Buckton Vale Quarry Access Road

Hydrogeological Risk Assessment

Churchill Enviro Ltd

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Contents

1 Introduction

1.1 Background

This Hydrogeological Risk Assessment (HRA) for the Buckton Vale Site has been prepared by ByrneLooby Partners (UK) Ltd (BLP) on behalf of Churchill Enviro Limited. This document supports a permit application for a waste recovery activity to construct an access road within the quarry.

As part of the preparation of this report, the following documents and data sources have been consulted in the preparation of this review including:

- Ordnance Survey mapping.
- British Geological Survey Sheet 86 Glossop Scale 1:50 000. Bedrock and Superficial edition. Published 2008.
- Minchin, D.J et al 2006. Mineral Recourses for National, Regional and local Planning: Greater Manchester, BGS Report CR/05/182N
- Abesser, Shand and Ingram, 2005. Baseline Report Series, 18, The Millstone Grit of Northern England, CR/05/015N)
- British Geological Survey web site: http://mapapps.bgs.ac.uk/geologyofbritain/home.html
- Tameside Metropolitan Council (TMC) – Abstraction and Springs search
- Environment Agency. Environmental Permitting Regulations: Inert Waste Guidance. Standards and Measures for the Deposit of Inert Waste on Land.

1.2 Site Location and History

The site is situated at Carrbrook, approximately 4km northeast of Stalybridge, Tameside. The site is located at National Grid Reference (NGR) SD99237 01457. Access to the site is from Castle Lane. A site location plan, showing the proposed permitted boundary is provided as Drawing Ref: 4859/1/004, the site is also depicted in Figure 1.1.

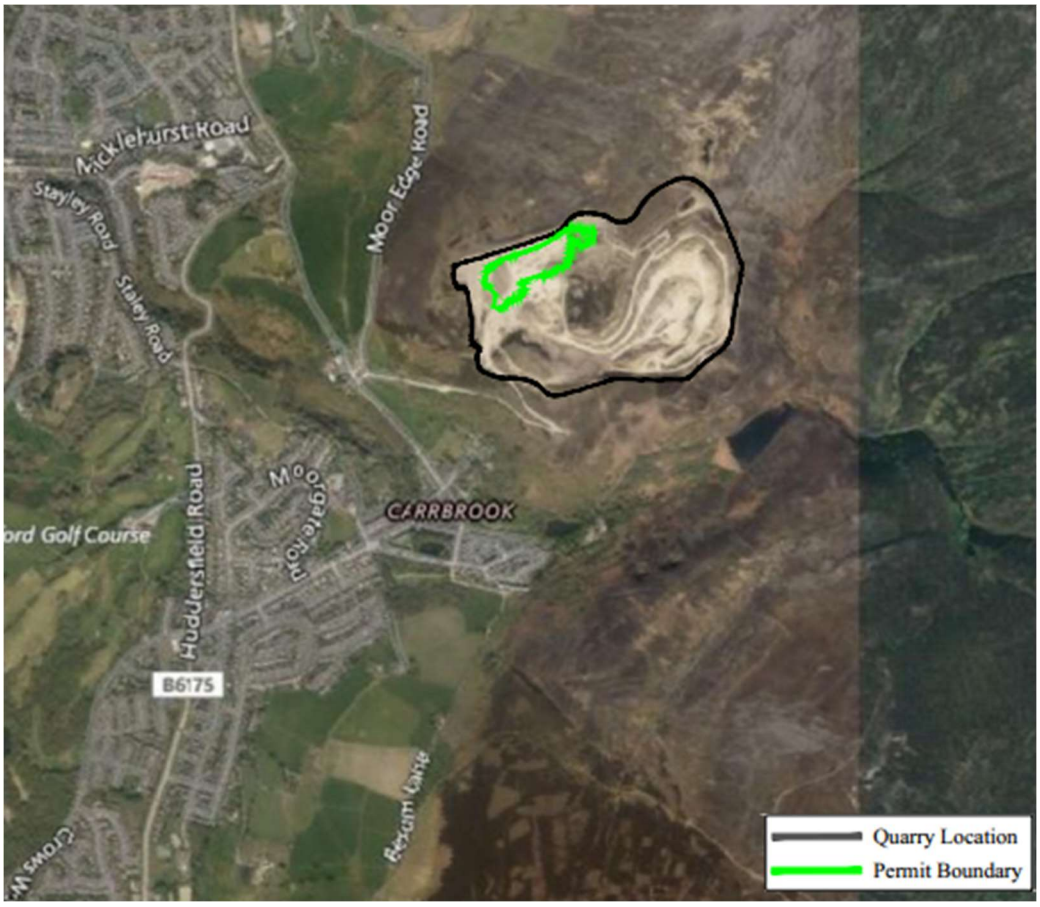
1.3 Report and Risk Assessment Objectives

This report has been prepared to assess the potential effects from the proposed development. Environment Agency guidance states[1] "We would normally expect you to provide a qualitative assessment of the risk from the deposit of inert waste to land. You should develop a table, such as

[1] Environment Agency. Environmental Permitting Regulations: Inert Waste Guidance. Standards and Measures for the Deposit of Inert Waste on Land

that in part 1 of our H1 guidance, with supporting information in the form of plans and cross sections to provide a detailed understanding of the site's setting and sensitivity (see the section on understanding the site above). The adequacy of the risk management measures (waste acceptance procedures) are an essential part of the risk assessment process"

Figure 1.1 – Site Location



As a result of the understanding of the site, and local sensitivity we provide within this document a quantitative assessment of risk. This review has given regard to content of the Environment Agency's HRA template[2].

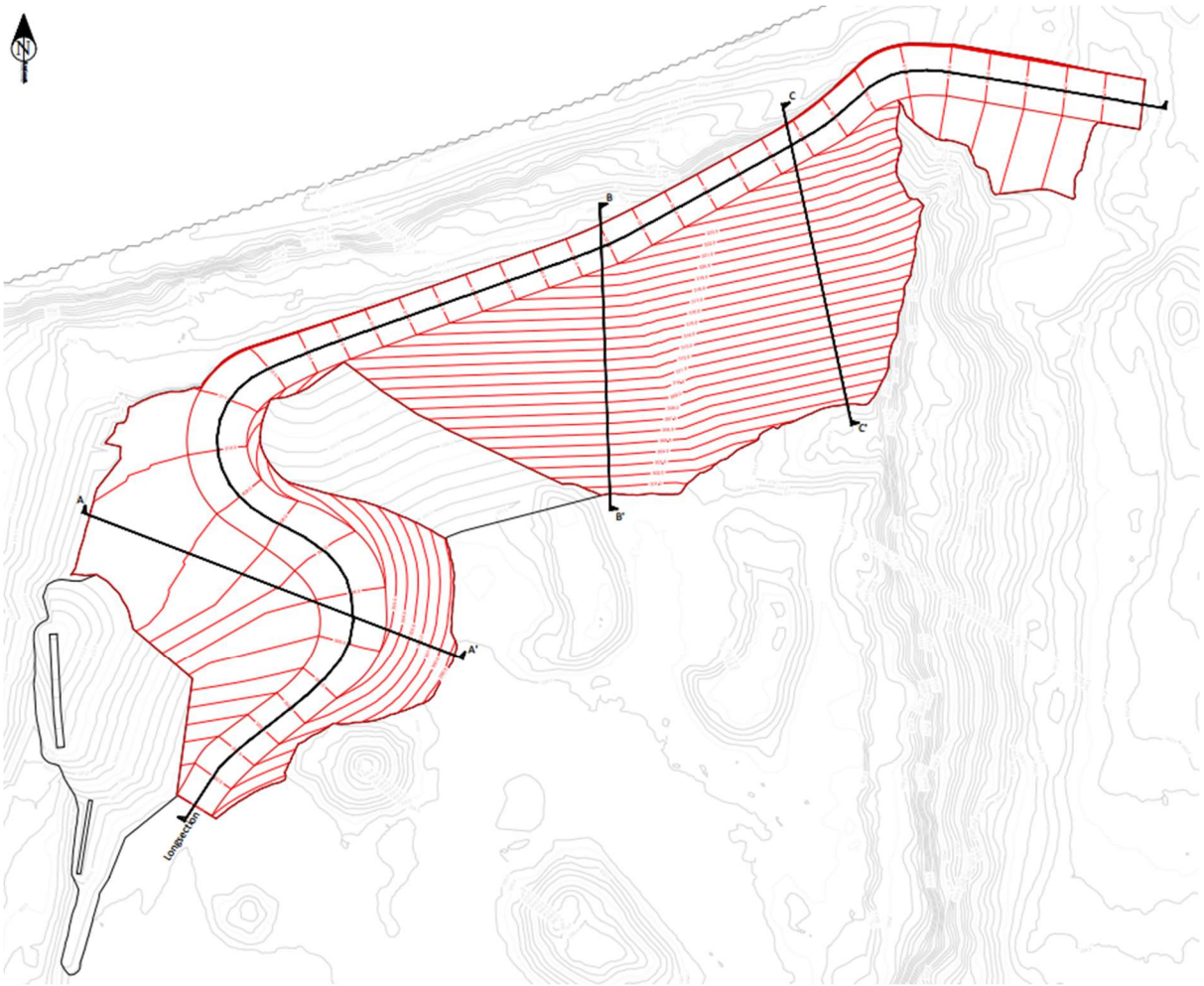
[2] Landfill operators: environmental permits - What to include in your hydrogeological risk assessment - Guidance - GOV.UK (www.gov.uk)

2 Source Term

2.1 Site Engineering

The location of the modelled site is illustrated in Figure 2.1. It is estimated that to achieve the required construction levels of the access road (with an outer gradient of 1:3), the importation of approximately 140,158 m^3 of inert materials will be required. The ground elevation currently at the base of the quarry is 300 mAOD. It is understood that a planning restriction does not allow extraction deeper than this level. The base of the fill areas will utilise the existing on site gritstone as the geological barrier.

Figure 2.1 – Buckton Vale Access Road



Although not a requirement for a waste recovery activity, a Reworked Geological Barrier (RGB) is proposed by the site operator, this is in accordance with Environment Agency feedback through Schedule 5 notifications on a similar site with similar environmental constraints. This is hoped to expedite the application process.

The RGB (underlain by in-situ gritstone) will be laid at a thickness of 0.4m, at a hydraulic conductivity of no greater than $1x10^{-7}$m/s and will be installed at the base of the site and in accordance with a Construction Quality Assurance (CQA) plan. A CQA validation report will ensure the design parameters are met prior to deposition of inert waste.

The rationale behind the Landfill Directive requirement of a 1m thick, $1x10^{-7}$ m/s artificial geological barrier for inert landfill sites is to allow the flux of water through the barrier, there is no requirement to manage leachate or collect leachate at such sites however the barrier will allow for attenuation (both in the barrier and underlying substrate).

In simple terms, a barrier of 0.4m thickness with a permeability of $1x10^{-7}$ m/s will allow all water to pass through it. We draw the Environment Agency's attention to hydraulic conductivity data contained within their LandSim manual, Table 5.9. All material with hydraulic conductivities of $1x10^{-7}$ m/s or lower (minimum) are described as "sand – fine", "sand – medium", "sand – coarse" and "gravel". These materials do not readily inhibit the movement of water through them if used as a barrier.

The total depth of waste within the proposed fill area is 16 m at a maximum. The phasing has been designed to utilise existing material and in-situ quarry features where possible to minimise the quantity of material required to construct the road.

2.2 Source Term Derivation

Only inert wastes that conform to the codes listed in the proposed permit will be accepted into the site. By definition, such material should be compliant with Waste Acceptance Criteria (WAC) for inert landfills and, in all probability, of a significantly lower leachable composition than these WAC limits.

3 Pathways

3.1 Geological Succession

The surrounding geological sequence comprises:

Superficial Glacial Till and river alluvium:

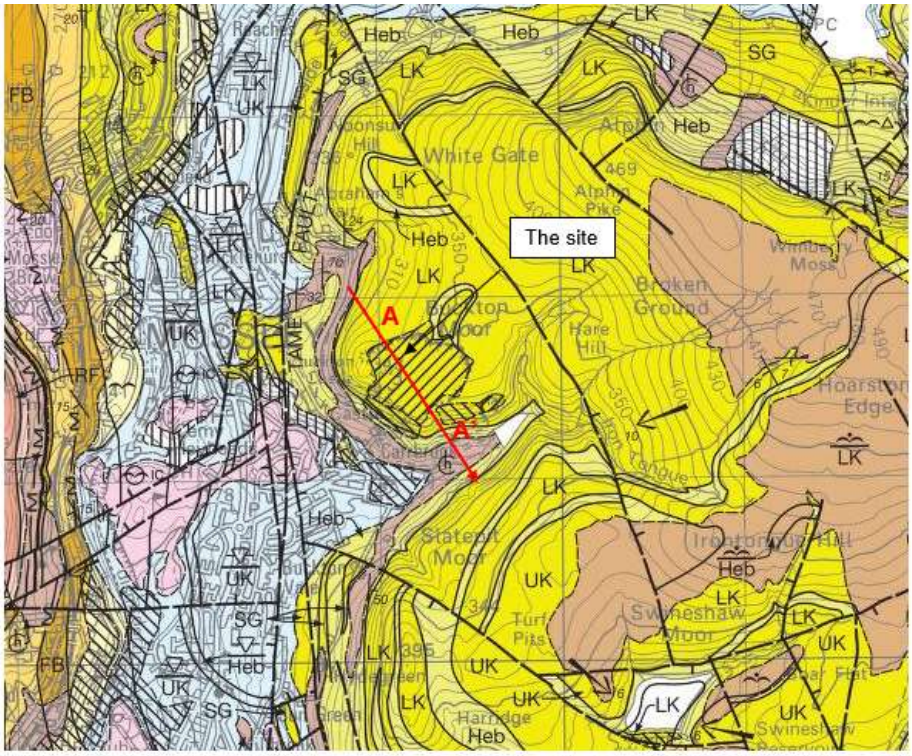
1. Glacial Till
2. Head - Clay, Silt, Sand And Gravel
3. Peat – (only on higher ground to the east)
4. Alluvium - Clay, Silt, Sand And Gravel (only to the west in the course of the River Tame)

The underlying bedrock geological sequence comprises:

Bedrock Strata:

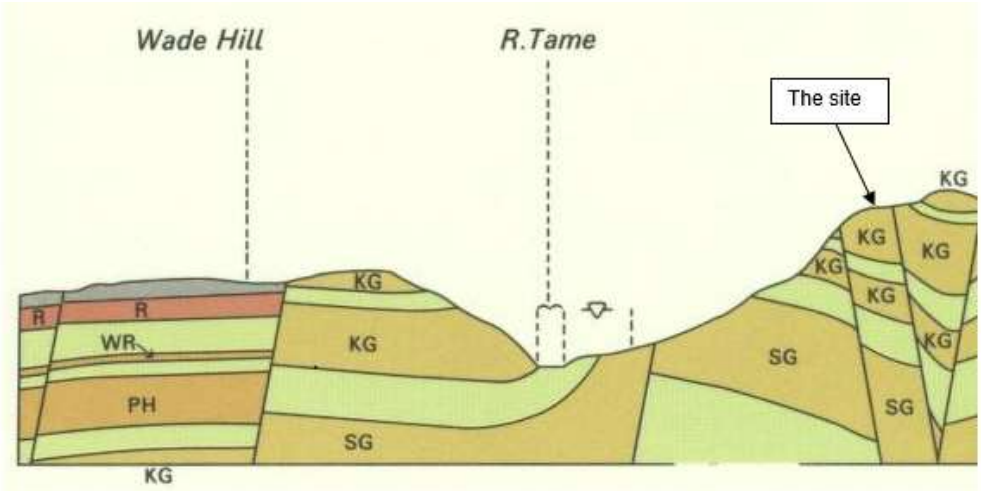
1. The Lower Kinderscout Grit (Gritstone)
2. Hebden Formation (Mudstone, Siltstone and Sandstone).

Figure 3.1 – Local Geology



Extract from British Geological Survey Sheet 86 Glossop Scale 1:50 000. Bedrock and Superficial edition. Published 2008. A-A' Section line at Figure 9.

Figure 3.2 – Geological Cross-Section



Section line W-E, approximately 4 km north of site, site location given for context and projected onto line of section. Section line taken from BGS map 86 (1981 edition) which provides vertical exaggeration for illustrative purposes. KG – Kinderscout Grit, equivalent to LK (Lower Kinderscout Grit) on Figure 3.

3.2 Superficial Geology

The BGS website http://mapapps.bgs.ac.uk/geologyofbritain/home.html indicates that the area around the Buckton Vale Quarry is mapped as generally free of drift deposits.

Glacial till, head and sand and gravel deposits are found in the valley bottoms and on the flatter higher ground to the east there are also accumulations of peat.

3.3 Bedrock Geology

The quarry comprises bedrock strata of the Namurian Stage of the Upper Carboniferous. Operations at the quarry involve the extraction and processing of the Lower Kinderscout Grit which is part of the Millstone Grit Group.

The Lower Kinderscout Grit (thickness of up to 150 m) is interbedded with the Hebden Formation (Mudstone, Siltstone and Sandstone, age of 322 Ma) and underlain by the deeper Shale Grit. According to the BGS geological map, the Lower Kinderscout Grit strata dips generally to the southwest at circa 5-10° however opposing dips may be apparent as a result of localised faulting.

The Kinderscout Grit succession comprises of fresh to highly weathered, grey and yellow coarse grained sandstones with argillaceous partings. Bedding thickness varies significantly within the succession.

The BGS map (Sheet 86) does not record any faults cross-cutting the site, the locally significant Tame Fault has a strike orientation of north-south and is located ~450 m to the west. An unnamed fault with a strike orientation of northwest-southeast is present to the east of the quarry (distance of ~400 m).

3.4 Groundwater

Regionally, to the west and locally, the superficial deposits are classified typically as Secondary aquifers (undifferentiated) Figure 3.3. This is in agreement with the BGS mapping; superficial strata are not a receptor at the site.

The bedrock strata at the site are classified as a Secondary A Aquifer (Figure 3.4), additionally the site is not within a Source Protection Zone (Figure 3.5). The location of the nearest SPZ is circa 7.5 km to the north-west.

Groundwater vulnerability is classified as "minor aquifer Low". The site is not located in Drinking Water Safeguard Zone (Groundwater), Drinking Water Groundwater Safeguard Zones (SgZs) are established around public water supplies where additional pollution control measures are needed.

Recharge to the groundwater system locally is on the higher topography to the north, (White Gate) northeast (Alphin Pike) and east of the site (Hare Hill and Broken Ground). Groundwater flow within the bedrock succession will be essentially controlled by the presence of discontinuities within the rock mass, the primary permeability of the constituent rock types are considered to be relatively low. The quarry is worked "dry" hence any groundwater table is below the base of the site.

Borehole logs are present for review on the BGS website, (BGS borehole ID: 33795, Reference: SD90SE17) providing detail on 10 boreholes drilled in 1981[3]. The boreholes are located adjacent to Castle Lane, circa 400m to the west. Where information is available, groundwater elevations were at ~225 mAOD for boreholes 2, 3 and 4, other boreholes indicate groundwater levels at ~220 mAOD (BH 10) or lower.

The BGS note that the Millstone Grit strata are a "multi-layered" aquifer system where abundant springs are located at the base of sandstone layers and at junctions between shale and sandstone horizons (some of which may be used for public water supply (Abesser, Shand and Ingram, 2005. Baseline Report Series, 18, The Millstone Grit of Northern England, CR/05/015N).

It is also noted by the BGS / EA in the 2005 report that groundwater movement is primarily by fracture flow, (secondary permeability) hence groundwater flow directions are difficult to establish and cannot be inferred by water level data. This is reflected in the data contained within the nearby drilling logs.

[3] http://scans.bgs.ac.uk/sobi_scans/boreholes/33795/images/10048412.html

Figure 3.3 – Superficial Aquifer Status

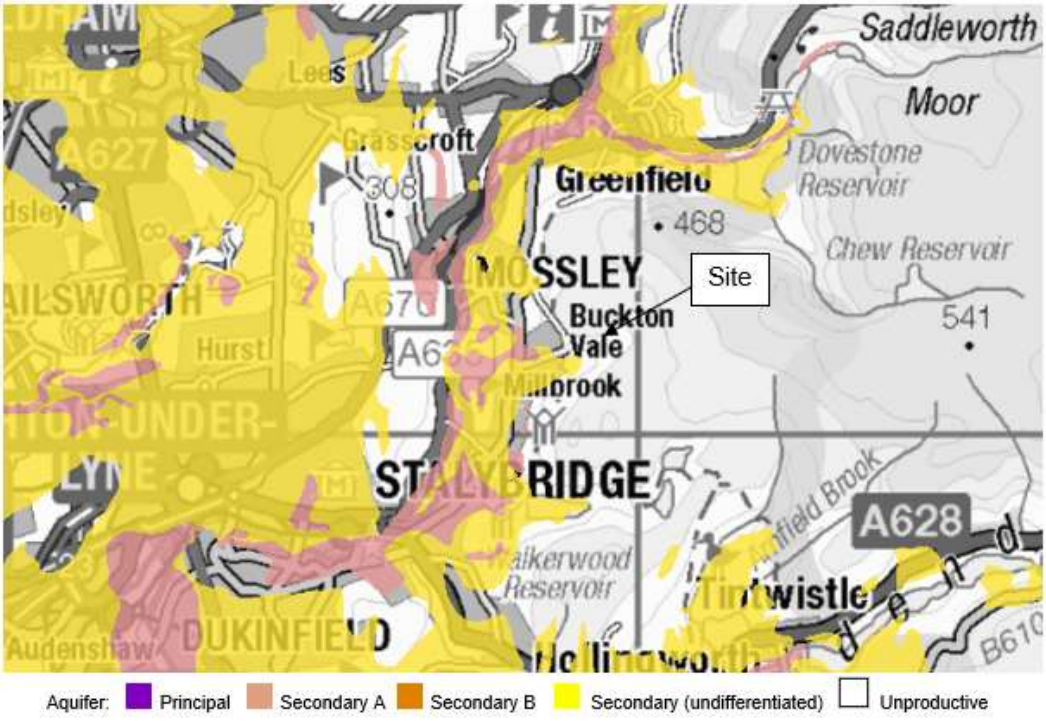
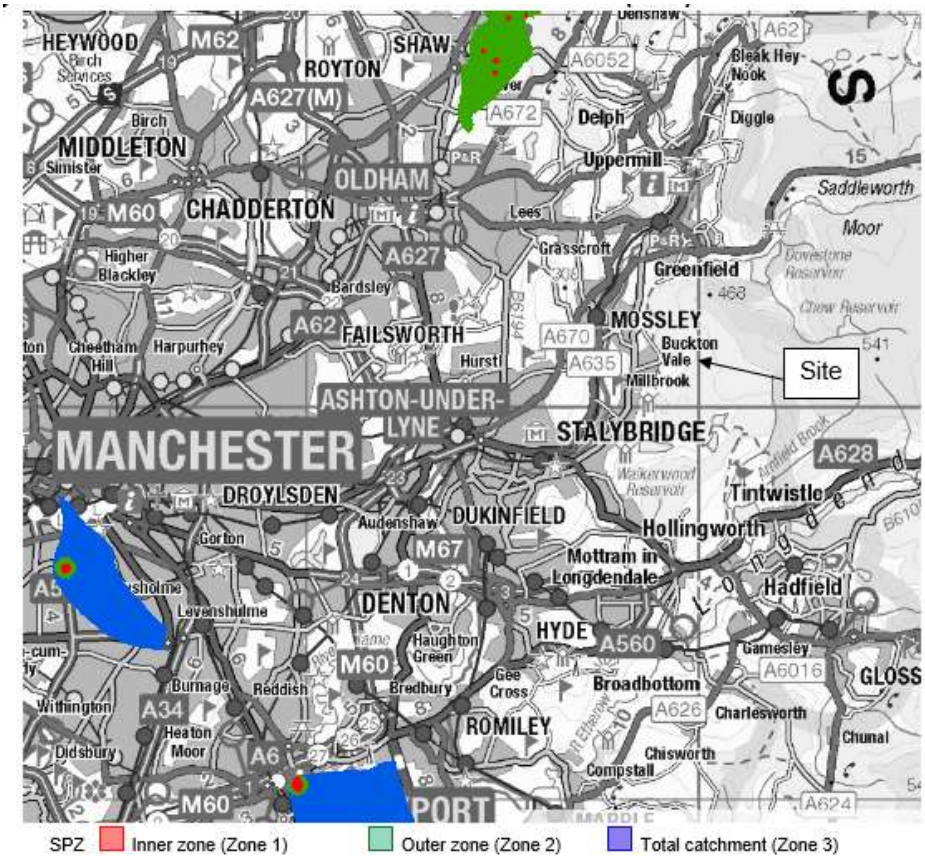


Figure 3.4 – Bedrock Aquifer Status

Figure 3.5 – Groundwater Source Protection Zones (SPZ)



A review of OS mapping indicates that spring lines appear to exit the topography to the northwest (near Greentop House) and south of the quarry (Carr Lane) which appear coincident with the change in geology from Lower Millstone Grit (Sandstone) to Hebden Formation (Mudstone / Siltstone) at elevations of circa 250 mAOD. These spring lines are above the height of the groundwater observed on the 1981 drilling logs but importantly are some 50 m below the base elevation of the quarry floor.

Tameside Metropolitan Council (TMC) has records of historic wells and springs identified on historical mapping (within 1 km of site). However according to TMC information, spring or well fed resources are not used as a private water supply.

A review of local water abstractions, also conducted through contact with Tameside Metropolitan Council indicates the following private water supplies:

- Buckton Grange
- Castle Farm
- Intake Cottage
- Shire Clough Farm

- Howards Farm

The TMC supplied information is provided at Appendix A in the Environmental Setting and Site Design (ESSD) report referenced K4859-ENV-R004-00 and details regarding potential receptors are discussed within section 4.5. Groundwater quality information is limited in detail and is only provided for a restricted suite of determinands.

3 groundwater boreholes have been installed at site in addition to the appropriate springs are monitored to establish baseline chemistry through a collection of samples to fulfil requirements of baseline data sets for low risk sites (as per LFTGN02[4]).

Through a site visit, desk study and discussion with residents it has been established that only Castle Farm and Intake Cottage spring supplies are possible receptors. Carr Brook Reservoir and Carr Brook at Cowbury Dale are discounted as receptors based on the inert nature of the proposed recovery activity.

3.5 Groundwater Hydraulic Direction

As the site sits within an elevated area on the periphery of the South Pennine Moors, where the lithological units dip to the southwest, it is conceptualised that the groundwater approaches from the north / northeast consistent with topography. Any standing water / surface water run-off also infiltrates to join the groundwater below the base of the quarry (in the local vicinity to the quarry) and exits to the northwest and southwest as discrete spring lines.

3 groundwater monitoring boreholes have been installed to record both level and quality of groundwater at the site. Initial data indicates an unsaturated zone of at least 10m based on an assumed maximum groundwater level beneath the site of 290 mAOD. Groundwater boreholes were positioned based on operational and topographical constraints.

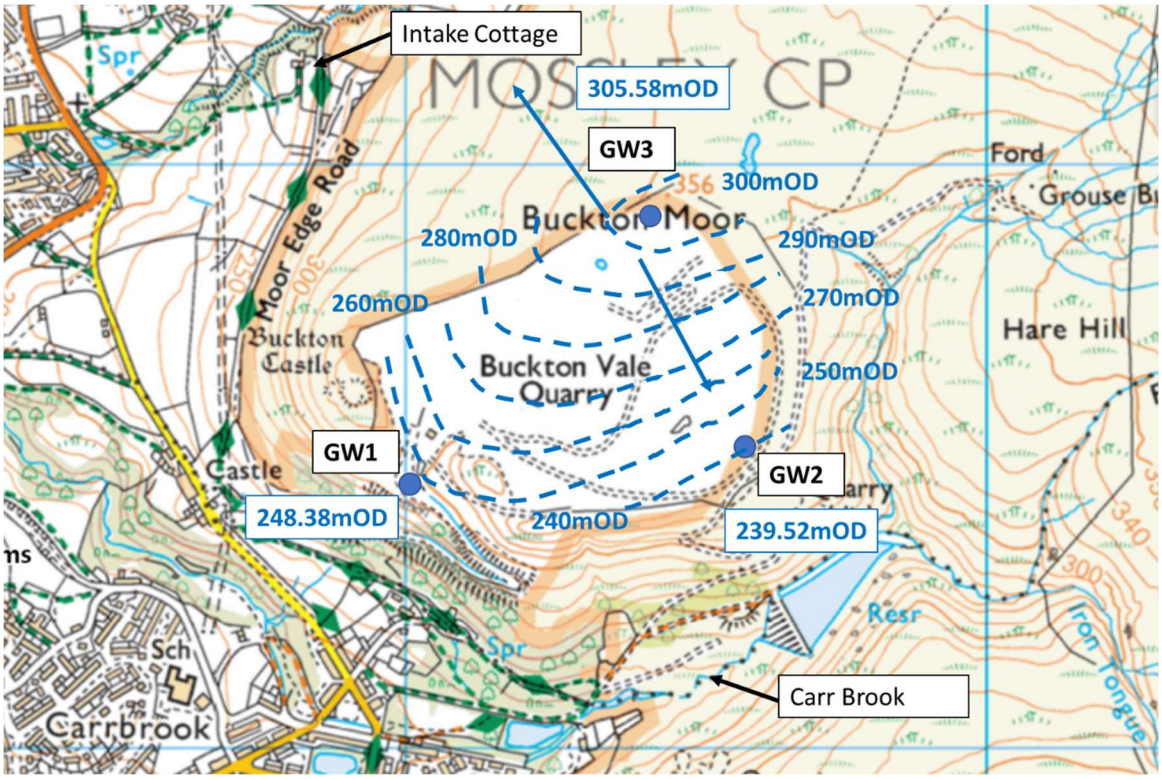
The groundwater quality within the gritstone can be collected however the monitoring of the groundwater at its discharge point is key, as this is where there is a direct link to the nearby receptors of Castle Farm and Intake Cottage. It is noted that both receptors take their water from the same spring line feed near to Intake Cottage.

The borehole data indicates the presence of a groundwater divide; a hydraulic gradient is established from the vicinity of BH3 towards the spring exit line near Intake Cottage to the north-west (see Figure 3.6).

The majority of the groundwater flow underneath the proposed site is towards the south-east and Carr Brook, and also towards an area of previous landfilling (see Figure 1.1 of ESSD report). BH3 is upgradient, BH1 and 2 are downgradient.

[4] Monitoring of landfill leachate, groundwater and surface water: LFTGN 02 - GOV.UK (www.gov.uk)

Figure 3.6 – Groundwater Level (mAOD) February2022 and Flow Direction



3.6 Surface Water

There are no surface watercourses that cross the area of the quarry. On site, surface water collects and ponds within the central part of the eastern quarry and an area towards the access to the quarry (from rainfall). From here, infiltration may continue to form part of the contributing supply to the groundwater system.

4 Conceptual Site Model

A simple conceptual model can be constructed for the site, based on the relationship

Source --> Pathway --> Receptor

A schematic site conceptual model is shown in Figure 4.1.

The conceptual model has been updated to reflect the proposed road (Figure 2.1) whereby the

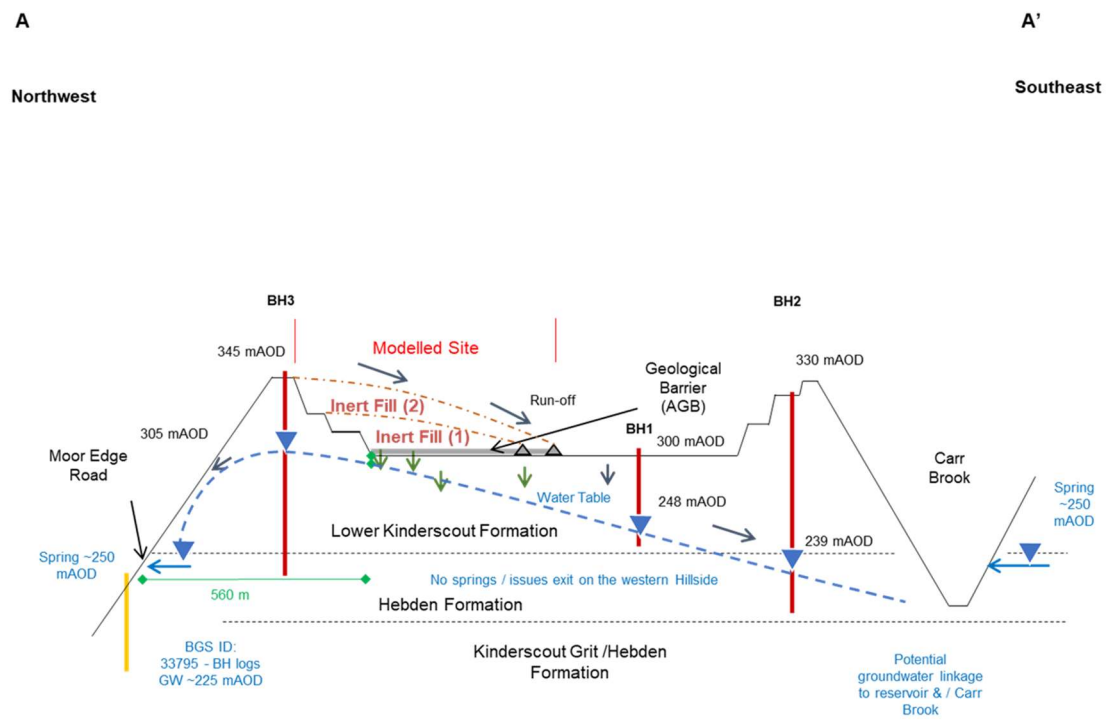
- source is the recovered inert waste
- the pathway is the RGB and underlying unsaturated Millstone Grit Series Strata

- the receptor is the groundwater exiting the strata as spring (supplying Castle Farm and Intake Cottage)

The LandSim model is based on a multi-component input system using the following units:

	Model Component	Analogous to:
1.	Waste Source	Inert waste material
2.	Liner system	RGB – not required but included
3.	Unsaturated Zone	In-situ gritstone (Base of site at 300 mAOD, spring line at 250 mAOD at Intake Cottage, groundwater at BH3 305 mAOD – i.e. assumed groundwater beneath site of 290mOD and therefore unsaturated zone of10m)
4.	Vertical Pathway	Not modelled
5.	Aquifer pathway	Grit stone
6.	Receptor	Base of Unsaturated Zone as an added level of conservatism (as the groundwater drains to discrete spring lines / issues). The “monitoring well is the “edge of monitoring point”; additional dilution will occur prior to exit at the groundwater spring line (the compliance point).

Figure 4.1 – Schematic Site Conceptual Model



5 Risk Assessment

5.1 Justification for Modelling Approach and Software

The site risk assessment was originally undertaken using the LandSim model. The LandSim model[5] was developed on behalf of the Environment Agency by Golder Associates is the preferred model for assessing risks to groundwater from landfill sites by each of the UK's Environment Agency bodies.

A model based on the principles of a landfill has been produced because of the similarities between the conceptual design of a landfill and the proposed development of the site. The LandSim model is a Monte Carlo simulator, which is a probabilistic simulator to assess contaminant migration from a source through a barrier system which underlies the potential polluting source, vertically through an unsaturated zone beneath the barrier, and a saturated pathway before entering an aquifer.

The Monte Carlo Simulator allows for a stochastic approach to be taken for the model. Stochastic models allow a range of values to be input for each parameter. The model then selects a value for each parameter when running a simulation. Thus the model overcomes difficulties associated with deterministic models which take a single value for each parameter when a series of end member scenarios are run without understanding how each parameter interacts or their relative importance.

[5] Golder Associates (UK) Ltd (2003). LandSim. Landfill Performance Simulation by Monte Carlo Method. *Environment Agency R&D Publication 120*

The model also performs multiple simulation runs and the simulation programme compiles the results as a statistical probability of a particular result occurring. When the results are statistically combined, the likelihood of each of the 'worst-case' parameters occurring simultaneously can be compared with the general case which is actually expected to happen. The impact of each of these cases and that of intervening probabilities can then be compared with relevant Environmental Quality Standards (EQS) to determine if the risk is acceptable.

The model also predicts timescales that any potential impact is likely to occur over. This includes factoring in whole lifecycle factors such as active or passive engineered controls and the polluting lifespan of the contaminant source. It is therefore considered appropriate to continue using LandSim as a primary assessment tool.

In most cases, the modelling is used to assess the potential impact from how a site is expected to be developed throughout its operational life when the majority of input parameters must be assumed.

A recent similar application (Inert Landfill in an upland setting with peripheral springs at a lower elevation than the base of the site) has necessitated the requirement (by the Environment Agency) to include dual porosity within the modelling component of the unsaturated zone. This HRA has included this request and is hence deemed to have considered current Environment Agency requirements. Simulated concentrations (to include the unsaturated zone) will be considered if unacceptable concentrations are modelled at the base of the geological barrier.

5.2 Environmental Screening

The assessment has been based on two levels of screening. The first level is a simple comparison of the likely source concentration compared to the Drinking Water Standard (DWS). The second level of assessment is a comparison of the predicted concentration, firstly at the base of the RGB and secondly at the base of the unsaturated zone. If required, predictions could also be made at then a hypothetical monitoring point immediately adjacent to the edge of the site.

These assessment points are therefore more conservative than consideration of an off-site receptor and takes account of the potable supply that feeds the adjacent Castle farm and Intake Cottage properties.

The data in Table 1 based on source term derived from WAC limits (in accordance with Environment Agency Guidance), indicates that molybdenum, antimony and fluoride are below DWS at source. On this basis these determinands are not considered further within the risk assessment, selenium is at DWS at source and is not considered further.

Although chloride and sulphate are below DWS they are retained within the next level of assessment as they are mobile anions that may affect the taste of receiving waters.

Table 1 – Derivation Source Term

Parameter	Source		DWS	Leach/DWS
	Soil	Leachate		
	Mg/kg	Mg/l	Mg/l	
Molybdenum	0.5	0.05	0.07	71%
Antimony	0.06	0.006	0.05	12%
Selenium	0.1	0.01	0.01	100%
Arsenic	0.5	0.05	0.01	500%
Chromium	0.5	0.05	0.05	100%
Nickel	0.4	0.04	0.02	200%
Lead	0.5	0.05	0.01	500%
Cadmium	0.04	0.004	0.005	80%
Mercury	0.01	0.001	0.001	100%
Copper	2	0.2	2	10%
Zinc	4	0.4	5	8%
	mg/kg	mg/l	mg/l	
Chloride*	800	80	250	32%
Sulphate*	1000	100	250	40%
Fluoride	10	1	1.5	67%

*Chloride and sulphate are below DWS at source however they have been modelled due to the potable nature of the receptor

5.3 Accumulation of water – potential for leachate generation

Previously, models would have included a very conservatively assumed 1m leachate head for this type of conceptualisation. In reality and due to the presence of the proposed RGB this cannot occur. Hence a 1m head is an exaggeration of the expected case and would also overtop any perimeter containment toe-bund. The sloped nature of the infill (drawing 2104/9/001) will ensure that the majority of rainfall will not enter the inert material.

The average rainfall for the site is 1151 mm (MAFF, Bulletin 34, 1976 – area 10) also confirmed by MET Office data for the Rochdale Weather Station (1118 mm/y, date period 1981-2010). Conservatively assuming that all rainfall enters the waste subsequently, and then the proposed RGB of 0.4m at $1x10^{-7}$m/s (i.e. excluding evaporation, transpiration and absorption) it would all pass the barrier and a head of liquid could therefore not develop. Rainfall in excess of 3000 mm per annum would be required to support any measurable head and in excess of 6000 mm per annum to support a 1 m head. The only potential for water to be retained in the site would be a result of the low permeability of the waste or the underlying geology. The LandSim simulations indicate that a 0.001m leachate head cannot be sustained post management period, i.e. LandSim calculates that a leachate head of 0 is appropriate in relation to infiltration and barrier hydraulics.

Nevertheless 0.001m is retained within the model to allow some forcing of water through the system, albeit this can cause LandSim to erroneously generate mass for some parameters i.e.

where calculations at the base of the barrier are greater than the input concentration. This is clearly a modelling flaw.

The nature of the underlying strata (with secondary permeability) will allow seepages to enter the groundwater system beneath the site.

5.4 Model Parameterisation

The model input parameters are tabulated below in Table 2.

Table 2 – LandSim Parameterisation

Parameter	LandSim Value (Whole Site)	Justification LandSim
Annual infiltration (mm)	1151	Total annual Rainfall (from MAFF 1Technical Bulletin 34 - Climate and Drainage)
Cap infiltration	1151	To simulate all rainfall passing through to the AGB
Source Zone		
Area (Ha2)	Top 3.2 Base 2.73	Site specific detail
Waste Thickness (m)	Min: 1 Most Likely: 15 Max:16	Site specific detail
Waste porosity (fraction)	Min: 0.1 Max: 0.2	Estimated range for deposited waste (inversely correlated with water-filled porosity)
Waste Dry Density (g/cm3)	Min: 1.6 Max: 2.2	Estimated range for deposited waste (for inert soil and construction type materials)
Waste Field Capacity	Min: 0.1 Max:0.2	Estimated range for deposited waste (inversely correlated with air-filled porosity)
Barrier (AGB) Thickness (m)	0.4	AGB for a waste recovery operation however a barrier of 0.4m has been provided
Hydraulic Conductivity (m/s)	1e-7	Environment Agency Requirement (similar application)
Longitudinal dispersivity (m)	0.1	10% thickness
Retardation (Kd	As	Science Report SC050021 / Arsenic SGV, Science Report SC050021 / Arsenic supplementary report
	Cd, Ni, Zn	Fannin 2006
	Cr	Based on similar application
	Hg	Science Report SC050021 / Mercury SGV
	Pb, Cu	LandSim Default
Head on Barrier (m)	0.001	Assumed maximum based on AGB, in reality 0 is appropriate
Unsaturated Pathway (m)	10	Based on minimum unsaturated zone from groundwater data, schematic groundwater contours indicating a maximum level of 290mOD and an unsaturated zone of 10m.
Matrix Porosity	Min: 2e-8 Max: 1.4e-7	Median Value - Abesser, Shand and Ingram, 2005

Parameter	LandSim Value (Whole Site)	Justification LandSim
Aquifer – Lower Kinderscout Grt		
Thickness (m)	25	To the base of quarry to Hebden Formation
Hydraulic conductivity (m/s)	Min: 2e-8 Max: 1.4e-7	Abesser, Shand and Ingram, 2005
Relative Vertical Dispersivity	2.5	10% thickness
Regional gradient	0.14	fall of 66.06 m over distance 465 m

Dual porosity enabled based on Environment Agency feedback on similar applications – it is noted that the LandSim manual only states applicable for fissured Chalk.

The LandSim model and results files are presented as Appendix A.

5.5 Emissions to Groundwater

Groundwater risk assessments are usually undertaken to one of two compliance points, namely:

- for hazardous substances after mixing with groundwater at the edge of the site / waste (the monitor well); and
- for non-hazardous substances at a downgradient receptor in continuity with the groundwater.

However, in order to compare the potential impacts and to ensure a reasonable level of conservatism all simulated concentrations in this assessment are made at the base of the AGB and base of the unsaturated zone prior to any mixing with groundwater or dilution (more conservative than edge of site or off site modelling locations). This is to assess the acceptability on exit through the substantial in-situ geological barrier. The model predictions are discussed assuming that most likely case equates to the 50th percentile concertation or timescale, whilst worst case predictions equate to the 95th percentile concentration or timescale.

The LandSim model (Buckton Vale 2022 HRA Sim A) results indicate that all the modelled substances had a 95th percentile concentration below their respective DWS and Minimum Reporting Values (MRV) at the base of the unsaturated zone. However, the concentrations of arsenic, chromium, copper, sulphate and chloride were greater after dilution in the aquifer. This indicates that the LandSim model was not suitable for the conceptualisation of this proposed recovery permit. Both sulphate and chloride also increased slightly between the base of the AGB and the base of the unsaturated zone. The increases in concentration demonstrated between the AGB, the base of the unsaturated zone and the compliance point demonstrates there is an issue with the mass balance calculation within Landsim.

The source term utilised in the Landsim Model is derived from worse case (conservative) values for all substances applied to the entire site.

Table 3 – Emissions to Groundwater

Substance	Source		DWS or standard	Leach / DWS	Point of Assessment			
					Model Predictions (Base of Liner) 0.4m @ 1x10^{-7}m/s		Model Predictions (Base of Unsaturated Zone)	
	Soil	Leachate						
	mg/kg	mg/l	mg/l		95th %ile mg/l	yrs	95th %ile mg/l	yrs
Molybdenum	0.5	0.05	0.07	71%	Below DWS in source - Not Modelled			
Antimony	0.06	0.006	0.05	12%	Below DWS in source - Not Modelled			
Selenium	0.1	0.01	0.01	100%	At DWS in source - Not Modelled			
Arsenic	0.5	0.05	0.01#	500%	4.3x10-3	228	4x10-3	457
Chromium	0.5	0.05	0.05#	100%	0.0061	52	5.4x10-3	57
Nickel	0.4	0.04	0.02	200%	<1x10-11	-	<1x10-11	-
Lead	0.5	0.05	0.01#	500%	<1x10-11	-	<1x10-11	-
Cadmium	0.04	0.004	0.005	80%	<1x10-11	-	<1x10-11	-
Mercury	0.01	0.001	0.001	100%	2.23x10-11	57	<1x10-11	-
Copper	2	0.2	2	10%	0.063	52	0.021	105
Zinc	4	0.4	3	8%	<1x10-11	-	<1x10-11	-
Chloride*	800	80	250	32%	35	103	46	103
Sulphate*	1000	100	250	40%	65	51	76	103
Fluoride	10	1	1.5	67%	Below DWS in source - Not Modelled			

Arsenic MRV concentration of 0.005 mg/l, chromium concentration of 0.005 mg/l and lead concentration of 0.005 mg/l = UK TAG limit based on approach within WFD UK Technical Advisory Group (Jan 2017): Technical Report on Groundwater Hazardous Substances[6]. Cadmium concentration of 0.0001 mg/l and mercury of 0.00001 mg/l are MRV[7].

Simple dilution calculations were undertaken utilising the concentrations at the base of the unsaturated zone modelled in Landsim. The dilution calculations are based upon very conservative assumptions and indicate that the Landsim modelled values at the compliance point are incorrect. The calculations below have factored in attenuation and dispersion due to the utilisation of the Landsim output concentration for each substance at the base of the unsaturated zone. The following assumptions are:

- The volume of leachate being created is equal to the effective rainfall at the site (1151mm/yr).

[6]http://wfduk.org/sites/default/files/Media/UKTAG_Technical%20report_GW_Haz Subs_ForWebfinal.pdf
http://wfduk.org/sites/default/files/Media/170116%20Substance%20Determinationsfinal.pdf
[7]https://www.gov.uk/government/publications/values-for-groundwater-risk-assessments/hazardous-substances-to groundwater minimum-reporting-values

- A liner with a permeability of 1x10-7 m/s results in 3150mm/yr, therefore all the leachate created will pass through the liner at the rate it is produced.
- The volume of water in the aquifer available for dilution is based upon the assumption of mixing only in the upper 1m of the saturated aquifer at the footprint of the base of the road, and that aquifer having the porosity of the matrix only (14%).
- The calculation has allowed for all rainfall flowing through the RGB, again this will not occur as the rainfall will shed off the 1:4 infill slope towards the base of the quarry and be limited to infiltration as bulk mass permeability of such material will restrict through flow or accumulation of water.
- The calculation assumed there was no attenuation or dispersion within the aquifer pathway.
- The waste proposed to be deposited under the recovery permit are considered unlikely to generate leachate.
- The dilution calculations assumes an infinitely replenishing source term.

Table 4 shows the calculations of the theoretical maximum concentrations upon dilution in the groundwater directly beneath the base of the site. The results of the calculations show that the calculated concentrations are considerably below the relevant DWS and MRV.

Table 4. Dilution Calculations in Groundwater

No	Parameter	Unit	Formula	As	Cr	Ni	Pb	Cd	Hg	Cu	Zn	Cl	SO4
ST	Source term	mg/l	-	4.0×10^{-3}	5.40×10^{-3}	$1.x10^{-11}$	$1.x10^{-11}$	$1.x10^{-11}$	$1.x10^{-11}$	0.021	$1.x10^{-11}$	46	76
A	Area	m2	A	32000	32000	32000	32000	32000	32000	32000	32000	32000	32000
B	Infiltration	mm/yr	B	1151	1151	1151	1151	1151	1151	1151	1151	1151	1151
C	Volume entering road	m3/yr	C=A*B	36832	36832	36832	36832	36832	36832	36832	36832	36832	36832
		l/d		100909.6	100909.6	100909.6	100909.6	100909.6	100909.6	100909.6	100909.6	100909.6	100909.6
D	Mass of substance (based on ST)	mg/d	D=C*ST	403.64	544.91	$1.01x10^{-6}$	$1.01x10^{-6}$	$1.01x10^{-6}$	$1.01x10^{-6}$	2119.1	$1.01x10^{-6}$	4641841	7669128.7
E	Area of base	m2	E	27300	27300	27300	27300	27300	27300	27300	27300	27300	27300
F	Aquifer thickness	m	F	1	1	1	1	1	1	1	1	1	1
G	Aquifer porosity	-	G	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
H	Volume of aquifer	m3	H=E*F*G	3822	3822	3822	3822	3822	3822	3822	3822	3822	3822
		litres		3822000	3822000	3822000	3822000	3822000	3822000	3822000	3822000	3822000	3822000
I	Concentration of substance in aquifer	mg/l	I=D/H	0.000106	0.000143	$2.64x10^{-13}$	$2.64x10^{-13}$	$2.64x10^{-13}$	$2.64x10^{-13}$	0.000554	$2.64x10^{-13}$	1.21	2.01
DWS mg/l				0.01	0.05	0.02	0.01	0.005	0.001	2	3	250	250
MRV mg/l				0.005	-	-	0.0002	-	0.00001	-	-	-	-

The calculations show that the concentrations for all substances at the base of the unsaturated zone once mixed with only a limited thickness of aquifer directly beneath the site cannot be close to the relevant DWS or MRV for these substances.

6 Requisite Surveillance

There will be no point source emissions that require monitoring within the constraints of the proposed recovery activity permit. Environmental monitoring will continue as part of the wider site and in accordance with condition 41 of the planning permission as detailed in the ESSD. This data may be used to support a future surrender application for the recovery activity to provide evidence that the necessary measures have been taken to avoid pollution risk resulting from the operation of the Site and to return he site to a satisfactory state, having regard to the state of the Site before the activity was put into operation.

7 Conclusions

Hydrogeologically the site is considered to be located in a low-sensitivity location in an upland setting. However, by virtue that local farms take potable supplies from springs that emanate from the base of the Lower Kinderscout Grit, the risks posed by the recovery activity have been assessed quantitatively in accordance with Environment Agency guidance and appropriate methodology.

The site has been assessed as a "worse case" whereby all potential groundwater flow is towards the receptor at Intake Cottage. In reality, the groundwater boreholes have established that groundwater is at a significant depth beneath the site (greater than 30m) and that a groundwater divide exists. Subsequently, groundwater flow beneath the site, is towards the south-east (based on the available data) and there are no receptors in this direction.

To reiterate the site will only accept Inert waste, the definition of inert waste is taken from the Landfill Directive. Article 2 (e) of the Landfill Directive defines inert waste as follows:

'Inert waste' means waste that does not undergo any significant physical, chemical or biological transformations. Inert waste will not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm human health. The total leachability and pollutant content of the waste and the ecotoxicity of the leachate must be insignificant, and in particular not endanger the quality of surface water and/or groundwater.

The Environment Agency modelling simulation software LandSim indicates no discernible effects at the base of the AGB or at the base of the unsaturated zone.

However, the concentrations for arsenic, copper, chromium, sulphate and chloride increased between the base of the unsaturated zone and the compliance point when diluted in the aquifer. It was therefore concluded that Landsim was not suitable for the conceptualisation of this proposed recovery permit. However, highly conservation calculations show that the concentrations of arsenic, copper, chromium, chloride and sulphate are considerably below their MRV/DWS value upon mixing with the top 1m of groundwater of the aquifer directly below the base of the site

The inclusion of an AGB is an unnecessary financial burden to the operator however is included as per current Environment Agency feedback to avoid application delay.

Appendix A – LandSim Files

Project: Buckton Vale

Project Number:

Customer: Churchill Enviro

Calculation Settings

Number of iterations: 1001

Results calculated using sampled PDFs

Full Calculation

Clay Liner:

Retarded values used for simulation

No Biodegradation

Unsaturated Pathway:

Retarded values used for simulation

No Biodegradation

Saturated Vertical Pathway:

No Vertical Pathway

Aquifer Pathway:

Retarded values used for simulation

No Biodegradation

Timeslices at: 30, 100, 300, 1000

Decline in Contaminant Concentration in Leachate

Sulphate

c (kg/l): 0.1209

Non-Volatile

m (kg/l): 0.0166

Zinc

c (kg/l): 0.0561

Non-Volatile

m (kg/l): 0.0403

Background Concentrations of Contaminants

Justification for Contaminant Properties

All units in milligrams per litre

Phase: Phase 1

Infiltration Information

Cap design infiltration (mm/year):	SINGLE(1151)
Infiltration to waste (mm/year):	SINGLE(1151)
End of filling (years from start of waste deposit):	8

Justification for Specified Infiltration

Duration of management control (years from the start of waste disposal): 11

Cell dimensions

Cell width (m):	130
Cell length (m):	210
Cell top area (ha):	3.21176
Cell base area (ha):	2.73
Number of cells:	1
Total base area (ha):	2.73
Total top area (ha):	3.21176
Head of Leachate when surface water breakout occurs (m)	SINGLE(1)
Waste porosity (fraction)	UNIFORM(0.1,0.2)
Final waste thickness (m):	TRIANGULAR(1,15,22)
Field capacity (fraction):	UNIFORM(0.1,0.2)
Waste dry density (kg/l)	UNIFORM(1.6,2.2)

Justification for Landfill Geometry

Source concentrations of contaminants

All units in milligrams per litre

Declining source term

Arsenic	SINGLE(0.05)
	Data are spot measurements of Leachate Quality
Cadmium	SINGLE(0.004)
	Substance to be treated as List 1
Chloride	SINGLE(80)
	Data are spot measurements of Leachate Quality
Chromium	LOGTRIANGULAR(3e-005,0.0057,0.05)
	Data are spot measurements of Leachate Quality
Copper	SINGLE(0.2)
	Data are spot measurements of Leachate Quality
Lead	SINGLE(0.05)
	Data are spot measurements of Leachate Quality
Mercury	SINGLE(0.001)
	Substance to be treated as List 1
Nickel	SINGLE(0.04)
	Data are spot measurements of Leachate Quality
Sulphate	SINGLE(100)
	Data are spot measurements of Leachate Quality
Zinc	SINGLE(0.4)
	Data are spot measurements of Leachate Quality

Justification for Species Concentration in Leachate
[CHANGED] [CHANGED]

Drainage Information

Fixed Head.

Head on EBS is given as (m):	SINGLE(0.001)

Justification for Specified Head

Barrier Information

There is a single clay barrier

Justification for Engineered Barrier Type

Design thickness of clay (m):	SINGLE(0.4)
Density of clay (kg/l):	UNIFORM(1.8,2)
Pathway moisture content (fraction):	UNIFORM(0.1,0.2)

Justification for Clay: Liner Thickness
[CHANGED] [CHANGED] [CHANGED] [CHANGED] [CHANGED] [CHANGED] [CHANGED] [CHANGED] [CHANGED] [CHANGED] [CHANGED] [CHANGED] [CHANGED] [CHANGED] [CHANGED]

Hydraulic conductivity of liner (m/s):	SINGLE(1e-007)
Pathway longitudinal dispersivity (m):	SINGLE(0.1)

Justification for Clay: Hydraulics Properties

Retardation parameters for clay liner

Uncertainty in Kd (l/kg):	
Arsenic	SINGLE(500)
Cadmium	UNIFORM(835,4298)
Chloride	SINGLE(0)
Chromium	LOGUNIFORM(1,4400)
Copper	LOGUNIFORM(40,27500)
Lead	UNIFORM(27,270000)
Mercury	UNIFORM(450,3835)
Nickel	SINGLE(1871)
Sulphate	SINGLE(0)
Zinc	UNIFORM(2404,6127)

Justification for Liner Kd Values by Species

Lower Kinderscout Grit pathway parameters

Modelled as unsaturated pathway

Pathway length (m):	SINGLE(10)
Flow Model:	dual porosity
Pathway Density (kg/l): SINGLE(1.6)	

Justification for Unsat Zone Geometry
[CHANGED] [CHANGED] [CHANGED]

Matrix hydraulic conductivity values (m/s):	LOGUNIFORM(2e-008,1.4e-007)

Justification for Unsat Zone Hydraulics Properties

Matrix porosity (fraction):	SINGLE(0.14)
Fissure porosity (fraction):	UNIFORM(0.005,0.01)
Pathway longitudinal dispersivity (m):	SINGLE(2.5)

Justification for Unsat Zone Dispersion Properties

Retardation parameters for Lower Kinderscout Grit pathway

Modelled as unsaturated pathway

Uncertainty in Kd (l/kg):

Arsenic	UNIFORM(25,50)
Cadmium	UNIFORM(1.6,150)
Chloride	SINGLE(0)
Chromium	UNIFORM(0,440)
Copper	UNIFORM(40,400)
Lead	UNIFORM(27,100)
Mercury	UNIFORM(6,450)
Nickel	UNIFORM(20,80)
Sulphate	SINGLE(0)
Zinc	UNIFORM(1,60)

Justification for Kd Values by Species

Aquifer Pathway Dimensions for Phase

Pathway length (m):	UNIFORM(510,660)
Pathway width (m):	SINGLE(200)

pathway parameters

No Vertical Pathway

Lower Part of L Kinderscout Grit pathway parameters

Modelled as aquifer pathway.

Mixing zone (m):

Calculated. Aquifer Thickness:	SINGLE(25)

Justification for Aquifer Geometry

Pathway regional gradient (-):	SINGLE(0.14)
Pathway hydraulic conductivity values (m/s):	UNIFORM(2e-008,1.4e-007)
Pathway porosity (fraction):	SINGLE(0.14)

Justification for Aquifer Hydraulics Properties
[CHANGED]

Pathway longitudinal dispersivity (m):	UNIFORM(7,21)
Pathway transverse dispersivity (m):	UNIFORM(0.72,2.1)

Justification for Aquifer Dispersion Details

Retardation parameters for Lower Part of L Kinderscout Grit pathway

Modelled as aquifer pathway.

Uncertainty in Kd (l/kg):

Arsenic	UNIFORM(2.5,5)
Cadmium	LOGTRIANGULAR(0.5,5.3,38.6)
Chloride	SINGLE(0)
Chromium	UNIFORM(0,44)
Copper	UNIFORM(4,40)
Lead	UNIFORM(2.7,10)
Mercury	LOGTRIANGULAR(13.4,132.4,2690)
Nickel	UNIFORM(2,8)
Sulphate	SINGLE(0)
Zinc	UNIFORM(0.2,0.6)

Justification for Aquifer Kd Values by Species

Pathway Density (kg/l): SINGLE(1.6)

Concentration of Arsenic in groundwater [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 2.19231E-017
99% of values less than 1.37007E-016

Minimum 0	Maximum 1.79377E-015	
Mean 8.66109E-018	Std. Dev. 8.6289E-017	Variance 7.44579E-033

At 300 years

01% of values less than 8.62785E-016
05% of values less than 1.1554E-012
10% of values less than 1.64654E-011
50% of values less than 4.01599E-008
90% of values less than 1.04858E-005
95% of values less than 3.79352E-005
99% of values less than 0.000175177

Minimum 0	Maximum 0.000382368	
Mean 7.25338E-006	Std. Dev. 3.00158E-005	Variance 9.0095E-010

At 1000 years

01% of values less than 2.34912E-014
05% of values less than 7.59723E-012
10% of values less than 1.98059E-010
50% of values less than 2.29703E-006
90% of values less than 0.0523419
95% of values less than 0.0972072
99% of values less than 0.208531

Minimum 0	Maximum 0.366591	
Mean 0.0167916	Std. Dev. 0.0427438	Variance 0.00182703

Concentration of Arsenic in groundwater [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 2.14045E-014
90% of values less than 2.94882E-013
95% of values less than 5.18175E-013
99% of values less than 8.63596E-012

Minimum 0	Maximum 0.000114531	
Mean 2.08236E-007	Std. Dev. 4.23681E-006	Variance 1.79505E-011

Concentration of Cadmium in groundwater [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 3.50565E-017

Minimum 0	Maximum 7.49806E-014	
Mean 8.7615E-017	Std. Dev. 2.38941E-015	Variance 5.7093E-030

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 1.56206E-016
99% of values less than 3.81428E-014

Minimum 0	Maximum 7.91425E-013	
Mean 2.7143E-015	Std. Dev. 3.80338E-014	Variance 1.44657E-027

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 1.84773E-016
99% of values less than 2.87015E-014

Minimum 0	Maximum 1.77943E-013	
Mean 1.0164E-015	Std. Dev. 1.03347E-014	Variance 1.06807E-028

Concentration of Cadmium in groundwater [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 5.73132E-012	
Mean 1.05132E-014	Std. Dev. 2.03556E-013	Variance 4.14352E-026

Concentration of Chloride in groundwater [mg/l]

At 30 years

01% of values less than 105.964
05% of values less than 317.938
10% of values less than 447.594
50% of values less than 888.833
90% of values less than 2303.91
95% of values less than 2905.56
99% of values less than 3928.62

Minimum 4.26607	Maximum 4753.23	
Mean 1163.55	Std. Dev. 813.644	Variance 662017

At 100 years

01% of values less than 0.000364805
05% of values less than 0.152669
10% of values less than 1.54668
50% of values less than 46.9413
90% of values less than 204.597
95% of values less than 276.246
99% of values less than 499.94

Minimum 0	Maximum 799.878	
Mean 81.1066	Std. Dev. 100.914	Variance 10183.7

At 300 years

01% of values less than 0
05% of values less than 2.00889E-008
10% of values less than 4.49455E-007
50% of values less than 0.0128269
90% of values less than 0.456904
95% of values less than 0.913863
99% of values less than 2.29755

Minimum 0	Maximum 798.485	
Mean 0.964084	Std. Dev. 25.2361	Variance 636.859

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 2.00001E-009
90% of values less than 2.67864E-007
95% of values less than 6.85266E-007
99% of values less than 2.08307E-006

Minimum 0	Maximum 762.993	
Mean 0.762231	Std. Dev. 24.1159	Variance 581.576

Concentration of Chloride in groundwater [mg/l]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 1.04042E-011

90% of values less than 5.28648E-011

95% of values less than 7.6022E-011

99% of values less than 1.49136E-010

Minimum 0	Maximum 1.15168	
Mean 0.00115053	Std. Dev. 0.0364012	Variance 0.00132505

Concentration of Chromium in groundwater [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 8.91456E-016

Minimum 0	Maximum 1.19331E-006	
Mean 1.81141E-009	Std. Dev. 4.24804E-008	Variance 1.80458E-015

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 9.29472E-015
95% of values less than 2.66413E-014
99% of values less than 2.51043E-006

Minimum 0	Maximum 0.182903	
Mean 0.000346757	Std. Dev. 0.00685234	Variance 4.69545E-005

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 9.69133E-017
90% of values less than 7.27709E-011
95% of values less than 1.96399E-005
99% of values less than 0.0185823

Minimum 0	Maximum 0.191277	
Mean 0.000845401	Std. Dev. 0.00909944	Variance 8.27997E-005

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 5.28654E-013
90% of values less than 0.00157123
95% of values less than 0.0113796
99% of values less than 0.0667111

Minimum 0	Maximum 0.142869	
Mean 0.00237619	Std. Dev. 0.0116151	Variance 0.000134911

Concentration of Chromium in groundwater [mg/l]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 2.14113E-015

90% of values less than 2.74328E-011

95% of values less than 2.80271E-009

99% of values less than 0.00102684

Minimum 0	Maximum 0.203019	
Mean 0.000407439	Std. Dev. 0.00698442	Variance 4.87822E-005

Concentration of Copper in groundwater [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 1.38236E-015
95% of values less than 1.3718E-014
99% of values less than 7.83468E-014

Minimum 0	Maximum 4.01185E-013	
Mean 3.56056E-015	Std. Dev. 2.1867E-014	Variance 4.78167E-028

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 1.924E-014
95% of values less than 1.06595E-013
99% of values less than 1.81956E-006

Minimum 0	Maximum 0.000502956	
Mean 8.43127E-007	Std. Dev. 1.64461E-005	Variance 2.70474E-010

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 4.47614E-005
95% of values less than 0.00453434
99% of values less than 0.27817

Minimum 0	Maximum 1.59553	
Mean 0.00946486	Std. Dev. 0.0739009	Variance 0.00546134

Concentration of Copper in groundwater [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 8.35263E-012
95% of values less than 1.17926E-010
99% of values less than 3.29094E-007

Minimum 0	Maximum 0.566202	
Mean 0.000775701	Std. Dev. 0.0190685	Variance 0.000363609

Concentration of Lead in groundwater [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 9.72718E-017	
Mean 9.71746E-020	Std. Dev. 3.07447E-018	Variance 9.45235E-036

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.59251E-012	
Mean 1.65972E-015	Std. Dev. 5.03794E-014	Variance 2.53808E-027

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0.00156819	
Mean 1.56727E-006	Std. Dev. 4.95658E-005	Variance 2.45677E-009

Concentration of Lead in groundwater [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.65689E-013	
Mean 1.66956E-016	Std. Dev. 5.23708E-015	Variance 2.7427E-029

Concentration of Mercury in groundwater [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 2.86794E-015	
Mean 6.36846E-018	Std. Dev. 1.23628E-016	Variance 1.52839E-032

Concentration of Mercury in groundwater [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 8.3407E-015
99% of values less than 2.04534E-012

Minimum 0	Maximum 7.43085E-009	
Mean 7.97785E-012	Std. Dev. 2.35048E-010	Variance 5.52476E-020

Concentration of Nickel in groundwater [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 2.97255E-016
95% of values less than 7.87798E-016
99% of values less than 1.97809E-015

Minimum 0	Maximum 3.53114E-015	
Mean 1.13413E-016	Std. Dev. 3.68308E-016	Variance 1.3565E-031

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 4.77103E-016
95% of values less than 9.39022E-016
99% of values less than 2.51411E-015

Minimum 0	Maximum 5.95366E-015	
Mean 1.73345E-016	Std. Dev. 5.10167E-016	Variance 2.6027E-031

Concentration of Nickel in groundwater [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.499E-015	
Mean 3.03905E-018	Std. Dev. 5.41319E-017	Variance 2.93026E-033

Concentration of Sulphate in groundwater [mg/l]

At 30 years

01% of values less than 386.471
05% of values less than 759.659
10% of values less than 893.266
50% of values less than 1496.47
90% of values less than 3752.85
95% of values less than 4787.29
99% of values less than 6117.79

Minimum 60.4372	Maximum 7049.08	
Mean 1958.04	Std. Dev. 1258.29	Variance 1.58329E+006

At 100 years

01% of values less than 1.03901
05% of values less than 18.2169
10% of values less than 53.5768
50% of values less than 327.684
90% of values less than 1018.86
95% of values less than 1373.5
99% of values less than 1940.08

Minimum 2.15766E-005	Maximum 2555.26	
Mean 455.968	Std. Dev. 419.248	Variance 175769

At 300 years

01% of values less than 2.82851E-007
05% of values less than 0.000450924
10% of values less than 0.0162604
50% of values less than 5.4803
90% of values less than 38.8203
95% of values less than 62.8652
99% of values less than 117.337

Minimum 0	Maximum 1175.84	
Mean 15.8383	Std. Dev. 43.6773	Variance 1907.71

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 1.86695E-009
50% of values less than 1.5888E-005
90% of values less than 0.00223522
95% of values less than 0.00588856
99% of values less than 0.0243736

Minimum 0	Maximum 1121.55	
Mean 1.12162	Std. Dev. 35.4487	Variance 1256.61

Concentration of Sulphate in groundwater [mg/l]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 1.59301E-011

90% of values less than 7.89099E-011

95% of values less than 1.15765E-010

99% of values less than 2.13727E-010

Minimum 0	Maximum 1.71433	
Mean 0.00171262	Std. Dev. 0.0541848	Variance 0.00293599

Concentration of Zinc in groundwater [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.56687E-017	
Mean 1.5653E-020	Std. Dev. 4.9524E-019	Variance 2.45262E-037

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 1.51434E-015
95% of values less than 3.03581E-015
99% of values less than 7.50971E-015

Minimum 0	Maximum 2.96562E-014	
Mean 5.39453E-016	Std. Dev. 1.86509E-015	Variance 3.47856E-030

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 4.42957E-017
99% of values less than 7.30268E-016

Minimum 0	Maximum 6.57601E-015	
Mean 3.32902E-017	Std. Dev. 3.16911E-016	Variance 1.00433E-031

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.57788E-015	
Mean 5.04434E-018	Std. Dev. 7.48374E-017	Variance 5.60064E-033

Concentration of Zinc in groundwater [mg/l]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 0

90% of values less than 0

95% of values less than 0

99% of values less than 0

Minimum 0	Maximum 1.59785E-015	
Mean 1.59625E-018	Std. Dev. 5.05032E-017	Variance 2.55058E-033

Approx. time to Peak Conc. Arsenic at Offsite Compliance Point [years]

01% of values less than 380
05% of values less than 420
10% of values less than 420
50% of values less than 689
90% of values less than 928
95% of values less than 1000
99% of values less than 1379

Minimum 344	Maximum 9056	
Mean 694.104	Std. Dev. 364.035	Variance 132522

Approx. time to Peak Conc. Cadmium at Offsite Compliance Point [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 761
95% of values less than 1131
99% of values less than 2499

Minimum 0	Maximum 20000	
Mean 300.21	Std. Dev. 1377.49	Variance 1.89747E+006

Approx. time to Peak Conc. Chloride at Offsite Compliance Point [years]

01% of values less than 17
05% of values less than 19
10% of values less than 19
50% of values less than 21
90% of values less than 23
95% of values less than 23
99% of values less than 23

Minimum 16	Maximum 30	
Mean 20.4565	Std. Dev. 1.61752	Variance 2.61636

Approx. time to Peak Conc. Chromium at Offsite Compliance Point [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 2759
90% of values less than 4999
95% of values less than 5519
99% of values less than 9056

Minimum 0	Maximum 20000	
Mean 2771.83	Std. Dev. 2130.7	Variance 4.53988E+006

Approx. time to Peak Conc. Copper at Offsite Compliance Point [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 1523
90% of values less than 4100
95% of values less than 4999
99% of values less than 9999

Minimum 0	Maximum 20000	
Mean 1938.44	Std. Dev. 2407.89	Variance 5.79793E+006

Approx. time to Peak Conc. Lead at Offsite Compliance Point [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1024	
Mean 6.51548	Std. Dev. 74.6441	Variance 5571.75

Approx. time to Peak Conc. Mercury at Offsite Compliance Point [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 4999
95% of values less than 13458
99% of values less than 20000

Minimum 0	Maximum 20000	
Mean 1465.56	Std. Dev. 4452.08	Variance 1.9821E+007

Approx. time to Peak Conc. Nickel at Offsite Compliance Point [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 565
90% of values less than 928
95% of values less than 928
99% of values less than 1249

Minimum 0	Maximum 20000	
Mean 549.4	Std. Dev. 725.672	Variance 526599

Approx. time to Peak Conc. Sulphate at Offsite Compliance Point [years]

01% of values less than 19
05% of values less than 19
10% of values less than 19
50% of values less than 21
90% of values less than 23
95% of values less than 23
99% of values less than 26

Minimum 17	Maximum 35	
Mean 21.4635	Std. Dev. 1.5934	Variance 2.53892

Approx. time to Peak Conc. Zinc at Offsite Compliance Point [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 70
90% of values less than 105
95% of values less than 128
99% of values less than 232

Minimum 0	Maximum 20000	
Mean 74.1568	Std. Dev. 633.265	Variance 401024

Phase: Phase 1

Source Concentration of Arsenic [mg/l]

At 30 years

01% of values less than 0.0187806
05% of values less than 0.0281925
10% of values less than 0.0324962
50% of values less than 0.040416
90% of values less than 0.0428572
95% of values less than 0.0433612
99% of values less than 0.0440271

Minimum 0.00539344	Maximum 0.0444049	
Mean 0.0387331	Std. Dev. 0.0052875	Variance 2.79576E-005

At 100 years

01% of values less than 0.00109908
05% of values less than 0.00535604
10% of values less than 0.0093194
50% of values less than 0.0218106
90% of values less than 0.0274139
95% of values less than 0.0286923
99% of values less than 0.0304486

Minimum 8.48329E-006	Maximum 0.0314802	
Mean 0.0200518	Std. Dev. 0.00699748	Variance 4.89648E-005

At 300 years

01% of values less than 3.3043E-007
05% of values less than 4.65602E-005
10% of values less than 0.000262751
50% of values less than 0.00374354
90% of values less than 0.00764774
95% of values less than 0.00881813
99% of values less than 0.0106168

Minimum 8.30101E-014	Maximum 0.0117814	
Mean 0.00390958	Std. Dev. 0.00278455	Variance 7.75374E-006

At 1000 years

01% of values less than 1.55689E-019
05% of values less than 2.85177E-012
10% of values less than 9.88762E-010
50% of values less than 7.84209E-006
90% of values less than 8.77002E-005
95% of values less than 0.000141911
99% of values less than 0.000265751

Minimum 0	Maximum 0.000377796	
Mean 3.08062E-005	Std. Dev. 5.29947E-005	Variance 2.80844E-009

Phase: Phase 1

Source Concentration of Arsenic [mg/l]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 0

90% of values less than 0

95% of values less than 0

99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Source Concentration of Cadmium [mg/l]

At 30 years

01% of values less than 0.00011954
05% of values less than 0.000512849
10% of values less than 0.000853452
50% of values less than 0.00186529
90% of values less than 0.00230176
95% of values less than 0.00240028
99% of values less than 0.00253506

Minimum 1.36464E-006	Maximum 0.00261393	
Mean 0.00171652	Std. Dev. 0.000567498	Variance 3.22054E-007

At 100 years

01% of values less than 4.55387E-009
05% of values less than 1.33102E-006
10% of values less than 9.69454E-006
50% of values less than 0.000204356
90% of values less than 0.000463858
95% of values less than 0.000546194
99% of values less than 0.000675848

Minimum 1.2169E-016	Maximum 0.000761588	
Mean 0.00022492	Std. Dev. 0.000174887	Variance 3.05854E-008

At 300 years

01% of values less than 1.07717E-021
05% of values less than 5.4471E-014
10% of values less than 2.69388E-011
50% of values less than 3.68551E-007
90% of values less than 4.77243E-006
95% of values less than 7.95147E-006
99% of values less than 1.54686E-005

Minimum 0	Maximum 2.24652E-005	
Mean 1.67512E-006	Std. Dev. 3.0365E-006	Variance 9.22033E-012

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 9.18098E-017
90% of values less than 5.27206E-013
95% of values less than 2.96004E-012
99% of values less than 2.80578E-011

Minimum 0	Maximum 9.90318E-011	
Mean 1.0249E-012	Std. Dev. 6.65976E-012	Variance 4.43524E-023

Phase: Phase 1

Source Concentration of Cadmium [mg/l]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 0

90% of values less than 0

95% of values less than 0

99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Source Concentration of Chloride [mg/l]

At 30 years

01% of values less than 0.0247799
05% of values less than 0.707691
10% of values less than 2.28533
50% of values less than 13.8204
90% of values less than 22.4229
95% of values less than 24.6937
99% of values less than 28.0025

Minimum 8.37774E-007	Maximum 30.0483	
Mean 13.2015	Std. Dev. 7.37184	Variance 54.344

At 100 years

01% of values less than 1.67012E-012
05% of values less than 7.91027E-007
10% of values less than 7.63864E-005
50% of values less than 0.0851322
90% of values less than 0.56167
95% of values less than 0.818113
99% of values less than 1.33574

Minimum 6.19388E-030	Maximum 1.75837	
Mean 0.204259	Std. Dev. 0.285928	Variance 0.081755

At 300 years

01% of values less than 0
05% of values less than 7.82472E-024
10% of values less than 1.24347E-017
50% of values less than 4.11708E-008
90% of values less than 1.49483E-005
95% of values less than 4.84049E-005
99% of values less than 0.000223912

Minimum 0	Maximum 0.000528547	
Mean 9.95122E-006	Std. Dev. 4.27651E-005	Variance 1.82886E-009

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 3.23834E-030
90% of values less than 1.45372E-021
95% of values less than 7.71179E-020
99% of values less than 1.36559E-017

Minimum 0	Maximum 2.48879E-016	
Mean 1.02022E-018	Std. Dev. 1.26641E-017	Variance 1.60379E-034

Phase: Phase 1

Source Concentration of Chloride [mg/l]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 0

90% of values less than 0

95% of values less than 0

99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Source Concentration of Chromium [mg/l]

At 30 years

01% of values less than 0.000697721
05% of values less than 0.00124632
10% of values less than 0.00157971
50% of values less than 0.00316009
90% of values less than 0.00559808
95% of values less than 0.00643036
99% of values less than 0.00871424

Minimum 0.000204979	Maximum 0.0113771	
Mean 0.00344178	Std. Dev. 0.00170081	Variance 2.89277E-006

At 100 years

01% of values less than 1.17011E-005
05% of values less than 0.000127555
10% of values less than 0.000308895
50% of values less than 0.00110722
90% of values less than 0.00206425
95% of values less than 0.00236055
99% of values less than 0.00290687

Minimum 4.63367E-009	Maximum 0.00454602	
Mean 0.00116684	Std. Dev. 0.000676623	Variance 4.57819E-007

At 300 years

01% of values less than 3.17504E-011
05% of values less than 5.93003E-008
10% of values less than 8.25544E-007
50% of values less than 6.89504E-005
90% of values less than 0.000235689
95% of values less than 0.000287044
99% of values less than 0.00037236

Minimum 2.20459E-022	Maximum 0.000452344	
Mean 9.65082E-005	Std. Dev. 9.47752E-005	Variance 8.98233E-009

At 1000 years

01% of values less than 1.04492E-030
05% of values less than 7.9032E-020
10% of values less than 7.44254E-016
50% of values less than 2.12845E-009
90% of values less than 3.94406E-007
95% of values less than 1.33651E-006
99% of values less than 8.31546E-006

Minimum 0	Maximum 0.000292957	
Mean 7.11838E-007	Std. Dev. 9.69244E-006	Variance 9.39434E-011

Phase: Phase 1

Source Concentration of Chromium [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0.000292957	
Mean 2.92664E-007	Std. Dev. 9.25948E-006	Variance 8.57379E-011

Phase: Phase 1

Source Concentration of Copper [mg/l]

At 30 years

01% of values less than 0.00406309
05% of values less than 0.0204585
10% of values less than 0.0360068
50% of values less than 0.0857608
90% of values less than 0.108303
95% of values less than 0.113461
99% of values less than 0.120554

Minimum 2.83645E-005	Maximum 0.124723	
Mean 0.0788338	Std. Dev. 0.0278736	Variance 0.000776939

At 100 years

01% of values less than 5.05623E-008
05% of values less than 2.75899E-005
10% of values less than 0.000249984
50% of values less than 0.00736772
90% of values less than 0.018301
95% of values less than 0.0219402
99% of values less than 0.0277915

Minimum 1.98615E-016	Maximum 0.0317312	
Mean 0.00852179	Std. Dev. 0.00708961	Variance 5.02626E-005

At 300 years

01% of values less than 4.89166E-022
05% of values less than 1.7394E-013
10% of values less than 1.70156E-010
50% of values less than 6.63356E-006
90% of values less than 0.000113837
95% of values less than 0.000200617
99% of values less than 0.000419901

Minimum 0	Maximum 0.000635369	
Mean 4.02741E-005	Std. Dev. 8.03412E-005	Variance 6.45471E-009

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 1.45276E-016
90% of values less than 2.16077E-012
95% of values less than 1.46661E-011
99% of values less than 1.78019E-010

Minimum 0	Maximum 7.21792E-010	
Mean 6.45704E-012	Std. Dev. 4.6487E-011	Variance 2.16105E-021

Phase: Phase 1

Source Concentration of Copper [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Source Concentration of Lead [mg/l]

At 30 years

01% of values less than 0.00432167
05% of values less than 0.0119339
10% of values less than 0.0170237
50% of values less than 0.0293691
90% of values less than 0.0340078
95% of values less than 0.0350166
99% of values less than 0.0363766

Minimum 0.000190909	Maximum 0.0371622	
Mean 0.0272684	Std. Dev. 0.00711182	Variance 5.0578E-005

At 100 years

01% of values less than 3.57649E-006
05% of values less than 0.000187616
10% of values less than 0.00074942
50% of values less than 0.00628162
90% of values less than 0.0111268
95% of values less than 0.0124699
99% of values less than 0.014467

Minimum 1.86835E-011	Maximum 0.0157238	
Mean 0.00617849	Std. Dev. 0.00382659	Variance 1.46428E-005

At 300 years

01% of values less than 5.5871E-015
05% of values less than 1.31941E-009
10% of values less than 9.98851E-008
50% of values less than 7.66132E-005
90% of values less than 0.000457145
95% of values less than 0.00065266
99% of values less than 0.00103814

Minimum 0	Maximum 0.00134675	
Mean 0.000168429	Std. Dev. 0.000225811	Variance 5.09908E-008

At 1000 years

01% of values less than 0
05% of values less than 1.21693E-027
10% of values less than 2.73034E-021
50% of values less than 1.53502E-011
90% of values less than 6.42617E-009
95% of values less than 2.14079E-008
99% of values less than 1.02761E-007

Minimum 0	Maximum 2.47654E-007	
Mean 4.48285E-009	Std. Dev. 1.97843E-008	Variance 3.9142E-016

Phase: Phase 1

Source Concentration of Lead [mg/l]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 0

90% of values less than 0

95% of values less than 0

99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Source Concentration of Mercury [mg/l]

At 30 years

01% of values less than 0.000120908
05% of values less than 0.000290474
10% of values less than 0.000394667
50% of values less than 0.000631829
90% of values less than 0.000717062
95% of values less than 0.000735379
99% of values less than 0.000759961

Minimum 8.1915E-006	Maximum 0.000774103	
Mean 0.000589537	Std. Dev. 0.000139182	Variance 1.93718E-008

At 100 years

01% of values less than 2.64729E-007
05% of values less than 8.06943E-006
10% of values less than 2.6659E-005
50% of values less than 0.000166958
90% of values less than 0.000273442
95% of values less than 0.000301699
99% of values less than 0.000342962

Minimum 7.32693E-012	Maximum 0.000368523	
Mean 0.000159932	Std. Dev. 9.03799E-005	Variance 8.16853E-009

At 300 years

01% of values less than 6.66498E-015
05% of values less than 2.8865E-010
10% of values less than 1.20748E-008
50% of values less than 3.72564E-006
90% of values less than 1.74021E-005
95% of values less than 2.36612E-005
99% of values less than 3.53161E-005

Minimum 3.83409E-029	Maximum 4.42088E-005	
Mean 6.68601E-006	Std. Dev. 8.01205E-006	Variance 6.41929E-011

At 1000 years

01% of values less than 0
05% of values less than 7.90172E-026
10% of values less than 2.38786E-020
50% of values less than 6.18411E-012
90% of values less than 1.13157E-009
95% of values less than 3.19638E-009
99% of values less than 1.23742E-008

Minimum 0	Maximum 2.64341E-008	
Mean 6.11748E-010	Std. Dev. 2.29042E-009	Variance 5.24602E-018

Phase: Phase 1

Source Concentration of Mercury [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Source Concentration of Nickel [mg/l]

At 30 years

01% of values less than 0.00248151
05% of values less than 0.00786315
10% of values less than 0.0117697
50% of values less than 0.0218616
90% of values less than 0.0258223
95% of values less than 0.0266938
99% of values less than 0.0278741

Minimum 7.18425E-005	Maximum 0.0285586	
Mean 0.0202208	Std. Dev. 0.00573922	Variance 3.29387E-005

At 100 years

01% of values less than 7.85312E-007
05% of values less than 7.04371E-005
10% of values less than 0.000339409
50% of values less than 0.00379434
90% of values less than 0.00726214
95% of values less than 0.00826537
99% of values less than 0.00978404

Minimum 7.89959E-013	Maximum 0.0107547	
Mean 0.00384884	Std. Dev. 0.00258078	Variance 6.66044E-006

At 300 years

01% of values less than 7.87E-017
05% of values less than 9.93024E-011
10% of values less than 1.35084E-008
50% of values less than 2.54771E-005
90% of values less than 0.000193631
95% of values less than 0.000290104
99% of values less than 0.000491389

Minimum 0	Maximum 0.000660339	
Mean 6.93937E-005	Std. Dev. 0.00010298	Variance 1.0605E-008

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 5.37269E-024
50% of values less than 6.31975E-013
90% of values less than 5.99325E-010
95% of values less than 2.35003E-009
99% of values less than 1.39509E-008

Minimum 0	Maximum 3.78759E-008	
Mean 5.58294E-010	Std. Dev. 2.83543E-009	Variance 8.03966E-018

Phase: Phase 1

Source Concentration of Nickel [mg/l]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 0

90% of values less than 0

95% of values less than 0

99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Source Concentration of Sulphate [mg/l]

At 30 years

01% of values less than 1.80938
05% of values less than 9.55901
10% of values less than 17.1089
50% of values less than 41.8146
90% of values less than 53.1734
95% of values less than 55.7825
99% of values less than 59.3767

Minimum 0.0108984	Maximum 61.4926	
Mean 38.4321	Std. Dev. 13.8457	Variance 191.704

At 100 years

01% of values less than 1.60956E-005
05% of values less than 0.0105921
10% of values less than 0.102469
50% of values less than 3.33956
90% of values less than 8.52267
95% of values less than 10.2726
99% of values less than 13.1041

Minimum 3.55671E-014	Maximum 15.0208	
Mean 3.92366	Std. Dev. 3.32747	Variance 11.072

At 300 years

01% of values less than 5.96747E-020
05% of values less than 3.80972E-011
10% of values less than 4.57326E-008
50% of values less than 0.00244107
90% of values less than 0.0455836
95% of values less than 0.0816974
99% of values less than 0.174792

Minimum 0	Maximum 0.267761	
Mean 0.0162017	Std. Dev. 0.033225	Variance 0.0011039

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 2.71609E-030
50% of values less than 2.57747E-014
90% of values less than 5.10063E-010
95% of values less than 3.6648E-009
99% of values less than 4.79102E-008

Minimum 0	Maximum 2.02508E-007	
Mean 1.74166E-009	Std. Dev. 1.28916E-008	Variance 1.66193E-016

Phase: Phase 1

Source Concentration of Sulphate [mg/l]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 0

90% of values less than 0

95% of values less than 0

99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Source Concentration of Zinc [mg/l]

At 30 years

01% of values less than 0.00871635
05% of values less than 0.0426305
10% of values less than 0.0742699
50% of values less than 0.174155
90% of values less than 0.219011
95% of values less than 0.229248
99% of values less than 0.243314

Minimum 6.6535E-005	Maximum 0.251576	
Mean 0.160108	Std. Dev. 0.0559548	Variance 0.00313094

At 100 years

01% of values less than 1.32912E-007
05% of values less than 6.47503E-005
10% of values less than 0.000563871
50% of values less than 0.0156373
90% of values less than 0.0382113
95% of values less than 0.0456604
99% of values less than 0.0575924

Minimum 7.39609E-016	Maximum 0.0656	
Mean 0.017919	Std. Dev. 0.0147319	Variance 0.00021703

At 300 years

01% of values less than 2.29808E-021
05% of values less than 5.73384E-013
10% of values less than 4.95547E-010
50% of values less than 1.59726E-005
90% of values less than 0.000260434
95% of values less than 0.000454312
99% of values less than 0.000938344

Minimum 0	Maximum 0.0014093	
Mean 9.1926E-005	Std. Dev. 0.000180296	Variance 3.25066E-008

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 5.44036E-016
90% of values less than 6.80714E-012
95% of values less than 4.4638E-011
99% of values less than 5.18025E-010

Minimum 0	Maximum 2.04812E-009	
Mean 1.87814E-011	Std. Dev. 1.32879E-010	Variance 1.76569E-020

Phase: Phase 1

Source Concentration of Zinc [mg/l]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 0

90% of values less than 0

95% of values less than 0

99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Concentration of Arsenic at base of Clay Liner [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 7.64702E-007
50% of values less than 1.91447E-006
90% of values less than 3.38558E-006
95% of values less than 3.77099E-006
99% of values less than 4.42021E-006

Minimum 0	Maximum 4.71031E-006	
Mean 2.00519E-006	Std. Dev. 1.01004E-006	Variance 1.02018E-012

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 5.39355E-005
90% of values less than 0.001236
95% of values less than 0.00148848
99% of values less than 0.00190291

Minimum 0	Maximum 0.00213448	
Mean 0.00040727	Std. Dev. 0.000532233	Variance 2.83271E-007

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0.00253194
95% of values less than 0.00375729
99% of values less than 0.00545476

Minimum 0	Maximum 0.00665442	
Mean 0.000648264	Std. Dev. 0.00130751	Variance 1.70958E-006

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0.000199806

Minimum 0	Maximum 0.000389268	
Mean 5.74144E-006	Std. Dev. 3.66005E-005	Variance 1.3396E-009

Phase: Phase 1

Concentration of Arsenic at base of Clay Liner [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 3.58071E-017
95% of values less than 4.72771E-017
99% of values less than 9.99031E-017

Minimum 0	Maximum 2.79616E-016	
Mean 1.17436E-017	Std. Dev. 2.28672E-017	Variance 5.22907E-034

Phase: Phase 1

Concentration of Cadmium at base of Clay Liner [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Concentration of Cadmium at base of Clay Liner [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 7.43754E-018
95% of values less than 6.84834E-017
99% of values less than 3.97198E-016

Minimum 0	Maximum 1.24237E-014	
Mean 3.62315E-017	Std. Dev. 4.39742E-016	Variance 1.93373E-031

Phase: Phase 1

Concentration of Chloride at base of Clay Liner [mg/l]

At 30 years

01% of values less than 0.0375407
05% of values less than 0.895176
10% of values less than 2.81186
50% of values less than 15.1559
90% of values less than 24.0402
95% of values less than 26.2872
99% of values less than 29.6132

Minimum 2.46772E-006	Maximum 31.4629	
Mean 14.3664	Std. Dev. 7.75424	Variance 60.1283

At 100 years

01% of values less than 0
05% of values less than 4.571E-006
10% of values less than 0.000146152
50% of values less than 0.112078
90% of values less than 0.686018
95% of values less than 0.969272
99% of values less than 1.56623

Minimum 0	Maximum 2.00813	
Mean 0.248746	Std. Dev. 0.337316	Variance 0.113782

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 4.17506E-013
50% of values less than 1.44795E-007
90% of values less than 3.6391E-005
95% of values less than 0.000107974
99% of values less than 0.000462191

Minimum 0	Maximum 0.00101784	
Mean 2.14691E-005	Std. Dev. 8.58422E-005	Variance 7.36889E-009

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 1.14929E-012
95% of values less than 1.64441E-012
99% of values less than 5.78396E-012

Minimum 0	Maximum 3.20044E-010	
Mean 8.0571E-013	Std. Dev. 1.0622E-011	Variance 1.12827E-022

Phase: Phase 1

Concentration of Chloride at base of Clay Liner [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 2.38122E-015
90% of values less than 1.4873E-014
95% of values less than 1.82527E-014
99% of values less than 2.60229E-014

Minimum 0	Maximum 5.77785E-014	
Mean 5.27359E-015	Std. Dev. 6.74989E-015	Variance 4.5561E-029

Phase: Phase 1

Concentration of Chromium at base of Clay Liner [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0.00140622
90% of values less than 0.00490861
95% of values less than 0.00574215
99% of values less than 0.00786039

Minimum 0	Maximum 0.0104366	
Mean 0.00187343	Std. Dev. 0.0020378	Variance 4.15261E-006

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0.000711059
90% of values less than 0.0019981
95% of values less than 0.0023808
99% of values less than 0.00291274

Minimum 0	Maximum 0.00481804	
Mean 0.000840766	Std. Dev. 0.000830768	Variance 6.90175E-007

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 2.44256E-005
90% of values less than 0.000259848
95% of values less than 0.000319285
99% of values less than 0.000426346

Minimum 0	Maximum 0.000561682	
Mean 8.66957E-005	Std. Dev. 0.000113857	Variance 1.29634E-008

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 7.92211E-011
90% of values less than 4.97334E-007
95% of values less than 1.30304E-006
99% of values less than 5.20516E-006

Minimum 0	Maximum 0.000282839	
Mean 6.31385E-007	Std. Dev. 9.2557E-006	Variance 8.56679E-011

Phase: Phase 1

Concentration of Chromium at base of Clay Liner [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 2.10626E-018
95% of values less than 6.2129E-018
99% of values less than 2.18497E-016

Minimum 0	Maximum 0.000292957	
Mean 2.92664E-007	Std. Dev. 9.25948E-006	Variance 8.57379E-011

Phase: Phase 1

Concentration of Copper at base of Clay Liner [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0.0393087
95% of values less than 0.0632469
99% of values less than 0.0852982

Minimum 0	Maximum 0.100188	
Mean 0.00928536	Std. Dev. 0.0204967	Variance 0.000420113

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0.00942533
95% of values less than 0.0173543
99% of values less than 0.0264467

Minimum 0	Maximum 0.0415166	
Mean 0.00206866	Std. Dev. 0.00590619	Variance 3.4883E-005

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 5.20205E-005
99% of values less than 0.000302569

Minimum 0	Maximum 0.00114758	
Mean 1.17937E-005	Std. Dev. 6.72299E-005	Variance 4.51985E-009

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 5.77132E-010

Minimum 0	Maximum 5.21575E-009	
Mean 2.17145E-011	Std. Dev. 2.1778E-010	Variance 4.74279E-020

Phase: Phase 1

Concentration of Copper at base of Clay Liner [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 6.04663E-017
95% of values less than 3.78375E-016
99% of values less than 9.58522E-015

Minimum 0	Maximum 4.4824E-014	
Mean 3.38606E-016	Std. Dev. 2.53209E-015	Variance 6.41146E-030

Phase: Phase 1

Concentration of Lead at base of Clay Liner [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0.000381308	
Mean 3.8173E-007	Std. Dev. 1.2052E-005	Variance 1.45251E-010

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Concentration of Lead at base of Clay Liner [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 4.70415E-014	
Mean 4.69945E-017	Std. Dev. 1.48684E-015	Variance 2.21069E-030

Phase: Phase 1

Concentration of Mercury at base of Clay Liner [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 1.49744E-008

Minimum 0	Maximum 1.26968E-007	
Mean 7.33057E-010	Std. Dev. 7.57217E-009	Variance 5.73378E-017

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Concentration of Mercury at base of Clay Liner [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 3.20446E-018
95% of values less than 2.24938E-017
99% of values less than 1.02154E-016

Minimum 0	Maximum 2.05059E-015	
Mean 7.1736E-018	Std. Dev. 7.7317E-017	Variance 5.97792E-033

Phase: Phase 1

Concentration of Nickel at base of Clay Liner [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Concentration of Nickel at base of Clay Liner [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Concentration of Sulphate at base of Clay Liner [mg/l]

At 30 years

01% of values less than 2.19883
05% of values less than 10.6701
10% of values less than 18.9144
50% of values less than 43.7518
90% of values less than 55.0342
95% of values less than 57.5278
99% of values less than 61.0372

Minimum 0.0186104	Maximum 62.9028	
Mean 40.2141	Std. Dev. 13.9975	Variance 195.93

At 100 years

01% of values less than 3.70844E-005
05% of values less than 0.0146774
10% of values less than 0.135377
50% of values less than 3.82427
90% of values less than 9.40208
95% of values less than 11.165
99% of values less than 14.1637

Minimum 0	Maximum 16.0411	
Mean 4.3647	Std. Dev. 3.60982	Variance 13.0308

At 300 years

01% of values less than 1.01366E-013
05% of values less than 1.4628E-010
10% of values less than 1.6151E-007
50% of values less than 0.00449818
90% of values less than 0.0704318
95% of values less than 0.120807
99% of values less than 0.249577

Minimum 0	Maximum 0.368351	
Mean 0.0246654	Std. Dev. 0.047844	Variance 0.00228905

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 8.50955E-008
95% of values less than 2.60296E-007
99% of values less than 9.60524E-007

Minimum 0	Maximum 1.97319E-006	
Mean 4.3626E-008	Std. Dev. 1.78643E-007	Variance 3.19133E-014

Phase: Phase 1

Concentration of Sulphate at base of Clay Liner [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 4.11311E-015
90% of values less than 2.17306E-014
95% of values less than 2.75401E-014
99% of values less than 3.68054E-014

Minimum 0	Maximum 1.03056E-013	
Mean 7.84566E-015	Std. Dev. 1.00403E-014	Variance 1.00807E-028

Phase: Phase 1

Concentration of Zinc at base of Clay Liner [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Concentration of Zinc at base of Clay Liner [mg/l]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 0

90% of values less than 0

95% of values less than 0

99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Concentration of Arsenic at base of Unsaturated Zone [mg/l]

At 30 years

01% of values less than 0
05% of values less than 1.37934E-018
10% of values less than 6.30334E-017
50% of values less than 3.16128E-010
90% of values less than 1.94845E-009
95% of values less than 2.52218E-009
99% of values less than 3.94516E-009

Minimum 0	Maximum 5.57737E-009	
Mean 6.75422E-010	Std. Dev. 8.88509E-010	Variance 7.89449E-019

At 100 years

01% of values less than 1.53156E-013
05% of values less than 1.7479E-009
10% of values less than 6.11307E-009
50% of values less than 8.92395E-007
90% of values less than 0.000151234
95% of values less than 0.000196792
99% of values less than 0.000285566

Minimum 7.45063E-016	Maximum 0.000364282	
Mean 4.33274E-005	Std. Dev. 6.99659E-005	Variance 4.89523E-009

At 300 years

01% of values less than 5.76728E-018
05% of values less than 1.09872E-015
10% of values less than 2.3245E-014
50% of values less than 1.99234E-007
90% of values less than 0.00276155
95% of values less than 0.00367405
99% of values less than 0.00512788

Minimum 0	Maximum 0.00613389	
Mean 0.000795746	Std. Dev. 0.0012984	Variance 1.68584E-006

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 1.52751E-015
90% of values less than 0.000125226
95% of values less than 0.000755651
99% of values less than 0.00184545

Minimum 0	Maximum 0.00252557	
Mean 8.79211E-005	Std. Dev. 0.000318521	Variance 1.01455E-007

Phase: Phase 1

Concentration of Arsenic at base of Unsaturated Zone [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 2.97132E-016
90% of values less than 2.01625E-015
95% of values less than 3.91754E-015
99% of values less than 4.63575E-014

Minimum 0	Maximum 8.55446E-007	
Mean 2.18493E-009	Std. Dev. 4.09085E-008	Variance 1.6735E-015

Phase: Phase 1

Concentration of Cadmium at base of Unsaturated Zone [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 2.95506E-017
95% of values less than 5.76954E-017
99% of values less than 1.40407E-016

Minimum 0	Maximum 7.1884E-015	
Mean 1.84495E-017	Std. Dev. 2.3169E-016	Variance 5.36803E-032

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 1.57993E-017
95% of values less than 1.32795E-016
99% of values less than 1.95937E-014

Minimum 0	Maximum 6.35517E-014	
Mean 5.66141E-016	Std. Dev. 4.40456E-015	Variance 1.94001E-029

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 1.1926E-017
99% of values less than 3.03808E-016

Minimum 0	Maximum 3.61982E-015	
Mean 1.4769E-017	Std. Dev. 1.49284E-016	Variance 2.22857E-032

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 6.43528E-018

Minimum 0	Maximum 1.90298E-015	
Mean 2.38434E-018	Std. Dev. 6.05208E-017	Variance 3.66277E-033

Phase: Phase 1

Concentration of Cadmium at base of Unsaturated Zone [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.03037E-014	
Mean 3.55563E-017	Std. Dev. 5.35187E-016	Variance 2.86425E-031

Phase: Phase 1

Concentration of Chloride at base of Unsaturated Zone [mg/l]

At 30 years

01% of values less than 0.350658
05% of values less than 3.29059
10% of values less than 7.53149
50% of values less than 24.0044
90% of values less than 34.2226
95% of values less than 37.0089
99% of values less than 42.086

Minimum 0.000386993	Maximum 58.7434	
Mean 22.5488	Std. Dev. 10.2341	Variance 104.736

At 100 years

01% of values less than 1.52197E-006
05% of values less than 0.000944623
10% of values less than 0.0159195
50% of values less than 0.964308
90% of values less than 3.47408
95% of values less than 4.3455
99% of values less than 5.88313

Minimum 0	Maximum 58.7147	
Mean 1.45129	Std. Dev. 2.30554	Variance 5.3155

At 300 years

01% of values less than 2.61163E-013
05% of values less than 1.56944E-010
10% of values less than 3.67813E-009
50% of values less than 0.000190582
90% of values less than 0.00740295
95% of values less than 0.0126032
99% of values less than 0.0311907

Minimum 0	Maximum 58.612	
Mean 0.0609364	Std. Dev. 1.85248	Variance 3.43169

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 1.00819E-010
90% of values less than 5.80978E-009
95% of values less than 1.80745E-008
99% of values less than 4.89932E-008

Minimum 0	Maximum 55.2267	
Mean 0.0551716	Std. Dev. 1.74555	Variance 3.04695

Phase: Phase 1

Concentration of Chloride at base of Unsaturated Zone [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 2.53234E-013
90% of values less than 7.08367E-013
95% of values less than 9.20201E-013
99% of values less than 2.0226E-012

Minimum 0	Maximum 0.019603	
Mean 1.95835E-005	Std. Dev. 0.000619593	Variance 3.83895E-007

Phase: Phase 1

Concentration of Chromium at base of Unsaturated Zone [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 2.85462E-008
90% of values less than 0.00360507
95% of values less than 0.00539843
99% of values less than 0.00792644

Minimum 0	Maximum 0.012828	
Mean 0.000849959	Std. Dev. 0.00185522	Variance 3.44183E-006

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 7.07005E-005
90% of values less than 0.00340427
95% of values less than 0.00476886
99% of values less than 0.00711287

Minimum 0	Maximum 0.0124783	
Mean 0.000986692	Std. Dev. 0.00169399	Variance 2.86961E-006

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 8.08263E-005
90% of values less than 0.00160302
95% of values less than 0.00248385
99% of values less than 0.00550663

Minimum 0	Maximum 0.00891613	
Mean 0.000582496	Std. Dev. 0.00110018	Variance 1.21039E-006

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 3.11995E-007
90% of values less than 0.000133517
95% of values less than 0.000303477
99% of values less than 0.00274886

Minimum 0	Maximum 0.00851665	
Mean 0.000109425	Std. Dev. 0.000550075	Variance 3.02582E-007

Phase: Phase 1

Concentration of Chromium at base of Unsaturated Zone [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 8.38445E-018
90% of values less than 1.63667E-014
95% of values less than 1.68485E-011
99% of values less than 2.22463E-005

Minimum 0	Maximum 0.00212971	
Mean 5.37068E-006	Std. Dev. 8.35438E-005	Variance 6.97956E-009

Phase: Phase 1

Concentration of Copper at base of Unsaturated Zone [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 1.30457E-017
90% of values less than 0.000295924
95% of values less than 0.00365324
99% of values less than 0.0196356

Minimum 0	Maximum 0.0247524	
Mean 0.000670061	Std. Dev. 0.00300896	Variance 9.05383E-006

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 8.17597E-016
90% of values less than 0.00788389
95% of values less than 0.0175297
99% of values less than 0.0391907

Minimum 0	Maximum 0.071782	
Mean 0.00258425	Std. Dev. 0.00776744	Variance 6.03331E-005

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 6.95482E-016
90% of values less than 0.00375151
95% of values less than 0.0102182
99% of values less than 0.0203873

Minimum 0	Maximum 0.0254393	
Mean 0.00122255	Std. Dev. 0.00370354	Variance 1.37162E-005

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 5.69407E-018
90% of values less than 7.02217E-005
95% of values less than 0.00054824
99% of values less than 0.00279233

Minimum 0	Maximum 0.0249412	
Mean 0.000165442	Std. Dev. 0.00119762	Variance 1.43429E-006

Phase: Phase 1

Concentration of Copper at base of Unsaturated Zone [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 3.53484E-015
95% of values less than 5.7676E-013
99% of values less than 2.48626E-009

Minimum 0	Maximum 0.0057316	
Mean 1.08514E-005	Std. Dev. 0.000242654	Variance 5.8881E-008

Phase: Phase 1

Concentration of Lead at base of Unsaturated Zone [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 2.93183E-007	
Mean 2.98307E-010	Std. Dev. 9.26805E-009	Variance 8.58968E-017

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0.000761832	
Mean 7.61072E-007	Std. Dev. 2.40792E-005	Variance 5.79809E-010

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 3.29262E-006	
Mean 3.28933E-009	Std. Dev. 1.0407E-007	Variance 1.08305E-014

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 3.02604E-012	
Mean 3.02302E-015	Std. Dev. 9.56441E-014	Variance 9.14779E-027

Phase: Phase 1

Concentration of Lead at base of Unsaturated Zone [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 7.11282E-016	
Mean 7.4035E-019	Std. Dev. 2.25003E-017	Variance 5.06262E-034

Phase: Phase 1

Concentration of Mercury at base of Unsaturated Zone [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 1.86697E-017
95% of values less than 4.08526E-017
99% of values less than 1.15161E-014

Minimum 0	Maximum 1.05646E-010	
Mean 1.52906E-013	Std. Dev. 3.52808E-012	Variance 1.24473E-023

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 5.5461E-015
95% of values less than 1.00947E-012
99% of values less than 4.94297E-010

Minimum 0	Maximum 3.017E-008	
Mean 8.1812E-011	Std. Dev. 1.28434E-009	Variance 1.64952E-018

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 2.17543E-015
95% of values less than 4.32507E-013
99% of values less than 1.25774E-010

Minimum 0	Maximum 6.05125E-009	
Mean 2.0712E-011	Std. Dev. 2.84063E-010	Variance 8.06916E-020

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 3.05231E-017
95% of values less than 1.2684E-014
99% of values less than 1.18806E-011

Minimum 0	Maximum 1.44278E-010	
Mean 5.19329E-013	Std. Dev. 6.73488E-012	Variance 4.53585E-023

Phase: Phase 1

Concentration of Mercury at base of Unsaturated Zone [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 2.09061E-017
99% of values less than 1.41473E-015

Minimum 0	Maximum 4.52813E-012	
Mean 4.59366E-015	Std. Dev. 1.43121E-013	Variance 2.04838E-026

Phase: Phase 1

Concentration of Nickel at base of Unsaturated Zone [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 8.2661E-017
90% of values less than 1.81066E-016
95% of values less than 2.01709E-016
99% of values less than 2.2783E-016

Minimum 0	Maximum 2.51145E-016	
Mean 8.70219E-017	Std. Dev. 7.0716E-017	Variance 5.00075E-033

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 8.94003E-017
95% of values less than 1.20876E-016
99% of values less than 1.55992E-016

Minimum 0	Maximum 1.83295E-016	
Mean 2.15429E-017	Std. Dev. 3.94848E-017	Variance 1.55905E-033

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 4.9395E-018
95% of values less than 3.6346E-017
99% of values less than 1.14556E-016

Minimum 0	Maximum 1.78995E-016	
Mean 5.10927E-018	Std. Dev. 2.02862E-017	Variance 4.11528E-034

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 5.82723E-017

Minimum 0	Maximum 1.49295E-016	
Mean 1.56435E-018	Std. Dev. 1.1945E-017	Variance 1.42684E-034

Phase: Phase 1

Concentration of Nickel at base of Unsaturated Zone [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.9655E-017	
Mean 5.01205E-020	Std. Dev. 8.13054E-019	Variance 6.61058E-037

Phase: Phase 1

Concentration of Sulphate at base of Unsaturated Zone [mg/l]

At 30 years

01% of values less than 6.21067
05% of values less than 19.9654
10% of values less than 30.4215
50% of values less than 54.7807
90% of values less than 65.5141
95% of values less than 68.0772
99% of values less than 72.638

Minimum 0.160927	Maximum 86.5393	
Mean 51.0191	Std. Dev. 14.6631	Variance 215.006

At 100 years

01% of values less than 0.00576187
05% of values less than 0.297105
10% of values less than 1.30532
50% of values less than 10.7814
90% of values less than 20.7165
95% of values less than 23.2509
99% of values less than 26.978

Minimum 6.82185E-007	Maximum 86.5487	
Mean 11.0412	Std. Dev. 7.47892	Variance 55.9342

At 300 years

01% of values less than 1.12861E-009
05% of values less than 4.43141E-006
10% of values less than 0.000245251
50% of values less than 0.140063
90% of values less than 0.908929
95% of values less than 1.20589
99% of values less than 1.9172

Minimum 0	Maximum 86.2874	
Mean 0.398788	Std. Dev. 2.74983	Variance 7.56154

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 2.21504E-011
50% of values less than 3.19079E-007
90% of values less than 2.33851E-005
95% of values less than 5.65528E-005
99% of values less than 0.000249066

Minimum 0	Maximum 81.2277	
Mean 0.081158	Std. Dev. 2.56736	Variance 6.59134

Phase: Phase 1

Concentration of Sulphate at base of Unsaturated Zone [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 4.21104E-013
90% of values less than 1.08077E-012
95% of values less than 1.30503E-012
99% of values less than 2.31435E-012

Minimum 0	Maximum 0.0291775	
Mean 2.91483E-005	Std. Dev. 0.000922212	Variance 8.50475E-007

Phase: Phase 1

Concentration of Zinc at base of Unsaturated Zone [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 2.6431E-018
90% of values less than 1.5239E-016
95% of values less than 2.4733E-016
99% of values less than 4.47923E-016

Minimum 0	Maximum 6.20402E-016	
Mean 4.12477E-017	Std. Dev. 9.34489E-017	Variance 8.73269E-033

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 5.14435E-018
95% of values less than 2.12402E-017
99% of values less than 1.23357E-016

Minimum 0	Maximum 2.11259E-016	
Mean 4.44507E-018	Std. Dev. 1.95718E-017	Variance 3.83055E-034

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 1.44722E-017

Minimum 0	Maximum 2.43575E-016	
Mean 9.03577E-019	Std. Dev. 1.04559E-017	Variance 1.09325E-034

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.1584E-016	
Mean 2.42953E-019	Std. Dev. 4.4408E-018	Variance 1.97207E-035

Phase: Phase 1

Concentration of Zinc at base of Unsaturated Zone [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 5.06375E-017	
Mean 5.05869E-020	Std. Dev. 1.6005E-018	Variance 2.56159E-036

Phase: Phase 1

Approx. time to Peak Conc. Arsenic at Base of Unsaturated Zone [years]

01% of values less than 43
05% of values less than 47
10% of values less than 52
50% of values less than 190
90% of values less than 344
95% of values less than 420
99% of values less than 928

Minimum 35	Maximum 8202	
Mean 217.012	Std. Dev. 323.525	Variance 104668

Approx. time to Peak Conc. Cadmium at Base of Unsaturated Zone [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 64
95% of values less than 95
99% of values less than 464

Minimum 0	Maximum 20000	
Mean 95.7213	Std. Dev. 1048.29	Variance 1.09891E+006

Approx. time to Peak Conc. Chloride at Base of Unsaturated Zone [years]

01% of values less than 5
05% of values less than 5
10% of values less than 5
50% of values less than 7
90% of values less than 8
95% of values less than 8
99% of values less than 11

Minimum 5	Maximum 16	
Mean 6.84216	Std. Dev. 1.20543	Variance 1.45306

Approx. time to Peak Conc. Chromium at Base of Unsaturated Zone [years]

01% of values less than 0
05% of values less than 0
10% of values less than 7
50% of values less than 128
90% of values less than 565
95% of values less than 840
99% of values less than 1681

Minimum 0	Maximum 20000	
Mean 259.728	Std. Dev. 892.109	Variance 795858

Approx. time to Peak Conc. Copper at Base of Unsaturated Zone [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 78
90% of values less than 464
95% of values less than 761
99% of values less than 1681

Phase: Phase 1

Approx. time to Peak Conc. Copper at Base of Unsaturated Zone [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 78
90% of values less than 464
95% of values less than 761
99% of values less than 1681

Minimum 0	Maximum 20000	
Mean 262.401	Std. Dev. 1397.61	Variance 1.9533E+006

Approx. time to Peak Conc. Lead at Base of Unsaturated Zone [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 105	
Mean 0.431568	Std. Dev. 4.8037	Variance 23.0756

Approx. time to Peak Conc. Mercury at Base of Unsaturated Zone [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 210
95% of values less than 464
99% of values less than 1681

Minimum 0	Maximum 20000	
Mean 215.861	Std. Dev. 1573.71	Variance 2.47657E+006

Approx. time to Peak Conc. Nickel at Base of Unsaturated Zone [years]

01% of values less than 0
05% of values less than 0
10% of values less than 30
50% of values less than 35
90% of values less than 95
95% of values less than 116
99% of values less than 300

Minimum 0	Maximum 1681	
Mean 57.1768	Std. Dev. 139.616	Variance 19492.6

Approx. time to Peak Conc. Sulphate at Base of Unsaturated Zone [years]

01% of values less than 5
05% of values less than 7
10% of values less than 7
50% of values less than 7
90% of values less than 9
95% of values less than 9
99% of values less than 11

Phase: Phase 1

Approx. time to Peak Conc. Sulphate at Base of Unsaturated Zone [years]

01% of values less than 5
05% of values less than 7
10% of values less than 7
50% of values less than 7
90% of values less than 9
95% of values less than 9
99% of values less than 11

Minimum 5	Maximum 21	
Mean 7.33267	Std. Dev. 1.11724	Variance 1.24822

Approx. time to Peak Conc. Zinc at Base of Unsaturated Zone [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 30
90% of values less than 43
95% of values less than 64
99% of values less than 141

Minimum 0	Maximum 565	
Mean 25.1908	Std. Dev. 34.7647	Variance 1208.58

Phase: Phase 1

Concentration of Arsenic at Phase Monitor Well [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 3.36336E-017
90% of values less than 7.42196E-016
95% of values less than 1.16434E-015
99% of values less than 2.88152E-015

Minimum 0	Maximum 9.45092E-015	
Mean 2.53079E-016	Std. Dev. 6.38635E-016	Variance 4.07854E-031

At 100 years

01% of values less than 1.40364E-014
05% of values less than 3.10477E-010
10% of values less than 1.73057E-009
50% of values less than 4.59735E-007
90% of values less than 5.23184E-006
95% of values less than 7.25619E-006
99% of values less than 1.21816E-005

Minimum 6.134E-016	Maximum 2.31984E-005	
Mean 1.68716E-006	Std. Dev. 2.66404E-006	Variance 7.09709E-012

At 300 years

01% of values less than 7.11042E-012
05% of values less than 1.7567E-010
10% of values less than 6.10424E-010
50% of values less than 2.44558E-006
90% of values less than 0.00188471
95% of values less than 0.00234713
99% of values less than 0.00336232

Minimum 6.94095E-016	Maximum 0.00399268	
Mean 0.000546337	Std. Dev. 0.00084668	Variance 7.16868E-007

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 6.8867E-011
90% of values less than 0.000388243
95% of values less than 0.00118688
99% of values less than 0.00255427

Minimum 0	Maximum 0.00299152	
Mean 0.000140315	Std. Dev. 0.000451246	Variance 2.03623E-007

Phase: Phase 1

Concentration of Arsenic at Phase Monitor Well [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 4.51354E-016
90% of values less than 4.40761E-015
95% of values less than 7.30472E-015
99% of values less than 2.79501E-013

Minimum 0	Maximum 1.30139E-006	
Mean 3.30071E-009	Std. Dev. 6.12632E-008	Variance 3.75318E-015

Phase: Phase 1

Concentration of Cadmium at Phase Monitor Well [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 8.66602E-019
99% of values less than 1.44735E-017

Minimum 0	Maximum 7.16099E-017	
Mean 4.41377E-019	Std. Dev. 3.56959E-018	Variance 1.2742E-035

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 1.63069E-017
95% of values less than 1.04052E-016
99% of values less than 6.75809E-015

Minimum 0	Maximum 1.11067E-013	
Mean 5.28083E-016	Std. Dev. 5.61339E-015	Variance 3.15101E-029

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 7.49819E-018
95% of values less than 3.93618E-017
99% of values less than 3.15894E-015

Minimum 0	Maximum 2.94383E-014	
Mean 1.35423E-016	Std. Dev. 1.31194E-015	Variance 1.72118E-030

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 5.62986E-017

Minimum 0	Maximum 2.35214E-015	
Mean 4.71177E-018	Std. Dev. 7.99786E-017	Variance 6.39657E-033

Phase: Phase 1

Concentration of Cadmium at Phase Monitor Well [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.47732E-013	
Mean 1.97668E-016	Std. Dev. 4.75973E-015	Variance 2.2655E-029

Phase: Phase 1

Concentration of Chloride at Phase Monitor Well [mg/l]

At 30 years

01% of values less than 0.735679
05% of values less than 5.03292
10% of values less than 10.1477
50% of values less than 27.3262
90% of values less than 37.4955
95% of values less than 39.9125
99% of values less than 44.4945

Minimum 0.0021551	Maximum 56.1212	
Mean 25.5957	Std. Dev. 10.4565	Variance 109.339

At 100 years

01% of values less than 4.50048E-006
05% of values less than 0.00309276
10% of values less than 0.0362219
50% of values less than 1.55392
90% of values less than 4.73794
95% of values less than 5.79375
99% of values less than 7.50454

Minimum 0	Maximum 54.7017	
Mean 2.05763	Std. Dev. 2.50841	Variance 6.2921

At 300 years

01% of values less than 0
05% of values less than 1.10684E-009
10% of values less than 2.19391E-008
50% of values less than 0.000616979
90% of values less than 0.0166683
95% of values less than 0.0274517
99% of values less than 0.0628321

Minimum 0	Maximum 54.6113	
Mean 0.0599193	Std. Dev. 1.72597	Variance 2.97897

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 1.13123E-010
90% of values less than 1.15944E-008
95% of values less than 2.23494E-008
99% of values less than 5.5506E-008

Minimum 0	Maximum 52.1839	
Mean 0.0521317	Std. Dev. 1.64937	Variance 2.72044

Phase: Phase 1

Concentration of Chloride at Phase Monitor Well [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 2.16218E-013
90% of values less than 7.36655E-013
95% of values less than 9.91917E-013
99% of values less than 1.58477E-012

Minimum 0	Maximum 0.0351745	
Mean 3.51393E-005	Std. Dev. 0.00111176	Variance 1.23601E-006

Phase: Phase 1

Concentration of Chromium at Phase Monitor Well [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 3.26336E-010
95% of values less than 2.14029E-007
99% of values less than 0.000222493

Minimum 0	Maximum 0.00581696	
Mean 2.17609E-005	Std. Dev. 0.000266733	Variance 7.11463E-008

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 7.0892E-010
90% of values less than 9.97605E-005
95% of values less than 0.000683757
99% of values less than 0.00344441

Minimum 0	Maximum 0.00638549	
Mean 0.000130702	Std. Dev. 0.000581351	Variance 3.37969E-007

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 2.30951E-005
90% of values less than 0.00137797
95% of values less than 0.00191019
99% of values less than 0.00380877

Minimum 0	Maximum 0.00580009	
Mean 0.000406232	Std. Dev. 0.000812443	Variance 6.60064E-007

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 1.99789E-005
90% of values less than 0.000525338
95% of values less than 0.00140347
99% of values less than 0.00382259

Minimum 0	Maximum 0.00769952	
Mean 0.000245878	Std. Dev. 0.000675535	Variance 4.56347E-007

Phase: Phase 1

Concentration of Chromium at Phase Monitor Well [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 5.82766E-018
90% of values less than 9.05375E-014
95% of values less than 4.64543E-011
99% of values less than 3.11882E-005

Minimum 0	Maximum 0.00213594	
Mean 5.67483E-006	Std. Dev. 8.53836E-005	Variance 7.29035E-009

Phase: Phase 1

Concentration of Copper at Phase Monitor Well [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 5.29569E-016
95% of values less than 2.07354E-011
99% of values less than 5.93279E-006

Minimum 0	Maximum 8.7357E-005	
Mean 3.43096E-007	Std. Dev. 4.45769E-006	Variance 1.9871E-011

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 8.42096E-006
95% of values less than 0.000173243
99% of values less than 0.0041858

Minimum 0	Maximum 0.0165764	
Mean 0.000119049	Std. Dev. 0.0008579	Variance 7.35992E-007

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 4.38342E-016
90% of values less than 0.00210255
95% of values less than 0.0068638
99% of values less than 0.0248399

Minimum 0	Maximum 0.03991	
Mean 0.00111934	Std. Dev. 0.00407158	Variance 1.65778E-005

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 3.80019E-016
90% of values less than 0.000919293
95% of values less than 0.00267408
99% of values less than 0.00665143

Minimum 0	Maximum 0.0223687	
Mean 0.000400643	Std. Dev. 0.00149637	Variance 2.23911E-006

Phase: Phase 1

Concentration of Copper at Phase Monitor Well [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 7.35928E-015
95% of values less than 1.18736E-012
99% of values less than 7.00595E-009

Minimum 0	Maximum 0.00599441	
Mean 1.16778E-005	Std. Dev. 0.000260626	Variance 6.79257E-008

Phase: Phase 1

Concentration of Lead at Phase Monitor Well [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.59092E-012	
Mean 1.58933E-015	Std. Dev. 5.02841E-014	Variance 2.52849E-027

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 9.26431E-006	
Mean 9.34724E-009	Std. Dev. 2.92829E-007	Variance 8.57486E-014

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0.000177215	
Mean 1.77045E-007	Std. Dev. 5.60125E-006	Variance 3.1374E-011

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 2.63121E-008	
Mean 2.62859E-011	Std. Dev. 8.31645E-010	Variance 6.91634E-019

Phase: Phase 1

Concentration of Lead at Phase Monitor Well [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.48592E-015	
Mean 1.52967E-018	Std. Dev. 4.69857E-017	Variance 2.20765E-033

Phase: Phase 1

Concentration of Mercury at Phase Monitor Well [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 6.0712E-014	
Mean 6.66709E-017	Std. Dev. 1.92793E-015	Variance 3.71692E-030

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 2.33242E-018
99% of values less than 2.37048E-014

Minimum 0	Maximum 4.39211E-009	
Mean 4.61219E-012	Std. Dev. 1.38901E-010	Variance 1.92935E-020

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 1.56873E-016
95% of values less than 2.972E-014
99% of values less than 1.44111E-011

Minimum 0	Maximum 2.61022E-009	
Mean 4.1457E-012	Std. Dev. 8.57888E-011	Variance 7.35971E-021

Phase: Phase 1

Concentration of Mercury at Phase Monitor Well [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 2.22326E-016
99% of values less than 2.75884E-014

Minimum 0	Maximum 4.45618E-013	
Mean 1.71112E-015	Std. Dev. 1.89792E-014	Variance 3.60208E-028

Phase: Phase 1

Concentration of Nickel at Phase Monitor Well [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 2.32148E-018
95% of values less than 5.36275E-018
99% of values less than 1.05855E-017

Minimum 0	Maximum 2.15422E-017	
Mean 7.20262E-019	Std. Dev. 2.29771E-018	Variance 5.27949E-036

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 1.72579E-017
90% of values less than 9.00916E-017
95% of values less than 1.10295E-016
99% of values less than 1.3638E-016

Minimum 0	Maximum 1.57839E-016	
Mean 3.48605E-017	Std. Dev. 3.70305E-017	Variance 1.37125E-033

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 2.52355E-017
95% of values less than 5.98561E-017
99% of values less than 1.20688E-016

Minimum 0	Maximum 1.54733E-016	
Mean 8.83282E-018	Std. Dev. 2.35031E-017	Variance 5.52394E-034

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 6.56073E-017

Minimum 0	Maximum 1.39573E-016	
Mean 1.63053E-018	Std. Dev. 1.14689E-017	Variance 1.31537E-034

Phase: Phase 1

Concentration of Nickel at Phase Monitor Well [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.88459E-017	
Mean 5.68037E-020	Std. Dev. 8.79004E-019	Variance 7.72647E-037

Phase: Phase 1

Concentration of Sulphate at Phase Monitor Well [mg/l]

At 30 years

01% of values less than 8.82601
05% of values less than 24.2327
10% of values less than 34.5826
50% of values less than 57.0096
90% of values less than 67.2142
95% of values less than 69.4233
99% of values less than 73.7078

Minimum 0.372236	Maximum 82.8145	
Mean 53.5406	Std. Dev. 13.8533	Variance 191.913

At 100 years

01% of values less than 0.0161459
05% of values less than 0.538689
10% of values less than 1.98274
50% of values less than 13.503
90% of values less than 23.754
95% of values less than 26.3335
99% of values less than 29.8151

Minimum 5.20795E-007	Maximum 80.6291	
Mean 13.2821	Std. Dev. 8.18424	Variance 66.9817

At 300 years

01% of values less than 7.65587E-009
05% of values less than 2.16818E-005
10% of values less than 0.000838651
50% of values less than 0.251159
90% of values less than 1.34211
95% of values less than 1.7849
99% of values less than 2.67335

Minimum 0	Maximum 80.4197	
Mean 0.56478	Std. Dev. 2.59812	Variance 6.75025

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 7.67027E-011
50% of values less than 7.32819E-007
90% of values less than 8.56416E-005
95% of values less than 0.000194617
99% of values less than 0.000774607

Minimum 0	Maximum 76.7067	
Mean 0.0766686	Std. Dev. 2.42447	Variance 5.87804

Phase: Phase 1

Concentration of Sulphate at Phase Monitor Well [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 3.03036E-013
90% of values less than 1.05767E-012
95% of values less than 1.43289E-012
99% of values less than 2.70716E-012

Minimum 0	Maximum 0.0523579	
Mean 5.23056E-005	Std. Dev. 0.00165487	Variance 2.73861E-006

Phase: Phase 1

Concentration of Zinc at Phase Monitor Well [mg/l]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 7.50501E-017
95% of values less than 1.55535E-016
99% of values less than 3.1523E-016

Minimum 0	Maximum 4.71464E-016	
Mean 2.48561E-017	Std. Dev. 6.2905E-017	Variance 3.95704E-033

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 7.73543E-018
95% of values less than 2.82208E-017
99% of values less than 1.36169E-016

Minimum 0	Maximum 1.91825E-016	
Mean 5.46156E-018	Std. Dev. 2.21249E-017	Variance 4.8951E-034

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 1.55062E-017

Minimum 0	Maximum 2.31485E-016	
Mean 9.32756E-019	Std. Dev. 1.02275E-017	Variance 1.04602E-034

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 1.07917E-016	
Mean 2.50499E-019	Std. Dev. 4.39248E-018	Variance 1.92939E-035

Phase: Phase 1

Concentration of Zinc at Phase Monitor Well [mg/l]

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 4.8798E-017	
Mean 4.87493E-020	Std. Dev. 1.54236E-018	Variance 2.37887E-036

Phase: Phase 1

Approx. time to Peak Conc. Arsenic at Phase Monitor Well [years]

01% of values less than 86
05% of values less than 95
10% of values less than 100
50% of values less than 256
90% of values less than 464
95% of values less than 512
99% of values less than 1024

Minimum 70	Maximum 9056	
Mean 288.623	Std. Dev. 355.499	Variance 126379

Approx. time to Peak Conc. Cadmium at Phase Monitor Well [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 172
95% of values less than 256
99% of values less than 565

Minimum 0	Maximum 20000	
Mean 104.239	Std. Dev. 926.944	Variance 859225

Approx. time to Peak Conc. Chloride at Phase Monitor Well [years]

01% of values less than 7
05% of values less than 7
10% of values less than 7
50% of values less than 7
90% of values less than 7
95% of values less than 11
99% of values less than 13

Minimum 7	Maximum 19	
Mean 7.27473	Std. Dev. 1.1779	Variance 1.38745

Approx. time to Peak Conc. Chromium at Phase Monitor Well [years]

01% of values less than 0
05% of values less than 0
10% of values less than 86
50% of values less than 464
90% of values less than 1024
95% of values less than 1249
99% of values less than 1856

Minimum 0	Maximum 12189	
Mean 549.85	Std. Dev. 588.782	Variance 346664

Phase: Phase 1

Approx. time to Peak Conc. Copper at Phase Monitor Well [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 312
90% of values less than 840
95% of values less than 1249
99% of values less than 1856

Minimum 0	Maximum 20000	
Mean 425.961	Std. Dev. 1175.05	Variance 1.38075E+006

Approx. time to Peak Conc. Lead at Phase Monitor Well [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 210	
Mean 1.02398	Std. Dev. 11.9757	Variance 143.417

Approx. time to Peak Conc. Mercury at Phase Monitor Well [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 1856
95% of values less than 2499
99% of values less than 11039

Minimum 0	Maximum 20000	
Mean 628.893	Std. Dev. 2050.52	Variance 4.20464E+006

Approx. time to Peak Conc. Nickel at Phase Monitor Well [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 100
90% of values less than 172
95% of values less than 210
99% of values less than 512

Minimum 0	Maximum 1856	
Mean 116.632	Std. Dev. 159.248	Variance 25360.1

Phase: Phase 1

Approx. time to Peak Conc. Sulphate at Phase Monitor Well [years]

01% of values less than 7
05% of values less than 7
10% of values less than 7
50% of values less than 7
90% of values less than 7
95% of values less than 11
99% of values less than 14

Minimum 7	Maximum 26	
Mean 7.35065	Std. Dev. 1.43664	Variance 2.06392

Approx. time to Peak Conc. Zinc at Phase Monitor Well [years]

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 35
90% of values less than 52
95% of values less than 70
99% of values less than 172

Minimum 0	Maximum 1024	
Mean 29.7053	Std. Dev. 50.3174	Variance 2531.84

Phase: Phase 1

Flow to Leachate Treatment Plant [l/day]

At 30 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 100 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Flow to Leachate Treatment Plant [l/day]

At infinity

01% of values less than 0

05% of values less than 0

10% of values less than 0

50% of values less than 0

90% of values less than 0

95% of values less than 0

99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Head on EBS [m]

At 1000 years

01% of values less than 1.001E-010
05% of values less than 1.001E-010
10% of values less than 1.001E-010
50% of values less than 1.001E-010
90% of values less than 1.001E-010
95% of values less than 1.001E-010
99% of values less than 1.001E-010

Minimum 1.001E-010	Maximum 1.001E-010	
Mean 1.001E-010	Std. Dev. 1.15746E-017	Variance 1.33972E-034

At infinity

01% of values less than 1.001E-010
05% of values less than 1.001E-010
10% of values less than 1.001E-010
50% of values less than 1.001E-010
90% of values less than 1.001E-010
95% of values less than 1.001E-010
99% of values less than 1.001E-010

Minimum 1.001E-010	Maximum 1.001E-010	
Mean 1.001E-010	Std. Dev. 1.15746E-017	Variance 1.33972E-034

Phase: Phase 1

Surface Breakout [l/day]

At 300 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At 1000 years

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

At infinity

01% of values less than 0
05% of values less than 0
10% of values less than 0
50% of values less than 0
90% of values less than 0
95% of values less than 0
99% of values less than 0

Minimum 0	Maximum 0	
Mean 0	Std. Dev. 0	Variance 0

Phase: Phase 1

Leakage through EBS [l/day]

At 100 years

01% of values less than 101211
05% of values less than 101211
10% of values less than 101211
50% of values less than 101211
90% of values less than 101211
95% of values less than 101211
99% of values less than 101211

Minimum 101211	Maximum 101211	
Mean 101211	Std. Dev. 0.00692474	Variance 4.7952E-005

At 300 years

01% of values less than 101211
05% of values less than 101211
10% of values less than 101211
50% of values less than 101211
90% of values less than 101211
95% of values less than 101211
99% of values less than 101211

Minimum 101211	Maximum 101211	
Mean 101211	Std. Dev. 0.00692474	Variance 4.7952E-005

At 1000 years

01% of values less than 101211
05% of values less than 101211
10% of values less than 101211
50% of values less than 101211
90% of values less than 101211
95% of values less than 101211
99% of values less than 101211

Minimum 101211	Maximum 101211	
Mean 101211	Std. Dev. 0.00692474	Variance 4.7952E-005

At infinity

01% of values less than 235872
05% of values less than 235872
10% of values less than 235872
50% of values less than 235872
90% of values less than 235872
95% of values less than 235872
99% of values less than 235872

Minimum 235872	Maximum 235872	
Mean 235872	Std. Dev. 0.0538619	Variance -0.0029011

Phase: Phase 1

Aquifer Flow [m³/year]

At 30 years

01% of values less than 37431.9
05% of values less than 37542.9
10% of values less than 37681
50% of values less than 38747.1
90% of values less than 39789
95% of values less than 39930.9
99% of values less than 40025.8

Minimum 0	Maximum 40058	
Mean 38700.5	Std. Dev. 1448.61	Variance 2.09846E+006

At 100 years

01% of values less than 37431.9
05% of values less than 37542.9
10% of values less than 37681
50% of values less than 38747.1
90% of values less than 39789
95% of values less than 39930.9
99% of values less than 40025.8

Minimum 0	Maximum 40058	
Mean 38700.5	Std. Dev. 1448.61	Variance 2.09846E+006

At 300 years

01% of values less than 37431.9
05% of values less than 37542.9
10% of values less than 37681
50% of values less than 38747.1
90% of values less than 39789
95% of values less than 39930.9
99% of values less than 40025.8

Minimum 0	Maximum 40058	
Mean 38700.5	Std. Dev. 1448.61	Variance 2.09846E+006

At 1000 years

01% of values less than 37431.9
05% of values less than 37542.9
10% of values less than 37681
50% of values less than 38747.1
90% of values less than 39789
95% of values less than 39930.9
99% of values less than 40025.8

Minimum 0	Maximum 40058	
Mean 38700.5	Std. Dev. 1448.61	Variance 2.09846E+006

Phase: Phase 1

Aquifer Flow [m³/year]

At infinity

01% of values less than 86616.7

05% of values less than 86727.8

10% of values less than 86865.9

50% of values less than 87932

90% of values less than 88973.9

95% of values less than 89115.8

99% of values less than 89210.6

Minimum 0	Maximum 89242.8	
Mean 87836.2	Std. Dev. 2884.81	Variance 8.32214E+006

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