Supplementary Information (SI) for Environmental Science: Atmospheres.
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Supporting information

Trace elements in *Sphagnum* moss waters as indicators of the chemical reactivity of contemporary atmospheric dusts: comparison with peat bog porewaters

Sundas Arooj Butt, Fiorella Barraza, Na Chen, and William Shotyk*

Department of Renewable Resources, University of Alberta. Edmonton, AB, Canada.

*Corresponding author: shotyk@ualberta.ca

sundas@ualberta.ca, barrazac@ualberta.ca, na3@ualberta.ca

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Section 1. Potential impact of pressure changes during squeezing on TE concentrations

Approximately 5 g of the living *Sphagnum* moss layers were centrifuged for 10 minutes at 2000 (689 x g), 6000 (6198 x g) and 10,000 (17217 x g) RPM (RCF), using centrifuge tubes with built-in 0.45 µm filter membranes. Although the volume of extracted water increased with increasing centrifuge speed (0.5 mL at 2000 to ~ 4 mL at 10,000 RPM), negligible variations were observed in the concentrations of most TEs across different centrifugation speeds (Fig. SI2). These findings suggest that minor changes in pressure during squeezing are unlikely to significantly affect TE concentrations.

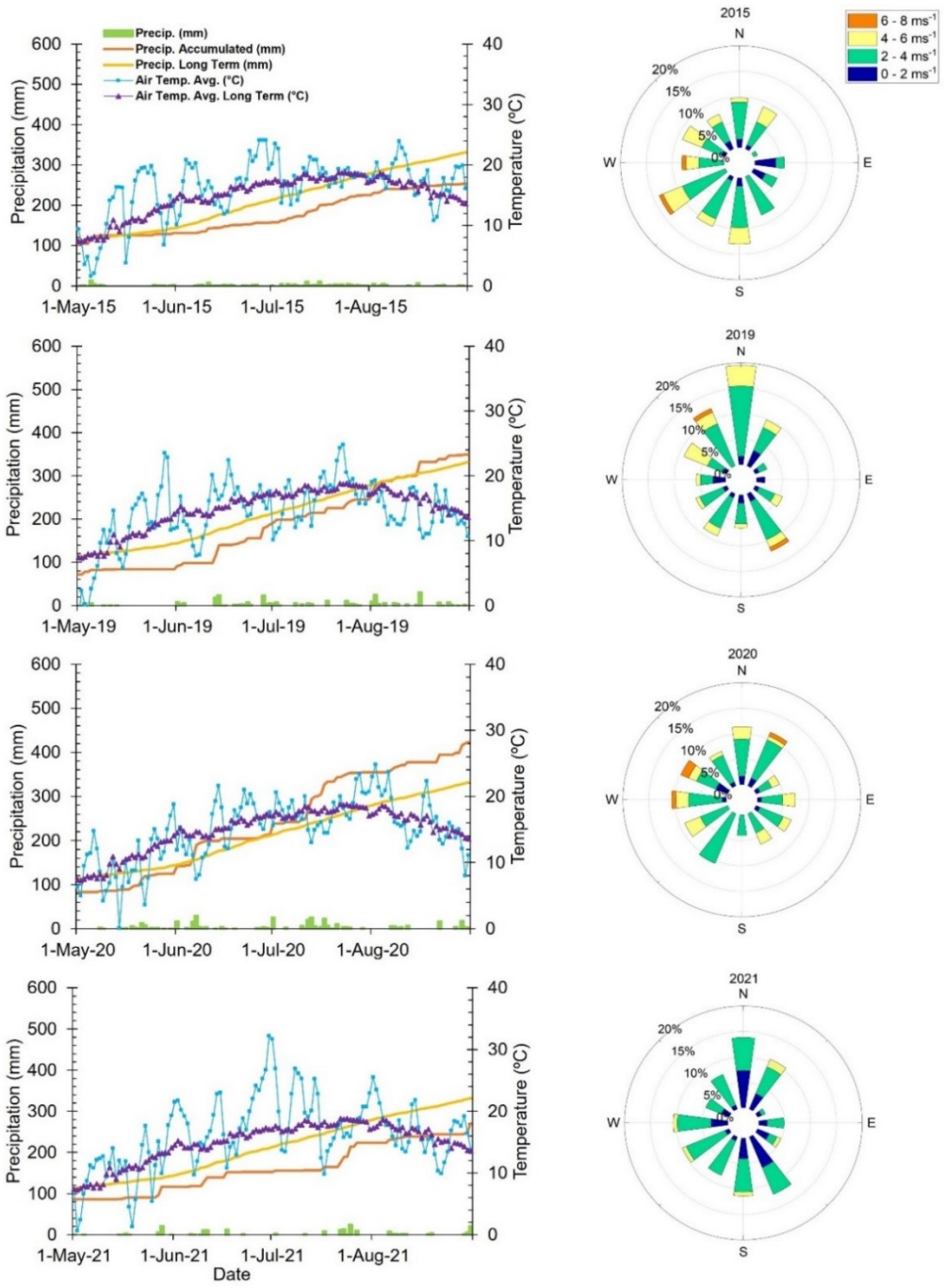

Figure SI1. Daily precipitation, temperature, and wind speed and direction in the Athabasca Bituminous Sands region (ABS) in 2015, 2019-2021.

Note: Historic daily weather data from 1 May to 31st August of the respective years was downloaded from the Government of Canada from the Mildred Lake station (Latitude: 57°02'28.000" N, Longitude: 111°33'32.000" W, Elevation: 310.00 m, Climate Identifier (ID): 3064528, World Meteorological Organization (WMO) ID: 71255, Transport Canada (TC) ID: WMX)

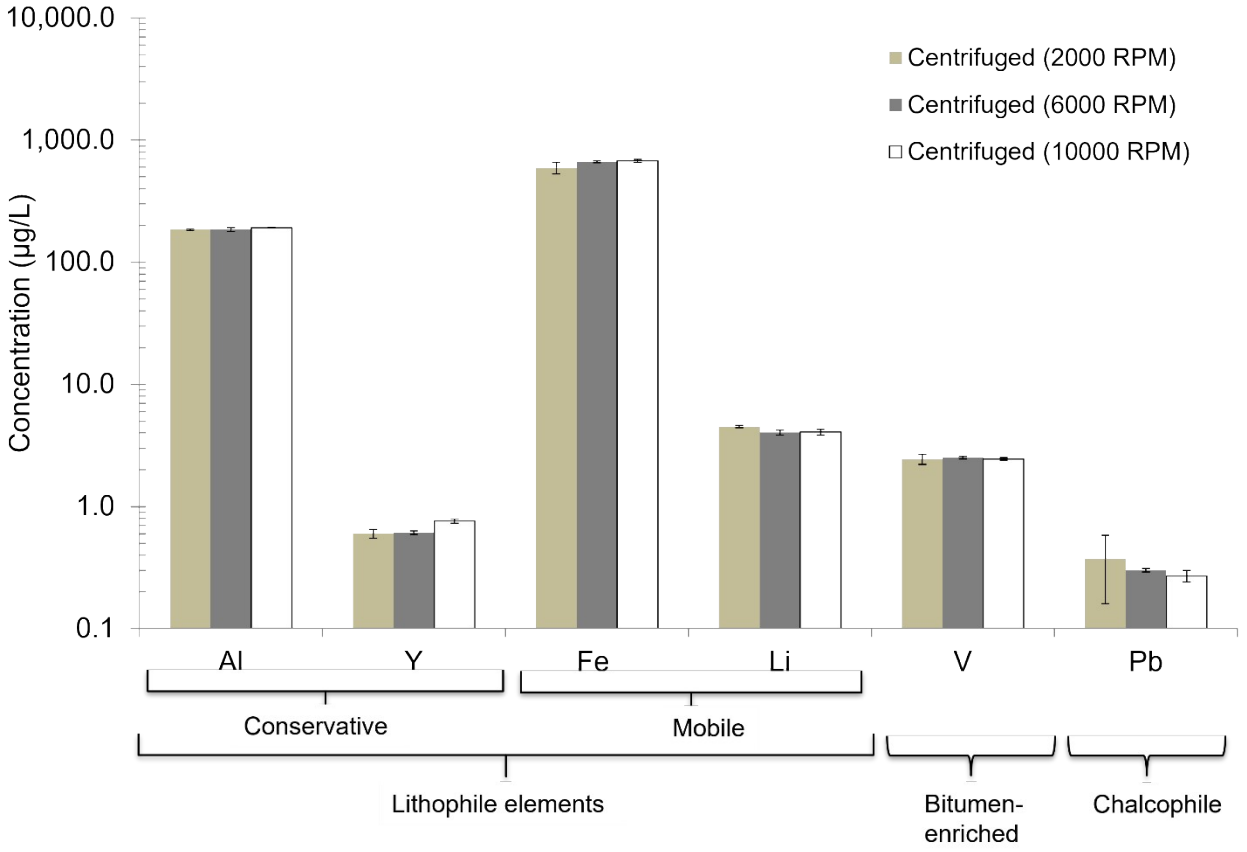

Figure SI2. Average concentrations of selected trace elements in moss waters extracted through centrifugation at different speeds (2000 (689 x g), 6000 (6198 x g) and 10,000 (17217 x g) RPM (RCF)).

Note: Error bars represent the standard deviation. All elements within these groups show similar trends; therefore, only selected elements are presented.

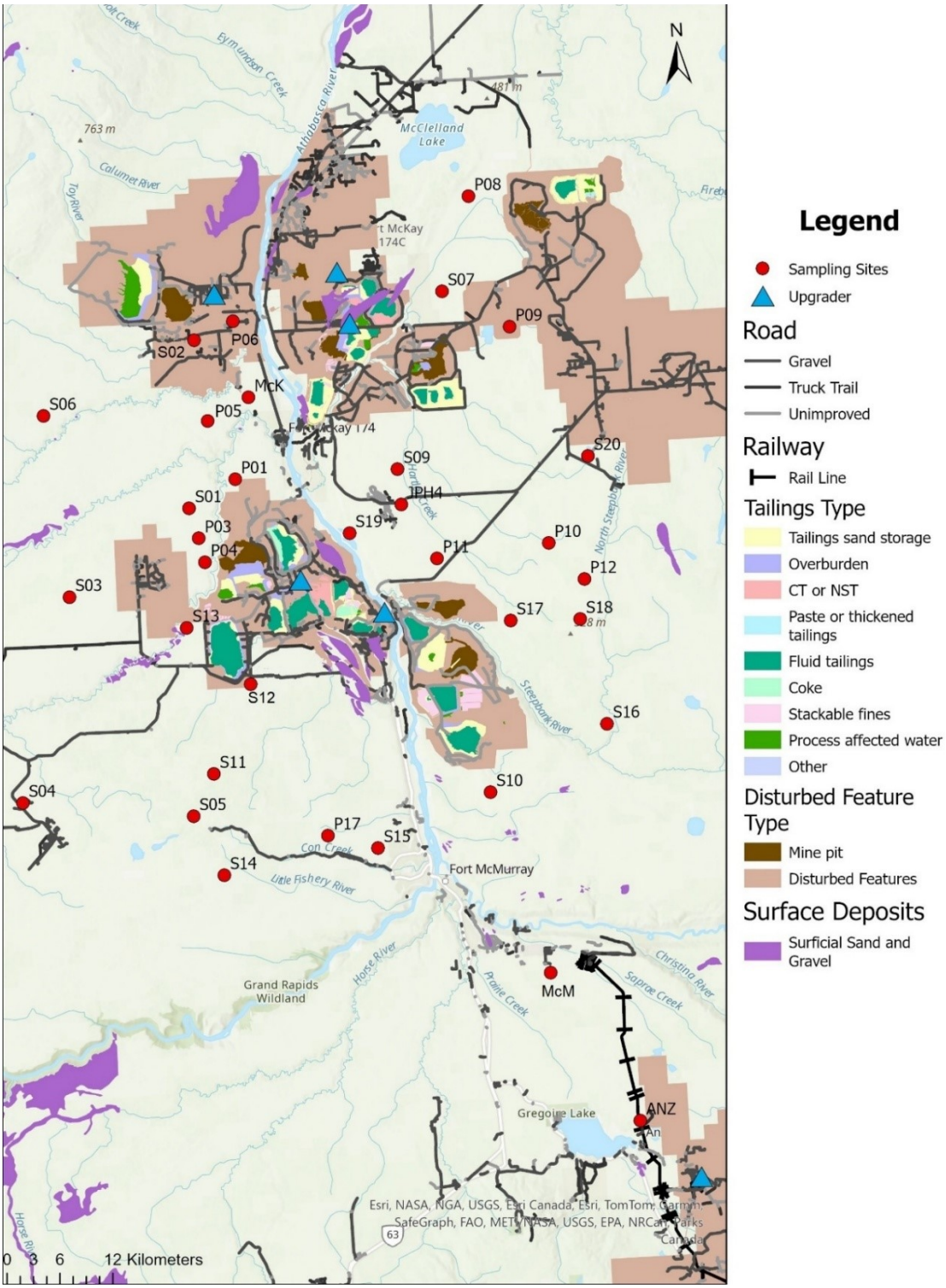

Figure SI3. Map showing the potential sources of dust emissions in the ABS region,[44] highlighted by different colours, with moss sampling sites indicated by red bullets.

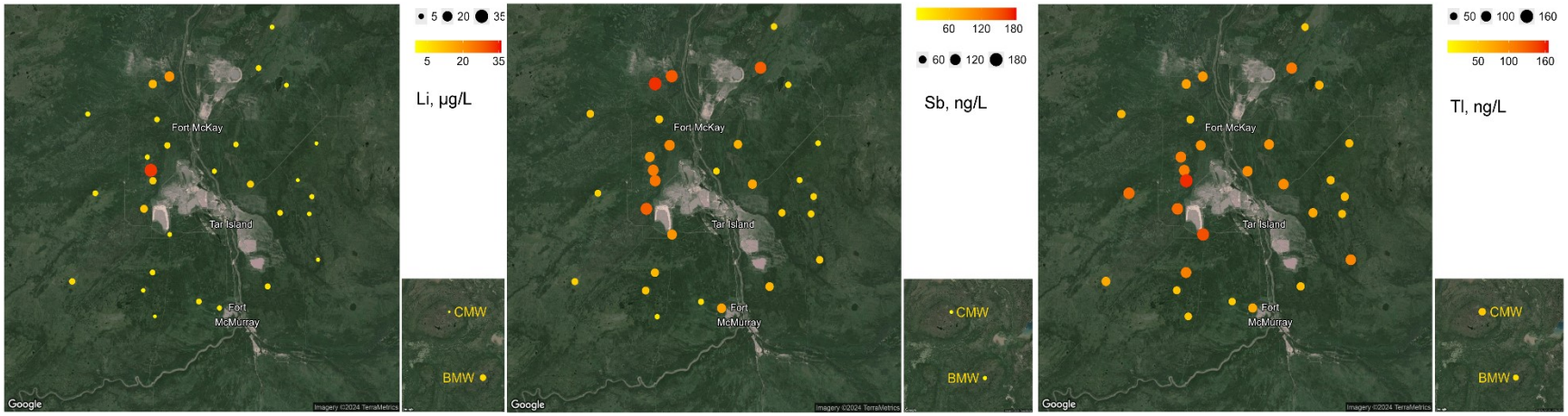

Figure SI4. Spatial variation in the concentrations of Li, Sb and Tl in moss waters, in autumn 2015.

Notes: CMW = Caribou Mountains Wildland and BMW = Birch Mountains Wildland. Both CMW and BMW were used as reference sites.

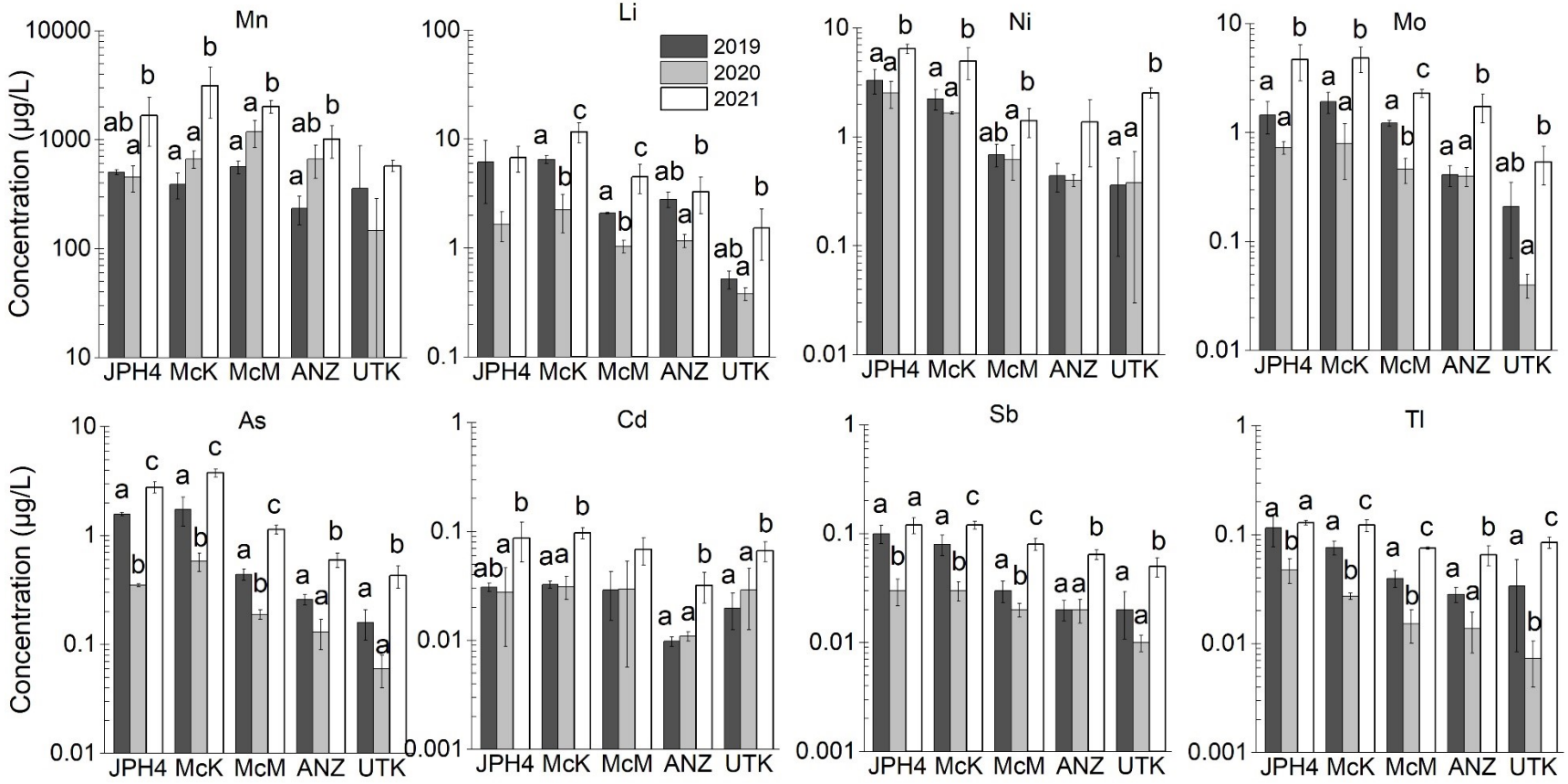

Figure SI5. Interannual variation in the dissolved concentrations of selected TEs in moss waters.

Notes: Error bars represent the standard deviation. Sites are ordered from right to left based on their proximity to the mining area. Bars having different letters indicate significant interannual variations in concentration at that site, while those sharing the same letter or are without letters indicate insignificant differences.

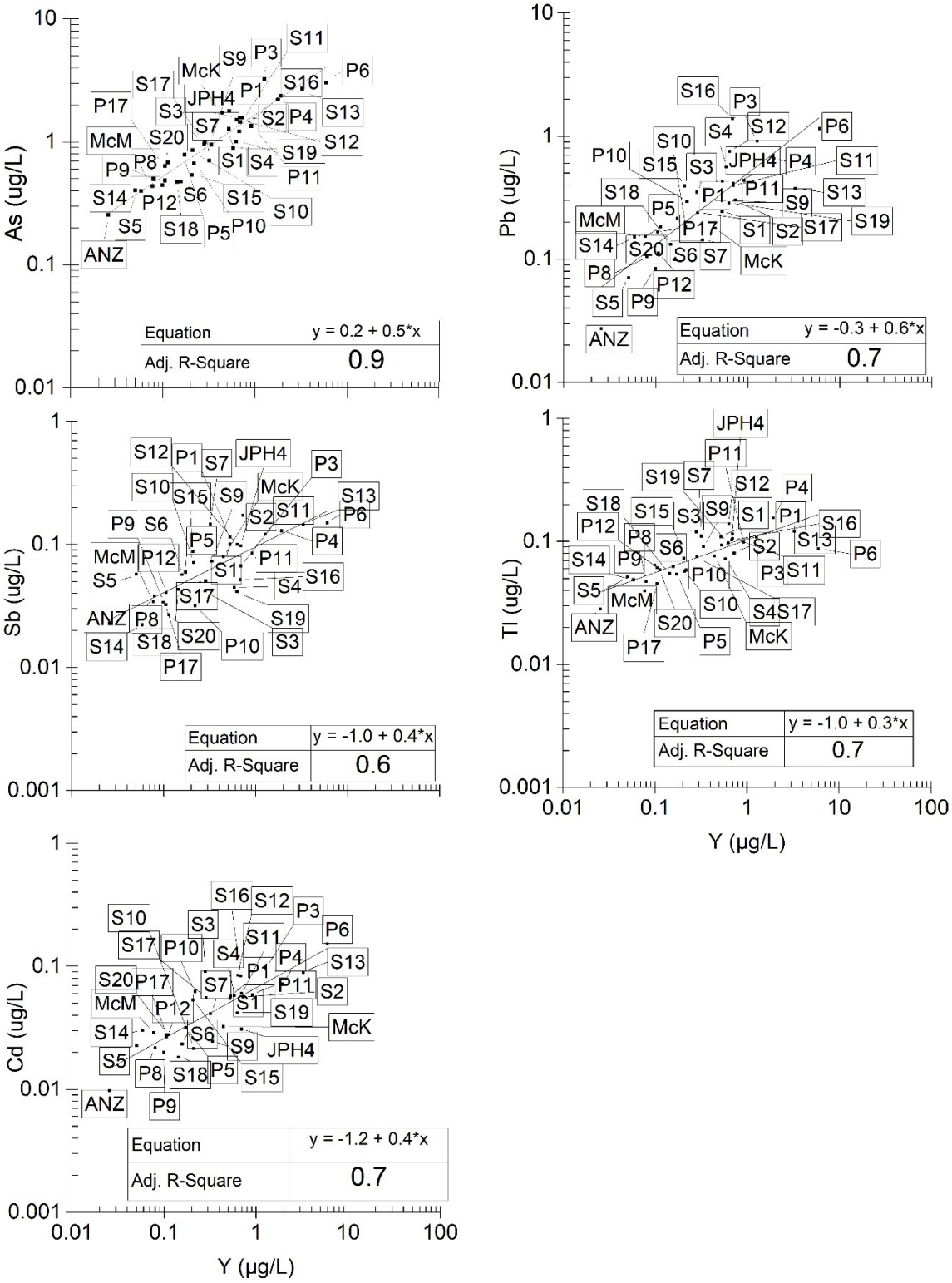

Figure SI6. Correlation between chalcophile elements (As, Pb, Sb, Tl, and Cd) and Y in moss waters collected from bog sites in the Athabasca Bituminous Sands region.

Table SI1. ICP-MS limit of detection (LOD), limit of quantification (LOQ), method detection limit (MDL) and water standard reference materials (SRMs) recoveries for autumn 2015 samples.

				NIST 1640a - Elements in Natural Surface Water			SPS-SW2 - Elements in Surface Water		
	LOD	LOQ	MDL	Certified Value	Measured Value (Mean, n = 4)	Recovery	Certified Value	Measured Value (Mean, n = 5)	Recovery
	ng/L	ng/L	ng/L	µg/L	µg/L	%	µg/L	µg/L	%
Al	12	125	325	53	55	104	250	257	103
As	1.0	7.3	<LOQ	8.1	8.2	101	50	52	104
Cd	0.1	0.5	<LOQ	4.0	4.0	100	2.5	2.6	104
Fe	29	135	176	36.8	39.9	108	100	105	105
Li	0.7	18	<LOD	0.4	0.3	83			
Mn	0.9	5.1	344	40.4	40.9	101	50	51	103
Mo	0.5	2.0	2.9	45.6	45.4	100	50	49.7	99
Ni	0.8	21	<LOD	25.3	25.2	100	50	50	100
Pb	0.1	0.4	1.4	12.1	12.2	101	25	25	100
Sb	0.5	2.2	<LOD	5.1	5.3	104			
Sr	0.5	3.7	18	126	130	103	250	261	104
Th	0.0	0.4	0.5				2.5	2.2	90
Tl	0.1	0.7	<LOD	1.6	1.6	99	2.5	2.5	99
V	0.4	2.0	<LOD	15.1	15.1	100	50	50	100
Y	0.1	0.5	0.6				2.5	2.6	103

LOD = (3*SD Blank Intensity) x Std conc. / Std Intensity - Blank Intensity, LOQ = (Blank Intensity + 10*SD Blank Intensity) x Std conc. / Std Intensity - Blank Intensity, MDL= $\bar{x}$ + 3*SD (where $\bar{x}$ = average concentration in method blanks, and SD= standard deviation in method blanks value)

Table SI2. ICP-MS limit of detection (LOD), limit of quantification (LOQ), method detection limit (MDL) and water standard reference materials (SRMs) recoveries for autumn 2019 and 2020 samples.

				NIST 1640a - Elements in Natural Surface Water			SPS-SW2 - Elements in Surface Water		
	LOD	LOQ	MDL	Certified Value	Measured Value (Mean, n = 5)	Recovery	Certified Value	Measured Value (Mean, n = 5)	Recovery
	ng/L	ng/L	ng/L	µg/L	µg/L	%	µg/L	µg/L	%
As	3.9	17.7	<LOD	8.1	8.1	100	50	52	104
Cd	0.1	0.2	<LOQ	4.0	3.9	97	2.5	2.5	102
Fe	7.5	50.1	<LOQ	36.8	33.6	91	100	93	93
Li	0.1	1.1	<LOQ	0.4	0.4	100			
Mn	0.9	5.3	<LOQ	40.4	32.5	80	50	41	82
Mo	0.4	1.6	1.7	45.6	40.1	88	50	45	90
Ni	0.6	8.7	<LOD	25.3	25.3	100	50	51	103
Pb	0.1	0.5	0.5	12.1	11.6	96	25	24.5	98
Sb	0.2	0.7	0.7	5.1	6.2	120			
Sr	2.0	11.2	17.5	126	111	88	250	226	91
Th	0.0	0.2	<LOD				2.5	2.5	98
Tl	0.0	0.1	<LOQ	1.6	1.5	94	2.5	2.4	97
V	0.2	1.1	<LOD	15.1	14.6	96	50	49	98
Y	0.0	0.1	<LOQ				2.5	2.6	106

LOD = (3*SD Blank Intensity) x Std conc. / Std Intensity - Blank Intensity, LOQ = (Blank Intensity + 10*SD Blank Intensity) x Std conc. / Std Intensity - Blank Intensity, MDL= $\bar{x}$ + 3*SD (where $\bar{x}$ = average concentration in method blanks, and SD= standard deviation in method blanks value)

Table SI3. ICP-MS limit of detection (LOD), limit of quantification (LOQ), method detection limit (MDL) and water standard reference materials (SRM) recoveries for autumn 2021 samples.

				NIST 1643f - Elements in Fresh Water			SPS-SW2 - Elements in Surface Water		
	LOD	LOQ	MDL	Certified Value	Measured Value (Mean, n = 6)	Recovery	Certified Value	Measured Value (Mean, n = 6)	Recovery
	ng/L	ng/L	ng/L	µg/L	µg/L	%	µg/L	µg/L	%
Al	50	248	518	134	152	114	250	287	115
As	2.7	13	<LOD	57.4	60.6	106	50	54	107
Cd	0.1	0.3	<LOQ	5.9	6.2	105	2.5	2.6	105
Fe	26	150	543	93.4	98.4	105	100	109	109
Li	0.2	1.1	<LOD	16.6	17.0	103			
Mn	0.7	4.8	15	37.1	37.7	102	50	52	104
Mo	0.5	3.2	<LOQ	115	109	94	50	47	94
Ni	2.0	14	23	59.8	59.2	99	50	51	103
Pb	0.1	0.4	1.5	18.5	19.4	105	25	26	104
Sb	0.2	0.9	5.4	55.5	56.3	101			
Sr	0.6	2.1	20	314	307	98	250	242	97
Th	0.1	0.7	<LOD				2.5	2.2	86
Tl	0.0	0.2	3.9	6.9	7.2	104	2.5	2.6	105
V	0.6	3.3	<LOD	36.1	37.1	103	50	52	103
Y	0.1	0.3	2.4				2.5	2.5	99

LOD = (3*SD Blank Intensity) x Std conc. / Std Intensity - Blank Intensity, LOQ = (Blank Intensity + 10*SD Blank Intensity) x Std conc. / Std Intensity - Blank Intensity, MDL= $\bar{x}$ + 3*SD (where $\bar{x}$ = average concentration in method blanks, and SD= standard deviation in method blanks value)

Table SI4. Trace element concentrations in moss waters from peat bogs in the Athabasca Bituminous Sands (ABS) region and in remote areas (for reference). The ratios of MAX/MIN concentrations of TEs in the ABS region are also included.

Industrial sites	Conservative			Mobile				Bitumen-enriched			Chalcophile				
	Al mg/L	Y µg/L	Th µg/L	Fe mg/L	Mn mg/L	Li µg/L	Sr µg/L	V µg/L	Ni µg/L	Mo µg/L	As µg/L	Pb µg/L	Sb µg/L	Cd µg/L	Tl µg/L
S1	1.26	0.52	0.99	9.18	0.76	4.09	17.8	3.63	2.61	1.71	1.28	0.24	0.10	0.06	0.11
S2	1.01	0.73	2.12	9.27	0.22	13.5	22.8	6.12	2.75	1.68	1.57	0.30	0.17	0.06	0.08
S3	1.36	0.28	0.51	1.91	2.01	5.32	54.8	3.26	1.98	1.54	0.97	0.35	0.04	0.09	0.12
S4	1.57	0.58	0.92	10.3	2.49	6.79	20.5	2.61	1.97	1.68	0.90	0.56	0.04	0.06	0.07
S5	0.27	0.05	0.08	0.57	0.73	2.71	4.60	2.10	0.56	0.98	0.40	0.07	0.06	0.02	0.05
S6	0.50	0.16	0.16	1.24	0.37	4.02	6.83	2.68	0.81	0.83	0.47	0.10	0.06	0.02	0.06
S7	1.06	0.32	1.15	7.12	0.61	5.53	12.9	4.04	2.77	1.36	0.70	0.14	0.15	0.04	0.11
S9	0.94	0.34	1.21	7.12	0.78	4.77	12.1	3.38	3.07	1.31	0.95	0.30	0.07	0.02	0.09
S10	0.76	0.21	0.46	3.90	1.29	5.81	12.5	3.46	1.61	2.04	0.86	0.18	0.07	0.02	0.06
S11	1.13	0.69	1.02	2.33	1.15	5.29	14.4	9.27	2.70	2.06	1.45	0.40	0.07	0.06	0.11
S12	1.40	0.63	1.46	12.4	0.79	3.47	37.0	4.31	3.64	2.82	1.51	0.75	0.10	0.08	0.14
S13	1.83	3.28	3.05	6.13	0.64	11.3	30.2	8.16	7.37	1.97	2.70	0.38	0.14	0.09	0.12
S14	0.27	0.06	0.08	0.38	0.35	1.78	7.97	1.74	0.90	0.99	0.40	0.15	0.02	0.03	0.05
S15	0.75	0.21	0.51	2.67	1.82	4.03	39.7	7.85	3.12	3.18	0.54	0.39	0.09	0.05	0.07
S16	1.81	0.68	1.01	3.69	3.93	2.37	19.2	6.36	2.85	1.79	1.22	1.38	0.05	0.08	0.10
S17	0.94	0.29	0.66	6.01	0.77	5.52	14.1	5.09	2.23	2.19	1.00	0.24	0.05	0.06	0.08
S18	0.49	0.14	0.33	1.11	0.40	3.02	6.38	3.04	1.08	1.32	0.47	0.13	0.04	0.02	0.05
S19	1.07	0.62	1.77	11.1	0.23	3.87	32.1	3.40	2.58	1.36	1.01	0.29	0.04	0.04	0.10
S20	0.60	0.11	0.10	1.24	0.89	2.17	39.5	3.13	0.89	1.43	0.68	0.18	0.03	0.03	0.06
P1	1.63	0.53	1.11	13.7	1.96	6.88	33.5	6.97	3.82	4.81	1.78	0.43	0.12	0.06	0.09
P3	2.39	1.27	1.91	16.3	3.30	33.0	115	8.17	6.05	1.58	3.23	0.92	0.12	0.10	0.11
P4	2.41	1.91	4.58	17.3	1.56	9.65	40.0	8.08	5.91	2.55	2.37	0.66	0.13	0.07	0.16
P5	0.78	0.17	0.44	3.40	0.92	5.19	15.8	3.71	1.37	3.02	0.79	0.21	0.06	0.03	0.05
P6	3.07	5.97	2.66	17.3	1.74	19.6	140	12.3	5.31	6.10	3.02	1.16	0.15	0.15	0.09
P8	0.66	0.08	0.21	2.12	1.20	3.29	8.52	3.14	1.19	2.00	0.50	0.10	0.04	0.02	0.05
P9	0.52	0.10	0.26	1.48	0.71	3.40	8.36	2.76	1.43	1.22	0.45	0.08	0.03	0.02	0.06

P10	0.70	0.22	0.25	2.66	1.41	1.92	35.7	5.49	1.67	2.02	0.67	0.30	0.03	0.06	0.06
P11	1.49	0.91	3.88	17.5	0.28	8.84	22.2	10.2	3.95	2.80	1.35	0.44	0.09	0.06	0.10
P12	0.46	0.11	0.33	0.94	0.33	4.02	5.76	3.48	1.01	1.17	0.49	0.11	0.04	0.03	0.06
P17	0.39	0.11	0.22	1.32	0.54	5.49	31.1	4.06	1.14	5.41	0.64	0.17	0.03	0.03	0.05
JPH4	1.13	0.69	1.91	5.55	0.50	6.17	22.4	4.21	3.31	1.45	1.58	0.41	0.10	0.03	0.12
McK	0.87	0.44	1.81	9.32	0.39	6.53	11.1	4.16	2.24	1.92	1.74	0.18	0.08	0.03	0.08
McM	0.30	0.08	0.17	0.49	0.56	2.10	8.16	1.68	0.69	1.22	0.44	0.15	0.03	0.03	0.04
ANZ	0.13	0.03	0.08	0.07	0.23	2.80	2.79	0.85	0.44	0.41	0.26	0.03	0.02	0.01	0.03
Max/Min	24	234	60	235	18	19	50	14	17	15	13	51	8	16	6
Reference sites															
UTK	0.15	0.02	0.03	0.06	0.36	0.52	3.74	0.50	0.36	0.21	0.16	0.08	0.02	0.02	0.03
BMW	0.14	0.01	0.04	0.05	1.25	7.30	5.54	0.75	0.23	0.28	0.29	0.09	0.01	0.01	0.03
CMW	0.13	0.01	0.02	0.03	0.41	0.45	3.83	0.38	0.12	0.19	0.16	0.06	0.01	0.04	0.05

Table SI5. Trace element concentrations (mean ± S.D.) in moss waters from peat bogs in the ABS region and in a remote area (UTK).

TEs	JPH4			McK			McM			ANZ			UTK		
	2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021
Al (mg/L)	1.13 ± 0.32	0.76 ± 0.10	2.43 ± 0.16	0.87 ± 0.14	0.63 ± 0.09	2.66 ± 0.64	0.30 ± 0.08	0.32 ± 0.04	0.96 ± 0.24	0.13 ± 0.03	0.20 ± 0.03	0.50 ± 0.09	0.15 ± 0.13	0.10 ± 0.05	0.58 ± 0.15
Y (µg/L)	0.69 ± 0.23	0.35 ± 0.02	0.65 ± 0.44	0.44 ± 0.12	0.42 ± 0.13	0.60 ± 0.04	0.08 ± 0.03	0.14 ± 0.05	0.16 ± 0.07	0.03 ± 0.01	0.06 ± 0.02	0.04 ± 0.01	0.02 ± 0.005	0.07 ± 0.02	0.04 ± 0.02
Th (µg/L)	1.91 ± 0.46	0.83 ± 0.13	0.50 ± 0.34	1.81 ± 0.12	0.93 ± 0.12	0.43 ± 0.03	0.17 ± 0.04	0.13 ± 0.02	0.08 ± 0.03	0.08 ± 0.03	0.08 ± 0.02	0.04 ± 0.01	0.03 ± 0.01	0.03 ± 0.01	0.04 ± 0.02
Fe (mg/L)	5.55 ± 0.63	5.23 ± 1.49	10.5 ± 5.48	9.32 ± 3.36	8.39 ± 3.94	12.7 ± 2.78	0.49 ± 0.08	0.60 ± 0.20	1.33 ± 0.58	0.07 ± 0.01	0.17 ± 0.01	0.41 ± 0.08	0.06 ± 0.06	0.05 ± 0.03	0.21 ± 0.04
Mn (mg/L)	0.50 ± 0.63	0.45 ± 0.12	1.66 ± 0.79	0.39 ± 0.10	0.67 ± 0.12	3.12 ± 1.55	0.56 ± 0.08	1.18 ± 0.33	2.02 ± 0.27	0.23 ± 0.07	0.67 ± 0.22	1.01 ± 0.34	0.36 ± 0.52	0.15 ± 0.14	0.58 ± 0.07
Li (µg/L)	6.17 ± 3.62	1.65 ± 0.51	6.78 ± 1.80	6.53 ± 0.52	2.25 ± 0.88	11.7 ± 2.49	2.10 ± 0.03	1.04 ± 0.14	4.50 ± 1.34	2.80 ± 0.46	1.17 ± 0.16	3.29 ± 1.23	0.52 ± 0.10	0.38 ± 0.05	1.53 ± 0.76
Sr (µg/L)	22.4 ± 4.57	10.8 ± 0.72	49.7 ± 13.5	11.1 ± 1.61	12.8 ± 2.63	45.5 ± 3.91	8.16 ± 3.81	6.76 ± 2.34	19.6 ± 1.76	2.79 ± 0.48	3.70 ± 0.93	7.02 ± 1.39	3.74 ± 3.82	3.97 ± 2.62	9.89 ± 2.19
V (µg/L)	4.21 ± 0.50	1.62 ± 0.25	9.14 ± 3.48	4.16 ± 1.29	1.88 ± 0.35	7.00 ± 0.22	1.68 ± 0.46	1.11 ± 0.25	3.66 ± 0.89	0.85 ± 0.23	0.66 ± 0.06	2.20 ± 0.31	0.50 ± 0.36	0.21 ± 0.10	1.43 ± 0.03
Ni (µg/L)	3.31	2.54	6.45	2.24	1.66	5.00	0.69	0.62	1.41	0.44	0.40	1.37	0.36	0.38	2.54

	± 0.83	± 0.70	± 0.62	± 0.47	± 0.04	± 1.63	± 0.16	± 0.22	± 0.42	± 0.13	± 0.05	± 0.84	± 0.28	± 0.35	± 0.28
Mo (µg/L)	1.45 ± 0.48	0.73 ± 0.10	4.70 ± 1.71	1.92 ± 0.43	0.79 ± 0.42	4.84 ± 1.29	1.22 ± 0.08	0.46 ± 0.12	2.30 ± 0.20	0.41 ± 0.09	0.40 ± 0.08	1.74 ± 0.51	0.21 ± 0.14	0.04 ± 0.01	0.54 ± 0.21
As (µg/L)	1.58 ± 0.06	0.35 ± 0.01	2.79 ± 0.33	1.74 ± 0.52	0.58 ± 0.11	3.77 ± 0.31	0.44 ± 0.05	0.19 ± 0.02	1.14 ± 0.11	0.26 ± 0.03	0.13 ± 0.04	0.60 ± 0.09	0.16 ± 0.05	0.06 ± 0.02	0.43 ± 0.10
Pb (µg/L)	0.41 ± 0.17	0.30 ± 0.10	0.81 ± 0.16	0.18 ± 0.10	0.25 ± 0.10	0.90 ± 0.14	0.15 ± 0.06	0.21 ± 0.07	0.64 ± 0.10	0.03 ± 0.003	0.10 ± 0.07	0.20 ± 0.09	0.08 ± 0.05	0.09 ± 0.08	0.26 ± 0.11
Sb (µg/L)	0.10 ± 0.02	0.03 ± 0.01	0.12 ± 0.02	0.08 ± 0.02	0.03 ± 0.01	0.12 ± 0.01	0.03 ± 0.01	0.02 ± 0.003	0.08 ± 0.01	0.02 ± 0.004	0.02 ± 0.005	0.06 ± 0.01	0.02 ± 0.01	0.01 ± 0.002	0.05 ± 0.01
Cd (µg/L)	0.03 ± 0.003	0.03 ± 0.02	0.09 ± 0.03	0.03 ± 0.002	0.03 ± 0.01	0.10 ± 0.01	0.03 ± 0.01	0.03 ± 0.02	0.07 ± 0.02	0.01 ± 0.001	0.01 ± 0.001	0.03 ± 0.01	0.02 ± 0.01	0.03 ± 0.02	0.07 ± 0.01
Tl (µg/L)	0.12 ± 0.04	0.05 ± 0.01	0.13 ± 0.01	0.08 ± 0.01	0.03 ± 0.002	0.12 ± 0.02	0.04 ± 0.01	0.02 ± 0.01	0.07 ± 0.002	0.03 ± 0.005	0.01 ± 0.01	0.07 ± 0.01	0.03 ± 0.03	0.01 ± 0.003	0.09 ± 0.01

Table SI6. Trace Elements enriched ≥2x in moss waters from peat bogs in the ABS region relative to the reference site, UTK, in autumn 2019-2021.

Sites															
	2019														
JPH4	**Fe**	**Th**	**Y**	**Ni**	**Li**	**Al**	**V**	**As**	**Sr**	**Mo**	**Mn**	**Pb**	**Sb**	**Tl**	**Cd**
	136	65	32	13	12	11	11	11	11	9	7	7	6	5	2
McK	**Fe**	**Th**	**Y**	**Li**	**As**	**Mo**	**V**	**Al**	**Ni**	**Mn**	**Sr**	**Sb**	**Tl**	**Pb**	**Cd**
	228	62	20	12	12	12	11	9	9	5	5	5	3	3	2
McM	**Fe**	**Mo**	**Mn**	**Th**	**V**	**Li**	**Sr**	**Y**	**Al**	**Ni**	**As**	**Pb**	**Cd**	**Sb**	**Tl**
	12	8	7	6	5	4	4	4	3	3	3	3	2	2	2
ANZ	**Li**	**Mn**	**Mo**	**Th**	**V**	**Fe**	**Ni**	**As**							
	6	3	3	3	2	2	2	2							
	2020														
JPH4	**Fe**	**Th**	**Mo**	**Ni**	**Al**	**V**	**Tl**	**As**	**Y**	**Pb**	**Mn**	**Li**	**Sr**	**Sb**	
	140	38	17	11	9	9	8	6	6	6	5	4	4	3	
McK	**Fe**	**Th**	**Mo**	**V**	**As**	**Al**	**Mn**	**Ni**	**Y**	**Li**	**Sr**	**Tl**	**Pb**	**Sb**	**Cd**
	225	43	19	10	10	8	8	8	7	6	5	5	5	3	2
McM	**Fe**	**Mn**	**Mo**	**V**	**Th**	**Al**	**Pb**	**Li**	**Ni**	**As**	**Sr**	**Tl**	**Y**	**Sb**	
	16	14	11	6	6	4	4	3	3	3	3	3	2	2	
ANZ	**Mo**	**Mn**	**Fe**	**V**	**Th**	**Li**	**Al**	**Ni**	**As**	**Sb**	**Tl**	**Pb**			
	9	8	5	4	4	3	2	2	2	2	2	2			
	2021														
JPH4	**Fe**	**Y**	**Th**	**Mo**	**As**	**V**	**Li**	**Sr**	**Al**	**Pb**	**Mn**	**Ni**	**Sb**	**Tl**	
	52	18	14	9	7	6	5	5	4	4	3	3	2	2	
McK	**Fe**	**Y**	**Th**	**Mo**	**Li**	**As**	**Al**	**V**	**Mn**	**Sr**	**Pb**	**Sb**	**Ni**		
	63	17	12	10	9	9	5	5	5	5	4	3	2		
McM	**Fe**	**Mo**	**Mn**	**Y**	**Li**	**V**	**As**	**Pb**	**Th**	**Al**	**Sr**	**Sb**			
	7	5	4	4	3	3	3	3	3	2	2	2			
ANZ	**Mo**	**Sb**	**Li**	**V**	**Mn**	**Fe**									
	3	3	2	2	2	2									

Table SI7. Expected concentrations of dissolved Al (mg/L) in moss waters at all sites, if controlled by the solubility of Gibbsite or amorphous Al-hydroxide

Sites	pH	Gibbsite	Amorphous Al-hydroxide
JPH4	3.90	7	214
McK	3.64	41	1290
McM	3.62	47	1481
ANZ	3.56	71	2242
UTK	3.62	47	1481

Note: The pH of moss waters presented here was measured in the field using a handheld device (Hanna HI98129, Hanna Instruments, Woonsocket, RI, USA).

Table SI8. Ratios of bitumen-enriched elements in moss waters from peat bogs in the Athabasca Bituminous Sands (ABS) region. The average ratios for the ABS region are also included.

Industrial sites	Bitumen-enriched element ratios		
	V/Ni	V/Mo	Ni/Mo
S1	1.4	2.1	1.5
S2	2.2	3.7	1.6
S3	1.6	2.1	1.3
S4	1.3	1.6	1.2
S5	3.7	2.1	0.6
S6	3.3	3.2	1.0
S7	1.5	3.0	2.0
S9	1.1	2.6	2.3
S10	2.1	1.7	0.8
S11	3.4	4.5	1.3
S12	1.2	1.5	1.3
S13	1.1	4.1	3.7
S14	1.9	1.8	0.9
S15	2.5	2.5	1.0
S16	2.2	3.5	1.6
S17	2.3	2.3	1.0
S18	2.8	2.3	0.8
S19	1.3	2.5	1.9
S20	3.5	2.2	0.6
P1	1.8	1.4	0.8
P3	1.3	5.2	3.8
P4	1.4	3.2	2.3
P5	2.7	1.2	0.5
P6	2.3	2.0	0.9
P8	2.6	1.6	0.6
P9	1.9	2.3	1.2
P10	3.3	2.7	0.8
P11	2.8	3.9	1.4
P12	3.5	3.0	0.9
P17	3.6	0.8	0.2
JPH4	1.3	2.9	2.3
McK	1.9	2.2	1.2
McM	2.4	1.4	0.6
ANZ	1.9	2.1	1.1
ABS average	2.2	2.5	1.3