

Table A7c. Microprobe Analyses of Pyroxenes in Cycle 2 Argillites.

Sample Number Photo # - Analysis # Layer Type	3H-39 1-5 W	3H-39 1-9 V	3H-39 2-28 A	3H-39 3-45 A	3H-39 5-64 V	3H-40 1-20A A	3H-40 1-5 A	3H-40 2-10 W	3H-40 3-16 W	16H-86 2-19 W	16H-86 3-50 A	16H-86 3-51 A	17H-87 1-9 C	17H-87 5-9 A	17H-87 5-10 A
SiO <sub>2</sub>	52.54	53.21	53.08	52.62	52.36	52.41	52.26	53.10	52.87	52.77	52.23	52.47	53.14	53.66	54.21
Al <sub>2</sub> O <sub>3</sub>	0.71	0.73	0.40	0.32	0.41	0.14	0.03	0.19	0.15	0.09	1.92	0.26	0.62	1.19	0.45
FeO	5.56	8.42	9.00	9.64	9.96	11.42	11.33	9.10	9.11	8.00	7.33	9.23	5.37	5.10	6.65
Fe <sub>2</sub> O <sub>3</sub>	1.47	0.00	1.27	0.68	0.00	0.00	0.00	0.00	0.24	0.14	0.66	0.00	0.92	1.07	0.07
MgO	13.46	12.69	12.53	11.94	10.99	10.52	10.27	11.50	11.93	12.73	12.23	12.20	14.41	14.19	14.06
MnO	0.19	0.19	0.22	0.25	0.41	0.90	0.93	1.27	1.21	0.29	0.23	0.18	0.16	0.09	0.17
TiO <sub>2</sub>	0.03	0.03	0.01	0.02	0.04	0.00	0.03	0.00	0.00	0.00	0.12	0.37	0.04	0.11	0.00
Cr <sub>2</sub> O <sub>3</sub>	0.05	0.11	0.06	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.00	0.00	0.00
CaO	24.90	24.72	24.33	24.42	23.80	24.07	24.25	24.58	24.76	25.47	24.54	25.13	25.40	25.32	25.42
Na <sub>2</sub> O	0.26	0.15	0.28	0.11	0.02	0.00	0.00	0.06	0.00	0.00	0.38	0.00	0.01	0.29	0.08
<b>Total</b>	<b>99.17</b>	<b>100.25</b>	<b>101.18</b>	<b>100.06</b>	<b>98.01</b>	<b>99.46</b>	<b>99.10</b>	<b>99.80</b>	<b>100.27</b>	<b>99.49</b>	<b>99.65</b>	<b>99.89</b>	<b>100.07</b>	<b>101.02</b>	<b>101.11</b>
Cations/6 Oxygens															
Si	1.971	1.987	1.977	1.985	2.012	2.005	2.008	2.007	1.992	1.991	1.959	1.980	1.971	1.967	1.992
IVAl	0.029	0.013	0.018	0.014	0.000	0.000	0.000	0.000	0.007	0.004	0.041	0.012	0.027	0.033	0.008
<b>Total Tetrahedral</b>	<b>2.000</b>	<b>2.000</b>	<b>1.995</b>	<b>1.999</b>	<b>2.012</b>	<b>2.005</b>	<b>2.008</b>	<b>2.007</b>	<b>1.999</b>	<b>1.995</b>	<b>2.000</b>	<b>1.992</b>	<b>1.998</b>	<b>2.000</b>	<b>2.000</b>
VIAl	0.003	0.020	0.000	0.000	0.019	0.006	0.001	0.008	0.000	0.000	0.043	0.000	0.000	0.018	0.012
Fe <sup>2+</sup>	0.175	0.263	0.280	0.304	0.320	0.365	0.364	0.288	0.287	0.252	0.230	0.291	0.166	0.156	0.204
Fe <sup>3+</sup>	0.042	0.000	0.035	0.019	0.000	0.000	0.000	0.000	0.007	0.004	0.018	0.000	0.026	0.029	0.002
Mg	0.733	0.706	0.695	0.671	0.630	0.600	0.588	0.648	0.670	0.716	0.683	0.686	0.796	0.775	0.770
Mn	0.006	0.006	0.007	0.008	0.013	0.029	0.030	0.041	0.039	0.009	0.007	0.006	0.005	0.003	0.005
Ti	0.001	0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.003	0.011	0.001	0.003	0.000
Cr	0.001	0.003	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
<b>Total Octahedral</b>	<b>0.981</b>	<b>0.999</b>	<b>1.019</b>	<b>1.005</b>	<b>0.984</b>	<b>1.000</b>	<b>0.984</b>	<b>0.985</b>	<b>1.003</b>	<b>0.981</b>	<b>0.984</b>	<b>0.995</b>	<b>0.994</b>	<b>0.984</b>	<b>0.993</b>
Ca	1.001	0.989	0.971	0.987	0.980	0.987	0.998	0.995	1.000	1.029	0.986	1.016	1.009	0.994	1.001
Na	0.019	0.011	0.020	0.008	0.001	0.000	0.000	0.004	0.000	0.000	0.028	0.000	0.001	0.021	0.006
<b>Total Cations</b>	<b>4.001</b>	<b>3.999</b>	<b>4.005</b>	<b>3.999</b>	<b>3.977</b>	<b>3.992</b>	<b>3.990</b>	<b>3.991</b>	<b>4.002</b>	<b>4.005</b>	<b>3.998</b>	<b>4.003</b>	<b>4.002</b>	<b>3.999</b>	<b>4.000</b>
%Quad	95.33	97.63	96.25	97.83	97.97	99.37	99.78	99.15	99.33	99.60	93.43	98.80	97.29	94.25	98.64
%Others'	4.67	2.37	3.75	2.17	2.03	0.63	0.22	0.85	0.67	0.40	6.57	1.20	2.71	5.08	1.36
Breakdown of Quad															
%Ca	51.91	50.51	49.87	50.30	50.79	50.55	51.18	51.55	51.09	51.54	51.91	50.97	51.18	51.64	50.67
%Mg	39.03	36.06	35.72	34.21	32.62	30.73	30.15	33.55	34.24	35.83	35.98	34.42	40.38	40.25	38.98
%Fe <sup>2+</sup>	9.05	13.43	14.40	15.49	16.59	18.72	18.67	14.90	14.67	12.64	12.10	14.61	8.44	8.11	10.35
Fe <sup>2+</sup> /(Fe <sup>2+</sup> + Mg)	0.189	0.271	0.287	0.312	0.337	0.378	0.382	0.308	0.300	0.260	0.252	0.298	0.173	0.168	0.209

Table A7c. Continued. Page 2 of 3 Pages.

Sample Number Photo # - Analyses # Layer Type	20H-100 1-14 W	20H-100 2-72 A	20H-100 3-29 W	20H-100 4-26 A	20H-100 4-26 A	8H-59 1-7 A	8H-59 2-20 A	8H-59 3-8A A	8H-59 4-11A A	8H-59 5-16A A	5H-44 1-44 A+C	5H-44 3-27 A+C	5H-44 4-21 A+C	5H-44 5-7A A+C	5H-44 5-9A A+C
SiO <sub>2</sub>	52.42	52.08	52.32	51.84	53.04	53.81	51.81	52.84	53.11	53.04	52.79	53.18	52.98	53.61	54.04
Al <sub>2</sub> O <sub>3</sub>	0.06	0.00	0.19	0.78	0.94	0.94	0.57	1.49	1.26	1.32	1.57	1.54	1.13	0.22	0.10
FeO	10.51	12.95	9.10	10.97	6.38	6.17	7.50	6.04	5.87	7.32	6.21	5.87	7.50	9.64	6.42
Fe <sub>2</sub> O <sub>3</sub>	0.10	0.10	0.00	0.00	0.10	0.00	0.17	0.65	1.77	0.35	0.00	0.00	0.00	0.09	0.00
MgO	11.14	9.88	11.08	10.55	13.90	14.65	13.63	13.53	14.19	13.41	13.60	14.38	13.60	12.41	14.14
MnO	0.94	0.39	2.48	1.07	0.13	0.11	0.14	0.16	0.12	0.14	0.11	0.10	0.22	0.29	0.11
TiO <sub>2</sub>	0.06	0.00	0.00	0.15	0.14	0.07	0.40	0.12	0.06	0.06	0.09	0.24	0.12	0.00	0.00
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.00	0.00	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	24.73	24.74	23.67	24.06	24.93	24.17	24.13	25.27	24.11	24.92	24.80	24.41	23.93	25.02	25.40
Na <sub>2</sub> O	0.05	0.04	0.00	0.08	0.07	0.05	0.03	0.13	0.30	0.04	0.06	0.11	0.07	0.00	0.00
<b>Total</b>	<b>100.01</b>	<b>100.18</b>	<b>98.84</b>	<b>99.50</b>	<b>99.63</b>	<b>99.97</b>	<b>98.38</b>	<b>100.23</b>	<b>100.79</b>	<b>100.60</b>	<b>99.23</b>	<b>99.83</b>	<b>99.55</b>	<b>101.28</b>	<b>100.21</b>

Cations/6 Oxygens

Si	1.992	1.994	2.005	1.982	1.977	1.988	1.967	1.960	1.957	1.966	1.971	1.968	1.980	1.994	2.001
VAl	0.003	0.000	0.000	0.018	0.023	0.012	0.026	0.040	0.043	0.034	0.029	0.032	0.020	0.006	0.000
<b>Total Tetrahedral</b>	<b>1.995</b>	<b>1.994</b>	<b>2.005</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>1.993</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.001</b>
VAl	0.000	0.000	0.009	0.017	0.018	0.029	0.000	0.025	0.012	0.024	0.040	0.035	0.029	0.004	0.004
Fe <sup>2+</sup>	0.334	0.415	0.292	0.351	0.199	0.191	0.238	0.187	0.181	0.227	0.194	0.182	0.234	0.300	0.199
Fe <sup>3+</sup>	0.003	0.003	0.000	0.000	0.003	0.000	0.005	0.018	0.049	0.010	0.000	0.000	0.000	0.003	0.000
Mg	0.631	0.564	0.633	0.601	0.772	0.807	0.771	0.748	0.779	0.741	0.757	0.793	0.757	0.688	0.780
Mn	0.030	0.013	0.081	0.035	0.004	0.003	0.005	0.005	0.004	0.004	0.003	0.003	0.007	0.009	0.003
Ti	0.002	0.000	0.000	0.004	0.004	0.002	0.011	0.003	0.002	0.002	0.003	0.007	0.003	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	0.000	0.000	0.000
<b>Total Octahedral</b>	<b>1.000</b>	<b>0.995</b>	<b>1.015</b>	<b>1.008</b>	<b>1.000</b>	<b>1.032</b>	<b>1.030</b>	<b>0.986</b>	<b>1.027</b>	<b>1.008</b>	<b>0.997</b>	<b>1.020</b>	<b>1.030</b>	<b>1.004</b>	<b>0.986</b>
Ca	1.007	1.015	0.972	0.986	0.995	0.957	0.982	1.004	0.952	0.990	0.992	0.968	0.958	0.997	1.008
Na	0.004	0.003	0.000	0.006	0.005	0.004	0.002	0.009	0.021	0.003	0.004	0.008	0.005	0.000	0.000
<b>Total Cations</b>	<b>4.006</b>	<b>4.007</b>	<b>3.992</b>	<b>4.000</b>	<b>4.000</b>	<b>3.993</b>	<b>4.007</b>	<b>3.999</b>	<b>4.000</b>	<b>4.001</b>	<b>3.993</b>	<b>3.996</b>	<b>3.993</b>	<b>4.001</b>	<b>3.995</b>
%Quad	99.53	99.70	99.14	97.87	97.54	96.93	97.45	95.37	93.74	96.48	95.71	95.81	96.72	99.39	99.56
%Others'	0.47	0.30	0.86	2.13	2.46	3.07	2.55	4.63	6.26	3.52	4.29	4.19	3.28	0.61	0.44

Breakdown of Quad

%Ca	51.07	50.92	51.25	50.87	50.63	48.96	49.31	51.78	49.79	50.56	51.07	49.82	49.14	50.24	50.72
%Mg	32.00	28.28	33.37	31.03	39.26	41.28	38.74	38.36	40.75	37.84	38.95	40.82	38.84	34.66	39.27
%Fe <sup>2+</sup>	16.94	20.80	15.38	18.10	10.11	9.76	11.96	9.66	9.46	11.60	9.98	9.35	12.02	15.10	10.01
Fe <sup>2+</sup> /(Fe <sup>2+</sup> + Mg)	0.346	0.424	0.316	0.369	0.205	0.191	0.236	0.200	0.189	0.236	0.204	0.187	0.236	0.304	0.203

Table A7c, Continued. Page 3 of 3 Pages.

Sample Number Photo # - Analysis # Layer Type	7H-54A 3-32 A	23H-135 3-57 C	23H-135 3-4 C	23H-135 4-14 A	23H-135 4-16 A
SiO <sub>2</sub>	52.81	51.31	51.83	51.43	51.33
Al <sub>2</sub> O <sub>3</sub>	0.12	0.79	0.80	0.14	0.05
FeO	8.62	11.90	10.27	15.55	15.82
Fe <sub>2</sub> O <sub>3</sub>	0.08	0.53	1.14	0.14	0.00
MgO	12.33	10.62	11.80	8.49	8.45
MnO	0.12	0.19	0.25	0.54	0.57
TiO <sub>2</sub>	0.02	0.08	0.04	0.02	0.02
Cr <sub>2</sub> O <sub>3</sub>	0.05	0.00	0.03	0.04	0.01
CaO	25.22	23.55	24.76	24.05	23.23
Na <sub>2</sub> O	0.03	0.05	0.00	0.00	0.00
<b>Total</b>	<b>99.40</b>	<b>99.02</b>	<b>100.94</b>	<b>100.40</b>	<b>99.58</b>
Cations/6 Oxygens					
Si	1.996	1.974	1.951	1.988	1.999
VAl	0.004	0.026	0.035	0.006	0.001
<b>Total Tetrahedral</b>	<b>2.000</b>	<b>2.000</b>	<b>1.986</b>	<b>1.994</b>	<b>2.000</b>
VAl	0.001	0.010	0.000	0.000	0.001
Fe <sup>2+</sup>	0.272	0.383	0.323	0.503	0.515
Fe <sup>3+</sup>	0.002	0.015	0.032	0.004	0.000
Mg	0.695	0.609	0.663	0.489	0.490
Mn	0.004	0.006	0.008	0.018	0.019
Ti	0.001	0.002	0.001	0.001	0.001
Cr	0.001	0.000	0.001	0.001	0.000
<b>Total Octahedral</b>	<b>0.976</b>	<b>1.025</b>	<b>1.028</b>	<b>1.016</b>	<b>1.026</b>
Ca	1.021	0.971	0.999	0.996	0.973
Na	0.002	0.004	0.000	0.000	0.000
<b>Total Cations</b>	<b>3.999</b>	<b>4.000</b>	<b>4.013</b>	<b>4.006</b>	<b>3.999</b>
%Quad	99.44	97.27	96.45	99.36	99.82
%Others'	0.56	2.75	3.55	0.64	0.18
Breakdown of Quad					
%Ca	51.37	49.46	50.31	50.11	49.19
%Mg	34.93	31.02	33.40	24.60	24.78
%Fe	13.70	19.51	16.29	25.28	26.03
Fe <sup>2+</sup> /(Fe <sup>2+</sup> + Mg)	0.281	0.386	0.328	0.507	0.512

A = Argillite Layer = Diopside + Feldspars, C = Calcite-rich Layer, W = Wollastonite-rich Layer, V = Vesuvianite-rich Layer.

Table A7d. Microprobe Analyses of Pyroxenes from Cycle 6 Argillites from Station 10H.

Sample Number Photo # - Analysis # Layer Type	10H-102 0-14 G	10H-102 1-12 G	10H-102 2-46 A	10H-102 3-40 A	10H-102 3-41 A	10H-103 2-47 C	10H-103 2-51 C	10H-103 3-39 W	10H-103 4-47 V*	10H-103 5-25 W	10H-104 1-72 V	10H-104 3-43 V	10H-104 4-14 A
SiO <sub>2</sub>	51.27	52.94	52.87	54.09	53.27	54.28	53.90	54.47	52.37	54.07	53.36	52.90	53.64
Al <sub>2</sub> O <sub>3</sub>	0.41	0.13	0.47	0.27	0.50	1.14	1.11	0.44	1.86	0.65	0.62	0.50	0.21
FeO	18.51	13.24	12.08	7.79	11.30	2.39	2.40	3.44	6.97	2.74	5.84	5.35	6.28
Fe <sub>2</sub> O <sub>3</sub>	0.00	0.04	0.48	0.00	0.00	0.46	1.99	0.00	0.00	1.35	1.46	1.25	0.30
MgO	5.27	9.11	9.39	13.44	10.87	16.41	15.86	16.04	13.20	16.25	13.93	14.03	13.68
MnO	1.89	1.55	0.83	0.24	0.49	0.07	0.12	0.61	0.17	0.46	0.53	0.91	1.00
TiO <sub>2</sub>	0.00	0.00	0.00	0.04	0.04	0.06	0.12	0.00	0.09	0.00	0.05	0.00	0.00
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.01	0.00	0.00	0.04	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	23.13	24.20	24.05	25.13	24.26	25.05	25.53	24.74	24.68	24.89	25.17	24.75	24.98
Na <sub>2</sub> O	0.16	0.10	0.47	0.00	0.14	0.25	0.23	0.07	0.03	0.13	0.23	0.18	0.10
<b>Total</b>	<b>100.64</b>	<b>101.32</b>	<b>100.64</b>	<b>101.00</b>	<b>100.91</b>	<b>100.17</b>	<b>101.26</b>	<b>99.81</b>	<b>99.37</b>	<b>100.54</b>	<b>101.19</b>	<b>99.87</b>	<b>100.19</b>
Cations/6 Oxygens													
Si	2.009	2.008	2.006	1.998	2.001	1.976	1.954	1.998	1.960	1.972	1.966	1.972	1.995
IVAl	0.000	0.000	0.000	0.002	0.000	0.024	0.046	0.002	0.040	0.028	0.027	0.022	0.005
<b>Total Tetrahedral</b>	<b>2.009</b>	<b>2.008</b>	<b>2.006</b>	<b>2.000</b>	<b>2.001</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>1.993</b>	<b>1.994</b>	<b>2.000</b>
VIAl	0.019	0.006	0.021	0.010	0.022	0.025	0.001	0.017	0.042	0.000	0.000	0.000	0.004
Fe <sup>2+</sup>	0.607	0.420	0.383	0.241	0.355	0.073	0.073	0.106	0.218	0.083	0.180	0.167	0.195
Fe <sup>3+</sup>	0.000	0.000	0.014	0.000	0.000	0.012	0.054	0.000	0.000	0.037	0.041	0.035	0.008
Mg	0.308	0.515	0.531	0.740	0.609	0.890	0.857	0.877	0.736	0.883	0.765	0.780	0.758
Mn	0.063	0.050	0.027	0.008	0.016	0.002	0.004	0.019	0.005	0.014	0.017	0.029	0.032
Ti	0.000	0.000	0.000	0.001	0.001	0.002	0.003	0.000	0.003	0.000	0.001	0.000	0.000
Cr	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total Octahedral</b>	<b>0.997</b>	<b>0.991</b>	<b>0.976</b>	<b>1.000</b>	<b>1.004</b>	<b>1.006</b>	<b>0.992</b>	<b>1.019</b>	<b>1.004</b>	<b>1.017</b>	<b>1.004</b>	<b>1.011</b>	<b>0.997</b>
Ca	0.971	0.984	0.978	0.995	0.976	0.977	0.992	0.972	0.990	0.973	0.994	0.989	0.995
Na	0.012	0.007	0.035	0.000	0.010	0.018	0.016	0.005	0.002	0.009	0.016	0.013	0.007
<b>Total Cations</b>	<b>3.989</b>	<b>3.990</b>	<b>3.995</b>	<b>3.995</b>	<b>3.991</b>	<b>4.001</b>	<b>4.000</b>	<b>4.996</b>	<b>3.996</b>	<b>3.999</b>	<b>4.007</b>	<b>4.007</b>	<b>3.999</b>
%Quad	98.11	99.26	96.54	98.86	97.55	95.96	94.10	98.32	95.50	96.29	95.80	96.50	98.76
%Others'	1.89	0.74	3.46	1.14	2.45	4.04	5.90	1.68	4.50	3.71	4.20	3.50	1.24
Breakdown of Quad													
%Ca	51.51	51.27	51.67	50.36	50.33	50.36	51.62	49.74	50.91	50.15	51.26	51.10	51.08
%Mg	16.32	26.84	28.06	37.46	31.37	45.89	44.60	44.86	37.87	45.54	39.46	40.29	38.90
%Fe	32.17	21.89	20.26	12.18	18.30	3.75	3.78	5.40	11.22	4.30	9.29	8.62	10.02
Fe <sup>2+</sup> /(Fe <sup>2+</sup> + Mg)	0.663	0.450	0.419	0.246	0.368	0.076	0.079	0.108	0.229	0.086	0.190	0.176	0.205

Table A7d. Continued. Page 2 of 2 Pages.

Sample Number Photo # - Analysis # Layer Type	10H-105 2-18 A	10H-105 3-34 V*	10H-105 4-53 W	10H-105 4-54 A	10H-105 5-63 C	10H-106A 2-30 W	10H-106A 3-49 W	10H-106A 4-55 A	10H-108 1-50 C	10H-108 3-38 A	10H-108 4-29 A	10H-108 4-27 A	10H-108 5-15 C
SiO <sub>2</sub>	53.67	53.33	52.41	53.79	53.31	53.50	54.17	53.82	53.26	53.15	53.08	53.54	52.52
Al <sub>2</sub> O <sub>3</sub>	0.66	0.23	0.75	1.35	0.57	1.18	1.02	0.82	0.63	0.51	1.04	0.69	0.99
FeO	5.20	5.74	8.71	4.46	7.49	6.55	5.89	8.20	6.52	9.14	9.92	6.47	9.93
Fe <sub>2</sub> O <sub>3</sub>	0.00	0.64	1.13	0.00	0.87	0.73	0.18	0.48	0.34	0.00	0.46	0.73	0.30
MgO	14.47	13.90	11.86	15.58	13.00	13.01	13.90	13.05	13.66	12.13	11.22	13.31	11.16
MnO	0.21	0.18	0.35	0.19	0.50	0.19	0.17	0.12	0.11	0.16	0.16	0.12	0.13
TiO <sub>2</sub>	0.04	0.00	0.03	0.09	0.00	0.06	0.05	0.02	0.04	0.03	0.03	0.01	0.03
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.00	0.04	0.00	0.02	0.05	0.00	0.03	0.00	0.02	0.00	0.00	0.02
CaO	25.72	25.31	24.46	24.93	25.36	25.13	24.79	24.58	25.52	24.99	23.95	24.69	23.78
Na <sub>2</sub> O	0.00	0.14	0.25	0.00	0.02	0.41	0.48	0.28	0.01	0.12	0.59	0.45	0.52
<b>Total</b>	<b>99.97</b>	<b>99.46</b>	<b>99.98</b>	<b>100.39</b>	<b>101.14</b>	<b>100.81</b>	<b>100.65</b>	<b>101.40</b>	<b>100.09</b>	<b>100.25</b>	<b>100.45</b>	<b>100.00</b>	<b>99.38</b>
Cations/6 Oxygens													
Si	1.985	1.991	1.975	1.969	1.976	1.976	1.991	1.984	1.981	1.993	1.991	1.991	1.992
IVAl	0.015	0.009	0.025	0.031	0.024	0.024	0.009	0.016	0.019	0.007	0.009	0.009	0.008
<b>Total Tetrahedral</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>	<b>2.000</b>
VIAl	0.014	0.001	0.008	0.027	0.001	0.028	0.035	0.020	0.008	0.015	0.037	0.021	0.036
Fe <sup>2+</sup>	0.161	0.179	0.274	0.137	0.232	0.202	0.181	0.253	0.203	0.287	0.311	0.201	0.315
Fe <sup>3+</sup>	0.000	0.018	0.032	0.000	0.024	0.020	0.005	0.013	0.010	0.000	0.013	0.020	0.009
Mg	0.798	0.773	0.666	0.850	0.718	0.716	0.761	0.717	0.737	0.678	0.627	0.738	0.631
Mn	0.007	0.006	0.011	0.006	0.016	0.006	0.005	0.004	0.003	0.005	0.005	0.004	0.004
Ti	0.001	0.000	0.001	0.002	0.000	0.002	0.001	0.001	0.001	0.001	0.001	0.000	0.001
Cr	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.001
<b>Total Octahedral</b>	<b>0.981</b>	<b>0.977</b>	<b>0.993</b>	<b>1.022</b>	<b>0.992</b>	<b>0.975</b>	<b>0.988</b>	<b>1.009</b>	<b>0.982</b>	<b>0.987</b>	<b>0.994</b>	<b>0.984</b>	<b>0.997</b>
Ca	1.019	1.013	0.990	0.978	1.007	0.995	0.976	0.971	1.017	1.004	0.963	0.984	0.966
Na	0.000	0.010	0.018	0.000	0.001	0.029	0.034	0.020	0.001	0.009	0.043	0.032	0.038
<b>Total Cations</b>	<b>4.000</b>	<b>4.000</b>	<b>4.001</b>	<b>4.000</b>	<b>4.000</b>	<b>3.999</b>	<b>3.998</b>	<b>4.000</b>	<b>4.000</b>	<b>4.000</b>	<b>4.000</b>	<b>4.000</b>	<b>4.001</b>
%Quad	98.50	98.09	95.77	96.88	97.44	94.87	95.83	96.50	98.07	98.32	94.91	95.85	95.41
%Others'	1.50	1.91	4.23	3.12	2.56	5.13	4.17	3.50	1.93	1.68	5.09	4.15	4.59
Breakdown of Quad													
%Ca	51.54	51.52	51.22	49.78	51.46	51.99	50.88	50.03	51.44	51.01	50.64	51.17	50.54
%Mg	40.33	39.36	34.54	43.27	36.69	37.43	39.68	36.94	38.30	34.43	32.99	38.37	32.99
%Fe	8.13	9.12	14.23	6.95	11.86	10.58	9.43	13.03	10.26	14.56	16.37	10.46	16.47
Fe <sup>2+</sup> /(Fe <sup>2+</sup> + Mg)	0.168	0.188	0.291	0.139	0.244	0.220	0.192	0.261	0.211	0.297	0.331	0.214	0.333

A = Argillite-rich Layer = Diopside + Feldspars. C = Calcite-rich Layer. G = Garnet-rich Layer. V = Vesuvianite-rich Layer. V\* = Vesuvianite-rich Layer with an Inclusion. W = Wollastonite-rich Layer.

Table A8. Microprobe Analyses of Olivine in Cycle 2 Limestones.

Sample Number Photo # - Analysis #	14H-81 2-25	14H-81 2-29	14H-81 2-34	14H-81 4-39	3H-38A 2-49
SiO <sub>2</sub>	41.45	41.20	41.91	41.50	41.44
Al <sub>2</sub> O <sub>3</sub>	0.00	0.00	0.00	0.00	0.02
FeO <sub>T</sub>	2.85	2.90	2.80	2.96	4.16
MgO	55.92	55.52	55.55	55.64	54.96
MnO	0.07	0.06	0.04	0.01	0.06
CaO	0.31	0.19	0.23	0.20	0.22
<b>Total</b>	<b>100.60</b>	<b>99.87</b>	<b>100.53</b>	<b>100.31</b>	<b>100.86</b>
Cations/4 Oxygens					
Si	0.981	0.982	0.991	0.984	0.983
Al	0.000	0.000	0.000	0.000	0.001
Fe <sup>2+</sup>	0.056	0.058	0.055	0.059	0.083
Mg	1.972	1.972	1.957	1.966	1.943
Mn	0.001	0.001	0.001	0.000	0.001
Ca	0.008	0.005	0.006	0.005	0.006
<b>Total Cations</b>	<b>3.018</b>	<b>3.018</b>	<b>3.010</b>	<b>3.014</b>	<b>3.017</b>
%Fo	97.24	97.14	97.26	97.09	95.90
Fe <sup>2+</sup> /(Fe <sup>2+</sup> + Mg)	0.028	0.029	0.027	0.029	0.041

Table A9a. Microprobe Analyses of Feldspars in Cycle 2 Limestones.

Sample Number Photo # - Analysis #	K-Feldspar				Plagioclase											
	16H-85 1-13	8H-130 1-10	16H-85 1-8	2-21	20H-99 2-51	4-30	8H-130 1-18	5H-46 6-30	5H-46 6-31	23H-136 3-46	23H-136 3-47	23H-136 3-52	11H-116 4-16	12H-122 1-16	12H-122 1-17	12H-122 1-18
SiO <sub>2</sub>	63.56	64.26	67.45	66.34	65.33	65.42	67.33	61.87	63.63	68.27	68.33	67.60	68.61	68.14	68.15	68.49
Al <sub>2</sub> O <sub>3</sub>	18.53	18.01	19.52	20.93	21.24	21.28	19.49	23.70	22.76	19.97	19.38	19.07	19.46	19.88	19.18	19.62
FeO	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
CaO	0.40	0.46	0.26	1.61	2.58	2.83	1.03	5.33	4.36	0.32	0.32	0.99	0.81	1.28	0.97	1.14
Na <sub>2</sub> O	0.29	0.95	11.64	10.74	10.24	10.37	11.16	8.63	9.36	11.54	11.48	11.29	11.56	10.90	11.37	11.29
K <sub>2</sub> O	15.82	15.30	0.02	0.03	0.04	0.04	0.08	0.18	0.19	0.09	0.06	0.06	0.13	0.10	0.06	0.02
Sum	98.60	98.98	98.89	99.67	99.44	99.94	99.10	99.71	100.30	100.19	99.57	99.01	100.59	100.30	99.73	100.56
Cations/8 Oxygens																
Si	2.979	2.997	2.981	2.918	2.888	2.882	2.974	2.752	2.807	2.977	2.996	2.988	2.986	2.972	2.990	2.980
Al	1.024	0.990	1.017	1.085	1.107	1.105	1.015	1.243	1.184	1.027	1.002	0.994	0.999	1.022	0.992	1.006
Total Tetrahedral	4.003	3.987	3.998	4.003	3.995	3.987	3.989	3.995	3.991	4.004	3.998	3.982	3.985	3.994	3.982	3.986
Fe	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Ca	0.020	0.023	0.012	0.076	0.122	0.134	0.049	0.254	0.206	0.015	0.015	0.047	0.038	0.060	0.046	0.053
Na	0.026	0.086	0.998	0.916	0.878	0.886	0.956	0.744	0.800	0.976	0.976	0.968	0.976	0.922	0.967	0.953
K	0.946	0.910	0.001	0.002	0.002	0.002	0.005	0.010	0.011	0.005	0.003	0.003	0.007	0.006	0.003	0.001
Total X' Cations	0.992	1.019	1.011	0.995	1.002	1.022	1.010	1.008	1.017	0.996	0.994	1.018	1.022	0.988	1.016	1.007
Or	95.36	89.30	0.10	0.20	0.20	0.20	0.50	0.99	1.08	0.50	0.30	0.29	0.69	0.61	0.30	0.10
Ab	2.62	8.44	98.71	92.15	87.62	86.69	94.65	73.81	78.66	97.99	98.19	95.09	95.59	93.32	95.18	94.64
An	2.02	2.26	1.18	7.65	12.18	13.11	4.85	25.20	20.26	1.51	1.51	4.62	3.72	6.07	4.53	5.26

Table A9b. Microprobe Analyses of Plagioclase in Cycle 1 Argillites.

Sample Number Photo # - Analysis #	14H-80 1-22 4-44	3H-36 2-21 1-15	3H-37 1-23 3-18	16H-84 2-9 3-40	18H-89 2-20	20H-98 4-26 3-21	8H-129 1-23 1-15A	7H-56 1-16 3-29	23H-137 1-5	11H-115 1-5
SiO <sub>2</sub>	69.90	67.52	67.49	60.31	65.58	69.08	60.63	51.53	63.67	67.88
Al <sub>2</sub> O <sub>3</sub>	19.47	19.82	20.10	24.38	20.77	19.83	24.90	30.23	22.13	20.03
FeO <sup>T</sup>	0.09	0.07	0.06	0.12	0.08	0.00	0.06	0.24	0.00	0.05
CaO	0.29	0.47	0.42	5.93	2.03	0.63	6.92	12.41	3.16	0.67
Na <sub>2</sub> O	11.65	11.61	10.92	8.25	10.27	11.33	8.08	3.96	9.06	11.38
K <sub>2</sub> O	0.05	0.22	0.31	0.14	0.18	0.19	0.11	0.17	1.00	0.12
<b>Total</b>	<b>101.54</b>	<b>100.16</b>	<b>99.71</b>	<b>99.13</b>	<b>98.91</b>	<b>101.06</b>	<b>100.70</b>	<b>98.54</b>	<b>99.02</b>	<b>100.13</b>
Cations/8 Oxygens										
Si	3.008	2.967	2.970	2.706	2.911	2.987	2.685	2.370	2.841	2.967
Al	0.987	1.027	1.043	1.290	1.087	1.011	1.300	1.639	1.164	1.032
<b>Total Tetrahedral</b>	<b>3.995</b>	<b>4.007</b>	<b>4.013</b>	<b>4.007</b>	<b>3.998</b>	<b>3.998</b>	<b>3.985</b>	<b>4.009</b>	<b>4.005</b>	<b>3.999</b>
Fe	0.003	0.003	0.002	0.005	0.003	0.000	0.002	0.009	0.000	0.002
Ca	0.013	0.387	0.020	0.285	0.097	0.029	0.328	0.611	0.151	0.031
Na	0.971	0.584	0.932	0.718	0.884	0.950	0.694	0.353	0.784	0.964
K	0.003	0.011	0.017	0.008	0.010	0.010	0.006	0.010	0.057	0.007
<b>Total 'X' Cations</b>	<b>0.990</b>	<b>0.985</b>	<b>0.971</b>	<b>1.016</b>	<b>0.994</b>	<b>0.989</b>	<b>1.030</b>	<b>0.983</b>	<b>0.992</b>	<b>1.004</b>
Or	0.30	1.17	1.75	0.79	1.01	1.01	0.58	1.03	5.74	0.70
Ab	98.38	59.47	96.18	71.02	89.20	96.06	67.51	36.24	79.03	96.21
An	1.32	39.41	2.06	28.19	9.79	2.93	31.90	62.73	15.22	3.09



Table A9c. Microprobe Analyses of Plagioclase in Cycle 2 Argillites.

Sample Number Photo # - Analysis #	3H-39 6-54 2-23	16H-86 2-45	17H-87 0-13	20H-100 2-19 4-10	20H-100 4-10	8H-59 5-19A 3-2A	8H-59 3-2A	5H-44 4-23	7H-54A 4-15	23H-135 4-18 4-46	23H-135 4-46	11H-117 2-49	12H-123 1-28	12H-123 1-24
SiO <sub>2</sub>	67.85	67.44	67.86	51.39	46.76	65.20	47.82	44.47	49.93	47.83	47.80	67.39	68.81	63.37
Al <sub>2</sub> O <sub>3</sub>	20.21	20.10	20.02	30.39	33.23	22.05	30.06	35.36	32.34	32.17	32.11	20.21	19.60	22.98
FeO <sup>T</sup>	0.00	0.04	0.06	0.15	0.09	0.14	0.08	0.08	0.13	0.22	0.37	0.07	0.01	0.06
CaO	0.13	0.69	0.87	12.45	16.96	0.35	16.26	18.35	15.19	16.10	15.68	1.14	0.64	4.20
Na <sub>2</sub> O	11.39	11.24	11.08	4.18	1.73	10.82	2.39	1.07	2.46	2.59	2.35	11.02	11.59	9.18
K <sub>2</sub> O	0.02	0.05	0.09	0.08	0.03	0.63	0.05	0.47	0.70	0.14	0.24	0.13	0.03	0.20
<b>Total</b>	<b>99.60</b>	<b>99.56</b>	<b>99.98</b>	<b>98.64</b>	<b>98.80</b>	<b>99.19</b>	<b>100.66</b>	<b>99.80</b>	<b>100.75</b>	<b>99.60</b>	<b>98.55</b>	<b>99.96</b>	<b>100.68</b>	<b>99.99</b>
Cations/8 Oxygens														
Si	2.972	2.962	2.968	2.362	2.172	2.885	2.177	2.062	2.266	2.205	2.224	2.953	2.988	2.802
Al	1.044	1.041	1.032	1.646	1.820	1.150	1.828	1.933	1.730	1.778	1.761	1.044	1.003	1.192
<b>Total Tetrahedral</b>	<b>4.016</b>	<b>4.003</b>	<b>4.000</b>	<b>4.008</b>	<b>3.992</b>	<b>4.035</b>	<b>4.005</b>	<b>3.995</b>	<b>3.996</b>	<b>3.983</b>	<b>3.985</b>	<b>3.997</b>	<b>3.991</b>	<b>3.994</b>
Fe	0.000	0.001	0.002	0.006	0.003	0.005	0.003	0.003	0.005	0.008	0.014	0.003	0.000	0.002
Ca	0.006	0.032	0.041	0.613	0.844	0.017	0.793	0.912	0.739	0.796	0.782	0.054	0.030	0.199
Na	0.967	0.957	0.940	0.372	0.156	0.928	0.211	0.096	0.216	0.231	0.212	0.936	0.976	0.787
K	0.001	0.003	0.005	0.005	0.002	0.036	0.003	0.028	0.041	0.008	0.014	0.007	0.002	0.011
<b>Total 'X' Cations</b>	<b>0.974</b>	<b>0.993</b>	<b>0.988</b>	<b>0.996</b>	<b>1.005</b>	<b>0.986</b>	<b>1.010</b>	<b>1.039</b>	<b>1.001</b>	<b>1.043</b>	<b>1.022</b>	<b>1.000</b>	<b>1.008</b>	<b>0.999</b>
Or	0.10	0.30	0.50	0.50	0.20	3.67	0.30	2.70	4.12	0.77	1.39	0.70	0.20	1.10
Ab	99.28	96.47	95.33	37.58	15.57	94.60	20.95	9.27	21.69	22.32	21.03	93.88	96.82	78.94
An	0.61	3.23	4.16	61.92	84.23	1.73	78.75	88.03	74.20	76.91	77.58	5.42	2.97	19.96

Table A9d. Microprobe Analyses of Plagioclase in Intrusion and Cycle 6 Argillites at Station 10H.

Sample Number Photo # - Analysis #	10H-101 1-27	10H-101 1-30	10H-101 1-31	10H-101 2-52	10H-101 2-51	10H-101 2-50	10H-102 0-27	10H-102 2-50	10H-102 2-48	10H-105 2-25	10H-105 2-28	10H-106A 2-27	10H-108 3-41
SiO <sub>2</sub>	64.47	61.06	62.40	62.76	65.41	68.21	68.12	65.30	58.26	67.24	59.68	68.00	60.04
Al <sub>2</sub> O <sub>3</sub>	22.89	24.35	24.00	23.07	21.45	19.88	20.44	23.01	26.58	20.52	25.62	20.43	20.61
FeO <sup>T</sup>	0.12	0.20	0.18	0.14	0.14	0.04	0.03	0.10	0.16	0.20	0.19	0.00	0.22
CaO	3.46	5.39	4.80	4.35	2.31	0.69	0.28	2.39	7.93	0.80	7.13	1.23	1.03
Na <sub>2</sub> O	9.37	8.46	8.81	9.21	10.17	11.59	11.45	10.31	6.65	10.95	7.39	10.72	10.76
K <sub>2</sub> O	0.54	0.33	0.49	0.23	0.26	0.15	0.05	0.03	0.47	0.07	0.16	0.22	0.13
<b>Total</b>	<b>100.85</b>	<b>99.79</b>	<b>100.68</b>	<b>99.76</b>	<b>99.74</b>	<b>100.56</b>	<b>100.37</b>	<b>101.14</b>	<b>100.05</b>	<b>99.78</b>	<b>100.17</b>	<b>100.60</b>	<b>100.79</b>
Cations/8 Oxygens													
Si	2.824	2.721	2.752	2.787	2.885	2.971	2.964	2.840	2.605	2.948	2.656	2.957	2.953
Al	1.182	1.279	1.248	1.208	1.115	1.021	1.049	1.180	1.401	1.061	1.344	1.047	1.055
<b>Total Tetrahedral</b>	<b>4.006</b>	<b>4.000</b>	<b>4.000</b>	<b>3.995</b>	<b>4.000</b>	<b>3.992</b>	<b>4.013</b>	<b>4.020</b>	<b>4.006</b>	<b>4.009</b>	<b>4.000</b>	<b>4.004</b>	<b>4.008</b>
Fe	0.004	0.007	0.007	0.005	0.005	0.001	0.001	0.004	0.006	0.007	0.007	0.000	0.008
Ca	0.162	0.257	0.227	0.207	0.109	0.032	0.013	0.111	0.380	0.038	0.340	0.057	0.048
Na	0.796	0.731	0.753	0.793	0.870	0.979	0.966	0.869	0.577	0.931	0.638	0.904	0.905
K	0.030	0.019	0.028	0.013	0.015	0.008	0.003	0.002	0.027	0.004	0.009	0.012	0.007
<b>Total 'X' Cations</b>	<b>0.992</b>	<b>1.014</b>	<b>1.015</b>	<b>1.018</b>	<b>0.999</b>	<b>1.020</b>	<b>0.983</b>	<b>0.986</b>	<b>0.990</b>	<b>0.980</b>	<b>0.994</b>	<b>0.973</b>	<b>0.968</b>
Or	3.04	1.89	2.78	1.28	1.51	0.78	0.31	0.20	2.74	0.41	0.91	1.23	0.73
Ab	80.57	72.59	74.70	78.28	87.53	96.07	98.37	88.49	58.64	95.68	64.64	92.91	94.27
An	16.40	25.52	22.52	20.43	10.97	3.14	1.32	11.30	38.62	3.90	34.45	5.86	5.00

Table A9e. Microprobe Analyses of K-feldspar in Cycle 1 Argillites.

Sample Number Photo # - Analysis #	14H-80 1-21	14H-80 3-29	3H-36 2-22	3H-36 1-19	3H-37 1-22	3H-37 3-34	16H-84 6-11	16H-84 0-32	18H-89 2-18	20H-98 4-28	20H-98 5-39	8H-129 1-20	5H-47 2-52	7H-56 1-11	23H-137 6-41	23H-137 6-39
SiO <sub>2</sub>	65.59	65.85	63.76	64.13	63.51	64.53	64.13	63.81	64.07	65.69	65.47	64.07	64.93	63.81	64.36	63.99
Al <sub>2</sub> O <sub>3</sub>	18.46	18.89	18.46	18.61	18.34	18.94	18.63	18.85	18.49	18.02	17.90	18.08	18.50	18.63	17.42	17.85
FeO	0.00	0.06	0.14	0.06	0.11	0.08	0.00	0.09	0.05	0.15	0.06	0.08	0.09	0.00	0.00	0.00
CaO	0.12	0.13	0.13	0.38	0.13	0.09	0.40	0.15	0.15	0.15	0.08	0.20	0.14	0.40	0.24	0.53
Na <sub>2</sub> O	0.51	1.78	0.27	1.52	0.35	1.84	1.25	1.98	0.70	0.60	1.97	0.52	0.77	0.79	0.65	1.20
K <sub>2</sub> O	15.98	14.07	16.18	14.23	16.07	14.17	14.62	13.90	15.30	15.81	13.93	15.74	15.52	14.84	15.55	14.68
<b>Total</b>	<b>100.66</b>	<b>100.78</b>	<b>98.94</b>	<b>98.93</b>	<b>98.51</b>	<b>99.65</b>	<b>99.03</b>	<b>98.78</b>	<b>98.76</b>	<b>100.42</b>	<b>99.41</b>	<b>98.69</b>	<b>99.95</b>	<b>98.47</b>	<b>98.22</b>	<b>98.25</b>
Cations/8 Oxygens																
Si	3.005	2.993	2.983	2.980	2.984	2.975	2.980	2.968	2.989	3.017	3.018	2.999	2.995	2.981	3.023	3.000
Al	0.997	1.012	1.018	1.019	1.016	1.029	1.021	1.034	1.017	0.976	0.973	0.998	1.006	1.026	0.965	0.987
<b>Total Tetrahedral</b>	<b>4.002</b>	<b>4.005</b>	<b>4.001</b>	<b>3.999</b>	<b>4.000</b>	<b>4.004</b>	<b>4.001</b>	<b>4.002</b>	<b>4.004</b>	<b>3.993</b>	<b>3.991</b>	<b>3.997</b>	<b>4.001</b>	<b>4.007</b>	<b>3.988</b>	<b>3.987</b>
Fe	0.000	0.002	0.005	0.002	0.004	0.003	0.000	0.004	0.002	0.006	0.002	0.003	0.003	0.000	0.000	0.000
Ca	0.006	0.006	0.007	0.019	0.007	0.004	0.020	0.007	0.007	0.007	0.004	0.010	0.007	0.020	0.012	0.027
Na	0.045	0.157	0.024	0.137	0.032	0.164	0.113	0.179	0.063	0.033	0.176	0.047	0.069	0.072	0.059	0.109
K	0.934	0.816	0.966	0.844	0.963	0.833	0.867	0.825	0.911	0.926	0.819	0.940	0.913	0.885	0.932	0.878
<b>Total 'X' Cations</b>	<b>0.985</b>	<b>0.981</b>	<b>1.002</b>	<b>1.002</b>	<b>1.006</b>	<b>1.004</b>	<b>1.000</b>	<b>1.015</b>	<b>0.983</b>	<b>0.992</b>	<b>1.001</b>	<b>1.000</b>	<b>0.992</b>	<b>0.977</b>	<b>1.003</b>	<b>1.014</b>
Or	94.82	83.35	96.89	84.40	96.11	83.22	86.70	81.60	92.86	93.91	81.98	94.28	92.31	90.58	92.92	86.59
Ab	4.57	16.04	2.41	13.70	3.19	16.38	11.30	17.70	6.42	5.37	17.62	4.71	6.98	7.37	5.88	10.75
An	0.61	0.61	0.70	1.90	0.70	0.40	2.00	0.69	0.71	0.71	0.40	1.00	0.71	2.05	1.20	2.66

Table A9f. Microprobe Analyses of K-feldspar in Cycle 2 Argillites.

Sample Number Photo # - Analysis #	3H-39 5-62 2-39	16H-86 2-16	17H-87 5-9 0-17	8H-59 3-30 2-27	5H-44 2-16	7H-54A 2-46	23H-135 2-19 4-13	11H-117 2-46	12H-123 1-25 2-48
SiO <sub>2</sub>	62.93	63.19	65.05	64.39	65.26	64.12	63.39	63.38	64.21
Al <sub>2</sub> O <sub>3</sub>	18.83	18.76	18.04	18.69	18.32	18.17	18.28	18.74	18.21
FeO <sub>T</sub>	0.03	0.15	0.04	0.00	0.05	0.37	0.37	0.00	0.02
CaO	0.09	0.45	0.09	0.06	0.50	0.08	0.15	0.24	0.53
Na <sub>2</sub> O	0.20	0.21	0.15	0.19	0.78	0.71	0.43	0.43	0.43
K <sub>2</sub> O	16.38	15.65	16.28	16.20	15.44	14.71	15.77	16.05	15.99
Total	98.46	98.59	99.65	99.53	100.08	98.16	98.39	98.84	99.39
Cations/8 Oxygens									
Si	2.963	2.966	3.014	2.988	3.002	3.003	2.982	2.968	2.990
Al	1.045	1.038	0.985	1.022	0.993	1.003	1.014	1.035	1.000
Total Tetrahedral	4.008	4.004	3.999	4.010	3.995	4.006	3.996	4.003	3.990
Fe	0.001	0.006	0.002	0.000	0.002	0.014	0.015	0.000	0.001
Ca	0.005	0.023	0.004	0.003	0.025	0.004	0.008	0.012	0.026
Na	0.018	0.019	0.013	0.017	0.070	0.064	0.039	0.039	0.039
K	0.984	0.948	0.962	0.959	0.890	0.879	0.946	0.959	0.950
Total 'X' Cations	1.008	0.996	0.981	0.979	0.987	0.961	1.008	1.010	1.016
Or	97.71	95.76	98.26	97.96	90.36	92.82	95.27	94.95	93.60
Ab	1.79	1.91	1.33	1.74	7.11	6.76	3.93	3.86	3.84
An	0.50	2.32	0.41	0.31	2.54	0.42	0.80	1.19	2.56

Table A9g. Microprobe Analyses of K-feldspar in Intrusion and Cycle 6 Argillites at Station 10H.

Sample Number Photo # - Analysis #	10H-101 1-37	10H-101 1-38	10H-101 2-54	10H-105 1-9	10H-105 2-22	10H-105 4-58	10H-106A 1-24	10H-106A 3-48	10H-108 4-31	10H-108 4-30	10H-108 3-39
SiO <sub>2</sub>	65.17	65.35	65.11	64.64	64.49	65.10	64.52	64.72	64.59	64.85	64.39
Al <sub>2</sub> O <sub>3</sub>	18.72	18.86	18.61	18.96	18.63	19.18	18.70	19.01	18.46	18.93	18.65
FeOT	0.07	0.08	0.11	0.04	0.22	0.20	0.02	0.00	0.09	0.12	0.10
CaO	0.00	0.05	0.02	0.16	0.04	0.32	0.27	0.43	0.35	0.38	0.41
Na <sub>2</sub> O	1.15	2.69	0.65	1.90	0.27	1.49	0.29	1.61	0.15	2.68	0.75
K <sub>2</sub> O	15.21	12.84	15.70	13.98	16.34	14.42	16.93	14.23	16.26	12.33	15.07
Total	100.32	99.87	100.20	99.68	99.99	100.71	99.30	100.00	99.90	99.29	99.37
Cations/8 Oxygens											
Si	2.991	2.988	2.995	2.976	2.985	2.971	2.986	2.973	2.990	2.979	2.984
Al	1.013	1.017	1.009	1.029	1.017	1.032	1.013	1.029	1.008	1.025	1.019
Total Tetrahedral	4.004	4.005	4.004	4.005	4.002	4.003	3.999	4.002	3.998	4.004	4.003
Fe	0.003	0.003	0.004	0.002	0.009	0.008	0.001	0.000	0.003	0.005	0.004
Ca	0.000	0.002	0.001	0.008	0.002	0.016	0.013	0.021	0.017	0.019	0.020
Na	0.102	0.238	0.058	0.170	0.024	0.132	0.026	0.143	0.013	0.239	0.067
K	0.891	0.749	0.922	0.821	0.965	0.840	0.960	0.834	0.960	0.723	0.891
Total 'X' Cations	0.996	0.992	0.985	1.001	1.000	0.996	1.000	0.998	0.993	0.986	0.982
Or	89.73	75.73	93.98	82.18	97.38	85.02	96.10	83.57	96.97	73.70	91.10
Ab	10.27	24.06	5.91	17.02	2.42	13.36	2.60	14.33	1.31	24.36	6.85
An	0.00	0.20	0.10	0.80	0.20	1.62	1.30	2.10	1.72	1.94	2.04

Table A10a. Microprobe Analyses of Scapolite in the Cycle 2 Limestones.

Sample Number Photo # - Analysis #	5H-46 1-28	5H-46 2-21	5H-46 2-23	5H-46 3-26	7H-55 1-36	7H-55 1-39	7H-55 3-33	7H-55 4-41	7H-55 6-44
SiO <sub>2</sub>	53.88	54.11	53.91	54.66	56.26	53.06	55.67	54.82	54.49
Al <sub>2</sub> O <sub>3</sub>	23.79	23.28	23.88	23.03	23.03	23.81	22.67	23.90	23.30
FeO <sup>a</sup>	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
CaO	9.88	9.68	10.08	8.89	7.75	9.90	8.98	9.94	9.44
Na <sub>2</sub> O	8.43	8.30	8.20	8.92	9.78	8.29	8.63	8.51	8.42
K <sub>2</sub> O	0.66	0.79	0.75	0.39	0.64	0.35	0.74	0.35	0.64
Cl	2.36	2.32	2.36	2.55	2.87	2.34	2.53	2.36	2.50
<b>Total</b>	<b>99.00</b>	<b>98.48</b>	<b>99.18</b>	<b>98.44</b>	<b>100.33</b>	<b>97.75</b>	<b>99.20</b>	<b>99.88</b>	<b>98.79</b>
-O ≡ Cl	-0.53	-0.52	-0.53	-0.58	-0.65	-0.53	-0.57	-0.53	-0.56
<b>New Total</b>	<b>98.47</b>	<b>97.96</b>	<b>98.65</b>	<b>97.86</b>	<b>99.68</b>	<b>97.22</b>	<b>98.63</b>	<b>99.35</b>	<b>98.23</b>
Ions/(Si + Al = 12)									
Si	7.892	7.962	7.883	8.018	8.094	7.848	8.108	7.926	7.978
Al	4.108	4.038	4.117	3.982	3.906	4.152	3.892	4.074	4.022
<b>Total Tetrahedral</b>	<b>12.000</b>	<b>12.000</b>	<b>12.000</b>	<b>12.000</b>	<b>12.000</b>	<b>12.000</b>	<b>12.000</b>	<b>12.000</b>	<b>12.000</b>
Ca	1.551	1.526	1.579	1.397	1.195	1.569	1.401	1.540	1.481
Na	2.394	2.368	2.325	2.537	2.728	2.377	2.437	2.386	2.390
K	0.123	0.148	0.140	0.073	0.117	0.066	0.137	0.065	0.120
<b>Total 'X'</b>	<b>4.068</b>	<b>4.042</b>	<b>4.044</b>	<b>4.007</b>	<b>4.040</b>	<b>4.012</b>	<b>3.975</b>	<b>3.991</b>	<b>3.991</b>
Cl	0.586	0.579	0.585	0.634	0.700	0.587	0.624	0.578	0.620
Me <sup>b</sup>	38.13	37.75	39.05	34.86	29.58	39.11	35.25	38.59	37.11
EqAn <sup>c</sup>	36.93	34.60	37.23	32.73	30.20	37.16	29.73	35.80	34.07

a Iron did not exceed detection limits.

b %Me = Ca/(Ca + Na + K) x 100.

c EqAn = (Al - 3)/3 x 100.

n.d. = not detected.

Table A10b. Microprobe Analyses of Scapolite in  
Cycle 1 Argillites.

Sample Number Photo # - Analysis #	8H-129 4-45	8H-129 4-47	5H-47 4-54	5H-47 1-59
SiO <sub>2</sub>	50.19	50.59	49.11	51.18
Al <sub>2</sub> O <sub>3</sub>	25.49	25.45	25.86	25.48
FeO <sup>a</sup>	n.d.	n.d.	n.d.	n.d.
CaO	14.62	14.70	15.18	14.07
Na <sub>2</sub> O	5.06	4.77	4.30	5.57
K <sub>2</sub> O	0.93	0.92	0.86	1.09
Cl	1.11	1.15	1.02	1.38
<b>Total</b>	<b>97.40</b>	<b>97.58</b>	<b>96.33</b>	<b>98.77</b>
-O ≡ Cl	-0.25	-0.26	-0.23	-0.31
<b>Total</b>	<b>97.15</b>	<b>97.32</b>	<b>96.10</b>	<b>98.46</b>
Ions/(Si + Al = 12)				
Si	7.506	7.533	7.404	7.562
Al	4.494	4.467	4.596	4.438
<b>Total Tetrahedral</b>	<b>12.000</b>	<b>12.000</b>	<b>12.000</b>	<b>12.000</b>
Ca	2.343	2.345	2.452	2.227
Na	1.467	1.377	1.257	1.596
K	0.177	0.175	0.165	0.205
<b>Total 'X'</b>	<b>3.987</b>	<b>3.897</b>	<b>3.874</b>	<b>4.028</b>
Cl	0.281	0.290	0.261	0.346
%Me <sup>b</sup>	58.77	60.17	63.29	55.29
EqAn <sup>c</sup>	49.80	48.90	53.20	47.93

<sup>a</sup> Iron did not exceed detection limits.

<sup>b</sup> %Me = Ca/(Ca + Na + K) x 100.

<sup>c</sup> EqAn = (Al - 3)/3 x 100.

n.d. = not detected.

Table A11. Microprobe Analyses of Epidote in Skarn from Station 10H.

Sample Number Photo # - Analysis #	10H-102 0-23		10H-102 1-20		10H-102 1-29	
	a	b	a	b	a	b
	SiO <sub>2</sub>	38.60	38.60	39.09	39.09	38.15
Al <sub>2</sub> O <sub>3</sub>	23.83	23.83	24.63	24.63	24.20	24.20
FeO	12.08	--	10.62	--	11.80	--
Fe <sub>2</sub> O <sub>3</sub>	--	13.43	--	11.80	--	13.11
MgO	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.32	0.32	0.53	0.53	0.57	0.57
TiO <sub>2</sub>	0.03	0.03	0.13	0.13	0.11	0.11
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.00	0.00	0.00	0.02	0.02
CaO	23.65	23.65	23.35	23.35	22.94	22.94
Na <sub>2</sub> O	0.00	0.00	0.00	0.00	0.00	0.00
K <sub>2</sub> O	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total</b>	<b>98.51</b>	<b>99.86</b>	<b>98.35</b>	<b>99.53</b>	<b>97.79</b>	<b>99.10</b>
Si	6.222	6.026	6.253	6.081	6.185	5.994
IVAl	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total Tetrahedral</b>	<b>6.222</b>	<b>6.026</b>	<b>6.253</b>	<b>6.081</b>	<b>6.185</b>	<b>5.994</b>
VIAl	4.528	4.384	4.645	4.516	4.625	4.480
Fe <sup>2+</sup>	1.628	--	1.421	--	1.600	--
Fe <sup>3+</sup>	--	1.578	--	1.381	--	1.550
Mg	0.000	0.000	0.000	0.000	0.000	0.000
Mn	0.044	0.042	0.072	0.070	0.078	0.075
Ti	0.004	0.004	0.016	0.015	0.013	0.013
Cr	0.000	0.000	0.000	0.000	0.003	0.002
<b>Total Octahedral</b>	<b>6.204</b>	<b>6.008</b>	<b>6.154</b>	<b>5.982</b>	<b>6.319</b>	<b>6.120</b>
Ca	4.085	3.957	4.002	3.892	3.985	3.862
Na	0.000	0.000	0.000	0.000	0.000	0.000
K	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total 'X'</b>	<b>4.085</b>	<b>3.967</b>	<b>4.002</b>	<b>3.892</b>	<b>3.985</b>	<b>3.862</b>

a = All Fe as Fe<sup>2+</sup>.  
b = All Fe as Fe<sup>3+</sup>.



Table A12a. Microprobe Analyses of Garnets in Cycle 1 Argillites.

Sample Number Photo # - Analysis #	14H-80 2-22a 2-23a	3H-36 1-12b	3H-37 2-25c 2-26c	16H-84 1-23d 1-25d	16H-84 5-9e 5-12e	18H-89 1-29f 1-28f	18H-89 3-43b
SiO <sub>2</sub>	37.66	37.50	39.22	37.79	38.44	38.54	38.76
Al <sub>2</sub> O <sub>3</sub>	11.75	12.06	19.08	16.76	17.87	17.83	17.28
Fe <sub>2</sub> O <sub>3</sub> <sup>h</sup>	13.51	13.57	6.48	8.08	8.18	6.00	6.42
MgO	0.00	0.00	0.06	0.00	0.00	0.06	0.05
MnO	0.18	0.15	0.28	0.21	0.20	0.07	0.08
TiO <sub>2</sub>	1.13	0.75	0.01	0.99	1.42	1.01	1.49
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.00	0.00	0.01	0.00	0.00	0.00
CaO	35.11	35.41	34.93	35.55	35.64	35.49	35.54
Total	99.34	99.44	100.00	99.39	99.54	99.00	99.56
Cations/12 Oxygens							
Si	2.996	2.983	2.994	2.943	2.962	2.982	2.966
Al	1.102	1.131	1.717	1.539	1.510	1.627	1.573
Fe <sup>3+</sup>	0.809	0.812	0.372	0.473	0.479	0.349	0.373
Ti	0.068	0.045	0.001	0.058	0.083	0.059	0.087
Cr	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Total Y Cations	1.979	1.988	2.090	2.071	2.072	2.035	2.076
Ca	2.993	3.018	2.858	2.966	2.957	2.943	2.977
Mn	0.012	0.010	0.018	0.014	0.013	0.005	0.005
Mg	0.000	0.000	0.007	0.000	0.000	0.007	0.000
Total X Cations	3.005	3.028	2.876	2.980	2.970	2.555	2.982
%Grossular	55.28	56.54	81.58	73.88	72.44	79.56	77.03
%Andradite	40.88	40.84	17.80	22.84	23.12	17.15	18.35
%"Ti"	3.44	2.26	0.05	2.80	4.01	2.90	4.28
%Uvarovite	0.00	0.00	0.00	0.05	0.00	0.00	0.00
%Spessertine	0.40	0.33	0.62	0.47	0.44	0.17	0.13
%Pyrope	0.00	0.00	0.00	0.00	0.00	0.24	0.20

a Area 2. Poikilitic grain ~2 mm, not adjacent to vesuvianite. Analysis 2-22 within ~60 μm of rim, analysis 2-23 400 μm into interior.

b Area 1. Anhedral grain <100 μm partially altered by prehnite.

c Area 2. Poikilitic grain ~2 cm partially replacing vesuvianite (see Table A13a). Analysis 2-25 within 30 μm of adjacent vesuvianite, analysis 2-26 ~50 μm into interior.

d Area 1. Poikilitic grain ~2 cm partially replacing vesuvianite (see Table A13a). Analysis 1-23 within 60 μm of adjacent vesuvianite, analysis 1-25 ~200 μm into interior.

e Area 5. Each analysis from a poikilitic anhedral grain ~500 μm intergrown with wollastonite.

f Area 1. Poikilitic ~300 μm thick rim on vesuvianite (see Table A13a). Analysis 1-29 within 50 μm of adjacent vesuvianite, analysis 1-28 at center of rim.

g Area 3. Non-poikilitic clear grain ~1 mm adjacent to calcite-rich layer.

h Total iron calculated as Fe<sub>2</sub>O<sub>3</sub>.

Table A12b. Microprobe Analyses of Garnets in Cycle 2 Argillites.

Sample Number Photo # - Analysis #	16H-86 1-67a	16H-86 1-70a	16H-86 2-33b	16H-86 2-32b	16H-86 2-29b	16H-86 2-28b	16H-86 3-56c	17H-87 3-37d	17H-87 3-38d	17H-87 4-25e
SiO <sub>2</sub>	39.42	39.13	38.61	38.63	38.55	38.86	38.79	39.07	39.33	38.51
Al <sub>2</sub> O <sub>3</sub>	19.43	18.93	16.20	17.31	17.60	18.57	16.60	19.96	20.37	18.57
Fe <sub>2</sub> O <sub>3</sub>	4.87	5.06	8.65	7.68	7.44	6.54	9.38	4.10	3.74	3.62
MgO	0.01	0.02	0.00	0.01	0.00	0.02	0.01	0.02	0.00	0.07
MnO	0.17	0.21	0.20	0.20	0.20	0.19	0.26	0.13	0.08	0.06
TiO <sub>2</sub>	0.67	0.88	0.92	0.88	0.72	0.70	0.14	0.47	0.62	1.67
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.00	0.00	0.03	0.02	0.00	0.02	0.00	0.00	0.00
CaO	36.53	36.21	36.13	35.71	35.65	36.07	35.79	36.87	37.08	36.90
<b>Total</b>	<b>101.10</b>	<b>100.44</b>	<b>100.71</b>	<b>100.45</b>	<b>100.18</b>	<b>100.95</b>	<b>100.99</b>	<b>100.62</b>	<b>101.21</b>	<b>99.40</b>
Cations/12 Oxygens										
Si	2.975	2.976	2.972	2.965	2.964	2.955	2.977	2.959	2.957	2.959
Al	1.729	1.697	1.470	1.566	1.595	1.665	1.502	1.782	1.805	1.682
Fe <sup>3+</sup>	0.276	0.289	0.501	0.444	0.430	0.374	0.542	0.234	0.211	0.210
Ti	0.038	0.050	0.053	0.051	0.042	0.040	0.008	0.027	0.035	0.097
Cr	0.000	0.000	0.000	0.002	0.001	0.000	0.001	0.000	0.000	0.000
<b>Total Y Cations</b>	<b>2.043</b>	<b>2.036</b>	<b>2.024</b>	<b>2.063</b>	<b>2.068</b>	<b>2.079</b>	<b>2.053</b>	<b>2.043</b>	<b>2.051</b>	<b>1.989</b>
Ca	2.954	2.951	2.980	2.937	2.937	2.939	2.943	2.993	2.987	3.038
Mn	0.011	0.014	0.013	0.013	0.013	0.012	0.017	0.008	0.005	0.004
Mg	0.001	0.002	0.000	0.001	0.000	0.002	0.001	0.002	0.000	0.008
<b>Total X Cations</b>	<b>2.966</b>	<b>2.967</b>	<b>2.993</b>	<b>2.951</b>	<b>2.950</b>	<b>2.953</b>	<b>2.961</b>	<b>3.003</b>	<b>2.992</b>	<b>3.050</b>
%Grossular	84.24	82.81	72.20	75.46	76.69	79.65	72.58	86.90	87.84	84.16
%Andradite	13.51	14.19	24.75	21.52	20.79	17.99	26.40	11.45	10.29	10.56
%"Tl"	1.86	2.46	2.62	2.47	2.03	1.92	0.39	1.32	1.71	4.88
%Uvarovite	0.00	0.00	0.00	0.10	0.05	0.00	0.05	0.00	0.00	0.00
%Spessertine	0.37	0.47	0.43	0.44	0.44	0.41	0.57	0.27	0.17	0.13
%Pyrope	0.03	0.07	0.00	0.03	0.00	0.07	0.03	0.07	0.00	0.26

- a Area 1. Poikilitic grain ~2 cm partially rimming vesuvianite (Table A13b). Analysis 1-67 within 60 μm of adjacent vesuvianite, analysis 1-70 ~350 μm into interior.
- b Area 2. Same garnet as above near edge of grain, adjacent to wollastonite-rich zone. Analysis 2-32 within ~60 μm of rim. Analysis 2-28 ~200 μm into interior.
- c Area 3. Same garnet as above adjacent to K-feldspar- + diopside-rich layer. Analysis 3-56 ~100 μm from rim.
- d Area 3. Poikilitic anhedral grain ~2 cm in calcite-rich layer.
- e Area 4. Poikilitic anhedral grain ~40 μm in calcite-rich layer.
- f Total iron calculated as Fe<sub>2</sub>O<sub>3</sub>.

Table A12c. Microprobe Analyses of Garnets in Skarn at Locality 10H.

Sample Number Photo # - Analysis #	10H-102 1-6a	10H-102 1-7a	10H-102 1-8a	10H-102 1-9a	10H-102 1-10a	10H-102 2-51b	10H-102 2-53b	10H-102 2-55c	10H-102 2-56c	10H-102 4-70d	10H-102 4-69d
SiO <sub>2</sub>	36.77	37.08	37.39	37.40	36.93	36.71	37.14	38.42	38.58	38.94	39.35
Al <sub>2</sub> O <sub>3</sub>	4.47	4.98	6.27	6.63	7.26	7.74	8.12	14.39	14.14	18.98	18.83
Fe <sub>2</sub> O <sub>3</sub> e	25.85	24.64	22.77	22.09	21.27	20.02	19.28	12.11	12.32	5.52	5.66
MgO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
MnO	0.65	0.72	0.72	0.61	0.66	0.57	0.52	1.50	1.64	0.06	0.14
TiO <sub>2</sub>	0.12	0.30	0.34	0.37	0.46	1.83	1.62	0.21	0.37	0.48	0.55
Cr <sub>2</sub> O <sub>3</sub>	0.03	0.01	0.02	0.00	0.00	0.09	0.02	0.04	0.02	0.00	0.01
CaO	33.49	33.48	33.72	34.07	33.89	33.52	33.55	33.40	33.77	36.38	36.30
<b>Total</b>	<b>101.38</b>	<b>101.21</b>	<b>101.23</b>	<b>101.17</b>	<b>100.47</b>	<b>100.48</b>	<b>100.25</b>	<b>100.07</b>	<b>100.84</b>	<b>100.39</b>	<b>100.84</b>
Cations/12 Oxygens											
<b>Si</b>	<b>2.996</b>	<b>3.012</b>	<b>3.014</b>	<b>3.011</b>	<b>2.989</b>	<b>2.957</b>	<b>2.986</b>	<b>3.006</b>	<b>3.002</b>	<b>2.967</b>	<b>2.984</b>
Al	0.429	0.477	0.596	0.629	0.693	0.735	0.770	1.327	1.297	1.705	1.683
Fe <sup>3+</sup>	1.585	1.506	1.382	1.339	1.295	1.213	1.167	0.713	0.722	0.317	0.323
Ti	0.007	0.018	0.021	0.022	0.028	0.111	0.098	0.012	0.022	0.028	0.031
Cr	0.002	0.001	0.001	0.000	0.000	0.006	0.001	0.002	0.001	0.000	0.001
<b>Total Y Cations</b>	<b>2.023</b>	<b>2.002</b>	<b>2.000</b>	<b>1.990</b>	<b>2.016</b>	<b>2.065</b>	<b>2.036</b>	<b>2.034</b>	<b>2.042</b>	<b>2.050</b>	<b>2.038</b>
Ca	2.924	2.914	2.913	2.939	2.939	2.893	2.890	2.800	2.815	2.970	2.950
Mn	0.045	0.050	0.049	0.042	0.045	0.039	0.035	0.099	0.108	0.004	0.009
Mg	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
<b>Total X Cations</b>	<b>2.969</b>	<b>2.964</b>	<b>2.962</b>	<b>2.981</b>	<b>2.984</b>	<b>2.932</b>	<b>2.925</b>	<b>2.899</b>	<b>2.923</b>	<b>2.977</b>	<b>2.959</b>
%Grossular	19.72	22.18	28.15	30.20	32.89	34.33	36.67	61.39	59.99	82.94	82.28
%Andradite	78.35	75.22	69.10	67.29	64.24	58.74	57.32	34.71	35.35	15.46	15.85
%T <sup>11</sup>	0.35	0.90	1.05	1.11	1.39	5.38	4.81	0.58	1.08	1.37	1.52
%Uvarovite	0.10	0.05	0.05	0.00	0.00	0.29	0.05	0.10	0.05	0.00	0.05
%Spessertine	1.47	1.69	1.65	1.41	1.51	1.33	1.20	3.41	3.69	0.13	0.30
%Pyrope	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00

- a Area 1. Optically zoned euhedral garnet ~1.2 mm, not associated with vesuvianite. Analysis 1-6 within ~40 μm of rim, analysis 1-10 approximate core of grain.
- b Area 2. Isotropic anhedral grain ~800 μm adjacent to garnet described in c. Both analyses within ~100 μm of grain edge.
- c Area 2. Birefringent anhedral grain ~1000 μm adjacent to garnet described in b. Analysis 2-55 within ~30 μm of adjacent garnet, analysis 2-56 ~200 μm into interior.
- d Area 4. Poikilitic grain ~3 cm partially rimming vesuvianite (Table A13c). Analysis 4-70 ~300 μm from adjacent vesuvianite, analysis 4-69 ~600 μm into interior.
- e Total iron calculated as Fe<sub>2</sub>O<sub>3</sub>.

Table A12d. Microprobe Analyses of Garnets in Cycle 6 Argillites at Locality 10H.

Sample Number Fluoro # - Analysis #	10H-103 2-21a	10H-103 2-55a	10H-103 3-52b	10H-103 5-22c	10H-104 2-47d	10H-104 2-65d	10H-104 3-44e	10H-104 3-45e	10H-104 4-9f	10H-104 4-11f	10H-104 4-12f	10H-105 3-31g	10H-106 1-14h	10H-106 1-13h	10H-106 1-12h
SiO <sub>2</sub>	39.40	39.19	39.13	39.31	37.62	38.18	38.01	38.41	37.92	37.37	37.76	38.73	38.62	38.60	38.78
Al <sub>2</sub> O <sub>3</sub>	19.88	18.29	18.18	17.89	14.95	12.84	14.96	16.01	12.19	11.83	13.11	18.85	15.70	16.28	16.72
Fe <sub>2</sub> O <sub>3</sub>	4.08	6.54	6.94	7.64	10.76	13.67	10.85	9.57	14.66	14.46	13.01	6.81	8.04	7.67	6.67
MgO	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.04
MnO	0.00	0.21	0.70	0.67	0.71	0.53	0.68	0.61	0.59	0.56	0.61	0.10	0.17	0.21	0.21
TiO <sub>2</sub>	0.70	0.33	0.30	0.15	0.23	0.78	0.48	0.43	0.53	0.65	0.69	0.52	2.53	2.39	2.43
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
CaO	37.00	36.09	36.19	35.97	35.12	34.72	34.98	35.22	35.23	34.79	34.79	36.76	35.81	35.83	36.08
Total	101.17	100.65	101.44	101.63	99.39	100.72	99.96	100.25	101.20	99.66	99.97	101.73	100.94	101.00	100.95
Cations/12 Oxygens															
Si	2.966	2.987	2.971	2.982	2.962	2.988	2.971	2.977	2.974	2.975	2.977	2.928	2.961	2.953	2.960
Al	1.764	1.643	1.627	1.600	1.388	1.185	1.379	1.463	1.127	1.110	1.218	1.680	1.419	1.468	1.504
Fe <sup>3+</sup>	0.231	0.375	0.396	0.436	0.637	0.805	0.638	0.528	0.865	0.866	0.772	0.388	0.464	0.441	0.383
Ti	0.040	0.019	0.017	0.009	0.014	0.046	0.028	0.025	0.031	0.039	0.041	0.030	0.146	0.137	0.139
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	0.000	0.001	0.001
Total Y Cations	2.035	2.037	2.040	2.045	2.039	2.036	2.045	2.046	2.023	2.015	2.031	2.098	2.029	2.047	2.027
Ca	2.984	2.947	2.944	2.923	2.963	2.912	2.930	2.925	2.961	2.968	2.939	2.978	2.942	2.937	2.951
Mn	0.000	0.014	0.045	0.043	0.047	0.035	0.045	0.040	0.039	0.038	0.041	0.006	0.011	0.014	0.014
Mg	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.005
Total X Cations	2.996	2.961	2.989	2.966	3.010	2.947	2.975	2.965	3.000	3.006	2.980	2.984	2.961	2.951	2.970
%Grossular	86.29	80.20	78.28	76.82	66.54	57.06	65.97	70.19	54.42	53.82	58.64	79.89	69.31	71.26	73.57
%Andradite	11.35	18.41	19.41	21.32	31.24	39.54	31.20	27.27	42.76	42.98	38.01	18.49	22.87	21.54	18.89
%Tl <sup>iv</sup>	1.96	0.93	0.83	0.44	0.69	2.26	1.37	1.22	1.53	1.94	2.02	1.43	7.20	6.69	6.85
%Uvavrovite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05
%Spessertine	0.00	0.47	1.51	1.45	1.56	1.19	1.51	1.35	1.30	1.26	1.38	0.20	0.37	0.48	0.47
%Pyrope	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.17

- a Area 2. Poikilitic grain ~5 mm adjacent to calcite-rich layer. Analysis 2-21 ~60 μm from grain edge, analysis 2.55 ~1.5 mm into interior.  
 b Area 3. Anhedral grain ~1 mm near vesuvianite (see Table A13c).  
 c Area 5. Subhedral grain ~1.5 mm near vesuvianite (see Table A13c).  
 d Area 2. Euhedral grains ~100 μm intergrown with calcite and quartz as inclusions in vesuvianite (see Table A13c).  
 e Area 3. Poikilitic anhedral layer replaced by vesuvianite (see Table A13c) altered by prehnite.  
 f Area 4. Anhedral grains ~50-100 μm in cloudy K-feldspar groundmass.  
 g Area 3. Poikilitic anhedral grain ~1 cm replacing vesuvianite (see Table A13c). Both analyses within 100 μm of adjacent vesuvianite.  
 h Area 1. Poikilitic euhedral inclusion in vesuvianite (see table A13c). Analysis 1-14 within ~30 μm of vesuvianite, analysis 1-12 near core.  
 j Total iron calculated as Fe<sub>2</sub>O<sub>3</sub>.

Table A13a. Microprobe Analyses of Vesuvianites in Cycle 1 Argillites.

Sample Number Photo #-Analysis #	14H-80 1-4a	14H-80 1-6a	14H-80 1-10a	14H-80 5-20a	3H-37 1-9b	3H-37 1-11b	3H-37 1-13b	3H-37 2-28c	3H-37 2-30c	16H-84 1-19d	16H-64 1-21d	16H-64 2-45e	16H-64 3-37e	16H-64 3-38e
SiO <sub>2</sub>	35.97	35.78	35.81	35.92	36.23	36.46	36.37	36.42	36.49	35.90	35.65	35.34	35.70	35.38
Al <sub>2</sub> O <sub>3</sub>	15.14	13.96	13.65	13.73	17.08	17.19	17.50	16.00	16.22	15.28	15.49	15.55	15.50	15.43
Fe <sub>2</sub> O <sub>3</sub>	5.11	5.59	5.72	5.70	3.38	3.58	3.47	3.69	3.75	4.78	4.67	4.70	5.03	4.99
MgO	1.13	1.26	1.39	1.32	1.40	1.62	1.55	1.64	1.67	1.29	1.39	0.94	1.40	1.22
MnO	0.04	0.03	0.08	0.05	0.00	0.00	0.00	0.00	0.00	0.05	0.04	0.05	0.02	0.04
TiO <sub>2</sub>	3.57	4.24	4.29	4.05	2.26	1.32	1.03	2.97	2.61	3.08	2.76	3.26	2.55	2.88
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	34.97	34.64	34.51	34.86	35.62	35.62	36.00	35.53	35.26	35.03	34.92	34.50	35.15	34.96
Na <sub>2</sub> O	0.29	0.18	0.25	0.18	0.15	0.09	0.09	0.18	0.16	0.16	0.15	0.25	0.20	0.11
<b>Total</b>	<b>96.22</b>	<b>95.68</b>	<b>95.70</b>	<b>95.83</b>	<b>96.12</b>	<b>95.88</b>	<b>96.01</b>	<b>96.43</b>	<b>96.16</b>	<b>95.57</b>	<b>95.07</b>	<b>94.49</b>	<b>95.55</b>	<b>95.01</b>
Ions/50 Cations														
Si	17.967	18.070	18.079	18.110	17.909	18.020	17.926	18.002	18.069	18.015	17.948	17.929	17.880	17.866
Al	8.915	8.312	8.124	8.161	9.953	10.016	10.169	9.324	9.469	9.040	9.194	9.300	9.152	9.186
Fe <sup>3+</sup>	1.922	2.125	2.174	2.163	1.257	1.331	1.286	1.373	1.396	1.805	1.769	1.795	1.897	1.896
Mg	0.841	0.948	1.046	0.992	1.031	1.193	1.139	1.208	1.232	0.965	1.043	0.711	1.045	0.918
Mn	0.017	0.013	0.034	0.021	0.000	0.000	0.000	0.000	0.000	0.021	0.017	0.021	0.008	0.017
Ti	1.341	1.610	1.629	1.536	0.840	0.491	0.382	1.104	0.972	1.162	1.045	1.244	0.960	1.094
Cr	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total Y Cations</b>	<b>13.036</b>	<b>13.008</b>	<b>13.007</b>	<b>12.881</b>	<b>13.081</b>	<b>13.031</b>	<b>12.976</b>	<b>13.009</b>	<b>13.069</b>	<b>12.993</b>	<b>13.068</b>	<b>13.071</b>	<b>13.062</b>	<b>13.111</b>
Ca	18.716	18.745	18.669	18.833	18.866	18.863	19.013	18.818	18.708	18.836	18.838	18.754	18.863	18.916
Na	0.281	0.176	0.245	0.176	0.144	0.086	0.086	0.173	0.154	0.156	0.146	0.246	0.194	0.108
<b>Total X Cations</b>	<b>18.997</b>	<b>18.921</b>	<b>18.914</b>	<b>19.009</b>	<b>19.010</b>	<b>18.949</b>	<b>19.099</b>	<b>18.991</b>	<b>18.862</b>	<b>18.992</b>	<b>18.984</b>	<b>19.000</b>	<b>19.057</b>	<b>19.024</b>

Table A13a. Continued. Page 2 of 2 Pages.

Sample Number Photo #-Analysis #	18H-89 1-24g	18H-89 1-25g	18H-89 1-26g	18H-89 4-47h	18H-89 4-48h	18H-89 4-49h	18H-89 4-50h	18H-89 4-51h
SiO <sub>2</sub>	36.11	36.05	36.01	36.05	36.12	36.13	36.32	36.11
Al <sub>2</sub> O <sub>3</sub>	15.99	16.08	15.87	15.61	15.85	15.99	16.58	16.50
Fe <sub>2</sub> O <sub>3</sub>	4.45	4.48	4.67	3.96	4.49	4.15	4.00	4.36
MgO	1.50	1.59	1.80	1.85	1.69	1.77	1.73	1.59
MnO	0.03	0.03	0.02	0.00	0.02	0.05	0.04	0.04
TiO <sub>2</sub>	2.62	1.90	2.08	2.83	1.97	2.13	1.62	1.60
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.00	0.02	0.04	0.01	0.00	0.00	0.00
CaO	35.40	35.55	35.87	35.74	35.40	35.36	35.52	35.17
Na <sub>2</sub> O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total</b>	<b>96.10</b>	<b>95.68</b>	<b>96.34</b>	<b>96.08</b>	<b>95.55</b>	<b>95.58</b>	<b>95.81</b>	<b>95.37</b>
Ions/50 Cations								
Si	17.971	17.972	17.836	17.910	18.035	18.016	18.022	18.031
Al	9.382	9.451	9.267	9.143	9.330	9.400	9.699	9.713
Fe <sup>3+</sup>	1.665	1.680	1.740	1.479	1.687	1.555	1.494	1.637
Mg	1.113	1.181	1.329	1.370	1.258	1.315	1.279	1.183
Mn	0.013	0.013	0.008	0.000	0.008	0.021	0.017	0.017
Ti	0.981	0.712	0.775	1.057	0.740	0.799	0.605	0.601
Cr	0.000	0.000	0.008	0.016	0.004	0.000	0.000	0.000
<b>Total Y Cations</b>	<b>13.154</b>	<b>13.037</b>	<b>13.127</b>	<b>13.065</b>	<b>13.027</b>	<b>13.090</b>	<b>13.094</b>	<b>13.151</b>
Ca	18.877	18.990	19.037	19.026	18.939	18.893	18.885	18.818
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total X Cations</b>	<b>18.877</b>	<b>18.990</b>	<b>19.037</b>	<b>19.026</b>	<b>18.939</b>	<b>18.893</b>	<b>18.885</b>	<b>18.818</b>

- a Areas 1 and 5. Poikilitic grain ~2.5 cm not associated with garnets. All analyses within ~60 μm of rim.
- b Area 1. Poikilitic grain ~1.5 mm, optically zoned, not associated with garnet. Analysis 1-9 within ~60 μm of rim, analysis 1-13 ~750 μm into interior.
- c Area 2. Poikilitic grain ~1 mm adjacent to garnet (Table A12a). Analysis 2-28 within ~50 μm of adjacent garnet, analyses 2-30 ~500 μm into interior.
- d Area 1. Poikilitic grain ~4 mm partially replaced by garnet (Table A12a). Analysis 1-19 within ~50 μm of adjacent garnet, 1-21 ~200 μm into interior.
- e Areas 2 and 3. Clear grains each ~200 μm in fine grained K-feldspar + diopside-rich layer.
- f Total iron calculated as Fe<sub>2</sub>O<sub>3</sub>.
- g Area 1. Poikilitic grain ~3 mm partially rimmed by garnet (Table A12a). Analysis 1-24 within ~40 μm of adjacent garnet, analysis 1-26 ~160 μm into interior.
- h Area 4. Poikilitic grain not associated with garnets. Analysis 4-47 within 60 μm of rim, analysis 4-51 ~800 μm into interior.

Table A13b. Microprobe Analyses of Vesuvianites in Cycle 2 Argillites.

Sample Number Photo #-Analysis #	3H-39 1-11a	3H-39 1-13a	3H-39 1-14a	3H-39 5-53b	3H-39 6-68c	3H-39 6-72c	3H-40 4-25d	3H-40 4-28d	3H-40 4-30d	16H-86 1-66e	16H-86 1-64e	16H-86 1-62e	16H-86 1-60e	16H-86 1-58e	16H-86 4-71f	16H-86 4-73f	16H-86 4-75f	16H-86 4-77f	16H-86 5-63e
SiO <sub>2</sub>	36.40	36.21	36.54	35.97	35.94	36.32	36.08	36.63	36.46	36.81	36.49	36.60	36.50	36.31	36.18	36.43	36.24	36.41	36.49
Al <sub>2</sub> O <sub>3</sub>	14.72	17.26	16.71	14.89	15.86	16.33	16.10	16.50	16.28	17.34	17.01	16.18	16.09	16.37	16.99	17.02	16.75	16.63	16.13
Fe <sub>2</sub> O <sub>3</sub>	4.73	3.42	3.57	4.78	3.93	3.50	4.65	4.40	4.79	3.25	3.61	4.11	4.23	3.80	3.65	3.59	3.78	3.63	3.57
MgO	1.64	1.22	1.24	1.35	1.46	1.41	1.63	1.66	1.63	1.51	1.44	1.35	1.28	1.48	1.52	1.55	1.58	1.58	1.72
MnO	0.00	0.00	0.00	0.00	0.00	0.08	0.11	0.14	0.16	0.05	0.02	0.05	0.05	0.02	0.06	0.07	0.03	0.07	0.09
TiO <sub>2</sub>	3.60	2.04	2.25	3.72	3.43	2.97	1.60	1.26	1.33	1.68	1.97	2.88	3.14	2.74	1.97	1.94	2.11	2.28	2.93
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.05	0.00	0.00	0.00	0.00	0.00
CaO	34.59	34.47	35.21	34.78	34.77	34.26	35.84	35.95	36.09	36.48	36.01	35.95	35.98	35.79	35.95	35.77	35.81	35.63	35.64
Na <sub>2</sub> O	0.20	0.25	0.18	0.12	0.18	0.24	0.00	0.00	0.00	0.09	0.12	0.15	0.10	0.10	0.00	0.00	0.00	0.00	0.06
<b>Total</b>	<b>95.88</b>	<b>94.87</b>	<b>95.70</b>	<b>95.61</b>	<b>95.59</b>	<b>95.15</b>	<b>96.01</b>	<b>96.54</b>	<b>96.74</b>	<b>97.21</b>	<b>96.68</b>	<b>97.33</b>	<b>97.34</b>	<b>96.66</b>	<b>96.32</b>	<b>96.37</b>	<b>96.30</b>	<b>96.23</b>	<b>96.63</b>
Ions/50 Cations																			
Si	18.215	18.122	18.172	18.088	17.975	18.193	17.917	18.052	17.962	17.954	17.934	17.968	17.946	17.916	17.863	17.972	17.911	18.015	18.004
Al	8.684	10.184	9.797	8.827	9.351	9.644	9.426	9.587	9.455	9.971	9.856	9.364	9.324	9.522	9.889	9.899	9.759	9.700	9.382
Fe <sup>3+</sup>	1.783	1.289	1.335	1.808	1.481	1.320	1.736	1.632	1.776	1.191	1.336	1.519	1.566	1.411	1.354	1.333	1.405	1.353	1.324
Mg	1.223	0.910	0.919	1.012	1.088	1.053	1.206	1.219	1.197	1.098	1.055	0.988	0.938	1.088	1.118	1.140	1.164	1.165	1.265
Mn	0.000	0.000	0.000	0.000	0.000	0.034	0.046	0.058	0.067	0.021	0.008	0.021	0.021	0.008	0.025	0.029	0.013	0.029	0.038
Ti	1.355	0.768	0.842	1.407	1.290	1.119	0.598	0.467	0.493	0.616	0.728	1.063	1.161	1.017	0.731	0.720	0.784	0.848	1.087
Cr	0.000	0.000	0.000	0.000	0.008	0.016	0.000	0.000	0.000	0.000	0.004	0.023	0.000	0.020	0.000	0.000	0.000	0.000	0.000
<b>Total Y Cations</b>	<b>13.045</b>	<b>13.151</b>	<b>12.893</b>	<b>13.034</b>	<b>13.218</b>	<b>13.186</b>	<b>13.012</b>	<b>12.963</b>	<b>12.988</b>	<b>12.897</b>	<b>12.987</b>	<b>12.978</b>	<b>13.010</b>	<b>13.066</b>	<b>13.117</b>	<b>13.121</b>	<b>13.125</b>	<b>13.095</b>	<b>13.096</b>
Ca	18.547	18.485	18.762	18.740	18.633	18.389	19.071	18.984	19.051	19.065	18.964	18.911	18.950	18.922	19.019	18.908	18.964	18.889	18.842
Na	0.194	0.243	0.174	0.117	0.175	0.233	0.000	0.000	0.000	0.085	0.114	0.143	0.095	0.096	0.000	0.000	0.000	0.000	0.057
<b>Total X Cations</b>	<b>18.741</b>	<b>18.728</b>	<b>18.936</b>	<b>18.857</b>	<b>18.808</b>	<b>18.622</b>	<b>19.071</b>	<b>19.984</b>	<b>19.051</b>	<b>19.150</b>	<b>19.078</b>	<b>19.034</b>	<b>19.045</b>	<b>19.018</b>	<b>19.019</b>	<b>18.908</b>	<b>19.964</b>	<b>18.889</b>	<b>18.899</b>

Table A13b. Continued. Page 2 of 2 Pages.

Sample Number Photo #-Analysis #	17H-87 2-20 <sup>l</sup>	17H-87 2-19 <sup>l</sup>	17H-87 2-21 <sup>l</sup>	17H-87 2-18 <sup>l</sup>	17H-87 2-22 <sup>l</sup>	17H-87 2-26 <sup>l</sup>	17H-87 2-23 <sup>l</sup>	17H-87 2-25 <sup>l</sup>	17H-87 4-27 <sup>l</sup>	20H-100 1-7k	20H-100 1-9k
SiO <sub>2</sub>	36.68	36.62	36.59	36.38	36.30	36.43	36.39	36.39	36.47	36.10	36.46
Al <sub>2</sub> O <sub>3</sub>	16.41	16.40	16.06	15.71	14.44	15.26	15.51	16.64	16.42	16.95	16.93
Fe <sub>2</sub> O <sub>3</sub> <sup>h</sup>	4.12	3.75	3.81	3.82	4.61	4.39	4.61	3.56	3.53	4.99	5.08
MgO	1.72	1.76	1.85	1.53	1.37	1.81	1.80	1.48	2.56	1.29	1.23
MnO	0.00	0.02	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.07	0.07
TiO <sub>2</sub>	1.73	2.41	2.98	3.83	4.77	3.29	2.37	3.02	0.28	1.20	1.24
Cr <sub>2</sub> O <sub>3</sub>	0.07	0.07	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	35.45	35.31	35.58	35.55	35.02	35.22	35.62	35.30	36.34	35.13	35.43
Na <sub>2</sub> O	0.13	0.19	0.10	0.20	0.34	0.22	0.21	0.13	0.00	0.00	0.00
<b>Total</b>	<b>96.31</b>	<b>96.53</b>	<b>97.09</b>	<b>97.03</b>	<b>96.85</b>	<b>96.64</b>	<b>96.51</b>	<b>96.54</b>	<b>95.60</b>	<b>95.73</b>	<b>96.44</b>
Ions/50 Cations											
Si	18.107	18.042	17.971	17.934	18.041	18.021	17.982	17.970	17.974	17.984	18.044
Al	9.550	9.526	9.299	9.130	8.461	8.899	9.036	9.687	9.540	9.955	9.878
Fe <sup>3+</sup>	1.532	1.389	1.409	1.418	1.725	1.634	1.715	1.321	1.311	1.871	1.892
Mg	1.265	1.292	1.352	1.124	1.015	1.334	1.326	1.089	1.880	0.938	0.907
Mn	0.000	0.008	0.000	0.004	0.000	0.008	0.000	0.008	0.000	0.030	0.029
Ti	0.642	0.893	1.101	1.420	1.783	1.224	0.881	1.122	0.104	0.450	0.462
Cr	0.027	0.027	0.047	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total Y Cations</b>	<b>13.016</b>	<b>13.135</b>	<b>13.208</b>	<b>13.092</b>	<b>12.984</b>	<b>13.099</b>	<b>12.958</b>	<b>13.227</b>	<b>12.835</b>	<b>13.264</b>	<b>13.168</b>
Ca	18.751	18.641	18.724	18.778	18.649	18.668	18.860	18.678	19.191	18.753	18.788
Na	0.124	0.182	0.095	0.191	0.328	0.211	0.201	0.124	0.000	0.000	0.000
<b>Total X Cations</b>	<b>18.875</b>	<b>18.823</b>	<b>18.819</b>	<b>18.969</b>	<b>18.977</b>	<b>18.879</b>	<b>19.061</b>	<b>18.802</b>	<b>19.191</b>	<b>18.753</b>	<b>18.788</b>

- a Area 1. Poikilitic grain ~3 mm. Analysis 1-11 within ~40 μm of rim, analysis 1-10 ~140 μm into interior.
- b Area 5. Poikilitic grain ~3 mm optically zoned. Analysis 5-53 ~40 μm from rim.
- c Area 6. Poikilitic grain ~3 cm rimmed by 600 μm thick nonpoikilitic rim. Analysis 6-68 within 60 μm of rim, analysis 6-72 ~450 μm into interior.
- d Area 4. Anedral grains each <60 μm in wollastonite and prehnite layer.
- e Area 1. Poikilitic grain ~1 cm partially rimmed by garnet (Table A12b). Analysis 1-66 within ~40 μm of adjacent garnet, Analysis 1-58 ~450 μm into interior.
- f Area 4. Non-poikilitic grain ~50 mm intergrown with wollastonite not associated with garnet. Analysis 4-77 ~250 μm from grain edge, analysis 4-71 ~1 mm into interior.
- g Area 5. Nonpoikilitic grain ~1 mm intergrown with other vesuvianite. Analysis is ~100 μm from grain edge.
- h Total iron calculated as Fe<sub>2</sub>O<sub>3</sub>.
- i Area 2. Poikilitic grain ~2 cm not associated with garnet. Analyses 2-20, 2-19, 2-18 on thin (~100 μm) zoned rim, analysis 2-22 on inner side of rim, analysis 2-26 ~600 μm into interior.
- j Area 4. Anedral clear grain ~1 mm in calcite-rich layer.
- k Area 1. Skeletal grain ~2 mm with inclusions of wollastonite needles.



Table A13c. Microprobe Analyses of Vesuvianites in the Skarn and Cycle 6 Argillites at Station 10H.

Sample Number Photo #-Analysis #	10H-102 3-38a	10H-102 4-57b	10H-102 4-60b	10H-102 5-73c	10H-102 5-75c	10H-103 2-53d	10H-103 6-27d	10H-103 6-32d	10H-103 3-55e	10H-103 3-30e	10H-103 4-40f	10H-103 4-44f	10H-103 5-88	10H-103 5-108	10H-103 5-128	10H-103 5-148	10H-103 5-168
SiO <sub>2</sub>	35.45	36.10	36.98	36.44	36.91	36.56	36.57	36.64	36.45	36.46	36.66	36.63	36.94	36.92	36.74	37.21	36.93
Al <sub>2</sub> O <sub>3</sub>	16.02	16.63	15.62	15.10	14.53	16.59	17.12	17.17	14.65	16.43	16.73	16.52	15.62	16.06	16.29	16.48	17.05
Fe <sub>2</sub> O <sub>3</sub> <sup>h</sup>	3.42	3.56	4.80	5.68	5.97	3.86	3.26	3.22	4.28	4.09	3.73	3.56	4.21	3.98	3.83	3.50	3.79
MgO	1.55	1.59	1.72	2.65	2.61	2.21	2.40	2.22	1.92	1.84	2.16	2.19	1.95	1.72	1.83	1.85	1.93
MnO	0.04	0.01	0.05	0.12	0.11	0.00	0.07	0.00	0.06	0.10	0.00	0.00	0.13	0.16	0.17	0.07	0.00
TiO <sub>2</sub>	4.22	2.88	2.71	0.60	0.67	1.39	0.78	0.88	3.55	2.01	1.58	1.57	2.84	2.66	2.40	2.24	1.21
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.03	0.02	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
CaO	35.16	34.94	35.07	35.61	35.33	35.92	36.79	36.72	36.10	35.86	36.80	36.69	35.81	36.20	36.08	36.52	36.54
Na <sub>2</sub> O	0.29	0.16	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.08	0.00	0.00	0.04	0.00	0.13	0.08
<b>Total</b>	<b>96.15</b>	<b>95.90</b>	<b>97.00</b>	<b>96.22</b>	<b>96.19</b>	<b>96.53</b>	<b>96.99</b>	<b>96.85</b>	<b>97.01</b>	<b>96.82</b>	<b>97.79</b>	<b>97.16</b>	<b>97.50</b>	<b>97.74</b>	<b>97.34</b>	<b>98.00</b>	<b>97.53</b>
Ions/50 Cations																	
Si	17.608	17.925	18.252	18.006	18.286	17.948	17.779	17.852	18.002	17.920	17.757	17.861	18.099	18.025	17.981	18.035	17.931
Al	9.381	9.735	9.089	8.796	8.487	9.602	9.812	9.862	8.533	9.520	9.553	9.497	9.023	9.244	9.399	9.417	9.760
Fe <sup>3+</sup>	1.279	1.329	1.783	2.112	2.225	1.425	1.191	1.182	1.591	1.513	1.361	1.305	1.553	1.462	1.412	1.277	1.385
Mg	1.147	1.177	1.265	1.951	1.927	1.617	1.739	1.612	1.414	1.348	1.559	1.591	1.424	1.251	1.335	1.336	1.397
Mn	0.017	0.004	0.021	0.050	0.046	0.000	0.029	0.000	0.025	0.042	0.000	0.000	0.054	0.066	0.070	0.029	0.000
Ti	1.576	1.075	1.006	0.223	0.250	0.513	0.285	0.322	1.319	0.743	0.576	0.576	1.047	0.977	0.883	0.817	0.442
Cr	0.000	0.012	0.008	0.008	0.024	0.000	0.000	0.000	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total Y Cations</b>	<b>13.400</b>	<b>13.332</b>	<b>13.172</b>	<b>13.140</b>	<b>12.959</b>	<b>13.157</b>	<b>13.056</b>	<b>12.978</b>	<b>12.882</b>	<b>13.166</b>	<b>13.068</b>	<b>12.969</b>	<b>13.101</b>	<b>13.000</b>	<b>13.099</b>	<b>12.876</b>	<b>12.984</b>
Ca	18.712	18.589	18.547	18.854	18.755	18.895	19.165	19.170	19.110	18.886	19.099	19.170	18.800	18.937	18.920	18.967	19.010
Na	0.279	0.154	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.075	0.000	0.000	0.038	0.000	0.122	0.075
<b>Total X Cations</b>	<b>18.991</b>	<b>18.754</b>	<b>18.576</b>	<b>18.854</b>	<b>18.755</b>	<b>18.895</b>	<b>19.165</b>	<b>19.170</b>	<b>19.110</b>	<b>18.915</b>	<b>19.174</b>	<b>19.170</b>	<b>18.800</b>	<b>18.975</b>	<b>18.920</b>	<b>19.089</b>	<b>19.085</b>

Table A13c. Continued. Page 2 of 4 Pages.

Sample Number Photo #-Analysis #	10H-104 1-71i	10H-104 2-51j	10H-104 2-53l	10H-104 2-55l	10H-104 3-21k	10H-104 3-23k	10H-104 3-25k	10H-104 3-27k	10H-104 3-29k	10H-105 3-40m	10H-105 3-42m	10H-105 3-44m	10H-105 3-46m
SiO <sub>2</sub>	36.33	36.03	36.28	36.18	36.68	36.40	36.42	36.99	36.24	36.26	36.09	36.40	36.20
Al <sub>2</sub> O <sub>3</sub>	16.77	16.26	16.47	16.28	16.02	15.34	16.51	16.18	16.03	16.06	16.01	16.15	15.78
Fe <sub>2</sub> O <sub>3</sub>	3.30	3.72	4.01	3.76	3.20	3.81	3.32	3.57	3.51	4.39	4.61	3.79	3.65
MgO	2.68	2.74	2.47	2.65	2.08	2.00	2.72	3.00	2.95	1.45	1.56	1.81	1.91
MnO	0.00	0.12	0.00	0.00	0.12	0.11	0.06	0.00	0.06	0.07	0.08	0.07	0.05
TiO <sub>2</sub>	1.16	0.48	0.28	0.40	2.50	2.69	1.28	1.42	1.46	3.05	2.94	2.83	2.93
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	36.13	35.28	35.51	35.47	35.99	36.15	36.69	35.70	35.62	36.07	35.30	35.32	35.09
Na <sub>2</sub> O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.00	0.00
<b>Total</b>	<b>96.37</b>	<b>94.63</b>	<b>95.02</b>	<b>94.74</b>	<b>96.59</b>	<b>96.57</b>	<b>96.00</b>	<b>96.86</b>	<b>95.87</b>	<b>97.39</b>	<b>96.61</b>	<b>96.37</b>	<b>95.61</b>
<b>Ions/50 Cations</b>													
Si	17.780	17.952	18.022	18.008	18.048	17.977	17.907	18.037	17.853	17.820	17.884	18.016	18.057
Al	9.676	9.551	9.645	9.553	9.293	8.932	9.570	9.301	9.310	9.305	9.353	9.423	9.280
Fe <sup>3+</sup>	1.216	1.396	1.500	1.407	1.185	1.417	1.230	1.309	1.302	1.624	1.720	1.412	1.368
Mg	1.955	2.035	1.829	1.966	1.525	1.472	1.993	2.180	2.166	1.062	1.152	1.335	1.420
Mn	0.000	0.051	0.000	0.000	0.050	0.046	0.025	0.000	0.025	0.029	0.034	0.029	0.021
Ti	0.427	0.180	0.105	0.150	0.925	0.999	0.473	0.521	0.541	1.127	1.096	1.053	1.099
Cr	0.000	0.000	0.000	0.000	0.000	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total Y Cations</b>	<b>13.274</b>	<b>13.213</b>	<b>13.079</b>	<b>13.076</b>	<b>12.978</b>	<b>12.893</b>	<b>13.291</b>	<b>13.311</b>	<b>13.344</b>	<b>13.147</b>	<b>13.355</b>	<b>13.252</b>	<b>13.188</b>
Ca	18.947	18.835	18.900	18.917	18.974	19.130	18.802	18.652	18.803	18.994	18.743	18.731	18.755
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.038	0.019	0.000	0.000
<b>Total X Cations</b>	<b>18.947</b>	<b>18.835</b>	<b>18.900</b>	<b>18.917</b>	<b>18.974</b>	<b>19.130</b>	<b>18.802</b>	<b>18.652</b>	<b>18.803</b>	<b>19.032</b>	<b>18.762</b>	<b>18.731</b>	<b>18.755</b>

Table A13c. Continued. Page 3 of 4 Pages.

Sample Number Photo #-Analysis #	1-20n	1-22n	2-33P	2-37P	2-41P	2-42P	5-62Q	5-64Q	10H-108 4-22r	10H-108 4-20r	10H-108 4-26r	10H-108 4-18r
SiO <sub>2</sub>	36.83	36.78	36.95	37.26	37.05	37.32	37.56	37.10	36.38	36.35	36.61	36.68
Al <sub>2</sub> O <sub>3</sub>	15.28	15.38	15.45	16.52	17.19	16.91	17.85	16.27	15.49	15.66	15.09	15.48
Fe <sub>2</sub> O <sub>3</sub> <sup>h</sup>	4.25	4.38	4.96	3.37	3.55	3.61	2.72	5.25	5.76	6.20	6.15	5.71
MgO	1.19	1.22	1.60	1.53	1.07	1.05	2.14	1.63	1.25	1.14	1.22	1.32
MnO	0.02	0.05	0.07	0.04	0.03	0.03	0.09	0.04	0.01	0.00	0.03	0.00
TiO <sub>2</sub>	4.55	4.63	2.73	3.07	2.80	2.94	0.64	1.25	2.85	2.50	2.63	2.50
Cr <sub>2</sub> O <sub>3</sub>	0.00	0.03	0.06	0.00	0.01	0.04	0.01	0.00	0.02	0.00	0.02	0.00
CaO	35.70	35.48	35.91	36.10	36.25	36.16	36.73	35.89	34.89	35.58	35.30	35.12
Na <sub>2</sub> O	0.33	0.30	0.11	0.18	0.29	0.25	0.00	0.18	0.20	0.15	0.12	0.15
<b>Total</b>	<b>98.15</b>	<b>98.25</b>	<b>97.84</b>	<b>98.07</b>	<b>98.24</b>	<b>98.31</b>	<b>97.74</b>	<b>97.61</b>	<b>96.85</b>	<b>97.58</b>	<b>97.17</b>	<b>96.92</b>
<b>Ions/50 Cations</b>												
Si	18.029	17.999	18.090	18.101	17.964	18.110	18.099	18.109	18.050	17.911	18.138	18.159
Al	8.818	8.873	8.917	9.461	9.826	9.674	10.140	9.362	9.060	9.097	8.814	9.035
Fe <sup>3+</sup>	1.564	1.613	1.826	1.231	1.293	1.319	0.987	1.927	2.149	2.299	2.291	2.128
Mg	0.868	0.890	1.167	1.108	0.773	0.759	1.537	1.186	0.924	0.837	0.901	0.974
Mn	0.008	0.021	0.029	0.016	0.012	0.012	0.037	0.017	0.004	0.000	0.013	0.000
Ti	1.675	1.704	1.005	1.122	1.021	1.073	0.232	0.459	1.063	0.926	0.980	0.931
Cr	0.000	0.012	0.023	0.000	0.004	0.015	0.004	0.000	0.008	0.000	0.008	0.000
<b>Total Y Cations</b>	<b>12.933</b>	<b>13.113</b>	<b>12.867</b>	<b>12.938</b>	<b>12.929</b>	<b>18.852</b>	<b>12.937</b>	<b>12.951</b>	<b>13.208</b>	<b>13.159</b>	<b>13.007</b>	<b>13.068</b>
Ca	18.725	18.604	18.838	18.791	18.833	18.802	18.964	18.771	18.548	18.785	18.740	18.630
Na	0.313	0.285	0.104	0.170	0.273	0.235	0.000	0.170	0.192	0.143	0.115	0.144
<b>Total X Cations</b>	<b>19.038</b>	<b>18.889</b>	<b>18.942</b>	<b>18.961</b>	<b>19.106</b>	<b>19.037</b>	<b>18.964</b>	<b>18.941</b>	<b>18.740</b>	<b>18.928</b>	<b>18.855</b>	<b>18.774</b>

- a Area 3. Poikilitic grain ~1 mm near garnet (see Table A12c). Analysis 3-38 within 60  $\mu$ m of grain edge.
- b Area 4. Poikilitic grain ~4.5 mm partially rimmed by garnet (see Table A12c). Analysis 4-57 within ~60  $\mu$ m of adjacent garnet, analysis 4-60 ~400  $\mu$ m into interior.
- c Area 5. Both analyses from nonpoikilitic grain ~600  $\mu$ m in calcite-rich layer.
- d Area 2 and 6. Anhedral grains each ~200  $\mu$ m in calcite-rich layer.
- e Area 3. Subhedral poikilitic grain ~1.5 mm partially rimming garnet (see Table A12d). Analysis 3-55 within ~40  $\mu$ m of adjacent garnet, analysis 3-30 ~150  $\mu$ m into interior.
- f Area 4. Euhedral grain ~1.5 mm. Interior of grain contains diopside inclusions. Outer ~100  $\mu$ m is clear. Both analyses in outer clear layer.
- g Area 5. Optically zoned poikilitic grain ~3 mm near garnet (see Table A12d). analysis 5-8 within ~60  $\mu$ m of grain edge, analysis 5-16 ~700  $\mu$ m into interior.
- h Total iron calculated as Fe<sub>2</sub>O<sub>3</sub>.
- i Area 1. Non-poikilitic grain ~200  $\mu$ m intergrown with wollastonite diopside garnet. Grain is altered by prehnite.
- j Area 2. Non-poikilitic grains ~600  $\mu$ m with wollastonite, calcite, quartz and euhedral garnet inclusions. Analyses 2-51 and 2-53 from vesuvianite which surrounds garnet (see Table A12d).
- k Area 3. Euhedral poikilitic grain ~600  $\mu$ m partially replaced by garnet (see Table A12d). Analysis 2-29 within ~150  $\mu$ m of adjacent garnet near core of grain, analyses 3-27 and 3-25 in poikilitic portion of grain, analyses 3-21 and 3-23 within clear 50  $\mu$ m thick outer rim of grain.
- m Area 3. Poikilitic anticular grain ~6 mm x 1 mm rimmed by garnet (see Table A12d). Analysis 3-40 within ~100  $\mu$ m of adjacent garnet, analysis 3-46 ~300  $\mu$ m into interior.
- n Area 1. Poikilitic subhedral grain ~2 cm with euhedral garnet inclusions (see Table A12d). Analysis 1-20 within ~30  $\mu$ m of garnet, analysis 1-22 ~100  $\mu$ m away from garnet.
- p Area 2. Same grain as above near outer rim adjacent to diopside + wollastonite-rich layer. Analysis 2-33 in outer rim, analysis 2-37 ~50  $\mu$ m into interior, analyses 2-41 and 2-42 ~600  $\mu$ m into interior.
- q Area 5. Both analyses from individual anhedral grains ~100  $\mu$ m in calcite-rich layer.
- r Area 4. Poikilitic vesuvianite-rich layer ~5 mm thick. Both analyses within ~100  $\mu$ m of adjacent wollastonite-rich layer.