Appendix D

The following analytical work using a microprobe was done by Dr. Brian Jones, P.Geol., of CARBEX Geological Services Ltd. Three samples (1, 12 and 20) were examined in detail and the mineralogical compositions determined by microprobe transect using 60 analytical points.

INTRODUCTION

This report supplements the Phase I report that provided detailed petrographic analyses of twenty samples that had been collected, by Dr. E. Perkins, from the upper part of the Slave Point Formation in the 08-33-115-6W6 well (Fig. 1). This report provides detailed compositional information, as determined by electron microprobe (EMP) analyses, for samples 1 (1345.23 m), 12 (1352.40 m), and 20 (1359.04 m) (Fig. 1).

The main aim of this study was to determine the composition of these limestones in terms of their CaO, MgO, BaO, SiO_2, MnO, SrO, Al_2O_3, and FeO (as requested by Dr. E. Perkins). This set of analyses focused primarily on the calcite and dolomite that form most of the limestones in this part of the Slave Point Formation. It was not possible to analyze the kaolinite and illite found in these limestones because of the difficulty of locating the minor amounts of these minerals that are located in the pores and pore throats.

METHOD OF ANALYSIS

The analyses of samples 1, 12, and 20 were made from the thin sections that had been used to evaluate their petrographic features. Each thin section was polished and coated with carbon before being examined on a JOEL 8900R electron microprobe that was operated with a 15 kV accelerating voltage, 5 nA beam current measured at a Faraday Cup, 5 μm beam size, 20 sec count time on the Ca, Mg, Ba, Si, Mn, Sr, Al, and Fe peaks, and a 10 second count time on the background.

For each sample, a transect line was selected that was deemed to be representative of the limestone. The probe was then programmed to analyze 60 equally-spaced points along that transect line. Given slight variations in the lengths of each transect line, this provided analyses at a spacing of 0.375 mm in Z1, 0.362 mm in sample Z12, and 0.359 mm in sample Z20. This method was chosen because it provided a time-efficient method of producing analyses from points that had not been subject to selection biases. In evaluating the data from these points, however, the following constraints must be considered.

- The 5 μm beam diameter may straddle two or more crystals that may be of different composition. If so, the analytical data is a composite of the composition of the crystals involved.

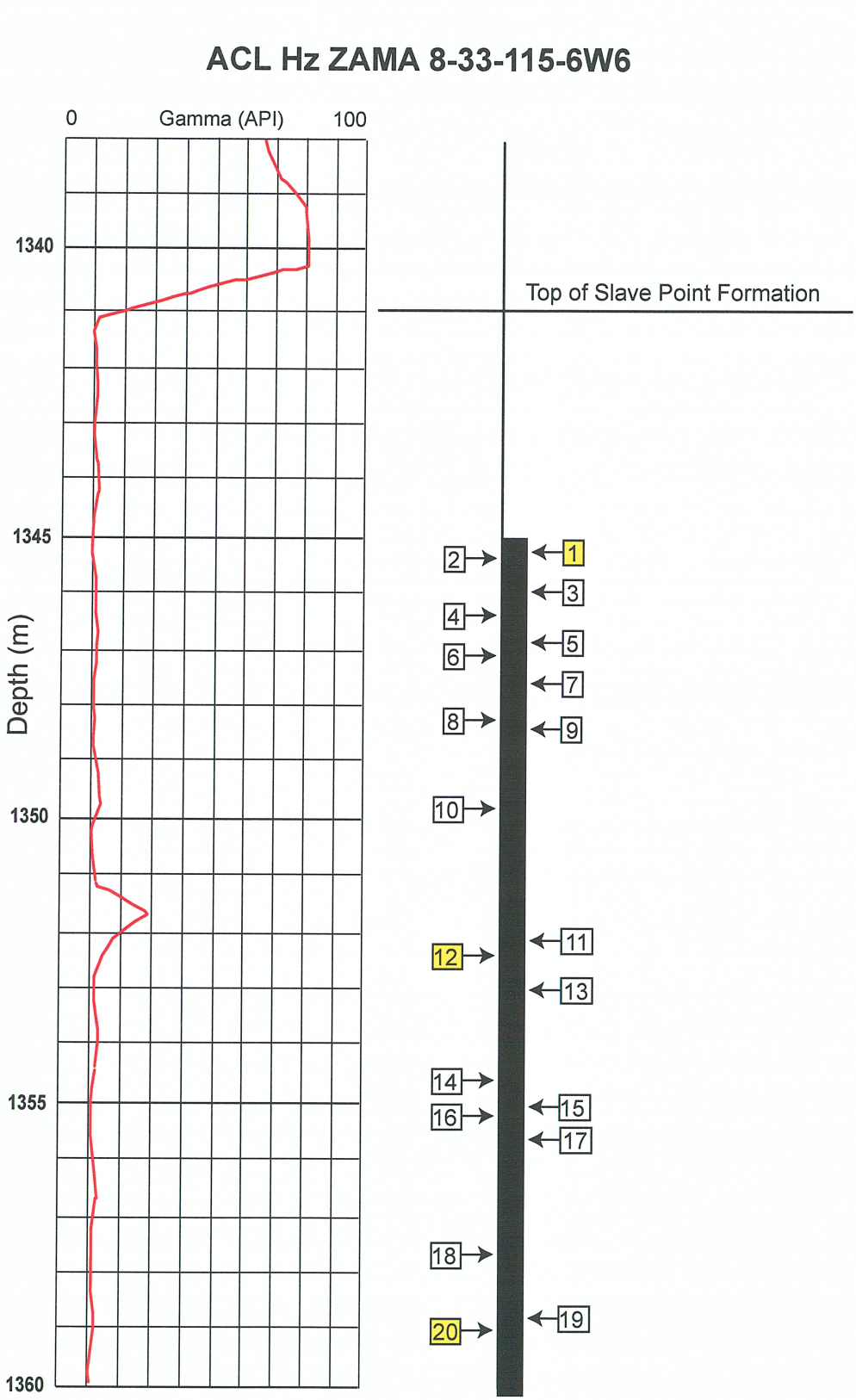


Figure 1: Location of samples 1–20 examined in Phase I study. Samples 1, 12, and 20, highlighted in yellow, were used for microprobe analyses.

- Pores will yield meaningless data.
- Petrographic analyses of these rocks clearly demonstrated that they have a high microporosity. This causes problems with microprobe analyses because the weight percentages are based on volumes of material that are assumed to be formed of solid material with no micropores. The presence of micropores will result in low total weight percentages and will cause variations in the weight percentages of each compound being considered.

ANALYTICAL RESULTS

Data Integrity

Each data point was first evaluated to assess it reliability (Tables 1-3). Analyses that yielded total weight % of less than 48 wt % in samples Z1, and Z12 and less than 47 wt % in sample Z20 were rejected as being unreliable (Tables 1B, 2B, 3B). In addition, samples that yielded anomalously high total wt percentages or displayed other unusual features were also rejected from consideration (Tables 1B, 2B, 3B). As a result, sample Z1 was left with 45 valid analyses, sample Z12 with 38 valid analyses, and sample Z20 with 36 valid analyses (Table 4). Ideally, for sample Z20, analyses with < 48 wt % should have been rejected as they were for samples Z1 and Z12. However, that would have reduced the data set even further and it was therefore decided to retain results for the points with between 47 and 48 wt % in order to minimize the number of rejected points.

Compositional Overview

The compositional data are consistent with the petrographic results that showed that these limestones are formed primarily of calcite along with minor amounts of dolomite, scattered pyrite, and local silicification of some of the fossil fragments (Table 4). The following points summarize the compositional aspects of these limestones (Table 4).

CaO and MgO: The CaO content ranges from 26.90 to 51.77 (average 43.82 to 48.72) wt % whereas the MgO content ranges from 0.25 to 18.90 (average 1.37 to 4.31) wt %. There is little variation in the CaO between samples whereas the range in MgO reflects the

Table 1A. Weight percent data for analyses from sample Z1, 1345.23 m. See Fig. 4 for location of transect.

No.	dist .(μm)	MgO	CaO	BaO	SiO_2	MnO	SrO	Al_2O_3	FeO	Total
1	0.38	0.82	51.13	0.07	0.06	0.01	0.08	0.01	0.01	52.17
2	0.75	0.76	50.25	0.11	0.06	0.01	0.07	0.03	0.05	51.32
3	1.13	0.95	49.34	0.04	0.09	0.02	0.04	0.04	0.08	50.61
4	1.50	0.75	50.25	0.10	0.03	0.01	0.06	0.01	0.04	51.26
6	2.25	0.78	49.34	0.12	0.08	0.02	0.05	0.03	0.05	50.47
7	2.63	0.89	51.09	0.06	0.05	0.00	0.09	0.01	0.06	52.25
8	3.00	0.85	51.44	0.15	0.07	0.01	0.07	0.00	0.04	52.63
9	3.38	0.33	47.61	0.12	0.12	0.05	0.05	0.02	0.21	48.50
10	3.75	0.64	50.11	0.09	0.03	0.00	0.03	0.00	0.02	50.92
11	4.13	0.65	50.74	0.06	0.07	0.00	0.08	0.01	0.07	51.69
12	4.50	0.38	47.87	0.09	0.41	0.02	0.03	0.05	0.11	48.95
14	5.25	0.45	51.77	0.09	0.04	0.03	0.04	0.00	0.13	52.55
16	6.00	0.63	50.87	0.12	0.04	0.02	0.06	0.03	0.07	51.83
18	6.75	0.61	50.86	0.08	0.04	0.01	0.07	0.02	0.11	51.78
19	7.13	0.55	50.21	0.08	0.08	0.00	0.04	0.02	0.07	51.04
20	7.50	0.52	48.50	0.12	0.18	0.01	0.17	0.05	0.06	49.61
21	7.88	0.53	50.74	0.04	0.04	0.01	0.03	0.00	0.07	51.47
22	8.25	0.36	50.05	0.06	0.05	0.04	0.02	0.02	0.16	50.77
23	8.63	0.45	51.22	0.10	0.04	0.04	0.04	0.02	0.19	52.07
26	9.75	0.57	51.11	0.09	0.04	0.02	0.07	0.00	0.14	52.04
27	10.13	0.86	50.51	0.11	0.05	0.00	0.06	0.03	0.06	51.67
28	10.50	0.61	51.07	0.12	0.06	0.02	0.07	0.02	0.15	52.10
29	10.88	0.68	50.28	0.13	0.06	0.01	0.11	0.02	0.09	51.39
30	11.25	0.46	50.46	0.14	0.09	0.01	0.06	0.03	0.11	51.35
31	11.63	0.89	42.39	0.14	5.37	0.01	0.06	0.12	0.08	49.05
32	12.00	16.30	28.76	0.05	0.02	0.05	0.01	0.06	4.84	50.08
33	12.38	0.71	51.16	0.14	0.04	0.03	0.04	0.01	0.07	52.18
36	13.50	0.71	49.83	0.08	0.06	0.02	0.06	0.02	0.06	50.84
37	13.88	0.69	46.73	0.12	0.13	0.03	0.06	0.05	3.26	51.08
38	14.25	0.68	48.39	0.09	0.06	0.00	0.05	0.01	0.07	49.35
39	14.63	0.91	49.81	0.16	0.05	0.01	0.06	0.02	0.01	51.02
40	15.00	0.82	50.22	0.04	0.04	0.02	0.07	0.01	0.07	51.28
41	15.38	0.50	47.97	0.15	0.06	0.01	0.03	0.03	0.06	48.81
42	15.75	0.80	51.06	0.04	0.06	0.02	0.04	0.01	0.04	52.06
43	16.13	1.28	49.58	0.06	0.04	0.01	0.14	0.02	0.03	51.15
46	17.25	0.39	48.20	0.18	0.14	0.00	0.04	0.08	0.10	49.13
47	17.63	16.66	29.12	0.06	0.07	0.07	0.00	0.04	3.56	49.58
48	18.00	0.73	49.84	0.05	0.05	0.02	0.07	0.03	0.09	50.88
49	18.38	0.72	50.70	0.07	0.05	0.00	0.05	0.00	0.08	51.68
50	18.75	0.62	48.31	0.08	0.06	0.02	0.05	0.02	0.04	49.20
52	19.50	0.69	48.50	0.11	0.03	0.01	0.04	0.01	0.07	49.47
53	19.88	0.44	48.50	0.13	0.06	0.02	0.03	0.01	0.04	49.23
54	20.25	0.51	50.45	0.12	0.05	0.01	0.05	0.01	0.00	51.19
56	21.00	0.70	48.09	0.13	0.12	0.00	0.09	0.02	0.08	49.23
57	21.38	0.77	48.04	0.13	0.09	0.01	0.06	0.00	0.04	49.13
Minimum		0.33	28.76	0.04	0.02	0.00	0.00	0.00	0.00	48.50
Mean		1.37	48.72	0.10	0.19	0.02	0.06	0.02	0.33	50.80
Maximum		16.66	51.77	0.18	5.37	0.07	0.17	0.12	4.84	52.63

Table 1B. Microprobe analyses from sample Z1, 1345.23 m rejected because of low total weight percentages.

No.	dist .(µm)	MgO	CaO	BaO	SiO_2	MnO	SrO	Al_2O_3	FeO	Total
5	1.88	0.23	28.82	0.03	0.05	0.03	0.05	0.02	0.16	29.38
13	4.88	0.00	0.10	0.05	0.30	0.00	0.03	0.00	0.00	0.48
15	5.63	0.16	34.65	0.10	0.15	0.03	0.03	0.02	0.03	35.17
17	6.38	0.00	0.09	0.02	0.29	0.00	0.00	0.01	0.00	0.42
24	9.00	0.52	46.35	0.07	0.09	0.04	0.03	0.01	0.05	47.15
25	9.38	0.10	13.54	0.12	0.06	0.00	0.01	0.02	0.06	13.90
34	12.75	0.54	45.17	0.15	11.27	0.03	0.05	0.02	0.05	57.29
35	13.13	0.24	41.82	0.10	0.05	0.04	0.02	0.01	0.10	42.37
44	16.50	0.26	34.51	0.09	8.03	0.01	0.06	0.05	0.03	43.03
45	16.88	0.08	7.72	0.07	0.37	0.01	0.00	0.00	0.03	8.28
51	19.13	0.41	46.80	0.12	0.09	0.04	0.05	0.02	0.02	47.54
55	20.63	0.13	12.95	0.14	0.06	0.02	0.01	0.02	0.00	13.32
58	21.75	0.71	45.17	0.05	0.05	0.01	0.06	0.02	0.03	46.11
59	22.13	7.07	17.90	0.12	0.08	0.13	0.00	0.02	3.83	29.15
60	22.50	0.15	22.18	0.08	0.06	0.02	0.01	0.00	0.08	22.56

Table 2A. Weight percent data for analyses from sample Z12, 1352.40 m. See Fig. 8 for location of transect.

No.	Dist (mm)	MgO	CaO	BaO	SiO2	MnO	SrO	Al_2O_3	FeO	Total
1	0.4	16.50	31.45	0.09	0.27	0.01	0.03	0.12	0.10	48.56
2	0.7	0.98	46.84	0.06	0.27	0.03	0.05	0.12	0.06	48.41
3	1.1	18.55	28.49	0.15	0.35	0.02	0.02	0.17	0.68	48.42
4	1.4	18.36	28.61	0.08	0.15	0.03	0.05	0.11	0.80	48.20
10	3.6	0.64	43.85	0.13	2.53	0.00	0.03	1.26	0.11	48.55
11	4.0	0.37	47.91	0.11	0.36	0.02	0.05	0.15	0.06	49.02
12	4.3	18.12	26.90	0.12	5.22	0.02	0.03	0.11	0.31	50.83
13	4.7	0.45	50.56	0.16	0.09	0.01	0.04	0.03	0.13	51.46
15	5.4	10.99	36.83	0.09	0.34	0.02	0.06	0.16	0.96	49.45
16	5.8	0.49	48.91	0.08	0.07	0.00	0.07	0.01	0.02	49.64
17	6.2	0.43	48.10	0.07	0.07	0.02	0.06	0.00	0.08	48.82
18	6.5	0.40	46.60	0.12	6.91	0.00	0.07	0.19	0.04	54.32
19	6.9	18.90	28.24	0.07	0.42	0.01	0.03	0.25	0.56	48.48
20	7.2	0.30	48.47	0.13	0.09	0.02	0.06	0.01	0.12	49.19
21	7.6	0.46	50.04	0.12	0.07	0.03	0.04	0.01	0.09	50.87
22	8.0	0.42	50.42	0.08	0.03	0.00	0.05	0.00	0.08	51.10
26	9.4	3.25	43.65	0.09	0.63	0.00	0.05	0.30	0.34	48.32
27	9.8	0.39	48.44	0.14	0.19	0.01	0.03	0.09	0.03	49.31
28	10.1	0.51	49.27	0.11	0.05	0.03	0.04	0.01	0.11	50.14
30	10.9	0.81	43.53	0.08	2.84	0.00	0.07	0.79	0.09	48.20
31	11.2	0.44	47.72	0.14	0.19	0.00	0.05	0.09	0.04	48.67
32	11.6	0.41	49.47	0.10	0.06	0.00	0.06	0.02	0.03	50.14
33	11.9	0.41	44.36	0.11	5.86	0.02	0.05	0.56	0.12	51.48
34	12.3	0.44	46.90	0.14	0.83	0.00	0.03	0.44	0.03	48.81
36	13.0	0.45	48.81	0.04	0.04	0.00	0.04	0.02	0.05	49.44
37	13.4	0.46	49.33	0.03	0.10	0.01	0.05	0.02	0.04	50.05
38	13.8	0.49	48.83	0.17	0.06	0.00	0.05	0.01	0.03	49.64
39	14.1	0.50	49.67	0.10	0.06	0.02	0.03	0.03	0.04	50.45
40	14.5	0.44	49.16	0.10	0.07	0.02	0.05	0.03	0.03	49.90
41	14.8	18.70	28.62	0.08	0.25	0.03	0.02	0.10	0.23	48.01
42	15.2	3.35	43.39	0.12	1.53	0.00	0.03	0.80	0.28	49.51
43	15.6	0.94	48.30	0.09	0.10	0.02	0.07	0.02	0.04	49.58
44	15.9	0.39	49.63	0.08	0.06	0.00	0.04	0.02	0.16	50.37
47	17.0	0.42	49.13	0.10	0.01	0.01	0.03	0.02	0.07	49.78
48	17.4	0.68	49.50	0.13	0.33	0.01	0.07	0.00	0.01	50.73
49	17.7	1.00	46.44	0.18	0.50	0.00	0.04	0.18	0.05	48.38
50	18.1	18.45	28.46	0.12	1.19	0.00	0.00	0.33	0.16	48.70
54	19.5	0.37	50.84	0.10	0.06	0.02	0.05	0.01	0.12	51.57
56	20.3	0.55	49.01	0.14	0.03	0.02	0.06	0.01	0.08	49.90
59	21.4	12.17	28.13	0.14	4.84	0.02	0.01	2.73	0.95	48.99
Minimum		0.30	26.90	0.03	0.01	0.00	0.00	0.00	0.01	48.01
Mean		4.31	43.82	0.11	0.93	0.01	0.04	0.23	0.18	49.63
Maximum		18.90	50.84	0.18	6.91	0.03	0.07	2.73	0.96	54.32

Table 2B. Microprobe analyses for sample Z12, 1352.40 m rejected because of low total weight percentages or other anomalous data points.

No.	Dist (mm)	MgO	CaO	BaO	SiO2	MnO	SrO	Al_2O_3	FeO	Total
5	1.8	0.06	8.06	0.01	0.28	0.00	0.01	0.00	0.01	8.43
6	2.2	0.42	45.00	0.06	1.14	0.02	0.05	0.59	0.04	47.31
7	2.5	0.39	46.35	0.04	0.36	0.00	0.04	0.20	0.06	47.44
8	2.9	5.75	33.26	0.10	24.83	0.02	0.11	0.03	0.18	64.27
9	3.3	0.05	13.32	0.11	0.05	0.01	0.00	0.02	0.01	13.56
14	5.1	0.33	46.22	0.14	0.08	0.02	0.04	0.02	0.03	46.88
23	8.3	9.93	32.13	0.10	1.07	0.01	0.05	0.67	0.61	44.56
24	8.7	0.29	36.92	0.07	0.28	0.01	0.05	0.14	0.04	37.80
25	9.1	0.27	18.20	0.10	60.54	0.03	0.25	1.07	0.14	80.60
29	10.5	0.52	42.61	0.07	2.72	0.02	0.03	0.97	0.09	47.03
35	12.7	11.73	22.65	0.06	0.13	0.02	0.01	0.03	0.44	35.07
45	16.3	5.26	30.34	0.10	3.74	0.03	0.06	2.05	0.49	42.06
46	16.7	0.03	0.29	0.06	46.90	0.01	0.14	37.71	0.01	85.14
51	18.5	2.48	31.62	0.04	5.11	0.02	0.03	3.45	0.65	43.41
52	18.8	0.14	31.85	0.15	0.12	0.02	0.00	0.03	0.05	32.35
53	19.2	0.34	27.67	0.11	0.09	0.02	0.00	0.03	0.13	28.39
55	19.9	1.16	36.19	0.06	3.66	0.03	0.03	1.46	0.19	42.77
57	20.6	0.32	43.54	0.13	1.35	0.00	0.04	0.63	0.08	46.08
58	21.0	1.80	38.52	0.09	3.77	0.00	0.03	1.92	0.25	46.39
60	21.7	12.55	22.23	0.08	0.17	0.01	0.01	0.08	0.44	35.57

Table 3A. Weight percent data for analyses from sample Z20, 1359.04 m. See Fig. 12 for location of transect.

No.	Dist (µm)	MgO	CaO	BaO	SiO_2	MnO	SrO	Al_2O_3	FeO	Total
3	1.1	17.58	27.62	0.10	0.08	0.05	0.03	0.05	2.16	47.67
6	2.2	18.15	27.94	0.10	0.05	0.04	0.01	0.04	2.25	48.58
7	2.5	0.86	46.51	0.15	0.09	0.00	0.06	0.05	0.04	47.75
9	3.2	0.83	49.62	0.05	0.06	0.01	0.05	0.01	0.04	50.67
10	3.6	0.79	49.01	0.03	0.09	0.00	0.06	0.00	0.02	49.99
11	3.9	0.25	49.27	0.07	0.07	0.02	0.06	0.02	0.08	49.83
12	4.3	0.75	49.87	0.09	0.05	0.00	0.03	0.00	0.00	50.78
14	5.0	0.42	48.80	0.13	0.06	0.00	0.07	0.01	0.05	49.53
20	7.2	0.31	48.48	0.06	0.04	0.01	0.04	0.00	0.07	49.02
21	7.5	0.68	47.34	0.12	0.08	0.01	0.03	0.01	0.03	48.30
22	7.9	0.42	48.45	0.07	0.13	0.00	0.03	0.06	0.02	49.18
23	8.3	0.68	48.20	0.07	0.19	0.02	0.08	0.04	0.01	49.29
24	8.6	0.57	46.65	0.12	0.09	0.00	0.09	0.01	0.00	47.53
26	9.3	0.38	46.18	0.08	0.30	0.01	0.06	0.11	0.08	47.19
28	10.1	0.32	48.37	0.11	0.05	0.02	0.06	0.04	0.00	48.95
29	10.4	0.51	47.70	0.08	0.05	0.02	0.07	0.04	0.05	48.52
34	12.2	0.37	49.18	0.13	0.12	0.00	0.03	0.04	0.01	49.88
35	12.6	0.79	48.89	0.06	0.05	0.00	0.09	0.01	0.01	49.91
36	12.9	0.63	47.78	0.10	0.12	0.00	0.04	0.06	0.03	48.77
37	13.3	0.71	48.46	0.05	0.14	0.01	0.04	0.03	0.02	49.47
38	13.6	0.66	48.91	0.09	0.13	0.00	0.04	0.04	0.00	49.87
40	14.4	18.16	28.66	0.08	0.06	0.04	0.03	0.01	1.35	48.39
41	14.7	17.99	28.84	0.05	0.05	0.04	0.02	0.03	1.32	48.34
42	15.1	0.34	48.72	0.13	0.05	0.00	0.05	0.01	0.12	49.43
43	15.4	0.71	48.53	0.15	0.06	0.01	0.08	0.01	0.01	49.55
44	15.8	0.70	50.26	0.13	0.08	0.02	0.07	0.02	0.02	51.28
45	16.2	0.50	49.31	0.10	0.07	0.00	0.01	0.00	0.09	50.08
46	16.5	0.57	46.69	0.11	0.10	0.02	0.03	0.04	0.01	47.56
50	18.0	0.72	47.81	0.10	0.04	0.02	0.10	0.02	0.00	48.81
51	18.3	0.40	47.22	0.01	0.05	0.01	0.03	0.02	0.13	47.86
52	18.7	0.75	48.38	0.14	0.08	0.00	0.04	0.04	0.00	49.42
53	19.0	0.70	46.40	0.13	0.11	0.03	0.05	0.05	0.01	47.48
54	19.4	0.55	48.83	0.11	0.07	0.00	0.03	0.00	0.00	49.60
55	19.7	1.21	49.19	0.03	0.05	0.00	0.02	0.02	0.00	50.52
57	20.5	0.46	46.40	0.17	0.11	0.02	0.03	0.02	0.02	47.22
58	20.8	0.71	47.00	0.15	0.13	0.00	0.04	0.03	0.00	48.05
Minimum		0.25	27.62	0.01	0.04	0.00	0.01	0.00	0.00	47.19
Mean		2.53	45.98	0.10	0.09	0.01	0.05	0.03	0.22	49.01
Maximum		18.16	50.26	0.17	0.30	0.05	0.10	0.11	2.25	51.28

Table 3B. Microprobe analyses from sample Z20, 1359.04 m rejected because of low total weight percentages or other anomalous values.

No.	Dist (μm)	MgO	CaO	BaO	SiO_2	MnO	SrO	Al_2O_3	FeO	Total
1	0.4	0.16	2.44	0.03	0.04	0.00	0.02	0.02	0.02	2.74
2	0.7	16.25	27.47	0.07	0.11	0.04	0.01	0.05	2.35	46.35
4	1.4	15.08	26.82	0.08	0.08	0.05	0.01	0.05	2.30	44.47
5	1.8	11.67	23.91	0.05	0.07	0.04	0.03	0.01	2.10	37.86
8	2.9	0.37	44.87	0.08	0.08	0.04	0.01	0.02	0.23	45.70
13	4.7	0.19	42.19	0.12	0.58	0.00	0.01	0.22	0.05	43.36
15	5.4	0.55	45.52	0.09	0.07	0.00	0.05	0.00	0.02	46.30
16	5.7	0.20	30.61	0.08	0.14	0.01	0.05	0.02	0.01	31.11
17	6.1	0.34	38.04	0.07	0.09	0.03	0.02	0.02	0.03	38.64
18	6.5	0.11	18.75	0.06	0.25	0.01	0.02	0.02	0.03	19.25
19	6.8	0.11	12.44	0.11	0.05	0.01	0.02	0.01	0.01	12.75
25	9.0	0.17	21.22	0.05	0.31	0.00	0.04	0.02	0.03	21.83
27	9.7	0.09	17.47	0.05	0.17	0.01	0.02	0.00	0.00	17.81
30	10.8	0.35	43.02	0.07	0.40	0.00	0.07	0.20	0.03	44.15
31	11.1	0.51	45.26	0.03	0.25	0.02	0.04	0.08	0.02	46.19
32	11.5	0.56	45.88	0.17	0.18	0.03	0.05	0.07	0.03	46.97
33	11.8	0.08	12.23	0.13	0.14	0.00	0.03	0.09	0.04	12.72
39	14.0	0.14	12.79	0.04	0.23	0.01	0.03	0.03	0.00	13.25
47	16.9	0.06	11.10	0.07	81.03	0.00	0.27	0.18	0.01	92.72
48	17.2	0.36	45.39	0.11	0.05	0.00	0.05	0.01	0.03	46.01
49	17.6	0.51	37.87	0.10	1.10	0.02	0.04	0.03	0.02	39.69
56	20.1	0.31	7.12	0.09	50.56	0.00	0.06	0.91	0.02	59.07
59	21.2	0.43	45.33	0.07	0.08	0.00	0.06	0.00	0.01	45.98
60	21.5	0.11	12.20	0.15	0.07	0.00	0.00	0.00	0.00	12.54

Table 4. Comparison of average weight % for elements from samples Z1, Z12, and Z20.

Sample	N	MgO			CaO			BaO		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Z1	45	0.33	1.37	16.66	28.76	48.72	51.77	0.04	0.10	0.18
Z12	38	0.30	4.31	18.90	26.90	43.82	50.84	0.03	0.11	0.18
Z20	36	0.25	2.53	18.16	27.62	45.98	50.26	0.01	0.10	0.17

Sample	N	SiO_2			MnO			SrO		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Z1	45	0.02	0.19	5.37	0.00	0.02	0.07	0.00	0.06	0.17
Z12	38	0.01	0.93	6.91	0.00	0.01	0.03	0.00	0.04	0.07
Z20	36	0.04	0.09	0.30	0.00	0.01	0.05	0.01	0.05	0.10

Sample	N	Al_2O_3			FeO			Total wt %		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Z1	45	0.00	0.02	0.12	0.00	0.33	4.84	48.50	50.80	52.63
Z12	38	0.00	0.23	2.73	0.01	0.18	0.96	48.01	49.63	54.32
Z20	36	0.00	0.03	0.11	0.00	0.22	2.25	47.19	49.01	51.28

Table 5. Correlation coefficients between all variables. Based on all valid data points from samples Z1, Z12, and Z20. N=121. Highlighted cells denote R > 0.60.

	CaO	MgO	BaO	SiO_2	MnO	SrO	Al_2O_3	FeO	Total wt.
CaO	1.00	-0.96	0.03	-0.29	-0.43	0.44	-0.34	-0.60	0.45
MgO		1.00	-0.10	0.14	0.46	-0.41	0.19	0.60	-0.30
BaO			1.00	0.16	-0.18	0.02	0.15	-0.12	-0.13
SiO_2				1.00	-0.07	-0.07	0.55	0.00	0.10
MnO					1.00	-0.26	-0.05	0.61	-0.06
SrO						1.00	-0.20	-0.31	0.24
Al_2O_3							1.00	0.08	-0.16
FeO								1.00	-0.10
Total wt.									1.00

presence/absence of dolomite. These data show that the calcite and dolomite are non-ferroan varieties.

BaO: The BaO content ranges from 0.01 to 0.18 wt % with an average of ~ 0.10 wt % in each of the three samples.

SiO_2: The SiO_2 content ranges from 0.01 to 6.91 wt % with averages between 0.09 to 0.93 wt % for the three samples. Those points with higher SiO_2 values probably areas that have undergone partial silicification.

MnO: The MnO content ranges from 0.0 to 0.07 wt % with averages of 0.01 to 0.02 wet %.

SrO: The SrO content ranges from 0.0 to 0.17 wt % with averages of 0.04 to 0.06 wt %.

Al_2O_3: The Al_2O_3 content ranges from 0.0 to 2.73 wt % with averages of 0.02 and 0.03 wt % in samples Z1 and Z20, respectively, but 2.73 wt % in sample Z12. The reason for the higher values in sample Z12 is unknown but may be related to the presence of clay.

FeO: The FeO content ranges from 0.0 to 4.84 wt % with averages from 0.18 to 0.33 wt %. The higher values probably reflect the presence of pyrite.

There are few well-defined relationships between these compounds (Table 5, Figs. 2, 3). As expected, the strongest correlation is between the MgO and CaO since this simply reflects the composition of calcite as opposed to dolomite (Fig. 2). The high correlation coefficient between these two parameters is misleading because most of the data points fall into either the calcite cluster or the dolomite cluster (Fig. 2). Rare points between these two clusters represent points that are averages between the two minerals. Similarly, the correlation coefficent of -0.60 between the CaO and FeO (Fig. 3F), 0.60 between MgO and FeO, and 0.61 between MnO and FeO are artifacts related to clustering of the data points and should be disregarded.

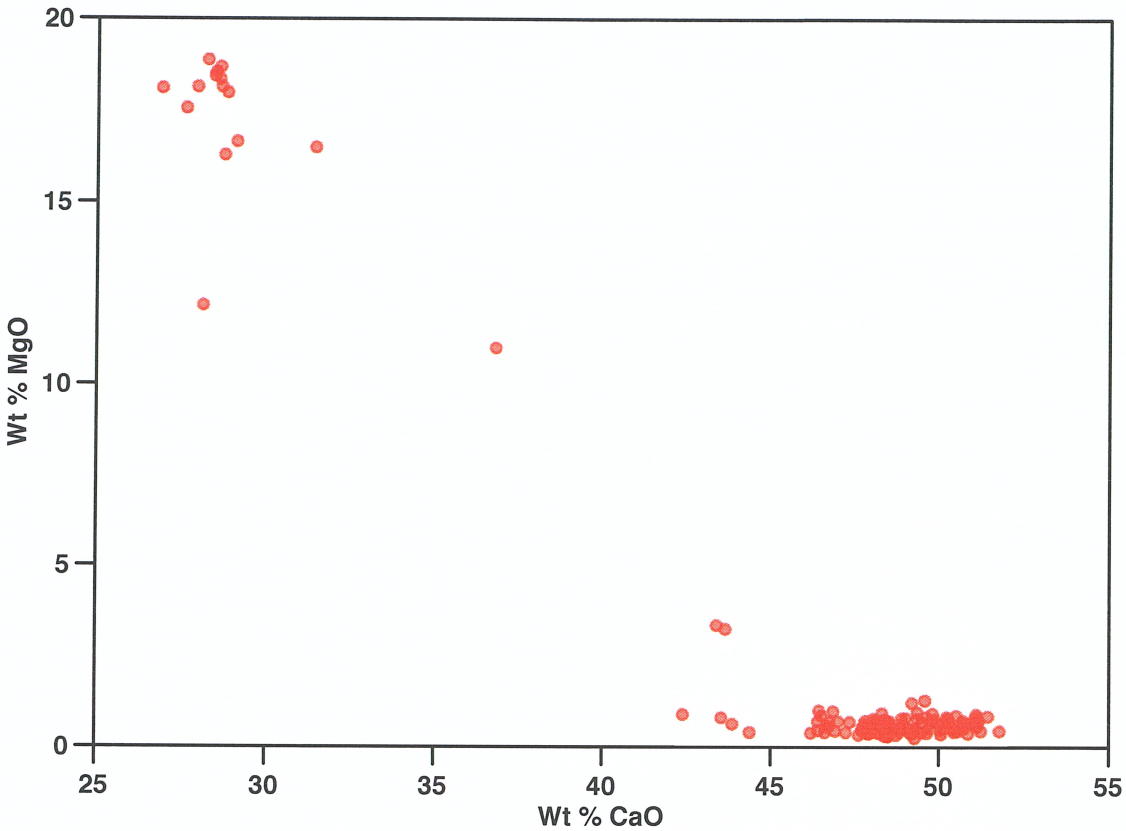
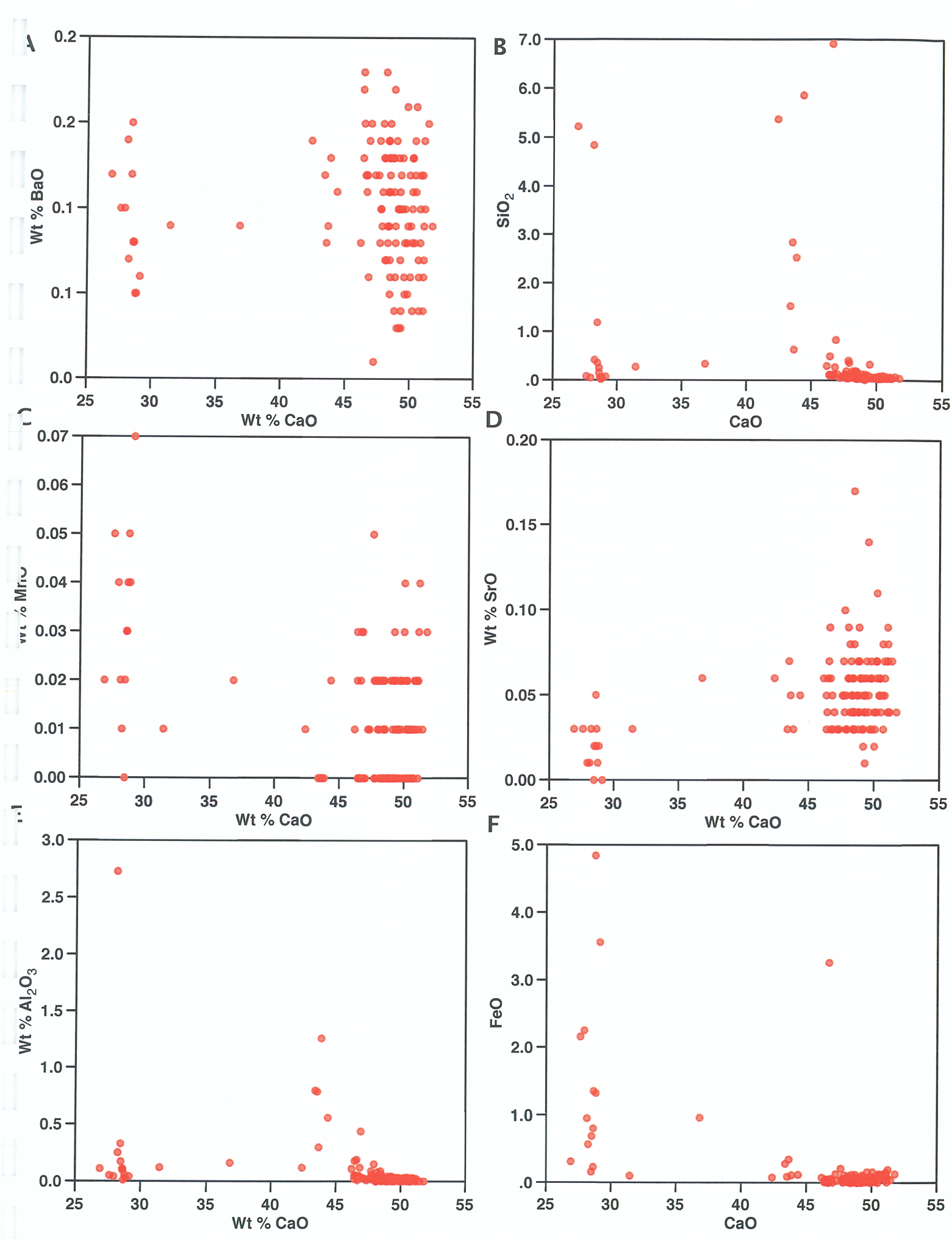


Figure 2. Weight % CaO versus weight % MgO for all valid analysis points from samples Z1, Z12, and Z20.

Figure 3. (Next page): Weight % (A) BaO, (B) SiO2, (C) MnO, (D) SrO, (E) Al2O3, and (F) FeO versus weight % CaO for all valid analysis points from samples Z1, Z12, and Z20.


A
Wt % BaO
Wt % CaO
B
SiO2
CaO
D
Wt % SrO
Wt % CaO
Wt % Al2O3
Wt % CaO
F
FeO
CaO

SAMPLE Z1 (1345.23 m)

Figures 4–7

Analyses from the transect across this sample (Fig. 4) produced 45 reliable data sets with 48 to 53 total wt % (Fig. 5). The CaO content was consistent except where dolomite was encountered (Fig. 6A). The BaO, SrO, and MnO contents, all less than 0.2 wt %, varied along with the transect with no readily apparent pattern (Fig. 6). The SiO_2, FeO, and Al_2O_3 contents displayed slightly more variability with local increases in the FeO content probably reflecting the presence of pyrite and increases in SiO_2 being due to local silicification (Fig. 7).

SAMPLE Z12 (1352.40 m)

Figures 8–11

Analyses from the transect across this sample (Fig. 8) produced 38 reliable data sets with 48 to 53 total wt % (Fig. 9). In most cases, however, the total wt % was less than 52% (Fig. 9) The CaO content was consistent except where dolomite was encountered (Fig. 10A). Compared to sample Z1, this sample contains more dolomite. The BaO, SrO, and MnO contents, all less than 0.2 wt %, varied along with the transect with no readily apparent pattern (Fig. 10B). The SiO_2, FeO, and Al_2O_3 contents are variable with local increases in SiO_2 probably due to silicification and increases in FeO probably due to pyrite (Fig. 11).

SAMPLE Z20 (1359.04 m)

Figures 12–15

Analyses from the transect across this sample (Fig. 12) produced 36 reliable data sets with 47 to 51 total wt % (Fig. 9). In general, the total weight percentages were lower than for samples Z1 and Z12, probably because this sample had higher microporosity than Z1 and Z12. The CaO content was consistent except where dolomite was encountered (Fig. 14A). The BaO, SrO, and MnO contents, all less than 0.2 wt %, varied along with the transect with no readily apparent pattern (Fig. 14B). The SiO_2, FeO, and Al_2O_3 contents are variable with local increases in FeO probably due to pyrite (Fig. 15).

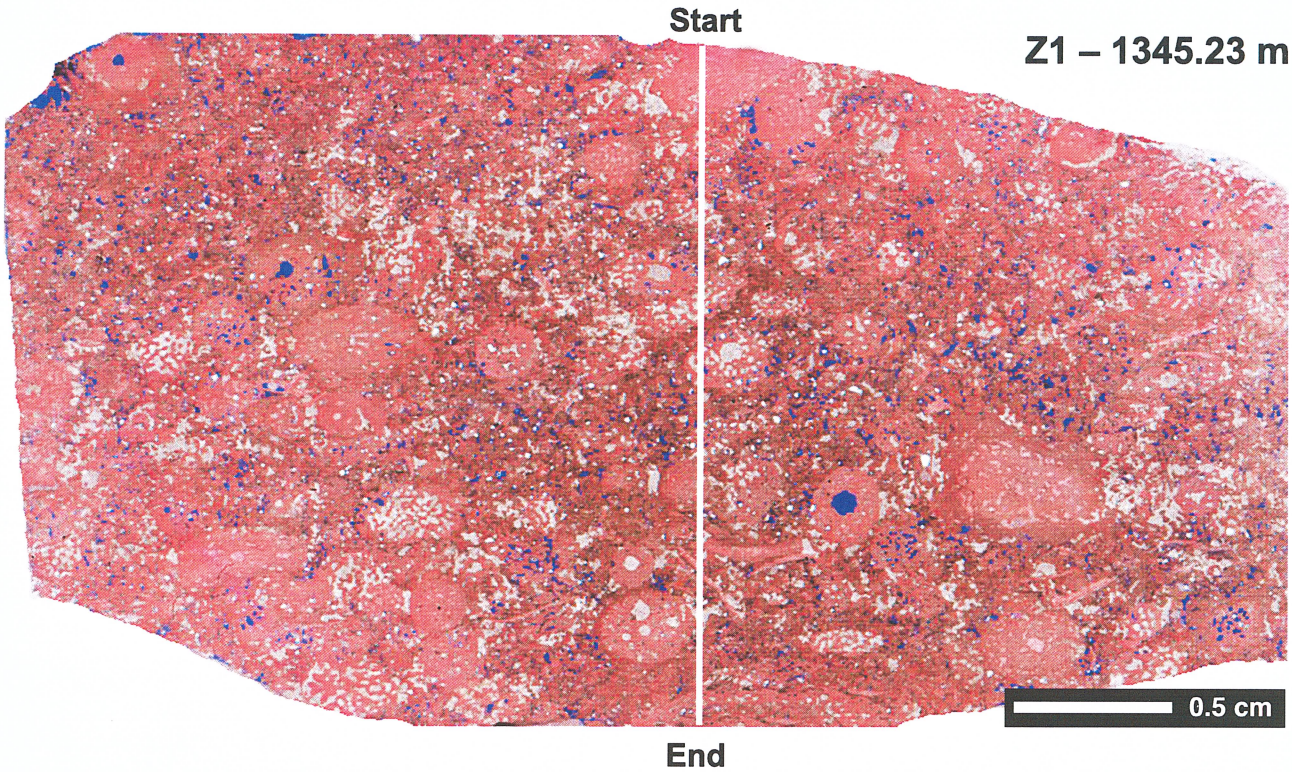


Figure 4: Scan of entire thin section showing *Amphipora* embedded in a peloidal packstone matrix. Dolomite (no stain) fills many of the pores. Note scattered pores (blue). White line indicates transect for microprobe analyses.

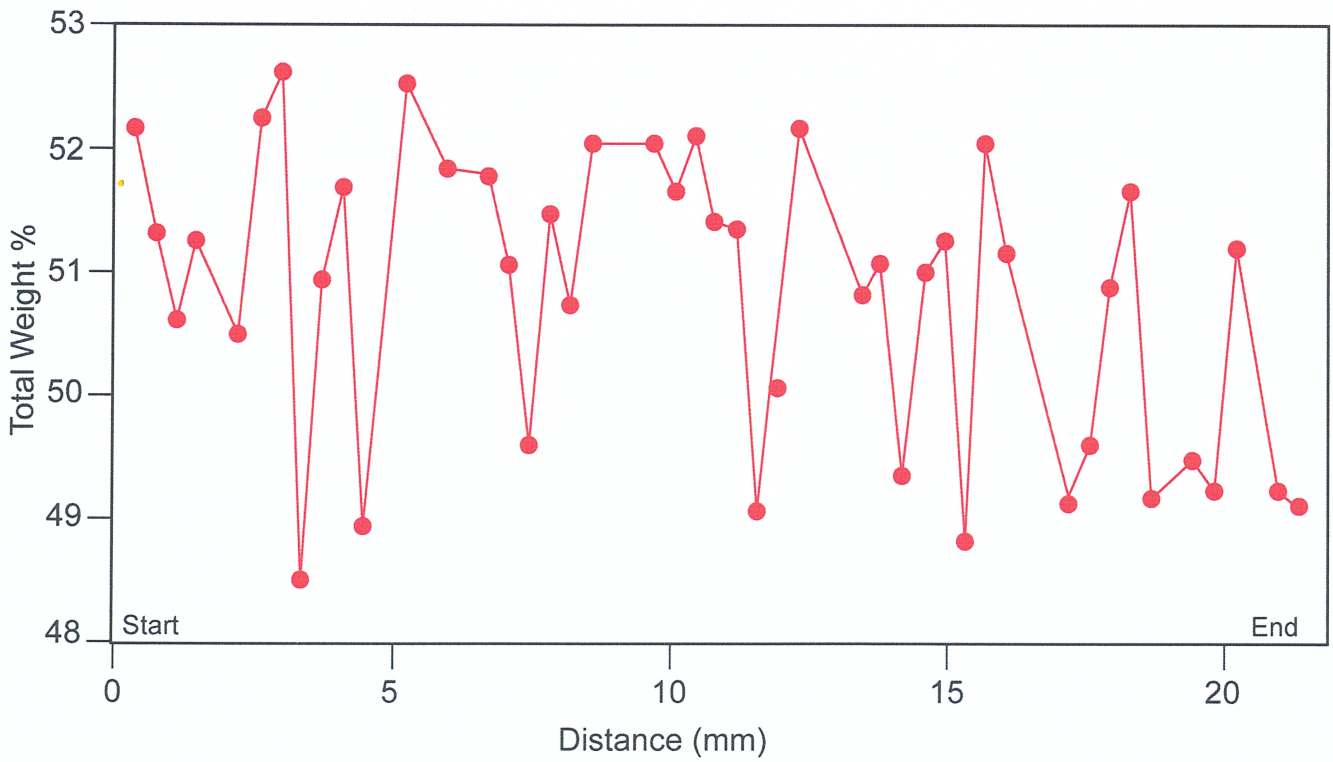


Figure 5: Variations in total weight percent for analyses along transect.

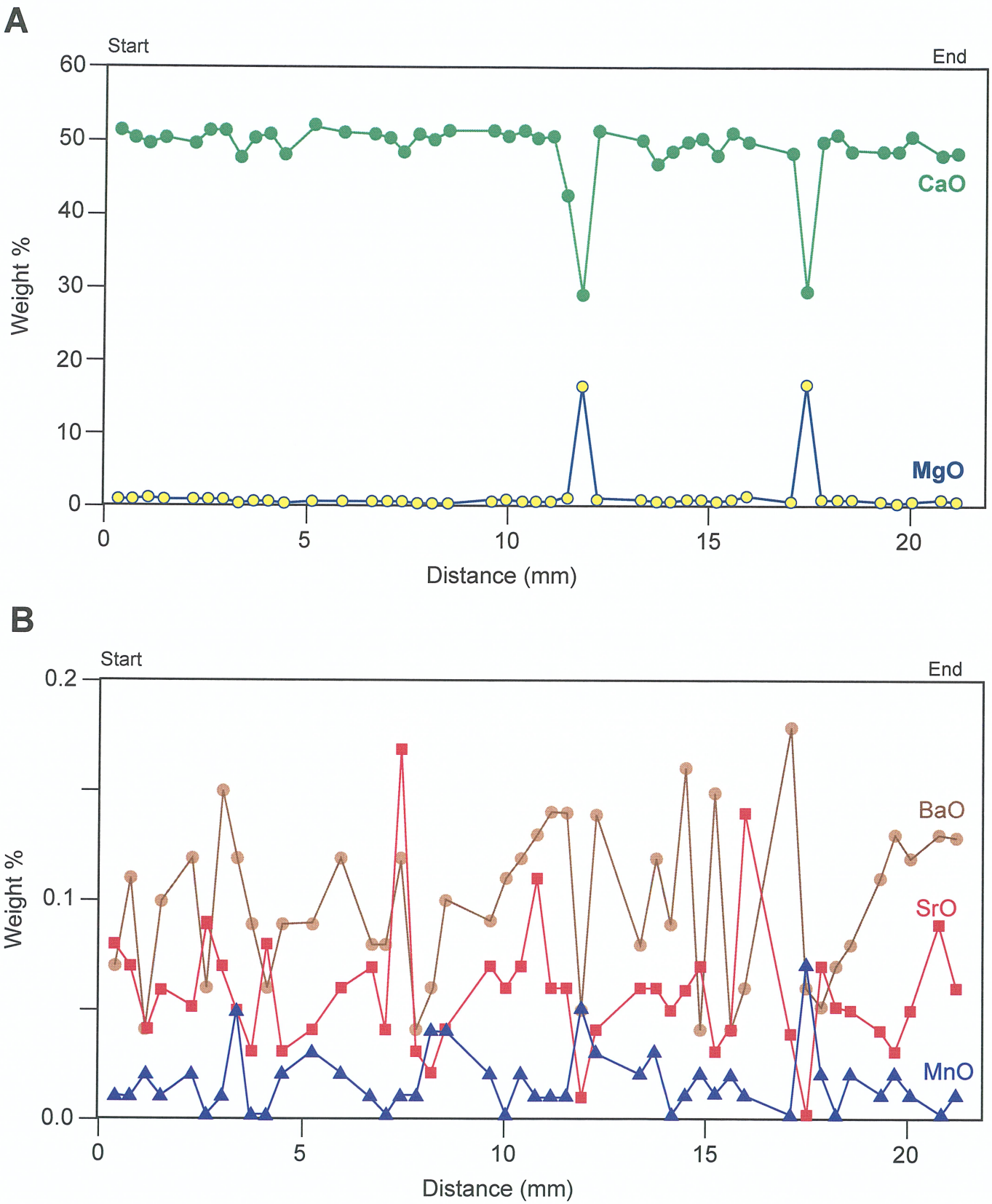


Figure 6. Variations in weight % of (A) Cao and MgO, and (B) BaO, SrO, and MnO along transect across sample Z1. See Figure *A for location of transect; start and end above refer to direction along the transect.

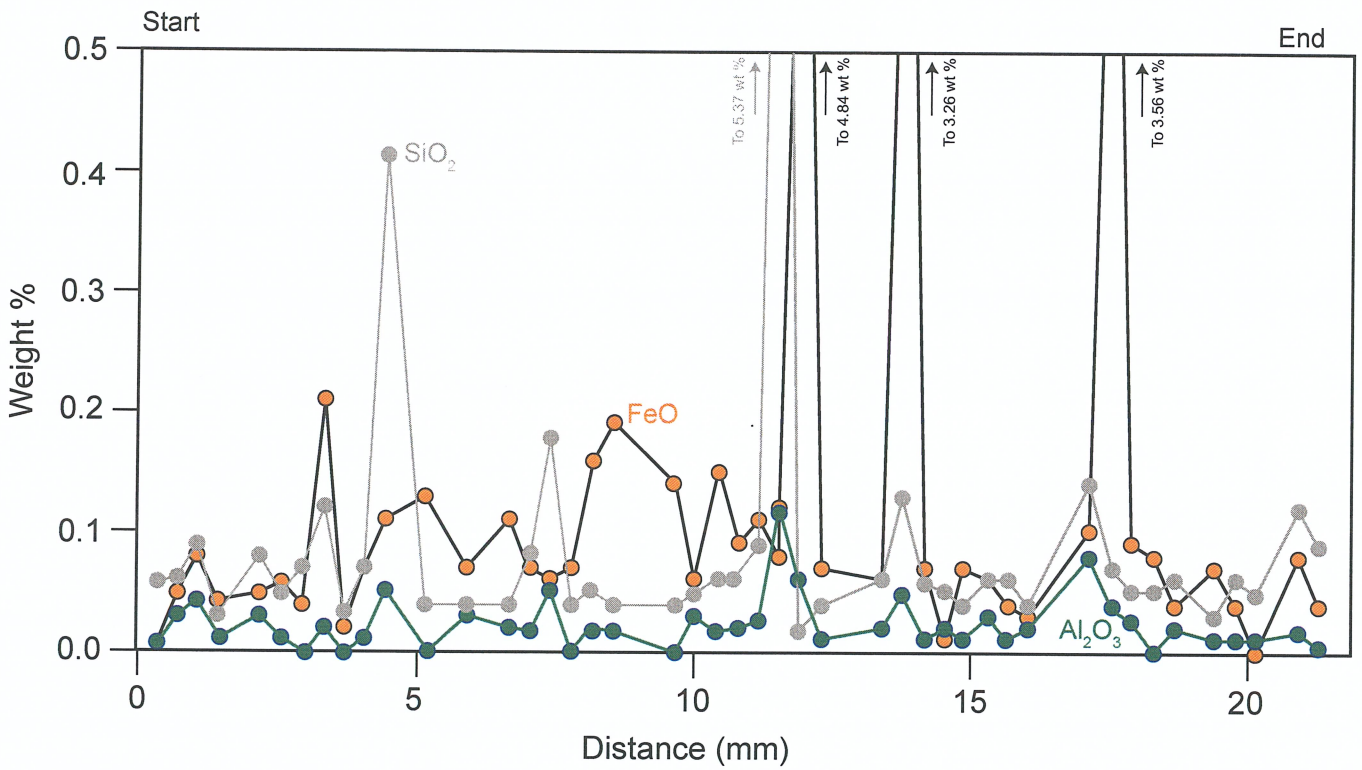


Figure 7. Variations in weight % of SiO_2 and FeO, and Al_2O_3 along transect across sample Z1. See Figure 4A for location of transect; start and end above refer to direction along the transect.

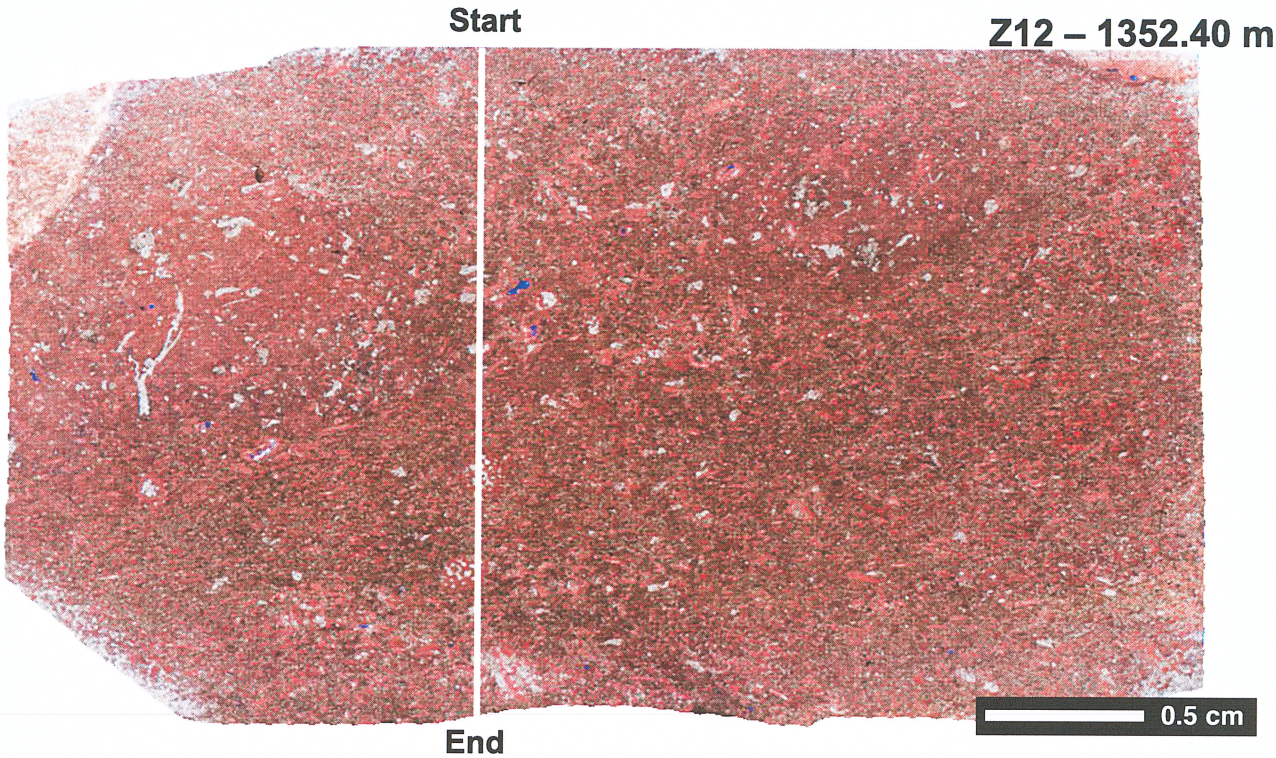


Figure 8: Scan of entire thin section showing dolomitic wackestone matrix with rare *Amphipora* branches and low porosity (blue). White line indicates transect for microprobe analyses.

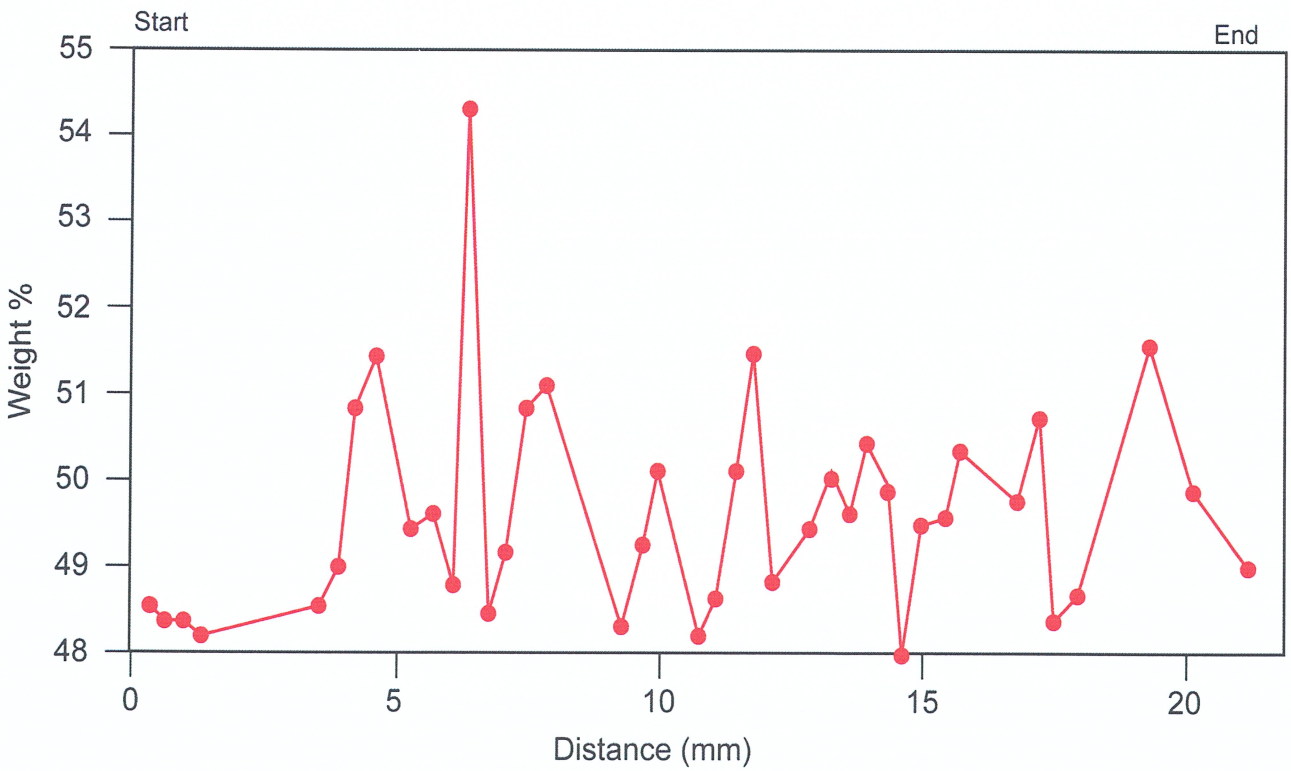


Figure 9: Variations in total weight percent for analyses along transect.

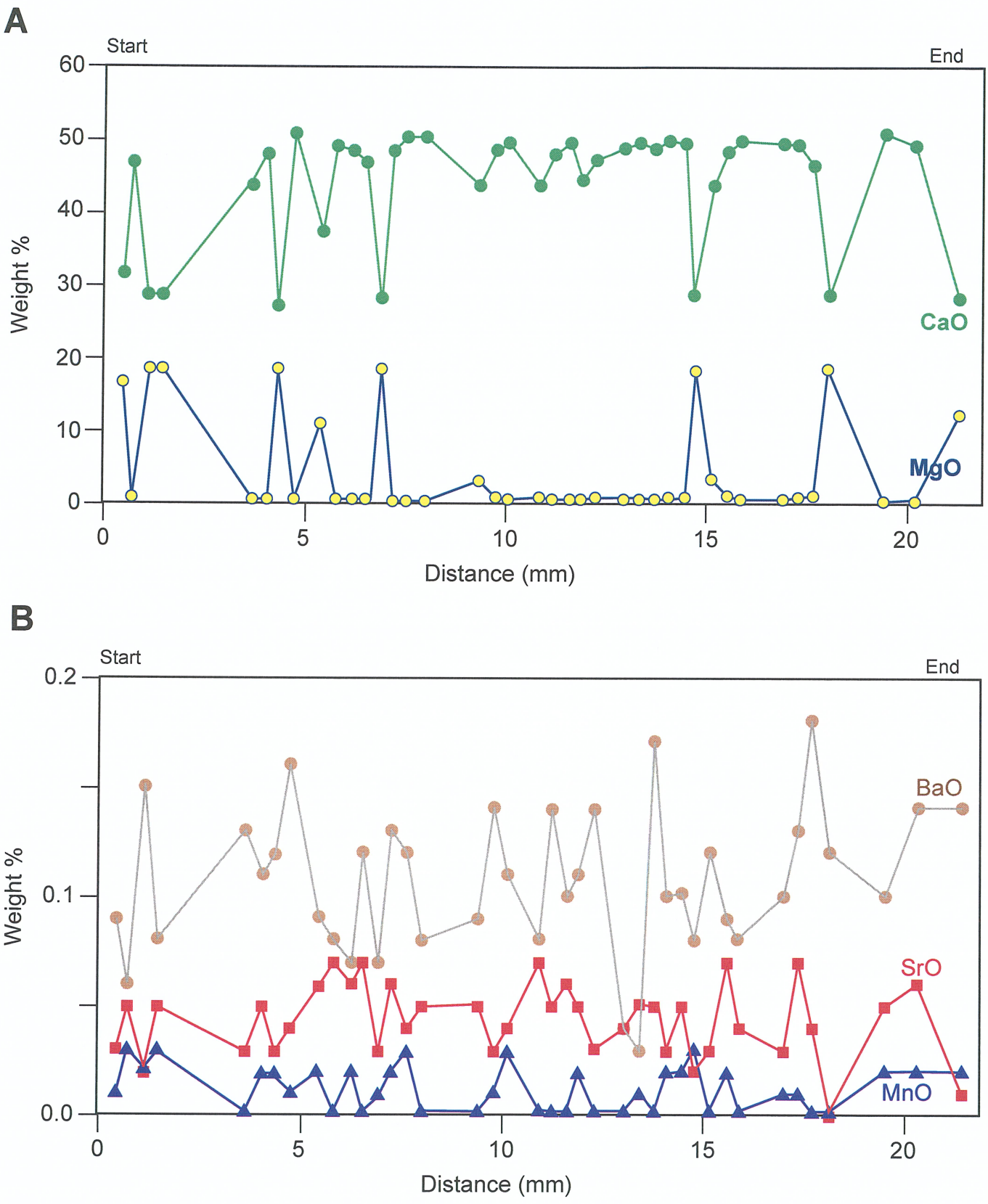


Figure 10. Variations in weight % of (A) Cao and MgO, and (B) BaO, SrO, and MnO along transect across sample Z12. See Figure 8A for location of transect; start and end above refer to direction along the transect.

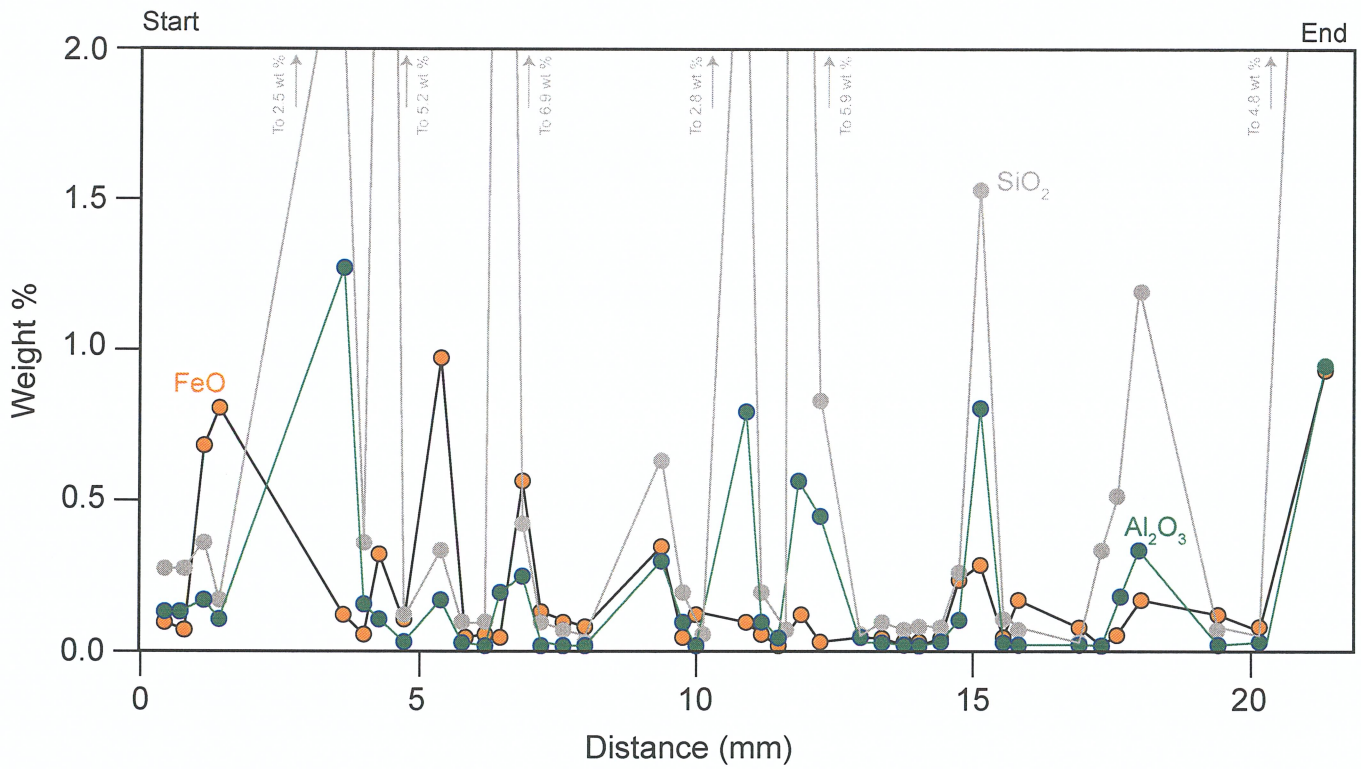


Figure 11. Variations in weight % of SiO_2 and FeO, and Al_2O_3 along transect across sample Z12. See Figure 8A for location of transect; start and end above refer to direction along the transect.

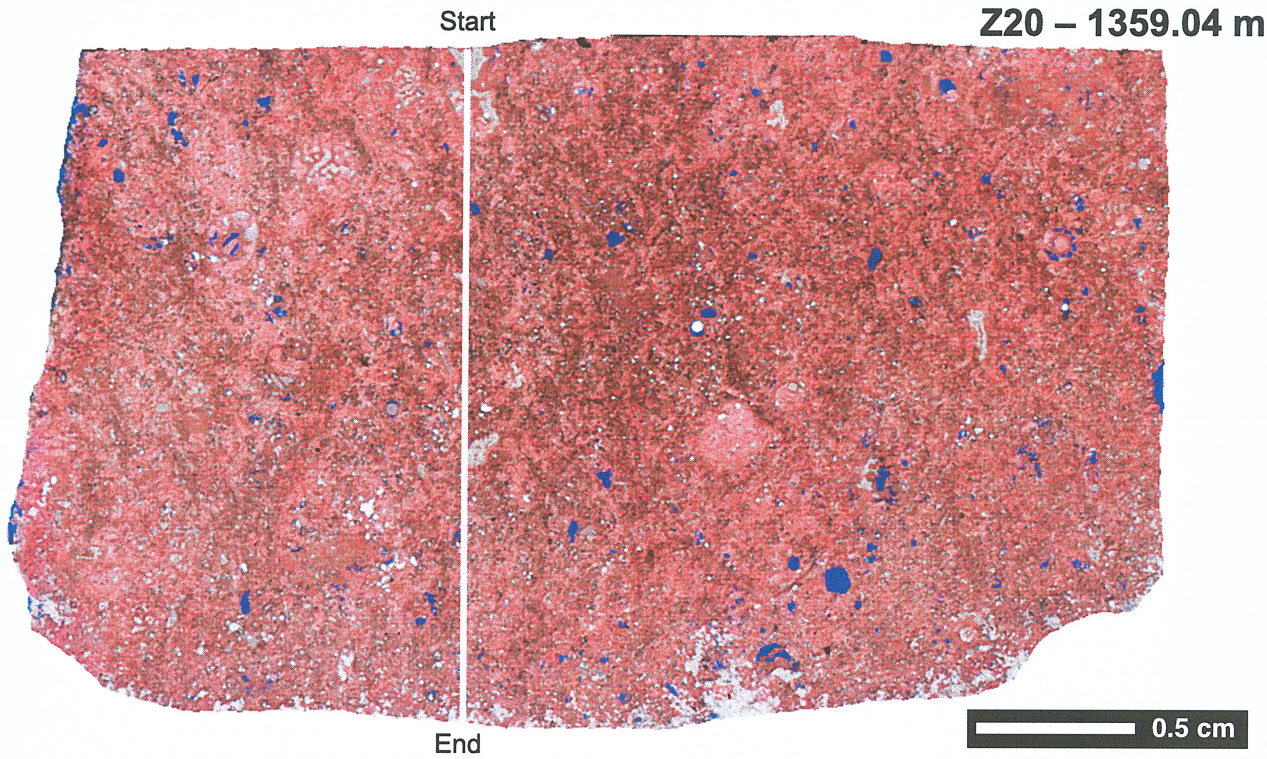


Figure 12: Scan of entire thin section showing peloidal packstone with minor dolomite (no stain) and scattered porosity (blue). White line indicates transect for microprobe analyses.

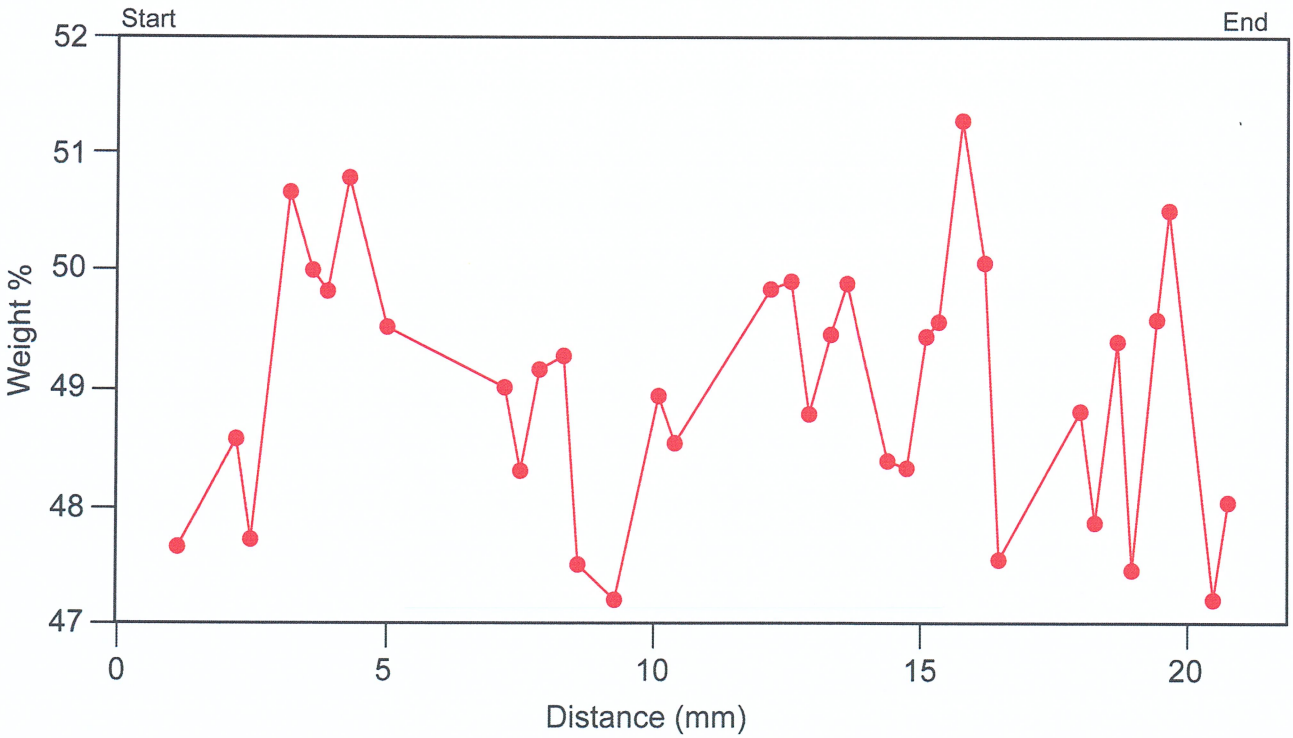


Figure 13: Variations in total weight percent for analyses along transect.

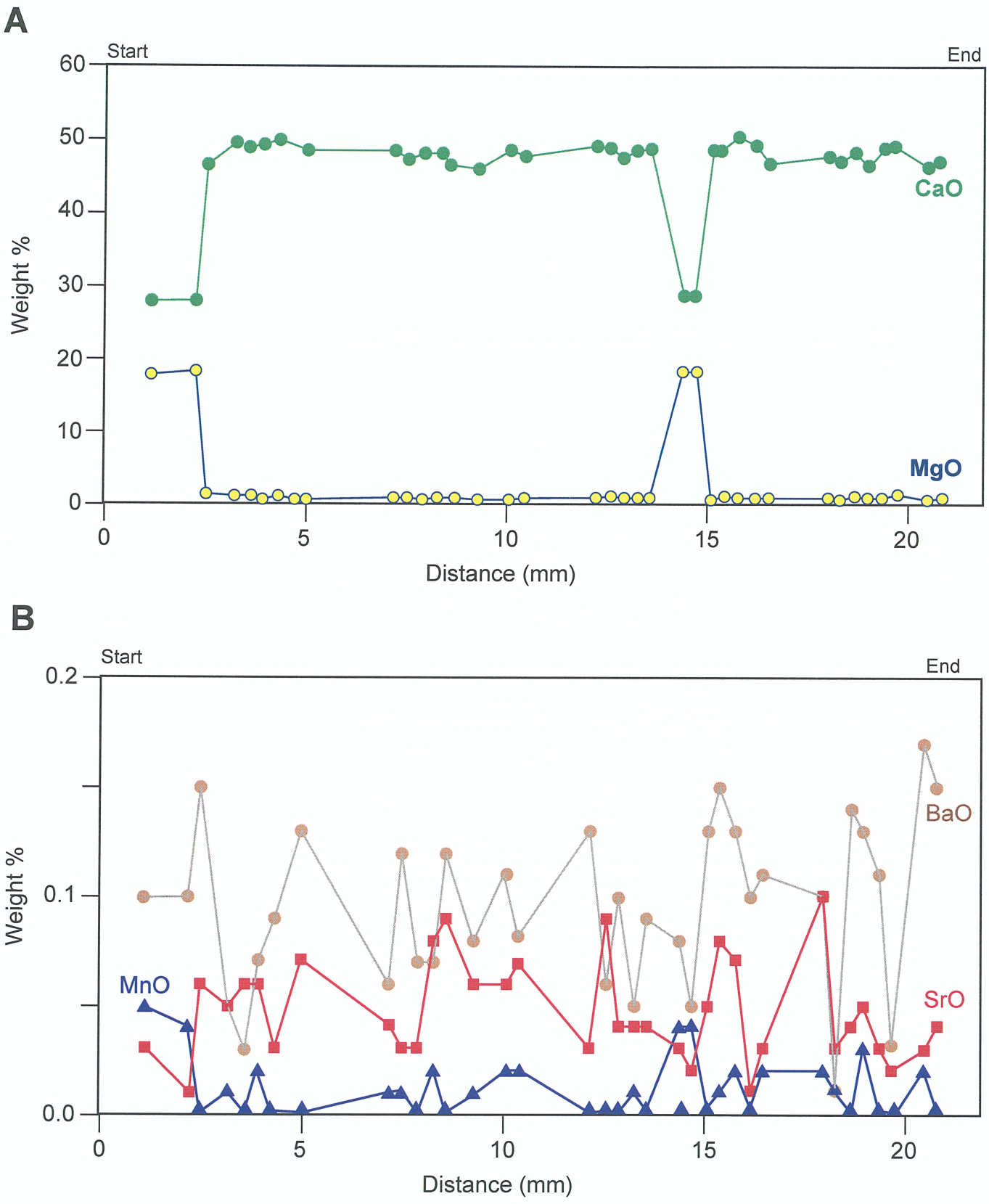


Figure 14. Variations in weight % of (A) Cao and MgO, and (B) BaO, SrO, and MnO along transect across sample Z20. See Figure 12A for location of transect; start and end above refer to direction along the transect.

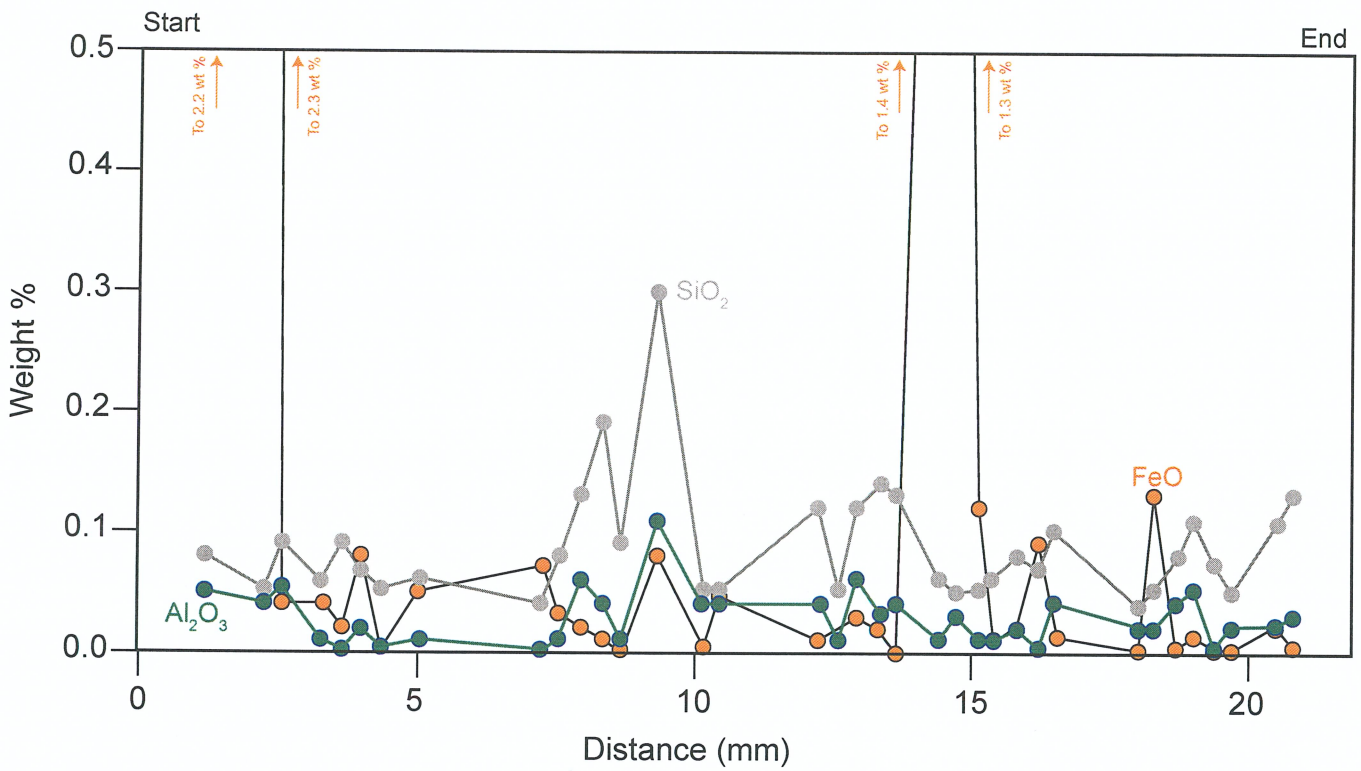


Figure 15. Variations in weight % of SiO_2 and FeO, and Al_2O_3 along transect across sample Z20. See Figure 12A for location of transect; start and end above refer to direction along the transect.