

Table S1: pH of metal spiked soils and soil chemical and physical properties related to metal bioaccessibility.

Soil Type	Control pH	As Spike pH ^a	Pb Spike pH ^b	% Clay	%OC ^c	eCEC (cmol·kg ⁻¹) ^d	Fe Oxide (mmol·kg ⁻¹)	Al Oxide (mmol·kg ⁻¹)
Canisteo A	7.5	7.6	7.6	38.8	3	30.2	14.2	5.5
Dennis A	5.6	4.9	4.8	23.8	1.9	9.8	51.5	31.1
Dennis B	6.1	5.6	5.2	45	0.8	14.6	23.0	43.0
Dougherty A	5.3	5	4.5	11.3	1.2	3.3	6.5	9.9
Hanlon A	7.4	7	6.7	17.5	1.6	16.3	27.4	16.6
Kirkland A	5.6	5.1	4.8	31.3	1.45	14	28.2	33.1
Luton A	7.1	7.2	6.6	7.3	2	32.4	42.7	26.0
Mansic A	7.8	8	7.7	30	1.5	16.5	4.0	22.1
Mansic B	8	8	7.8	35	0.53	11.7	1.8	9.3
Osage A	6.6	6	5.9	55.7	2.6	28.3	91.2	36.7
Osage B	6.8	6.2	5.9	61.3	2	27.5	141.4	53.4
Pond Creek A	5.2	4.7	4.1	28.8	1.9	10.7	26.0	31.9
Pond Creek B	6	6	5.2	32.5	0.8	12.5	20.6	28.5
Pratt A	6.5	6.3	4.6	5	0.9	4.4	2.9	7.0
Pratt B	6.4	6	5.2	6.25	0.5	3.4	2.7	6.0
Richfield B	7.7	7.6	6.4	41.3	1.1	22.3	7.1	26.3
Summit A	7.2	7.3	7	45.7	2.4	29.4	39.2	50.0
Summit B	7	6.7	6.5	56.8	1.25	27.6	17.6	36.4
Taloka	5.1	4.7	4.2	11.3	1.2	4.8	32.5	22.5
Mean	7.1	6.1	5.6	30.8	1.5	16.8	30.6	26.1
Median	6.5	6	5.2	31.3	1.3	14.6	23.0	26.2
Minimum	4	4	3.8	5.0	0.5	3.3	1.8	5.5
Maximum	8	8	7.8	61.3	3.0	32.4	141.4	53.4

^a As spike level: 250 mg·kg⁻¹

^b Pb spike level: 2000 mg·kg⁻¹

^c soil organic carbon

^d effective cation exchange capacity

Table S2: Simple linear correlation coefficients (r) and regression equations for heavy metal bioaccessibility vs soil properties

Metal bioaccessibility	Soil properties	Correlation coefficients (r)	Linear Regression Equations
As	FeOx	-0.574*	%Bioaccessible As = 49.9 – 0.455FeOx
	AlOx	-0.850***	%Bioaccessible As = 78.3 – 1.61AlOx
	^a Log FeOx	-0.773**	%Bioaccessible As = 85.3 – 40.5LogFeOx
	^a Log AlOx	-0.813***	%Bioaccessible As = 131 – 71.2LogFeOx
	FeOx + AlOx	-0.705**	%Bioaccessible As = 60.1 – 0.424 (FeOx + AlOx)
	Log (FeOx + AlOx)	-0.816***	%Bioaccessible As = 97.1– 25.5Log(FeOx + AlOx)

	Soil pH	0.585*	%Bioaccessible As = 15.3 soil pH – 61.6
	% Clay	-0.509*	%Bioaccessible As = 85.3 – 40.5 %clay
	%OC	-0.2411	%Bioaccessible As = 50.6 – 9.51 %OC
	eCEC	-0.256	%Bioaccessible As = 50.0 – 0.738 %CEC
Pb	FeOx	-0.596**	%Bioaccessible Pb = 82.8 – 0.17FeOx
	AlOx	-0.700**	%Bioaccessible Pb = 89.4 – 0.475AlOx
	^a Log FeOx	-0.637**	%Bioaccessible Pb = 91.6– 11.9LogFeOx
	^a Log AlOx	-0.652**	%Bioaccessible Pb = 104 – 20.5LogAlOx
	FeOx + AlOx	-0.674**	%Bioaccessible Pb = 85.3 – 0.146(FeOx + AlOx)
	Log (FeOx + AlOx)	-0.706**	%Bioaccessible Pb = 98.9 – 8.58Log(FeOx + AlOx)
	Soil pH	-0.195	%Bioaccessible Pb = 86.3 – 1.59 soil pH
	% Clay	-0.699**	%Bioaccessible Pb = 89.0 – 0.389 %clay
	%OC	-0.429	%Bioaccessible Pb = 86.1 – 6.05 %OC
	eCEC	-0.700**	%Bioaccessible Pb = 88.7– 0.693eCEC

^aLog = log₍₁₀₎; Significance level: **P* < 0.05, ** *P* < 0.01, *** *P* < 0.001

Table S3: As soil properties correlation analysis

	spiked	% Clay	Fe Oxide	Al Oxide	FeOx + Al	logFeOx
spiked pH	1					
% Clay	0.138	1				
Fe Oxide	-0.210	0.524	1			
Al Oxide	-0.218	0.700	0.675	1		
FeOx + Al	-0.229	0.620	0.972	0.829	1	
logFeOx	-0.341	0.483	0.826	0.768	0.870	1

Table S4: Pb soil properties correlation analysis

	% Clay	Fe Oxide (mmol·kg ⁻¹)	Al Oxide (mmol·kg ⁻¹)	eCEC (cmol·kg ⁻¹)	FeOx + Al Ox (mmol·kg ⁻¹)	logFeOx (mmol·kg ⁻¹)	log (FeOx + AlOx) (log mmol·kg ⁻¹)
% Clay	1						
Fe Oxide (mmol·kg ⁻¹)	0.502	1					
Al Oxide (mmol·kg ⁻¹)	0.689	0.673	1				
eCEC (cmol·kg ⁻¹)	0.641	0.456	0.489	1			
FeOx + Al Ox (mmol·kg ⁻¹)	0.600	0.972	0.828	0.501	1		
logFeOx (mmol·kg ⁻¹)	0.423	0.821	0.753	0.506	0.861	1	
log (FeOx + AlOx) (log mmol·kg ⁻¹)	0.567	0.796	0.896	0.539	0.889	0.948	1

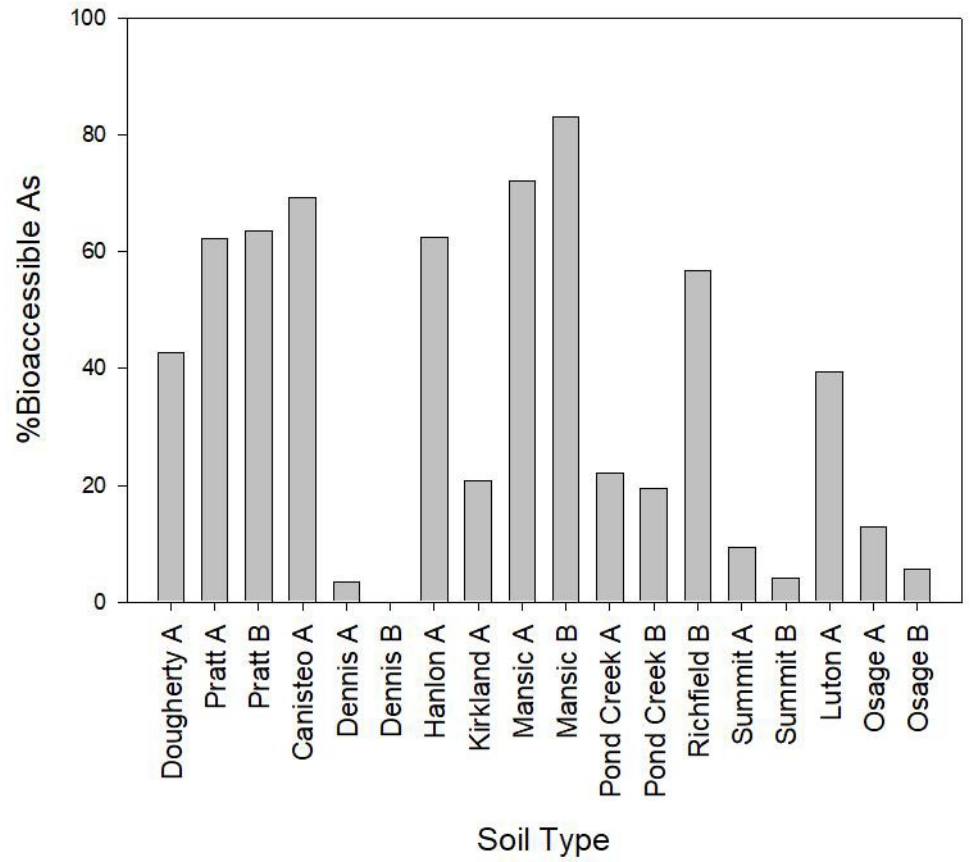


Figure S1: Effect of soil type on %bioaccessible As

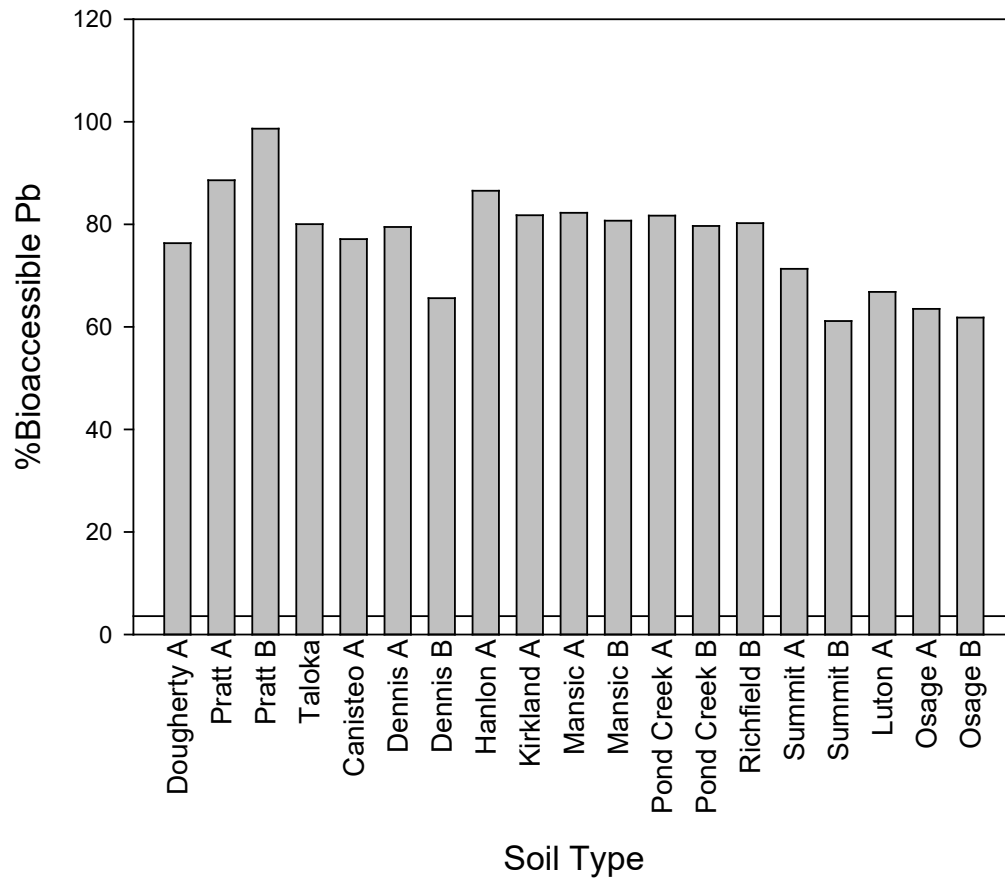


Figure S2: Effect of soil type on %bioaccessible Pb