Validation Test Summary

Table 1 Marfa SP Validation Tests.

Validation Test	Retention Model	Flow	Kd	Decay/ Ingrowth	Comments
1	Infinite matrix	Steady	Steady	Yes	Single Segment
2	Finite matrix	Steady	Steady	Yes	Single segment
3	Finite and infinite matrix	Steady	Steady	Yes	Two independent pathways. Single segment.
4	Infinite Matrix	Unsteady	Steady	Yes	Single segment
5	Finite matrix	Unsteady	Steady	Yes	Single segment
5a	Finite matrix	Unsteady	Steady	Yes	Multiple segment. Includes resident concentration calculation.
6	Infinite matrix	Unsteady	Steady	Yes	Multiple segments.
7	Infinite matrix	Unsteady	Unsteady	Yes	Single segment
8	Tabular	Steady	Steady	Yes	Single segment
9	Tabular	Steady	Steady	Yes	5 segments
9a	Tabular	Unsteady	Steady	Yes	5 segments
9b	Tabular	Unsteady	Steady	Yes	5 segments
10	Infinite matrix	Steady	Steady	Yes	Tests particle splitting
11	Infinite matrix	Steady	Steady	Yes	Colloids
11a	Finite matrix	Steady	Steady	Yes	Colloids
11b	Finite matrix	Steady	Steady	Yes	Colloids and surface sorption
12	Equilibrium Sorption	Steady	Steady	No	Single segment. Compare with Ogata Banks. Two independent nuclides with and without sorption, no decay.
12a	Equilibrium Sorption	Steady	Steady	No	Colloids. Single segment. Compare with Ogata Banks.
12b	Equilibrium Sorption	Steady	Steady	No	Tests Resident concentration calculation
12c	Equilibrium Sorption	Steady	Steady	Yes	Tests Resident concentration calculation.
12d	Equilibrium Sorption	Unsteady	Steady	Yes	Tests Resident concentration calculation.
13	Stagnant water and infinite matrix	Steady	Steady	Yes	Single segment. Compare to analytical solution of Shahkarami et al. 2015. No dispersion

13a	Stagnant water and infinite matrix	Steady	Steady	Yes	Dispersion on flowpath.
13b	Stagnant water and infinite matrix.	Steady	Steady	Yes	Smaller flowpath width.
13c	Stagnant water and finite matrix	Steady	Steady	Yes	Same a Test 13a but with matrix of 1 m.
13d	Stagnant water and infinite matrix.	Unsteady	Steady	Yes	Same a Test 13a but with flow changes.

Table 2 Marfa NR Validation Tests

Validation Test	Retention model	Flow	Kd	Decay/ Ingrowth	Comments
1a	Infinite matrix	Steady	Steady	Yes	Compare NR and SP versions.
1b	Finite matrix	Steady	Steady	Yes	Compare NR and SP versions.
1c	Equilibrium Sorption	Steady	Steady	Yes	Compare NR and SP versions. Also tests resident concentration calculation.
2	Infinite matrix	Unsteady	Unsteady	Yes	Compare NR and SP versions.
3	Infinite matrix	Steady	Steady	Yes	Compare NR and SP versions. Multiple pathways.