



Hills Quarry Products Limited

Airfield Quarry

Gally Leaze, Gloucestershire

Proposed sand and gravel extraction and restoration

Hydrogeological Risk Assessment

Final Report

April 2022

Appendix 8 RAM Model Summary Output

RAM MODEL – Principal Aquifer Assessment : Airfield Quarry RAM_HRA_PA1

Results Type

☒ Deterministic ☐ Probabilistic

Show Full Results

Run Key

Source

Click on Source
for Remediation Targets
(Not Advanced)

Unit

Click on Unit
for Receptor Concs
(if Present)

Receptor

Click on Receptor
for Receptor Concs
(if Present)

Node

Click on Pathway node
for Dilution and/or
Attenuation factors
(Only Levels 2,3 & 4)

Please select results type and
then click on model

Inert infill

Oxford Clay

Principal Aquifer

Meysey Hampton BH

Created: 04/04/2022 21:46:15

by: Admin

Version: 3.00.00 Adv

Site: Airfield Quarry

Deterministic Results

Probabilistic Results

Non-compliant results

Data specified elsewhere

SOURCE CONCENTRATIONS: Inert infill

Source Data Options

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

Source Geometry

Inert_infill_Source_length
Inert_infill_Source_width
Inert_infill_Source_area
Inert_infill_Source_thickness
Inert_infill_Source_volume

SOIL SOURCE

Source Type

- ☐ Constant source
- ☒ Declining source

1150	m
1450	m
1667500	m2
1.9	m
3168250	m3

General Source Properties

Inert_infill_Source_field_capacity	[-]	0.2
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Source Contaminant Information

Source determinand names		Amm	Nitro	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
Inert_infill_Leaching_test_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4	
Inert_infill_Initial_inventory	kg	506.92	31.6825	50692	31.6825	0.63365	25.346	63365	253.46	
Inert_infill_Input_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4	

ATTENUATION PARAMETERS

Hydrogeological Units	Oxford Cla Principal A		
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General properties

Attenuation_Dry_bulk_density	kg/m3	2000	2650
Attenuation_Fraction_organic_carbon	[-]	0.5	0.1

Contaminant specific parameters

Amm Nitrogen

Attenuation_Partition_Coefficient_Kd_Species_1	L/kg	1.25	1.25
Attenuation_Retardation_Species_1	[-]	7.25	23.84483
Attenuation_Half_Life_Species_1	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_1	1/s	0	0

Arsenic

Attenuation_Partition_Coefficient_Kd_Species_2	L/kg	137.5	137.5
Attenuation_Retardation_Species_2	[-]	688.5	2513.931
Attenuation_Half_Life_Species_2	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_2	1/s	0	0

Chloride

Attenuation_Partition_Coefficient_Kd_Species_3	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_3	[-]	1	1
Attenuation_Half_Life_Species_3	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_3	1/s	0	0

Lead

Attenuation_Partition_Coefficient_Kd_Species_4	L/kg	27	27
Attenuation_Retardation_Species_4	[-]	136	494.4483
Attenuation_Half_Life_Species_4	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_4	1/s	0	0

Mercury

Attenuation_Partition_Coefficient_Kd_Species_5	L/kg	2142.5	2142.5
Attenuation_Retardation_Species_5	[-]	10713.5	39157.03
Attenuation_Half_Life_Species_5	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_5	1/s	0	0

Nickel

Attenuation_Partition_Coefficient_Kd_Species_6	L/kg	410	410
Attenuation_Retardation_Species_6	[-]	2051	7494.103
Attenuation_Half_Life_Species_6	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_6	1/s	0	0

Sulphate

Attenuation_Partition_Coefficient_Kd_Species_7	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_7	[-]	1	1
Attenuation_Half_Life_Species_7	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_7	1/s	0	0

Zinc

Attenuation_Partition_Coefficient_Kd_Species_8	L/kg	301	301
Attenuation_Retardation_Species_8	[-]	1506	5502.034
Attenuation_Half_Life_Species_8	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_8	1/s	0	0

HYDROGEOLOGICAL UNITS

Hydrogeological Units		Oxford Cla Principal Aquif	
Hydrogeology_Unit_Thickness	m	11	76.5
Hydrogeology_Log_Hydraulic_Conductivity	log(m/s)	-9	-4.49
Hydrogeology_Hydraulic_Conductivity	m/s	1E-09	3.24E-05
Hydrogeology_Hydraulic_Gradient	[-]	1.9	0.002
Hydrogeology_Porosity	[-]	0.4	0.145
Hydrogeology_Velocity	m/s	4.75E-09	4.46E-07
Hydrogeology_Tortuosity	[-]	10	10

WATER BALANCE

Infiltration through the soil zone source

Source Name: Inert infill

Effective_Rainfall	196	mm/year
Infiltration_Factor	1	[-]
Infiltration_Rate	196	mm/year
Infiltration_Area	1667500	m2
Q_Infiltration	0.010357	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 infill		Oxford Clay: Node 1		Principal Aquifer: Node 1		Meysey Hampton BH	
Declining source		ADRD (1D)		ADRD (1D) + Dilution		Monitoring Borehole	
						Target Standard	EAL
Q_managed [m3/s]	0.000E+00	Velocity [m/s]	4.750E-09	Velocity [m/s]	4.463E-07		
Managed time [years]	0.000E+00	Dispersivity [m]	1.1	Dispersivity [m]	0.1		
Q_path [m3/s]	1.036E-02	Travel Distance [m]	11.0	Travel Distance [m]	1.0		
Q_decline [m3/s]	1.036E-02			Mixing Depth [m]	25.0		
				Mixing Width [m]	1450.0		
		Q_Dilute [m3/s]	0	Q_Dilute [m3/s]	2.346E-03	Q_dilute [m3/s]	0.000E+00

BREAKTHROUGH RESULTS

Site Name: "Airfield Quarry"
Level 3

Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH
Concentrations in mg/L in Meysey Hampton BH

Compared with EAL target concentration in mg/L

	3.900E-01	5.000E-03	2.500E+02	1.000E-02	1.000E-05	2.000E-02	2.500E+02	1.000E-02
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Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	0.000E+00	0.000E+00	1.399E-32	0.000E+00	0.000E+00	0.000E+00	1.749E-32	0.000E+00
10	5.770E-29	0.000E+00	6.780E-06	0.000E+00	0.000E+00	0.000E+00	8.476E-06	0.000E+00
50	5.214E-12	0.000E+00	1.830E+00	0.000E+00	0.000E+00	0.000E+00	2.288E+00	0.000E+00
100	2.696E-06	0.000E+00	8.081E-01	0.000E+00	0.000E+00	0.000E+00	1.010E+00	0.000E+00
1000	2.993E-04	0.000E+00	0.000E+00	1.636E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5000	2.182E-12	2.453E-14	0.000E+00	5.654E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
50000	0.000E+00	1.424E-06	8.098E-11	2.084E-10	2.175E-23	6.454E-08	1.013E-10	3.126E-06

Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH
Remedial Target Concentrations in mg/L in Inert infill

Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	1.000E+40	1.000E+40	1.429E+36	1.000E+40	1.000E+40	1.000E+40	1.429E+36	1.000E+40
10	5.407E+27	1.000E+40	2.950E+09	1.000E+40	1.000E+40	1.000E+40	2.950E+09	1.000E+40
50	5.983E+10	1.000E+40	1.093E+04	1.000E+40	1.000E+40	1.000E+40	1.093E+04	1.000E+40
100	1.157E+05	1.000E+40	2.475E+04	1.000E+40	1.000E+40	1.000E+40	2.475E+04	1.000E+40
1000	1.043E+03	1.000E+40	1.000E+40	3.057E+09	1.000E+40	1.000E+40	1.000E+40	1.000E+40
5000	1.430E+11	1.019E+10	1.000E+40	8.843E+01	1.000E+40	1.000E+40	1.000E+40	1.000E+40
50000	1.000E+40	1.755E+02	2.470E+14	2.399E+06	4.598E+14	1.240E+04	2.468E+14	1.280E+03

Compared with source concentrations in mg/L

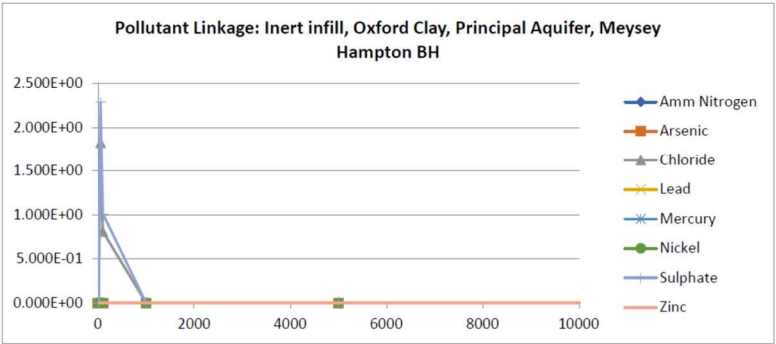
8.000E-01	5.000E-02	8.000E+01	5.000E-02	1.000E-03	4.000E-02	1.000E+02	4.000E-01
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Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH
Dilution Factor

1.227E+00 for all species and timeslices

Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH
Attenuation Factor

Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	1.000E+40	1.000E+40	4.661E+33	1.000E+40	1.000E+40	1.000E+40	4.661E+33	1.000E+40
10	1.130E+28	1.000E+40	9.619E+06	1.000E+40	1.000E+40	1.000E+40	9.619E+06	1.000E+40
50	1.251E+11	1.000E+40	3.563E+01	1.000E+40	1.000E+40	1.000E+40	3.563E+01	1.000E+40
100	2.420E+05	1.000E+40	8.071E+01	1.000E+40	1.000E+40	1.000E+40	8.071E+01	1.000E+40
1000	2.179E+03	1.000E+40	1.000E+40	2.492E+11	1.000E+40	1.000E+40	1.000E+40	1.000E+40
5000	2.990E+11	1.662E+12	1.000E+40	7.209E+03	1.000E+40	1.000E+40	1.000E+40	1.000E+40
50000	1.000E+40	2.862E+04	8.054E+11	1.956E+08	3.749E+19	5.053E+05	8.050E+11	1.043E+05



RAM MODEL – Sensitivity analysis 1. Principal Aquifer: RAM_HRA_PA1_SENS1

Source Type



Soil Source



Groundwater Source

Level Number



Level One



Level Two



Level Three



Level Four



Advanced

Parameter Values



Deterministic



Probabilistic

Created: 04/04/2022 21:46:15

by: Admin

Version: 3.00.00 Adv

Site: Airfield Quarry

Numerical value

Suggested formula

Probabilistic parameters

Data specified elsewhere

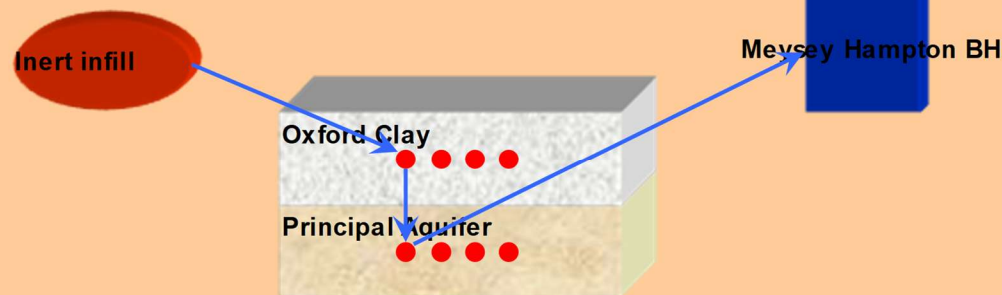
Suggested formula edited

Inert infill

Oxford Clay

Principal Aquifer

Meysey Hampton BH



SOURCE CONCENTRATIONS: Inert infill

Source Data Options

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

Source Geometry

Inert_infill_Source_length	1150	m
Inert_infill_Source_width	1450	m
Inert_infill_Source_area	1667500	m2
Inert_infill_Source_thickness	1.9	m
Inert_infill_Source_volume	3168250	m3

General Source Properties

Inert_infill_Source_field_capacity	[-]	0.2
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Source Contaminant Information

Source determinand names		Amm	Nitro	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
Inert_infill_Leaching_test_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4	
Inert_infill_Initial_inventory	kg	506.92	31.6825	50692	31.6825	0.63365	25.346	63365	253.46	
Inert_infill_Input_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4	

SOIL SOURCE

Source Type

- ☐ Constant source
- ☒ Declining source

HYDROGEOLOGICAL UNITS

Hydrogeological Units				Oxford Cla Principal A
Hydrogeology_Unit_Thickness	m	11	76.5	
Hydrogeology_Log_Hydraulic_Conductivity	log(m/s)	-9	-4.49	
Hydrogeology_Hydraulic_Conductivity	m/s	1E-09	3.24E-05	
Hydrogeology_Hydraulic_Gradient	[-]	1.9	0.002	
Hydrogeology_Porosity	[-]	0.4	0.145	
Hydrogeology_Velocity	m/s	4.75E-09	4.46E-07	
Hydrogeology_Tortuosity	[-]	10	10	

WATER BALANCE

Infiltration through the soil zone source
Source Name: Inert infill

Effective_Rainfall	196	mm/year
Infiltration_Factor	1	[-]
Infiltration_Rate	196	mm/year
Infiltration_Area	1667500	m2
Q_Infiltration	0.010357	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 infill		Oxford Clay: Node 1		Principal Aquifer: Node 1		Meysey Hampton B	
Declining source		ADRD (1D)		Aquifer Dilution Only		Monitoring Borehole	
						Target Standard EAL	
Q_managed [m3/s]	0.000E+00	Velocity [m/s]	4.750E-09				
Managed time [years]	0.000E+00	Dispersivity [m]	1.1				
Q_path [m3/s]	1.036E-02	Travel Distance [m]	11.0				
Q_decline [m3/s]	1.036E-02			Mixing Depth [m]	25.0		
				Mixing Width [m]	1450.0		
		Q_Dilute [m3/s]	0	Q_Dilute [m3/s]	2.346E-03	Q_dilute [m3/s]	0.000E+00

ATTENUATION PARAMETERS

Hydrogeological Units	Oxford Cla Principal A
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General properties

Attenuation_Dry_bulk_density	kg/m3	2000	2650
Attenuation_Fraction_organic_carbon	[-]	0.5	0.1

Contaminant specific parameters

Amm Nitrogen

Attenuation_Partition_Coefficient_Kd_Species_1	L/kg	1.25	1.25
Attenuation_Retardation_Species_1	[-]	7.25	23.84483
Attenuation_Half_Life_Species_1	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_1	1/s	0	0

Arsenic

Attenuation_Partition_Coefficient_Kd_Species_2	L/kg	137.5	137.5
Attenuation_Retardation_Species_2	[-]	688.5	2513.931
Attenuation_Half_Life_Species_2	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_2	1/s	0	0

Chloride

Attenuation_Partition_Coefficient_Kd_Species_3	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_3	[-]	1	1
Attenuation_Half_Life_Species_3	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_3	1/s	0	0

Lead

Attenuation_Partition_Coefficient_Kd_Species_4	L/kg	27	27
Attenuation_Retardation_Species_4	[-]	136	494.4483
Attenuation_Half_Life_Species_4	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_4	1/s	0	0

Mercury

Attenuation_Partition_Coefficient_Kd_Species_5	L/kg	2142.5	2142.5
Attenuation_Retardation_Species_5	[-]	10713.5	39157.03
Attenuation_Half_Life_Species_5	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_5	1/s	0	0

Nickel

Attenuation_Partition_Coefficient_Kd_Species_6	L/kg	410	410
Attenuation_Retardation_Species_6	[-]	2051	7494.103
Attenuation_Half_Life_Species_6	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_6	1/s	0	0

Sulphate

Attenuation_Partition_Coefficient_Kd_Species_7	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_7	[-]	1	1
Attenuation_Half_Life_Species_7	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_7	1/s	0	0

Zinc

Attenuation_Partition_Coefficient_Kd_Species_8	L/kg	301	301
Attenuation_Retardation_Species_8	[-]	1506	5502.034
Attenuation_Half_Life_Species_8	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_8	1/s	0	0

BREAKTHROUGH RESULTS

Site Name: "Airfield Quarry"

Level 2

Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH

Concentrations in mg/L in Meysey Hampton BH

Compared with EAL target concentration in mg/L

3.900E-01	5.000E-03	2.500E+02	1.000E-02	1.000E-05	2.000E-02	2.500E+02	1.000E-02
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Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	0.000E+00	7.707E-06	0.000E+00	0.000E+00	0.000E+00	9.634E-06	0.000E+00
50	1.206E-11	0.000E+00	1.832E+00	0.000E+00	0.000E+00	0.000E+00	2.290E+00	0.000E+00
100	3.290E-06	0.000E+00	8.064E-01	0.000E+00	0.000E+00	0.000E+00	1.008E+00	0.000E+00
1000	2.968E-04	0.000E+00	6.491E-15	3.594E-13	0.000E+00	0.000E+00	8.114E-15	0.000E+00
5000	5.287E-13	5.501E-14	0.000E+00	5.745E-06	0.000E+00	1.707E-35	0.000E+00	6.918E-26
50000	0.000E+00	1.417E-06	0.000E+00	2.064E-10	1.198E-22	6.825E-08	0.000E+00	3.199E-06

Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH

Remedial Target Concentrations in mg/L in Inert infill

Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	1.000E+40	1.000E+40	1.000E+40	1.000E+40	1.000E+40	1.000E+40	1.000E+40	1.000E+40
10	1.000E+40	1.000E+40	2.595E+09	1.000E+40	1.000E+40	1.000E+40	2.595E+09	1.000E+40
50	2.586E+10	1.000E+40	1.091E+04	1.000E+40	1.000E+40	1.000E+40	1.091E+04	1.000E+40
100	9.483E+04	1.000E+40	2.480E+04	1.000E+40	1.000E+40	1.000E+40	2.480E+04	1.000E+40
1000	1.051E+03	1.000E+40	3.081E+18	1.391E+09	1.000E+40	1.000E+40	3.081E+18	1.000E+40
5000	5.901E+11	4.545E+09	1.000E+40	8.703E+01	1.000E+40	4.686E+31	1.000E+40	5.782E+22
50000	1.000E+40	1.764E+02	1.000E+40	2.422E+06	8.347E+13	1.172E+04	1.000E+40	1.251E+03

Compared with source concentrations in mg/L

8.000E-01	5.000E-02	8.000E+01	5.000E-02	1.000E-03	4.000E-02	1.000E+02	4.000E-01
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Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH

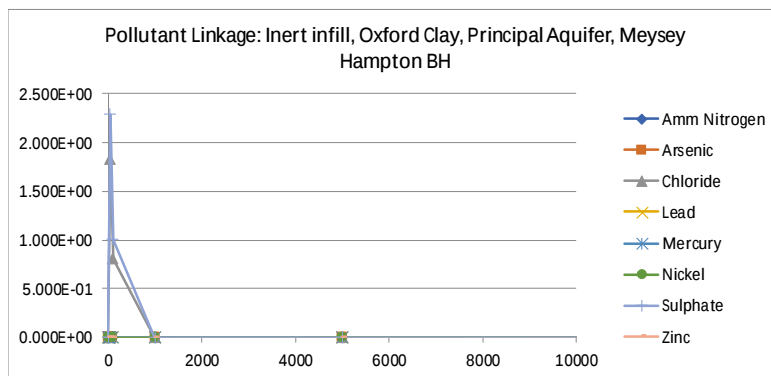
Dilution Factor

1.227E+00 for all species and timeslices

Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH

Attenuation Factor

Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	1.000E+40	1.000E+40	1.000E+40	1.000E+40	1.000E+40	1.000E+40	1.000E+40	1.000E+40
10	1.000E+40	1.000E+40	8.463E+06	1.000E+40	1.000E+40	1.000E+40	8.463E+06	1.000E+40
50	5.407E+10	1.000E+40	3.560E+01	1.000E+40	1.000E+40	1.000E+40	3.560E+01	1.000E+40
100	1.982E+05	1.000E+40	8.088E+01	1.000E+40	1.000E+40	1.000E+40	8.088E+01	1.000E+40
1000	2.197E+03	1.000E+40	1.005E+16	1.134E+11	1.000E+40	1.000E+40	1.005E+16	1.000E+40
5000	1.234E+12	7.411E+11	1.000E+40	7.095E+03	1.000E+40	1.910E+33	1.000E+40	4.714E+24
50000	1.000E+40	2.877E+04	1.000E+40	1.975E+08	6.805E+18	4.779E+05	1.000E+40	1.020E+05



RAM MODEL – Sensitivity analysis 2. Principal Aquifer: RAM_HRA_PA1_SENS2

Results Type

☒ Deterministic ☐ Probabilistic

Show Full Results

Run Key

Source

Click on Source
for Remediation Targets
(Not Advanced)

Unit

Click on Unit
for Receptor Concs
(if Present)

Receptor

Click on Receptor
for Receptor Concs
(if Present)

Node

Click on Pathway node
for Dilution and/or
Attenuation factors
(Only Levels 2,3 & 4)

Please select results type and
then click on model

Inert infill

Oxford Clay

Principal Aquifer

Meysey Hampton BH

Created: 04/04/2022 21:46:15

by: Admin

Version: 3.00.00 Adv

Site: Airfield Quarry

Deterministic Results

Probabilistic Results

Non-compliant results

Data specified elsewhere

SOURCE CONCENTRATIONS: Inert infill

Source Data Options

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

Source Geometry

Inert_infill_Source_length	1150	m
Inert_infill_Source_width	1450	m
Inert_infill_Source_area	1667500	m2
Inert_infill_Source_thickness	1.9	m
Inert_infill_Source_volume	3168250	m3

General Source Properties

Inert_infill_Source_field_capacity	[-]	0.2
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Source Contaminant Information

Source determinand names		Amm	Nitro	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
Inert_infill_Leaching_test_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4	
Inert_infill_Initial_inventory	kg	506.92	31.6825	50692	31.6825	0.63365	25.346	63365	253.46	
Inert_infill_Input_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4	

SOIL SOURCE

Source Type

- ☐ Constant source
- ☒ Declining source

HYDROGEOLOGICAL UNITS

Hydrogeological Units		Oxford Cla Principal A	
Hydrogeology_Unit_Thickness	m	11	76.5
Hydrogeology_Log_Hydraulic_Conductivity	log(m/s)	-9	-4.49
Hydrogeology_Hydraulic_Conductivity	m/s	1E-09	3.24E-05
Hydrogeology_Hydraulic_Gradient	[-]	1.9	0.002
Hydrogeology_Porosity	[-]	0.4	0.145
Hydrogeology_Velocity	m/s	4.75E-09	4.46E-07
Hydrogeology_Tortuosity	[-]	10	10

WATER BALANCE

Infiltration through the soil zone source

Source Name: Inert infill

Effective_Rainfall	196	mm/year
Infiltration_Factor	1	[-]
Infiltration_Rate	196	mm/year
Infiltration_Area	1667500	m2
Q_Infiltration	0.010357	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 infill		Oxford Clay: Node 1		Principal Aquifer: Node 1		Meysey Hampton BH	
Declining source		ADRD (1D)		ADRD (1D) + Dilution		Monitoring Borehole	
						Target Standard	
Q_managed [m3/s]	0.000E+00	Velocity [m/s]	4.750E-09	Velocity [m/s]	4.463E-07		
Managed time [years]	0.000E+00	Dispersivity [m]	1.1	Dispersivity [m]	0.1		
Q_path [m3/s]	1.036E-02	Travel Distance [m]	11.0	Travel Distance [m]	1.0		
Q_decline [m3/s]	1.036E-02			Mixing Depth [m]	25.0		
				Mixing Width [m]	725.0		
		Q_Dilute [m3/s]	0	Q_Dilute [m3/s]	1.173E-03	Q_dilute [m3/s]	0.000E+00

ATTENUATION PARAMETERS

Hydrogeological Units Oxford Cla Principal A

General properties

Attenuation_Dry_bulk_density	kg/m3	2000	2650
Attenuation_Fraction_organic_carbon	[-]	0.5	0.1

Contaminant specific parameters

Amm Nitrogen

Attenuation_Partition_Coefficient_Kd_Species_1	L/kg	1.25	1.25
Attenuation_Retardation_Species_1	[-]	7.25	23.84483
Attenuation_Half_Life_Species_1	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_1	1/s	0	0

Arsenic

Attenuation_Partition_Coefficient_Kd_Species_2	L/kg	137.5	137.5
Attenuation_Retardation_Species_2	[-]	688.5	2513.931
Attenuation_Half_Life_Species_2	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_2	1/s	0	0

Chloride

Attenuation_Partition_Coefficient_Kd_Species_3	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_3	[-]	1	1
Attenuation_Half_Life_Species_3	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_3	1/s	0	0

Lead

Attenuation_Partition_Coefficient_Kd_Species_4	L/kg	27	27
Attenuation_Retardation_Species_4	[-]	136	494.4483
Attenuation_Half_Life_Species_4	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_4	1/s	0	0

Mercury

Attenuation_Partition_Coefficient_Kd_Species_5	L/kg	2142.5	2142.5
Attenuation_Retardation_Species_5	[-]	10713.5	39157.03
Attenuation_Half_Life_Species_5	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_5	1/s	0	0

Nickel

Attenuation_Partition_Coefficient_Kd_Species_6	L/kg	410	410
Attenuation_Retardation_Species_6	[-]	2051	7494.103
Attenuation_Half_Life_Species_6	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_6	1/s	0	0

Sulphate

Attenuation_Partition_Coefficient_Kd_Species_7	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_7	[-]	1	1
Attenuation_Half_Life_Species_7	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_7	1/s	0	0

Zinc

Attenuation_Partition_Coefficient_Kd_Species_8	L/kg	301	301
Attenuation_Retardation_Species_8	[-]	1506	5502.034
Attenuation_Half_Life_Species_8	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_8	1/s	0	0

BREAKTHROUGH RESULTS

Site Name: "Airfield Quarry"

Level 3

Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH

Concentrations in mg/L in Meysey Hampton BH

Compared with EAL target concentration in mg/L

	3.900E-01	5.000E-03	2.500E+02	1.000E-02	1.000E-05	2.000E-02	2.500E+02	1.000E-02
Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	0.000E+00	0.000E+00	1.542E-32	0.000E+00	0.000E+00	0.000E+00	1.927E-32	0.000E+00
10	6.357E-29	0.000E+00	7.470E-06	0.000E+00	0.000E+00	0.000E+00	9.338E-06	0.000E+00
50	5.745E-12	0.000E+00	2.017E+00	0.000E+00	0.000E+00	0.000E+00	2.521E+00	0.000E+00
100	2.970E-06	0.000E+00	8.904E-01	0.000E+00	0.000E+00	0.000E+00	1.113E+00	0.000E+00
1000	3.297E-04	0.000E+00	0.000E+00	1.802E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5000	2.404E-12	2.702E-14	0.000E+00	6.230E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
50000	0.000E+00	1.569E-06	8.926E-11	2.296E-10	2.396E-23	7.110E-08	1.116E-10	3.444E-06

Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH

Remedial Target Concentrations in mg/L in Inert infill

Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	1.000E+40	1.000E+40	1.297E+36	1.000E+40	1.000E+40	1.000E+40	1.297E+36	1.000E+40
10	4.908E+27	1.000E+40	2.677E+09	1.000E+40	1.000E+40	1.000E+40	2.677E+09	1.000E+40
50	5.431E+10	1.000E+40	9.917E+03	1.000E+40	1.000E+40	1.000E+40	9.917E+03	1.000E+40
100	1.051E+05	1.000E+40	2.246E+04	1.000E+40	1.000E+40	1.000E+40	2.246E+04	1.000E+40
1000	9.462E+02	1.000E+40	1.000E+40	2.775E+09	1.000E+40	1.000E+40	1.000E+40	1.000E+40
5000	1.298E+11	9.251E+09	1.000E+40	8.026E+01	1.000E+40	1.000E+40	1.000E+40	1.000E+40
50000	1.000E+40	1.593E+02	2.241E+14	2.178E+06	4.174E+14	1.125E+04	2.241E+14	1.161E+03

Compared with source concentrations in mg/L

8.000E-01	5.000E-02	8.000E+01	5.000E-02	1.000E-03	4.000E-02	1.000E+02	4.000E-01
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Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH

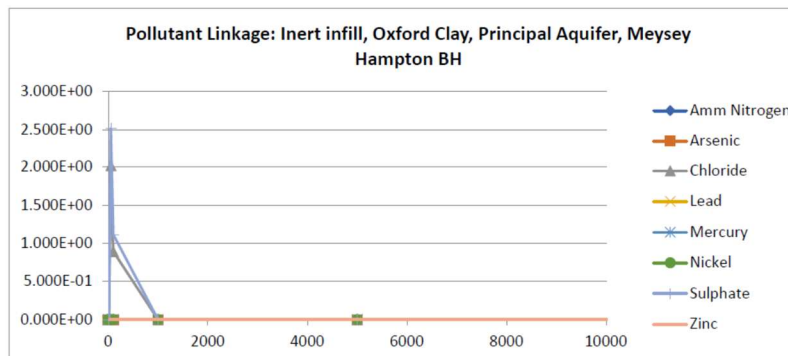
Dilution Factor

1.113E+00 for all species and timeslices

Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH

Attenuation Factor

Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	1.000E+40	1.000E+40	4.661E+33	1.000E+40	1.000E+40	1.000E+40	4.661E+33	1.000E+40
10	1.130E+28	1.000E+40	9.619E+06	1.000E+40	1.000E+40	1.000E+40	9.619E+06	1.000E+40
50	1.251E+11	1.000E+40	3.563E+01	1.000E+40	1.000E+40	1.000E+40	3.563E+01	1.000E+40
100	2.420E+05	1.000E+40	8.071E+01	1.000E+40	1.000E+40	1.000E+40	8.071E+01	1.000E+40
1000	2.179E+03	1.000E+40	1.000E+40	2.492E+11	1.000E+40	1.000E+40	1.000E+40	1.000E+40
5000	2.989E+11	1.662E+12	1.000E+40	7.209E+03	1.000E+40	1.000E+40	1.000E+40	1.000E+40
50000	1.000E+40	2.862E+04	8.051E+11	1.956E+08	3.749E+19	5.053E+05	8.051E+11	1.043E+05



RAM MODEL – Rogue Load Assessment. Principal Aquifer: RAM_HRA_PA1_RL1

Source Type

☒ Soil Source ☐ Groundwater Source

Level Number

- ☐ Level One
- ☐ Level Two
- ☒ Level Three
- ☐ Level Four
- ☐ Advanced

Parameter Values

☒ Deterministic ☐ Probabilistic

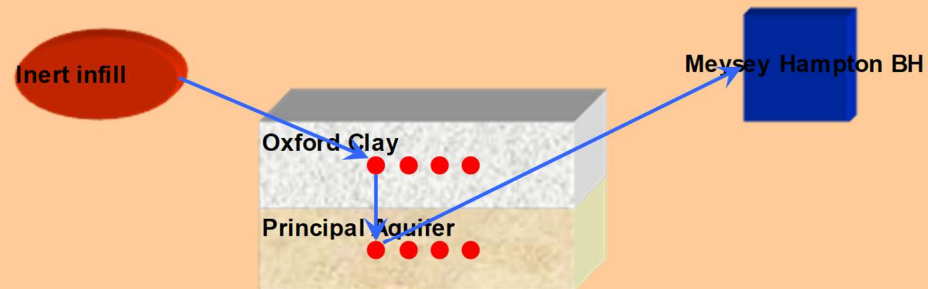
Created: 04/04/2022 21:46:15

by: Admin

Version: 3.00.00 Adv

Site: Airfield Quarry

Numerical value
Suggested formula
Probabilistic parameters
Data specified elsewhere
Suggested formula edited



SOURCE CONCENTRATIONS: Inert infill

Source Data Options

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

Source Geometry

Inert_infill_Source_length
Inert_infill_Source_width
Inert_infill_Source_area
Inert_infill_Source_thickness
Inert_infill_Source_volume

1150	m
1450	m
1667500	m2
1.9	m
3168250	m3

General Source Properties

Inert_infill_Source_field_capacity	[-]	0.2
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Source Contaminant Information

Source determinand names		Amm	Nitro	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
Inert_infill_Leaching_test_concentration	mg/L	0.5	0.06	460	0.15	0.002	0.12	1500	1.2	
Inert_infill_Initial_inventory	kg	316.825	38.019	291479	95.0475	1.2673	76.038	950475	760.38	
Inert_infill_Input_concentration	mg/L	0.5	0.06	460	0.15	0.002	0.12	1500	1.2	

SOIL SOURCE

Source Type

- ☐ Constant source
- ☒ Declining source

HYDROGEOLOGICAL UNITS

Hydrogeological Units				Oxford Cla Principal A
Hydrogeology_Unit_Thickness	m	11	76.5	
Hydrogeology_Log_Hydraulic_Conductivity	log(m/s)	-9	-4.49	
Hydrogeology_Hydraulic_Conductivity	m/s	1E-09	3.24E-05	
Hydrogeology_Hydraulic_Gradient	[-]	1.9	0.002	
Hydrogeology_Porosity	[-]	0.4	0.145	
Hydrogeology_Velocity	m/s	4.75E-09	4.46E-07	
Hydrogeology_Tortuosity	[-]	10	10	

WATER BALANCE

Infiltration through the soil zone source

Source Name: Inert infill

Effective_Rainfall	196	mm/year
Infiltration_Factor	1	[-]
Infiltration_Rate	196	mm/year
Infiltration_Area	1667500	m2
Q_Infiltration	0.010357	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 infill		Oxford Clay: Node 1		Principal Aquifer: Node 1		Meysey Hampton BH	
Declining source		ADRD (1D)		ADRD (1D) + Dilution		Monitoring Borehole	
						Target Standard	
Q_managed [m3/s]		0.000E+00	Velocity [m/s]	4.750E-09	Velocity [m/s]	4.463E-07	
Managed time [years]		0.000E+00	Dispersivity [m]	1.1	Dispersivity [m]	0.1	
Q_path [m3/s]		1.036E-02	Travel Distance [m]	11.0	Travel Distance [m]	1.0	
Q_decline [m3/s]		1.036E-02			Mixing Depth [m]	25.0	
					Mixing Width [m]	1450.0	
			Q_Dilute [m3/s]	0	Q_Dilute [m3/s]	2.346E-03	Q_dilute [m3/s]
							0.000E+00

ATTENUATION PARAMETERS

Hydrogeological Units	Oxford Cla Principal A		
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General properties

Attenuation_Dry_bulk_density	kg/m3	2000	2650
Attenuation_Fraction_organic_carbon	[-]	0.5	0.1

Contaminant specific parameters

Amm Nitrogen

Attenuation_Partition_Coefficient_Kd_Species_1	L/kg	1.25	1.25
Attenuation_Retardation_Species_1	[-]	7.25	23.84483
Attenuation_Half_Life_Species_1	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_1	1/s	0	0

Arsenic

Attenuation_Partition_Coefficient_Kd_Species_2	L/kg	137.5	137.5
Attenuation_Retardation_Species_2	[-]	688.5	2513.931
Attenuation_Half_Life_Species_2	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_2	1/s	0	0

Chloride

Attenuation_Partition_Coefficient_Kd_Species_3	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_3	[-]	1	1
Attenuation_Half_Life_Species_3	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_3	1/s	0	0

Lead

Attenuation_Partition_Coefficient_Kd_Species_4	L/kg	27	27
Attenuation_Retardation_Species_4	[-]	136	494.4483
Attenuation_Half_Life_Species_4	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_4	1/s	0	0

Mercury

Attenuation_Partition_Coefficient_Kd_Species_5	L/kg	2142.5	2142.5
Attenuation_Retardation_Species_5	[-]	10713.5	39157.03
Attenuation_Half_Life_Species_5	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_5	1/s	0	0

Nickel

Attenuation_Partition_Coefficient_Kd_Species_6	L/kg	410	410
Attenuation_Retardation_Species_6	[-]	2051	7494.103
Attenuation_Half_Life_Species_6	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_6	1/s	0	0

Sulphate

Attenuation_Partition_Coefficient_Kd_Species_7	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_7	[-]	1	1
Attenuation_Half_Life_Species_7	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_7	1/s	0	0

Zinc

Attenuation_Partition_Coefficient_Kd_Species_8	L/kg	301	301
Attenuation_Retardation_Species_8	[-]	1506	5502.034
Attenuation_Half_Life_Species_8	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_8	1/s	0	0

BREAKTHROUGH RESULTS

Site Name: "Airfield Quarry"
Level 3

Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH
Concentrations in mg/L in Meysey Hampton BH

Compared with EAL target concentration in mg/L

	3.900E-01	5.000E-03	2.500E+02	1.000E-02	1.000E-05	2.000E-02	2.500E+02	1.000E-02
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Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	0.000E+00	0.000E+00	8.047E-32	0.000E+00	0.000E+00	0.000E+00	2.624E-31	0.000E+00
10	3.606E-29	0.000E+00	3.899E-05	0.000E+00	0.000E+00	0.000E+00	1.271E-04	0.000E+00
50	3.259E-12	0.000E+00	1.053E+01	0.000E+00	0.000E+00	0.000E+00	3.432E+01	0.000E+00
100	1.685E-06	0.000E+00	4.647E+00	0.000E+00	0.000E+00	0.000E+00	1.515E+01	0.000E+00
1000	1.870E-04	0.000E+00	0.000E+00	4.907E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5000	1.364E-12	2.943E-14	0.000E+00	1.696E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
50000	0.000E+00	1.709E-06	4.658E-10	6.252E-10	4.349E-23	1.936E-07	1.519E-09	9.379E-06

Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH
Remedial Target Concentrations in mg/L in Inert infill

Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	1.000E+40	1.000E+40	1.429E+36	1.000E+40	1.000E+40	1.000E+40	1.429E+36	1.000E+40
10	5.407E+27	1.000E+40	2.950E+09	1.000E+40	1.000E+40	1.000E+40	2.950E+09	1.000E+40
50	5.983E+10	1.000E+40	1.093E+04	1.000E+40	1.000E+40	1.000E+40	1.093E+04	1.000E+40
100	1.157E+05	1.000E+40	2.475E+04	1.000E+40	1.000E+40	1.000E+40	2.475E+04	1.000E+40
1000	1.043E+03	1.000E+40	1.000E+40	3.057E+09	1.000E+40	1.000E+40	1.000E+40	1.000E+40
5000	1.430E+11	1.019E+10	1.000E+40	8.843E+01	1.000E+40	1.000E+40	1.000E+40	1.000E+40
50000	1.000E+40	1.755E+02	2.469E+14	2.399E+06	4.598E+14	1.240E+04	2.468E+14	1.280E+03

Compared with source concentrations in mg/L

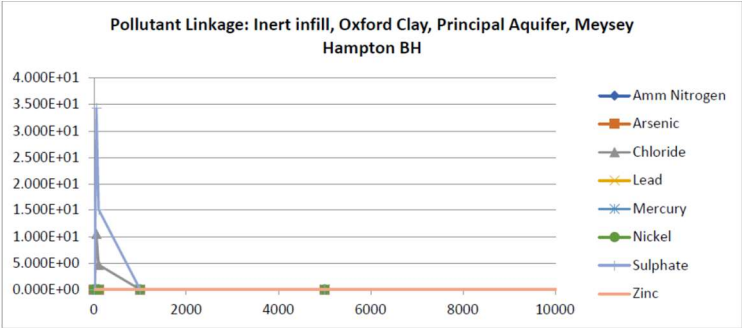
5.000E-01	6.000E-02	4.600E+02	1.500E-01	2.000E-03	1.200E-01	1.500E+03	1.200E+00
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Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH
Dilution Factor

1.227E+00 for all species and timeslices

Pollutant Linkage: Inert infill, Oxford Clay, Principal Aquifer, Meysey Hampton BH
Attenuation Factor

Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	1.000E+40	1.000E+40	4.661E+33	1.000E+40	1.000E+40	1.000E+40	4.661E+33	1.000E+40
10	1.130E+28	1.000E+40	9.619E+06	1.000E+40	1.000E+40	1.000E+40	9.619E+06	1.000E+40
50	1.251E+11	1.000E+40	3.563E+01	1.000E+40	1.000E+40	1.000E+40	3.563E+01	1.000E+40
100	2.420E+05	1.000E+40	8.071E+01	1.000E+40	1.000E+40	1.000E+40	8.071E+01	1.000E+40
1000	2.179E+03	1.000E+40	1.000E+40	2.492E+11	1.000E+40	1.000E+40	1.000E+40	1.000E+40
5000	2.989E+11	1.662E+12	1.000E+40	7.209E+03	1.000E+40	1.000E+40	1.000E+40	1.000E+40
50000	1.000E+40	2.862E+04	8.051E+11	1.956E+08	3.749E+19	5.053E+05	8.049E+11	1.043E+05



RAM MODEL –Secondary Aquifer (Sand and gravel) : Airfield Quarry RAM_HRA_PA1

Source Type

☒ Soil Source ☐ Groundwater Source

Level Number

☐ Level One

☐ Level Two

☒ Level Three

☐ Level Four

☐ Advanced

Parameter Values

☒ Deterministic ☐ Probabilistic

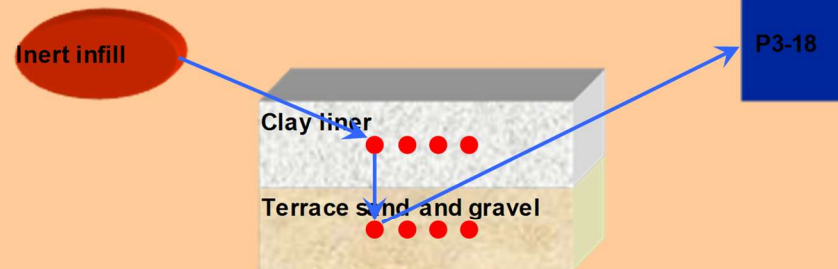
Created: 05/04/2022 16:55:45

by: Admin

Version: 3.00.00 Adv

Site: Airfield Quarry

Numerical value
Suggested formula
Probabilistic parameters
Data specified elsewhere
Suggested formula edited



SOURCE CONCENTRATIONS: Inert infill

Source Data Options

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

Source Geometry

Inert_infill_Source_length
Inert_infill_Source_width
Inert_infill_Source_area
Inert_infill_Source_thickness
Inert_infill_Source_volume

1450	m
1150	m
1667500	m2
1.9	m
3168250	m3

General Source Properties

Inert_infill_Source_field_capacity	[-]	0.2
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Source Contaminant Information

Source determinand names		Amm	Nitrc	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
Inert_infill_Leaching_test_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4	
Inert_infill_Initial_inventory	kg	506.92	31.6825	50692	31.6825	0.63365	25.346	63365	253.46	
Inert_infill_Input_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4	

SOIL SOURCE

Source Type

- ☐ Constant source
- ☒ Declining source

HYDROGEOLOGICAL UNITS

Hydrogeological Units		Clay liner	Terrace sa
Hydrogeology_Unit_Thickness	m	1	3
Hydrogeology_Log_Hydraulic_Conductivity	log(m/s)	-7	-3.1079
Hydrogeology_Hydraulic_Conductivity	m/s	1E-07	0.00078
Hydrogeology_Hydraulic_Gradient	[-]	0.5	0.004
Hydrogeology_Porosity	[-]	0.2	0.39
Hydrogeology_Velocity	m/s	2.5E-07	8E-06
Hydrogeology_Tortuosity	[-]	10	10

WATER BALANCE

Infiltration through the soil zone source
Source Name: Inert infill

Effective_Rainfall	94.1	mm/year
Infiltration_Factor	1	[-]
Infiltration_Rate	94.1	mm/year
Infiltration_Area	1667500	m2
Q_Infiltration	0.004972	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 infill		Clay liner: Node 1		Terrace sand and gravel: Node 1		P3-18	
Declining source		ADRD (1D)		ADRD (1D) + Dilution		Monitoring Borehole	
						Target Standard	
Q_managed [m3/s]		0.000E+00	Velocity [m/s]	2.500E-07	8.000E-06		
Managed time [years]		0.000E+00	Dispersivity [m]	0.1	1.0		
Q_path [m3/s]		4.972E-03	Travel Distance [m]	1.0	10.0		
Q_decline [m3/s]		4.972E-03			Mixing Depth [m]	2.4	
					Mixing Width [m]	1450.0	
			Q_Dilute [m3/s]	0	Q_Dilute [m3/s]	1.086E-02	Q_dilute [m3/s]
							0.000E+00

ATTENUATION PARAMETERS

Hydrogeological Units	Clay liner	Terrace sa
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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 Nitrogen

Attenuation_Partition_Coefficient_Kd_Species_1	L/kg	1.25	1.25
Attenuation_Retardation_Species_1	[-]	13.5	7.089744
Attenuation_Half_Life_Species_1	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_1	1/s	0	0

Arsenic

Attenuation_Partition_Coefficient_Kd_Species_2	L/kg	137.5	137.5
Attenuation_Retardation_Species_2	[-]	1376	670.8718
Attenuation_Half_Life_Species_2	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_2	1/s	0	0

Chloride

Attenuation_Partition_Coefficient_Kd_Species_3	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_3	[-]	1	1
Attenuation_Half_Life_Species_3	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_3	1/s	0	0

Lead

Attenuation_Partition_Coefficient_Kd_Species_4	L/kg	27	27
Attenuation_Retardation_Species_4	[-]	271	132.5385
Attenuation_Half_Life_Species_4	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_4	1/s	0	0

Mercury

Attenuation_Partition_Coefficient_Kd_Species_5	L/kg	2142.5	2142.5
Attenuation_Retardation_Species_5	[-]	21426	10438.82
Attenuation_Half_Life_Species_5	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_5	1/s	0	0

Nickel

Attenuation_Partition_Coefficient_Kd_Species_6	L/kg	410	410
Attenuation_Retardation_Species_6	[-]	4101	1998.436
Attenuation_Half_Life_Species_6	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_6	1/s	0	0

Sulphate

Attenuation_Partition_Coefficient_Kd_Species_7	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_7	[-]	1	1
Attenuation_Half_Life_Species_7	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_7	1/s	0	0

Zinc

Attenuation_Partition_Coefficient_Kd_Species_8	L/kg	301	301
Attenuation_Retardation_Species_8	[-]	3011	1467.41
Attenuation_Half_Life_Species_8	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_8	1/s	0	0

BREAKTHROUGH RESULTS

Site Name: "Airfield Quarry"
Level 3

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18
Concentrations in mg/L in P3-18

Compared with EAL target concentration in mg/L								
	3.900E-01	5.000E-03	2.500E+02	1.000E-02	1.000E-05	2.000E-02	2.500E+02	1.000E-02
Time(years)	Species1	Species2	Species3	Species4	Species5	Species6	Species7	Species8
	Amm Nitroge	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
1	1.019E-02	0.000E+00	2.044E+01	1.698E-31	0.000E+00	0.000E+00	2.555E+01	0.000E+00
10	3.529E-02	2.374E-22	2.201E+00	4.431E-07	0.000E+00	5.595E-40	2.751E+00	6.111E-33
50	1.761E-06	2.333E-07	1.098E-04	1.190E-03	0.000E+00	1.249E-18	1.372E-04	8.522E-15
100	0.000E+00	1.422E-04	0.000E+00	3.257E-05	0.000E+00	5.925E-11	0.000E+00	3.087E-07
1000	0.000E+00	2.208E-09	5.378E-11	0.000E+00	1.132E-08	1.651E-05	6.709E-11	3.614E-05
5000	7.374E-12	0.000E+00	8.425E-10	0.000E+00	9.574E-08	1.351E-13	1.053E-09	6.376E-13
10000	4.549E-12	0.000E+00	4.817E-10	0.000E+00	6.909E-10	0.000E+00	6.021E-10	0.000E+00

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18
Remedial Target Concentrations in mg/L in Inert infill

Time(years)	Species1	Species2	Species3	Species4	Species5	Species6	Species7	Species8
	Amm Nitroge	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
1	3.062E+01	1.000E+40	9.783E+02	2.944E+27	1.000E+40	1.000E+40	9.783E+02	1.000E+40
10	8.840E+00	1.053E+18	9.086E+03	1.129E+03	1.000E+40	1.430E+36	9.086E+03	6.546E+29
50	1.771E+05	1.072E+03	1.822E+08	4.201E-01	1.000E+40	6.406E+14	1.822E+08	4.694E+11
100	1.000E+40	1.758E+00	1.000E+40	1.535E+01	1.000E+40	1.350E+07	1.000E+40	1.296E+04
1000	1.000E+40	1.132E+05	3.719E+14	1.000E+40	8.834E-01	4.846E+01	3.726E+14	1.107E+02
5000	4.231E+10	1.000E+40	2.374E+13	1.000E+40	1.045E-01	5.922E+09	2.374E+13	6.274E+09
10000	6.859E+10	1.000E+40	4.152E+13	1.000E+40	1.447E+01	1.000E+40	4.152E+13	1.000E+40

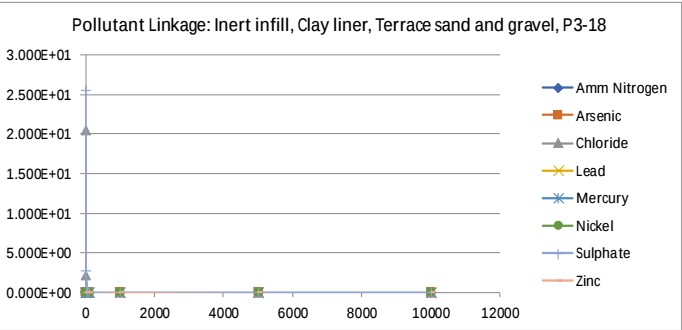
Compared with source concentrations in mg/L								
	8.000E-01	5.000E-02	8.000E+01	5.000E-02	1.000E-03	4.000E-02	1.000E+02	4.000E-01

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18
Dilution Factor

3.184E+00 for all species and timeslices

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18
Attenuation Factor

Time(years)	Species1	Species2	Species3	Species4	Species5	Species6	Species7	Species8
	Amm Nitroge	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
1	2.466E+01	1.000E+40	1.229E+00	9.247E+28	1.000E+40	1.000E+40	1.229E+00	1.000E+40
10	7.120E+00	6.614E+19	1.142E+01	3.545E+04	1.000E+40	2.246E+37	1.142E+01	2.056E+31
50	1.427E+05	6.731E+04	2.289E+05	1.320E+01	1.000E+40	1.006E+16	2.289E+05	1.474E+13
100	1.000E+40	1.104E+02	1.000E+40	4.823E+02	1.000E+40	2.121E+08	1.000E+40	4.070E+05
1000	1.000E+40	7.112E+06	4.672E+11	1.000E+40	2.775E+04	7.611E+02	4.682E+11	3.476E+03
5000	3.407E+10	1.000E+40	2.983E+10	1.000E+40	3.281E+03	9.301E+10	2.982E+10	1.971E+11
10000	5.524E+10	1.000E+40	5.216E+10	1.000E+40	4.547E+05	1.000E+40	5.217E+10	1.000E+40



RAM MODEL – Sensitivity analysis 1. Secondary Aquifer: RAM_HRA_SA1_SENS1

Source Type



Soil Source



Groundwater Source

Level Number



Level One



Level Two



Level Three



Level Four



Advanced

Parameter Values



Deterministic



Probabilistic

Created: 05/04/2022 16:55:45

by: Admin

Version: 3.00.00 Adv

Site: Airfield Quarry

Numerical value

Suggested formula

Probabilistic parameters

Data specified elsewhere

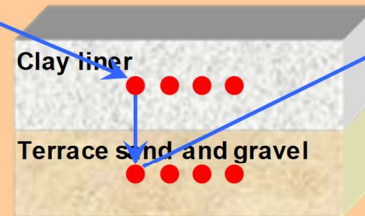
Suggested formula edited

Inert infill

Clay liner

Terrace sand and gravel

P3-18



SOURCE CONCENTRATIONS: Inert infill

Source Data Options

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

Source Geometry

Inert_infill_Source_length	1450	m
Inert_infill_Source_width	1150	m
Inert_infill_Source_area	1667500	m2
Inert_infill_Source_thickness	1.9	m
Inert_infill_Source_volume	3168250	m3

General Source Properties

Inert_infill_Source_field_capacity	[-]	0.2
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Source Contaminant Information

Source determinand names		Amm	Nitro	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
Inert_infill_Leaching_test_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4	
Inert_infill_Initial_inventory	kg	506.92	31.6825	50692	31.6825	0.63365	25.346	63365	253.46	
Inert_infill_Input_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4	

SOIL SOURCE

Source Type

- ☐ Constant source
- ☒ Declining source

HYDROGEOLOGICAL UNITS

Hydrogeological Units		Clay liner	Terrace sa
Hydrogeology_Unit_Thickness	m	1	3
Hydrogeology_Log_Hydraulic_Conductivity	log(m/s)	-7	-3.1079
Hydrogeology_Hydraulic_Conductivity	m/s	1E-07	0.00078
Hydrogeology_Hydraulic_Gradient	[-]	0.5	0.004
Hydrogeology_Porosity	[-]	0.2	0.39
Hydrogeology_Velocity	m/s	2.5E-07	8E-06
Hydrogeology_Tortuosity	[-]	10	10

WATER BALANCE

Infiltration through the soil zone source

Source Name: Inert infill

Effective_Rainfall	94.1	mm/year
Infiltration_Factor	1	[-]
Infiltration_Rate	94.1	mm/year
Infiltration_Area	1667500	m2
Q_Infiltration	0.004972	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 infill		Clay liner: Node 1		Terrace sand and gravel: Node 1		P3-18	
Declining source		ADRD (1D)		ADRD (1D) + Dilution		Monitoring Borehole	
						Target Standard	
Q_managed [m3/s]	0.000E+00	Velocity [m/s]	2.500E-07	Velocity [m/s]	8.000E-06		
Managed time [years]	0.000E+00	Dispersivity [m]	0.1	Dispersivity [m]	1.0		
Q_path [m3/s]	4.972E-03	Travel Distance [m]	1.0	Travel Distance [m]	10.0		
Q_decline [m3/s]	4.972E-03			Mixing Depth [m]	2.4		
				Mixing Width [m]	1450.0		
		Q_Dilute [m3/s]	0	Q_Dilute [m3/s]	1.086E-02	Q_dilute [m3/s]	0.000E+00

ATTENUATION PARAMETERS

Hydrogeological Units	Clay liner	Terrace sa
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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 Nitrogen

Attenuation_Partition_Coefficient_Kd_Species_1	L/kg	0.65	0.65
Attenuation_Retardation_Species_1	[-]	7.5	4.166667
Attenuation_Half_Life_Species_1	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_1	1/s	0	0

Arsenic

Attenuation_Partition_Coefficient_Kd_Species_2	L/kg	47.5	47.5
Attenuation_Retardation_Species_2	[-]	476	232.4103
Attenuation_Half_Life_Species_2	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_2	1/s	0	0

Chloride

Attenuation_Partition_Coefficient_Kd_Species_3	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_3	[-]	1	1
Attenuation_Half_Life_Species_3	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_3	1/s	0	0

Lead

Attenuation_Partition_Coefficient_Kd_Species_4	L/kg	27	27
Attenuation_Retardation_Species_4	[-]	271	132.5385
Attenuation_Half_Life_Species_4	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_4	1/s	0	0

Mercury

Attenuation_Partition_Coefficient_Kd_Species_5	L/kg	788.5	788.5
Attenuation_Retardation_Species_5	[-]	7886	3842.41
Attenuation_Half_Life_Species_5	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_5	1/s	0	0

Nickel

Attenuation_Partition_Coefficient_Kd_Species_6	L/kg	92	92
Attenuation_Retardation_Species_6	[-]	921	449.2051
Attenuation_Half_Life_Species_6	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_6	1/s	0	0

Sulphate

Attenuation_Partition_Coefficient_Kd_Species_7	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_7	[-]	1	1
Attenuation_Half_Life_Species_7	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_7	1/s	0	0

Zinc

Attenuation_Partition_Coefficient_Kd_Species_8	L/kg	60.9	60.9
Attenuation_Retardation_Species_8	[-]	610	297.6923
Attenuation_Half_Life_Species_8	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_8	1/s	0	0

BREAKTHROUGH RESULTS

Site Name: "Airfield Quarry"
Level 3

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18
Concentrations in mg/L in P3-18

Compared with EAL target concentration in mg/L								
	3.900E-01	5.000E-03	2.500E+02	1.000E-02	1.000E-05	2.000E-02	2.500E+02	1.000E-02
Time(years)	Species1	Species2	Species3	Species4	Species5	Species6	Species7	Species8
	Amm Nitroge	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
1	1.107E-01	0.000E+00	2.044E+01	1.698E-31	0.000E+00	0.000E+00	2.555E+01	0.000E+00
10	2.801E-02	2.551E-12	2.201E+00	4.431E-07	0.000E+00	0.000E+00	2.751E+00	6.509E-15
50	1.397E-06	9.970E-04	1.098E-04	1.190E-03	0.000E+00	2.315E-05	1.372E-04	3.510E-03
100	0.000E+00	3.975E-04	0.000E+00	3.257E-05	5.660E-21	4.540E-04	0.000E+00	5.054E-03
1000	0.000E+00	0.000E+00	5.378E-11	0.000E+00	1.337E-06	1.848E-12	6.709E-11	5.192E-12
5000	7.871E-12	0.000E+00	8.425E-10	0.000E+00	5.248E-11	0.000E+00	1.053E-09	0.000E+00
10000	4.677E-12	0.000E+00	4.817E-10	0.000E+00	1.601E-15	0.000E+00	6.021E-10	0.000E+00

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18
Remedial Target Concentrations in mg/L in Inert infill

Time(years)	Species1	Species2	Species3	Species4	Species5	Species6	Species7	Species8
	Amm Nitroge	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
1	2.819E+00	1.000E+40	9.783E+02	2.944E+27	1.000E+40	1.000E+40	9.783E+02	1.000E+40
10	1.114E+01	9.801E+07	9.086E+03	1.129E+03	1.000E+40	1.000E+40	9.086E+03	6.145E+11
50	2.233E+05	2.508E-01	1.822E+08	4.201E-01	1.000E+40	3.456E+01	1.822E+08	1.139E+00
100	1.000E+40	6.290E-01	1.000E+40	1.535E+01	1.767E+12	1.762E+00	1.000E+40	7.915E-01
1000	1.000E+40	1.000E+40	3.719E+14	1.000E+40	7.481E-03	4.330E+08	3.726E+14	7.705E+08
5000	3.964E+10	1.000E+40	2.374E+13	1.000E+40	1.906E+02	1.000E+40	2.374E+13	1.000E+40
10000	6.670E+10	1.000E+40	4.152E+13	1.000E+40	6.246E+06	1.000E+40	4.152E+13	1.000E+40

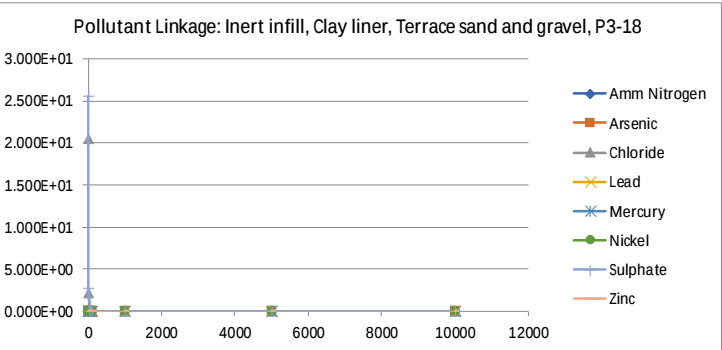
Compared with source concentrations in mg/L								
	8.000E-01	5.000E-02	8.000E+01	5.000E-02	1.000E-03	4.000E-02	1.000E+02	4.000E-01

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18
Dilution Factor

3.184E+00 for all species and timeslices

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18
Attenuation Factor

Time(years)	Species1	Species2	Species3	Species4	Species5	Species6	Species7	Species8
	Amm Nitroge	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
1	2.271E+00	1.000E+40	1.229E+00	9.247E+28	1.000E+40	1.000E+40	1.229E+00	1.000E+40
10	8.971E+00	6.157E+09	1.142E+01	3.545E+04	1.000E+40	1.000E+40	1.142E+01	1.930E+13
50	1.798E+05	1.575E+01	2.289E+05	1.320E+01	1.000E+40	5.428E+02	2.289E+05	3.579E+01
100	1.000E+40	3.951E+01	1.000E+40	4.823E+02	5.549E+16	2.768E+01	1.000E+40	2.486E+01
1000	1.000E+40	1.000E+40	4.672E+11	1.000E+40	2.350E+02	6.800E+09	4.682E+11	2.420E+10
5000	3.193E+10	1.000E+40	2.983E+10	1.000E+40	5.985E+06	1.000E+40	2.982E+10	1.000E+40
10000	5.372E+10	1.000E+40	5.216E+10	1.000E+40	1.962E+11	1.000E+40	5.217E+10	1.000E+40



RAM MODEL – Sensitivity analysis 2. Secondary Aquifer: RAM_HRA_SA1_SENS2

Source Type



Soil Source



Groundwater Source

Level Number



Level One



Level Two



Level Three



Level Four



Advanced

Parameter Values



Deterministic



Probabilistic

Created: 05/04/2022 16:55:45

by: Admin

Version: 3.00.00 Adv

Site: Airfield Quarry

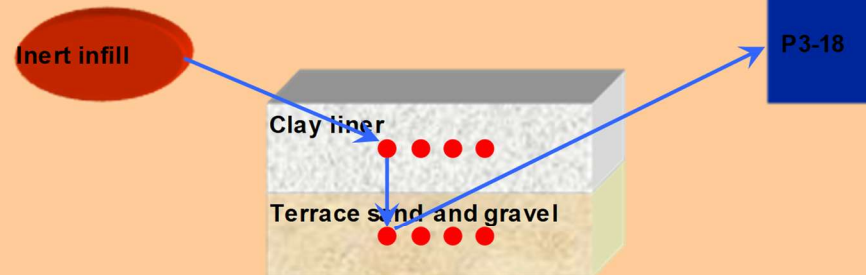
Numerical value

Suggested formula

Probabilistic parameters

Data specified elsewhere

Suggested formula edited



SOURCE CONCENTRATIONS: Inert infill

Source Data Options

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

Source Geometry

Inert_infill_Source_length	1450	m
Inert_infill_Source_width	1150	m
Inert_infill_Source_area	1667500	m2
Inert_infill_Source_thickness	1.9	m
Inert_infill_Source_volume	3168250	m3

General Source Properties

Inert_infill_Source_field_capacity	[-]	0.2
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Source Contaminant Information

Source determinand names		Amm Nitrc	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
Inert_infill_Leaching_test_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4
Inert_infill_Initial_inventory	kg	506.92	31.6825	50692	31.6825	0.63365	25.346	63365	253.46
Inert_infill_Input_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4

SOIL SOURCE

Source Type

- ☐ Constant source
- ☒ Declining source

HYDROGEOLOGICAL UNITS

Hydrogeological Units		Clay liner	Terrace sa
Hydrogeology_Unit_Thickness	m	1	3
Hydrogeology_Log_Hydraulic_Conductivity	log(m/s)	-7	-2.743
Hydrogeology_Hydraulic_Conductivity	m/s	1E-07	0.001807
Hydrogeology_Hydraulic_Gradient	[-]	0.5	0.004
Hydrogeology_Porosity	[-]	0.2	0.39
Hydrogeology_Velocity	m/s	2.5E-07	1.85E-05
Hydrogeology_Tortuosity	[-]	10	10

WATER BALANCE

Infiltration through the soil zone source

Source Name: Inert infill

Effective_Rainfall	94.1	mm/year
Infiltration_Factor	1	[-]
Infiltration_Rate	94.1	mm/year
Infiltration_Area	1667500	m2
Q_Infiltration	0.004972	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 infill		Clay liner: Node 1		Terrace sand and gravel: Node 1		P3-18	
Declining source		ADRD (1D)		ADRD (1D) + Dilution		Monitoring Borehole	
						Target Standard	
Q_managed [m3/s]		0.000E+00	Velocity [m/s]	2.500E-07	Velocity [m/s]	1.854E-05	
Managed time [years]		0.000E+00	Dispersivity [m]	0.1	Dispersivity [m]	1.0	
Q_path [m3/s]		4.972E-03	Travel Distance [m]	1.0	Travel Distance [m]	10.0	
Q_decline [m3/s]		4.972E-03			Mixing Depth [m]	2.4	
					Mixing Width [m]	1450.0	
			Q_Dilute [m3/s]	0	Q_Dilute [m3/s]	2.516E-02	Q_dilute [m3/s]
							0.000E+00

ATTENUATION PARAMETERS

Hydrogeological Units	Clay liner	Terrace sa
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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 Nitrogen

Attenuation_Partition_Coefficient_Kd_Species_1	L/kg	1.25	1.25
Attenuation_Retardation_Species_1	[-]	13.5	7.089744
Attenuation_Half_Life_Species_1	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_1	1/s	0	0

Arsenic

Attenuation_Partition_Coefficient_Kd_Species_2	L/kg	137.5	137.5
Attenuation_Retardation_Species_2	[-]	1376	670.8718
Attenuation_Half_Life_Species_2	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_2	1/s	0	0

Chloride

Attenuation_Partition_Coefficient_Kd_Species_3	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_3	[-]	1	1
Attenuation_Half_Life_Species_3	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_3	1/s	0	0

Lead

Attenuation_Partition_Coefficient_Kd_Species_4	L/kg	27	27
Attenuation_Retardation_Species_4	[-]	271	132.5385
Attenuation_Half_Life_Species_4	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_4	1/s	0	0

Mercury

Attenuation_Partition_Coefficient_Kd_Species_5	L/kg	2142.5	2142.5
Attenuation_Retardation_Species_5	[-]	21426	10438.82
Attenuation_Half_Life_Species_5	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_5	1/s	0	0

Nickel

Attenuation_Partition_Coefficient_Kd_Species_6	L/kg	410	410
Attenuation_Retardation_Species_6	[-]	4101	1998.436
Attenuation_Half_Life_Species_6	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_6	1/s	0	0

Sulphate

Attenuation_Partition_Coefficient_Kd_Species_7	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_7	[-]	1	1
Attenuation_Half_Life_Species_7	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_7	1/s	0	0

Zinc

Attenuation_Partition_Coefficient_Kd_Species_8	L/kg	301	301
Attenuation_Retardation_Species_8	[-]	3011	1467.41
Attenuation_Half_Life_Species_8	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_8	1/s	0	0

BREAKTHROUGH RESULTS

Site Name: "Airfield Quarry"
Level 3

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18

Concentrations in mg/L in P3-18

Compared with EAL target concentration in mg/L

	3.900E-01	5.000E-03	2.500E+02	1.000E-02	1.000E-05	2.000E-02	2.500E+02	1.000E-02
Time(years)	Species1	Species2	Species3	Species4	Species5	Species6	Species7	Species8
	Amm Nitroge	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
1	1.169E-02	0.000E+00	1.068E+01	0.000E+00	0.000E+00	0.000E+00	1.335E+01	0.000E+00
10	1.782E-02	5.905E-23	1.150E+00	2.554E-06	0.000E+00	0.000E+00	1.438E+00	3.070E-29
50	8.892E-07	1.306E-06	5.736E-05	5.279E-04	9.172E-39	6.265E-18	7.170E-05	2.587E-12
100	0.000E+00	1.275E-04	0.000E+00	1.332E-05	4.330E-28	1.766E-09	0.000E+00	2.311E-06
1000	0.000E+00	9.056E-10	4.285E-11	0.000E+00	2.513E-08	6.864E-06	5.340E-11	1.481E-05
5000	3.923E-12	0.000E+00	4.437E-10	0.000E+00	3.995E-08	6.130E-14	5.546E-10	0.000E+00
10000	2.401E-12	0.000E+00	2.533E-10	0.000E+00	2.824E-10	0.000E+00	3.166E-10	0.000E+00

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18

Remedial Target Concentrations in mg/L in Inert infill

Time(years)	Species1	Species2	Species3	Species4	Species5	Species6	Species7	Species8
	Amm Nitroge	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
1	2.668E+01	1.000E+40	1.872E+03	1.000E+40	1.000E+40	1.000E+40	1.872E+03	1.000E+40
10	1.751E+01	4.234E+18	1.739E+04	1.958E+02	1.000E+40	1.000E+40	1.739E+04	1.303E+26
50	3.509E+05	1.914E+02	3.487E+08	9.472E-01	1.090E+30	1.277E+14	3.487E+08	1.546E+09
100	1.000E+40	1.961E+00	1.000E+40	3.753E+01	2.310E+19	4.529E+05	1.000E+40	1.731E+03
1000	1.000E+40	2.761E+05	4.667E+14	1.000E+40	3.979E-01	1.165E+02	4.681E+14	2.701E+02
5000	7.953E+10	1.000E+40	4.507E+13	1.000E+40	2.503E-01	1.305E+10	4.508E+13	1.000E+40
10000	1.299E+11	1.000E+40	7.896E+13	1.000E+40	3.542E+01	1.000E+40	7.895E+13	1.000E+40

Compared with source concentrations in mg/L

8.000E-01	5.000E-02	8.000E+01	5.000E-02	1.000E-03	4.000E-02	1.000E+02	4.000E-01
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Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18

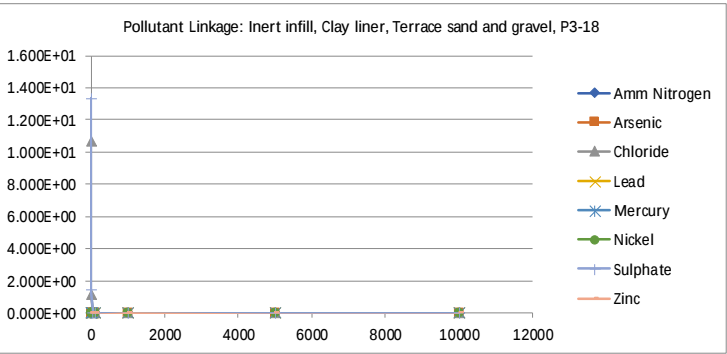
Dilution Factor

6.059E+00 for all species and timeslices

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18

Attenuation Factor

Time(years)	Species1	Species2	Species3	Species4	Species5	Species6	Species7	Species8
	Amm Nitroge	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
1	1.129E+01	1.000E+40	1.236E+00	1.000E+40	1.000E+40	1.000E+40	1.236E+00	1.000E+40
10	7.410E+00	1.397E+20	1.148E+01	3.231E+03	1.000E+40	1.000E+40	1.148E+01	2.151E+27
50	1.485E+05	6.316E+03	2.302E+05	1.563E+01	1.799E+34	1.054E+15	2.302E+05	2.552E+10
100	1.000E+40	6.473E+01	1.000E+40	6.193E+02	3.812E+23	3.738E+06	1.000E+40	2.857E+04
1000	1.000E+40	9.112E+06	3.081E+11	1.000E+40	6.567E+03	9.617E+02	3.090E+11	4.457E+03
5000	3.365E+10	1.000E+40	2.975E+10	1.000E+40	4.131E+03	1.077E+11	2.976E+10	1.000E+40
10000	5.498E+10	1.000E+40	5.213E+10	1.000E+40	5.845E+05	1.000E+40	5.212E+10	1.000E+40



RAM MODEL – Sensitivity analysis 3. Secondary Aquifer: RAM_HRA_SA1_SENS3

Source Type

☒ Soil Source ☐ Groundwater Source

Level Number

☐ Level One
☐ Level Two
☒ Level Three
☐ Level Four
☐ Advanced

Parameter Values

☒ Deterministic ☐ Probabilistic

Created: 05/04/2022 16:55:45

by: Admin

Version: 3.00.00 Adv

Site: Airfield Quarry

Numerical value

Suggested formula

Probabilistic parameters

Data specified elsewhere

Suggested formula edited

Inert infill

Clay liner

Terrace sand and gravel

P3-18

SOURCE CONCENTRATIONS: Inert infill

Source Data Options

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

Source Geometry

Inert_infill_Source_length	1450	m
Inert_infill_Source_width	1150	m
Inert_infill_Source_area	1667500	m2
Inert_infill_Source_thickness	1.9	m
Inert_infill_Source_volume	3168250	m3

General Source Properties

Inert_infill_Source_field_capacity	[-]	0.2
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Source Contaminant Information

Source determinand names		Amm	Nitro	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
Inert_infill_Leaching_test_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4	
Inert_infill_Initial_inventory	kg	506.92	31.6825	50692	31.6825	0.63365	25.346	63365	253.46	
Inert_infill_Input_concentration	mg/L	0.8	0.05	80	0.05	0.001	0.04	100	0.4	

SOIL SOURCE

Source Type

- ☐ Constant source
- ☒ Declining source

HYDROGEOLOGICAL UNITS

Hydrogeological Units		Clay liner	Terrace sa
Hydrogeology_Unit_Thickness	m	1	3
Hydrogeology_Log_Hydraulic_Conductivity	log(m/s)	-7	-3.1079
Hydrogeology_Hydraulic_Conductivity	m/s	1E-07	0.00078
Hydrogeology_Hydraulic_Gradient	[-]	0.5	0.004
Hydrogeology_Porosity	[-]	0.2	0.39
Hydrogeology_Velocity	m/s	2.5E-07	8E-06
Hydrogeology_Tortuosity	[-]	10	10

WATER BALANCE

Infiltration through the soil zone source

Source Name: Inert infill

Effective_Rainfall	94.1	mm/year
Infiltration_Factor	1	[-]
Infiltration_Rate	94.1	mm/year
Infiltration_Area	1667500	m2
Q_Infiltration	0.004972	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 infill		Clay liner: Node 1		Terrace sand and gravel: Node 1		P3-18	
Declining source		ADRD (1D)		ADRD (1D) + Dilution		Monitoring Borehole	
						Target Standard	EAL
Q_managed [m3/s]	0.000E+00	Velocity [m/s]	2.500E-07	Velocity [m/s]	8.000E-06		
Managed time [years]	0.000E+00	Dispersivity [m]	0.1	Dispersivity [m]	1.0		
Q_path [m3/s]	4.972E-03	Travel Distance [m]	1.0	Travel Distance [m]	10.0		
Q_decline [m3/s]	4.972E-03			Mixing Depth [m]	2.4		
				Mixing Width [m]	725.0		
		Q_Dilute [m3/s]	0	Q_Dilute [m3/s]	5.429E-03	Q_dilute [m3/s]	0.000E+00

ATTENUATION PARAMETERS

Hydrogeological Units	Clay liner	Terrace sa
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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 Nitrogen

Attenuation_Partition_Coefficient_Kd_Species_1	L/kg	1.25	1.25
Attenuation_Retardation_Species_1	[-]	13.5	7.089744
Attenuation_Half_Life_Species_1	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_1	1/s	0	0

Arsenic

Attenuation_Partition_Coefficient_Kd_Species_2	L/kg	137.5	137.5
Attenuation_Retardation_Species_2	[-]	1376	670.8718
Attenuation_Half_Life_Species_2	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_2	1/s	0	0

Chloride

Attenuation_Partition_Coefficient_Kd_Species_3	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_3	[-]	1	1
Attenuation_Half_Life_Species_3	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_3	1/s	0	0

Lead

Attenuation_Partition_Coefficient_Kd_Species_4	L/kg	27	27
Attenuation_Retardation_Species_4	[-]	271	132.5385
Attenuation_Half_Life_Species_4	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_4	1/s	0	0

Mercury

Attenuation_Partition_Coefficient_Kd_Species_5	L/kg	2142.5	2142.5
Attenuation_Retardation_Species_5	[-]	21426	10438.82
Attenuation_Half_Life_Species_5	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_5	1/s	0	0

Nickel

Attenuation_Partition_Coefficient_Kd_Species_6	L/kg	410	410
Attenuation_Retardation_Species_6	[-]	4101	1998.436
Attenuation_Half_Life_Species_6	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_6	1/s	0	0

Sulphate

Attenuation_Partition_Coefficient_Kd_Species_7	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_7	[-]	1	1
Attenuation_Half_Life_Species_7	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_7	1/s	0	0

Zinc

Attenuation_Partition_Coefficient_Kd_Species_8	L/kg	301	301
Attenuation_Retardation_Species_8	[-]	3011	1467.41
Attenuation_Half_Life_Species_8	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_8	1/s	0	0

BREAKTHROUGH RESULTS

Site Name: "Airfield Quarry"

Level 3

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18

Concentrations in mg/L in P3-18

Compared with EAL target concentration in mg/L

3.900E-01	5.000E-03	2.500E+02	1.000E-02	1.000E-05	2.000E-02	2.500E+02	1.000E-02
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Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	1.551E-02	0.000E+00	3.111E+01	2.585E-31	0.000E+00	0.000E+00	3.889E+01	0.000E+00
10	5.371E-02	3.614E-22	3.350E+00	6.743E-07	0.000E+00	8.516E-40	4.188E+00	9.300E-33
50	2.681E-06	3.551E-07	1.671E-04	1.811E-03	0.000E+00	1.901E-18	2.089E-04	1.297E-14
100	0.000E+00	2.165E-04	0.000E+00	4.956E-05	0.000E+00	9.017E-11	0.000E+00	4.698E-07
1000	0.000E+00	3.361E-09	8.267E-11	0.000E+00	1.723E-08	2.512E-05	1.026E-10	5.501E-05
5000	1.122E-11	0.000E+00	1.282E-09	0.000E+00	1.457E-07	2.056E-13	1.603E-09	9.706E-13
10000	6.924E-12	0.000E+00	7.330E-10	0.000E+00	1.051E-09	0.000E+00	9.165E-10	0.000E+00

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18

Remedial Target Concentrations in mg/L in Inert infill

Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	2.012E+01	1.000E+40	6.428E+02	1.934E+27	1.000E+40	1.000E+40	6.428E+02	1.000E+40
10	5.809E+00	6.918E+17	5.970E+03	7.415E+02	1.000E+40	9.395E+35	5.970E+03	4.301E+29
50	1.164E+05	7.041E+02	1.197E+08	2.760E-01	1.000E+40	4.209E+14	1.197E+08	3.084E+11
100	1.000E+40	1.155E+00	1.000E+40	1.009E+01	1.000E+40	8.872E+06	1.000E+40	8.514E+03
1000	1.000E+40	7.438E+04	2.419E+14	1.000E+40	5.804E-01	3.184E+01	2.437E+14	7.272E+01
5000	2.780E+10	1.000E+40	1.560E+13	1.000E+40	6.863E-02	3.891E+09	1.560E+13	4.121E+09
10000	4.506E+10	1.000E+40	2.728E+13	1.000E+40	9.511E+00	1.000E+40	2.728E+13	1.000E+40

Compared with source concentrations in mg/L

8.000E-01	5.000E-02	8.000E+01	5.000E-02	1.000E-03	4.000E-02	1.000E+02	4.000E-01
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Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18

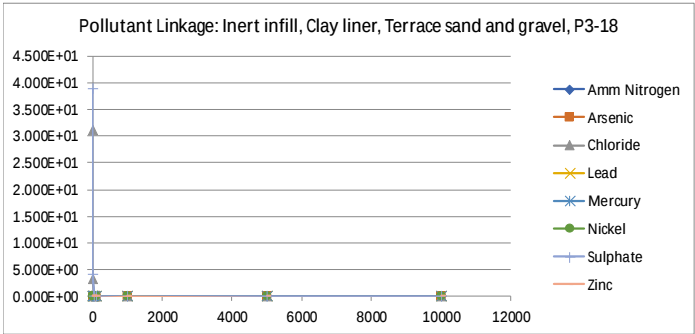
Dilution Factor

2.092E+00 for all species and timeslices

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18

Attenuation Factor

Time(years)	Species1 Amm Nitroge	Species2 Arsenic	Species3 Chloride	Species4 Lead	Species5 Mercury	Species6 Nickel	Species7 Sulphate	Species8 Zinc
1	2.466E+01	1.000E+40	1.229E+00	9.247E+28	1.000E+40	1.000E+40	1.229E+00	1.000E+40
10	7.120E+00	6.614E+19	1.142E+01	3.545E+04	1.000E+40	2.246E+37	1.142E+01	2.056E+31
50	1.427E+05	6.731E+04	2.289E+05	1.320E+01	1.000E+40	1.006E+16	2.289E+05	1.474E+13
100	1.000E+40	1.104E+02	1.000E+40	4.823E+02	1.000E+40	2.121E+08	1.000E+40	4.070E+05
1000	1.000E+40	7.112E+06	4.626E+11	1.000E+40	2.775E+04	7.611E+02	4.661E+11	3.476E+03
5000	3.408E+10	1.000E+40	2.982E+10	1.000E+40	3.281E+03	9.302E+10	2.983E+10	1.970E+11
10000	5.524E+10	1.000E+40	5.217E+10	1.000E+40	4.547E+05	1.000E+40	5.216E+10	1.000E+40



RAM MODEL – Rogue Load Assessment. Principal Aquifer: RAM_HRA_PA1_RL1

Source Type

☒ Soil Source ☐ Groundwater Source

Level Number

☐ Level One
☐ Level Two
☒ Level Three
☐ Level Four
☐ Advanced

Parameter Values

☒ Deterministic ☐ Probabilistic

Created: 05/04/2022 16:55:45

by: Admin

Version: 3.00.00 Adv

Site: Airfield Quarry

Numerical value

Suggested formula

Probabilistic parameters

Data specified elsewhere

Suggested formula edited

Inert infill

Clay liner

Terrace sand and gravel

P3-18

SOURCE CONCENTRATIONS: Inert infill

Source Data Options

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

Source Geometry

Inert_infill_Source_length
Inert_infill_Source_width
Inert_infill_Source_area
Inert_infill_Source_thickness
Inert_infill_Source_volume

1450	m
1150	m
1667500	m2
1.9	m
3168250	m3

General Source Properties

Inert_infill_Source_field_capacity	[-]	0.2
------------------------------------	-----	-----

Source Contaminant Information

Source determinand names		Amm	Nitro	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
Inert_infill_Leaching_test_concentration	mg/L	0.77	0.051	118	0.06	0.011	0.048	240	0.48	
Inert_infill_Initial_inventory	kg	487.9105	32.31615	74770.7	38.019	6.97015	30.4152	152076	304.152	
Inert_infill_Input_concentration	mg/L	0.77	0.051	118	0.06	0.011	0.048	240	0.48	

SOIL SOURCE

Source Type

- ☐ Constant source
☒ Declining source

HYDROGEOLOGICAL UNITS

Hydrogeological Units				Clay liner	Terrace sa
Hydrogeology_Unit_Thickness	m	1	3		
Hydrogeology_Log_Hydraulic_Conductivity	log(m/s)	-7	-3.1079		
Hydrogeology_Hydraulic_Conductivity	m/s	1E-07	0.00078		
Hydrogeology_Hydraulic_Gradient	[-]	0.5	0.004		
Hydrogeology_Porosity	[-]	0.2	0.39		
Hydrogeology_Velocity	m/s	2.5E-07	8E-06		
Hydrogeology_Tortuosity	[-]	10	10		

WATER BALANCE

Infiltration through the soil zone source

Source Name: Inert infill

Effective_Rainfall	94.1	mm/year
Infiltration_Factor	1	[-]
Infiltration_Rate	94.1	mm/year
Infiltration_Area	1667500	m2
Q_Infiltration	0.004972	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 infill		Clay liner: Node 1		Terrace sand and gravel: Node 1		P3-18	
Declining source		ADRD (1D)		ADRD (1D) + Dilution		Monitoring Borehole	
						Target Standard	EAL
Q_managed [m3/s]	0.000E+00	Velocity [m/s]	2.500E-07	Velocity [m/s]	8.000E-06		
Managed time [years]	0.000E+00	Dispersivity [m]	0.1	Dispersivity [m]	1.0		
Q_path [m3/s]	4.972E-03	Travel Distance [m]	1.0	Travel Distance [m]	10.0		
Q_decline [m3/s]	4.972E-03			Mixing Depth [m]	2.4		
				Mixing Width [m]	1450.0		
		Q_Dilute [m3/s]	0	Q_Dilute [m3/s]	1.086E-02	Q_dilute [m3/s]	0.000E+00

ATTENUATION PARAMETERS

Hydrogeological Units	Clay liner	Terrace sa
-----------------------	------------	------------

General properties

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

Contaminant specific parameters

Amm Nitrogen

Attenuation_Partition_Coefficient_Kd_Species_1	L/kg	1.25	1.25
Attenuation_Retardation_Species_1	[-]	13.5	7.089744
Attenuation_Half_Life_Species_1	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_1	1/s	0	0

Arsenic

Attenuation_Partition_Coefficient_Kd_Species_2	L/kg	137.5	137.5
Attenuation_Retardation_Species_2	[-]	1376	670.8718
Attenuation_Half_Life_Species_2	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_2	1/s	0	0

Chloride

Attenuation_Partition_Coefficient_Kd_Species_3	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_3	[-]	1	1
Attenuation_Half_Life_Species_3	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_3	1/s	0	0

Lead

Attenuation_Partition_Coefficient_Kd_Species_4	L/kg	27	27
Attenuation_Retardation_Species_4	[-]	271	132.5385
Attenuation_Half_Life_Species_4	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_4	1/s	0	0

Mercury

Attenuation_Partition_Coefficient_Kd_Species_5	L/kg	2142.5	2142.5
Attenuation_Retardation_Species_5	[-]	21426	10438.82
Attenuation_Half_Life_Species_5	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_5	1/s	0	0

Nickel

Attenuation_Partition_Coefficient_Kd_Species_6	L/kg	410	410
Attenuation_Retardation_Species_6	[-]	4101	1998.436
Attenuation_Half_Life_Species_6	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_6	1/s	0	0

Sulphate

Attenuation_Partition_Coefficient_Kd_Species_7	L/kg	1.00E-09	1.00E-09
Attenuation_Retardation_Species_7	[-]	1	1
Attenuation_Half_Life_Species_7	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_7	1/s	0	0

Zinc

Attenuation_Partition_Coefficient_Kd_Species_8	L/kg	301	301
Attenuation_Retardation_Species_8	[-]	3011	1467.41
Attenuation_Half_Life_Species_8	days	No Decay	No Decay
Attenuation_Decay_Coefficient_Species_8	1/s	0	0

BREAKTHROUGH RESULTS

Site Name: "Airfield Quarry"
Level 3

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18
Concentrations in mg/L in P3-18

Compared with EAL target concentration in mg/L								
	3.900E-01	5.000E-03	2.500E+02	1.000E-02	1.000E-05	2.000E-02	2.500E+02	1.000E-02
Time(years)	Species1	Species2	Species3	Species4	Species5	Species6	Species7	Species8
	Amm Nitroge	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
1	9.808E-03	0.000E+00	3.015E+01	2.038E-31	0.000E+00	0.000E+00	6.133E+01	0.000E+00
10	3.397E-02	2.422E-22	3.247E+00	5.317E-07	0.000E+00	6.714E-40	6.603E+00	7.333E-33
50	1.695E-06	2.380E-07	1.619E-04	1.428E-03	0.000E+00	1.498E-18	3.293E-04	1.023E-14
100	0.000E+00	1.451E-04	0.000E+00	3.908E-05	0.000E+00	7.109E-11	0.000E+00	3.704E-07
1000	0.000E+00	2.253E-09	8.003E-11	0.000E+00	1.245E-07	1.981E-05	1.630E-10	4.337E-05
5000	7.097E-12	0.000E+00	1.243E-09	0.000E+00	1.053E-06	1.621E-13	2.528E-09	7.654E-13
10000	4.379E-12	0.000E+00	7.105E-10	0.000E+00	7.599E-09	0.000E+00	1.445E-09	0.000E+00

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18
Remedial Target Concentrations in mg/L in Inert infill

Time(years)	Species1	Species2	Species3	Species4	Species5	Species6	Species7	Species8
	Amm Nitroge	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
1	3.062E+01	1.000E+40	9.783E+02	2.944E+27	1.000E+40	1.000E+40	9.783E+02	1.000E+40
10	8.840E+00	1.053E+18	9.086E+03	1.129E+03	1.000E+40	1.430E+36	9.086E+03	6.546E+29
50	1.771E+05	1.072E+03	1.822E+08	4.201E-01	1.000E+40	6.406E+14	1.822E+08	4.694E+11
100	1.000E+40	1.758E+00	1.000E+40	1.535E+01	1.000E+40	1.350E+07	1.000E+40	1.296E+04
1000	1.000E+40	1.132E+05	3.686E+14	1.000E+40	8.834E-01	4.846E+01	3.681E+14	1.107E+02
5000	4.232E+10	1.000E+40	2.374E+13	1.000E+40	1.045E-01	5.921E+09	2.374E+13	6.271E+09
10000	6.858E+10	1.000E+40	4.152E+13	1.000E+40	1.447E+01	1.000E+40	4.152E+13	1.000E+40

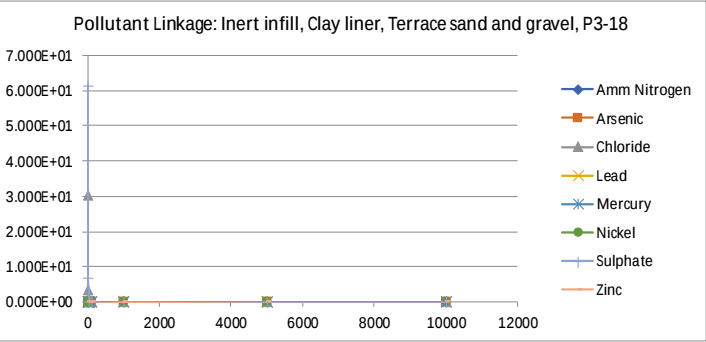
Compared with source concentrations in mg/L								
	7.700E-01	5.100E-02	1.180E+02	6.000E-02	1.100E-02	4.800E-02	2.400E+02	4.800E-01

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18
Dilution Factor

3.184E+00 for all species and timeslices

Pollutant Linkage: Inert infill, Clay liner, Terrace sand and gravel, P3-18
Attenuation Factor

Time(years)	Species1	Species2	Species3	Species4	Species5	Species6	Species7	Species8
	Amm Nitroge	Arsenic	Chloride	Lead	Mercury	Nickel	Sulphate	Zinc
1	2.466E+01	1.000E+40	1.229E+00	9.247E+28	1.000E+40	1.000E+40	1.229E+00	1.000E+40
10	7.120E+00	6.614E+19	1.142E+01	3.545E+04	1.000E+40	2.246E+37	1.142E+01	2.056E+31
50	1.427E+05	6.731E+04	2.289E+05	1.320E+01	1.000E+40	1.006E+16	2.289E+05	1.474E+13
100	1.000E+40	1.104E+02	1.000E+40	4.823E+02	1.000E+40	2.121E+08	1.000E+40	4.070E+05
1000	1.000E+40	7.112E+06	4.631E+11	1.000E+40	2.775E+04	7.611E+02	4.624E+11	3.476E+03
5000	3.408E+10	1.000E+40	2.982E+10	1.000E+40	3.281E+03	9.299E+10	2.982E+10	1.970E+11
10000	5.524E+10	1.000E+40	5.217E+10	1.000E+40	4.547E+05	1.000E+40	5.217E+10	1.000E+40





Hills Quarry Products Limited

Airfield Quarry

Gally Leaze, Gloucestershire

Proposed sand and gravel extraction and restoration

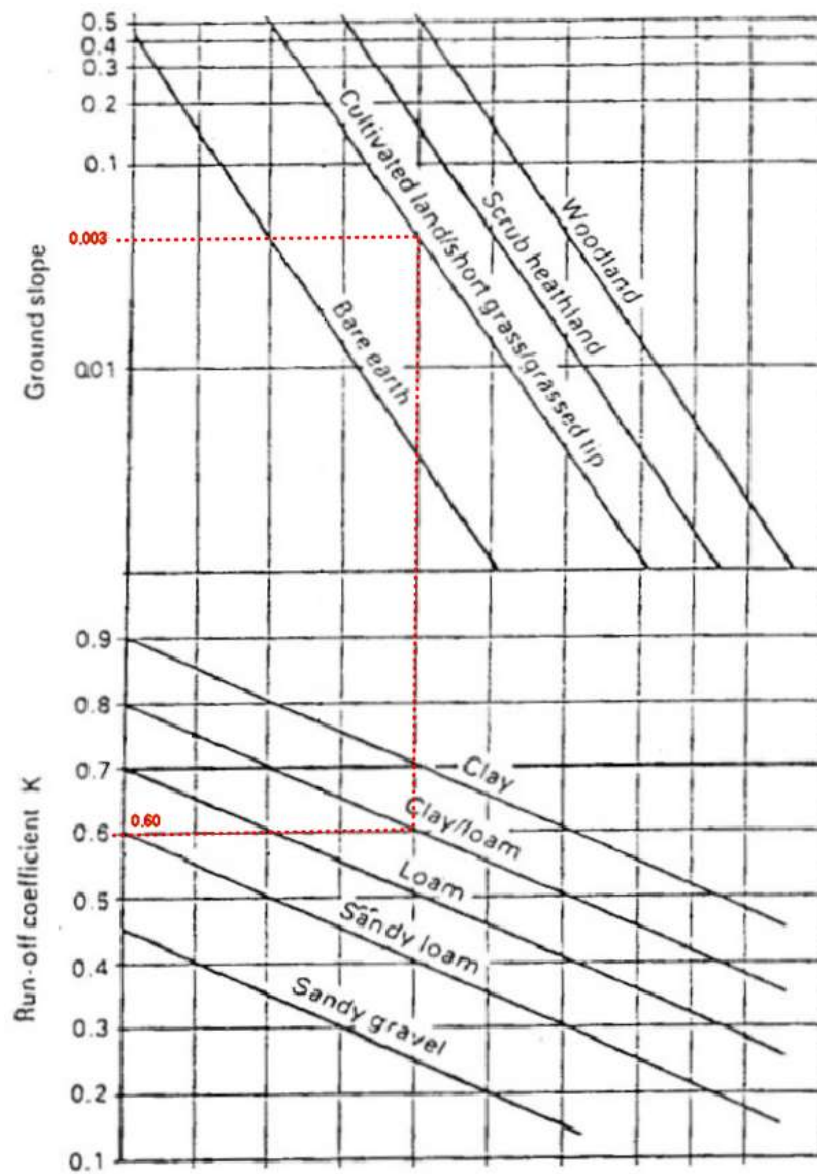
Hydrogeological Risk Assessment

Final Report

April 2022

Appendix 9 Rainfall runoff nomogram

Rainfall runoff nomogram for varying gradients and soil/subsoil types. Reproduced from "Technical Management of Water in the Coal Mining Industry", National Coal Board (NCB), 1982.





Hills Quarry Products Limited

Airfield Quarry

Gally Leaze, Gloucestershire

Proposed sand and gravel extraction and restoration

Hydrogeological Risk Assessment

Final Report

April 2022

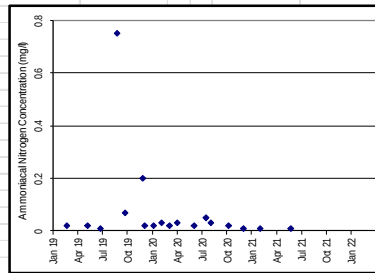
Appendix 10 Statistical analysis of background water quality data

Ammoniacal nitrogen

D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Ammoniacal Nitrogen P1-18
Concentrations <LOD excluded
Statistical test does not demonstrate conformance with Normal or Log-Normal Test.

Baseline Data (mg/l)					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	0.02			0.03	
08/05/2019	0.02	0.01	0.02		
27/06/2019	0.01	0.01	0.06	0.04	0.05
29/07/2019		0.02	0.01		0.04
27/08/2019	0.75	0.46	0.8	0.56	0.36
25/09/2019	0.07	0.02	0.05	0.03	0.03
30/10/2019		0.02	0.03		
28/11/2019	0.2	0.2	0.21	0.28	0.25
05/12/2019	0.02	0.03	0.02	0.02	
07/01/2020	0.02	0.06	0.02	0.22	0.02
06/02/2020	0.03	0.03	0.01	0.12	0.07
06/03/2020	0.02		0.04	0.07	
02/04/2020	0.03	0.04	0.03	0.04	0.03
07/05/2020		0.03	0.03		
04/06/2020	0.02	0.05	0.02	0.03	
16/07/2020	0.05	0.06	0.06	0.05	0.08
04/08/2020	0.03	0.03	0.05	0.03	0.03
09/09/2020					
07/10/2020	0.02	0.03	0.2	0.01	0.02
05/11/2020		0.01			
02/12/2020	0.01	0.02	0.02	0.04	0.03
08/01/2021		0.03		0.5	
01/02/2021	0.01	0.02	0.03	0.6	0.03
16/03/2021				0.02	
25/05/2021	0.01	0.01	0.02	0.01	
26/07/2021					0.03
21/10/2021					
27/01/2022					0.02



Natural Logs of Baseline Data					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	-3.912			-3.507	
08/05/2019	-3.912	-4.605	-3.912		
27/06/2019	-4.605	-4.605	-2.813	-3.219	-2.996
29/07/2019		-3.912	-4.605		-3.219
27/08/2019	-0.288	-0.777	-0.223	-0.580	-1.022
25/09/2019	-2.659	-3.912	-2.996	-3.507	-3.507
30/10/2019		-3.912	-3.507		
28/11/2019	-1.609	-1.609	-1.561	-1.273	-1.386
05/12/2019	-3.912	-3.507	-3.912	-3.912	
07/01/2020	-3.912	-2.813	-3.912	-1.514	-3.912
06/02/2020	-3.507	-3.507	-4.605	-2.120	-2.659
06/03/2020	-3.912		-3.219	-2.659	
02/04/2020	-3.507	-3.219	-3.507	-3.219	-3.507
07/05/2020		-3.507	-3.507		
04/06/2020	-3.912	-2.996	-3.912	-3.507	
16/07/2020	-2.996	-2.813	-2.813	-2.996	-2.526
04/08/2020	-3.507	-3.507	-2.996	-3.507	-3.507
09/09/2020					
07/10/2020	-3.912	-3.507	-1.609	-4.605	-3.912
05/11/2020		-4.605			
02/12/2020	-4.605	-3.912	-3.912	-3.219	-3.507
08/01/2021		-3.507		-0.693	
01/02/2021	-4.605	-3.912	-3.507	-0.511	-3.507
16/03/2021				-3.912	
25/05/2021	-4.605	-4.605	-3.912	-4.605	
26/07/2021					-3.507
21/10/2021					
27/01/2022					-3.912

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	0.01	-8	-0.08
2	0.01	-7	-0.07
3	0.01	-6	-0.06
4	0.01	-5	-0.05
5	0.02	-4	-0.08
6	0.02	-3	-0.06
7	0.02	-2	-0.04
8	0.02	-1	-0.02
9	0.02	0	0
10	0.02	1	0.02
11	0.02	2	0.04
12	0.03	3	0.09
13	0.03	4	0.12
14	0.03	5	0.15
15	0.05	6	0.3
16	0.07	7	0.49
17	0.2	8	1.6

NORMALITY DISTRIBUTION TEST	
n	17
Mean	0.03
Standard Deviation	0.05
T	2.35
D	0.180
Y	-14.102
Y 1% value	-3.89
Y 99% value	0.62
Y in range? (& therefore Data is Normally	No
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

LOG-NORMALITY DISTRIBUTION TEST	
n	17
Mean	-3.74
Standard Deviation	0.78
T	55.58
D	0.248
Y	-4.698
Y 1% value	-3.89
Y 99% value	0.62
Y in range? (& therefore Data is Log-Normally	No
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	-4.605	-8	36.8
2	-4.605	-7	32.2
3	-4.605	-6	27.6
4	-4.605	-5	23.0
5	-3.912	-4	15.6
6	-3.912	-3	11.7
7	-3.912	-2	7.8
8	-3.912	-1	3.9
9	-3.912	0	0.0
10	-3.912	1	-3.9
11	-3.912	2	-7.8
12	-3.507	3	-10.5
13	-3.507	4	-14.0
14	-3.507	5	-17.5
15	-2.996	6	-18.0
16	-2.659	7	-18.6
17	-1.609	8	-12.9

Outlier test (as detailed in Annex A of "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final technical report P1-471, 2002.

Reduced dataset - two highest values			
Mean	0.0744444	Std Dev	0.1742285

Standardised data	Number	Reordered data
-0.312	1	-0.370
-0.312	2	-0.370
-0.370	3	-0.370
3.877	4	-0.370
-0.026	5	-0.312
0.721	6	-0.312
-0.312	7	-0.312
-0.312	8	-0.312
-0.255	9	-0.312
-0.312	10	-0.312
-0.255	11	-0.312
-0.312	12	-0.255
-0.140	13	-0.255
-0.255	14	-0.26
-0.312	15	-0.14
-0.370	16	-0.03
-0.370	17	0.72
-0.370	18	3.88

This data point identified as outlier (Normal dataset): >Critical Value for Normal distribution (probability less than 1 in 100)

Reduced dataset - removing first three values			
Mean	-3.549	Std Dev	1.108409625

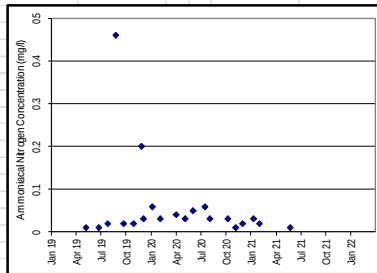
Standardised data	Number	Reordered data
-0.328	1	-0.953
-0.328	2	-0.953
-0.953	3	-0.953
2.942	4	-0.953
0.802	5	-0.328
1.750	6	-0.328
-0.328	7	-0.328
-0.328	8	-0.328
0.038	9	-0.328
-0.328	10	-0.328
0.038	11	-0.328
-0.328	12	0.038
0.499	13	0.038
0.038	14	0.04
-0.328	15	0.50
-0.953	16	0.80
-0.953	17	1.75
-0.953	18	2.94

D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Ammoniacal Nitrogen P2-18
Concentrations <LOD excluded

Statistical test demonstrates conformance with Log-Normal Tests, when omitting 1 outlier data point.

Baseline Data (mg/l)				
Date	P1-18	P2-18	P3-18	P5-18
21/02/2019	0.02			
08/05/2019	0.02	0.01	0.02	
27/06/2019	0.01	0.01	0.06	0.05
29/07/2019		0.02	0.01	0.04
27/08/2019	0.75	0.46	0.8	0.56
25/09/2019	0.07	0.02	0.05	0.03
30/10/2019		0.02	0.03	
28/11/2019	0.2	0.2	0.21	0.28
05/12/2019	0.02	0.03	0.02	0.02
07/01/2020	0.02	0.06	0.02	0.22
06/02/2020	0.03	0.03	0.01	0.12
06/03/2020	0.02		0.04	0.07
02/04/2020	0.03	0.04	0.03	0.04
07/05/2020		0.03	0.03	
04/06/2020	0.02	0.05	0.02	0.03
16/07/2020	0.05	0.06	0.06	0.05
04/08/2020	0.03	0.03	0.05	0.03
09/09/2020				
07/10/2020	0.02	0.03	0.2	0.01
05/11/2020		0.01		0.02
02/12/2020	0.01	0.02	0.02	0.04
08/01/2021		0.03		0.5
01/02/2021	0.01	0.02	0.03	0.6
16/03/2021				0.02
25/05/2021	0.01	0.01	0.02	0.01
26/07/2021				0.03
21/10/2021				
27/01/2022				0.02



Natural Logs of Baseline Data				
Date	P1-18	P2-18	P3-18	P5-18
21/02/2019	-3.912			
08/05/2019	-3.912	-4.605	-3.912	
27/06/2019	-4.605	-4.605	-2.813	-3.219
29/07/2019		-3.912	-4.605	-3.219
27/08/2019	-0.288	-0.777	-0.223	-0.580
25/09/2019	-2.659	-3.912	-2.996	-3.507
30/10/2019		-3.912	-3.507	
28/11/2019	-1.609	-1.609	-1.561	-1.273
05/12/2019	-3.912	-3.507	-3.912	-3.912
07/01/2020	-3.912	-2.813	-3.912	-1.514
06/02/2020	-3.507	-3.507	-4.605	-2.120
06/03/2020	-3.912		-3.219	-2.659
02/04/2020	-3.507	-3.219	-3.507	-3.219
07/05/2020		-3.507	-3.507	
04/06/2020	-3.912	-2.996	-3.912	-3.507
16/07/2020	-2.996	-2.813	-2.813	-2.996
04/08/2020	-3.507	-3.507	-2.996	-3.507
09/09/2020				
07/10/2020	-3.912	-3.507	-1.609	-4.605
05/11/2020		-4.605		-3.912
02/12/2020	-4.605	-3.912	-3.912	-3.507
08/01/2021		-3.507		-0.693
01/02/2021	-4.605	-3.912	-3.507	-0.511
16/03/2021				-3.912
25/05/2021	-4.605	-4.605	-3.912	-4.605
26/07/2021				-3.507
21/10/2021				
27/01/2022				-3.912

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	0.01	-9.5	-0.095
2	0.01	-8.5	-0.085
3	0.01	-7.5	-0.075
4	0.01	-6.5	-0.065
5	0.02	-5.5	-0.11
6	0.02	-4.5	-0.09
7	0.02	-3.5	-0.07
8	0.02	-2.5	-0.05
9	0.02	-1.5	-0.03
10	0.03	-0.5	-0.015
11	0.03	0.5	0.015
12	0.03	1.5	0.045
13	0.03	2.5	0.075
14	0.03	3.5	0.105
15	0.03	4.5	0.135
16	0.04	5.5	0.22
17	0.05	6.5	0.325
18	0.06	7.5	0.45
19	0.06	8.5	0.51
20	0.2	9.5	1.9

NORMALITY DISTRIBUTION TEST	
n	20
Mean	0.04
Standard Deviation	0.04
T	3.10
D	0.187
Y	-14.150
Y 1% value	-3.82
Y 99% value	0.70
Y in range? (and therefore Data is Normally distributed)	No
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

LOG-NORMALITY DISTRIBUTION TEST	
n	20
Mean	-3.62
Standard Deviation	0.74
T	76.27
D	0.259
Y	-3.412
Y 1% value	-3.82
Y 99% value	0.70
Y in range? (and therefore Data is Log Normally distributed)	Yes
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	0.12 mg/l
Percentile	97.725% mg/l
$\mu + 3\sigma$	0.24 mg/l
Percentile	99.865% mg/l

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	-4.605	-10	43.7
2	-4.605	-9	39.1
3	-4.605	-8	34.5
4	-4.605	-7	29.9
5	-3.912	-6	21.5
6	-3.912	-5	17.6
7	-3.912	-4	13.7
8	-3.912	-3	9.8
9	-3.912	-2	5.9
10	-3.507	-1	1.8
11	-3.507	1	-1.8
12	-3.507	2	-5.3
13	-3.507	3	-8.8
14	-3.507	4	-12.3
15	-3.507	5	-15.8
16	-3.219	6	-17.7
17	-2.996	7	-19.5
18	-2.813	8	-21.1
19	-2.813	9	-23.9
20	-1.609	10	-15.3

Outlier test (as detailed in Annex A of "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final technical report P1-471, 2002).

Reduced dataset - two highest values

Mean 0.0566667 Std Dev 0.1008134

Standardised data	Number	Reordered data
-0.463	1	-0.463
-0.463	2	-0.463
-0.364	3	-0.463
4.001	4	-0.463
-0.364	5	-0.364
-0.364	6	-0.364
1.422	7	-0.364
-0.265	8	-0.364
0.033	9	-0.364
-0.265	10	-0.265
-0.165	11	-0.265
-0.265	12	-0.265
-0.066	13	-0.265
0.033	14	-0.26
-0.265	15	-0.26
-0.265	16	-0.17
-0.463	17	-0.07
-0.364	18	0.03
-0.265	19	0.03
-0.364	20	1.42
-0.463	21	4.00

This data point identified as outlier (Normal dataset): >Critical Value for Normal distribution (probability less than 1 in 100)

Reduced dataset - removing first three values

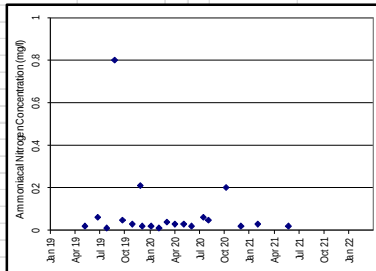
Mean -3.488 Std Dev 0.948664566

Standardised data	Number	Reordered data
-1.178	1	-1.178
-1.178	2	-1.178
-0.447	3	-1.178
2.858	4	-1.178
-0.447	5	-0.447
-0.447	6	-0.447
1.980	7	-0.447
-0.020	8	-0.447
0.711	9	-0.447
-0.020	10	-0.020
0.284	11	-0.020
-0.020	12	-0.020
0.519	13	-0.020
0.711	14	-0.02
-0.020	15	-0.02
-0.020	16	0.28
-1.178	17	0.52
-0.447	18	0.71
-0.020	19	0.71
-0.447	20	1.98
-1.178	21	2.86

D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Ammoniacal Nitrogen P3-18
Concentrations <LOD excluded
Statistical test demonstrates conformance with Log-Normal Tests, when omitting 1 outlier data point.

Baseline Data (mg/l)					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	0.02			0.03	
08/05/2019	0.02	0.01	0.02		
27/06/2019	0.01	0.01	0.06	0.04	0.05
29/07/2019		0.02	0.01		0.04
27/08/2019	0.75	0.46	0.8	0.56	0.36
25/09/2019	0.07	0.02	0.05	0.03	0.03
30/10/2019		0.02	0.03		
28/11/2019	0.2	0.2	0.21	0.28	0.25
05/12/2019	0.02	0.03	0.02	0.02	
07/01/2020	0.02	0.06	0.02	0.22	0.02
06/02/2020	0.03	0.03	0.01	0.12	0.07
06/03/2020	0.02		0.04	0.07	
02/04/2020	0.03	0.04	0.03	0.04	0.03
07/05/2020		0.03	0.03		
04/06/2020	0.02	0.05	0.02	0.03	
16/07/2020	0.05	0.06	0.06	0.05	0.08
04/08/2020	0.03	0.03	0.05	0.03	0.03
09/09/2020					
07/10/2020	0.02	0.03	0.2	0.01	0.02
05/11/2020		0.01			
02/12/2020	0.01	0.02	0.02	0.04	0.03
08/01/2021		0.03		0.5	
01/02/2021	0.01	0.02	0.03	0.6	0.03
16/03/2021				0.02	
25/05/2021	0.01	0.01	0.02	0.01	
26/07/2021					0.03
21/10/2021					
27/01/2022					0.02



Natural Logs of Baseline Data					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	-3.912			-3.507	
08/05/2019	-3.912	-4.605	-3.912		
27/06/2019	-4.605	-4.605	-2.813	-3.219	-2.996
29/07/2019		-3.912	-4.605		-3.219
27/08/2019	-0.288	-0.777	-0.223	-0.580	-1.022
25/09/2019	-2.659	-3.912	-2.996	-3.507	-3.507
30/10/2019		-3.912	-3.507		
28/11/2019	-1.609	-1.609	-1.561	-1.273	-1.386
05/12/2019	-3.912	-3.507	-3.912	-3.912	
07/01/2020	-3.912	-2.813	-3.912	-1.514	-3.912
06/02/2020	-3.507	-3.507	-4.605	-2.120	-2.659
06/03/2020	-3.912		-3.219	-2.659	
02/04/2020	-3.507	-3.219	-3.507	-3.219	-3.507
07/05/2020		-3.507	-3.507		
04/06/2020	-3.912	-2.996	-3.912	-3.507	
16/07/2020	-2.996	-2.813	-2.813	-2.996	-2.526
04/08/2020	-3.507	-3.507	-2.996	-3.507	-3.507
09/09/2020					
07/10/2020	-3.912	-3.507	-1.609	-4.605	-3.912
05/11/2020		-4.605			
02/12/2020	-4.605	-3.912	-3.912	-3.219	-3.507
08/01/2021		-3.507		-0.693	
01/02/2021	-4.605	-3.912	-3.507	-0.511	-3.507
16/03/2021				-3.912	
25/05/2021	-4.605	-4.605	-3.912	-4.605	
26/07/2021					-3.507
21/10/2021					
27/01/2022					-3.912

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	0.01	-9	-0.09
2	0.01	-8	-0.08
3	0.02	-7	-0.14
4	0.02	-6	-0.12
5	0.02	-5	-0.1
6	0.02	-4	-0.08
7	0.02	-3	-0.06
8	0.02	-2	-0.04
9	0.03	-1	-0.03
10	0.03	0	0
11	0.03	1	0.03
12	0.03	2	0.06
13	0.04	3	0.12
14	0.05	4	0.2
15	0.05	5	0.25
16	0.06	6	0.36
17	0.06	7	0.42
18	0.2	8	1.6
19	0.21	9	1.89

NORMALITY DISTRIBUTION TEST	
n	19
Mean	0.05
Standard Deviation	0.06
T	4.19
D	0.203
Y	-11.430
Y 1% value	-3.85
Y 99% value	0.67
Y in range? (& therefore Data is Normality)	No
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

LOG-NORMALITY DISTRIBUTION TEST	
n	19
Mean	-3.41
Standard Deviation	0.82
T	76.79
D	0.259
Y	-3.388
Y 1% value	-3.85
Y 99% value	0.67
Y in range? (& therefore Data is Log Normality)	Yes
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	0.17 mg/l
Percentile	97.725% mg/l
$\mu + 3\sigma$	0.39 mg/l
Percentile	99.865% mg/l

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	-4.605	-9	41.4
2	-4.605	-8	36.8
3	-3.912	-7	27.4
4	-3.912	-6	23.5
5	-3.912	-5	19.6
6	-3.912	-4	15.6
7	-3.912	-3	11.7
8	-3.912	-2	7.8
9	-3.507	-1	3.5
10	-3.507	0	0.0
11	-3.507	1	-3.5
12	-3.507	2	-7.0
13	-3.219	3	-9.7
14	-2.996	4	-12.0
15	-2.996	5	-15.0
16	-2.813	6	-16.9
17	-2.813	7	-19.7
18	-1.609	8	-12.9
19	-1.561	9	-14.0

Outlier test (as detailed in Annex A of "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final technical report P1-471, 2002.

Full dataset			
Mean	0.0865	Std Dev	0.1768816

Standardised data	Number	Reordered data
-0.376	1	-0.432
-0.150	2	-0.432
-0.432	3	-0.376
4.034	4	-0.376
-0.206	5	-0.376
-0.319	6	-0.376
0.698	7	-0.376
-0.376	8	-0.376
-0.376	9	-0.319
-0.432	10	-0.319
-0.263	11	-0.319
-0.319	12	-0.319
-0.319	13	-0.263
-0.376	14	-0.21
-0.150	15	-0.21
-0.206	16	-0.15
0.642	17	-0.15
-0.376	18	0.64
-0.319	19	0.70
-0.376	20	4.03

Data point identified as outlier (in both Normal and L-Normal datasets): >Critical Value for Normal distribution (probability less than 1 in 100)

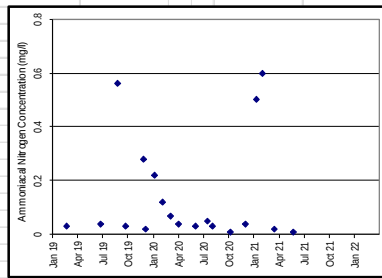
Full dataset			
Mean	-3.247	Std Dev	1.070770255

Standardised data	Number	Reordered data
-0.621	1	-1.268
0.405	2	-1.268
-1.268	3	-0.621
2.824	4	-0.621
0.235	5	-0.621
-0.242	6	-0.621
1.575	7	-0.621
-0.621	8	-0.621
-0.621	9	-0.242
-1.268	10	-0.242
0.026	11	-0.242
-0.242	12	-0.242
-0.242	13	0.026
-0.621	14	0.23
0.405	15	0.23
0.235	16	0.40
1.529	17	0.40
-0.621	18	1.53
-0.242	19	1.57
-0.621	20	2.82

D'Agostino's Test for Normal / Log-Normal Distribution
 From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Ammoniacal Nitrogen P4-18
 Concentrations <LOD excluded
 Statistical test demonstrates conformance with Log-Normal Tests.

Baseline Data (mg/l)					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	0.02			0.03	
08/05/2019	0.02	0.01	0.02		
27/06/2019	0.01	0.01	0.06	0.04	0.05
29/07/2019		0.02	0.01		0.04
27/08/2019	0.75	0.46	0.8	0.56	0.36
25/09/2019	0.07	0.02	0.05	0.03	0.03
30/10/2019		0.02	0.03		
28/11/2019	0.2	0.2	0.21	0.28	0.25
05/12/2019	0.02	0.03	0.02	0.02	
07/01/2020	0.02	0.06	0.02	0.22	0.02
06/02/2020	0.03	0.03	0.01	0.12	0.07
06/03/2020	0.02		0.04	0.07	
02/04/2020	0.03	0.04	0.03	0.04	0.03
07/05/2020		0.03	0.03		
04/06/2020	0.02	0.05	0.02	0.03	
16/07/2020	0.05	0.06	0.06	0.05	0.08
04/08/2020	0.03	0.03	0.05	0.03	0.03
09/09/2020					
07/10/2020	0.02	0.03	0.2	0.01	0.02
05/11/2020		0.01			
02/12/2020	0.01	0.02	0.02	0.04	0.03
08/01/2021		0.03		0.5	
01/02/2021	0.01	0.02	0.03	0.6	0.03
16/03/2021				0.02	
25/05/2021	0.01	0.01	0.02	0.01	
26/07/2021					0.03
21/10/2021					
27/01/2022					0.02



Natural Logs of Baseline Data					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	-3.912			-3.507	
08/05/2019	-3.912	-4.605	-3.912		
27/06/2019	-4.605	-4.605	-2.813	-3.219	-2.996
29/07/2019		-3.912	-4.605		-3.219
27/08/2019	-0.288	-0.777	-0.223	-0.580	-1.022
25/09/2019	-2.659	-3.912	-2.996	-3.507	-3.507
30/10/2019		-3.912	-3.507		
28/11/2019	-1.609	-1.609	-1.561	-1.273	-1.386
05/12/2019	-3.912	-3.507	-3.912	-3.912	
07/01/2020	-3.912	-2.813	-3.912	-1.514	-3.912
06/02/2020	-3.507	-3.507	-4.605	-2.120	-2.659
06/03/2020	-3.912		-3.219	-2.659	
02/04/2020	-3.507	-3.219	-3.507	-3.219	-3.507
07/05/2020		-3.507	-3.507		
04/06/2020	-3.912	-2.996	-3.912	-3.507	
16/07/2020	-2.996	-2.813	-2.813	-2.996	-2.526
04/08/2020	-3.507	-3.507	-2.996	-3.507	-3.507
09/09/2020					
07/10/2020	-3.912	-3.507	-1.609	-4.605	-3.912
05/11/2020		-4.605			
02/12/2020	-4.605	-3.912	-3.912	-3.219	-3.507
08/01/2021		-3.507		-0.693	
01/02/2021	-4.605	-3.912	-3.507	-0.511	-3.507
16/03/2021				-3.912	
25/05/2021	-4.605	-4.605	-3.912	-4.605	
26/07/2021					-3.507
21/10/2021					
27/01/2022					-3.912

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	0.01	-9	-0.09
2	0.01	-8	-0.08
3	0.02	-7	-0.14
4	0.02	-6	-0.12
5	0.03	-5	-0.15
6	0.03	-4	-0.12
7	0.03	-3	-0.09
8	0.03	-2	-0.06
9	0.04	-1	-0.04
10	0.04	0	0
11	0.04	1	0.04
12	0.05	2	0.1
13	0.07	3	0.21
14	0.12	4	0.48
15	0.22	5	1.1
16	0.28	6	1.68
17	0.5	7	3.5
18	0.56	8	4.48
19	0.6	9	5.4

NORMALITY DISTRIBUTION TEST	
n	19
Mean	0.14
Standard Deviation	0.20
T	16.10
D	0.226
Y	-8.082
Y 1% value	-3.85
Y 99% value	0.67
Y in range? (& therefore Data is Normally	No
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

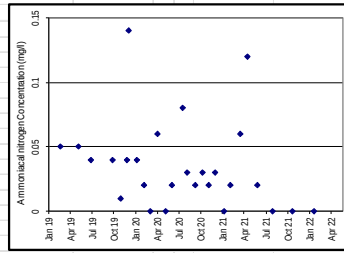
LOG-NORMALITY DISTRIBUTION TEST	
n	19
Mean	-2.79
Standard Deviation	1.30
T	126.49
D	0.269
Y	-1.960
Y 1% value	-3.85
Y 99% value	0.67
Y in range? (& therefore Data is Log Normally	Yes
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	0.83 mg/l
Percentile	97.725% mg/l
$\mu + 3\sigma$	3.07 mg/l
Percentile	99.865% mg/l

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	-4.605	-9	41.4
2	-4.605	-8	36.8
3	-3.912	-7	27.4
4	-3.912	-6	23.5
5	-3.507	-5	17.5
6	-3.507	-4	14.0
7	-3.507	-3	10.5
8	-3.507	-2	7.0
9	-3.219	-1	3.2
10	-3.219	0	0.0
11	-3.219	1	-3.2
12	-2.996	2	-6.0
13	-2.659	3	-8.0
14	-2.120	4	-8.5
15	-1.514	5	-7.6
16	-1.273	6	-7.6
17	-0.693	7	-4.9
18	-0.580	8	-4.6
19	-0.511	9	-4.6

D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Ammoniacal Nitrogen SW2 (Location WC1)
Concentrations <LOD excluded
Statistical test demonstrates conformance with Log-Normal Test.

Baseline Data (mg/l)				
Date	SW1	SW2	SW3	SW4
21/02/2019		0.05		
08/05/2019		0.05		
28/06/2019		0.04		
26/09/2019		0.04		
31/10/2019		0.01		
28/11/2019		0.04		
05/12/2019		0.14		
07/01/2020		0.04		
06/02/2020		0.02		
06/03/2020		<0.01		
02/04/2020		0.06		
07/05/2020		<0.01		
04/06/2020		0.02		
16/07/2020		0.08		
04/08/2020		0.03		
09/09/2020		0.02		
07/10/2020		0.03		
05/11/2020		0.02		
02/12/2020		0.03		
08/01/2021		<0.01		
01/02/2021		0.02		
16/03/2021		0.06		
15/04/2021		0.12		
25/05/2021		0.02		
30/07/2021		<0.01		
21/10/2021		<0.01		
21/01/2022		<0.01		



Natural Logs of Baseline Data				
Date	SW1	SW2	SW3	SW4
21/02/2019		-2.996		
08/05/2019		-2.996		
28/06/2019		-3.219		
26/09/2019		-3.219		
31/10/2019		-4.605		
28/11/2019		-3.219		
05/12/2019		-1.966		
07/01/2020		-3.219		
06/02/2020		-3.912		
06/03/2020				
02/04/2020		-2.813		
07/05/2020				
04/06/2020		-3.912		
16/07/2020		-2.526		
04/08/2020		-3.507		
09/09/2020		-3.912		
07/10/2020		-3.507		
05/11/2020		-3.912		
02/12/2020		-3.507		
08/01/2021				
01/02/2021		-3.912		
16/03/2021		-2.813		
15/04/2021		-2.120		
25/05/2021		-3.912		
30/07/2021				
21/10/2021				
21/01/2022				

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	$x - (n+1)/2$ [B]	Product of A & B
1	0.01	-10	-0.1
2	0.02	-9	-0.18
3	0.02	-8	-0.16
4	0.02	-7	-0.14
5	0.02	-6	-0.12
6	0.02	-5	-0.1
7	0.02	-4	-0.08
8	0.03	-3	-0.09
9	0.03	-2	-0.06
10	0.03	-1	-0.03
11	0.04	0	0
12	0.04	1	0.04
13	0.04	2	0.08
14	0.04	3	0.12
15	0.05	4	0.2
16	0.05	5	0.25
17	0.06	6	0.36
18	0.06	7	0.42
19	0.08	8	0.64
20	0.12	9	1.08
21	0.14	10	1.4

NORMALITY DISTRIBUTION TEST	
n	21
Mean	0.04
Standard Deviation	0.03
T	3.53
D	0.241
Y	-6.331
Y 1% value	-3.80
Y 99% value	0.72
Y in range? (& therefore Data is Normally	No
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A

LOG-NORMALITY DISTRIBUTION TEST	
n	20
Mean	-3.39
Standard Deviation	0.59
T	63.65
D	0.270
Y	-1.817
Y 1% value	-3.82
Y 99% value	0.70
Y in range? (& therefore Data is Log Normally	Yes
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	0.11 mg/l
Percentile	97.725%
$\mu + 3\sigma$	0.20 mg/l
Percentile	99.865%

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	$x - (n+1)/2$ [B]	Product of A & B
1	-4.605	-10	43.7
2	-3.912	-9	33.3
3	-3.912	-8	29.3
4	-3.912	-7	25.4
5	-3.912	-6	21.5
6	-3.912	-5	17.6
7	-3.912	-4	13.7
8	-3.507	-3	8.8
9	-3.507	-2	5.3
10	-3.507	-1	1.8
11	-3.219	1	-1.6
12	-3.219	2	-4.8
13	-3.219	3	-8.0
14	-3.219	4	-11.3
15	-2.996	5	-13.5
16	-2.996	6	-16.5
17	-2.813	7	-18.3
18	-2.813	8	-21.1
19	-2.526	9	-21.5
20	-2.120	10	-20.1

Arsenic

P1_18 – all values below LOD

P2_18 – all values below LOD

P3_18 – all values below LOD

P4_18 – all values below LOD

SW2 (WC1) – one value above LOD

Chloride

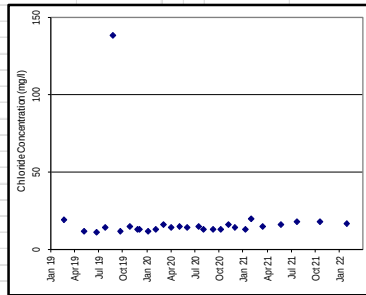
D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Chloride P1-18

All samples included

Statistical test indicates conformance with both Normal and Log-Normal Tests, when omitting 1 outlier data point.

Baseline Data (mg/l)				
Date	P1-18	P2-18	P3-18	P5-18
21/02/2019	19	14	16	223
08/05/2019	12	15	14	
27/06/2019	11	36	14	172
28/07/2019	14	109	14	74
27/08/2019	138	12	17	261
25/09/2019	12	114	17	358
30/10/2019	15	21	16	16
28/11/2019	13	15	15	51
05/12/2019	13	15	16	111
07/01/2020	12	16	15	137
06/02/2020	13	18	14	123
06/03/2020	16	14	12	33
02/04/2020	14	16	12	191
07/05/2020	15	19	14	67
04/06/2020	14	17	7	20
16/07/2020	15	18	9	24
04/08/2020	13	17	8	23
09/09/2020	13	17	15	31
07/10/2020	13	20	16	32
05/11/2020	16	37	15	112
02/12/2020	14	26	17	70
06/01/2021	13	19	15	23
01/02/2021	20	18	14	56
16/03/2021	15	18	14	193
25/05/2021	16	64	12	240
26/07/2021	18	135	5	34
21/10/2021	18	91	16	95
27/01/2022	17	68	16	89



Natural Logs of Baseline Data				
Date	P1-18	P2-18	P3-18	P5-18
21/02/2019	2.944	2.639	2.773	5.407
08/05/2019	2.485	2.708	2.639	
27/06/2019	2.398	3.584	2.639	5.147
28/07/2019	2.639	4.691	2.639	4.304
27/08/2019	4.927	2.485	2.833	5.565
25/09/2019	2.485	4.736	2.833	5.861
30/10/2019	2.708	3.045	2.773	2.773
28/11/2019	2.565	2.708	2.708	3.932
05/12/2019	2.565	2.708	2.773	4.710
07/01/2020	2.485	2.773	2.708	4.920
06/02/2020	2.565	2.890	2.639	4.812
06/03/2020	2.773	2.639	2.485	3.497
02/04/2020	2.639	2.773	2.485	5.252
07/05/2020	2.708	2.944	2.639	4.205
04/06/2020	2.639	2.833	1.946	2.996
16/07/2020	2.708	2.890	2.197	3.178
04/08/2020	2.565	2.833	2.079	3.135
09/09/2020	2.565	2.833	2.708	3.434
07/10/2020	2.565	2.996	2.773	3.466
05/11/2020	2.773	3.611	2.708	4.718
02/12/2020	2.639	3.258	2.833	4.248
08/01/2021	2.565	2.944	2.708	3.135
01/02/2021	2.996	2.890	2.639	4.025
16/03/2021	2.708	2.890	2.639	5.263
25/05/2021	2.773	4.159	2.485	5.481
26/07/2021	2.890	4.905	1.609	3.526
21/10/2021	2.890	4.511	2.773	4.554
27/01/2022	2.833	4.220	2.773	4.489

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	11	-13	-143
2	12	-12	-144
3	12	-11	-132
4	12	-10	-120
5	13	-9	-117
6	13	-8	-104
7	13	-7	-91
8	13	-6	-78
9	13	-5	-65
10	13	-4	-52
11	13	-3	-39
12	14	-2	-28
13	14	-1	-14
14	14	0	0
15	14	1	14
16	15	2	30
17	15	3	45
18	15	4	60
19	15	5	75
20	16	6	96
21	16	7	112
22	16	8	128
23	17	9	153
24	18	10	180
25	18	11	198
26	19	12	228
27	20	13	260

NORMALITY DISTRIBUTION TEST	
n	27
Mean	14.59
Standard Deviation	2.29
T	452.00
D	0.271
Y	-1.995
Y 1% value	-3.70
Y 99% value	0.85
Y in range? (& therefore Data is Normally	Yes
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	19 mg/l
Percentile	97.725%
$\mu + 3\sigma$	21 mg/l
Percentile	99.865%

LOG-NORMALITY DISTRIBUTION TEST	
n	27
Mean	2.67
Standard Deviation	0.15
T	30.43
D	0.275
Y	-1.284
Y 1% value	-3.70
Y 99% value	0.85
Y in range? (& therefore Data is Log-Normally	Yes
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	20 mg/l
Percentile	97.725%
$\mu + 3\sigma$	23 mg/l
Percentile	99.865%

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	2.398	-13	-31.2
2	2.485	-12	-29.8
3	2.485	-11	-27.3
4	2.485	-10	-24.8
5	2.565	-9	-23.1
6	2.565	-8	-20.5
7	2.565	-7	-18.0
8	2.565	-6	-15.4
9	2.565	-5	-12.8
10	2.565	-4	-10.3
11	2.565	-3	-7.7
12	2.639	-2	-5.3
13	2.639	-1	-2.6
14	2.639	0	0.0
15	2.639	1	2.6
16	2.708	2	5.4
17	2.708	3	8.1
18	2.708	4	10.8
19	2.708	5	13.5
20	2.773	6	16.6
21	2.773	7	19.4
22	2.773	8	22.2
23	2.833	9	25.5
24	2.890	10	28.9
25	2.890	11	31.8
26	2.944	12	35.3
27	2.996	13	38.9

Outlier test (as detailed in Annex A of "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final technical report P1-471, 2002.

Full dataset			
Mean	19	Std Dev	23.429959

Standardised data	Number	Reordered data
0.000	1	-0.703
-0.299	2	-0.675
-0.341	3	-0.675
-0.213	4	-0.675
5.079	5	-0.646
-0.299	6	-0.646
-0.171	7	-0.646
-0.256	8	-0.646
-0.256	9	-0.646
-0.299	10	-0.646
-0.256	11	-0.646
-0.128	12	-0.618
-0.213	13	-0.618
-0.171	14	-0.62
-0.213	15	-0.62
-0.171	16	-0.59
-0.256	17	-0.59
-0.256	18	-0.59
-0.256	19	-0.59
-0.128	20	-0.56
-0.213	21	-0.56
-0.256	22	-0.56
0.043	23	-0.53
-0.171	24	-0.50
-0.128	25	-0.50
-0.043	26	-0.48
-0.043	27	-0.45
-0.085	28	2.92

Full dataset			
Mean	2.750	Std Dev	0.452043378

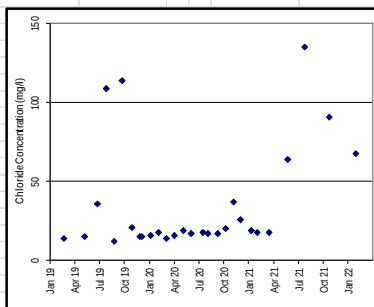
Standardised data	Number	Reordered data
0.431	1	-0.779
-0.586	2	-0.586
-0.779	3	-0.586
-0.245	4	-0.586
4.817	5	-0.409
-0.586	6	-0.409
-0.092	7	-0.409
-0.409	8	-0.409
-0.409	9	-0.409
-0.586	10	-0.409
-0.409	11	-0.409
0.050	12	-0.245
-0.245	13	-0.245
-0.092	14	-0.25
-0.245	15	-0.25
-0.092	16	-0.09
-0.409	17	-0.09
-0.409	18	-0.09
-0.409	19	-0.09
0.050	20	0.05
-0.245	21	0.05
-0.409	22	0.05
0.544	23	0.18
-0.092	24	0.31
0.050	25	0.31
0.311	26	0.43
0.311	27	0.54
0.184	28	4.82

This data point identified as outlier (L-Normal datasets): >Critical Value for Normal distribution (probability less than 1 in 100)

D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Chloride P2-18
All samples included
Statistical test does not demonstrate conformance with Normal or Log-Normal Test.

Baseline Data (mg/l)					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	19	14	16	223	9
08/05/2019	12	15	14	172	2
27/06/2019	11	36	14	172	2
29/07/2019	14	109	14	74	4
27/08/2019	138	12	17	261	5
25/09/2019	12	114	17	358	4
30/10/2019	15	21	16	16	5
28/11/2019	13	15	15	51	4
05/12/2019	13	15	16	111	3
07/01/2020	12	16	15	137	4
06/02/2020	13	18	14	123	2
06/03/2020	16	14	12	33	3
02/04/2020	14	16	12	191	4
07/05/2020	15	19	14	67	3
04/06/2020	14	17	7	20	4
16/07/2020	15	18	9	24	5
04/08/2020	13	17	8	23	3
09/09/2020	13	17	15	31	3
07/10/2020	13	20	16	32	4
05/11/2020	16	37	15	112	6
02/12/2020	14	26	17	70	19
08/01/2021	13	19	15	23	7
01/02/2021	20	18	14	56	3
16/03/2021	15	18	14	153	5
25/05/2021	16	64	12	240	2
26/07/2021	18	135	5	34	17
21/10/2021	18	91	16	95	4
27/01/2022	17	68	16	89	6



Natural Logs of Baseline Data					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	2.944	2.639	2.773	5.407	2.197
08/05/2019	2.485	2.708	2.639	5.147	0.693
27/06/2019	2.398	3.584	2.639	5.147	0.693
29/07/2019	2.639	4.691	2.639	4.304	1.386
27/08/2019	4.927	2.485	2.833	5.565	1.609
25/09/2019	2.485	4.736	2.833	5.881	1.386
30/10/2019	2.708	3.045	2.773	2.773	1.609
28/11/2019	2.565	2.708	2.708	3.932	1.386
05/12/2019	2.565	2.708	2.773	4.710	1.099
07/01/2020	2.485	2.773	2.708	4.920	1.386
06/02/2020	2.565	2.890	2.639	4.812	0.693
06/03/2020	2.773	2.639	2.485	3.497	1.099
02/04/2020	2.639	2.773	2.485	5.252	1.386
07/05/2020	2.708	2.944	2.639	4.205	1.099
04/06/2020	2.639	2.833	1.946	2.996	1.386
16/07/2020	2.708	2.890	2.197	3.178	1.609
04/08/2020	2.565	2.833	2.079	3.135	1.099
09/09/2020	2.565	2.833	2.708	3.434	1.099
07/10/2020	2.565	2.996	2.773	3.466	1.386
05/11/2020	2.773	3.611	2.708	4.718	1.792
02/12/2020	2.639	3.258	2.833	4.248	2.944
08/01/2021	2.565	2.944	2.708	3.135	1.946
01/02/2021	2.996	2.890	2.639	4.025	1.099
16/03/2021	2.708	2.890	2.639	5.263	1.609
25/05/2021	2.773	4.159	2.485	5.481	0.693
26/07/2021	2.890	4.905	1.609	3.526	2.833
21/10/2021	2.890	4.511	2.773	4.554	1.386
27/01/2022	2.833	4.220	2.773	4.489	1.792

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	12	-13.5	-162
2	14	-12.5	-175
3	14	-11.5	-161
4	15	-10.5	-157.5
5	15	-9.5	-142.5
6	15	-8.5	-127.5
7	16	-7.5	-120
8	16	-6.5	-104
9	17	-5.5	-93.5
10	17	-4.5	-76.5
11	17	-3.5	-59.5
12	18	-2.5	-45
13	18	-1.5	-27
14	18	-0.5	-9
15	18	0.5	9
16	19	1.5	28.5
17	19	2.5	47.5
18	20	3.5	70
19	21	4.5	94.5
20	26	5.5	143
21	36	6.5	234
22	37	7.5	277.5
23	64	8.5	544
24	68	9.5	646
25	91	10.5	955.5
26	109	11.5	1253.5
27	114	12.5	1425
28	135	13.5	1822.5

NORMALITY DISTRIBUTION TEST	
n	28
Mean	35.68
Standard Deviation	35.09
T	6090.50
D	0.221
Y	-10.715
Y 1% value	-3.68
Y 99% value	0.86
Y in range? (if therefore Data is Normally	No
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

LOG-NORMALITY DISTRIBUTION TEST	
n	28
Mean	3.25
Standard Deviation	0.74
T	143.74
D	0.249
Y	-5.818
Y 1% value	-3.68
Y 99% value	0.86
Y in range? (if therefore Data is Log Normally	No
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	2.485	-14	-33.5
2	2.639	-13	-33.0
3	2.639	-12	-30.3
4	2.708	-11	-28.4
5	2.708	-10	-25.7
6	2.708	-9	-23.0
7	2.773	-8	-20.8
8	2.773	-7	-18.0
9	2.833	-6	-15.6
10	2.833	-5	-12.7
11	2.833	-4	-9.9
12	2.890	-3	-7.2
13	2.890	-2	-4.3
14	2.890	-1	-1.4
15	2.890	1	1.4
16	2.944	2	4.4
17	2.944	3	7.4
18	2.996	4	10.5
19	3.045	5	13.7
20	3.258	6	17.9
21	3.584	7	23.3
22	3.611	8	27.1
23	4.159	9	35.4
24	4.220	10	40.1
25	4.511	11	47.4
26	4.691	12	54.0
27	4.736	13	59.2
28	4.905	14	66.2

Outlier test (as detailed in Annex A of "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final technical report P1-471, 2002.

Full dataset			
Mean	35.6785714	Std Dev	35.092527

Standardised data	Number	Reordered data
-0.618	1	-0.675
-0.589	2	-0.618
0.009	3	-0.618
2.089	4	-0.589
-0.675	5	-0.589
2.232	6	-0.589
-0.418	7	-0.561
-0.589	8	-0.561
-0.589	9	-0.532
-0.561	10	-0.532
-0.504	11	-0.532
-0.618	12	-0.504
-0.561	13	-0.504
-0.475	14	-0.50
-0.532	15	-0.50
-0.504	16	-0.48
-0.532	17	-0.48
-0.532	18	-0.45
-0.447	19	-0.42
0.038	20	-0.28
-0.276	21	0.01
-0.475	22	0.04
-0.504	23	0.81
-0.504	24	0.92
0.807	25	1.58
2.830	26	2.09
1.576	27	2.23
0.921	28	2.83

Full dataset			
Mean	3.253	Std Dev	0.735957982

Standardised data	Number	Reordered data
-0.835	1	-1.044
-0.741	2	-0.835
0.448	3	-0.835
1.954	4	-0.741
-1.044	5	-0.741
2.015	6	-0.741
-0.284	7	-0.653
-0.741	8	-0.653
-0.741	9	-0.571
-0.653	10	-0.571
-0.493	11	-0.571
-0.835	12	-0.493
-0.653	13	-0.493
-0.420	14	-0.49
-0.571	15	-0.49
-0.493	16	-0.42
-0.571	17	-0.42
-0.571	18	-0.35
-0.350	19	-0.28
0.486	20	0.01
0.006	21	0.45
-0.420	22	0.49
-0.493	23	1.23
-0.493	24	1.31
1.230	25	1.71
2.244	26	1.95
1.709	27	2.01
1.313	28	2.24

Although last four datapoints appear as outliers, but do not meet test criteria for omission (Normal and L-Normal datasets).
>Critical Value for Normal distribution (probability less than 1 in 100)

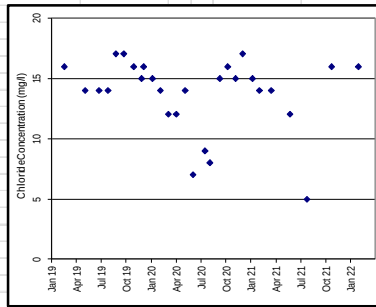
D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Chloride P3-18

All samples included

Statistical test does not demonstrate conformance with Normal or Log-Normal Test.

Baseline Data (mg/l)					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	19	14	16	223	9
08/05/2019	12	15	14		
27/06/2019	11	36	14	172	2
29/07/2019	14	109	14	74	4
27/08/2019	138	12	17	261	5
25/09/2019	12	114	17	358	4
30/10/2019	15	21	16	16	5
28/11/2019	13	15	15	51	4
05/12/2019	13	15	16	111	3
07/01/2020	12	16	15	137	4
06/02/2020	13	18	14	123	2
06/03/2020	16	14	12	33	3
02/04/2020	14	16	12	191	4
07/05/2020	15	19	14	67	3
04/06/2020	14	17	7	20	4
16/07/2020	15	18	9	24	5
04/08/2020	13	17	8	23	3
09/09/2020	13	17	15	31	3
07/10/2020	13	20	16	32	4
05/11/2020	16	37	15	112	6
02/12/2020	14	26	17	70	19
08/01/2021	13	19	15	23	7
01/02/2021	20	18	14	56	3
16/03/2021	15	18	14	193	5
25/05/2021	16	64	12	240	2
26/07/2021	18	135	5	34	17
21/10/2021	18	91	16	95	4
27/01/2022	17	68	16	89	6



Natural Logs of Baseline Data					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	2.944	2.639	2.773	5.407	2.197
08/05/2019	2.485	2.708	2.639		
27/06/2019	2.398	3.584	2.639	5.147	0.693
29/07/2019	2.639	4.691	2.639	4.304	1.386
27/08/2019	4.927	2.485	2.833	5.565	1.609
25/09/2019	2.485	4.736	2.833	5.881	1.386
30/10/2019	2.708	3.045	2.773	2.773	1.609
28/11/2019	2.565	2.708	2.708	3.932	1.386
05/12/2019	2.565	2.708	2.773	4.710	1.099
07/01/2020	2.485	2.773	2.708	4.920	1.386
06/02/2020	2.565	2.890	2.639	4.812	0.693
06/03/2020	2.773	2.639	2.485	3.497	1.099
02/04/2020	2.639	2.773	2.485	5.252	1.386
07/05/2020	2.708	2.944	2.639	4.205	1.099
04/06/2020	2.639	2.833	1.946	2.996	1.386
16/07/2020	2.708	2.890	2.197	3.178	1.609
04/08/2020	2.565	2.833	2.079	3.135	1.099
09/09/2020	2.565	2.833	2.708	3.434	1.099
07/10/2020	2.565	2.996	2.773	3.466	1.386
05/11/2020	2.773	3.611	2.708	4.718	1.792
02/12/2020	2.639	3.258	2.833	4.248	2.944
08/01/2021	2.565	2.944	2.708	3.135	1.946
01/02/2021	2.996	2.890	2.639	4.025	1.099
16/03/2021	2.708	2.890	2.639	5.263	1.609
25/05/2021	2.773	4.159	2.485	5.481	0.693
26/07/2021	2.890	4.905	1.609	3.526	2.833
21/10/2021	2.890	4.511	2.773	4.554	1.386
27/01/2022	2.833	4.220	2.773	4.489	1.792

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	7	-13	-91
2	8	-12	-96
3	9	-11	-99
4	12	-10	-120
5	12	-9	-108
6	12	-8	-96
7	14	-7	-98
8	14	-6	-84
9	14	-5	-70
10	14	-4	-56
11	14	-3	-42
12	14	-2	-28
13	14	-1	-14
14	15	0	0
15	15	1	15
16	15	2	30
17	15	3	45
18	15	4	60
19	16	5	80
20	16	6	96
21	16	7	112
22	16	8	128
23	16	9	144
24	16	10	160
25	17	11	187
26	17	12	204
27	17	13	221

NORMALITY DISTRIBUTION TEST	
n	27
Mean	14.07
Standard Deviation	2.62
T	480.00
D	0.252
Y	-5.258
Y 1% value	-3.70
Y 99% value	0.85
Y in range? (& therefore Data is	No
Normally	
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

LOG-NORMALITY DISTRIBUTION TEST	
n	27
Mean	2.62
Standard Deviation	0.22
T	38.44
D	0.236
Y	-7.979
Y 1% value	-3.70
Y 99% value	0.85
Y in range? (& therefore Data is Log	No
Normally	
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	1.946	-13	-25.3
2	2.079	-12	-25.0
3	2.197	-11	-24.2
4	2.485	-10	-24.8
5	2.485	-9	-22.4
6	2.485	-8	-19.9
7	2.639	-7	-18.5
8	2.639	-6	-15.8
9	2.639	-5	-13.2
10	2.639	-4	-10.6
11	2.639	-3	-7.9
12	2.639	-2	-5.3
13	2.639	-1	-2.6
14	2.708	0	0.0
15	2.708	1	2.7
16	2.708	2	5.4
17	2.708	3	8.1
18	2.708	4	10.8
19	2.773	5	13.9
20	2.773	6	16.6
21	2.773	7	19.4
22	2.773	8	22.2
23	2.773	9	25.0
24	2.773	10	27.7
25	2.833	11	31.2
26	2.833	12	34.0
27	2.833	13	36.8

Outlier test (as detailed in Annex A of "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final technical report P1-471, 2002.

Full dataset

Mean	13.75	Std Dev	3.0867099
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Standardised data	Number	Reordered data
0.729	1	-2.835
0.081	2	-2.187
0.081	3	-1.863
0.081	4	-1.539
1.053	5	-0.567
1.053	6	-0.567
0.729	7	-0.567
0.405	8	0.081
0.729	9	0.081
0.405	10	0.081
0.081	11	0.081
-0.567	12	0.081
-0.567	13	0.081
0.081	14	0.08
-2.187	15	0.40
-1.539	16	0.40
-1.863	17	0.40
0.405	18	0.40
0.729	19	0.40
0.405	20	0.73
1.053	21	0.73
0.405	22	0.73
0.081	23	0.73
0.081	24	0.73
-0.567	25	0.73
-2.835	26	1.05
0.729	27	1.05
0.729	28	1.05

Data point identified as outlier (L-Normal datasets): >Critical Value for Normal distribution (probability less than 1 in 100)

Full dataset

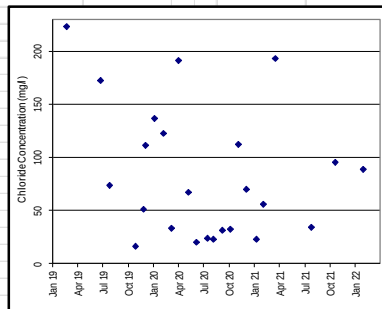
Mean	2.587	Std Dev	0.291114782
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Standardised data	Number	Reordered data
0.638	1	-3.358
0.179	2	-2.202
0.179	3	-1.743
0.179	4	-1.339
0.846	5	-0.351
0.846	6	-0.351
0.638	7	-0.351
0.416	8	0.179
0.638	9	0.179
0.416	10	0.179
0.179	11	0.179
-0.351	12	0.179
-0.351	13	0.179
0.179	14	0.18
-2.202	15	0.42
-1.339	16	0.42
-1.743	17	0.42
0.416	18	0.42
0.638	19	0.42
0.416	20	0.64
0.846	21	0.64
0.416	22	0.64
0.179	23	0.64
0.179	24	0.64
-0.351	25	0.64
-3.358	26	0.85
0.638	27	0.85
0.638	28	0.85

D'Agostino's Test for Normal / Log-Normal Distribution
 From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Chloride P4-18
 All samples included
 Statistical test demonstrates conformance with both Normal and Log-Normal Test.

Baseline Data (mg/l)					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	19	14	16	223	9
08/05/2019	12	15	14		
27/06/2019	11	36	14	172	2
29/07/2019	14	109	14	74	4
27/08/2019	138	12	17	261	5
25/09/2019	12	114	17	358	4
30/10/2019	15	21	16	16	5
28/11/2019	13	15	15	51	4
05/12/2019	13	15	16	111	3
07/01/2020	12	16	15	137	4
06/02/2020	13	18	14	123	2
06/03/2020	16	14	12	33	3
02/04/2020	14	16	12	191	4
07/05/2020	15	19	14	67	3
04/06/2020	14	17	7	20	4
16/07/2020	15	18	9	24	5
04/08/2020	13	17	8	23	3
09/09/2020	13	17	15	31	3
07/10/2020	13	20	16	32	4
05/11/2020	16	37	15	112	6
02/12/2020	14	26	17	70	19
08/01/2021	13	19	15	23	7
01/02/2021	20	18	14	56	3
16/03/2021	15	18	14	193	5
25/05/2021	16	64	12	240	2
26/07/2021	18	135	5	34	17
21/10/2021	18	91	16	95	4
27/01/2022	17	68	16	89	6



Natural Logs of Baseline Data					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	2.944	2.639	2.773	5.407	2.197
08/05/2019	2.485	2.708	2.639		
27/06/2019	2.398	3.584	2.639	5.147	0.693
29/07/2019	2.639	4.691	2.639	4.304	1.386
27/08/2019	4.927	2.485	2.833	5.565	1.609
25/09/2019	2.485	4.736	2.833	5.881	1.386
30/10/2019	2.708	3.045	2.773	2.773	1.609
28/11/2019	2.565	2.708	2.708	3.932	1.386
05/12/2019	2.565	2.708	2.773	4.710	1.099
07/01/2020	2.485	2.773	2.708	4.920	1.386
06/02/2020	2.565	2.890	2.639	4.812	0.693
06/03/2020	2.773	2.639	2.485	3.497	1.099
02/04/2020	2.639	2.773	2.485	5.252	1.386
07/05/2020	2.708	2.944	2.639	4.205	1.099
04/06/2020	2.639	2.833	1.946	2.996	1.386
16/07/2020	2.708	2.890	2.197	3.178	1.609
04/08/2020	2.565	2.833	2.079	3.135	1.099
09/09/2020	2.565	2.833	2.708	3.434	1.099
07/10/2020	2.565	2.996	2.773	3.466	1.386
05/11/2020	2.773	3.611	2.708	4.718	1.792
02/12/2020	2.639	3.258	2.833	4.248	2.944
08/01/2021	2.565	2.944	2.708	3.135	1.946
01/02/2021	2.996	2.890	2.639	4.025	1.099
16/03/2021	2.708	2.890	2.639	5.263	1.609
25/05/2021	2.773	4.159	2.485	5.481	0.693
26/07/2021	2.890	4.905	1.609	3.526	2.833
21/10/2021	2.890	4.511	2.773	4.554	1.386
27/01/2022	2.833	4.220	2.773	4.489	1.792

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	16	-13	-208
2	20	-12	-240
3	23	-11	-253
4	23	-10	-230
5	24	-9	-216
6	31	-8	-248
7	32	-7	-224
8	33	-6	-198
9	34	-5	-170
10	51	-4	-204
11	56	-3	-168
12	67	-2	-134
13	70	-1	-70
14	74	0	0
15	89	1	89
16	95	2	190
17	111	3	333
18	112	4	448
19	123	5	615
20	137	6	822
21	172	7	1204
22	191	8	1528
23	193	9	1737
24	223	10	2230
25	240	11	2640
26	261	12	3132
27	358	13	4654

NORMALITY DISTRIBUTION TEST	
n	27
Mean	105.89
Standard Deviation	89.23
T	17059.00
D	0.262
Y	-3.440
Y 1% value	-3.70
Y 99% value	0.85
Y in range? (& therefore Data is Normally	Yes
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	284 mg/l
Percentile	97.725%
$\mu + 3\sigma$	374 mg/l
Percentile	99.865%

LOG-NORMALITY DISTRIBUTION TEST	
n	27
Mean	4.30
Standard Deviation	0.90
T	185.93
D	0.282
Y	-0.027
Y 1% value	-3.70
Y 99% value	0.85
Y in range? (& therefore Data is Log Normally	Yes
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	449 mg/l
Percentile	97.725%
$\mu + 3\sigma$	1110 mg/l
Percentile	99.865%

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	2.773	-13	-36.0
2	2.996	-12	-35.9
3	3.135	-11	-34.5
4	3.135	-10	-31.4
5	3.178	-9	-28.6
6	3.434	-8	-27.5
7	3.466	-7	-24.3
8	3.497	-6	-21.0
9	3.526	-5	-17.6
10	3.932	-4	-15.7
11	4.025	-3	-12.1
12	4.205	-2	-8.4
13	4.248	-1	-4.2
14	4.304	0	0.0
15	4.489	1	4.5
16	4.554	2	9.1
17	4.710	3	14.1
18	4.718	4	18.9
19	4.812	5	24.1
20	4.920	6	29.5
21	5.147	7	36.0
22	5.252	8	42.0
23	5.263	9	47.4
24	5.407	10	54.1
25	5.481	11	60.3
26	5.565	12	66.8
27	5.881	13	76.4

Lead

P1_18 – all values below LOD

P2_18 – all values below LOD

P3_18 – all values below LOD

P4_18 – all values below LOD

SW2 (WC1) – all values below LOD

Mercury

P1_18 – all values below LOD

P2_18 – all values below LOD

P3_18 – all values below LOD

P4_18 – only 1 value above LOD

SW2 (WC1) – all values below LOD

Nickel

P1_18 – all values below LOD

P2_18 – only 1 value above LOD

P3_18 – only 2 values above LOD

P4_18 – only 4 values above LOD

Sulphate

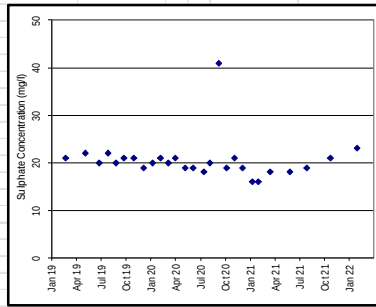
D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Sulphate P1-18

All samples included

Statistical test demonstrates conformance with both Normal and Log-Normal Tests, when omitting 1 outlier data point.

Baseline Data (mg/l)					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	21	22	60	26	14
08/05/2019	22	24	58		
27/06/2019	20	19	47	29	20
29/07/2019	22	19	34	36	16
27/08/2019	20	24	51	35	20
25/09/2019	21	21	56	33	12
30/10/2019	21	19	49	20	14
28/11/2019					6
05/12/2019	19	18	51	18	11
07/01/2020	20	19	50	21	7
06/02/2020	21	20	53	22	4
06/03/2020	20	20	44	19	7
02/04/2020	21	20	47	15	7
07/05/2020	19	21	47	8	8
04/06/2020	19	20	23	4	11
16/07/2020	18	18	25	5	11
04/08/2020	20	20	25	8	11
09/09/2020	41	18	60	11	11
07/10/2020	19	18	54	7	10
05/11/2020	21	20	55	11	9
02/12/2020	19	19	56	25	12
08/01/2021	16	18	48	14	6
01/02/2021	16	18	49	17	3
16/03/2021	18	18	56	17	4
25/05/2021	18	17	47	16	6
26/07/2021	19	21	12	14	23
21/10/2021	21	23	64	14	9
27/01/2022	23	22	58	35	11



Natural Logs of Baseline Data					
Date	P21-19	P22-19	P23-19	P24-19	P25-19
21/02/2019	3.045	3.091	4.094	3.258	2.639
08/05/2019	3.091	3.178	4.060		
27/06/2019	2.996	2.944	3.850	3.367	2.996
29/07/2019	3.091	2.944	3.526	3.584	2.773
27/08/2019	2.996	3.178	3.932	3.555	2.996
25/09/2019	3.045	3.045	4.025	3.497	2.485
30/10/2019	3.045	2.944	3.892	2.996	2.639
28/11/2019					1.792
05/12/2019	2.944	2.890	3.932	2.890	2.398
07/01/2020	2.996	2.944	3.912	3.045	1.946
06/02/2020	3.045	2.996	3.970	3.091	1.386
06/03/2020	2.996	2.996	3.784	2.944	1.946
02/04/2020	3.045	2.996	3.850	2.708	1.946
07/05/2020	2.944	3.045	3.850	2.079	2.079
04/06/2020	2.944	2.996	3.135	1.386	2.398
16/07/2020	2.890	2.890	3.219	1.609	2.398
04/08/2020	2.996	2.996	3.219	2.079	2.398
09/09/2020	3.714	2.890	4.094	2.398	2.398
07/10/2020	2.944	2.890	3.989	1.946	2.303
05/11/2020	3.045	2.996	4.007	2.398	2.197
02/12/2020	2.944	2.944	4.025	3.219	2.485
08/01/2021	2.773	2.890	3.871	2.639	1.792
01/02/2021	2.773	2.890	3.892	2.833	1.099
16/03/2021	2.890	2.890	4.025	2.833	1.386
25/05/2021	2.890	2.833	3.850	2.773	1.792
26/07/2021	2.944	3.045	2.485	2.639	3.135
21/10/2021	3.045	3.135	4.159	2.639	2.197
27/01/2022	3.135	3.091	4.060	3.555	2.398

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	16	-12.5	-200
2	16	-11.5	-184
3	18	-10.5	-189
4	18	-9.5	-171
5	18	-8.5	-153
6	19	-7.5	-142.5
7	19	-6.5	-123.5
8	19	-5.5	-104.5
9	19	-4.5	-85.5
10	19	-3.5	-66.5
11	19	-2.5	-47.5
12	20	-1.5	-30
13	20	-0.5	-10
14	20	0.5	10
15	20	1.5	30
16	20	2.5	50
17	21	3.5	73.5
18	21	4.5	94.5
19	21	5.5	115.5
20	21	6.5	136.5
21	21	7.5	157.5
22	21	8.5	178.5
23	21	9.5	199.5
24	22	10.5	231
25	22	11.5	253
26	23	12.5	287.5

NORMALITY DISTRIBUTION TEST	
n	26
Mean	19.77
Standard Deviation	1.70
T	310.00
D	0.269
Y	-2.215
Y 1% value	-3.71
Y 99% value	0.83
Y in range? (& therefore Data is Normally	Yes
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	23 mg/l
Percentile	97.725%
$\mu + 3\sigma$	25 mg/l
Percentile	99.865%

LOG-NORMALITY DISTRIBUTION TEST	
n	26
Mean	2.98
Standard Deviation	0.09
T	15.96
D	0.266
Y	-2.734
Y 1% value	-3.71
Y 99% value	0.83
Y in range? (& therefore Data is Log Normally	Yes
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	24 mg/l
Percentile	97.725%
$\mu + 3\sigma$	26 mg/l
Percentile	99.865%

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	2.773	-13	-34.7
2	2.773	-12	-31.9
3	2.890	-11	-30.3
4	2.890	-10	-27.5
5	2.890	-9	-24.6
6	2.944	-8	-22.1
7	2.944	-7	-19.1
8	2.944	-6	-16.2
9	2.944	-5	-13.2
10	2.944	-4	-10.3
11	2.944	-3	-7.4
12	2.996	-2	-4.5
13	2.996	-1	-1.5
14	2.996	1	1.5
15	2.996	2	4.5
16	2.996	3	7.5
17	3.045	4	10.7
18	3.045	5	13.7
19	3.045	6	16.7
20	3.045	7	19.8
21	3.045	8	22.8
22	3.045	9	25.9
23	3.045	10	28.9
24	3.091	11	32.5
25	3.091	12	35.5
26	3.135	13	39.2

Outlier test (as detailed in Annex A of "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final technical report P1-471, 2002.

Reduced dataset - two highest values

Mean	20.55556	Std Dev	4.414286
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Standardised data	Number	Reordered data
0.101	1	-1.032
0.327	2	-1.032
-0.126	3	-0.579
0.327	4	-0.579
-0.126	5	-0.579
0.101	6	-0.352
0.101	7	-0.352
-0.352	8	-0.352
-0.126	9	-0.352
0.101	10	-0.352
-0.126	11	-0.352
0.101	12	-0.126
-0.352	13	-0.126
-0.352	14	-0.13
-0.579	15	-0.13
-0.126	16	-0.13
4.631	17	0.10
-0.352	18	0.10
0.101	19	0.10
-0.352	20	0.10
-1.032	21	0.10
-1.032	22	0.10
-0.579	23	0.10
-0.579	24	0.33
-0.352	25	0.33
0.101	26	0.55
0.554	27	4.63

This data point identified as outlier (Normal and L-Normal datasets): >Critical Value for Normal distribution (probability less than 1 in 100)

Reduced dataset - removing first three values

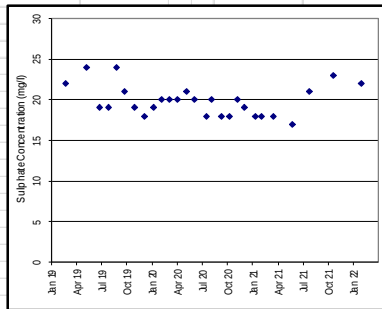
Mean	3.008	Std Dev	0.16579012
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Standardised data	Number	Reordered data
0.223	1	-1.417
0.504	2	-1.417
-0.071	3	-0.707
0.504	4	-0.707
-0.071	5	-0.707
0.223	6	-0.381
0.223	7	-0.381
-0.381	8	-0.381
-0.071	9	-0.381
0.223	10	-0.381
-0.071	11	-0.381
0.223	12	-0.071
-0.381	13	-0.071
-0.381	14	-0.07
-0.707	15	-0.07
-0.071	16	-0.07
4.259	17	0.22
-0.381	18	0.22
0.223	19	0.22
-0.381	20	0.22
-1.417	21	0.22
-1.417	22	0.22
-0.707	23	0.22
-0.707	24	0.50
-0.381	25	0.50
0.223	26	0.77
0.772	27	4.26

D'Agostino's Test for Normal / Log-Normal Distribution
 From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Sulphate P2-18
 All samples included
 Statistical test demonstrates conformance with both Normal and Log-Normal Tests.

Baseline Data (mg/l)					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	21	22	60	26	14
08/05/2019	22	24	58		
27/06/2019	20	19	47	29	20
29/07/2019	22	19	34	36	16
27/08/2019	20	24	51	35	20
25/09/2019	21	21	56	33	12
30/10/2019	21	19	49	20	14
28/11/2019					6
05/12/2019	19	18	51	18	11
07/01/2020	20	19	50	21	7
06/02/2020	21	20	53	22	4
06/03/2020	20	20	44	19	7
02/04/2020	21	20	47	15	7
07/05/2020	19	21	47	8	8
04/06/2020	19	20	23	4	11
16/07/2020	18	18	25	5	11
04/08/2020	20	20	25	8	11
09/09/2020	41	18	60	11	11
07/10/2020	19	18	54	7	10
05/11/2020	21	20	55	11	9
02/12/2020	19	19	56	25	12
08/01/2021	16	18	48	14	6
01/02/2021	16	18	49	17	3
16/03/2021	18	18	56	17	4
25/05/2021	18	17	47	16	6
26/07/2021	19	21	12	14	23
21/10/2021	23	23	64	14	9
27/01/2022	21	22	58	35	11



Natural Logs of Baseline Data					
Date	P21-19	P22-19	P23-19	P24-19	P25-19
21/02/2019	3.045	3.091	4.094	3.258	2.639
08/05/2019	3.091	3.178	4.060		
27/06/2019	2.996	2.944	3.850	3.367	2.996
29/07/2019	3.091	2.944	3.526	3.584	2.773
27/08/2019	2.996	3.178	3.932	3.555	2.996
25/09/2019	3.045	3.045	4.025	3.497	2.485
30/10/2019	3.045	2.944	3.892	2.996	2.639
28/11/2019					1.792
05/12/2019	2.944	2.890	3.932	2.890	2.398
07/01/2020	2.996	2.944	3.912	3.045	1.946
06/02/2020	3.045	2.996	3.970	3.091	1.386
06/03/2020	2.996	2.996	3.784	2.944	1.946
02/04/2020	3.045	2.996	3.850	2.708	1.946
07/05/2020	2.944	3.045	3.850	2.079	2.079
04/06/2020	2.944	2.996	3.135	1.386	2.398
16/07/2020	2.890	2.890	3.219	1.609	2.398
04/08/2020	2.996	2.996	3.219	2.079	2.398
09/09/2020	3.714	2.890	4.094	2.398	2.398
07/10/2020	2.944	2.890	3.989	1.946	2.303
05/11/2020	3.045	2.996	4.007	2.398	2.197
02/12/2020	2.944	2.944	4.025	3.219	2.485
08/01/2021	2.773	2.890	3.871	2.639	1.792
01/02/2021	2.773	2.890	3.892	2.833	1.099
16/03/2021	2.890	2.890	4.025	2.833	1.386
25/05/2021	2.890	2.833	3.850	2.773	1.792
26/07/2021	2.944	3.045	2.485	2.639	3.135
21/10/2021	3.045	3.135	4.159	2.639	2.197
27/01/2022	3.135	3.091	4.060	3.555	2.398

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	17	-13	-221
2	18	-12	-216
3	18	-11	-198
4	18	-10	-180
5	18	-9	-162
6	18	-8	-144
7	18	-7	-126
8	18	-6	-108
9	19	-5	-95
10	19	-4	-76
11	19	-3	-57
12	19	-2	-38
13	19	-1	-19
14	20	0	0
15	20	1	20
16	20	2	40
17	20	3	60
18	20	4	80
19	20	5	100
20	21	6	126
21	21	7	147
22	21	8	168
23	22	9	198
24	22	10	220
25	22	11	253
26	24	12	288
27	24	13	312

NORMALITY DISTRIBUTION TEST	
n	27
Mean	19.85
Standard Deviation	1.90
T	372.00
D	0.269
Y	-2.231
Y 1% value	-3.70
Y 99% value	0.85
Y in range? (& therefore Data is Normally	Yes
Parameter level and percentile (assuming normal distribution)	
μ + 2σ	24 mg/l
Percentile	97.725%
μ + 3σ	26 mg/l
Percentile	99.865%

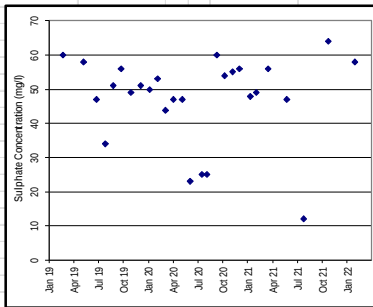
LOG-NORMALITY DISTRIBUTION TEST	
n	27
Mean	2.98
Standard Deviation	0.09
T	18.45
D	0.272
Y	-1.729
Y 1% value	-3.70
Y 99% value	0.85
Y in range? (& therefore Data is Log Normally	Yes
Parameter level and percentile (assuming log-normal distribution)	
μ + 2σ	24 mg/l
Percentile	97.725%
μ + 3σ	26 mg/l
Percentile	99.865%

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	2.833	-13	-36.8
2	2.890	-12	-34.7
3	2.890	-11	-31.8
4	2.890	-10	-28.9
5	2.890	-9	-26.0
6	2.890	-8	-23.1
7	2.890	-7	-20.2
8	2.890	-6	-17.3
9	2.944	-5	-14.7
10	2.944	-4	-11.8
11	2.944	-3	-8.8
12	2.944	-2	-5.9
13	2.944	-1	-2.9
14	2.996	0	0.0
15	2.996	1	3.0
16	2.996	2	6.0
17	2.996	3	9.0
18	2.996	4	12.0
19	2.996	5	15.0
20	3.045	6	18.3
21	3.045	7	21.3
22	3.045	8	24.4
23	3.091	9	27.8
24	3.091	10	30.9
25	3.135	11	34.5
26	3.178	12	38.1
27	3.178	13	41.3

D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Sulphate P3-18
All samples included
Statistical test does not demonstrate conformance with Normal or Log-Normal Test.

Baseline Data (mg/l)					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	21	22	60	26	14
08/05/2019	22	24	58		
27/06/2019	20	19	47	29	20
29/07/2019	22	19	34	36	16
27/08/2019	20	24	51	35	20
25/09/2019	21	21	56	33	12
30/10/2019	21	19	49	20	14
28/11/2019					6
05/12/2019	19	18	51	18	11
07/01/2020	20	19	50	21	7
06/02/2020	21	20	53	22	4
06/03/2020	20	20	44	19	7
02/04/2020	21	20	47	15	7
07/05/2020	19	21	47	8	8
04/06/2020	19	20	23	4	11
16/07/2020	18	18	25	5	11
04/08/2020	20	20	25	8	11
09/09/2020	41	18	60	11	11
07/10/2020	19	18	54	7	10
05/11/2020	21	20	55	11	9
02/12/2020	19	19	56	25	12
08/01/2021	16	18	48	14	6
01/02/2021	16	18	49	17	3
16/03/2021	18	18	56	17	4
25/05/2021	18	17	47	16	6
26/07/2021	19	21	12	14	23
21/10/2021	21	23	64	14	9
27/01/2022	23	22	58	35	11



Natural Logs of Baseline Data					
Date	P21-19	P22-19	P23-19	P24-19	P25-19
21/02/2019	3.045	3.091	4.094	3.258	2.639
08/05/2019	3.091	3.178	4.060		
27/06/2019	2.996	2.944	3.850	3.367	2.996
29/07/2019	3.091	2.944	3.526	3.584	2.773
27/08/2019	2.996	3.178	3.932	3.555	2.996
25/09/2019	3.045	3.045	4.025	3.497	2.485
30/10/2019	3.045	2.944	3.892	2.996	2.639
28/11/2019					1.792
05/12/2019	2.944	2.890	3.932	2.890	2.398
07/01/2020	2.996	2.944	3.912	3.045	1.946
06/02/2020	3.045	2.996	3.970	3.091	1.386
06/03/2020	2.996	2.996	3.784	2.944	1.946
02/04/2020	3.045	2.996	3.850	2.708	1.946
07/05/2020	2.944	3.045	3.850	2.079	2.079
04/06/2020	2.944	2.996	3.135	1.386	2.398
16/07/2020	2.890	2.890	3.219	1.609	2.398
04/08/2020	2.996	2.996	3.219	2.079	2.398
09/09/2020	3.714	2.890	4.094	2.398	2.398
07/10/2020	2.944	2.890	3.989	1.946	2.303
05/11/2020	3.045	2.996	4.007	2.398	2.197
02/12/2020	2.944	2.944	4.025	3.219	2.485
08/01/2021	2.773	2.890	3.871	2.639	1.792
01/02/2021	2.773	2.890	3.892	2.833	1.099
16/03/2021	2.890	2.890	4.025	2.833	1.386
25/05/2021	2.890	2.833	3.850	2.773	1.792
26/07/2021	2.944	3.045	2.485	2.639	3.155
21/10/2021	3.045	3.135	4.159	2.639	2.197
27/01/2022	3.135	3.091	4.060	3.555	2.398

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	12	-13	-156
2	23	-12	-276
3	25	-11	-275
4	25	-10	-250
5	34	-9	-306
6	44	-8	-352
7	47	-7	-329
8	47	-6	-282
9	47	-5	-235
10	47	-4	-188
11	48	-3	-144
12	49	-2	-98
13	49	-1	-49
14	50	0	0
15	51	1	51
16	51	2	102
17	53	3	159
18	54	4	216
19	55	5	275
20	56	6	336
21	56	7	392
22	56	8	448
23	58	9	522
24	58	10	580
25	60	11	660
26	60	12	720
27	64	13	832

NORMALITY DISTRIBUTION TEST	
n	27
Mean	47.37
Standard Deviation	12.79
T	2353.00
D	0.252
Y	-5.158
Y 1% value	-3.70
Y 99% value	0.85
Y in range? (if therefore Data is Normally	No
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

LOG-NORMALITY DISTRIBUTION TEST	
n	26
Mean	3.85
Standard Deviation	0.28
T	44.28
D	0.238
Y	-7.472
Y 1% value	-3.71
Y 99% value	0.83
Y in range? (if therefore Data is Log Normally	No
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	3.135	-13	-39.2
2	3.219	-12	-37.0
3	3.219	-11	-33.8
4	3.526	-10	-33.5
5	3.784	-9	-32.2
6	3.850	-8	-28.9
7	3.850	-7	-25.0
8	3.850	-6	-21.2
9	3.850	-5	-17.3
10	3.871	-4	-13.5
11	3.892	-3	-9.7
12	3.892	-2	-5.8
13	3.912	-1	-2.0
14	3.932	1	2.0
15	3.932	2	5.9
16	3.970	3	9.9
17	3.989	4	14.0
18	4.007	5	18.0
19	4.025	6	22.1
20	4.025	7	26.2
21	4.025	8	30.2
22	4.060	9	34.5
23	4.060	10	38.6
24	4.094	11	43.0
25	4.094	12	47.1
26	4.159	13	52.0

Outlier test (as detailed in Annex A of "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final technical report P1-471, 2002.

Full dataset			
Mean	47.37037	Std Dev	12.791668

Standardised data	Number	Reordered data
0.987	1	-2.765
0.831	2	-1.905
-0.029	3	-1.749
-1.045	4	-1.749
0.284	5	-1.045
0.675	6	-0.263
0.127	7	-0.029
0.284	8	-0.029
0.206	9	-0.029
0.440	10	-0.029
-0.263	11	0.049
-0.029	12	0.127
-0.029	13	0.127
-1.905	14	0.21
-1.749	15	0.28
-1.749	16	0.28
0.987	17	0.44
0.518	18	0.52
0.596	19	0.60
0.675	20	0.67
0.049	21	0.67
0.127	22	0.67
0.675	23	0.83
-0.029	24	0.83
-2.765	25	0.99
1.300	26	0.99
0.831	27	1.30

Data point identified as outlier (L-Normal datasets): >Critical Value for Normal distribution (probability less than 1 in 100)

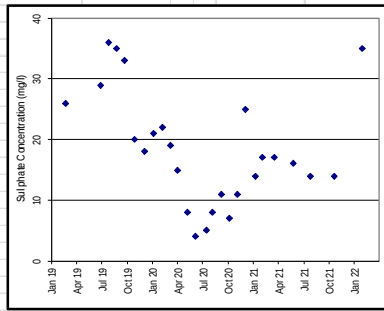
Full dataset			
Mean	3.804	Std Dev	0.37714539

Standardised data	Number	Reordered data
0.770	1	-3.498
0.680	2	-1.773
0.122	3	-1.552
-0.736	4	-1.552
0.339	5	-0.736
0.587	6	-0.053
0.233	7	0.122
0.339	8	0.122
0.286	9	0.122
0.441	10	0.122
-0.053	11	0.178
0.122	12	0.233
0.122	13	0.233
-1.773	14	0.29
-1.552	15	0.34
-1.552	16	0.34
0.770	17	0.44
0.490	18	0.49
0.539	19	0.54
0.587	20	0.59
0.178	21	0.59
0.233	22	0.59
0.587	23	0.68
0.122	24	0.68
-3.498	25	0.77
0.941	26	0.77
0.680	27	0.94

D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Sulphate P4-18
All samples included
Statistical test demonstrates conformance with both Normal and Log-Normal Tests.

Baseline Data (mg/l)					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	21	22	60	26	14
08/05/2019	22	24	58		
27/06/2019	20	19	47	29	20
29/07/2019	22	19	34	36	16
27/08/2019	20	24	51	35	20
25/09/2019	21	21	56	33	12
30/10/2019	21	19	49	20	14
28/11/2019					6
05/12/2019	19	18	51	18	11
07/01/2020	20	19	50	21	7
06/02/2020	21	20	53	22	4
06/03/2020	20	20	44	19	7
02/04/2020	21	20	47	15	7
07/05/2020	19	21	47	8	8
04/06/2020	19	20	23	4	11
16/07/2020	18	18	25	5	11
04/08/2020	20	20	25	8	11
09/09/2020	41	18	60	11	11
07/10/2020	19	18	54	7	10
05/11/2020	21	20	55	11	9
02/12/2020	19	19	56	25	12
08/01/2021	16	18	48	14	6
01/02/2021	16	18	49	17	3
16/03/2021	18	18	56	17	4
25/05/2021	18	17	47	16	6
26/07/2021	19	21	12	14	23
21/10/2021	23	23	64	14	9
27/01/2022	21	22	58	35	11



Natural Logs of Baseline Data					
Date	P21-19	P22-19	P23-19	P24-19	P25-19
21/02/2019	3.045	3.091	4.094	3.258	2.639
08/05/2019	3.091	3.178	4.060		
27/06/2019	2.996	2.944	3.850	3.367	2.996
29/07/2019	3.091	2.944	3.526	3.584	2.773
27/08/2019	2.996	3.178	3.932	3.555	2.996
25/09/2019	3.045	3.045	4.025	3.497	2.485
30/10/2019	3.045	2.944	3.892	2.996	2.639
28/11/2019					1.792
05/12/2019	2.944	2.890	3.932	2.890	2.398
07/01/2020	2.996	2.944	3.912	3.045	1.946
06/02/2020	3.045	2.996	3.970	3.091	1.386
06/03/2020	2.996	2.996	3.784	2.944	1.946
02/04/2020	3.045	2.996	3.850	2.708	1.946
07/05/2020	2.944	3.045	3.850	2.079	2.079
04/06/2020	2.944	2.996	3.135	1.386	2.398
16/07/2020	2.890	2.890	3.219	1.609	2.398
04/08/2020	2.996	2.996	3.219	2.079	2.398
09/09/2020	3.714	2.890	4.094	2.398	2.398
07/10/2020	2.944	2.890	3.989	1.946	2.303
05/11/2020	3.045	2.996	4.007	2.398	2.197
02/12/2020	2.944	2.944	4.025	3.219	2.485
08/01/2021	2.773	2.890	3.871	2.639	1.792
01/02/2021	2.773	2.890	3.892	2.833	1.099
16/03/2021	2.890	2.890	4.025	2.833	1.386
25/05/2021	2.890	2.833	3.850	2.773	1.792
26/07/2021	2.944	3.045	2.485	2.639	3.135
21/10/2021	3.045	3.135	4.159	2.639	2.197
27/01/2022	3.135	3.091	4.060	3.555	2.398

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	4	-12.5	-50
2	5	-11.5	-57.5
3	7	-10.5	-73.5
4	8	-9.5	-76
5	8	-8.5	-68
6	11	-7.5	-82.5
7	11	-6.5	-71.5
8	14	-5.5	-77
9	14	-4.5	-63
10	14	-3.5	-49
11	15	-2.5	-37.5
12	16	-1.5	-24
13	17	-0.5	-8.5
14	17	0.5	8.5
15	18	1.5	27
16	19	2.5	47.5
17	20	3.5	70
18	21	4.5	94.5
19	22	5.5	121
20	25	6.5	162.5
21	26	7.5	195
22	29	8.5	246.5
23	33	9.5	313.5
24	35	10.5	367.5
25	35	11.5	402.5
26	36	12.5	450

NORMALITY DISTRIBUTION TEST	
n	26
Mean	18.46
Standard Deviation	9.45
T	1768.00
D	0.277
Y	-0.907
Y 1% value	-3.71
Y 99% value	0.83
Y in range? (& therefore Data is Normally	Yes
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	37 mg/l
Percentile	97.725%
$\mu + 3\sigma$	47 mg/l
Percentile	99.865%

LOG-NORMALITY DISTRIBUTION TEST	
n	26
Mean	2.77
Standard Deviation	0.59
T	109.27
D	0.274
Y	-1.453
Y 1% value	-3.71
Y 99% value	0.83
Y in range? (& therefore Data is Log Normally	Yes
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	52 mg/l
Percentile	97.725%
$\mu + 3\sigma$	94 mg/l
Percentile	99.865%

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	1.386	-13	-17.3
2	1.609	-12	-18.5
3	1.946	-11	-20.4
4	2.079	-10	-19.8
5	2.079	-9	-17.7
6	2.398	-8	-18.0
7	2.398	-7	-15.6
8	2.639	-6	-14.5
9	2.639	-5	-11.9
10	2.639	-4	-9.2
11	2.708	-3	-6.8
12	2.773	-2	-4.2
13	2.833	-1	-1.4
14	2.833	1	1.4
15	2.890	2	4.3
16	2.944	3	7.4
17	2.996	4	10.5
18	3.045	5	13.7
19	3.091	6	17.0
20	3.219	7	20.9
21	3.258	8	24.4
22	3.367	9	28.6
23	3.497	10	33.2
24	3.555	11	37.3
25	3.555	12	40.9
26	3.584	13	44.8

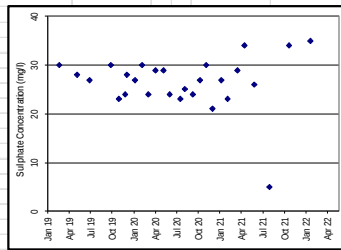
D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Sulphate SW2 (location WC1)

All samples included

Statistical test demonstrates conformance with both Normal and Log-Normal Tests, with omission of 1 outlier.

Baseline Data (mg/l)				
Date	SW1	SW2	SW3	SW4
21/02/2019		30		
08/05/2019		28		
28/06/2019		27		
26/09/2019		30		
31/10/2019		23		
28/11/2019		24		
05/12/2019		28		
07/01/2020		27		
06/02/2020		30		
06/03/2020		24		
02/04/2020		29		
07/05/2020		29		
04/06/2020		24		
16/07/2020		23		
04/08/2020		25		
09/09/2020		24		
07/10/2020		27		
05/11/2020		30		
02/12/2020		21		
08/01/2021		27		
01/02/2021		23		
16/03/2021		29		
15/04/2021		34		
25/05/2021		26		
30/07/2021		5		
21/10/2021		34		
21/01/2022		35		



Natural Logs of Baseline Data				
Date	SW1	SW2	SW3	SW4
21/02/2019		3.401		
08/05/2019		3.332		
28/06/2019		3.296		
26/09/2019		3.401		
31/10/2019		3.135		
28/11/2019		3.178		
05/12/2019		3.332		
07/01/2020		3.296		
06/02/2020		3.401		
06/03/2020		3.178		
02/04/2020		3.367		
07/05/2020		3.367		
04/06/2020		3.178		
16/07/2020		3.135		
04/08/2020		3.219		
09/09/2020		3.178		
07/10/2020		3.296		
05/11/2020		3.401		
02/12/2020		3.045		
08/01/2021		3.296		
01/02/2021		3.135		
16/03/2021		3.367		
15/04/2021		3.526		
25/05/2021		3.258		
30/07/2021		1.609		
21/10/2021		3.526		
21/01/2022		3.555		

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	$x-(n+1)/2$ [B]	Product of A & B
1	21	-12.5	-262.5
2	23	-11.5	-264.5
3	23	-10.5	-241.5
4	23	-9.5	-218.5
5	24	-8.5	-204
6	24	-7.5	-180
7	24	-6.5	-156
8	24	-5.5	-132
9	25	-4.5	-112.5
10	26	-3.5	-91
11	27	-2.5	-67.5
12	27	-1.5	-40.5
13	27	-0.5	-13.5
14	27	0.5	13.5
15	28	1.5	42
16	28	2.5	70
17	28	3.5	101.5
18	29	4.5	130.5
19	29	5.5	159.5
20	30	6.5	195
21	30	7.5	225
22	30	8.5	255
23	30	9.5	285
24	34	10.5	357
25	34	11.5	391
26	35	12.5	437.5

NORMALITY DISTRIBUTION TEST	
n	26
Mean	27.35
Standard Deviation	3.65
T	678.50
D	0.275
Y	-1.267
Y 1% value	-3.71
Y 99% value	0.83
Y in range? (if therefore Data is Normally	Yes
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	35 mg/l
Percentile	97.725%
$\mu + 3\sigma$	38 mg/l
Percentile	99.865%

LOG-NORMALITY DISTRIBUTION TEST	
n	26
Mean	3.30
Standard Deviation	0.13
T	24.77
D	0.277
Y	-0.939
Y 1% value	-3.71
Y 99% value	0.83
Y in range? (if therefore Data is Log Normally	Yes
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	35 mg/l
Percentile	97.725%
$\mu + 3\sigma$	40 mg/l
Percentile	99.865%

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	$x-(n+1)/2$ [B]	Product of A & B
1	3.045	-13	-38.1
2	3.135	-12	-36.1
3	3.135	-11	-32.9
4	3.135	-10	-29.8
5	3.178	-9	-27.0
6	3.178	-8	-23.8
7	3.178	-7	-20.7
8	3.178	-6	-17.5
9	3.219	-5	-14.5
10	3.258	-4	-11.4
11	3.296	-3	-8.2
12	3.296	-2	-4.9
13	3.296	-1	-1.6
14	3.296	1	1.6
15	3.332	2	5.0
16	3.332	3	8.3
17	3.367	4	11.8
18	3.367	5	15.2
19	3.367	6	18.5
20	3.401	7	22.1
21	3.401	8	25.5
22	3.401	9	28.9
23	3.401	10	32.3
24	3.526	11	37.0
25	3.526	12	40.6
26	3.555	13	44.4

Outlier test (as detailed in Annex A of "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final technical report P1-471, 2002.

Full dataset			
Mean	26.518519	Std Dev	5.597873

Standardised data	Number	Reordered data
0.622	1	-3.844
0.265	2	-0.986
0.086	3	-0.629
0.622	4	-0.629
-0.629	5	-0.629
-0.450	6	-0.450
0.265	7	-0.450
0.086	8	-0.450
0.622	9	-0.450
-0.450	10	-0.271
0.443	11	-0.093
0.443	12	0.086
-0.450	13	0.086
-0.629	14	0.09
-0.271	15	0.09
-0.450	16	0.26
0.086	17	0.26
0.622	18	0.44
-0.986	19	0.44
0.086	20	0.44
-0.629	21	0.62
0.443	22	0.62
1.336	23	0.62
-0.093	24	0.62
-3.844	25	1.34
1.336	26	1.34
1.515	27	1.52

Data point identified as outlier (L-Normal datasets): >Critical Value for Normal distribution (probability less than 1 in 100)

Full dataset			
Mean	3.237	Std Dev	0.350336956

Standardised data	Number	Reordered data
0.467	1	-4.647
0.270	2	-0.551
0.167	3	-0.291
0.467	4	-0.291
-0.291	5	-0.291
-0.170	6	-0.170
0.270	7	-0.170
0.167	8	-0.170
0.467	9	-0.170
-0.170	10	-0.053
0.371	11	0.059
0.371	12	0.167
-0.170	13	0.167
-0.291	14	0.17
-0.053	15	0.17
-0.170	16	0.27
0.167	17	0.27
0.467	18	0.37
-0.551	19	0.37
0.167	20	0.37
-0.291	21	0.47
0.371	22	0.47
0.825	23	0.47
0.059	24	0.47
-4.647	25	0.82
0.825	26	0.82
0.907	27	0.91

Zinc

D'Agostino's Test for Normal / Log-Normal Distribution

From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

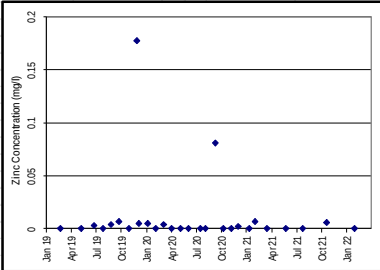
Zinc

P1-18

Concentrations <LOD excluded

Statistical test does not demonstrate conformance with Normal or Log-Normal Test.

Baseline Data (mg/l)	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	<0.002	<0.002	<0.002	<0.002	<0.002
08/05/2019	<0.002	<0.002	<0.002		
27/06/2019	0.003	<0.002		<0.002	<0.002
29/07/2019	<0.002	<0.002	<0.002	<0.002	0.003
27/08/2019	0.004	0.119	0.182	0.184	0.168
25/09/2019	0.007	0.003	0.009	0.005	0.007
30/10/2019	<0.002	0.002	0.003	<0.002	<0.002
28/11/2019	0.177	0.01	0.006	<0.002	0.003
05/12/2019	0.005	0.005	0.007	0.005	0.006
07/01/2020	0.005	0.039	0.004	0.006	0.017
06/02/2020	<0.002	0.003	<0.002	0.003	0.005
06/03/2020	0.004	0.006	0.002	0.005	0.008
02/04/2020	<0.002	0.028	<0.002	<0.002	<0.002
07/05/2020	<0.002	0.003	0.004	<0.002	<0.002
04/06/2020	<0.002	0.003	<0.002	<0.002	<0.002
16/07/2020	<0.002	<0.002	<0.002	<0.002	<0.002
04/08/2020	<0.002	<0.002	<0.002	<0.002	<0.002
09/09/2020	0.081	<0.002	<0.002	<0.002	<0.002
07/10/2020	<0.002	<0.002	<0.002	<0.002	<0.002
05/11/2020	<0.002	<0.002	<0.002	<0.002	<0.002
02/12/2020	0.002	0.004	0.103	<0.002	<0.002
08/01/2021	<0.002	0.003	<0.002	<0.002	<0.002
01/02/2021	0.007	<0.002	0.003	0.005	<0.002
16/03/2021	<0.002	<0.002	<0.002	<0.002	<0.002
25/05/2021	<0.002	<0.002	<0.002	<0.002	<0.002
26/07/2021	<0.002	<0.002	0.002	<0.002	<0.002
21/10/2021	0.006	0.003	0.006	0.006	0.006
27/01/2022	<0.002	0.004	<0.002	0.002	<0.002



Natural Logs of Baseline Data	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019					
08/05/2019					
27/06/2019	-5.809				
29/07/2019					-5.809
27/08/2019	-5.521	-2.129	-1.704	-1.693	-1.784
25/09/2019	-4.962	-5.809	-4.711	-5.298	-4.962
30/10/2019		-6.215	-5.809		
28/11/2019	-1.732	-4.605	-5.116		-5.809
05/12/2019	-5.298	-5.298	-4.962	-5.298	-5.116
07/01/2020	-5.298	-3.244	-5.521	-5.116	-4.075
06/02/2020		-5.809		-5.809	-5.298
06/03/2020	-5.521	-5.116	-6.215	-5.298	-4.828
02/04/2020		-3.576			
07/05/2020		-5.809	-5.521		
04/06/2020		-5.809			
16/07/2020					
04/08/2020					
09/09/2020	-2.513				
07/10/2020					
05/11/2020					
02/12/2020	-6.215	-5.521	-2.273		
08/01/2021		-5.809	#VALUE!		
01/02/2021	-4.962		-5.809	-5.298	
16/03/2021					
25/05/2021					
26/07/2021			-6.215		
21/10/2021	-5.116	-5.809	-5.116	-5.116	-5.116
27/01/2022		-5.521		-6.215	

D'Agostino's Test for Normal Distribution

Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	0.002	-4.5	-0.009
2	0.003	-3.5	-0.0105
3	0.004	-2.5	-0.01
4	0.004	-1.5	-0.006
5	0.005	-0.5	-0.0025
6	0.005	0.5	0.0025
7	0.006	1.5	0.009
8	0.007	2.5	0.0175
9	0.007	3.5	0.0245
10	0.081	4.5	0.3645

NORMALITY DISTRIBUTION TEST

n	10
Mean	0.01
Standard Deviation	0.02
T	0.38
D	0.157
Y	-13.160
Y 1% value	-4.11
Y 99% value	0.36
Y in range? (& therefore Data is Normally	No
Parameter level and percentile (assuming normal distribution)	
μ + 2σ Percentile	N/A mg/l
μ + 3σ Percentile	N/A mg/l

LOG-NORMALITY DISTRIBUTION TEST

n	10
Mean	-5.12
Standard Deviation	0.99
T	21.63
D	0.217
Y	-6.817
Y 1% value	-4.11
Y 99% value	0.36
Y in range? (& therefore Data is Log Normally	No
Parameter level and percentile (assuming log-normal distribution)	
μ + 2σ Percentile	N/A mg/l
μ + 3σ Percentile	N/A mg/l

D'Agostino's Test for Log-Normal Distribution

Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	-6.215	-5	28.0
2	-5.809	-4	20.3
3	-5.521	-3	13.8
4	-5.521	-2	8.3
5	-5.298	-1	2.6
6	-5.298	1	-2.6
7	-5.116	2	-7.7
8	-4.962	3	-12.4
9	-4.962	4	-17.4
10	-2.513	5	-11.3

Outlier test (as detailed in Annex A of "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final technical report P1-471, 2002.

Reduced dataset - two highest values

Mean	0.0273636	Std Dev	0.0546649
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Reduced dataset - removing first three values

Mean	-4.813	Std Dev	1.39109322
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Standardised data	Number	Reordered data
-0.446	1	-0.464
-0.427	2	-0.446
-0.373	3	-0.427
2.737	4	-0.427
-0.409	5	-0.409
-0.409	6	-0.409
-0.427	7	-0.391
0.981	8	-0.373
-0.464	9	-0.373
-0.373	10	0.981
-0.391	11	2.737

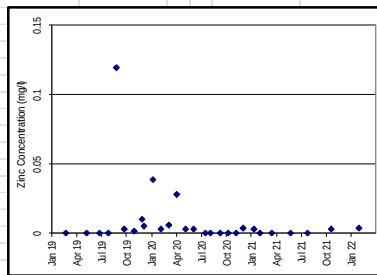
This data point identified as outlier (Normal dataset): >Critical Value for Normal distribution (probability less than 1 in 100)

Standardised data	Number	Reordered data
-0.716	1	-1.007
-0.509	2	-0.716
-0.107	3	-0.509
2.215	4	-0.509
-0.349	5	-0.349
-0.349	6	-0.349
-0.509	7	-0.217
1.653	8	-0.107
-1.007	9	-0.107
-0.107	10	1.653
-0.217	11	2.215

D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Zinc P2-18
Concentrations <LOD excluded
Statistical test does not demonstrate conformance with Normal or Log-Normal Test.

Baseline Data (mg/l)	P1-18	P2-18	P3-18	P4-18	P5-18
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	<0.002	<0.002	<0.002	<0.002	<0.002
08/05/2019	<0.002	<0.002	<0.002	<0.002	<0.002
27/06/2019	0.003	<0.002	<0.002	<0.002	<0.002
29/07/2019	<0.002	<0.002	<0.002	<0.002	0.003
27/08/2019	0.004	0.119	0.182	0.184	0.168
25/09/2019	0.007	0.003	0.009	0.005	0.007
30/10/2019	<0.002	0.002	0.003	<0.002	<0.002
28/11/2019	0.177	0.01	0.006	<0.002	0.003
05/12/2019	0.005	0.005	0.007	0.005	0.006
07/01/2020	0.005	0.039	0.004	0.006	0.017
06/02/2020	<0.002	0.003	<0.002	0.003	0.005
06/03/2020	0.004	0.006	0.002	0.005	0.008
02/04/2020	<0.002	0.028	<0.002	<0.002	<0.002
07/05/2020	<0.002	0.003	0.004	<0.002	<0.002
04/06/2020	<0.002	0.003	<0.002	<0.002	<0.002
16/07/2020	<0.002	<0.002	<0.002	<0.002	<0.002
04/08/2020	<0.002	<0.002	<0.002	<0.002	<0.002
09/09/2020	0.081	<0.002	<0.002	<0.002	<0.002
07/10/2020	<0.002	<0.002	<0.002	<0.002	<0.002
05/11/2020	<0.002	<0.002	<0.002	<0.002	<0.002
02/12/2020	0.002	0.004	0.103	<0.002	<0.002
08/01/2021	<0.002	0.003	<0.002	<0.002	<0.002
01/02/2021	0.007	<0.002	0.003	0.005	<0.002
16/03/2021	<0.002	<0.002	<0.002	<0.002	<0.002
25/05/2021	<0.002	<0.002	<0.002	<0.002	<0.002
26/07/2021	<0.002	<0.002	0.002	<0.002	<0.002
21/10/2021	0.006	0.003	0.006	0.006	0.006
27/01/2022	<0.002	0.004	<0.002	0.002	<0.002



Natural Logs of Baseline Data	P1-18	P2-18	P3-18	P4-18	P5-18
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019					
08/05/2019					
27/06/2019	-5.809				
29/07/2019					-5.809
27/08/2019	-5.521	-2.129	-1.704	-1.693	-1.784
25/09/2019	-4.962	-5.809	-4.711	-5.298	-4.962
30/10/2019		-6.215	-5.809		
28/11/2019	-1.732	-4.605	-5.116		-5.809
05/12/2019	-5.298	-5.298	-4.962	-5.298	-5.116
07/01/2020	-5.298	-3.244	-5.521	-5.116	-4.075
06/02/2020		-5.809		-5.809	-5.298
06/03/2020	-5.521	-5.116	-6.215	-5.298	-4.828
02/04/2020		-3.576			
07/05/2020		-5.809	-5.521		
04/06/2020		-5.809			
16/07/2020					
04/08/2020					
09/09/2020	-2.513				
07/10/2020					
05/11/2020					
02/12/2020	-6.215	-5.521	-2.273		
08/01/2021		-5.809	#VALUE!		
01/02/2021	-4.962		-5.809	-5.298	
16/03/2021					
25/05/2021					
26/07/2021			-6.215		
21/10/2021	-5.116	-5.809	-5.116	-5.116	-5.116
27/01/2022		-5.521		-6.215	

D'Agostino's Test for Normal Distribution	Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	0.002	-6.5	-0.013	
2	0.003	-5.5	-0.0165	
3	0.003	-4.5	-0.0135	
4	0.003	-3.5	-0.0105	
5	0.003	-2.5	-0.0075	
6	0.003	-1.5	-0.0045	
7	0.003	-0.5	-0.0015	
8	0.004	0.5	0.002	
9	0.004	1.5	0.006	
10	0.005	2.5	0.0125	
11	0.006	3.5	0.021	
12	0.01	4.5	0.045	
13	0.028	5.5	0.154	
14	0.039	6.5	0.2535	

NORMALITY DISTRIBUTION TEST	n	Mean	Standard Deviation	T	D	Y	Y 1% value	Y 99% value	Y in range? (and therefore Data is Normally)	Parameter level and percentile (assuming normal distribution)	μ + 2σ	Percentile	μ + 3σ	Percentile
	14	0.01	0.01	0.43	0.197	-10.656	-3.97	0.52	No	N/A	N/A	N/A	N/A	N/A

LOG-NORMALITY DISTRIBUTION TEST	n	Mean	Standard Deviation	T	D	Y	Y 1% value	Y 99% value	Y in range? (and therefore Data is Log Normally)	Parameter level and percentile (assuming log-normal distribution)	μ + 2σ	Percentile	μ + 3σ	Percentile
	14	-5.28	0.89	41.29	0.238	-5.528	-3.97	0.52	No	N/A	N/A	N/A	N/A	N/A

D'Agostino's Test for Log-Normal Distribution	Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	-6.215	-7	40.4	
2	-5.809	-6	32.0	
3	-5.809	-5	26.1	
4	-5.809	-4	20.3	
5	-5.809	-3	14.5	
6	-5.809	-2	8.7	
7	-5.809	-1	2.9	
8	-5.521	1	-2.8	
9	-5.521	2	-8.3	
10	-5.298	3	-13.2	
11	-5.116	4	-17.9	
12	-4.605	5	-20.7	
13	-3.576	6	-19.7	
14	-3.244	7	-21.1	

Outlier test (as detailed in Annex A of "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final technical report P1-471, 2002.
Reduced dataset - two highest values

Mean	0.0156667	Std Dev	0.0305139
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Standardised data	Number	Reordered data
3.386	1	-0.448
-0.415	2	-0.415
-0.448	3	-0.415
-0.186	4	-0.415
-0.350	5	-0.415
0.765	6	-0.415
-0.415	7	-0.415
-0.317	8	-0.382
0.404	9	-0.382
-0.415	10	-0.350
-0.415	11	-0.317
-0.382	12	-0.186
-0.415	13	0.404
-0.415	14	0.76
-0.382	15	3.39

This data point identified as outlier (Normal dataset): >Critical Value for Normal distribution (probability less than 1 in 100)

Reduced dataset - removing first three values

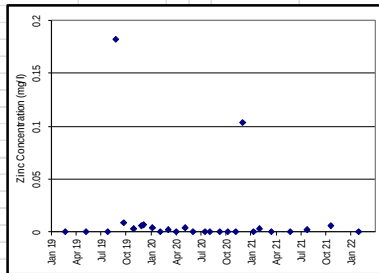
Mean	-5.072	Std Dev	1.179727582
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Standardised data	Number	Reordered data
2.495	1	-0.969
-0.625	2	-0.625
-0.969	3	-0.625
0.396	4	-0.625
-0.192	5	-0.625
1.549	6	-0.625
-0.625	7	-0.625
-0.037	8	-0.381
1.268	9	-0.381
-0.625	10	-0.192
-0.625	11	-0.037
-0.381	12	0.396
-0.625	13	1.268
-0.625	14	1.55
-0.381	15	2.49

D'Agostino's Test for Normal / Log-Normal Distribution
From: "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final Technical Report P1-471, 2002.

Zinc P3-18
Concentrations <LOD excluded
Statistical test does not demonstrate conformance with Normal or Log-Normal Test.

Baseline Data (mg/l)					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019	<0.002	<0.002	<0.002	<0.002	<0.002
08/05/2019	<0.002	<0.002	<0.002	<0.002	<0.002
27/06/2019	0.003	<0.002	<0.002	<0.002	<0.002
29/07/2019	<0.002	<0.002	<0.002	<0.002	0.003
27/08/2019	0.004	0.119	0.182	0.184	0.168
25/09/2019	0.007	0.003	0.009	0.005	0.007
30/10/2019	<0.002	0.002	0.003	<0.002	<0.002
28/11/2019	0.177	0.01	0.006	<0.002	0.003
05/12/2019	0.005	0.005	0.007	0.005	0.006
07/01/2020	0.005	0.039	0.004	0.006	0.017
06/02/2020	<0.002	0.003	<0.002	0.003	0.005
06/03/2020	0.004	0.006	0.002	0.005	0.008
02/04/2020	<0.002	0.028	<0.002	<0.002	<0.002
07/05/2020	<0.002	0.003	0.004	<0.002	<0.002
04/06/2020	<0.002	0.003	<0.002	<0.002	<0.002
16/07/2020	<0.002	<0.002	<0.002	<0.002	<0.002
04/08/2020	<0.002	<0.002	<0.002	<0.002	<0.002
09/09/2020	0.081	<0.002	<0.002	<0.002	<0.002
07/10/2020	<0.002	<0.002	<0.002	<0.002	<0.002
05/11/2020	<0.002	<0.002	<0.002	<0.002	<0.002
02/12/2020	0.002	0.004	0.103	<0.002	<0.002
08/01/2021	<0.002	0.003	<0.002	<0.002	<0.002
01/02/2021	0.007	<0.002	0.003	0.005	<0.002
16/03/2021	<0.002	<0.002	<0.002	<0.002	<0.002
25/05/2021	<0.002	<0.002	<0.002	<0.002	<0.002
26/07/2021	<0.002	<0.002	0.002	<0.002	<0.002
21/10/2021	0.006	0.003	0.006	0.006	0.006
27/01/2022	<0.002	0.004	<0.002	0.002	<0.002



Natural Logs of Baseline Data					
Date	P1-18	P2-18	P3-18	P4-18	P5-18
21/02/2019					
08/05/2019					
27/06/2019	-5.809				
29/07/2019					-5.809
27/08/2019	-5.521	-2.129	-1.704	-1.693	-1.784
25/09/2019	-4.962	-5.809	-4.711	-5.298	-4.962
30/10/2019		-6.215	-5.809		
28/11/2019	-1.732	-4.605	-5.116		-5.809
05/12/2019	-5.298	-5.298	-4.962	-5.298	-5.116
07/01/2020	-5.298	-3.244	-5.521	-5.116	-4.075
06/02/2020		-5.809		-5.809	-5.298
06/03/2020	-5.521	-5.116	-6.215	-5.298	-4.828
02/04/2020		-3.576			
07/05/2020		-5.809	-5.521		
04/06/2020		-5.809			
16/07/2020					
04/08/2020					
09/09/2020	-2.513				
07/10/2020					
05/11/2020					
02/12/2020	-6.215	-5.521	-2.273		
08/01/2021		-5.809			
01/02/2021	-4.962		-5.809	-5.298	
16/03/2021					
25/05/2021					
26/07/2021			-6.215		
21/10/2021	-5.116	-5.809	-5.116	-5.116	-5.116
27/01/2022		-5.521		-6.215	

D'Agostino's Test for Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	0.002	-5	-0.01
2	0.002	-4	-0.008
3	0.003	-3	-0.009
4	0.003	-2	-0.006
5	0.004	-1	-0.004
6	0.004	0	0
7	0.006	1	0.006
8	0.006	2	0.012
9	0.007	3	0.021
10	0.009	4	0.036
11	0.103	5	0.515

NORMALITY DISTRIBUTION TEST	
n	11
Mean	0.01
Standard Deviation	0.03
T	0.55
D	0.154
Y	-14.209
Y 1% value	-4.07
Y 99% value	0.41
Y in range? (and therefore Data is Normally)	No
Parameter level and percentile (assuming normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

LOG-NORMALITY DISTRIBUTION TEST	
n	11
Mean	-5.21
Standard Deviation	1.09
T	30.06
D	0.228
Y	-5.998
Y 1% value	-4.07
Y 99% value	0.41
Y in range? (and therefore Data is Log Normally)	No
Parameter level and percentile (assuming log-normal distribution)	
$\mu + 2\sigma$	N/A mg/l
Percentile	N/A mg/l
$\mu + 3\sigma$	N/A mg/l
Percentile	N/A mg/l

D'Agostino's Test for Log-Normal Distribution			
Count [x]	Sorted Data [A]	x-(n+1)/2 [B]	Product of A & B
1	-6.215	-5	31.1
2	-6.215	-4	24.9
3	-5.809	-3	17.4
4	-5.809	-2	11.6
5	-5.521	-1	5.5
6	-5.521	0	0.0
7	-5.116	1	-5.1
8	-5.116	2	-10.2
9	-4.962	3	-14.9
10	-4.711	4	-18.8
11	-2.273	5	-11.4

Outlier test (as detailed in Annex A of "Techniques for the Interpretation of Landfill Monitoring Data" (Guidance Notes), EA Final technical report P1-471, 2002.

Reduced dataset - two highest values

Mean	0.0275833	Std Dev	0.056297
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Standardised data	Number	Reordered data
2.743	1	-0.454
-0.330	2	-0.454
-0.437	3	-0.437
-0.383	4	-0.437
-0.366	5	-0.419
-0.419	6	-0.419
-0.454	7	-0.383
-0.419	8	-0.383
1.340	9	-0.366
-0.437	10	-0.330
-0.454	11	1.340
-0.383	12	2.743

This data point identified as outlier (Normal dataset): >Critical Value for Normal distribution (probability less than 1 in 100)

Reduced dataset - removing first three values

Mean	-4.914	Std Dev	1.450062413
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Standardised data	Number	Reordered data
2.214	1	-0.897
0.141	2	-0.897
-0.617	3	-0.617
-0.139	4	-0.617
-0.033	5	-0.419
-0.419	6	-0.419
-0.897	7	-0.139
-0.419	8	-0.139
1.821	9	-0.033
-0.617	10	0.141
-0.897	11	1.821
-0.139	12	2.214

