

# MIGRATEv10

Version 10.00  
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## Case 2: Landfill with composite primary and compacted clay secondary liners.

### Layer Properties

Layer	Thickness	Sublayers	Dry Density	Porosity	Distribution Coefficient	Half-Life
Primary Geomembrane	60 mil	1	950 kg/m <sup>3</sup>	1	0 m <sup>3</sup> /kg	0 year
Primary Liner	0.9 m	10	1.9 g/cm <sup>3</sup>	0.35	0.5 mL/g	0 year
Collection System	0.3 m	1	1.9 g/cm <sup>3</sup>	0.35	0 mL/g	0 year
Secondary Liner	0.9 m	10	1.9 g/cm <sup>3</sup>	0.35	0.5 mL/g	0 year
Aquitard	3 m	10	1.9 g/cm <sup>3</sup>	0.3	0.5 mL/g	3.61046560799303E-308

Layer	Vertical Diffusion	Horizontal Diffusion	Vertical Velocity	Horizontal Velocity	Sink Removal	Concentration
Primary Geomembrane	3E-5 m <sup>2</sup> /a	3E-5 m <sup>2</sup> /a	5.7851E-5 m/a	0 m/a	0 m/a	0 mg/L
Primary Liner	0.02 m <sup>2</sup> /a	0.02 m <sup>2</sup> /a	5.7851E-5 m/a	0 m/a	0 m/a	0 mg/L
Collection System	100 m <sup>2</sup> /a	100 m <sup>2</sup> /a	5.7851E-5 m/a	0 m/a	0 m/a	0 mg/L
Secondary Liner	0.02 m <sup>2</sup> /a	0.02 m <sup>2</sup> /a	5.7851E-5 m/a	0 m/a	0 m/a	0 mg/L
Aquitard	0.02 m <sup>2</sup> /a	0.02 m <sup>2</sup> /a	5.7851E-5 m/a	0 m/a	1.24573197620075E-315	6.36598737289582E-314

### Boundary Conditions

#### Constant Concentration Top Boundary

	Cell 1
Offset	0 m
Surface Width	200 m
Base Width	200 m
Initial Concentration	1500 µg/L

#### Aquifer Bottom Boundary

Base Thickness	3 m
Base Half-Life	0 year
Base Porosity	0.3
Sink Removal	0 m/a
Outflow Velocity	10 m/a
Dispersion Coefficient	10 m <sup>2</sup> /a
Base Integration Width	1200 m

### Laplace Transform Parameters

TAU	7
N	11
SIG	0
RNU	1

## Gauss Integration Parameters

Integration Level	Fine
Subinterval Size	0.025
Number of Subintervals	48
Number of Sample Points per Step	0
Total Width of Integration	1.2
Total Number of Integration Points	1920

## Calculated Concentrations at Selected Depths, Lateral Distances and Times

Time year	Distance m	Depth m	Concentration mg/L
30	0	0.00000E+00	1.49348E+00
		1.52400E-03	9.05397E-01
		9.15240E-02	7.61706E-01
		1.81524E-01	6.30056E-01
		2.71524E-01	5.12016E-01
		3.61524E-01	4.08438E-01
		4.51524E-01	3.19469E-01
		5.41524E-01	2.44620E-01
		6.31524E-01	1.82880E-01
		7.21524E-01	1.32853E-01
		8.11524E-01	9.29139E-02
		9.01524E-01	6.13480E-02
		1.20152E+00	6.13313E-02
		1.29152E+00	4.23235E-02
		1.38152E+00	2.85957E-02
		1.47152E+00	1.89117E-02
		1.56152E+00	1.22399E-02
		1.65152E+00	7.75125E-03
		1.74152E+00	4.80275E-03
		1.83152E+00	2.91248E-03
		1.92152E+00	1.73094E-03
		2.01152E+00	1.01292E-03
		2.10152E+00	5.92264E-04
		2.40152E+00	6.62024E-05
		2.70152E+00	5.54204E-06
		3.00152E+00	3.46138E-07
		3.30152E+00	1.60827E-08
		3.60152E+00	5.54616E-10
		3.90152E+00	1.38356E-11

		4.20152E+00	3.84415E-13
		4.50152E+00	1.15855E-14
		4.80152E+00	-1.79525E-14
		5.10152E+00	2.27423E-15
30	100	0.00000E+00	7.49344E-01
		1.52400E-03	4.54201E-01
		9.15240E-02	3.82093E-01
		1.81524E-01	3.16035E-01
		2.71524E-01	2.56812E-01
		3.61524E-01	2.04848E-01
		4.51524E-01	1.60215E-01
		5.41524E-01	1.22666E-01
		6.31524E-01	9.16893E-02
		7.21524E-01	6.65849E-02
		8.11524E-01	4.65348E-02
		9.01524E-01	3.06771E-02
		1.20152E+00	3.06687E-02
		1.29152E+00	2.11635E-02
		1.38152E+00	1.42988E-02
		1.47152E+00	9.45641E-03
		1.56152E+00	6.12027E-03
		1.65152E+00	3.87579E-03
		1.74152E+00	2.40147E-03
		1.83152E+00	1.45629E-03
		1.92152E+00	8.65499E-04
		2.01152E+00	5.06474E-04
		2.10152E+00	2.96140E-04
		2.40152E+00	3.31021E-05
		2.70152E+00	2.77110E-06
		3.00152E+00	1.73075E-07
		3.30152E+00	8.04163E-09
		3.60152E+00	2.77319E-10
		3.90152E+00	6.91807E-12
		4.20152E+00	1.92228E-13
		4.50152E+00	5.68124E-15
		4.80152E+00	-9.12360E-15
		5.10152E+00	4.35576E-15

<b>Total Mass into Soil</b>	<b>Total Mass into Base</b>	<b>Velocity Transport</b>	<b>Mass in Base -WY/2 to +WY/2</b>
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9.32099E+01	3.58604E-13	3.54622E-14	2.52217E-13
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Time year	Distance m	Depth m	Concentration mg/L
50	0	0.00000E+00	1.49348E+00
		1.52400E-03	1.00320E+00
		9.15240E-02	8.81852E-01
		1.81524E-01	7.67108E-01
		2.71524E-01	6.60014E-01
		3.61524E-01	5.61343E-01
		4.51524E-01	4.71583E-01
		5.41524E-01	3.90940E-01
		6.31524E-01	3.19361E-01
		7.21524E-01	2.56559E-01
		8.11524E-01	2.02062E-01
		9.01524E-01	1.55250E-01
		1.20152E+00	1.55223E-01
		1.29152E+00	1.21470E-01
		1.38152E+00	9.38927E-02
		1.47152E+00	7.16805E-02
		1.56152E+00	5.40448E-02
		1.65152E+00	4.02449E-02
		1.74152E+00	2.96058E-02
		1.83152E+00	2.15292E-02
		1.92152E+00	1.54984E-02
		2.01152E+00	1.10785E-02
		2.10152E+00	7.91258E-03
		2.40152E+00	1.98834E-03
		2.70152E+00	4.21707E-04
		3.00152E+00	7.52939E-05
		3.30152E+00	1.12935E-05
		3.60152E+00	1.42060E-06
		3.90152E+00	1.49650E-07
		4.20152E+00	1.31884E-08
		4.50152E+00	9.71575E-10
		4.80152E+00	5.91076E-11
		5.10152E+00	-4.52462E-13
50	100	0.00000E+00	7.49344E-01
		1.52400E-03	5.03222E-01
		9.15240E-02	4.42308E-01
		1.81524E-01	3.84721E-01

		2.71524E-01	3.30980E-01
		3.61524E-01	2.81470E-01
		4.51524E-01	2.36433E-01
		5.41524E-01	1.95970E-01
		6.31524E-01	1.60052E-01
		7.21524E-01	1.28534E-01
		8.11524E-01	1.01178E-01
		9.01524E-01	7.76726E-02
		1.20152E+00	7.76591E-02
		1.29152E+00	6.07670E-02
		1.38152E+00	4.69677E-02
		1.47152E+00	3.58543E-02
		1.56152E+00	2.70315E-02
		1.65152E+00	2.01283E-02
		1.74152E+00	1.48066E-02
		1.83152E+00	1.07669E-02
		1.92152E+00	7.75066E-03
		2.01152E+00	5.54018E-03
		2.10152E+00	3.95686E-03
		2.40152E+00	9.94259E-04
		2.70152E+00	2.10866E-04
		3.00152E+00	3.76485E-05
		3.30152E+00	5.64693E-06
		3.60152E+00	7.10321E-07
		3.90152E+00	7.48268E-08
		4.20152E+00	6.59433E-09
		4.50152E+00	4.85795E-10
		4.80152E+00	2.98360E-11
		5.10152E+00	2.77880E-13

Total Mass into Soil	Total Mass into Base	Velocity Transport	Mass in Base -WY/2 to +WY/2
1.35689E+02	1.18706E-10	-1.09890E-10	4.48376E-10

Time year	Distance m	Depth m	Concentration mg/L
100	0	0.00000E+00	1.49348E+00
		1.52400E-03	1.11918E+00
		9.15240E-02	1.02550E+00
		1.81524E-01	9.34557E-01
		2.71524E-01	8.46866E-01

		3.61524E-01	7.62875E-01
		4.51524E-01	6.82965E-01
		5.41524E-01	6.07442E-01
		6.31524E-01	5.36541E-01
		7.21524E-01	4.70417E-01
		8.11524E-01	4.09155E-01
		9.01524E-01	3.52770E-01
		1.20152E+00	3.52735E-01
		1.29152E+00	3.05893E-01
		1.38152E+00	2.63745E-01
		1.47152E+00	2.26106E-01
		1.56152E+00	1.92748E-01
		1.65152E+00	1.63418E-01
		1.74152E+00	1.37836E-01
		1.83152E+00	1.15713E-01
		1.92152E+00	9.67521E-02
		2.01152E+00	8.06601E-02
		2.10152E+00	6.71506E-02
		2.40152E+00	3.16106E-02
		2.70152E+00	1.37085E-02
		3.00152E+00	5.46909E-03
		3.30152E+00	2.00492E-03
		3.60152E+00	6.74680E-04
		3.90152E+00	2.08232E-04
		4.20152E+00	5.88983E-05
		4.50152E+00	1.52374E-05
		4.80152E+00	3.49090E-06
		5.10152E+00	1.31596E-07
100	100	0.00000E+00	7.49344E-01
		1.52400E-03	5.61332E-01
		9.15240E-02	5.14286E-01
		1.81524E-01	4.68633E-01
		2.71524E-01	4.24626E-01
		3.61524E-01	3.82490E-01
		4.51524E-01	3.42416E-01
		5.41524E-01	3.04557E-01
		6.31524E-01	2.69031E-01
		7.21524E-01	2.35918E-01
		8.11524E-01	2.05263E-01

		9.01524E-01	1.77074E-01
		1.20152E+00	1.77057E-01
		1.29152E+00	1.53493E-01
		1.38152E+00	1.32303E-01
		1.47152E+00	1.13390E-01
		1.56152E+00	9.66372E-02
		1.65152E+00	8.19128E-02
		1.74152E+00	6.90753E-02
		1.83152E+00	5.79771E-02
		1.92152E+00	4.84684E-02
		2.01152E+00	4.04007E-02
		2.10152E+00	3.36294E-02
		2.40152E+00	1.58240E-02
		2.70152E+00	6.86024E-03
		3.00152E+00	2.73632E-03
		3.30152E+00	1.00294E-03
		3.60152E+00	3.37462E-04
		3.90152E+00	1.04145E-04
		4.20152E+00	2.94560E-05
		4.50152E+00	7.62479E-06
		4.80152E+00	1.77308E-06
		5.10152E+00	2.04239E-07

Total Mass into Soil	Total Mass into Base	Velocity Transport	Mass in Base -WY/2 to +WY/2
2.20647E+02	5.82327E-05	6.04131E-07	5.64203E-05

Time year	Distance m	Depth m	Concentration mg/L
150	0	0.00000E+00	1.49348E+00
		1.52400E-03	1.17764E+00
		9.15240E-02	1.09828E+00
		1.81524E-01	1.02051E+00
		2.71524E-01	9.44652E-01
		3.61524E-01	8.71004E-01
		4.51524E-01	7.99829E-01
		5.41524E-01	7.31361E-01
		6.31524E-01	6.65801E-01
		7.21524E-01	6.03311E-01
		8.11524E-01	5.44021E-01
		9.01524E-01	4.88024E-01

		1.20152E+00	4.87989E-01
		1.29152E+00	4.39587E-01
		1.38152E+00	3.94557E-01
		1.47152E+00	3.52881E-01
		1.56152E+00	3.14517E-01
		1.65152E+00	2.79393E-01
		1.74152E+00	2.47416E-01
		1.83152E+00	2.18474E-01
		1.92152E+00	1.92438E-01
		2.01152E+00	1.69165E-01
		2.10152E+00	1.48505E-01
		2.40152E+00	8.70053E-02
		2.70152E+00	4.83144E-02
		3.00152E+00	2.54051E-02
		3.30152E+00	1.26394E-02
		3.60152E+00	5.94543E-03
		3.90152E+00	2.64225E-03
		4.20152E+00	1.10779E-03
		4.50152E+00	4.34379E-04
		4.80152E+00	1.47682E-04
		5.10152E+00	7.40349E-06
150	100	0.00000E+00	7.49344E-01
		1.52400E-03	5.90814E-01
		9.15240E-02	5.50992E-01
		1.81524E-01	5.11998E-01
		2.71524E-01	4.73991E-01
		3.61524E-01	4.37121E-01
		4.51524E-01	4.01522E-01
		5.41524E-01	3.67311E-01
		6.31524E-01	3.34592E-01
		7.21524E-01	3.03450E-01
		8.11524E-01	2.73953E-01
		9.01524E-01	2.46151E-01
		1.20152E+00	2.46134E-01
		1.29152E+00	2.21598E-01
		1.38152E+00	1.98794E-01
		1.47152E+00	1.77709E-01
		1.56152E+00	1.58317E-01
		1.65152E+00	1.40576E-01

		1.74152E+00	1.24438E-01
		1.83152E+00	1.09841E-01
		1.92152E+00	9.67174E-02
		2.01152E+00	8.49940E-02
		2.10152E+00	7.45923E-02
		2.40152E+00	4.36614E-02
		2.70152E+00	2.42276E-02
		3.00152E+00	1.27322E-02
		3.30152E+00	6.33155E-03
		3.60152E+00	2.97721E-03
		3.90152E+00	1.32281E-03
		4.20152E+00	5.54733E-04
		4.50152E+00	2.18342E-04
		4.80152E+00	7.69514E-05
		5.10152E+00	1.27010E-05

Total Mass into Soil	Total Mass into Base	Velocity Transport	Mass in Base -WY/2 to +WY/2
2.90645E+02	6.00657E-03	4.30766E-04	4.71427E-03

Time year	Distance m	Depth m	Concentration mg/L
200	0	0.00000E+00	1.49348E+00
		1.52400E-03	1.21492E+00
		9.15240E-02	1.14477E+00
		1.81524E-01	1.07568E+00
		2.71524E-01	1.00788E+00
		3.61524E-01	9.41575E-01
		4.51524E-01	8.76964E-01
		5.41524E-01	8.14225E-01
		6.31524E-01	7.53514E-01
		7.21524E-01	6.94973E-01
		8.11524E-01	6.38719E-01
		9.01524E-01	5.84849E-01
		1.20152E+00	5.84815E-01
		1.29152E+00	5.37693E-01
		1.38152E+00	4.93091E-01
		1.47152E+00	4.51046E-01
		1.56152E+00	4.11574E-01
		1.65152E+00	3.74673E-01
		1.74152E+00	3.40322E-01

		1.83152E+00	3.08486E-01
		1.92152E+00	2.79115E-01
		2.01152E+00	2.52145E-01
		2.10152E+00	2.27501E-01
		2.40152E+00	1.49271E-01
		2.70152E+00	9.41371E-02
		3.00152E+00	5.70211E-02
		3.30152E+00	3.31528E-02
		3.60152E+00	1.84896E-02
		3.90152E+00	9.88016E-03
		4.20152E+00	5.03932E-03
		4.50152E+00	2.40848E-03
		4.80152E+00	9.69458E-04
		5.10152E+00	5.39431E-05
200	100	0.00000E+00	7.49344E-01
		1.52400E-03	6.09891E-01
		9.15240E-02	5.74791E-01
		1.81524E-01	5.40259E-01
		2.71524E-01	5.06408E-01
		3.61524E-01	4.73347E-01
		4.51524E-01	4.41176E-01
		5.41524E-01	4.09985E-01
		6.31524E-01	3.79859E-01
		7.21524E-01	3.50870E-01
		8.11524E-01	3.23081E-01
		9.01524E-01	2.96545E-01
		1.20152E+00	2.96528E-01
		1.29152E+00	2.72440E-01
		1.38152E+00	2.49673E-01
		1.47152E+00	2.28237E-01
		1.56152E+00	2.08136E-01
		1.65152E+00	1.89365E-01
		1.74152E+00	1.71910E-01
		1.83152E+00	1.55748E-01
		1.92152E+00	1.40852E-01
		2.01152E+00	1.27185E-01
		2.10152E+00	1.14707E-01
		2.40152E+00	7.51582E-02
		2.70152E+00	4.73437E-02

		3.00152E+00	2.86499E-02
		3.30152E+00	1.66444E-02
		3.60152E+00	9.27723E-03
		3.90152E+00	4.95636E-03
		4.20152E+00	2.53110E-03
		4.50152E+00	1.21983E-03
		4.80152E+00	5.16400E-04
		5.10152E+00	9.60765E-05

<b>Total Mass into Soil</b>	<b>Total Mass into Base</b>	<b>Velocity Transport</b>	<b>Mass in Base -WY/2 to +WY/2</b>
3.52528E+02	7.12668E-02	9.94176E-03	4.14416E-02

#### NOTICE

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