Supplementary Information

Figure S1. Concentrations of total and filtered samples in the Torna Creek downstream of Ajka. Upper left plot shows dissolved Na^+ and SO_4^{2-} curves (open triangles show Na^+ at reference sites; closed circles show SO_4^{2-} at reference sites). All other plots show total (solid line) and dissolved (i.e. passes a 0.45µm filter: grey line) curves with reference samples as closed triangles (total fraction) and asterisk (dissolved concentration).

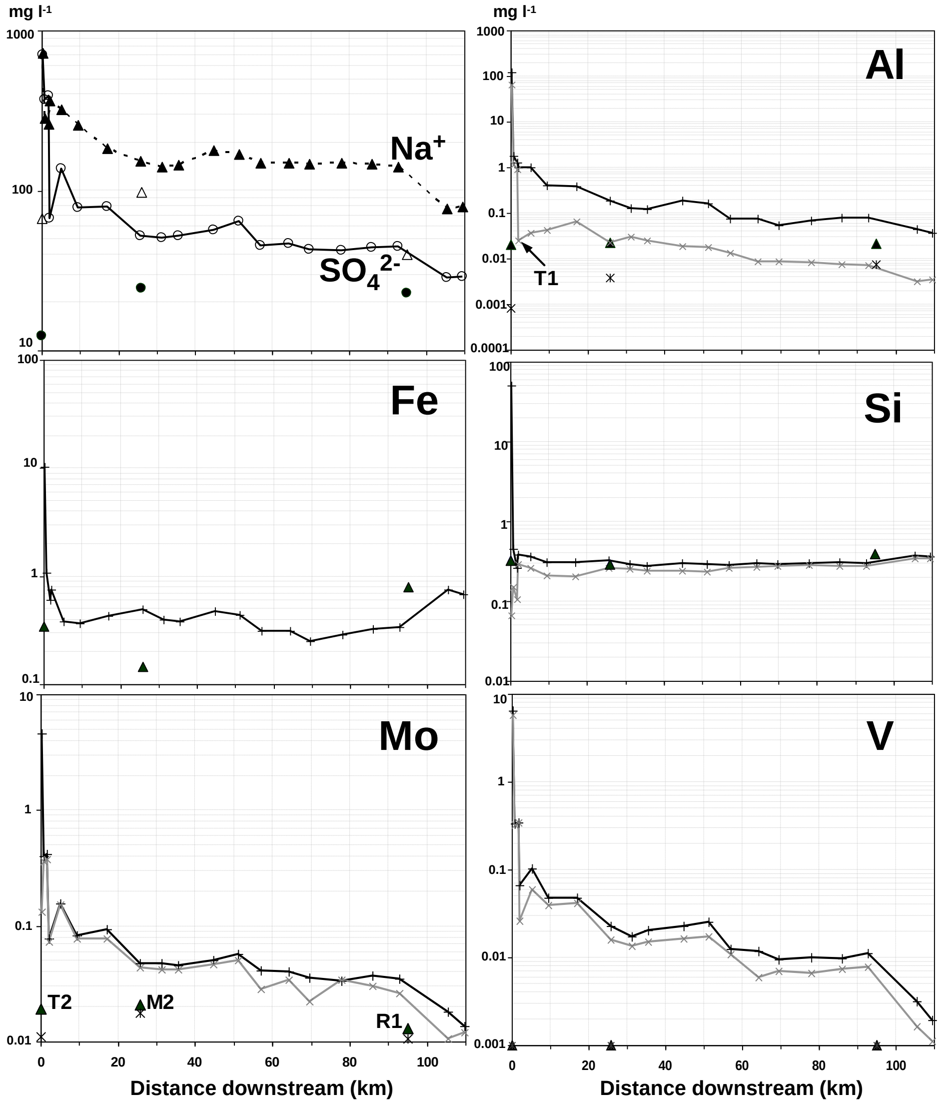


Figure S2. Mean velocity (and standard deviation of velocity measurements shown on error bars, n = 4-7) at sample stations in the Torna Creek on 1/12/10. Note: no velocity reading possible at K1 as sample taken from constructed settlement ponds.

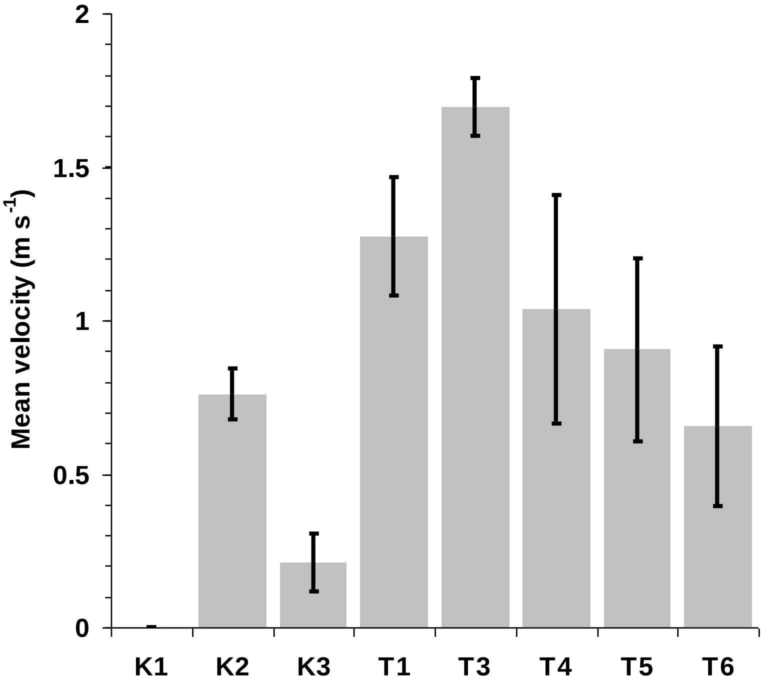


Figure S3. Gypsum-dominated streambed deposits at M6 and M10. Note also the fine suspended sediment in water column at M10.

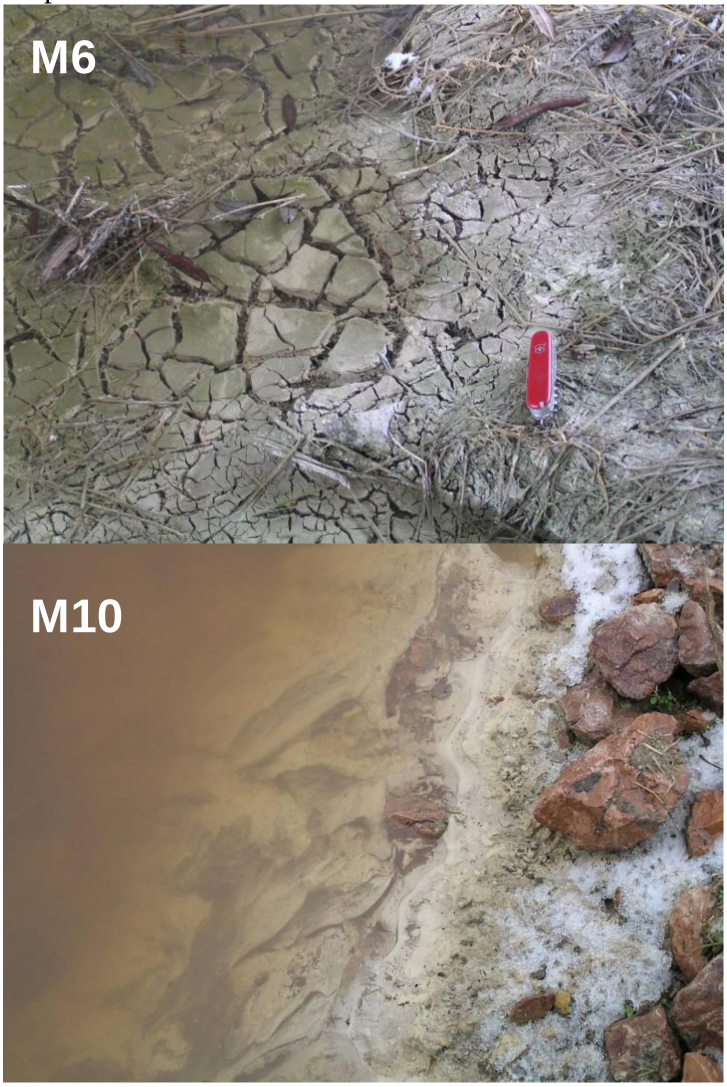
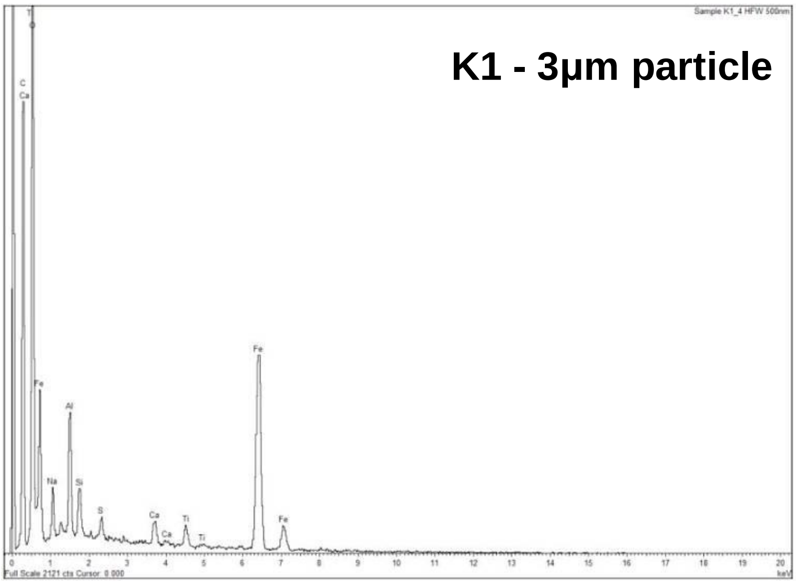


Figure S4. EDS spectra for samples shown in Figure 6. Upper image shows coarser material in K1 sample. Sample is rich in O, Al, Si and Na, with abundant Ca, S, Fe and Ti consistent with cancrinite. Lower image shows finer particles in K1 sample relatively enriched in Fe consistent with iron oxides hosted in these small aggregates.



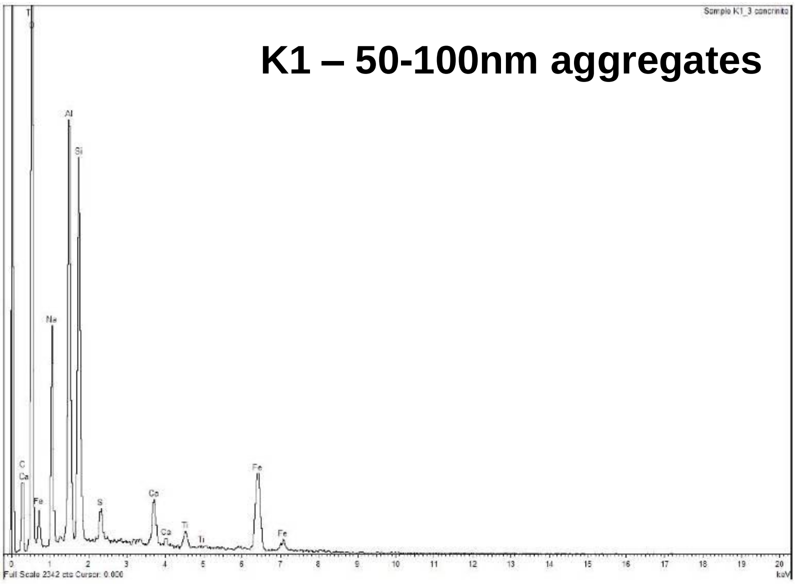


Figure S5. Particle size distribution of selected fluvial sediment samples. Curves show volume of sample in each sample size bin. Mean data generated from three scans, standard deviation shown in *y* error bars. T2 = reference sample upstream of Ajka spill. K3, T1 and T6 show red-mud enriched samples (reporting high red mud-sourced trace element concentrations). T3 reports lower red mud-sourced trace element concentrations than K3, T1 and T6.

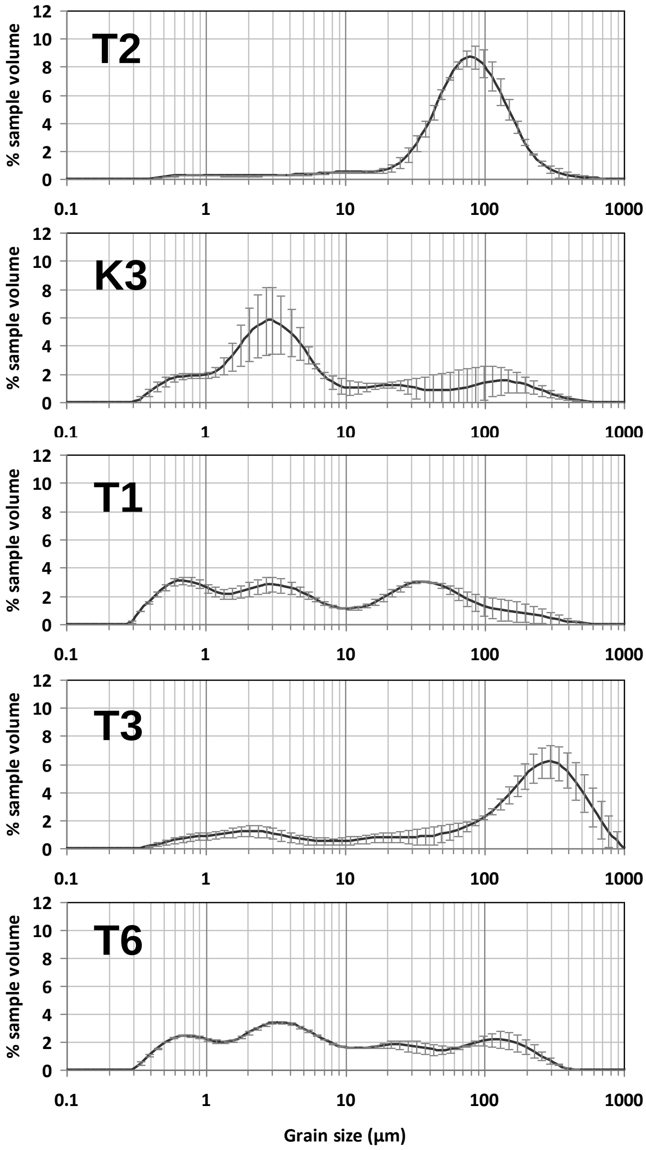


Table S1: Saturation indices for selected mineral phases in the Torna Creek.

Saturation Index		T2	K1	K2	K3	T1	T3	T4	T5	T6	M1
Phase	Species										
Adularia	$KAlSi_3O_8$	-0.94	**2.61**	-3.26	**0.56**	**0.37**	**0.71**	**0.43**	**0.69**	**0.47**	-0.05
$Al(OH)_3$(a)	$Al(OH)_3$	-2.06	**1.39**	-2.53	-0.85	-0.79	-0.47	-0.50	-0.50	-0.85	-1.30
Albite	$NaAlSi_3O_8$	-3.20	**0.9**	-4.86	-1.01	-1.31	-0.83	-1.23	-1.00	-1.32	-2.21
Alunite	$KAl3(SO_4)2(OH)_6$	-6.40	**2.76**	-16.44	-6.13	-1.54	-0.20	-0.88	-1.75	-2.71	-3.46
Analcime	$NaAlSi_2O_6$:H_2O	-4.68	**0.25**	-4.25	-1.71	-2.69	-2.20	-2.53	-2.30	-2.73	-3.69
Anorthite	$CaAl_2Si_2O_8$	-4.01	**1.44**	-3.22	-0.70	-1.15	-0.88	-0.94	-0.63	-1.29	-2.74
Aragonite	$CaCO_3$	**1**	**0.4**	**1.47**	**1.28**	**1.19**	**1.04**	**1.09**	**1.3**	**1.16**	**0.92**
Artinite	$MgCO_3$:$Mg(OH)_2$:$3H_2O$	-5.35	-10.54	**2.16**	-1.75	-4.71	-5.16	-4.98	-4.29	-4.66	-5.40
$Ba_3(AsO_4)_2$	$Ba_3(AsO_4)_2$	**9.35**	**9.94**	**13.16**	**10.41**	**8.86**	**5.38**	**9.3**	**9.85**	**9.15**	**9.98**
Barite	$BaSO_4$	**0.22**	-0.98	-0.60	-0.56	**0.54**	**0.39**	**0.43**	**0.38**	**0.41**	**0.41**
Basaluminite	$Al_4(OH)10SO_4$	-1.56	**10.17**	-10.29	**0.02**	**3.35**	**5.22**	**4.97**	**4.75**	**3.42**	**2.3**
Boehmite	AlOOH	**0.05**	**3.51**	-0.40	**1.27**	**1.34**	**1.65**	**1.61**	**1.61**	**1.26**	**0.81**
Brucite	$Mg(OH)_2$	-4.90	-7.11	**1.55**	-2.04	-4.46	-4.76	-4.60	-4.20	-4.40	-4.99
Calcite	$CaCO_3$	**1.16**	**0.56**	**1.63**	**1.44**	**1.35**	**1.2**	**1.25**	**1.46**	**1.32**	**1.08**
Chlorite14A	$Mg_5Al_2Si_3O_{10}(OH)_8$	-1.84	-8.49	**23.15**	**12.51**	**2.55**	**1.73**	**2.22**	**4.33**	**2.9**	-0.66
Chlorite7A	$Mg_5Al_2Si_3O_{10}(OH)_8$	-5.43	-12.07	**19.57**	**8.93**	-1.02	-1.86	-1.38	**0.72**	-0.71	-4.28
Chrysotile	$Mg_3Si_2O_5(OH)_4$	-3.10	-11.41	**12.01**	**3.88**	-2.06	-2.90	-2.56	-1.27	-1.70	-3.26
Clinoenstatite	$MgSiO_3$	-3.26	-6.29	**1.1**	-1.18	-2.91	-3.22	-3.15	-2.73	-2.84	-3.35
CuMetal	Cu	-1.86	**0.46**	-6.42	-0.89	**0.48**	**0.14**	**0.27**	-0.06	-2.23	-1.49
Cuprite	Cu_2O	-1.00	**3.48**	-4.79	**0.94**	**1.4**	**1.14**	**1.13**	**0.79**	-1.36	0.70
Diaspore	AlOOH	**1.97**	**5.41**	**1.49**	**3.17**	**3.23**	**3.56**	**3.52**	**3.53**	**3.18**	**2.74**
Diopside	$CaMgSi_2O_6$	-2.91	-6.61	**5.2**	**0.78**	-2.26	-2.84	-2.65	-1.88	-2.07	-3.17
Dolomite	$CaMg(CO_3)_2$	**1.72**	-1.85	**3.28**	**2.76**	**2.14**	**1.81**	**1.88**	**2.34**	**2.01**	**1.62**
Dolomite(d)	$CaMg(CO_3)_2$	**1.07**	-2.50	**2.64**	**2.11**	**1.5**	**1.17**	**1.23**	**1.69**	**1.38**	**0.97**
Forsterite	Mg_2SiO_4	-8.37	-13.60	**2.45**	-3.42	-7.56	-8.18	-7.96	-7.14	-7.45	-8.55
Gibbsite	$Al(OH)_3$	**0.85**	**4.29**	**0.36**	**2.05**	**2.1**	**2.43**	**2.41**	**2.42**	**2.07**	**1.63**
Halloysite	$Al_2Si_2O_5(OH)_4$	-2.80	**2.46**	-7.90	-1.93	-0.43	**0.18**	-0.05	-0.03	-0.52	-1.28
Hausmannite	Mn_3O_4	-17.23	-18.99	**1.66**	-12.11	-18.02	-17.82	-17.66	-16.56	-14.63	-18.92
Huntite	$CaMg_3(CO_3)_4$	-1.55	-11.05	**2.19**	**1.01**	-0.62	-1.34	-1.25	-0.27	-0.90	-1.65
Hydroxyapatite	$Ca_5(PO_4)3OH$	**2.76**	-2.17	**5.11**	**3.13**	**2.23**	-2.78	**2.98**	**3.91**	**2.81**	**1.95**
Kaolinite	$Al_2Si_2O_5(OH)_4$	**2.53**	**7.79**	-2.58	**3.39**	**4.87**	**5.51**	**5.29**	**5.32**	**4.83**	**4.08**
Kmica	$KAl_3Si_3O_{10}(OH)_2$	**6.25**	**16.69**	**2.97**	**10.15**	**10.07**	**11.08**	**10.73**	**11.02**	**10.1**	**8.7**
Laumontite	$CaAl_2Si_4O_{12}$:$4H_2O$	**0.34**	**4.11**	-3.09	**2.04**	**2.92**	**3.24**	**3.05**	**3.44**	**2.96**	**1.68**
Leonhardite	$Ca_2Al_4Si_8O_{24}$:$7H_2O$	**9.15**	**16.68**	**2.24**	**12.53**	**14.25**	**14.95**	**14.59**	**15.39**	**14.43**	**11.9**
Magnesite	$MgCO_3$	**0.07**	-2.90	**1.16**	**0.83**	**0.29**	**0.13**	**0.14**	**0.41**	**0.25**	**0.08**
$Ni(OH)_2$	$Ni(OH)_2$	-0.96	-3.05	**1.53**	-0.25	-0.83	-0.60	-0.39	-0.02	-0.13	-1.03
Phlogopite	$KMg_3AlSi_3O_{10}(OH)_2$	-3.32	-6.52	**13.49**	**6.6**	-1.01	-1.32	-1.04	**0.63**	-0.26	-2.39
Plumbogummite	$PbAl_3(PO_4)_2(OH)_5$:H_2O	-0.97	**4.67**	-17.81	-3.15	**1.77**	-0.61	**2.73**	**2.46**	**1.25**	**1.26**
Prehnite	$Ca_2Al_2Si_3O_{10}(OH)_2$	-2.47	**2.29**	**2.02**	**2.4**	**0.62**	**0.67**	**0.74**	**1.46**	**0.7**	-1.30
Pyrophyllite	$Al_2Si_4O_{10}(OH)_2$	**1.45**	**5.21**	-7.57	**0.96**	**4.01**	**4.31**	**3.81**	**3.62**	**3.38**	**2.6**
Sepiolite	$Mg_2Si_3O7.5OH$:$3H_2O$	-2.14	-9.08	**4.41**	**1.18**	-1.67	-2.20	-2.08	-1.16	-1.29	-2.19
Sepiolite(d)	$Mg_2Si_3O7.5OH$:$3H_2O$	-4.41	-11.37	**2.1**	-1.12	-4.01	-4.48	-4.34	-3.38	-3.52	-4.39
Strontianite	$SrCO_3$	-0.99	-1.40	**0.42**	**0.03**	-0.43	-0.58	-0.60	-0.32	-0.48	-0.68
Talc	$Mg_3Si_4O_{10}(OH)_2$	-0.62	-10.55	**10.36**	**4.84**	**0.3**	-0.61	-0.45	**0.83**	**0.61**	-0.85
Tremolite	$Ca_2Mg_5Si_8O_{22}(OH)_2$	-0.98	-18.35	**26.15**	**11.81**	**1.15**	-0.87	-0.30	**2.59**	**1.97**	-1.64

Table S2. Correlation matrix for major particulate elements versus selected metals / metalloids in water samples. Values show correlation coefficient (Spearman's r_s). Statistically significant relationships indicated in bold. [*] indicates significant correlation at $p < 0.05$, [ǂ] indicates significant correlation at $p < 0.001$.

	Al	Ca	Fe	K	Mg	Si	S	Ti
As	**0.49**[*]	**0.52**[*]	0.34	0.05	0.23	0.33	0.26	**0.54**[*]
Ba	**0.78**[ǂ]	**0.79**[ǂ]	**0.69**[ǂ]	-0.16	**0.42**[*]	**0.84**[ǂ]	**0.43**[*]	**0.68**[ǂ]
Cr	0.41	0.27	0.36	0.10	0.39	0.33	0.34	0.41
Co	**0.58**[*]	**0.49**[*]	**0.44**[*]	0.21	0.39	**0.79**[ǂ]	0.03	0.50[*]
Cu	**0.78**[ǂ]	**0.83**[ǂ]	**0.48**[*]	0.12	**0.55**[*]	**0.78**[ǂ]	0.22	**0.79**[ǂ]
Ga	**0.72**[ǂ]	**0.70**[ǂ]	0.35	-0.15	**0.45**[*]	**0.68**[ǂ]	0.31	**0.78**[ǂ]
Mo	0.29	0.34	0.10	0.33	**0.60**[*]	0.38	0.16	0.40
Ni	**0.52**[*]	**0.66**[ǂ]	**0.58**[*]	-0.08	0.19	**0.63**[ǂ]	0.34	**0.49**[*]
Sr	**0.81**[ǂ]	**0.88**[ǂ]	**0.62**[*]	0.07	**0.56**[*]	**0.75**[ǂ]	0.30	**0.74**[ǂ]
V	**0.92**[ǂ]	**0.76**[ǂ]	**0.78**[ǂ]	0.11	**0.42**[*]	**0.85**[ǂ]	0.37	**0.84**[ǂ]
Zn	0.34	**0.49**[*]	**0.50**[*]	0.36	0.12	0.39	0.18	0.38