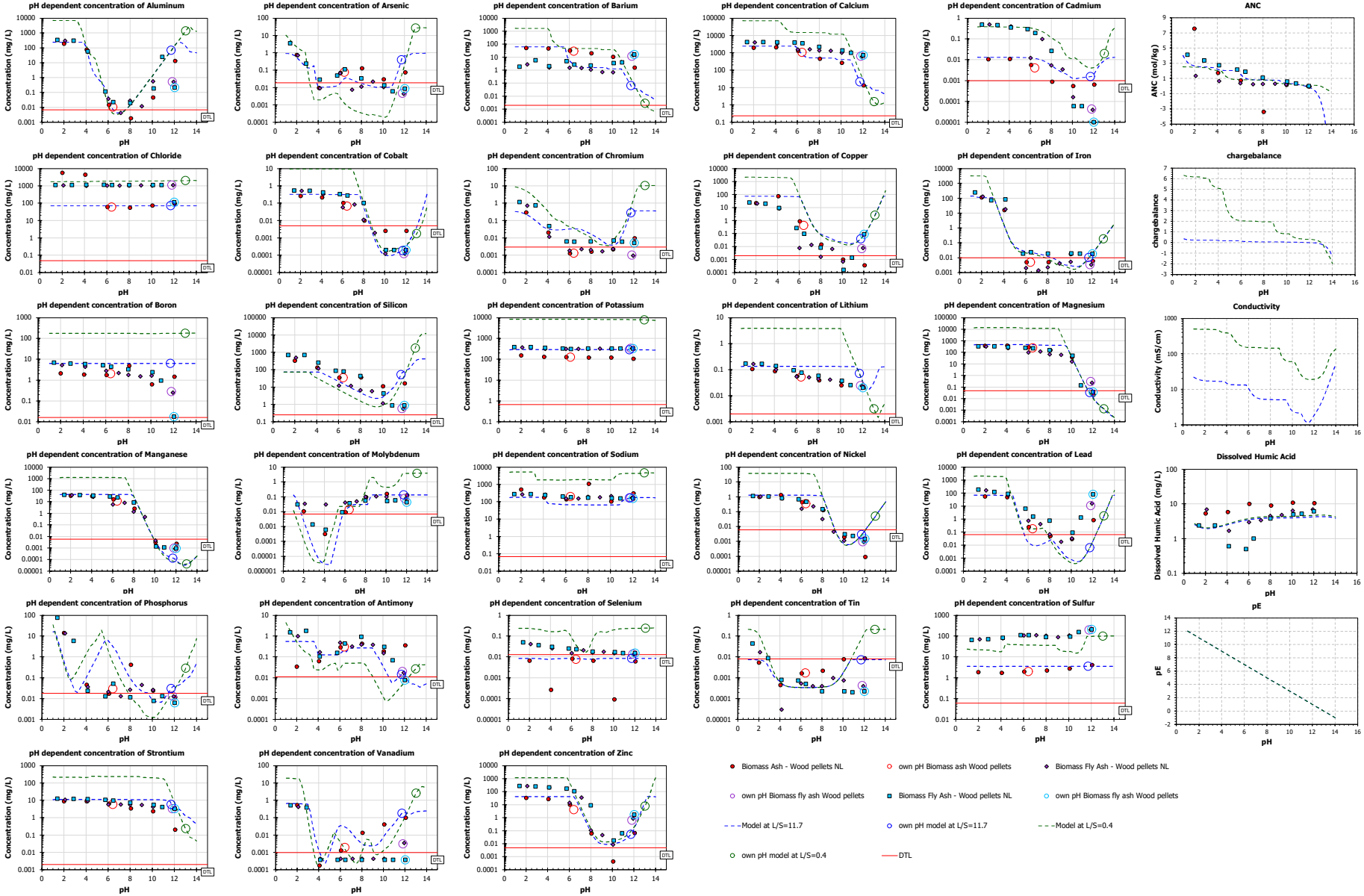
BIOMASS ASH WOOD PELLETS NL

COMPARISON pH DEPENDENCE WITH MODEL



Object pH Dependent Leaching Test Model
Name Biomass wood ash NL

pH Dependent Leaching Test Scenario

Lab Test

Extra L/S Simulation

Lab Test

Model Parameters

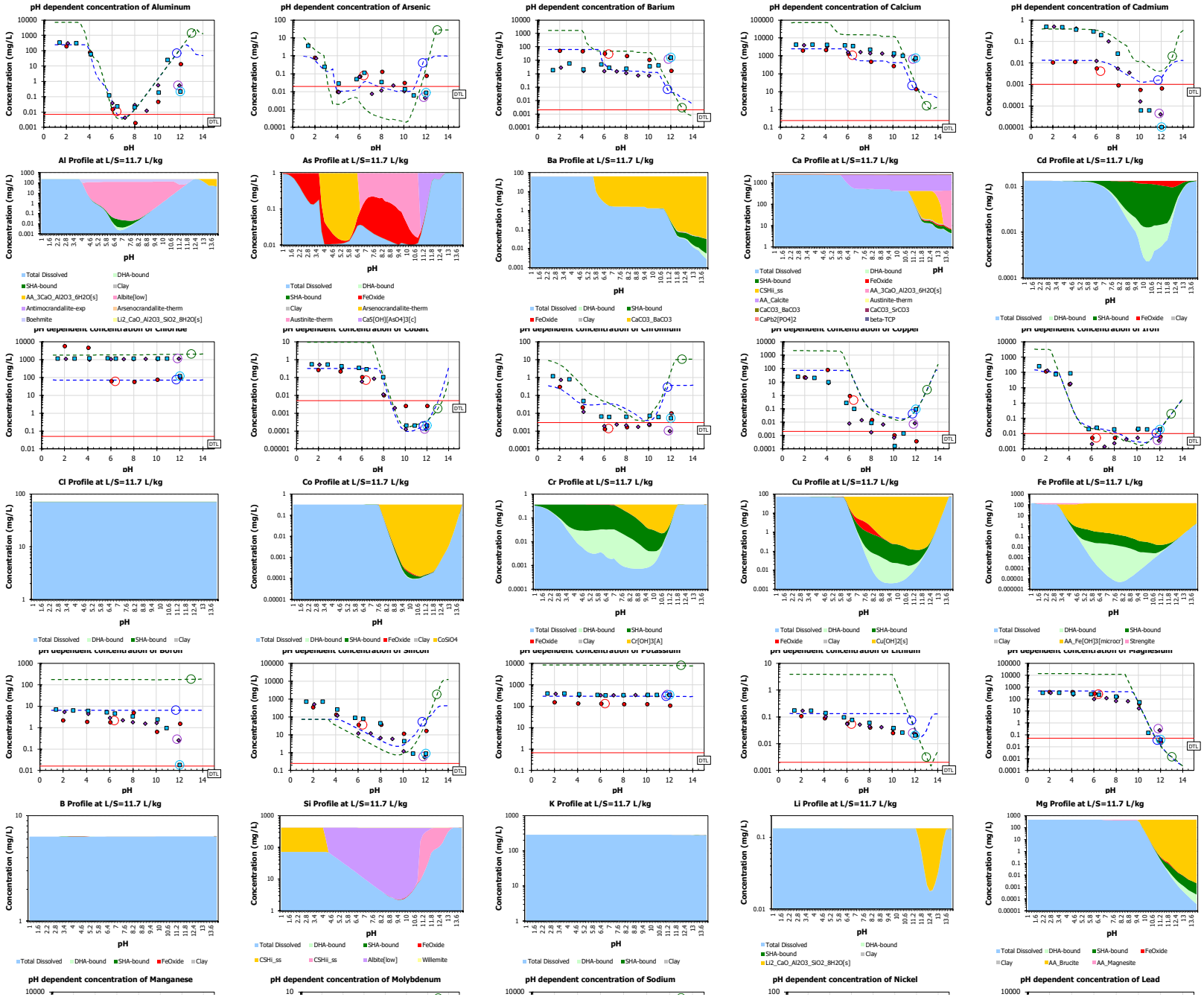
Entity	Unit	Default	Available Content Entity	mg/kg	Entity	mg/kg	Entity	mg/kg
c0		-5.538	Al	2828	Si	4932	Sn	0.08540
c1		-0.5263	As	11.25	Hg	2.006E-07	S	41.00
c2		0.1980	Ba	733.1	K	3380	Sr	129.2
c3		-0.02918	Ca	2.863E+04	Li	1.559	V	7.845
c4		0.001916	Cd	0.1552	Mg	5405	Zn	478.1
c5		-4.675E-05	Cl	832.8	Mn	494.1		
Clay	mg/kg	2.000E+04	Co	3.768	Mo	1.568		
Hydrous Ferric Oxide	mg/kg	327.0	CO32-	3.520E+04	Na	2072		
L/S	L/kg	11.66	Cr	4.259	Ni	15.12		
pE		1.000	Cu	869.9	Pb	803.9		
pH		12.00	F	10.00	PO4	630.2		
Solid Humic Acid	mg/kg	500.0	Fe	1658	Sb	6.414		
Simulated Low L/S	L/kg	0.4000	B	74.15	Se	0.09894		

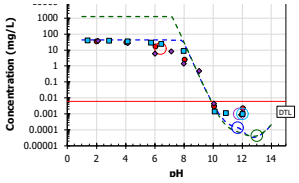
Solid Solutions

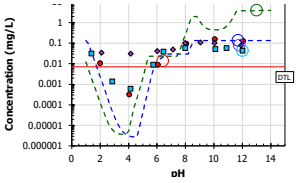
Name	End Member	Log(K)	Reaction
CSHi_ss	Cem07_SiO2[am]_s	24.21	Cem07_SiO2[am]_ss + 2 H2O -> 1 CSHi_ss + 2 H+ + 1 H2SiO4-2
	Cem07_Tob_I_ss	23.87	Cem07_Tob_I_ss -> 1 CSHi_ss + 2 Ca+2 + 0.8 H+ + 1.2 H2O + 2.4 H2SiO4-2
CSHii_ss	Cem07_Jenn_ss	-7.799	Cem07_Jenn_ss + 1.33333 H+ -> 1 CSHii_ss + 1.66667 Ca+2 + 1.76667 H2O + 1 H2SiO4-2
	Cem07_Tob_II_ss	10.36	Cem07_Tob_II_ss -> 1 CSHii_ss + 0.83333 Ca+2 + 0.33333 H+ + 0.16667 H2O + 1 H2SiO4-2

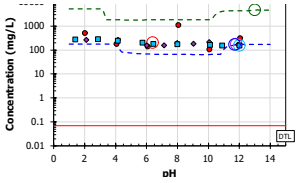
Minerals

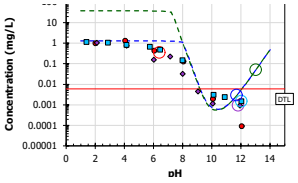
Name	Log(K)	Reaction
AA_3CaO_Al2O3_6H2O[	-33.53	AA_3CaO_Al2O3_6H2O[s] + 4 H+ -> 2 Al[OH]4- + 3 Ca+2 + 4 H2O
AA_Brucite	-16.84	AA_Brucite + 2 H+ -> 2 H2O + 1 Mg+2
AA_Calcite	9.481	AA_Calcite -> 1 CO3-2 + 1 Ca+2
AA_Fe[OH]3[microcr]	18.60	AA_Fe[OH]3[microcr] + 1 H2O -> 1 Fe[OH]4- + 1 H+
AA_Magnesite	9.359	AA_Magnesite -> 1 CO3-2 + 1 Mg+2
Albite[low]	85.27	Albite[low] + 8 H2O -> 1 Al[OH]4- + 6 H+ + 3 H2SiO4-2 + 1 Na+
Antimocrandallite-exp	63.00	Antimocrandallite-exp + 8 H2O -> 3 Al[OH]4- + 1 Ca+2 + 3 H+ + 2 Sb[OH]6-
Arsenocrandallite-therm	95.56	Arsenocrandallite-therm + 6 H2O -> 3 Al[OH]4- + 2 AsO4-3 + 1 Ca+2 + 7 H+
Austinite-therm	11.47	Austinite-therm + 1 H+ -> 1 AsO4-3 + 1 Ca+2 + 1 H2O + 1 Zn+2
BaSrSO4[50%Ba]	8.221	BaSrSO4[50%Ba] -> 0.5 Ba+2 + 1 SO4-2 + 0.5 Sr+2
beta-TCP	28.93	beta-TCP -> 3 Ca+2 + 2 PO4-3
Boehmite	14.42	Boehmite + 2 H2O -> 1 Al[OH]4- + 1 H+
Ca[OH]Sb[OH]6[s]	2.000	Ca[OH]Sb[OH]6[s] + 1 H+ -> 1 Ca+2 + 1 H2O + 1 Sb[OH]6-
Ca5[OH][AsO4]3[c]	26.13	Ca5[OH][AsO4]3[c] + 1 H+ -> 3 AsO4-3 + 5 Ca+2 + 1 H2O
CaCO3_BaCO3	22.00	CaCO3_BaCO3 -> 1 Ba+2 + 2 CO3-2 + 1 Ca+2
CaCO3_SrCO3	19.85	CaCO3_SrCO3 -> 2 CO3-2 + 1 Ca+2 + 1 Sr+2
CaMoO4[c]	7.940	CaMoO4[c] -> 1 Ca+2 + 1 MoO4-2
CaPb2[PO4]2	40.76	CaPb2[PO4]2 -> 1 Ca+2 + 2 PO4-3 + 2 Pb+2
CaSb[OH]6[s]2	18.41	CaSb[OH]6[s]2 + 6 H2O -> 1 Ca+2 + 2 Sb[OH]6-
CoSiO4	6.289	CoSiO4 + 2 H+ -> 2 Co+2 + 1 H2SiO4-2
Cr[OH]3[A]	68.13	Cr[OH]3[A] + 1 H2O -> 1 CrO4-2 + 5 H+ + 3 e-
Cu[OH]2[s]	-8.640	Cu[OH]2[s] + 2 H+ -> 1 Cu+2 + 2 H2O
Fe_Vanadate	19.18	Fe_Vanadate + 1 H2O -> 0.5 Fe[OH]4- + 1 VO2+ + 0.5 e-
Fluorite	10.96	Fluorite -> 1 Ca+2 + 2 F-
Li2_CaO_Al2O3_SiO2_8H2O[s]	22.69	Li2_CaO_Al2O3_SiO2_8H2O[s] -> 2 Al[OH]4- + 1 Ca+2 + 3 H2O + 1 H2SiO4-2 + 2 Li+
Manganite	-25.27	Manganite + 3 H+ + 1 e- -> 2 H2O + 1 Mn+2
Ni[OH]2[s]	-10.80	Ni[OH]2[s] + 2 H+ -> 2 H2O + 1 Ni+2
Pb[OH]2[C]	-8.150	Pb[OH]2[C] + 2 H+ -> 2 H2O + 1 Pb+2
Pb2V2O7	0.9500	Pb2V2O7 + 3 H+ -> 1.5 H2O + 1 Pb+2 + 1 VO2+
Pb3[VO4]2	-3.070	Pb3[VO4]2 + 4 H+ -> 2 H2O + 1.5 Pb+2 + 1 VO2+
PbMoO4[c]	15.80	PbMoO4[c] -> 1 MoO4-2 + 1 Pb+2
Sn[OH]2[s]	1.447	Sn[OH]2[s] + 2 H+ -> 2 H2O + 1 Sn+2
Strengite	48.00	Strengite + 2 H2O -> 1 Fe[OH]4- + 4 H+ + 1 PO4-3
Willemite	6.289	Willemite + 2 H+ -> 1 H2SiO4-2 + 2 Zn+2
Zn3[SbO4]2[s]	3.000	Zn3[SbO4]2[s] + 4 H+ + 4 H2O -> 2 Sb[OH]6- + 3 Zn+2

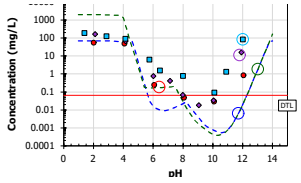

pH dependent concentration of Aluminum
pH dependent concentration of Arsenic
pH dependent concentration of Barium
pH dependent concentration of Calcium
pH dependent concentration of Cadmium
Al Profile at L/S=11.7 L/kg
As Profile at L/S=11.7 L/kg
Ba Profile at L/S=11.7 L/kg
Ca Profile at L/S=11.7 L/kg
Cd Profile at L/S=11.7 L/kg
pH dependent concentration of Chloride
pH dependent concentration of Cobalt
pH dependent concentration of Chromium
pH dependent concentration of Copper
pH dependent concentration of Iron
Cl Profile at L/S=11.7 L/kg
Co Profile at L/S=11.7 L/kg
Cr Profile at L/S=11.7 L/kg
Cu Profile at L/S=11.7 L/kg
Fe Profile at L/S=11.7 L/kg
pH dependent concentration of Boron
pH dependent concentration of Silicon
pH dependent concentration of Potassium
pH dependent concentration of Lithium
pH dependent concentration of Magnesium
B Profile at L/S=11.7 L/kg
Si Profile at L/S=11.7 L/kg
K Profile at L/S=11.7 L/kg
Li Profile at L/S=11.7 L/kg
Mg Profile at L/S=11.7 L/kg
pH dependent concentration of Manganese
pH dependent concentration of Molybdenum
pH dependent concentration of Sodium
pH dependent concentration of Nickel
pH dependent concentration of Lead
Concentration (mg/L)
pH
DTL
Total Dissolved
DHA-bound
SHA-bound
FeOxide
Clay
CaCO3_BaCO3
CaCO3_SrCO3
beta-TCP
Willemite
AA_Brucite
AA_Magnesite



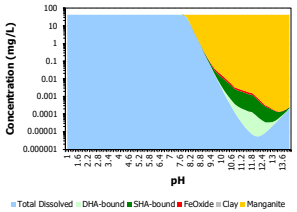




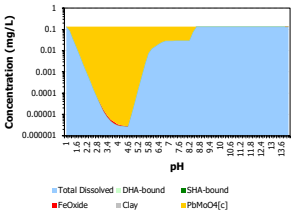




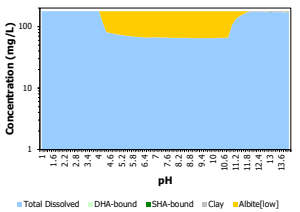
Mn Profile at L/S=11.7 L/kg



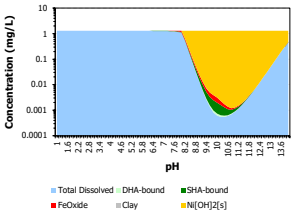
Mo Profile at L/S=11.7 L/kg



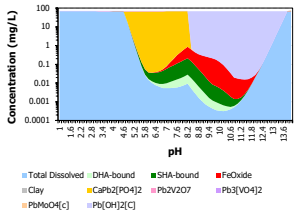
Na Profile at L/S=11.7 L/kg

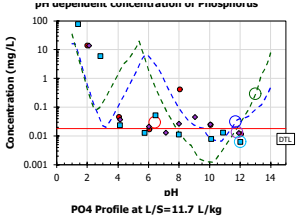


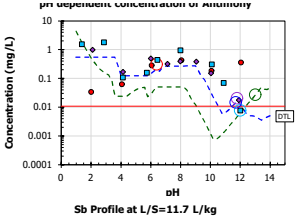
Ni Profile at L/S=11.7 L/kg

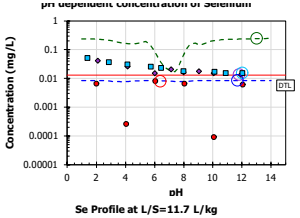


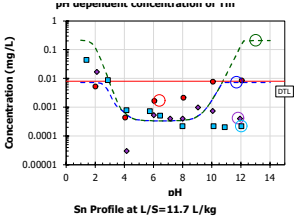
Pb Profile at L/S=11.7 L/kg

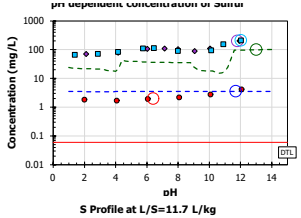




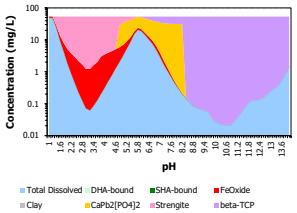




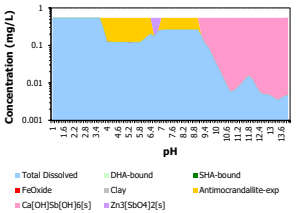




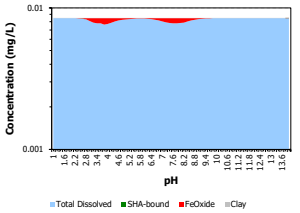
PO4 Profile at L/S=11.7 L/kg



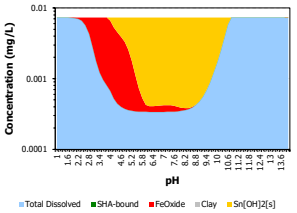
Sb Profile at L/S=11.7 L/kg



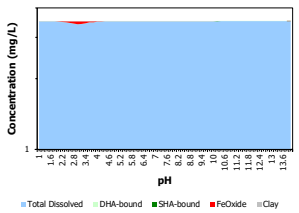
Se Profile at L/S=11.7 L/kg

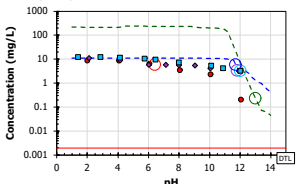


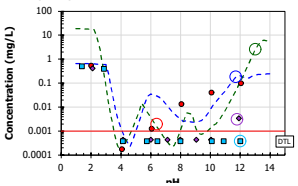
Sn Profile at L/S=11.7 L/kg

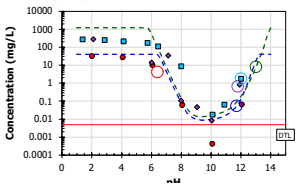


S Profile at L/S=11.7 L/kg

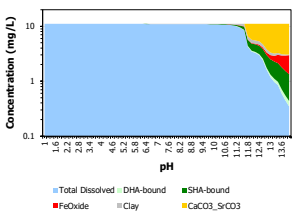




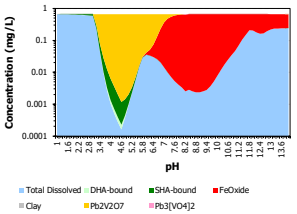




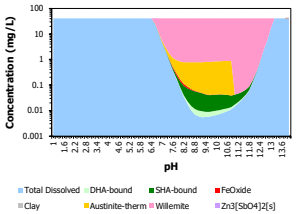
Sr Profile at L/S=11.7 L/kg



V Profile at L/S=11.7 L/kg



Zn Profile at L/S=11.7 L/kg



Model Comparison: residuals - Concentration

Name **Biomass wood ash NL**

Legend

Total Average Deviation	Square root of the sum of the squared values of residuals divided by the number of values, over the entire X range.
User Average Deviation	Square root of the sum of the squared values of residuals divided by the number of values, over the user defined X range.
Fractional Average Deviation	Square root of the sum of the squared values of residuals divided by the number of values, over the fraction.
	Note that the Total and User Average Deviation columns are averages as well.

Residual details, concentrations

Residuals as log(model/sample)

Fraction	*6*	*5*	*4*	*3*	*2*	*1*	*Total Avg*
pH	*2.01*	*4.07*	*6.07*	*8.07*	*10.1*	*12.1*	*Deviation*
Al	0.10	-0.05	0.38	0.97	1.54	1.07	0.36
As	-0.15	0.05	-0.55	-0.87	-0.45	0.96	0.25
Ba	0.10	0.14	-0.81	-1.10	-0.90	-1.60	0.38
Ca	0.10	0.08	0.08	0.05	0.19	0.01	0.04
Cd	0.10	0.08	0.35	0.76	0.38	0.54	0.18
Cl	-1.89	-1.79	0.07	0.12	0.00	-0.11	0.43
Co	0.10	0.18	0.50	0.66	-1.39	-0.87	0.31
Cr	-0.10	0.20	1.42	1.00	0.26	1.58	0.40
Cu	0.54	-0.01	1.82	0.79	1.35	2.40	0.57
Fe	0.00	-1.09	0.68	0.38	-0.78	0.57	0.28
B	0.48	0.54	0.57	0.12	1.01	0.64	0.25
Si	-0.66	-0.26	-0.22	-0.89	-0.59	0.74	0.25
K	0.28	0.35	0.36	0.38	0.38	0.44	0.15
Li	0.10	0.19	0.38	0.53	0.73	0.13	0.17
Mg	0.10	0.10	0.23	0.44	-0.07	-0.28	0.10
Mn	0.10	0.15	0.42	0.93	0.01	-1.46	0.30
Mo	-0.68	-2.01	0.20	-0.49	-0.06	0.03	0.37
Na	-0.45	-0.07	-0.31	-1.21	-0.20	-0.25	0.23
Ni	0.13	0.00	0.47	0.83	-0.44	1.82	0.35
Pb	0.10	0.13	-1.21	-0.29	-1.59	-1.50	0.42
PO4	-	-	-	-	-	-	-
Sb	1.22	0.32	-0.26	-0.19	-0.78	-1.50	0.36
Se	0.11	1.47	0.02	0.08	1.97	0.14	0.41
Sn	0.14	0.15	-0.68	-0.78	-0.58	-0.06	0.20
S	0.28	0.31	0.26	0.20	0.11	-0.07	0.09
Sr	0.10	0.10	0.23	0.50	0.67	1.23	0.25
V	0.08	0.78	1.43	-0.65	-0.63	0.30	0.32
Zn	0.10	0.19	0.60	0.01	1.38	0.45	0.26
Avg Deviati	0.10	0.13	0.13	0.13	0.17	0.19	0.28

Yellow = own pH All residuals within + 1 or - 1 are considered to represent a good fit.