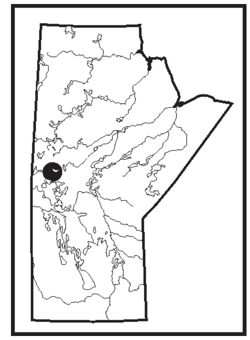
GS-4 Evaluation of an electromagnetic conductor at Reed Lake, Manitoba, using Enzyme Leach[SM] analyses of peat bog and lake sediment (NTS 63K10)

by G.H. Gale



Gale, G.H. 2004: Evaluation of an electromagnetic conductor at Reed Lake, Manitoba, using Enzyme Leach[SM] analyses of peat bog and lake sediment (NTS 63K10); *in* Report of Activities 2004, Manitoba Industry, Economic Development and Mines, Manitoba Geological Survey, p. 43–52.

Summary

Enzyme Leach[SM] analytical data are presented for peat, lake sediment and clay collected in the vicinity of an electromagnetic conductor at Reed Lake. The data show anomalous Zn, Mo, Sb, Au, Mn and As responses associated with the conductor. The elements present in anomalous concentrations are present in exhalite intersected in drillcore at the western end of the property and the responses are consistent with the presence of an electrochemical cell generated by a sulphide body at the eastern end of the conductor.

Introduction

An electromagnetic conductor underlies bog, water and lake sediment at the west end of a small bay on Reed Lake (Figure GS-4-1). Drillcores from holes drilled to test the conductor intersected minor sulphide mineralization and altered rocks in rhyolitic sandstones near the contact between basalt and the underlying rhyolite (Gale, 2002). The presence of a positive Eu anomaly in rock analyses of the drillcores suggest that the drilled portion of this conductor defines a distal exhalite that is probably associated with volcanogenic massive sulphide mineralization.

Cores of peat, lake sediment and underlying glacial clays were collected and analyzed by the Enzyme Leach[SM] analytical method. The objective of this project is to determine if electromagnetic conductors beneath bogs and lake sediment can be effectively evaluated by geochemical methods, in particular, by partial leach methods, prior to undertaking a drill program. Sample data for the clays analyzed in 2003 are available in the MGS Data Repository item 2003001[1]. New data are presented here for peat samples collected immediately above the clay-peat interface and are available in Data Repository item 2004004[2]. The clay sample data suggest that a large electrochemical cell exists at the eastern end of the conductor (Gale, 2003). This report provides an evaluation of both peat and clay Enzyme Leach[SM] data and discusses the implications for exploration.

Analytical data

Peat and lake bottom sediment cores were obtained by inserting a plastic tube through frozen peat bog and lake ice (Gale, 2002). The peat and clay cores were air dried and cut into 10 cm long sections. Each clay section and the bottom three peat sections were analyzed. The remainder of the samples are archived. Dried peat samples were crushed, sieved and analyzed by the Enzyme Leach[SM] method at Activation Laboratories Ltd. in Ancaster, Ontario. The complete analyses, together with duplicates, are available in MGS Data Repository item 2004004[2]. Selected data used in the illustrations are presented in Table GS-4-1.

Results

The amount of clay recovered at each sample site varied considerably. In general, the softer pale brown 'oxidized' clay was cored for lengths of over 1 m, whereas the firmer grey clay could only be cored for a few tens of centimetres. The relative distribution of peat, brown clay and grey clay in the cores is illustrated in the cross-section shown on Figure GS-4-2. In cores where clay and peat did not separate cleanly, the contact zone was sampled separately to avoid mixing sample media; the data for the contact zone samples is not included in this dataset, but is included in the Data Repository item 2004004[2].

[1] MGS Data Repository item 2003001, containing the data or other information sources used to compile this report, is available on-line to download free of charge at www2.gov.mb.ca/itm-cat/freedownloads.htm, or on request from minesinfo@gov.mb.ca or Mineral Resources Library, Manitoba Industry, Economic Development and Mines, 360–1395 Ellice Avenue, Winnipeg, MB R3G 3P2, Canada.

[2] MGS Data Repository item 2004004, containing the data or other information sources used to compile this report, is available on-line to download free of charge at www2.gov.mb.ca/itm-cat/freedownloads.htm, or on request from minesinfo@gov.mb.ca or Mineral Resources Library, Manitoba Industry, Economic Development and Mines, 360–1395 Ellice Avenue, Winnipeg, MB R3G 3P2, Canada.

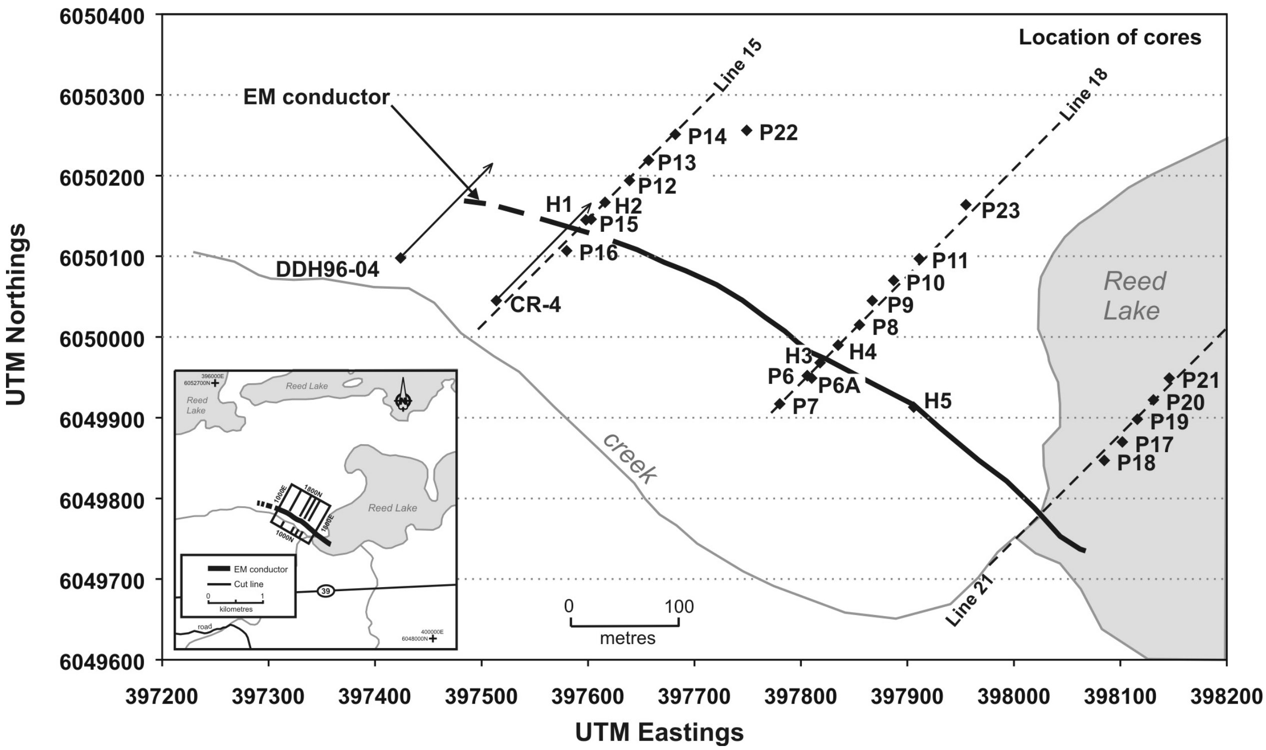


Figure GS-4-1*: Location of the Reed Lake electromagnetic conductor and sample sites for peat and clay cores.*

The distribution of metals in clay and peat exhibits considerable variation both between cores and between the clay and peat samples in the same core. The analytical data for some elements are higher in the clay, whereas analytical data for other elements are higher in the peat. For example, Figure GS-4-3 illustrates the Zn data in both clay and peat vertically in each core along Line 18 (cf. Gale, 2003). Although Zn responses are considerably higher in some peat samples than in the underlying clays, the distribution of Zn is independent of the peat content because the lowermost peat sample in cores P7 and P6 have negligible Zn content, similar to the underlying clay. In core P8, Zn contents are high and similar in both the uppermost clay and the overlying peat samples (Figure GS-4-3). It is significant that the Zn contents in the peat samples are not only highest in cores P8, P9 and P10, but in these cores elevated Zn responses in the underlying clay extend deeper than in the other cores; these cores are interpreted to be closer to the oxidizing body than core P6.

In Figure GS-4-4, Mo responses are largest in both the bottom peat sample and the underlying clays in cores P7 and P6; these samples have little or no Zn responses (Figure GS-4-3; Table GS-4-1). In addition, Mo values in the clays from cores P7 and P6 are up to five times larger than in the other cores along this profile (Table GS-4-2). The Mo response is considerably higher in the clays of core P11 than in the clays of the adjacent cores. This may represent the northern spike of a 'rabbit ear' anomaly.

The highest Zn responses occur on the north side of the conductor whereas the highest Mo responses are on the south side. The high Zn responses in cores P8, P9 and P10 may represent an apical Zn anomaly that is flanked by an asymmetrical Mo 'rabbit ear' anomaly. Anomalous Mo and Zn concentrations are present in exhalite associated with this conductor (Gale, 2002).

Figures GS-4-5 and -6 show the relative areal distribution of selected elements in the vicinity of the peat-clay contact in all of the cores sampled. These plots portray the highest response from the bottom two samples from the peat cores and the top two samples from the clay cores.

The responses for Zn, Au, Mn and As (?) are highest in the bottom two peat samples in cores along the north side of the conductor (Figure GS-4-5). These elements form a multi-element response north of the conductor that is interpreted as an apical anomaly (single peak) to a geochemical cell. The Mo and Sb responses form anomalies south of the conductor on lines 15 and 18, but north of the conductor on Line 21. These responses may represent 'rabbit ear' anomalies with weak responses on the north side of the southward-dipping conductor. A drillhole along a section of Line 15 indicates that the highest Mo responses are directly underlain by basalt and the Mo-bearing exhalite (Gale, 2002).

The highest responses from the top two samples from each clay core are illustrated in Figure GS-4-6. The Zn

Table GS-4-1: Enzyme Leach℠ analyses for selected elements from the bottom 20 cm of peat in the Reed property cores. Trace elements values are in ppb. Negative values equal 'not detected' at that lower limit.

2003 Samples

Sample identification	Easting	Northing	SQ Cl	Br	I	V	As	Mo	Sb	W	Re	Au	Co	Ni	Cu	Zn	Pb	Cd	Sn
P16-P9	397580	6050107	80500	261	20	622	38.8	381	3.92	3.2	0.920	-0.005	7.2	17.6	20.5	64	-0.1	3.2	0.3
P16-P10	397580	6050107	76100	307	18	806	34.0	340	6.63	14.7	0.700	0.006	13.2	25.7	65.5	82	-0.1	4.0	0.5
P15-P9	397603	6050146	69300	315	17	315	26.8	626	4.88	2.0	0.865	0.009	10.2	14.4	18.5	-5	-0.1	3.7	-0.2
P15-P10	397603	6050146	67900	360	16	1340	243	862	16.1	17.5	1.01	-0.005	20.3	47.5	47.2	134	-0.1	4.4	0.3
P12-P7	397639	6050194	35600	322	12	916	42.2	65.9	1.81	3.6	0.346	-0.005	13.7	30.6	33.0	321	-0.1	1.7	1.0
P12-P8	397639	6050194	32500	242	9	4430	99.6	63.6	4.71	8.9	0.296	-0.005	24.0	52.5	56.5	162	-0.1	1.1	0.9
P13-P6	397657	6050219	32200	361	22	448	32.2	87.7	1.67	2.0	0.276	-0.005	5.5	10.3	23.0	202	-0.1	0.6	0.6
P13-P7	397657	6050219	39300	569	25	1610	167	145	4.60	9.2	0.556	-0.005	28.9	38.4	57.7	750	-0.1	1.8	0.6
P14-P4	397682	6050251	27100	436	15	971	127	67.7	1.36	3.7	0.249	-0.005	5.8	21.4	23.9	49	-0.1	1.2	0.6
P14-P5	397682	6050251	22500	601	21	4160	580	198	4.11	11.7	0.262	-0.005	16.9	76.4	75.4	395	-0.1	3.1	0.7
P22-P0	397749	6050256	23800	370	46	2990	27.6	37.5	1.89	2.7	0.096	-0.005	11.1	70.2	102	-5	1.4	1.1	4.7
P7-P6	397780	6049917	66400	333	16	1020	77.5	83.9	3.81	3.2	0.263	-0.005	6.6	16.2	44.3	146	0.4	0.9	1.9
P7-P7	397780	6049917	70700	351	17	570	68.2	610	9.23	5.5	0.292	-0.005	8.2	14.7	41.6	-5	-0.1	3.1	-0.2
P6-P-8	397806	6049952	105000	338	21	1040	76.1	107	4.42	3.1	0.307	-0.005	6.4	16.0	36.1	181	0.2	1.0	0.7
P6-P-9	397806	6049952	112000	352	26	509	60.1	398	4.64	3.1	0.378	-0.005	5.5	8.5	26.9	306	-0.1	1.6	4.3
P8-P11	397855	6050015	166000	360	20	594	48.5	116	2.75	2.5	1.13	-0.005	5.5	18.0	18.1	24	-0.1	1.1	0.6
P8-P12	397855	6050015	155000	420	28	1220	32.8	65.6	4.53	8.8	1.70	0.020	56.7	64.2	41.5	582	0.3	3.7	0.5
P9-P10	397867	6050045	215000	339	21	534	48.6	87.9	1.52	1.7	0.982	-0.005	5.0	6.2	15.4	-5	-0.1	0.7	0.5
P9-P11	397867	6050045	219000	391	33	983	39.1	63.1	3.21	8.8	1.72	0.007	20.3	30.8	30.9	351	-0.1	2.8	0.4
P10-P9	397887	6050070	249000	537	25	500	36.3	148	1.89	2.0	0.534	-0.005	5.0	5.4	16.8	-5	-0.1	0.8	0.6
P10-P10	397887	6050070	216000	597	23	3070	46.9	91.8	3.27	15.1	0.398	-0.005	23.4	28.6	52.7	448	-0.1	2.0	0.4
P11-P9	397911	6050097	122000	444	16	486	35.6	118	1.68	2.4	0.597	-0.005	6.5	14.7	16.9	26	-0.1	1.2	0.5
P11-P10	397911	6050097	178000	1280	27	603	38.1	95.1	5.32	3.4	0.674	0.031	23.9	34.6	24.2	196	-0.1	2.2	0.6
P23-P4	397955	6050164	44400	330	19	462	40.2	78.0	1.63	1.5	0.404	-0.005	5.5	10.7	16.7	28	-0.1	1.1	1.0
P23-P5	397955	6050164	54900	700	27	647	53.9	116	4.68	5.9	0.782	0.005	14.1	22.7	44.0	133	-0.1	2.4	1.0
P18-P1B	398085	6049847	45000	391	24	970	53.4	164	5.75	6.4	0.201	0.011	6.3	30.8	57.1	8	1.8	0.8	1.3
P18-P2	398085	6049847	52500	409	23	612	65.4	386	6.77	9.5	0.354	0.013	6.9	12.8	49.6	-5	0.1	1.2	0.3
P18A-P2	398085	6049847	47400	351	21	748	59.5	159	5.12	6.3	0.292	0.012	4.8	14.8	49.1	-5	1.2	1.0	1.2
P18A-P3	398085	6049847	49400	365	20	540	55.8	464	5.98	8.6	0.309	0.009	8.0	8.8	44.6	-5	-0.1	1.5	0.3
P17-P1	398102	6049870	37700	340	20	785	44.8	148	4.21	6.5	0.202	-0.005	5.8	27.5	55.4	11	1.3	0.9	1.7
P17-P2	398102	6049870	43600	295	19	358	38.7	416	4.27	8.4	0.244	-0.005	7.0	7.9	42.6	-5	-0.1	2.1	1.2
P19-P1	398116	6049898	51000	390	19	768	61.5	212	6.15	6.4	0.352	0.008	5.5	15.1	50.0	-5	1.1	1.2	1.1
P20-P1	398131	6049922	40600	320	19	720	47.6	210	5.40	7.3	0.265	-0.005	10.8	262	74.0	-5	1.3	1.8	1.1
P20-P1B	398131	6049922	47400	402	24	842	54.9	237	6.15	6.5	0.226	0.007	5.5	13.3	54.6	-5	1.0	0.9	1.1
P21-P1	398146	6049949	41800	372	21	796	45.3	185	4.66	5.4	0.198	0.007	5.5	17.6	46.8	-5	0.7	0.2	0.7

2002 Samples

Sample identification	SQ Cl	Br	I	V	As	Mo	Sb	W	Re	Au	Co	Ni	Cu	Zn	Pb	Cd	Sn
H2-P9	15600	363	27	2270	97	252	12.4	15	0.78	22.0	8	37	91	40	-1	1.3	2.0
H4-P17	136000	234	35	862	49	328	9.1	5	1.24	-0.05	6	25	42	240	-1	1.5	-0.8
H5-P7	22200	201	17	927	29	52	2.2	2	0.13	-0.05	6	18	33	103	2	0.8	0.9
H5-P8	16400	202	18	795	28	78	2.7	2	0.12	-0.05	3	10	30	39	2	0.2	0.9
H5-P9	22700	216	22	896	35	118	3.9	3	0.16	-0.05	5	12	40	70	2	0.7	1.0
H5-P10	21600	242	21	614	29	188	5.5	6	0.23	-0.05	5	14	35	73	1	0.8	-0.8

Table GS-4-1: Enzyme Leach^{SM} analyses for selected elements from the bottom 20 cm of peat in the Reed property cores. Trace elements values are in ppb. Negative values equal 'not detected' at that lower limit. *(continued)*

2003 Samples

Sample identification	Tl	La	Ce	Eu	Gd	Dy	Er	Yb	SQ Li	Mn	Sr	Cs	Ba
P16-P9	0.300	0.55	1.05	0.35	0.11	0.16	0.06	0.08	115	2340	3410	0.20	1470
P16-P10	0.103	2.45	4.22	0.41	0.28	0.38	0.18	0.25	124	1710	5080	0.11	1450
P15-P9	0.194	0.49	0.98	0.45	0.11	0.12	0.06	0.06	114	2820.0	6680	0.21	1520
P15-P10	0.163	1.23	2.79	0.40	0.30	0.41	0.21	0.26	109	3190	4320	0.06	1190
P12-P7	0.450	1.42	3.00	0.31	0.23	0.21	0.11	0.15	109	5610	3350	0.12	1040
P12-P8	0.681	6.81	15.0	0.33	0.90	0.64	0.36	0.44	182	3710	2330	0.08	926
P13-P6	0.401	0.53	1.00	0.21	0.07	0.11	0.07	0.09	83.6	3460	2670	1.81	783
P13-P7	0.868	2.64	4.77	0.34	0.35	0.35	0.21	0.21	123	6760	4980	0.30	1200
P14-P4	0.674	1.38	2.70	0.14	0.27	0.40	0.15	0.27	68.3	2290	1880	0.38	365
P14-P5	1.32	13.8	24.9	0.53	1.93	1.74	0.94	1.00	83.7	2300	1800	0.11	390
P22-P0	0.172	40.1	112	1.65	7.77	5.98	3.67	3.98	211	1060	2180	0.45	536
P7-P6	0.534	1.69	3.68	0.16	0.22	0.29	0.10	0.16	107	473	1270	0.25	578
P7-P7	0.278	1.32	2.86	0.25	0.23	0.13	0.08	0.09	91.5	618	2220	0.16	916
P6-P-8	0.827	1.67	2.53	0.18	0.17	0.17	0.09	0.14	79.9	697	1710	0.42	608
P6-P-9	0.464	0.69	1.20	0.16	0.10	0.07	0.04	0.07	76.5	705	2320	0.55	788
P8-P11	0.425	0.69	1.34	0.20	0.12	0.16	0.10	0.10	164	3890	1930	0.48	973
P8-P12	1.140	4.93	8.46	0.45	0.61	0.65	0.37	0.41	397	19200	5640	0.41	1420
P9-P10	0.372	0.47	0.94	0.22	0.11	0.15	0.07	0.10	145	3340	1960	0.50	867
P9-P11	0.625	2.75	4.34	0.40	0.32	0.34	0.21	0.24	237	13700	6080	0.39	1470
P10-P9	0.237	0.50	1.11	0.23	0.09	0.14	0.08	0.07	145	2450	2470	0.27	1060
P10-P10	0.332	3.76	6.54	0.41	0.42	0.32	0.25	0.29	167	5050	4450	0.15	1210
P11-P9	0.337	0.58	1.17	0.32	0.11	0.17	0.08	0.10	98.9	3330	3440	0.20	1230
P11-P10	0.321	2.56	4.25	0.35	0.29	0.26	0.16	0.15	177	8290	9710	0.16	1210
P23-P4	0.234	0.67	1.57	0.20	0.09	0.17	0.07	0.07	68.2	1810	2230	0.45	661
P23-P5	0.421	1.20	2.46	0.29	0.24	0.21	0.14	0.17	124	4360	4210	0.15	1230
P18-P1B	0.411	3.92	8.86	0.23	0.60	0.45	0.24	0.22	133	1190	857	0.35	505
P18-P2	0.231	2.34	5.46	0.17	0.39	0.26	0.13	0.20	162	752	1520	0.17	703
P18A-P2	0.398	2.71	6.01	0.14	0.40	0.36	0.19	0.23	142	825	840	0.28	473
P18A-P3	0.215	1.96	4.49	0.23	0.27	0.22	0.14	0.15	144	751	1670	0.17	679
P17-P1	0.418	3.81	9.43	0.22	0.55	0.47	0.26	0.32	126	1030	655	0.33	490
P17-P2	0.154	2.08	4.53	0.27	0.40	0.32	0.18	0.16	71.8	867	1500	0.07	663
P19-P1	0.428	2.95	6.37	0.19	0.37	0.39	0.18	0.20	130	842	961	0.26	501
P20-P1	0.362	3.12	6.47	0.24	0.41	0.48	0.21	0.17	134	1020	849	0.27	487
P20-P1B	0.332	3.00	6.90	0.21	0.46	0.41	0.21	0.22	136	863	997	0.32	518
P21-P1	0.413	3.33	7.23	0.23	0.47	0.45	0.20	0.16	102	1110	880	0.28	490

2002 Samples

Sample identification	Tl	Dy	SQ Li	Mn	Sr	Cs
H2-P9	0.1	0.4	142	2600	3620	0.2
H4-P17	0.3	0.1	133	1970	1670	0.4
H5-P7	0.3	0.4	137	473	468	0.2
H5-P8	0.1	0.3	117	282	330	0.1
H5-P9	0.1	0.3	131	362	432	0.1
H5-P10	0.1	0.2	159	551	1100	0.2

Abbreviation: SQ, semiquantitative.

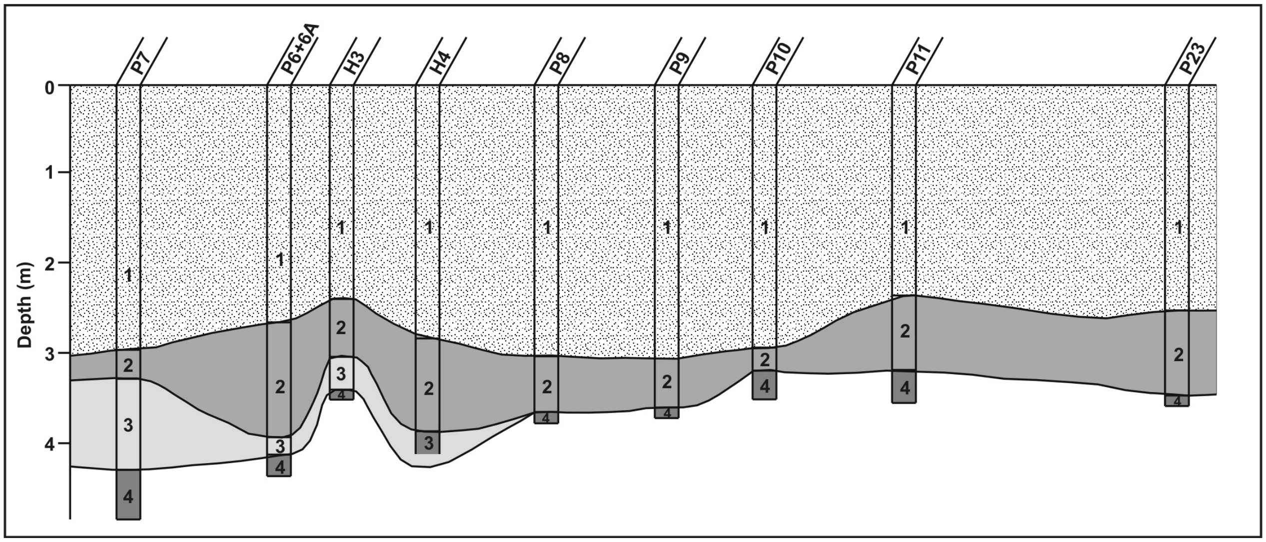


***Figure GS-4-2**: Profile of cores obtained along Line 18 of the Reed property. See Figure GS-4-1 for location of Line 18.*

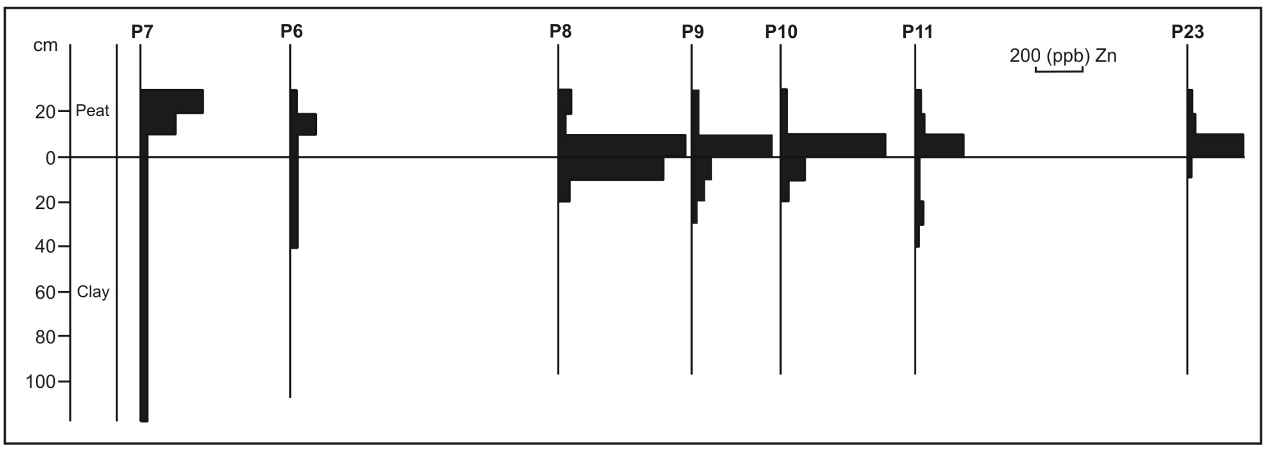


***Figure GS-4-3**: Schematic illustration of Enzyme Leach^SM analytical data for Zn in peat and clay along Line 18. Core profiles are shown in Figure GS-4-2. All samples represent 10 cm core intervals and are plotted relative to the peat-clay interface.*

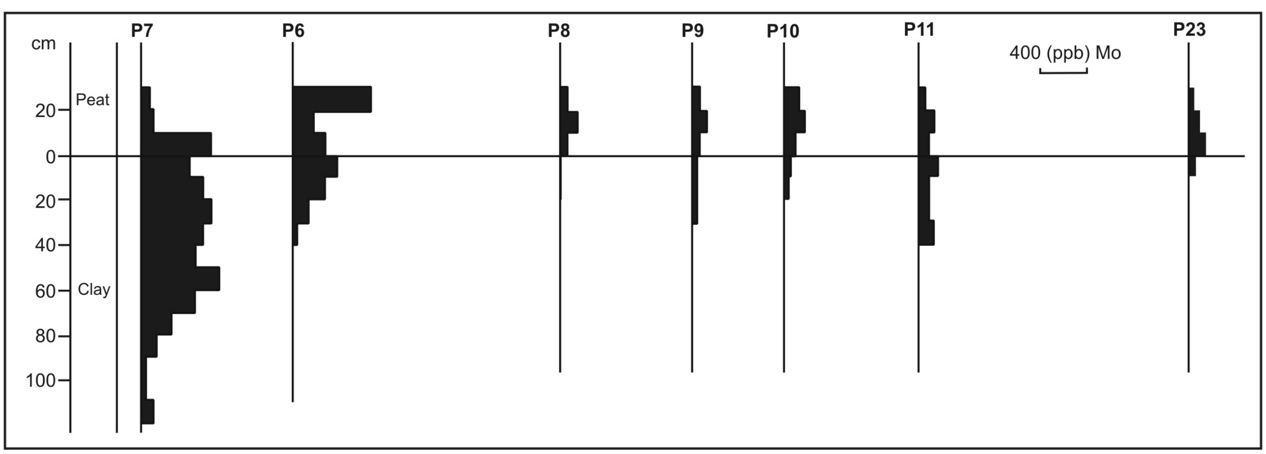


***Figure GS-4-4**: Schematic illustration of Enzyme Leach^SM analytical data for Mo in peat and clay along Line 18. Core profiles are shown in Figure GS-4-2. All samples represent 10 cm core intervals and are plotted relative to the peat-clay interface.*

Table GS-4-2: Enzyme Leach℠ analyses for selected elements from the top 20 cm of clay in the Reed property cores. Date for samples H2 to H5 are repeated from Data Repository item 2003001[1].

Sample identification		Easting	Northing	SQ Cl	Br	I	V	As	Se	Mo	Sb	W	Re	Au	Th	U	Co	Ni	Cu	Zn	Pb	Ga
2003 Samples																						
P16 E1	P19	397580	6050107	15200	134	7	1010	25	9	47	5.0	2	0.06	0.47	11.0	9.0	30	127	212	-10	9	2
P16 E2	P20	397580	6050107	20900	96	8	1160	42	7	62	6.0	2	0.06	0.13	16.1	13.0	14	103	226	-10	3	2
P15 E1	P18	397603	6050146	19600	93	6	1120	43	10	88	4.8	4	0.11	0.18	39.3	31.6	9	51	190	-10	6	3
P12 E1	P15	397639	6050194	10400	53	5	762	22	9	9	1.3	2	0.02	0.21	11.1	1.4	13	32	82	-10	9	2
P12 E2	P16	397639	6050194	15800	34	5	937	45	6	12	2.5	2	0.02	0.10	9.0	2.8	12	58	139	-10	3	2
P13 E1	P16	397657	6050219	3440	135	6	530	72	22	66	2.9	4	0.12	0.15	5.6	8.7	12	35	68	70	5	1
P13 E2	P17	397657	6050219	2490	79	5	640	46	-5	31	3.0	2	0.04	0.19	16.7	4.5	17	87	213	-10	13	2
P14 E1	P16	397682	6050251	-2000	107	6	1040	74	10	33	1.7	3	0.03	0.19	33.3	19.0	8	41	170	30	15	4
P14 E2	P17	397682	6050251	5140	87	7	716	27	5	24	4.0	2	0.03	0.11	35.6	6.1	11	43	245	110	17	3
P22 E1	P23	397749	6050256	4030	127	18	1970	13	11	15	1.1	2	0.02	0.14	53.0	10.1	10	48	103	-10	7	4
P22 E2	P24	397749	6050256	5260	103	34	1440	16	7	22	2.6	1	0.04	0.05	23.9	5.8	10	28	198	-10	4	3
P7 E1	P8	397780	6049917	34100	119	10	188	23	6	417	7.4	6	0.13	-0.05	0.7	4.5	2	5	15	-10	-1	2
P7 E2	P9	397780	6049917	38300	93	9	180	21	-5	586	8.3	3	0.09	-0.05	0.2	10.3	2	4	9	-10	-1	1
P6A E1	P6A	397806	6049952	32100	62	8	229	13	-5	386	7.3	9	0.51	-0.05	0.4	38.6	3	8	19	-10	-1	2
P6A E2	P6A	397806	6049952	36500	141	8	511	13	7	264	4.4	12	0.61	0.06	2.3	43.0	9	20	50	-10	1	3
P8 E1	P9	397855	6050015	71900	233	12	915	12	5	22	3.2	2	0.66	0.24	3.4	3.3	42	93	64	463	3	1
P8 E2	P10	397855	6050015	58700	186	10	-1	10	-5	11	2.7	1	0.31	0.07	6.7	2.7	48	179	90	36	4	2
P9 E1	P10	397867	6050045	23000	170	8	596	11	-5	15	2.7	2	0.58	0.19	3.6	4.7	37	108	80	67	3	2
P9 E2	P11	397867	6050045	35400	241	9	996	10	-5	8	2.7	1	0.20	-0.05	3.0	2.7	37	110	88	41	2	1
P10 E1	P11	397887	6050070	66000	423	9	1210	23	5	45	4.5	2	0.09	-0.05	7.4	5.2	49	212	162	95	5	1
P10 E2	P12	397887	6050070	41300	169	9	931	7	6	9	2.7	-1	0.05	-0.05	3.5	4.4	49	192	109	16	2	-1
P11 E1		397911	6050097	15300	166	5	1300	37	11	151	5.9	4	0.06	0.07	16.4	8.8	19	78	255	-10	18	3
P11 E2	P12	397911	6050097	23100	168	5	989	34	12	68	7.7	4	0.06	0.10	27.2	5.7	12	69	374	-10	16	6
P23 E1	P24	397955	6050164	9540	69	5	1170	48	10	51	5.4	2	0.04	-0.05	17.3	4.1	12	73	291	-10	6	2
P18 E1	P19	398085	6049847	25600	116	8	169	23	-5	286	4.8	6	0.25	0.11	1.4	5.8	3	8	21	20	-1	2
P18 E2	P20	398085	6049847	37000	105	7	195	16	-5	491	10.1	2	0.14	0.11	0.4	17.4	3	9	12	-10	-1	2
P18A E1	P19	398085	6049847	19800	92	8	147	21	6	336	5.1	4	0.18	0.17	1.1	9.1	3	47	18	-10	-1	2
P18A E2	P20	398085	6049847	16000	79	7	184	12	-5	387	7.2	2	0.14	0.12	0.2	17.0	2	3	10	-10	-1	2
P17 E1	P18	398102	6049870	33500	112	9	167	16	5	389	7.2	3	0.14	0.24	0.8	15.3	2	5	12	-10	-1	1
P17 E2	P19	398102	6049870	29000	81	7	195	15	-5	602	12.2	3	0.21	0.15	0.4	27.9	2	4	11	-10	-1	2
P19 E1	P20	398116	6049898	21300	92	7	193	13	6	520	8.4	2	0.12	0.07	0.2	17.0	2	6	10	-10	-1	2
P19 E2	P21	398116	6049898	25100	86	8	195	15	7	746	12.3	3	0.23	-0.05	0.2	22.3	2	4	11	-10	-1	2
P20 E1	P21	398131	6049922	10500	90	7	163	13	5	454	7.6	2	0.09	-0.05	1.3	12.1	2	4	11	-10	-1	2
P20 E2	P22	398131	6049922	23200	85	7	176	12	6	614	8.7	2	0.14	-0.05	0.6	16.9	3	7	9	-10	-1	2
P21 E1	P22	398146	6049949	7040	54	6	417	12	15	165	2.6	12	0.35	-0.05	5.5	22.7	9	21	47	-10	-1	3
P21 E2	P23	398146	6049949	11900	78	8	1000	9	6	27	1.8	3	0.21	0.11	5.7	15.7	16	62	76	-10	-1	2
2002 Samples																						
Sample identification				**SQ Cl**	**Br**	**I**	**V**	**As**	**Se**	**Mo**	**Sb**	**W**	**Re**	**Au**	**Th**	**U**	**Co**	**Ni**	**Cu**	**Zn**	**Pb**	**Ga**
H2-E10				-2000	123	18	1690	42	14	87	4.4	4	0.07	1.68	34.7	51.1	11	79	223	26	8	3
H2-E11				4810	69	11	1430	45	8	65	5.0	3	0.05	-0.05	45.3	27.0	9	73	322	16	11	3
H5-E11				22200	191	20	284	21	8	328	6.4	7	0.18	-0.05	1.3	12.7	4	7	24	15	-1	1
H5-E12				19800	147	15	235	16	-5	392	7.0	4	0.10	-0.05	0.6	17.6	3	5	13	11	-1	1
H5-E13				31300	139	20	248	13	-5	624	10.3	3	0.17	-0.05	0.3	25.6	2	5	12	-10	-1	1
H3-E10				43100	227	43	356	36	6	1250	12.4	5	0.29	4.40	1.7	27.6	3	9	24	-10	-1	-1
H3-E11				44500	170	23	197	30	6	815	11.6	5	0.38	2.26	0.6	23.5	2	10	21	15	-1	-1
H4-E19				29600	217	21	789	17	13	283	3.6	14	0.63	5.21	7.5	42.6	12	30	68	25	1	2
H4-E20				25200	247	19	1100	15	13	212	2.5	18	0.49	7.03	5.0	50.3	14	35	80	39	1	2

Table GS-4-2: Enzyme Leach℠ analyses for selected elements from the top 20 cm of clay in the Reed property cores. Date for samples H2 to H5 are repeated from Data Repository item 2003001[1]. *(continued)*

2003 Samples

Sample identification		Ge	Cd	Sn	Tl	SQ Ti	Zr	Nb	La	Ce	Eu	Dy	Er	Yb	SQ Li	Mn	Rb	Sr	Cs	Ba
P16 E1	P19	0.7	1.0	1.6	0.3	557	110	5	27.2	61.8	1.2	4.0	2.2	2.3	216	781	65	693	0.7	933
P16 E2	P20	-0.5	1.2	-0.8	0.3	333	65	4	32.7	57.0	1.3	4.2	2.2	2.2	192	1900	64	1130	0.4	930
P15 E1	P18	-0.5	0.6	-0.8	0.3	340	73	3	35.7	77.4	1.4	4.8	2.5	2.4	141	1550	51	1050	0.6	776
P12 E1	P15	-0.5	1.6	1.2	0.5	589	68	4	24.3	67.5	0.9	2.8	1.4	1.5	128	588	39	359	0.3	422
P12 E2	P16	-0.5	0.6	-0.8	0.3	405	53	3	41.9	102	1.2	3.8	2.4	2.0	92	873	49	519	0.2	448
P13 E1	P16	1.1	0.9	1.3	0.5	435	47	3	12.6	23.8	0.5	1.6	0.8	0.9	178	785	56	531	0.3	574
P13 E2	P17	-0.5	0.9	1.1	0.4	513	132	5	52.7	117	2.2	8.2	4.4	5.0	144	431	69	362	0.5	490
P14 E1	P16	0.7	0.9	2.1	0.5	1100	271	8	70.4	181	2.9	10.0	5.9	5.7	155	709	58	495	0.8	563
P14 E2	P17	0.6	0.8	-0.8	0.3	635	269	7	85.1	220	3.8	14.3	7.9	8.3	138	541	59	468	0.4	552
P22 E1	P23	0.7	0.6	0.9	0.2	812	285	8	79.5	258	3.3	11.3	7.5	7.3	174	567	24	754	0.8	442
P22 E2	P24	0.6	0.5	-0.8	0.1	428	113	5	74.5	212	3.7	12.9	7.2	7.7	194	756	30	999	0.4	429
P7 E1	P8	-0.5	1.4	-0.8	0.1	-100	3	-1	1.0	2.1	0.1	0.1	-0.1	0.1	46	687	12	1120	-0.1	523
P7 E2	P9	-0.5	1.9	-0.8	0.1	-100	2	-1	0.3	0.5	0.1	-0.1	-0.1	-0.1	23	741	8	1180	0.1	536
P6A E1	P6A	0.6	1.2	-0.8	0.2	-100	4	1	0.4	0.9	0.1	-0.1	-0.1	-0.1	37	1180	12	1300	-0.1	536
P6A E2	P6A	1.1	0.9	0.9	0.2	218	17	3	2.4	6.0	0.2	0.3	0.2	0.2	99	1230	29	1320	0.1	618
P8 E1	P9	2.5	1.4	2.3	0.4	589	57	6	13.0	27.9	0.7	1.7	1.2	1.1	427	6460	111	2290	0.5	1300
P8 E2	P10	1.8	1.4	1.3	0.3	513	75	5	29.2	61.6	1.4	4.4	2.5	2.5	-2	4260	129	1660	0.6	1790
P9 E1	P10	1.6	1.4	1.9	0.3	511	48	5	11.9	25.2	0.6	1.5	1.0	0.9	382	4670	81	1830	0.4	766
P9 E2	P11	1.6	1.1	-0.8	0.2	338	34	4	13.2	28.3	0.6	2.2	1.2	1.3	355	4130	80	1540	0.3	820
P10 E1	P11	1.3	1.1	1.3	0.2	581	97	6	23.9	54.6	1.2	4.1	2.4	2.5	395	2080	64	1510	0.3	1250
P10 E2	P12	1.0	1.4	-0.8	0.3	291	42	3	15.9	33.6	0.9	2.8	2.0	1.8	415	3940	84	1810	0.3	1160
P11 E1		0.6	2.1	1.9	0.3	791	164	7	35.1	76.2	1.3	5.3	3.1	3.0	192	1010	55	578	0.9	754
P11 E2	P12	0.7	0.9	1.5	0.3	1070	178	7	59.8	127	2.1	8.0	4.6	4.5	179	736	70	783	1.6	830
P23 E1	P24	-0.5	1.2	-0.8	0.1	529	112	5	37.4	86.8	1.6	5.0	3.4	3.0	128	1520	37	575	0.3	651
P18 E1	P19	-0.5	1.0	-0.8	0.1	-100	12	-1	1.6	3.5	0.2	0.2	0.1	0.1	55	770	18	985	-0.1	472
P18 E2	P20	-0.5	1.8	-0.8	-0.1	-100	3	-1	0.3	0.7	0.2	-0.1	-0.1	-0.1	23	1320	9	1370	-0.1	595
P18A E1	P19	-0.5	1.0	-0.8	0.1	-100	3	-1	1.0	2.1	0.1	0.1	-0.1	-0.1	34	919	17	1140	-0.1	526
P18A E2	P20	-0.5	1.4	1.5	-0.1	-100	2	-1	0.1	0.2	0.2	-0.1	-0.1	-0.1	15	904	8	1290	-0.1	563
P17 E1	P18	-0.5	1.4	-0.8	-0.1	-100	4	-1	0.9	1.9	0.1	0.2	-0.1	-0.1	27	838	11	1240	-0.1	561
P17 E2	P19	-0.5	2.3	-0.8	-0.1	-100	3	-1	0.4	0.8	0.2	-0.1	-0.1	-0.1	21	629	11	1340	-0.1	629
P19 E1	P20	-0.5	1.9	-0.8	-0.1	-100	2	-1	0.1	0.2	0.1	-0.1	-0.1	-0.1	16	797	9	1190	-0.1	477
P19 E2	P21	-0.5	2.8	-0.8	-0.1	-100	2	-1	0.1	0.2	0.1	-0.1	-0.1	-0.1	19	668	9	1320	-0.1	578
P20 E1	P21	-0.5	1.8	-0.8	-0.1	-100	2	-1	0.7	1.5	0.2	0.1	-0.1	-0.1	16	1240	7	1120	-0.1	482
P20 E2	P22	-0.5	1.9	-0.8	-0.1	-100	2	-1	0.3	0.5	0.2	-0.1	-0.1	-0.1	17	952	8	1340	-0.1	577
P21 E1	P22	0.8	0.7	-0.8	0.1	260	16	4	3.3	7.6	0.3	0.6	0.4	0.3	95	1730	40	1310	0.1	853
P21 E2	P23	1.0	0.7	-0.8	0.2	209	12	2	8.2	17.7	0.5	1.6	1.1	1.0	227	4300	81	1820	0.3	655

2002 Samples

Sample identification	Ge	Cd	Sn	Tl	SQ Ti	Zr	Nb	La	Ce	Eu	Dy	Er	Yb	SQ Li	Mn	Rb	Sr	Cs	Ba
H2-E10	-0.5	0.8	1.0	0.4	483	136	5	45.2	94.4	1.5	4.3	2.8	2.5	249	832	62	1470	0.8	792
H2-E11	-0.5	0.5	-0.8	0.5	521	121	5	58.4	117	1.9	5.4	3.2	2.9	228	573	63	1210	0.8	764
H5-E11	-0.5	0.9	-0.8	-0.1	-100	5	-1	2.0	4.0	0.1	0.2	0.1	0.1	71	717	23	1130	-0.1	437
H5-E12	-0.5	1.2	-0.8	-0.1	-100	3	-1	0.7	1.5	-0.1	0.1	-0.1	-0.1	38	795	12	1090	-0.1	375
H5-E13	-0.5	1.8	-0.8	-0.1	-100	3	-1	0.5	0.9	-0.1	0.1	-0.1	-0.1	31	772	10	1170	-0.1	391
H3-E10	-0.5	3.8	-0.8	-0.1	-100	7	-1	1.4	3.1	0.1	0.2	0.1	-0.1	37	491	12	1770	0.1	661
H3-E11	-0.5	2.5	-0.8	-0.1	-100	4	-1	0.6	1.2	-0.1	-0.1	-0.1	-0.1	31	528	9	1720	0.1	756
H4-E19	0.9	1.0	-0.8	0.1	251	21	3	9.5	21.6	0.4	1.3	0.7	0.6	178	1620	46	1750	0.1	922
H4-E20	1.1	0.6	-0.8	0.1	255	26	5	6.5	14.5	0.4	0.8	0.5	0.4	206	1690	57	1880	0.2	1100

Abbreviation: SQ, semiquantitative.

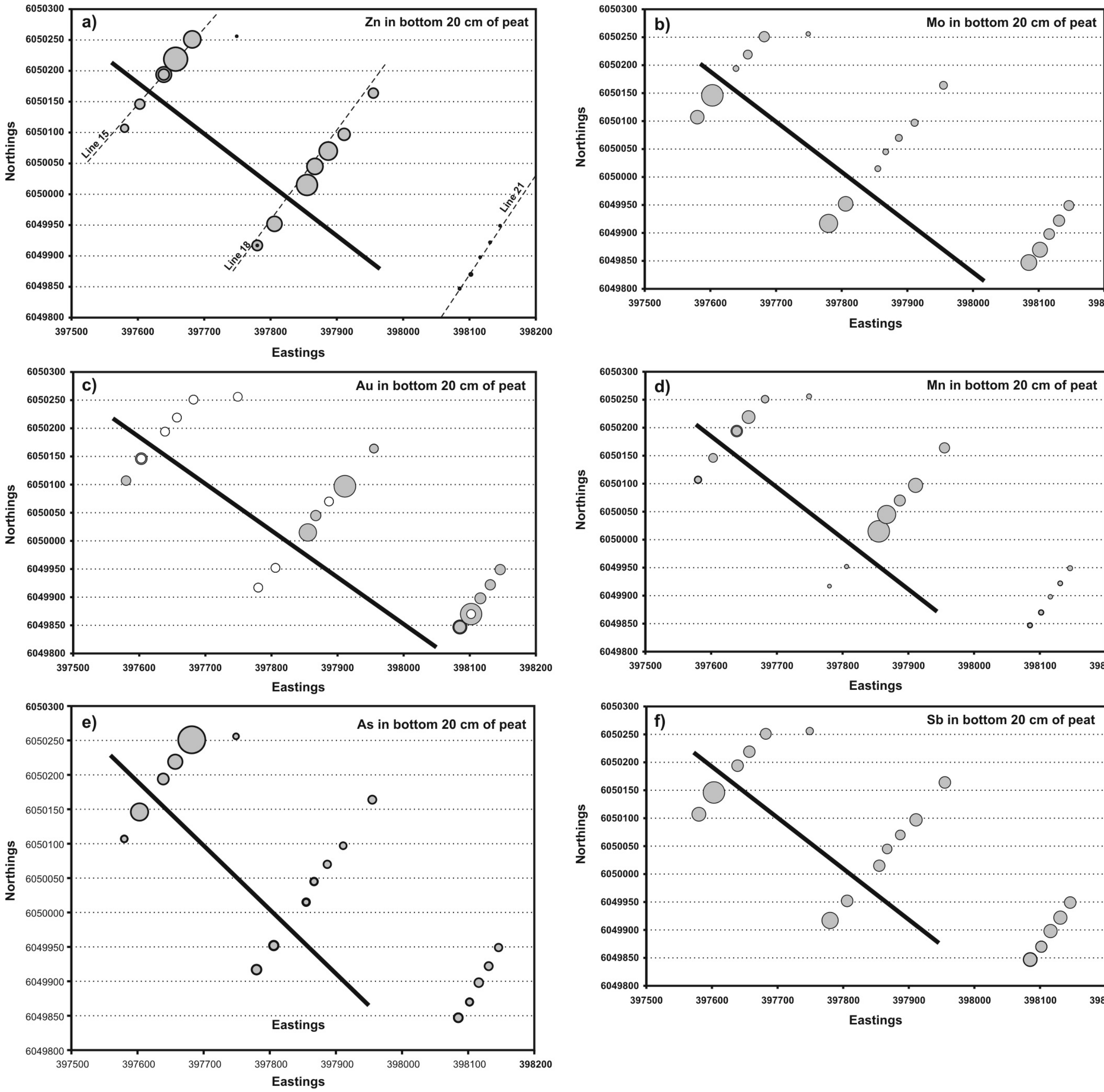


Figure GS-4-5*: Relative distribution of elements in the bottom 20 cm of peat cores at the Reed property. The heavy line shows the approximate position of the conductor. Core locations are the same as shown on Figure GS-4-1.*

responses are anomalous north of the conductor on lines 15 and 18 in many of the same cores as those that have anomalous Zn in the overlying peat samples (cf. Figures GS-4-5, -6). In clay samples south of the conductor and on Line 21, the Zn contents are below detection. The Mn responses are highest on the north side of the conductor on Line 18 in the same samples that have the highest Zn responses. This suggests that Zn and Mn represent apical anomalies and the source lies immediately north of the conductor. The Mo responses in clay samples south of the conductor on Line 18 are considerably stronger that those on Line 15, 300 m to the west. The weak Mo response in core P11 (Figure GS-4-4) and the strong responses on Line 21 on the north side of the conductor (Figures GS-4-5, -6) suggest that the Mo responses define a strong 'rabbit ear' (a double-peaked) anomaly to the conductor or buried mineralization. Anomalous Au is present on all three sample lines immediately north of the conductor and responses appear to be stronger in cores from Line 15 (Figures GS-4-5, -6). In addition, anomalous Au occurs in samples from the 2002 cores located directly over the conductor (Gale, 2002); this data is not illustrated here to avoid mixing data from different sources. Anomalous Pb contents in the clays (>10 ppb) are coincident with anomalous Cu contents on the north side of the conductor.

The total rare earth element (REE) values (Table GS-4-2) are significantly lower in clay samples from cores P7

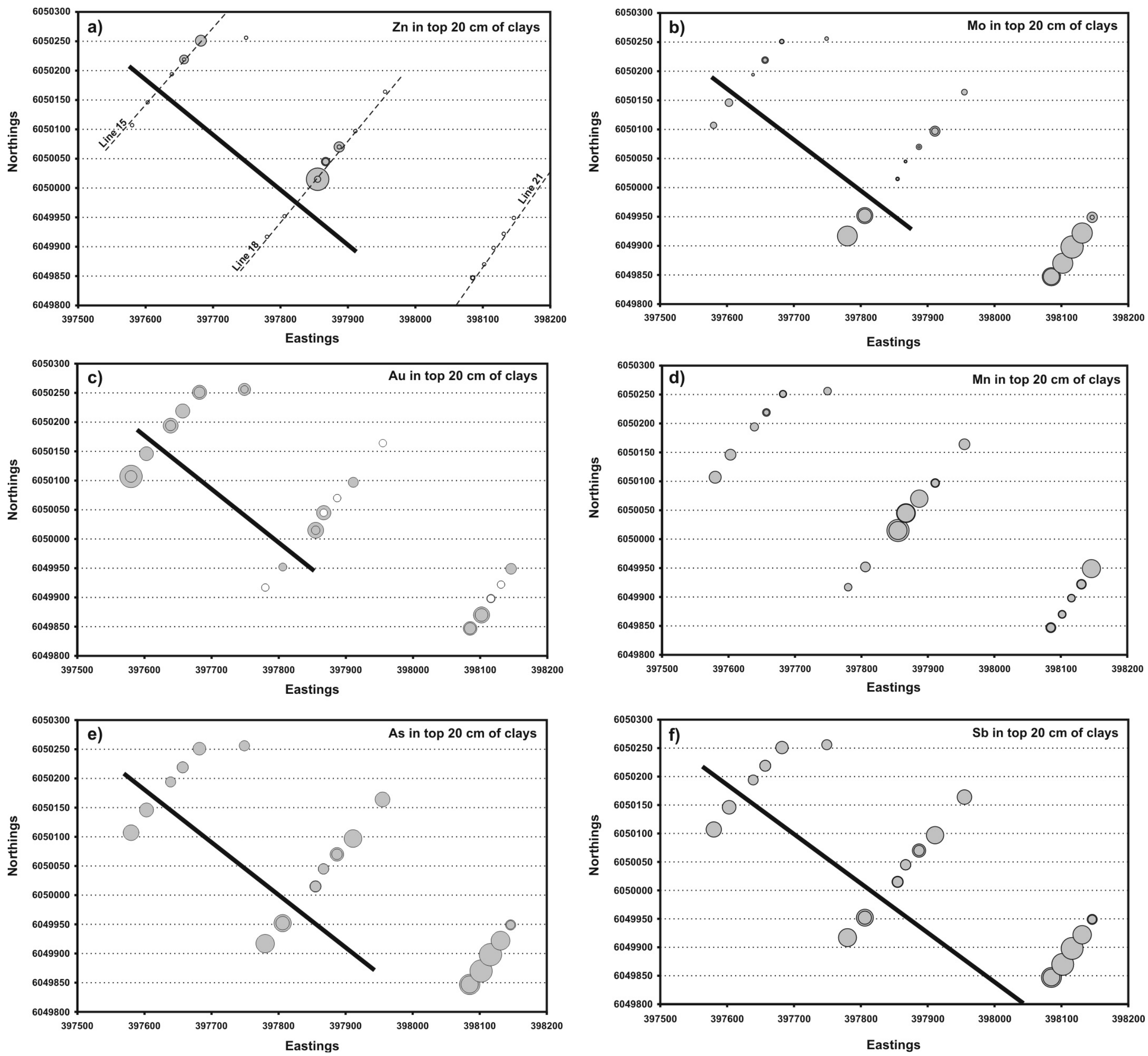


***Figure GS-4-6**: Relative distribution of elements in the top 20 cm of clay cores at the Reed property. The heavy line shows the approximate position of the conductor. Core locations are the same as shown on Figure GS-4-1.*

and P6 on Line 18 and in all clay samples collected along Line 21. This contrast in total REE values does not occur in the overlying peat samples, however, in a number of the cores, peat samples closest to the clay-peat interface have higher total REE values than the immediately overlying peat sample, collected 10 to 20 cm above the interface; it is uncertain if this is a reflection of a higher inorganic content added to the basal peat or 'trapping' of upward migrating elements. Eu anomalies in the clays are dominantly negative, and samples from pale brown 'oxidized' clay appear to have more strongly negative anomalies than those samples from grey clay. In contrast, Eu anomalies in the peat samples are dominantly positive. Additional data are required to determine whether the Eu deviations are related to a hidden electrochemical cell and decrease both vertically away from the interface and laterally away from the conductor.

Discussion

The distribution of elements in peat and clay beneath the bog and lake sediment at the Reed property identify base and precious metal anomalies in a portion of the conductor that has not been drilled. Analytical data obtained from the 2002 and 2003 surveys define an Au anomaly that is approximately coincident with the electromagnetic conductor. The Zn, Re, Mn and Cu apical anomalies that are flanked by 'rabbit ear' Mo and Sb anomalies indicate that the source for these elements is probably located north of the conductor. In addition, the highest Pb response in the clay and the highest As responses in the peat are located west of the highest Zn responses; this suggests metal zonation. The element responses are consistent with the presence of an electrochemical cell overlying an exhalite similar to that intersected in the drillhole on Line 15 and an oxidizing body of massive sulphides. The observed anomalies in the Enzyme Leach[SM] data (Figures GS-4-5, -6) indicate that if a massive sulphide deposit exists in this area it is probably Zn rich and would not have been intersected in the drillholes put down to date. The Mo anomaly on Line 21 may also be an indication of either a body of mineralized quartz-feldspar porphyry or a massive sulphide–type alteration zone. This study is considered to be incomplete and additional analyses should be undertaken before the property is test drilled.

A comparison of Enzyme Leach[SM] data from the 2002 and 2003 cores (Tables GS-4-1, -2) indicate a large discrepancy in values obtained for some elements, e.g., Au. This indicates that data from different surveys, or samples analyzed at different times, should not be combined into the same dataset. When the datasets are considered separately, both can be used to access the mineral potential of the conductor.

Conclusions and economic considerations

Enzyme Leach[SM] data for peat and clay beneath a bog and under a lake show that exhalite related to base-metal hydrothermal systems provides different responses in the two media. The data obtained is consistent with the presence of a body of oxidizing massive sulphide and advances the evaluation of massive sulphide potential in this area. The application of this type of study in areas where there are bog- and lake-covered geophysical conductors is a cost-effective method of evaluating conductors prior to undertaking a drill program.

References

Gale, G.H. 2002: Geochemistry of drillcore samples, alders, peat, bog iron and till at Reed Lake, Manitoba (NTS 63K9); *in* Report of Activities 2002, Manitoba Industry, Trade and Mines, Manitoba Geological Survey, p. 75–82.

Gale, G.H. 2003: Geochemical studies of dwarf birch twigs, peat, bog iron and clay at Reed Lake, Manitoba (NTS 63K10); *in* Report of Activities 2003, Manitoba Industry, Economic Development and Mines, Manitoba Geological Survey, p. 29–36.