

Source Type

☒ Soil Source

☐ Groundwater Source

Level Number

☐ Level One

☐ Level Two

☒ Level Three

☐ Level Four

☐ Advanced

Parameter Values

☒ Deterministic

☐ Probabilistic

Created: 06/07/2020 14:10:16

by: Gavin Chaplin

Version: 3.00.00 Adv

Site: Cavenham Minor

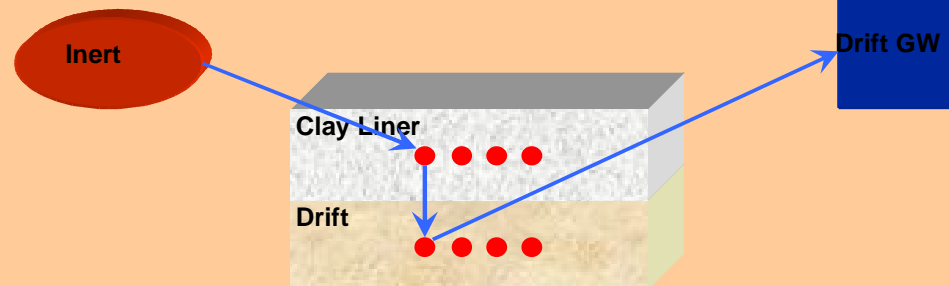
Numerical value

Suggested formula

Probabilistic parameters

Data specified elsewhere

Suggested formula edited



SOURCE CONCENTRATIONS: Inert

Source Data Options

- ☒ Pore water concentrations
- ☐ Leaching test
- ☐ Soil contaminant concentrations

Source Geometry

Inert_Source_length	800	m
Inert_Source_width	775	m
Inert_Source_area	620000	m2
Inert_Source_thickness	4.17	m
Inert_Source_volume	2585400	m3

General Source Properties

Inert_Source_field_capacity	[-]	0.3
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Source Contaminant Information

Source determinand names		Amm N	Cadmium	Chloide	Fluoride	Nickel	Potassium	Selenium
Inert_Pore_water_concentration	mg/L	0.53	0.02	460	2.5	0.12	20.605	0.04
Inert_Initial_inventory	kg	411.0786	15.5124	356785.2	1939.05	93.0744	15981.65	31.0248
Inert_Input_concentration	mg/L	0.53	0.02	460	2.5	0.12	20.605	0.04

SOIL SOURCE

Source Type

- ☐ Constant source
- ☒ Declining source

CONTAMINANT INFORMATION

		Species1	Species2	Species3	Species4	Species5	Species6	Species7
Source determinand names	<div><div></div><div></div></div>	7 Amm N	Cadmium	Chloide	Fluoride	Nickel	Potassium	Selenium

Receptor Target Concentrations

	Name	Values in mg/L						
Quality Standard 1	EAL	0.5	0.005	250	1.5	0.02	10	0.01
Quality Standard 2								
Quality Standard 3								
Quality Standard 4								

Generic Contaminant Properties

Contaminants_Organic_Carbon_Water_Partition_Coefficient_Koc	L/kg	
Contaminants_Free_Water_Diffusion_Coefficient	m2/s	

HYDROGEOLOGICAL UNITS

Hydrogeological Units		Clay Liner	Drift
Hydrogeology_Unit_Thickness	m	1	3
Hydrogeology_Log_Hydraulic_Conductivity	log(m/s)	-7	-4.2375
Hydrogeology_Hydraulic_Conductivity	m/s	1E-07	5.79E-05
Hydrogeology_Hydraulic_Gradient	[-]	10	0.00275
Hydrogeology_Porosity	[-]	0.4	0.42
Hydrogeology_Velocity	m/s	2.5E-06	3.79E-07
Hydrogeology_Tortuosity	[-]	10	10

ATTENUATION PARAMETERS

Hydrogeological Units	Clay Liner	Drift
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General properties

Attenuation_Dry_bulk_density	kg/m3	2000	1900
Attenuation_Fraction_organic_carbon	[-]	0.05	0.002

Contaminant specific parameters

Amm N

Attenuation_Partition_Coefficient_Kd_Species_1	L/kg	1.25	1.25
Attenuation_Retardation_Species_1	[-]	7.25	6.654761905
Attenuation_Half_Life_Species_1	days	No Decay	1300
Attenuation_Decay_Coefficient_Species_1	1/s	0	6.17118E-09

Cadmium

Attenuation_Partition_Coefficient_Kd_Species_2	L/kg	188.3	188.3
Attenuation_Retardation_Species_2	[-]	942.5	852.8333333
Attenuation_Half_Life_Species_2	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_2	1/s	0	0

Chloide

Attenuation_Partition_Coefficient_Kd_Species_3	L/kg	1E-09	0.000000001
Attenuation_Retardation_Species_3	[-]	1	1.000000005
Attenuation_Half_Life_Species_3	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_3	1/s	0	0

Fluoride

Attenuation_Partition_Coefficient_Kd_Species_4	L/kg	1E-09	0.000000001
Attenuation_Retardation_Species_4	[-]	1	1.000000005
Attenuation_Half_Life_Species_4	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_4	1/s	0	0

Nickel

Attenuation_Partition_Coefficient_Kd_Species_5	L/kg	110	110
Attenuation_Retardation_Species_5	[-]	551	498.6190476
Attenuation_Half_Life_Species_5	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_5	1/s	0	0

Potassium

Attenuation_Partition_Coefficient_Kd_Species_6	L/kg	1E-09	0.000000001
Attenuation_Retardation_Species_6	[-]	1	1.000000005
Attenuation_Half_Life_Species_6	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_6	1/s	0	0

Selenium

Attenuation_Partition_Coefficient_Kd_Species_7	L/kg	50	50
Attenuation_Retardation_Species_7	[-]	251	227.1904762
Attenuation_Half_Life_Species_7	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_7	1/s	0	0

WATER BALANCE

Infiltration through the soil zone source

Source Name: Inert

Effective_Rainfall	86	mm/year
Infiltration_Factor	0.6	[-]
Infiltration_Rate	51.6	mm/year
Infiltration_Area	620000	m2
Q_Infiltration	0.001014	m3/s

PATHWAY SUMMARY

Path 1
Path 1 Type
Path 1 Name
Path 1 Process
Path 1 Standards
Path 1 Parameter1
Path 1 Parameter2
Path 1 Parameter3
Path 1 Parameter4
Path 1 Parameter5
Path 1 Parameter6

Section 1		Section 2		Section 3		Section 4	
Source		Unit		Unit		Receptor	
Inert		Clay Liner: Node 1		Drift: Node 1		Drift GW	
Declining source		ADRD (1D)		ADRD (1D) + Dilution		Monitoring Borehole	
						Target Standard	
Q_managed [m3/s]		Velocity [m/s]		Velocity [m/s]			
Managed time [years]		Dispersivity [m]		Dispersivity [m]			
Q_path [m3/s]		Travel Distance [m]		Travel Distance [m]			
Q_decline [m3/s]				Mixing Depth [m]			
				Mixing Width [m]			
		Q_Dilute [m3/s]		Q_Dilute [m3/s]		Q_dilute [m3/s]	

SIMULATION PARAMETERS

Monte Carlo Analysis with Crystal Ball

Reported Percentile
Number of simulations

95
10000

- ☐ Stop on calculation error
☐ Use same sequence of random numbers

Minimise while running:

- ☒ Nothing
☐ All Spreadsheets (faster)
☐ Microsoft Excel (fastest)

Named Constants

s_per_year	31557600
s_per_day	86400

Laplace Transform Solution Parameters

sigma	0
nu	1
nsum	16
omega	11

Reporting Options

- ☐ Include Remedial Targets and Attenuation Factors on the results sheets in Advanced level.
☐ Use the array form of the RAM function
☐ Include a set of timeslices for each contaminant in each pathway

Number of timeslices for breakthrough curves

5

The timeslices specified on the results sheets are saved below.

Path1 timeslices in years

TS_Path1

1000
2500
5000
10000
50000

BREAKTHROUGH RESULTS

Site Name: "Cavenham Minor"

Level 3

Pollutant Linkage: Inert, Clay Liner, Drift, Drift GW

Concentrations in mg/L in Drift GW

Compared with EAL target concentration in mg/L

5.000E-01	5.000E-03	2.500E+02	1.500E+00	2.000E-02	1.000E+01	1.000E-02
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Time(years)	Species1 Amm N	Species2 Cadmium	Species3 Chloide	Species4 Fluoride	Species5 Nickel	Species6 Potassium	Species7 Selenium
1000	0.000E+00	9.677E-24	0.000E+00	0.000E+00	1.044E-18	0.000E+00	1.224E-09
2500	0.000E+00	3.465E-14	0.000E+00	0.000E+00	1.564E-08	0.000E+00	1.646E-05
5000	0.000E+00	1.279E-08	0.000E+00	0.000E+00	1.388E-05	0.000E+00	1.041E-04
10000	0.000E+00	3.083E-06	0.000E+00	0.000E+00	1.329E-04	0.000E+00	4.292E-05
50000	6.104E-19	1.896E-06	6.042E-09	3.284E-11	6.222E-07	2.707E-10	2.122E-11

Pollutant Linkage: Inert, Clay Liner, Drift, Drift GW

Remedial Target Concentrations in mg/L in Inert

Time(years)	Species1 Amm N	Species2 Cadmium	Species3 Chloide	Species4 Fluoride	Species5 Nickel	Species6 Potassium	Species7 Selenium
1000	1.000E+40	1.033E+19	1.000E+40	1.000E+40	2.298E+15	1.000E+40	3.268E+05
2500	1.000E+40	2.886E+09	1.000E+40	1.000E+40	1.534E+05	1.000E+40	2.430E+01
5000	1.000E+40	7.820E+03	1.000E+40	1.000E+40	1.729E+02	1.000E+40	3.842E+00
10000	1.000E+40	3.243E+01	1.000E+40	1.000E+40	1.806E+01	1.000E+40	9.320E+00
50000	4.341E+17	5.274E+01	1.903E+13	1.142E+11	3.857E+03	7.613E+11	1.885E+07

Compared with source concentrations in mg/L

5.300E-01	2.000E-02	4.600E+02	2.500E+00	1.200E-01	2.061E+01	4.000E-02
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Pollutant Linkage: Inert, Clay Liner, Drift, Drift GW

Dilution Factor

1.377E+00	for all species and timeslices
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Pollutant Linkage: Inert, Clay Liner, Drift, Drift GW

Attenuation Factor

Time(years)	Species1 Amm N	Species2 Cadmium	Species3 Chloide	Species4 Fluoride	Species5 Nickel	Species6 Potassium	Species7 Selenium
1000	1.000E+40	1.501E+21	1.000E+40	1.000E+40	8.346E+16	1.000E+40	2.373E+07
2500	1.000E+40	4.192E+11	1.000E+40	1.000E+40	5.571E+06	1.000E+40	1.765E+03
5000	1.000E+40	1.136E+06	1.000E+40	1.000E+40	6.280E+03	1.000E+40	2.791E+02
10000	1.000E+40	4.711E+03	1.000E+40	1.000E+40	6.560E+02	1.000E+40	6.769E+02
50000	6.306E+17	7.662E+03	5.530E+10	5.529E+10	1.401E+05	5.529E+10	1.369E+09

