Table 11.4 Water Quality Data

Determinand	BH950011	Stream	Units
pH	6.2	7.0	-
Alkalinity	45	44	mg/l as $CaCO_3$
EC	370	360	uS/cm
Sodium	36	24	mg/l
Calcium	31	38	mg/l
Magnesium	1.4	3.6	mg/l
Chloride	49	43	mg/l
Sulphate	52	40	mg/l
Iron	0.09	<0.04	mg/l
Manganese	0.27	0.03	mg/l
Nitrate	4.3	5.8	mg/l as N

11.1.36 A baseline water sampling exercise was undertaken in 1998/1999, and included 12 monthly sampling rounds. Water quality data were collected from streams A, B and C (Figure 11.3) to define the baseline chemistry in the surface waters, in order to appropriately constrain the quality of augmentation flows. The methodology and scope of the sampling exercise was agreed with the Environment Agency at the time. Results are summarised in Table 11.5 below.

Table 11.5 Summary of Water Quality Data

Parameter	Stream A			Stream B			Stream C		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Temp (°c)	6.7	9.6	11.8	6.0	9.6	12.4	7.0	9.8	12.4
Ph	6.8	7.2	7.7	6.7	7.2	7.7	6.9	7.3	7.7
DO(%)	88.0	91.9	95.1	90.7	93.4	95.6	86.2	91.8	95.8
DO	9.6	10.5	11.6	9.6	10.7	11.6	9.6	10.4	11.1
TDS	134	160	189	157	202	244	102	134	154
EC (us/cm)	246	311	360	381	394	420	190	252	299
Susp sols	5.0	24.3	53.0	4.0	10.8	20.0	2.0	47.5	244.0
BOD (mg/l O)	1.5	1.5	1.5	1.7	1.7	1.7		<1.4	
Ammonia NH_4		<0.1			<0.1	0.2		<0.1	
Chloride	19.0	21.8	24.0	29.0	40.2	63.0	18.0	20.8	23.0
Sulphate	28.0	32.0	38.0	34.0	37.2	41.0	27.0	31.0	35.0
Nitrate	19.0	24.2	29.0	18.0	20.0	24.0	15.0	16.8	19.0
Alk ($_{HCO3}$)	55.0	79.2	128.0	67.0	95.4	201.0	30.0	57.6	137.0
Calcium	27.0	33.8	38.0	30.0	39.4	47.0	21.0	26.2	31.0
Magnesium	2.7	3.7	5.4	2.6	3.6	4.3	1.5	2.1	2.7
Iron	0.01	0.02	0.03	0.01	0.05	0.07	0.04	0.06	0.08
Manganese	0.02	0.09	0.24	0.01	0.03	0.04	0.01	0.01	0.01
Cadmium		<0.005			<0.005			<0.005	
Chromium		<0.01			<0.01			<0.01	
Copper		<0.01			<0.01	0.01		<0.01	
Nickel		<0.01			<0.01	0.02		<0.01	
Lead		<0.01			<0.01			<0.01	
Zinc	0.50	0.50	0.50	0.56	0.56	0.56	0.41	0.41	0.41

All data in mg/l unless stated otherwise

Temp: Water Temperature

DO: Dissolved Oxygen

TDS: Total Dissolved Solids

EC: Electrical Conductivity

Susp Sols: Suspended Solids

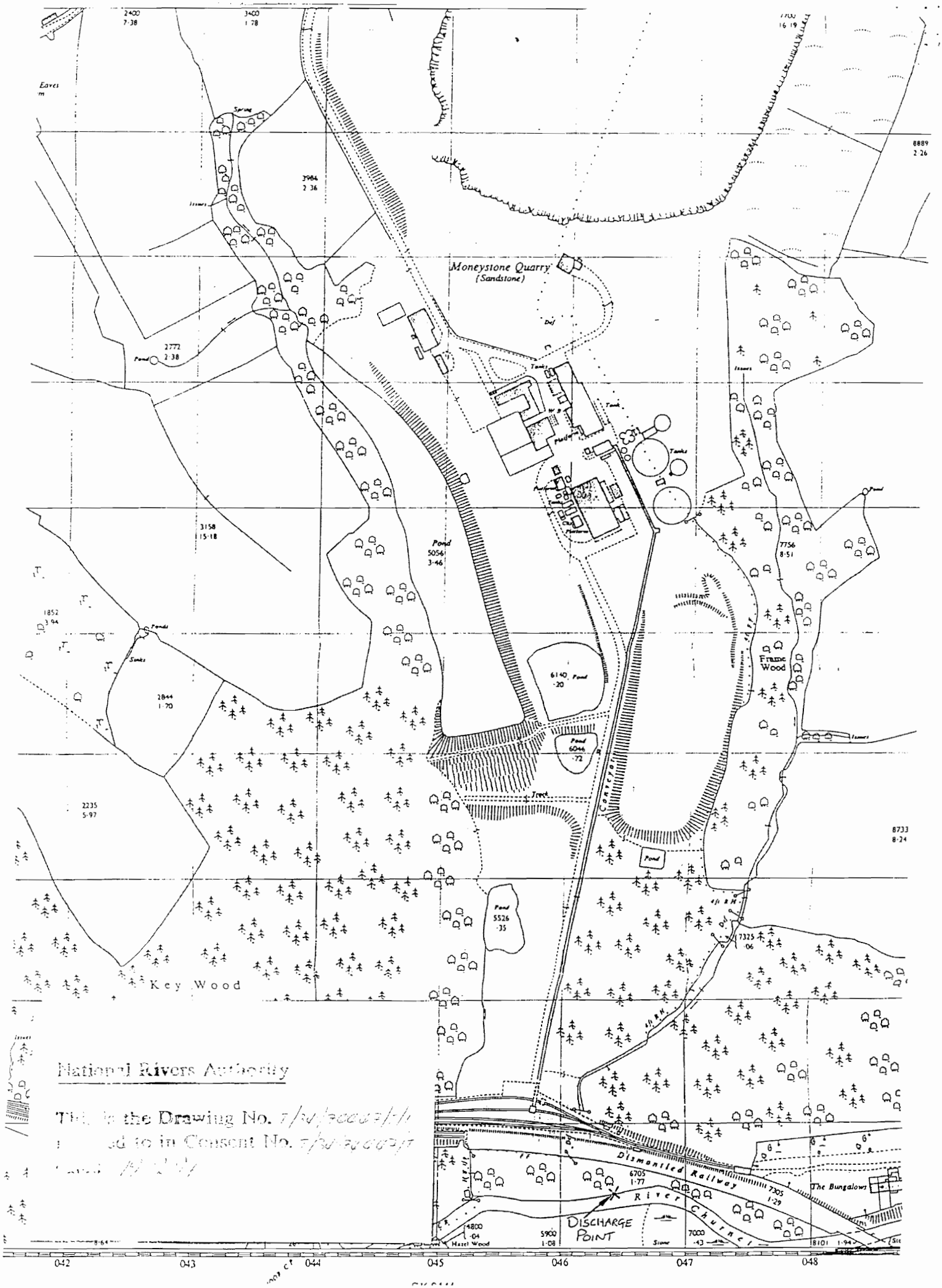
BOD: Biological Oxygen Demand

Alk (HCO_3): Alkalinity as HCO_3

Potential Receptors

Site of Special Scientific Interest (SSSI)

11.1.37 There is a SSSI located to the south west of the permitted quarry area, as shown in Figure 11.3. This forms part of Whiston Eaves SSSI, which predominantly comprises a series of species-rich meadows managed as grazing pasture or hay meadows with additional areas of rush pasture, scrub and running water. The topography is varied and there is a range of soils of variable drainage and nutrient status. The majority of this area is directly underlain by Coal Measures strata, and therefore the impacts of



National Rivers Authority

This is the Drawing No. [illegible] referred to in Consent No. [illegible]

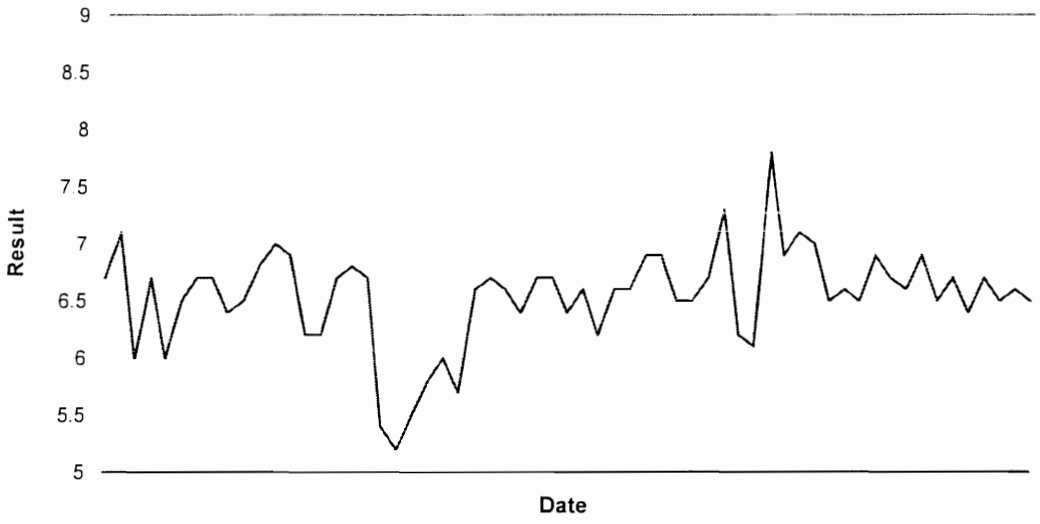
SIBELCO
UK

Quarterly Water Circuit Report - Oakamoor

For: 01/10/2009 to 24/12/2009

River Discharge Analysis

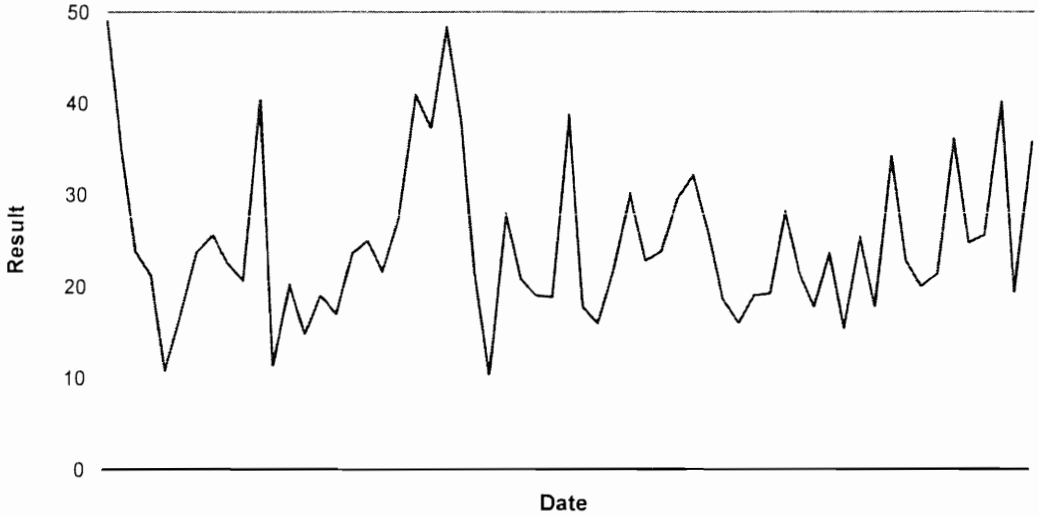
For River Discarge pH



No of Samples	61
Minimum	5.20
Maximum	7.80
Average	6.54
Std Dev (n-1)	0.44
Limits 5.00 to 9.00	

River Discharge Analysis

For River Discarge SS



No of Samples	61
Minimum	10.40
Maximum	49.00
Average	24.84
Std Dev (n-1)	8.74
Limits 0.00 to 50.00	ppm

Environment Agency Samples

Date Sampled	Analysis	Result
18/02/2009	pH EA Recorded	7.20
	pH OK Recorded	6.50
	SS Result	35.00
11/03/2009	pH EA Recorded	7.50
	pH OK Recorded	6.90
	SS Result	28.60
05/06/2009	pH EA Recorded	7.10
	pH OK Recorded	6.90
	SS Result	14.40
28/07/2009	pH EA Recorded	7.50
	pH OK Recorded	6.90
	SS Result	21.00
25/11/2009	pH EA Recorded	6.50
	pH OK Recorded	7.00
	SS Result	16.40
09/12/2009	pH EA Recorded	6.50
	pH OK Recorded	6.80
	SS Result	22.00

Abstraction

Monthly Volumes Extracted (G x 1000)

October 2009	Total Volume	7,609
November 2009	Total Volume	10,945
December 2009	Total Volume	6,166

NOTES

It is essential that Nikki Carey is informed of visits by the EA and samples taken in conjunction with them are saved for analysis, and the EA portable pH results noted.

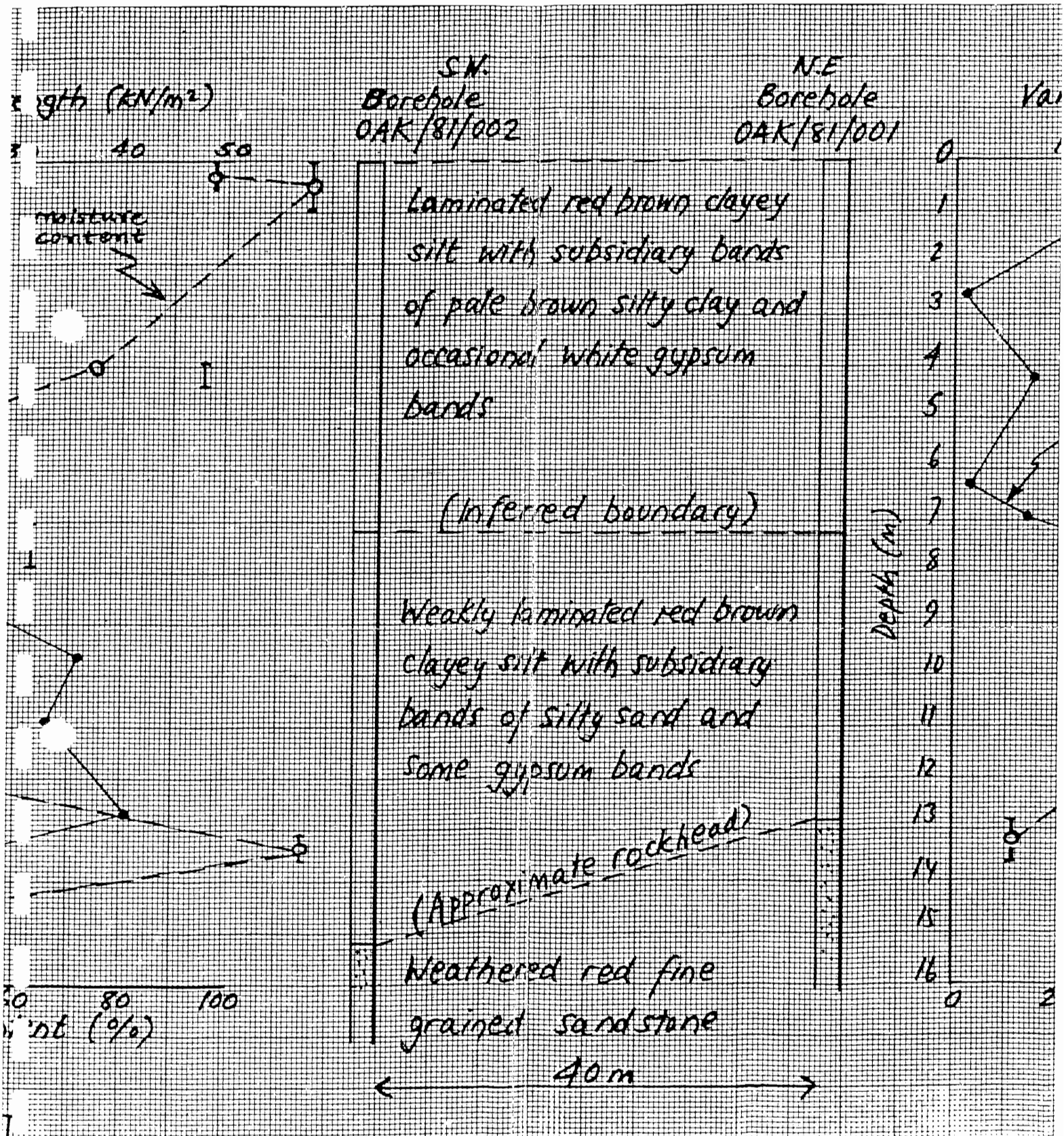
Similarly, it is essential that both Nikki Carey and Production Management are informed immediately of discharge failures and corrective action taken. This applies to both production personnel observing the continuous monitoring equipment, and to lab staff carrying out daily analysis.

APPENDIX I - BOREHOLE LOG EXTRACT *(REFERENCE 51)*

BINNIE
& PARTNERS
WESTMINSTER
LONDON, S.W.1

Subject

Computed



PROFILES OF IN SITU UNDRAINED SHEAR
AND MOISTURE CONTENT FOR SLURRY WAS

APPENDIX J - CONTAMINATED LAND DEFINITION

Contaminated Land Definition

Contaminated land is defined under Part IIA of the Environmental Protection Act 1990 which states that : any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in on or under the land that (*Reference B & F)* :

1. Significant harm is being caused or there is significant possibility of such harm being caused.
2. Pollution of controlled waters is being or is likely to be caused.

The questions that should be asked to determine this are:

1. What harm is to be regarded as 'significant'
2. Whether the possibility of significant harm being caused is 'significant'
3. Whether pollution of controlled waters is being, or is likely to be caused.

The definition of contaminated land is based upon the principals of risk assessment. The guidance defines risk as the combination of :

1. The probability, or frequency, of occurrence of a defined hazard; and
2. The magnitude (including the seriousness) of the consequences.

The approach to risk assessment is based upon an assessment of plausible pollutant linkages, referred to as the contaminant - pathway - receptor model, based upon the current or proposed use of the site.

A contaminant is a substance which is in, on or under the land, which has the potential to cause harm to a receptor or to cause pollution of controlled waters.

A receptor is either:

1. A living organism, a group of living organisms, an ecological system, or a piece of property which is being, or could be harmed by a contaminant.
2. Controlled waters which are being or could be polluted by a contaminant.

A pathway is one or more routes or means by, or through which a receptor is being exposed to, or affected by a contaminant. A pathway can only be identified if it is capable of exposing an identified receptor to an identified contaminant. The contaminant should be capable of harming or in the case of controlled waters, be capable of polluting that particular receptor.

A pollutant linkage is the relationship between a contaminant, a pathway and a receptor, unless all three elements of a pollutant linkage are identified, then that land should not be identified as contaminated land.

APPENDIX K - SITE SPECIFIC ASSESSMENT CRITERIA CALCULATED USING CLEA SOFTWARE VERSION 1.06

Site Specific Assessment Criteria

The Site Specific Assessment Criteria (SSAC) given below are based on a site end use of a holiday park with lodge type accommodation, hotels, amenities, acess roads parking (soft and hard), public open spaces (POS), lakes and ponds.

Chemical	mg/kg
Arsenic	390
Cadmium	252
Mercury (Inorganic)	2,786
Nickel	13,985
Selenium	8,238
Boron	150,483
Chromium III	209,249
Chromium VI	1,269
Copper	112,245
Lead	450
Vanadium	3,749
Zinc	421,053

Chemical	mg/kg
Acenaphthene	24,220
Acenaphthylene	22,594
Anthracene	301,172
Benz(a)anthracene	34
Benzo(a)pyrene	8
Benzo(b)fluoranthene	59
Benzo(ghi)perylene	513
Benzo(k)fluoranthene	103
Chrysene	9
Dibenz(ah)anthracene	6
Fluoranthene	16,630
Fluorene	23,257
Indeno(123-cd)pyrene	33
Naphthalene	43
Phenanthrene	13,097
Pyrene	40,201

Chemical	mg/kg
Ali EC5 - 6	808
Ali EC 6 - 8	22,727
Ali EC8 - 10	6,637
Ali EC10 - 12	29,450
Ali EC12 - 16	25,661
Ali EC16 - 35	1,402,995
Ali EC35 - 44	1,402,995
Aro EC5 - 7	8,534
Aro EC7 - 8	20,938
Aro EC8 - 10	1,193
Aro EC10 - 12	5,813
Aro EC12 - 16	23,077
Aro EC16 - 21	21,045
Aro EC21 - 35	21,045
Aro EC35 - 44	21,045

Chemical	mg/kg
Benzene	9
Ethylbenzene	6,066
Toluene	20,577
Xylene, o-	2,398
Xylene, m-	2,259
Xylene, p-	2,165
Phenol	6,809
WHO 12 PCBs	16 ug/kg
MTBE	120

The above values have been calculated using CLEA Software Version 1.06 *(Reference A, C, D, E, F & G)*. The values assume that the critical receptor is a 16 year old female worker who has the potential to be working at the site for her entire working life (i.e. 49 years AC 17 - 18). This receptor is deemed at a greater risk than the more typical high risk receptor of a 0 to 6 year old female (AC 0 - 6) due to the the short exposure times of typically 1 to 14 days whilst on holiday.

All values assume that free phase product is not present.

Abbeydale
Building Preservation Consultants
4 Neville Street, Wakefield, WF1 5EF
01924 376622 www.abbeydalebc.com
Company Reg. No. 06707508

METALS & ORGANICS SITE SPECIFIC ASSESSMENT CRITERIA

CLIENT : Laver Leisure
PROJECT : Moneystone Quarry, Oakamoor
NUMBER : 418004
DATE : March 2011

CLEA Software Version 1.06

Report generated 03/11/2010

Report title Moneystone Quarry - Metals

Created by AG at Abbeydale BEC

Environment Agency

BASIC SETTINGS

Land Use Residential (lifetime exposure)

Building Bungalow
Receptor Female (com) Start age class 17 End age class 18 Exposure Duration 59 years
Soil Silty clay loam

Exposure Pathways

Direct soil and dust ingestion	✓	Dermal contact with indoor dust	✓	Inhalation of indoor dust	✓
Consumption of homegrown produce	✖	Dermal contact with soil	✓	Inhalation of soil dust	✓
Soil attached to homegrown produce	✖			Inhalation of indoor vapour	✓
				Inhalation of outdoor vapour	✓

Environment Agency

Land Use Residential (lifetime exposure)

Age Class	Exposure Frequencies (days yr^{-1})						Occupation Periods (hr day^{-1})		Soil to skin adherence factors (mg cm^{2})		Direct soil ingestion rate (g day^{-1})
	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with indoor dust	Dermal contact with soil	Inhalation of dust and vapour, indoor	Inhalation of dust and vapour, outdoor	Indoors	Outdoors	Indoor	Outdoor	
1	180	180	180	180	365	365	23.0	1.0	0.06	1.00	0.10
2	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10
3	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10
4	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10
5	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
6	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
7	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
8	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
9	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
10	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
11	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
12	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
13	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
14	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
15	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
16	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
17	365	365	365	365	365	365	16.0	1.0	0.06	0.30	0.05
18	365	365	365	365	365	365	16.0	1.0	0.06	0.30	0.05

Environment Agency

Receptor Female (com)

Age Class	Body weight (kg)	Body height (m)	Inhalation rate (m^3 day^{-1})	Max exposed skin factor: Indoor (m^2 m^{-2})	Max exposed skin factor: Outdoor (m^2 m^{-2})	Total skin area (m^2)	Consumption rates (g FW kg^{-1} BW day^{-1}): Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
1	5.60	0.7	8.5	0.00	0.00	3.43E-01	7.12	10.69	16.03	1.83	2.23	3.82
2	9.80	0.8	13.3	0.00	0.00	4.84E-01	6.85	3.30	5.46	3.96	0.54	11.96
3	12.70	0.9	12.7	0.00	0.00	5.82E-01	6.85	3.30	5.46	3.96	0.54	11.96
4	15.10	0.9	12.2	0.00	0.00	6.36E-01	6.85	3.30	5.46	3.96	0.54	11.96
5	16.90	1.0	12.2	0.00	0.00	7.04E-01	3.74	1.77	3.38	1.85	0.16	4.26
6	19.70	1.1	12.2	0.00	0.00	7.94E-01	3.74	1.77	3.38	1.85	0.16	4.26
7	22.10	1.2	12.4	0.00	0.00	8.73E-01	3.74	1.77	3.38	1.85	0.16	4.26
8	25.30	1.2	12.4	0.00	0.00	9.36E-01	3.74	1.77	3.38	1.85	0.16	4.26
9	27.50	1.3	12.4	0.00	0.00	1.01E+00	3.74	1.77	3.38	1.85	0.16	4.26
10	31.40	1.3	12.4	0.00	0.00	1.08E+00	3.74	1.77	3.38	1.85	0.16	4.26
11	35.70	1.4	12.4	0.00	0.00	1.19E+00	3.74	1.77	3.38	1.85	0.16	4.26
12	41.30	1.4	13.4	0.00	0.00	1.29E+00	3.74	1.77	3.38	1.85	0.16	4.26
13	47.20	1.5	13.4	0.00	0.00	1.42E+00	3.74	1.77	3.38	1.85	0.16	4.26
14	51.20	1.6	13.4	0.00	0.00	1.52E+00	3.74	1.77	3.38	1.85	0.16	4.26
15	56.70	1.6	13.4	0.00	0.00	1.60E+00	3.74	1.77	3.38	1.85	0.16	4.26
16	59.00	1.6	13.4	0.00	0.00	1.63E+00	3.74	1.77	3.38	1.85	0.16	4.26
17	70.00	1.6	14.8	0.08	0.08	1.78E+00	2.94	1.40	1.79	1.61	0.22	2.97
18	70.90	1.6	12.0	0.00	0.00	1.80E+00	2.94	1.40	1.79	1.61	0.22	2.97

Environment Agency

Building Bungalow

Building footprint (m^2)	7.80E+01
Living space air exchange rate (hr^{-1})	5.00E-01
Living space height (above ground, m)	2.40E+00
Living space height (below ground, m)	0.00E+00
Pressure difference (soil to enclosed space, Pa)	2.60E+00
Foundation thickness (m)	1.50E-01
Floor crack area (cm^2)	7.07E+02
Dust loading factor ($\mu g\ m^{-3}$)	5.00E+01

Soil Silty clay loam

Porosity, Total ($cm^3\ cm^{-3}$)	5.80E-01
Porosity, Air-Filled ($cm^3\ cm^{-3}$)	1.20E-01
Porosity, Water-Filled ($cm^3\ cm^{-3}$)	4.60E-01
Residual soil water content ($cm^3\ cm^{-3}$)	2.10E-01
Saturated hydraulic conductivity ($cm\ s^{-1}$)	1.17E-03
van Genuchten shape parameter *m* (dimensionless)	3.07E-01
Bulk density ($g\ cm^{-3}$)	1.07E+00
Threshold value of wind speed at 10m ($m\ s^{-1}$)	7.20E+00
Empirical function (F_x) for dust model (dimensionless)	1.22E+00
Ambient soil temperature (K)	2.83E+02
Soil pH	7.00E+00
Soil Organic Matter content (%)	2.00E+00
Fraction of organic carbon ($g\ g^{-1}$)	1.16E-02
Effective total fluid saturation (unitless)	6.76E-01
Intrinsic soil permeability (cm^2)	1.56E-08
Relative soil air permeability (unitless)	4.66E-01
Effective air permeability (cm^2)	7.28E-09

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Environment Agency

Soil - Vapour Model

Depth to top of source (no building) (cm)	0
Depth to top of source (beneath building) (cm)	65
Default soil gas ingress rate?	Yes
Soil gas ingress rate ($cm^3 s^{-1}$)	2.50E+01
Building ventilation rate ($cm^3 s^{-1}$)	2.60E+04
Averaging time surface emissions (yr)	59
Finite vapour source model?	No
Thickness of contaminated layer (cm)	200

Air Dispersion Model

Mean annual windspeed at 10m ($m s^{-1}$)	5.00
Air dispersion factor at height of 0.8m *	2400.00
Air dispersion factor at height of 1.6m *	19000.00
Fraction of site cover ($m^2 m^{-2}$)	0.75

* Air dispersion factor in $g m^{-2} s^{-1}$ per $kg m^{-3}$

Soil - Plant Model

	Dry weight conversion factor	Homegrown fraction		Soil loading factor	Preparation correction factor
		Average	High		
	g DW g^{-1} FW	dimensionless		g g^{-1} DW	dimensionless
Green vegetables	0.096	0.05	0.33	1.00E-03	2.00E-01
Root vegetables	0.103	0.06	0.40	1.00E-03	1.00E+00
Tuber vegetables	0.210	0.02	0.13	1.00E-03	1.00E+00
Herbaceous fruit	0.058	0.06	0.40	1.00E-03	6.00E-01
Shrub fruit	0.166	0.09	0.60	1.00E-03	6.00E-01
Tree fruit	0.157	0.04	0.27	1.00E-03	6.00E-01

Gardener type Average

CLEA Software Version 1.06

Report generated	03-Nov-10
Report title	Moneystone Quarry - Metals
Created by	AG at Abbeydale BEC

Environment Agency

RESULTS

Environment Agency

		Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?	
		oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal
1	Arsenic	3.90E+02	5.78E+02	NR	1.00	0.68	NR	NR	No	No
2	Cadmium	2.52E+02	3.22E+02	1.65E+02	0.49	0.51	1.00	NR	Yes	No
3	Mercury, inorganic	2.79E+03	1.73E+04	2.40E+03	0.86	0.14	1.00	NR	No	No
4	Nickel	1.40E+04	1.49E+03	NR	0.10	1.00	NR	NR	No	No
5	Selenium	8.24E+03	NR	NR	1.00	NR	NR	NR	No	No
6	Boron	1.50E+05	8.36E+05	1.28E+05	0.85	0.15	1.00	NR	No	No
7	Chromium III	2.09E+05	2.78E+04	2.45E+04	0.12	0.88	1.00	NR	No	No
8	Chromium VI	1.27E+03	NR	NR	1.00	NR	NR	NR	No	No
9	Copper	1.12E+05	7.98E+04	5.43E+04	0.32	0.68	1.00	NR	Yes	No
10	Vanadium	3.75E+03	5.62E+03	2.30E+03	0.61	0.39	1.00	NR	No	No
11	Zinc	4.21E+05	1.73E+08	4.21E+05	1.00	0.00	1.00	NR	Yes	No
12										
13										
14										
15										
16										
17										
18										
19										
20										

Environment Agency

	Assessment Criterion (mg kg $^{-1}$)			Ratio of ADE to HCV			Saturation Limit (mg kg $^{-1}$)	50% rule?	
	oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

CLEA Software Version 1.06 Report generated 3-Nov-10

Environment Agency

		Soil Distribution				Media Concentrations													
		Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
		%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
1	Arsenic	99.9	0.1	0.0	100.0	3.90E+02	NR	1.95E+02	1.66E-07	2.10E-08	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA
2	Cadmium	99.6	0.4	0.0	100.0	1.65E+02	NR	8.25E+01	7.02E-08	8.87E-09	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA
3	Mercury, inorganic	99.9	0.1	0.0	100.0	2.40E+03	NR	1.20E+03	1.02E-06	1.29E-07	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA
4	Nickel	99.9	0.1	0.0	100.0	1.49E+03	NR	7.43E+02	6.32E-07	7.99E-08	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA
5	Selenium	99.1	0.9	0.0	100.0	8.24E+03	NR	4.12E+03	3.51E-06	4.43E-07	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA
6	Boron	-4199.1	4299.1	0.0	100.0	1.28E+05	NR	6.38E+04	5.43E-05	6.86E-06	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA
7	Chromium III	91.0	9.0	0.0	100.0	2.45E+04	NR	1.23E+04	1.04E-05	1.32E-06	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA
8	Chromium VI	-2288.4	2388.4	0.0	100.0	1.27E+03	NR	6.35E+02	5.40E-07	6.82E-08	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA
9	Copper	-329.9	429.9	0.0	100.0	5.43E+04	NR	2.72E+04	2.31E-05	2.92E-06	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA
10	Vanadium	-3312.0	3412.0	0.0	100.0	2.30E+03	NR	1.15E+03	9.79E-07	1.24E-07	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA
11	Zinc	-1031.3	1131.3	0.0	100.0	4.21E+05	NR	2.10E+05	1.79E-04	2.26E-05	0.00E+00	0.00E+00	0.00E+00	NA	NA	NA	NA	NA	NA
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Environment Agency

	Soil Distribution				Media Concentrations													
	Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
	%	%	%	%	mg kg^{-1}	mg m^{3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
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Environment Agency

		Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
		Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
1	Arsenic	2.78E-04	0.00E+00	2.18E-05	1.35E-06	0.00E+00	0.00E+00	0.00E+00	92.31	0.00	7.24	0.45	0.00	0.00	0.00	0.00
2	Cadmium	1.18E-04	0.00E+00	3.08E-07	5.72E-07	0.00E+00	1.91E-04	2.85E-07	49.69	0.00	0.13	0.24	0.00	0.00	49.82	0.12
3	Mercury, inorganic	1.71E-03	0.00E+00	0.00E+00	8.31E-06	0.00E+00	1.43E-05	0.00E+00	98.70	0.00	0.00	0.48	0.00	0.00	0.82	0.00
4	Nickel	1.06E-03	0.00E+00	1.38E-05	5.14E-06	0.00E+00	1.85E-03	8.55E-07	48.98	0.00	0.64	0.24	0.00	0.00	49.86	0.04
5	Selenium	5.87E-03	0.00E+00	0.00E+00	2.85E-05	0.00E+00	4.99E-04	8.55E-07	91.75	0.00	0.00	0.45	0.00	0.00	7.81	0.00
6	Boron	9.09E-02	0.00E+00	0.00E+00	4.42E-04	0.00E+00	5.27E-02	5.67E-06	63.08	0.00	0.00	0.31	0.00	0.00	36.61	0.00
7	Chromium III	1.75E-02	0.00E+00	0.00E+00	8.49E-05	0.00E+00	8.58E-04	3.85E-06	94.86	0.00	0.00	0.46	0.00	0.00	4.66	0.02
8	Chromium VI	9.04E-04	0.00E+00	0.00E+00	4.39E-06	0.00E+00	9.55E-05	0.00E+00	90.45	0.00	0.00	0.00	0.00	0.00	9.55	0.00
9	Copper	3.87E-02	0.00E+00	0.00E+00	1.88E-04	0.00E+00	9.98E-02	9.69E-06	49.87	0.00	0.00	0.24	0.00	0.00	49.87	0.01
10	Vanadium	1.64E-03	0.00E+00	0.00E+00	7.96E-06	0.00E+00	3.28E-04	9.12E-06	82.66	0.00	0.00	0.40	0.00	0.00	16.54	0.40
11	Zinc	3.00E-01	0.00E+00	0.00E+00	1.46E-03	0.00E+00	3.85E-01	3.42E-05	49.88	0.00	0.00	0.24	0.00	0.00	49.88	0.01
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	Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
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		Oral Health Criteria Value	Oral Health Criteria Value ($\mu g\ kg^{-1}\ BW\ day^{-1}$)	Inhalation Health Criteria Value	Inhalation Health Criteria Value ($\mu g\ kg^{-1}\ BW\ day^{-1}$)	Oral Mean Daily Intake ($\mu g\ day^{-1}$)	Inhalation Mean Daily Intake ($\mu g\ day^{-1}$)	Air-water partition coefficient (K_{aw}) ($cm^3\ cm^{-3}$)	Coefficient of Diffusion in Air ($m^2\ s^{-1}$)	Coefficient of Diffusion in Water ($m^2\ s^{-1}$)	log K_{oc} ($cm^3\ g^{-1}$)	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g^{-1} DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
1	Arsenic	ID	0.3	ID	0.002	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	1	1
2	Cadmium	TDI	0.36	TDI	0.0014	13.4	0.02	NR	NR	NR	NR	NR	0.001	0.5	1	1	1
3	Mercury, inorganic	TDI	2	TDI	0.06	1	0	NR	NR	NR	NR	NR	0	0.5	1	1	1
4	Nickel	TDI	12	TDI	0.006	130	0.06	NR	NR	NR	NR	NR	0.005	0.5	1	1	1
5	Selenium	TDI	6.4	NR	0	35	0.06	NR	NR	NR	NR	NR	0	0.5	1	1	1
6	Boron	TDI	160	TDI	2.9	3700	0.398	NR	NR	NR	NR	NR	0	0.5	1	1	1
7	Chromium III	TDI	150	TDI	0.1	60.2	0.27	NR	NR	NR	NR	NR	0	0.5	1	1	1
8	Chromium VI	TDI	1	NR	NR	6.7	NR	NR	NR	NR	NR	NR	0	0.5	1	1	1
9	Copper	TDI	160	TDI	0.286	7000	0.68	NR	NR	NR	NR	NR	0	0.5	1	1	1
10	Vanadium	TDI	3	TDI	0.0286	23	0.64	NR	NR	NR	NR	NR	0	0.5	1	1	1
11	Zinc	TDI	600	TDI	600	27000	2.4	NR	NR	NR	NR	NR	0	0.5	1	1	1
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Environment Agency

		Oral Health Criteria Value ($\mu g\ kg^{-1}\ BW\ day^{-1}$)	Inhalation Health Criteria Value ($\mu g\ kg^{-1}\ BW\ day^{-1}$)	Oral Mean Daily Intake ($\mu g\ day^{-1}$)	Inhalation Mean Daily Intake ($\mu g\ day^{-1}$)	Air-water partition coefficient (K_{aw}) ($cm^3\ cm^{-3}$)	Coefficient of Diffusion in Air ($m^2\ s^{-1}$)	Coefficient of Diffusion in Water ($m^2\ s^{-1}$)	log K_{oc} ($cm^3\ g^{-1}$)	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor ($g\ g^{-1}$ DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
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Environment Agency

		Soil-to-water partition coefficient ($cm^3 g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg L^{-1}$)	Soil-to-plant concentration factor for green vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)
1	Arsenic	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
2	Cadmium	1.00E+02	NR	1.62E+06	0.052 fw	0.029 fw	0.031 fw	0.016 fw	0.0031 fw	0.0014 fw
3	Mercury, inorganic	5.00E+02	NR	7.40E+04	0.0038 fw	0.0069 fw	0.0043 fw	0.001 fw	0.0011 fw	0.001 fw
4	Nickel	5.00E+02	NR	2.50E+06	0.0038 fw	0.0043 fw	0.0019 fw	0.0025 fw	0.0025 fw	0.0034 fw
5	Selenium	5.00E+01	NR	2.17E+06	0.0108 fw	0.00364 fw	0.00083 fw	0.00271 fw	0.003 fw	0.003 fw
6	Boron	1.00E-02	NR	6.35E+04	0.4 dw	model	model	model	model	model
7	Chromium III	4.80E+00	NR	5.85E+05	0.00003 dw	model	model	model	model	model
8	Chromium VI	1.80E-02	NR	6.24E+05	0.0002 dw	model	model	model	model	model
9	Copper	1.00E-01	NR	1.38E+06	0.0206 dw	model	model	model	model	model
10	Vanadium	1.26E-02	NR	2.11E+05	0.013 dw	model	model	model	model	model
11	Zinc	3.80E-02	NR	4.32E+06	0.054 dw	model	model	model	model	model
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Environment Agency

	Soil-to-water partition coefficient ($cm^3 g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg L^{-1}$)	Soil-to-plant concentration factor for green vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)
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Report generated	03/11/2010
Report title	Moneystone Quarry - PAH
Created by	AG at Abbeydale BEC

Environment Agency

BASIC SETTINGS

Land Use	Residential (lifetime exposure)
Building	Bungalow
Receptor	Female (com)
Soil	Silty clay loam

Start age class 17 End age class 18 Exposure Duration 59 years

Exposure Pathways

Direct soil and dust ingestion	✓	Dermal contact with indoor dust	✓	Inhalation of indoor dust	✓
Consumption of homegrown produce	✖	Dermal contact with soil	✓	Inhalation of soil dust	✓
Soil attached to homegrown produce	✖			Inhalation of indoor vapour	✓
				Inhalation of outdoor vapour	✓

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Land Use Residential (lifetime exposure)

Age Class	Exposure Frequencies (days yr^{-1})						Occupation Periods (hr day^{-1})		Soil to skin adherence factors (mg cm^{-2})		Direct soil ingestion rate (g day^{-1})
	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with indoor dust	Dermal contact with soil	Inhalation of dust and vapour, indoor	Inhalation of dust and vapour, outdoor	Indoors	Outdoors	Indoor	Outdoor	
1	180	180	180	180	365	365	23.0	1.0	0.06	1.00	0.10
2	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10
3	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10
4	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10
5	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
6	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
7	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
8	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
9	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
10	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
11	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
12	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
13	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
14	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
15	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
16	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
17	365	365	365	365	365	365	16.0	1.0	0.06	0.30	0.05
18	365	365	365	365	365	365	16.0	1.0	0.06	0.30	0.05

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Receptor Female (com)

Age Class	Body weight (kg)	Body height (m)	Inhalation rate (m^3 day^{-1})	Max exposed skin factor: Indoor (m^2 m^{-2})	Max exposed skin factor: Outdoor (m^2 m^{-2})	Total skin area (m^2)	Consumption rates (g FW kg^{-1} BW day^{-1}): Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
1	5.60	0.7	8.5	0.00	0.00	3.43E-01	7.12	10.69	16.03	1.83	2.23	3.82
2	9.80	0.8	13.3	0.00	0.00	4.84E-01	6.85	3.30	5.46	3.96	0.54	11.96
3	12.70	0.9	12.7	0.00	0.00	5.82E-01	6.85	3.30	5.46	3.96	0.54	11.96
4	15.10	0.9	12.2	0.00	0.00	6.36E-01	6.85	3.30	5.46	3.96	0.54	11.96
5	16.90	1.0	12.2	0.00	0.00	7.04E-01	3.74	1.77	3.38	1.85	0.16	4.26
6	19.70	1.1	12.2	0.00	0.00	7.94E-01	3.74	1.77	3.38	1.85	0.16	4.26
7	22.10	1.2	12.4	0.00	0.00	8.73E-01	3.74	1.77	3.38	1.85	0.16	4.26
8	25.30	1.2	12.4	0.00	0.00	9.36E-01	3.74	1.77	3.38	1.85	0.16	4.26
9	27.50	1.3	12.4	0.00	0.00	1.01E+00	3.74	1.77	3.38	1.85	0.16	4.26
10	31.40	1.3	12.4	0.00	0.00	1.08E+00	3.74	1.77	3.38	1.85	0.16	4.26
11	35.70	1.4	12.4	0.00	0.00	1.19E+00	3.74	1.77	3.38	1.85	0.16	4.26
12	41.30	1.4	13.4	0.00	0.00	1.29E+00	3.74	1.77	3.38	1.85	0.16	4.26
13	47.20	1.5	13.4	0.00	0.00	1.42E+00	3.74	1.77	3.38	1.85	0.16	4.26
14	51.20	1.6	13.4	0.00	0.00	1.52E+00	3.74	1.77	3.38	1.85	0.16	4.26
15	56.70	1.6	13.4	0.00	0.00	1.60E+00	3.74	1.77	3.38	1.85	0.16	4.26
16	59.00	1.6	13.4	0.00	0.00	1.63E+00	3.74	1.77	3.38	1.85	0.16	4.26
17	70.00	1.6	14.8	0.08	0.08	1.78E+00	2.94	1.40	1.79	1.61	0.22	2.97
18	70.90	1.6	12.0	0.00	0.00	1.80E+00	2.94	1.40	1.79	1.61	0.22	2.97

Environment Agency

Building Bungalow

Building footprint (m^2)	7.80E+01
Living space air exchange rate (hr^{-1})	5.00E-01
Living space height (above ground, m)	2.40E+00
Living space height (below ground, m)	0.00E+00
Pressure difference (soil to enclosed space, Pa)	2.60E+00
Foundation thickness (m)	1.50E-01
Floor crack area (cm^2)	7.07E+02
Dust loading factor ($\mu g\ m^{-3}$)	5.00E+01

Soil Silty clay loam

Porosity, Total ($cm^3\ cm^{-3}$)	5.80E-01
Porosity, Air-Filled ($cm^3\ cm^{-3}$)	1.20E-01
Porosity, Water-Filled ($cm^3\ cm^{-3}$)	4.60E-01
Residual soil water content ($cm^3\ cm^{-3}$)	2.10E-01
Saturated hydraulic conductivity ($cm\ s^{-1}$)	1.17E-03
van Genuchten shape parameter *m* (dimensionless)	3.07E-01
Bulk density ($g\ cm^{-3}$)	1.07E+00
Threshold value of wind speed at 10m ($m\ s^{-1}$)	7.20E+00
Empirical function (F_x) for dust model (dimensionless)	1.22E+00
Ambient soil temperature (K)	2.83E+02
Soil pH	7.00E+00
Soil Organic Matter content (%)	2.00E+00
Fraction of organic carbon ($g\ g^{-1}$)	1.16E-02
Effective total fluid saturation (unitless)	6.76E-01
Intrinsic soil permeability (cm^2)	1.56E-08
Relative soil air permeability (unitless)	4.66E-01
Effective air permeability (cm^2)	7.28E-09

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Report generated	03-Nov-10
Report title	Moneystone Quarry - PAH
Created by	AG at Abbeydale BEC

RESULTS

Environment Agency

		Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?	
		oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal
1	Acenaphthene	2.21E+04	2.21E+04	1.10E+04	0.50	0.50	1.00	1.14E+02 (sol)	No	No
2	Acenaphthylene	2.07E+04	2.07E+04	1.04E+04	0.50	0.50	1.00	1.71E+02 (sol)	No	No
3	Anthracene	2.42E+05	2.42E+05	1.21E+05	0.50	0.50	1.00	2.33E+00 (vap)	No	No
4	Benz(a)anthracene	1.42E+02	3.36E-01	3.35E-01	0.00	1.00	1.00	3.42E+00 (sol)	No	No
5	Benzo(a)pyrene	1.92E+01	3.65E-02	3.65E-02	0.00	1.00	1.00	1.82E+00 (vap)	No	Yes
6	Benzo(b)fluoranthene	1.46E+02	3.28E-01	3.27E-01	0.00	1.00	1.00	2.43E+00 (sol)	No	No
7	Benzo(ghi)perylene	9.47E+02	3.19E+00	3.18E+00	0.00	1.00	1.00	3.08E-02 (vap)	No	No
8	Benzo(k)fluoranthene	2.07E+02	6.26E-01	6.24E-01	0.00	1.00	1.00	1.37E+00 (sol)	No	No
9	Chrysene	2.07E+02	3.65E-02	3.65E-02	0.00	1.00	1.00	1.37E+00 (sol)	No	Yes
10	Dibenz(ah)anthracene	1.82E+01	3.28E-02	3.28E-02	0.00	1.00	1.00	8.80E-01 (vap)	No	Yes
11	Fluoranthene	1.26E+04	1.26E+04	6.29E+03	0.50	0.50	1.00	3.79E+01 (vap)	No	No
12	Fluorene	2.04E+04	2.04E+04	1.02E+04	0.50	0.50	1.00	6.16E+01 (sol)	No	No
13	Indeno(123-cd)pyrene	8.82E+01	1.79E-01	1.79E-01	0.00	1.00	1.00	1.23E-01 (vap)	No	No
14	Naphthalene	9.87E+02	4.07E+01	3.91E+01	0.04	0.96	1.00	1.50E+02 (sol)	No	No
15	Phenanthrene	1.04E+04	1.05E+04	5.22E+03	0.50	0.50	1.00	7.19E+01 (sol)	No	No
16	Pyrene	3.03E+04	3.04E+04	1.52E+04	0.50	0.50	1.00	5.33E+00 (vap)	No	No
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Environment Agency

	Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?	
	oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal
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Environment Agency

		Soil Distribution				Media Concentrations													
		Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
		%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
1	Acenaphthene	98.4	1.6	0.0	100.0	1.10E+04	3.03E+02	5.52E+03	4.69E-06	5.93E-07	1.43E-01	2.55E-04	3.23E-05	NA	NA	NA	NA	NA	NA
2	Acenaphthylene	98.0	2.0	0.0	100.0	1.04E+04	2.73E+02	5.18E+03	4.41E-06	5.57E-07	1.47E-01	2.72E-04	3.43E-05	NA	NA	NA	NA	NA	NA
3	Anthracene	99.3	0.7	0.0	100.0	1.21E+05	3.34E+02	6.06E+04	5.16E-05	6.51E-06	2.49E-01	1.69E-03	2.13E-04	NA	NA	NA	NA	NA	NA
4	Benz(a)anthracene	100.0	0.0	0.0	100.0	3.35E-01	1.17E-05	1.67E-01	1.43E-10	1.80E-11	1.07E-08	1.16E-09	1.47E-10	NA	NA	NA	NA	NA	NA
5	Benzo(a)pyrene	100.0	0.0	0.0	100.0	3.65E-02	4.30E-08	1.82E-02	1.55E-11	1.96E-12	6.05E-11	9.65E-11	1.22E-11	NA	NA	NA	NA	NA	NA
6	Benzo(b)fluoranthene	100.0	0.0	0.0	100.0	3.27E-01	5.53E-07	1.64E-01	1.39E-10	1.76E-11	7.15E-10	9.54E-10	1.20E-10	NA	NA	NA	NA	NA	NA
7	Benzo(ghi)perylene	100.0	0.0	0.0	100.0	3.18E+00	1.88E-06	1.59E+00	1.35E-09	1.71E-10	2.11E-09	4.60E-09	5.81E-10	NA	NA	NA	NA	NA	NA
8	Benzo(k)fluoranthene	100.0	0.0	0.0	100.0	6.24E-01	6.33E-07	3.12E-01	2.66E-10	3.36E-11	8.90E-10	1.53E-09	1.93E-10	NA	NA	NA	NA	NA	NA
9	Chrysene	100.0	0.0	0.0	100.0	3.65E-02	3.70E-08	1.83E-02	1.55E-11	1.96E-12	5.21E-11	8.95E-11	1.13E-11	NA	NA	NA	NA	NA	NA
10	Dibenz(ah)anthracene	99.9	0.1	0.0	100.0	3.28E-02	1.64E-07	1.64E-02	1.40E-11	1.76E-12	1.81E-10	1.35E-10	1.70E-11	NA	NA	NA	NA	NA	NA
11	Fluoranthene	99.8	0.2	0.0	100.0	6.29E+03	1.87E+00	3.14E+03	2.68E-06	3.38E-07	1.62E-03	4.70E-05	5.93E-06	NA	NA	NA	NA	NA	NA
12	Fluorene	98.7	1.3	0.0	100.0	1.02E+04	1.27E+02	5.10E+03	4.34E-06	5.48E-07	7.51E-02	2.06E-04	2.60E-05	NA	NA	NA	NA	NA	NA
13	Indeno(123-cd)pyrene	100.0	0.0	0.0	100.0	1.79E-01	3.63E-07	8.94E-02	7.61E-11	9.61E-12	4.63E-10	5.62E-10	7.10E-11	NA	NA	NA	NA	NA	NA
14	Naphthalene	94.6	5.4	0.0	100.0	3.91E+01	3.27E+01	1.95E+01	1.66E-08	2.10E-09	5.51E-03	2.35E-06	2.97E-07	NA	NA	NA	NA	NA	NA
15	Phenanthrene	99.3	0.7	0.0	100.0	5.22E+03	1.16E+01	2.61E+03	2.22E-06	2.81E-07	9.08E-03	7.30E-05	9.22E-06	NA	NA	NA	NA	NA	NA
16	Pyrene	99.8	0.2	0.0	100.0	1.52E+04	3.74E+00	7.59E+03	6.46E-06	8.16E-07	3.33E-03	1.20E-04	1.52E-05	NA	NA	NA	NA	NA	NA
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Environment Agency

	Soil Distribution				Media Concentrations													
	Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
	%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
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Environment Agency

		Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
		Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
1	Acenaphthene	7.86E-03	0.00E+00	2.67E-03	3.82E-05	1.94E-02	1.40E-05	3.56E-07	13.10	0.00	4.45	0.06	32.37	0.00	0.02	0.00
2	Acenaphthylene	7.38E-03	0.00E+00	2.51E-03	3.59E-05	2.01E-02	2.00E-06	1.57E-07	12.30	0.00	4.18	0.06	33.46	0.00	0.00	0.00
3	Anthracene	8.63E-02	0.00E+00	2.93E-02	4.19E-04	3.39E-02	1.14E-06	5.84E-07	28.78	0.00	9.78	0.14	11.30	0.00	0.00	0.00
4	Benz(a)anthracene	2.39E-07	0.00E+00	8.11E-08	1.16E-09	1.45E-09	8.55E-07	1.57E-07	21.23	0.00	7.22	0.10	0.13	0.00	28.68	13.95
5	Benzo(a)pyrene	2.60E-08	0.00E+00	8.84E-09	1.26E-10	8.34E-12	1.57E-06	8.55E-08	18.59	0.00	6.32	0.09	0.01	0.00	25.00	25.00
6	Benzo(b)fluoranthene	2.33E-07	0.00E+00	7.93E-08	1.13E-09	9.84E-11	1.57E-06	1.85E-07	20.71	0.00	7.04	0.10	0.01	0.00	27.85	16.44
7	Benzo(ghi)perylene	2.27E-06	0.00E+00	7.70E-07	1.10E-08	2.92E-10	8.55E-07	1.43E-07	31.95	0.00	10.86	0.16	0.00	0.00	12.06	2.01
8	Benzo(k)fluoranthene	4.45E-07	0.00E+00	1.51E-07	2.16E-09	1.23E-10	1.28E-06	9.98E-08	23.48	0.00	7.98	0.11	0.01	0.00	31.58	5.27
9	Chrysene	2.60E-08	0.00E+00	8.85E-09	1.26E-10	7.19E-12	1.57E-06	2.42E-07	18.59	0.00	6.32	0.09	0.01	0.00	25.00	25.00
10	Dibenz(ah)anthracene	2.34E-08	0.00E+00	7.95E-09	1.14E-10	2.47E-11	5.70E-07	4.70E-07	18.58	0.00	6.31	0.09	0.02	0.00	25.00	25.00
11	Fluoranthene	4.48E-03	0.00E+00	1.52E-03	2.18E-05	2.21E-04	4.99E-06	1.20E-06	35.85	0.00	12.19	0.17	1.77	0.00	0.04	0.01
12	Fluorene	7.26E-03	0.00E+00	2.47E-03	3.53E-05	1.02E-02	8.41E-06	1.37E-06	18.16	0.00	6.17	0.09	25.57	0.00	0.02	0.00
13	Indeno(123-cd)pyrene	1.27E-07	0.00E+00	4.33E-08	6.19E-10	6.36E-11	1.43E-06	1.28E-07	19.83	0.00	6.74	0.10	0.01	0.00	26.68	19.97
14	Naphthalene	2.78E-05	0.00E+00	9.47E-06	1.35E-07	7.50E-04	9.98E-05	3.99E-05	1.62	0.00	0.55	0.01	43.74	0.00	5.82	2.33
15	Phenanthrene	3.72E-03	0.00E+00	1.27E-03	1.81E-05	1.24E-03	2.20E-05	7.38E-06	29.74	0.00	10.11	0.14	9.88	0.00	0.18	0.06
16	Pyrene	1.08E-02	0.00E+00	3.68E-03	5.26E-05	4.54E-04	4.99E-06	9.27E-07	36.05	0.00	12.25	0.18	1.51	0.00	0.02	0.00
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Environment Agency

	Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
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Environment Agency

		Oral Health Criteria Value (µg kg^{-1} BW day^{-1})		Inhalation Health Criteria Value (µg kg^{-1} BW day^{-1})		Oral Mean Daily Intake (µg day^{-1})	Inhalation Mean Daily Intake (µg day^{-1})	Air-water partition coefficient (K_{aw}) (cm^3 cm^{-3})	Coefficient of Diffusion in Air (m^2 s^{-1})	Coefficient of Diffusion in Water (m^2 s^{-1})	log K_{oc} (cm^3 g^{-1})	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g^{-1} DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
1	Acenaphthene	TDI	60	TDI	60	0.98	0.025	7.59E-04	5.85E-06	4.70E-10	3.37	4.03	0.13	0.5	1	1	1
2	Acenaphthylene	TDI	60	TDI	60	0.14	0.011	5.68E-04	5.97E-06	4.82E-10	3.26	3.91	0.13	0.5	1	1	1
3	Anthracene	TDI	300	TDI	300	0.08	0.041	1.81E-04	5.36E-06	4.36E-10	3.75	4.5	0.13	0.5	1	1	1
4	Benz(a)anthracene	TDI	0.138	TDI	0.00048	0.06	0.011	3.16E-05	4.60E-06	3.80E-10	4.89	5.91	0.13	0.5	1	1	1
5	Benzo(a)pyrene	TDI	0.02	TDI	0.00007	0.11	0.006	1.76E-06	4.38E-06	3.67E-10	5.11	6.18	0.13	0.5	1	1	1
6	Benzo(b)fluoranthene	TDI	0.142	TDI	0.0005	0.11	0.013	2.05E-06	4.38E-06	3.62E-10	5.02	6.08	0.13	0.5	1	1	1
7	Benzo(ghi)perylene	TDI	0.909	TDI	0.0032	0.06	0.01	2.86E-06	4.22E-06	3.56E-10	5.62	6.81	0.13	0.5	1	1	1
8	Benzo(k)fluoranthene	TDI	0.2	TDI	0.0007	0.09	0.007	1.74E-06	4.36E-06	3.62E-10	5.17	6.26	0.13	0.5	1	1	1
9	Chrysene	TDI	0.2	TDI	0.00007	0.11	0.017	1.74E-06	4.36E-06	3.62E-10	5.17	6.26	0.13	0.5	1	1	1
10	Dibenz(ah)anthracene	TDI	0.018	TDI	0.000063	0.04	0.033	3.18E-06	4.57E-06	3.77E-10	4.74	5.73	0.13	0.5	1	1	1
11	Fluoranthene	TDI	12.5	TDI	12.5	0.35	0.084	6.29E-05	5.01E-06	4.11E-10	4.26	5.13	0.13	0.5	1	1	1
12	Fluorene	TDI	40	TDI	40	0.59	0.096	4.12E-04	5.58E-06	4.47E-10	3.45	4.13	0.13	0.5	1	1	1
13	Indeno(123-cd)pyrene	TDI	0.086	TDI	0.0003	0.1	0.009	2.05E-06	4.17E-06	3.51E-10	4.94	5.97	0.13	0.5	1	1	1
14	Naphthalene	TDI	20	TDI	0.86	7	2.8	6.62E-03	6.52E-06	5.16E-10	2.81	3.34	0.13	0.5	1	1	1
15	Phenanthrene	TDI	12.5	TDI	12.5	1.54	0.518	1.43E-04	5.34E-06	4.32E-10	3.74	4.5	0.13	0.5	1	1	1
16	Pyrene	TDI	30	TDI	30	0.35	0.065	4.65E-05	5.01E-06	4.15E-10	4.21	5.08	0.13	0.5	1	1	1
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Environment Agency

	Oral Health Criteria Value (µg kg^{-1} BW day^{-1})		Inhalation Health Criteria Value (µg kg^{-1} BW day^{-1})	Oral Mean Daily Intake (µg day^{-1})	Inhalation Mean Daily Intake (µg day^{-1})	Air-water partition coefficient (K_{aw}) (cm^3 cm^{-3})	Coefficient of Diffusion in Air (m^2 s^{-1})	Coefficient of Diffusion in Water (m^2 s^{-1})	log K_{oc} (cm^3 g^{-1})	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g^{-1} DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
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Environment Agency

		Soil-to-water partition coefficient ($cm^3 g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg L^{-1}$)	Soil-to-plant concentration factor for green vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)
1	Acenaphthene	2.72E+01	7.37E-02	4.11E+00	model	model	model	model	model	model
2	Acenaphthylene	2.11E+01	7.08E-02	7.95E+00	model	model	model	model	model	model
3	Anthracene	6.52E+01	8.49E-05	5.60E-02	model	model	model	model	model	model
4	Benz(a)anthracene	9.00E+02	1.24E-06	3.80E-03	model	model	model	model	model	model
5	Benzo(a)pyrene	1.49E+03	2.00E-08	2.80E-03	model	model	model	model	model	model
6	Benzo(b)fluoranthene	1.21E+03	6.34E-08	2.00E-03	model	model	model	model	model	model
7	Benzo(ghi)perylene	4.84E+03	1.55E-10	2.60E-04	model	model	model	model	model	model
8	Benzo(k)fluoranthene	1.72E+03	1.64E-08	8.00E-04	model	model	model	model	model	model
9	Chrysene	1.72E+03	1.64E-08	8.00E-04	model	model	model	model	model	model
10	Dibenz(ah)anthracene	6.37E+02	4.52E-08	2.00E-03	model	model	model	model	model	model
11	Fluoranthene	2.11E+02	1.31E-04	2.30E-01	model	model	model	model	model	model
12	Fluorene	3.27E+01	1.56E-02	1.86E+00	model	model	model	model	model	model
13	Indeno(123-cd)pyrene	1.01E+03	2.12E-09	2.00E-04	model	model	model	model	model	model
14	Naphthalene	7.49E+00	2.31E+00	1.90E+01	model	model	model	model	model	model
15	Phenanthrene	6.37E+01	2.82E-03	1.12E+00	model	model	model	model	model	model
16	Pyrene	1.88E+02	1.53E-05	1.30E-01	model	model	model	model	model	model
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Environment Agency

	Soil-to-water partition coefficient ($cm^3\ g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg\ L^{-1}$)	Soil-to-plant concentration factor for green vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)
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CLEA Software Version 1.06

Report generated	03/11/2010
Report title	Moneystone Quarry - TPH
Created by	AG at Abbeydale BEC

Environment Agency

BASIC SETTINGS

Land Use	Residential (lifetime exposure)						
Building	Bungalow						
Receptor	Female (com)	Start age class	17	End age class	18	Exposure Duration	59 years
Soil	Silty clay loam						

Exposure Pathways

Direct soil and dust ingestion	✓	Dermal contact with indoor dust	✓	Inhalation of indoor dust	✓
Consumption of homegrown produce	✖	Dermal contact with soil	✓	Inhalation of soil dust	✓
Soil attached to homegrown produce	✖			Inhalation of indoor vapour	✓
				Inhalation of outdoor vapour	✓

Environment Agency

Land Use Residential (lifetime exposure)

Age Class	Exposure Frequencies (days yr^{-1})						Occupation Periods (hr day^{-1})		Soil to skin adherence factors (mg cm^{2})		Direct soil ingestion rate (g day^{-1})
	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with indoor dust	Dermal contact with soil	Inhalation of dust and vapour, indoor	Inhalation of dust and vapour, outdoor	Indoors	Outdoors	Indoor	Outdoor	
1	180	180	180	180	365	365	23.0	1.0	0.06	1.00	0.10
2	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10
3	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10
4	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10
5	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
6	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
7	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
8	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
9	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
10	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
11	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
12	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
13	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
14	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
15	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
16	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
17	365	365	365	365	365	365	16.0	1.0	0.06	0.30	0.05
18	365	365	365	365	365	365	16.0	1.0	0.06	0.30	0.05

Environment Agency

Receptor Female (com)

Age Class	Body weight (kg)	Body height (m)	Inhalation rate (m^3 day^{-1})	Max exposed skin factor: Indoor (m^2 m^{-2})	Max exposed skin factor: Outdoor (m^2 m^{-2})	Total skin area (m^2)	Consumption rates (g FW kg^{-1} BW day^{-1}): Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
1	5.60	0.7	8.5	0.00	0.00	3.43E-01	7.12	10.69	16.03	1.83	2.23	3.82
2	9.80	0.8	13.3	0.00	0.00	4.84E-01	6.85	3.30	5.46	3.96	0.54	11.96
3	12.70	0.9	12.7	0.00	0.00	5.82E-01	6.85	3.30	5.46	3.96	0.54	11.96
4	15.10	0.9	12.2	0.00	0.00	6.36E-01	6.85	3.30	5.46	3.96	0.54	11.96
5	16.90	1.0	12.2	0.00	0.00	7.04E-01	3.74	1.77	3.38	1.85	0.16	4.26
6	19.70	1.1	12.2	0.00	0.00	7.94E-01	3.74	1.77	3.38	1.85	0.16	4.26
7	22.10	1.2	12.4	0.00	0.00	8.73E-01	3.74	1.77	3.38	1.85	0.16	4.26
8	25.30	1.2	12.4	0.00	0.00	9.36E-01	3.74	1.77	3.38	1.85	0.16	4.26
9	27.50	1.3	12.4	0.00	0.00	1.01E+00	3.74	1.77	3.38	1.85	0.16	4.26
10	31.40	1.3	12.4	0.00	0.00	1.08E+00	3.74	1.77	3.38	1.85	0.16	4.26
11	35.70	1.4	12.4	0.00	0.00	1.19E+00	3.74	1.77	3.38	1.85	0.16	4.26
12	41.30	1.4	13.4	0.00	0.00	1.29E+00	3.74	1.77	3.38	1.85	0.16	4.26
13	47.20	1.5	13.4	0.00	0.00	1.42E+00	3.74	1.77	3.38	1.85	0.16	4.26
14	51.20	1.6	13.4	0.00	0.00	1.52E+00	3.74	1.77	3.38	1.85	0.16	4.26
15	56.70	1.6	13.4	0.00	0.00	1.60E+00	3.74	1.77	3.38	1.85	0.16	4.26
16	59.00	1.6	13.4	0.00	0.00	1.63E+00	3.74	1.77	3.38	1.85	0.16	4.26
17	70.00	1.6	14.8	0.08	0.08	1.78E+00	2.94	1.40	1.79	1.61	0.22	2.97
18	70.90	1.6	12.0	0.00	0.00	1.80E+00	2.94	1.40	1.79	1.61	0.22	2.97

Environment Agency

Building Bungalow

Building footprint (m^2)	7.80E+01
Living space air exchange rate (hr^{-1})	5.00E-01
Living space height (above ground, m)	2.40E+00
Living space height (below ground, m)	0.00E+00
Pressure difference (soil to enclosed space, Pa)	2.60E+00
Foundation thickness (m)	1.50E-01
Floor crack area (cm^2)	7.07E+02
Dust loading factor ($\mu g\ m^{-3}$)	5.00E+01

Soil Silty clay loam

Porosity, Total ($cm^3\ cm^{-3}$)	5.80E-01
Porosity, Air-Filled ($cm^3\ cm^{-3}$)	1.20E-01
Porosity, Water-Filled ($cm^3\ cm^{-3}$)	4.60E-01
Residual soil water content ($cm^3\ cm^{-3}$)	2.10E-01
Saturated hydraulic conductivity ($cm\ s^{-1}$)	1.17E-03
van Genuchten shape parameter *m* (dimensionless)	3.07E-01
Bulk density ($g\ cm^{-3}$)	1.07E+00
Threshold value of wind speed at 10m ($m\ s^{-1}$)	7.20E+00
Empirical function (F_x) for dust model (dimensionless)	1.22E+00
Ambient soil temperature (K)	2.83E+02
Soil pH	7.00E+00
Soil Organic Matter content (%)	2.00E+00
Fraction of organic carbon ($g\ g^{-1}$)	1.16E-02
Effective total fluid saturation (unitless)	6.76E-01
Intrinsic soil permeability (cm^2)	1.56E-08
Relative soil air permeability (unitless)	4.66E-01
Effective air permeability (cm^2)	7.28E-09

Environment Agency

Soil - Vapour Model

Depth to top of source (no building) (cm)	0
Depth to top of source (beneath building) (cm)	65
Default soil gas ingress rate?	Yes
Soil gas ingress rate ($cm^3\ s^{-1}$)	2.50E+01
Building ventilation rate ($cm^3\ s^{-1}$)	2.60E+04
Averaging time surface emissions (yr)	59
Finite vapour source model?	No
Thickness of contaminated layer (cm)	200

Air Dispersion Model

Mean annual windspeed at 10m ($m\ s^{-1}$)	5.00
Air dispersion factor at height of 0.8m *	2400.00
Air dispersion factor at height of 1.6m *	19000.00
Fraction of site cover ($m^2\ m^{-2}$)	0.75

* Air dispersion factor in $g\ m^{-2}\ s^{-1}$ per $kg\ m^3$

Soil - Plant Model

	Dry weight conversion factor	Homegrown fraction		Soil loading factor	Preparation correction factor
		Average	High		
	$g\ DW\ g^{-1}\ FW$	dimensionless		$g\ g^{-1}\ DW$	dimensionless
Green vegetables	0.096	0.05	0.33	1.00E-03	2.00E-01
Root vegetables	0.103	0.06	0.40	1.00E-03	1.00E+00
Tuber vegetables	0.210	0.02	0.13	1.00E-03	1.00E+00
Herbaceous fruit	0.058	0.06	0.40	1.00E-03	6.00E-01
Shrub fruit	0.166	0.09	0.60	1.00E-03	6.00E-01
Tree fruit	0.157	0.04	0.27	1.00E-03	6.00E-01

Gardener type Average

CLEA Software Version 1.06

Report generated	03-Nov-10
Report title	Moneystone Quarry - TPH
Created by	AG at Abbeydale BEC

Environment Agency

RESULTS

Environment Agency

		Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?	
		oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal
1	Ali EC5 - 6	8.08E+02	8.08E+02	5.39E+02	0.50	0.50	1.00	4.38E+02 (sol)	Yes	Yes
2	Ali EC 6 - 8	2.26E+04	2.26E+04	1.51E+04	0.50	0.50	1.00	2.41E+02 (sol)	Yes	Yes
3	Ali EC8 - 10	2.25E+03	6.54E+03	2.03E+03	0.82	0.18	1.00	1.50E+02 (sol)	Yes	Yes
4	Ali EC10 - 12	9.87E+03	2.86E+04	8.86E+03	0.82	0.18	1.00	9.44E+01 (sol)	Yes	Yes
5	Ali EC12 - 16	8.56E+03	2.48E+04	7.70E+03	0.82	0.18	1.00	4.73E+01 (sol)	Yes	Yes
6	Ali EC16 - 35	8.40E+05	NR	NR	1.00	NR	NR	1.70E+01 (sol)	Yes	No
7	Ali EC35 - 44	8.40E+05	NR	NR	1.00	NR	NR	1.70E+01 (sol)	Yes	No
8	Aro EC5 - 7	1.39E+03	8.72E+03	1.20E+03	0.86	0.14	1.00	2.18E+03 (sol)	No	No
9	Aro EC7 - 8	3.54E+03	2.21E+04	3.05E+03	0.86	0.14	1.00	1.66E+03 (vap)	No	No
10	Aro EC8 - 10	7.76E+02	1.16E+03	6.09E+02	0.65	0.35	1.00	1.22E+03 (vap)	Yes	Yes
11	Aro EC10 - 12	3.48E+03	5.22E+03	2.73E+03	0.65	0.35	1.00	7.25E+02 (sol)	Yes	Yes
12	Aro EC12 - 16	1.33E+04	2.00E+04	1.05E+04	0.65	0.35	1.00	3.37E+02 (sol)	Yes	Yes
13	Aro EC16 - 21	1.59E+04	NR	NR	1.00	NR	NR	1.07E+02 (vap)	Yes	No
14	Aro EC21 - 35	1.66E+04	NR	NR	1.00	NR	NR	9.66E+00 (sol)	Yes	No
15	Aro EC35 - 44	1.66E+04	NR	NR	1.00	NR	NR	9.66E+00 (sol)	Yes	No
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Environment Agency

	Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?	
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Environment Agency

		Soil Distribution				Media Concentrations													
		Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
		%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
1	Ali EC5 - 6	77.2	3.5	19.3	100.0	5.39E+02	9.26E+05	2.69E+02	2.29E-07	2.90E-08	1.22E+01	1.27E-03	1.61E-04	NA	NA	NA	NA	NA	NA
2	Ali EC 6 - 8	98.4	1.0	0.7	100.0	1.51E+04	9.16E+05	7.53E+03	6.41E-06	8.09E-07	1.21E+01	6.70E-03	8.46E-04	NA	NA	NA	NA	NA	NA
3	Ali EC8 - 10	99.7	0.1	0.1	100.0	2.03E+03	2.39E+04	1.01E+03	8.62E-07	1.09E-07	3.17E-01	3.97E-04	5.01E-05	NA	NA	NA	NA	NA	NA
4	Ali EC10 - 12	100.0	0.0	0.0	100.0	8.86E+03	2.05E+04	4.43E+03	3.77E-06	4.77E-07	2.71E-01	7.68E-04	9.71E-05	NA	NA	NA	NA	NA	NA
5	Ali EC12 - 16	100.0	0.0	0.0	100.0	7.70E+03	2.11E+04	3.85E+03	3.28E-06	4.14E-07	2.79E-01	7.26E-04	9.17E-05	NA	NA	NA	NA	NA	NA
6	Ali EC16 - 35	100.0	0.0	0.0	100.0	8.40E+05	1.35E+05	4.20E+05	3.58E-04	4.52E-05	1.78E+00	1.92E-02	2.42E-03	NA	NA	NA	NA	NA	NA
7	Ali EC35 - 44	100.0	0.0	0.0	100.0	8.40E+05	1.35E+05	4.20E+05	3.58E-04	4.52E-05	1.78E+00	1.92E-02	2.42E-03	NA	NA	NA	NA	NA	NA
8	Aro EC5 - 7	63.9	35.0	1.1	100.0	1.20E+03	1.13E+05	6.00E+02	5.11E-07	6.45E-08	1.40E+00	6.40E-04	8.09E-05	NA	NA	NA	NA	NA	NA
9	Aro EC7 - 8	84.2	15.3	0.5	100.0	3.05E+03	1.25E+05	1.53E+03	1.30E-06	1.64E-07	1.39E+00	1.01E-03	1.27E-04	NA	NA	NA	NA	NA	NA
10	Aro EC8 - 10	97.6	2.3	0.2	100.0	6.09E+02	8.17E+03	3.04E+02	2.59E-07	3.27E-08	1.11E-01	1.29E-04	1.63E-05	NA	NA	NA	NA	NA	NA
11	Aro EC10 - 12	98.5	1.5	0.0	100.0	2.73E+03	6.67E+03	1.37E+03	1.16E-06	1.47E-07	9.71E-02	2.57E-04	3.25E-05	NA	NA	NA	NA	NA	NA
12	Aro EC12 - 16	99.3	0.7	0.0	100.0	1.05E+04	2.25E+03	5.23E+03	4.45E-06	5.62E-07	4.60E-02	3.60E-04	4.54E-05	NA	NA	NA	NA	NA	NA
13	Aro EC16 - 21	99.7	0.3	0.0	100.0	1.59E+04	6.75E+01	7.97E+03	6.79E-06	8.57E-07	4.44E-03	2.18E-04	2.75E-05	NA	NA	NA	NA	NA	NA
14	Aro EC21 - 35	100.0	0.0	0.0	100.0	1.66E+04	2.82E-01	8.30E+03	7.07E-06	8.93E-07	2.67E-05	7.34E-05	9.27E-06	NA	NA	NA	NA	NA	NA
15	Aro EC35 - 44	100.0	0.0	0.0	100.0	1.66E+04	2.82E-01	8.30E+03	7.07E-06	8.93E-07	2.67E-05	7.34E-05	9.27E-06	NA	NA	NA	NA	NA	NA
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Environment Agency

	Soil Distribution				Media Concentrations													
	Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
	%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
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		Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
		Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
1	Ali EC5 - 6	3.84E-04	0.00E+00	1.00E-04	1.87E-06	1.67E+00	1.42E+95	1.42E+95	0.01	0.00	0.00	0.00	24.99	0.00	25.00	25.00
2	Ali EC 6 - 8	1.07E-02	0.00E+00	2.81E-03	5.21E-05	1.65E+00	1.42E+95	1.42E+95	0.16	0.00	0.04	0.00	24.80	0.00	25.00	25.00
3	Ali EC8 - 10	1.44E-03	0.00E+00	3.77E-04	7.01E-06	4.31E-02	1.42E+95	1.42E+95	0.80	0.00	0.21	0.00	23.98	0.00	25.00	25.00
4	Ali EC10 - 12	6.32E-03	0.00E+00	1.65E-03	3.07E-05	3.69E-02	1.42E+95	1.42E+95	3.52	0.00	0.92	0.02	20.55	0.00	25.00	25.00
5	Ali EC12 - 16	5.48E-03	0.00E+00	1.43E-03	2.67E-05	3.80E-02	1.42E+95	1.42E+95	3.05	0.00	0.80	0.01	21.13	0.00	25.00	25.00
6	Ali EC16 - 35	5.99E-01	0.00E+00	1.57E-01	2.91E-03	2.42E-01	1.42E+95	0.00E+00	29.92	0.00	7.82	0.15	12.10	0.00	50.00	0.00
7	Ali EC35 - 44	5.99E-01	0.00E+00	1.57E-01	2.91E-03	2.42E-01	1.42E+95	0.00E+00	29.92	0.00	7.82	0.15	12.10	0.00	50.00	0.00
8	Aro EC5 - 7	8.56E-04	0.00E+00	2.24E-04	4.16E-06	1.91E-01	4.28E-05	2.85E-03	0.22	0.00	0.06	0.00	49.35	0.00	0.01	0.74
9	Aro EC7 - 8	2.17E-03	0.00E+00	5.69E-04	1.06E-05	1.89E-01	1.43E-04	7.41E-03	0.56	0.00	0.15	0.00	48.33	0.00	0.04	1.89
10	Aro EC8 - 10	4.34E-04	0.00E+00	1.13E-04	2.11E-06	1.51E-02	1.42E+95	1.42E+95	0.69	0.00	0.18	0.00	24.12	0.00	25.00	25.00
11	Aro EC10 - 12	1.95E-03	0.00E+00	5.09E-04	9.46E-06	1.32E-02	1.42E+95	1.42E+95	3.10	0.00	0.81	0.02	21.07	0.00	25.00	25.00
12	Aro EC12 - 16	7.45E-03	0.00E+00	1.95E-03	3.62E-05	6.26E-03	1.42E+95	1.42E+95	11.87	0.00	3.10	0.06	9.97	0.00	25.00	25.00
13	Aro EC16 - 21	1.14E-02	0.00E+00	2.97E-03	5.52E-05	6.05E-04	1.42E+95	0.00E+00	37.89	0.00	9.91	0.18	2.02	0.00	50.00	0.00
14	Aro EC21 - 35	1.18E-02	0.00E+00	3.10E-03	5.75E-05	3.72E-06	1.42E+95	0.00E+00	39.47	0.00	10.32	0.19	0.01	0.00	50.00	0.00
15	Aro EC35 - 44	1.18E-02	0.00E+00	3.10E-03	5.75E-05	3.72E-06	1.42E+95	0.00E+00	39.47	0.00	10.32	0.19	0.01	0.00	50.00	0.00
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Environment Agency

	Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
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Environment Agency

		Oral Health Criteria Value ($\mu g\ kg^{-1}\ BW\ day^{-1}$)		Inhalation Health Criteria Value ($\mu g\ kg^{-1}\ BW\ day^{-1}$)		Oral Mean Daily Intake ($\mu g\ day^{-1}$)	Inhalation Mean Daily Intake ($\mu g\ day^{-1}$)	Air-water partition coefficient (K_{aw}) ($cm^3\ cm^{-3}$)	Coefficient of Diffusion in Air ($m^2\ s^{-1}$)	Coefficient of Diffusion in Water ($m^2\ s^{-1}$)	log K_{oc} ($cm^3\ g^{-1}$)	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor ($g\ g^{-1}$ DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
1	Ali EC5 - 6	TDI	5000	TDI	5000	9.99E+99	9.99E+99	2.10E+01	1.00E-05	1.00E-09	2.91	3.31	0.1	0.5	10	1	1
2	Ali EC 6 - 8	TDI	5000	TDI	5000	9.99E+99	9.99E+99	2.73E+00	1.00E-05	1.00E-09	3.58	4.13	0.1	0.5	10	1	1
3	Ali EC8 - 10	TDI	100	TDI	290	9.99E+99	9.99E+99	4.15E+00	1.00E-05	1.00E-09	4.48	5.22	0.1	0.5	10	1	1
4	Ali EC10 - 12	TDI	100	TDI	290	9.99E+99	9.99E+99	6.44E+00	1.00E-05	1.00E-09	5.38	6.3	0.1	0.5	10	1	1
5	Ali EC12 - 16	TDI	100	TDI	290	9.99E+99	9.99E+99	1.71E+02	1.00E-05	1.00E-09	6.73	7.94	0.1	0.5	10	1	1
6	Ali EC16 - 35	TDI	2000	NR	NR	9.99E+99	NR	1.07E+03	1.00E-05	1.00E-09	8.76	10.39	0.1	0.5	10	1	1
7	Ali EC35 - 44	TDI	2000	NR	NR	9.99E+99	NR	1.07E+03	1.00E-05	1.00E-09	8.76	10.39	0.1	0.5	10	1	1
8	Aro EC5 - 7	TDI	223	TDI	1400	3	200	1.16E-01	8.77E-06	6.64E-10	1.83	2.13	0.1	0.5	10	1	1
9	Aro EC7 - 8	TDI	223	TDI	1400	10	520	1.15E-01	7.78E-06	5.88E-10	2.31	2.73	0.1	0.5	10	1	1
10	Aro EC8 - 10	TDI	40	TDI	60	9.99E+99	9.99E+99	2.53E-01	1.00E-05	1.00E-09	3.2	3.69	0.1	0.5	10	1	1
11	Aro EC10 - 12	TDI	40	TDI	60	9.99E+99	9.99E+99	7.22E-02	1.00E-05	1.00E-09	3.4	3.93	0.1	0.5	10	1	1
12	Aro EC12 - 16	TDI	40	TDI	60	9.99E+99	9.99E+99	1.26E-02	1.00E-05	1.00E-09	3.7	4.29	0.1	0.5	10	1	1
13	Aro EC16 - 21	TDI	30	NR	NR	9.99E+99	NR	6.95E-04	1.00E-05	1.00E-09	4.15	4.82	0.1	0.5	10	1	1
14	Aro EC21 - 35	TDI	30	NR	NR	9.99E+99	NR	2.48E-05	1.00E-05	1.00E-09	5.1	5.95	0.1	0.5	10	1	1
15	Aro EC35 - 44	TDI	30	NR	NR	9.99E+99	NR	2.48E-05	1.00E-05	1.00E-09	5.1	5.95	0.1	0.5	10	1	1
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	Oral Health Criteria Value (µg kg^{-1} BW day^{-1})	Inhalation Health Criteria Value (µg kg^{-1} BW day^{-1})	Oral Mean Daily Intake (µg day^{-1})	Inhalation Mean Daily Intake (µg day^{-1})	Air-water partition coefficient (K_{aw}) (cm^3 cm^{-3})	Coefficient of Diffusion in Air (m^2 s^{-1})	Coefficient of Diffusion in Water (m^2 s^{-1})	log K_{oc} (cm^3 g^{-1})	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g^{-1} DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
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Environment Agency

		Soil-to-water partition coefficient ($cm^3 g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg L^{-1}$)	Soil-to-plant concentration factor for green vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)
1	Ali EC5 - 6	9.43E+00	2.19E+04	3.59E+01	model	model	model	model	model	model
2	Ali EC 6 - 8	4.41E+01	3.45E+03	5.37E+00	model	model	model	model	model	model
3	Ali EC8 - 10	3.50E+02	3.20E+02	4.27E-01	model	model	model	model	model	model
4	Ali EC10 - 12	2.78E+03	3.21E+01	3.39E-02	model	model	model	model	model	model
5	Ali EC12 - 16	6.23E+04	1.53E+00	7.59E-04	model	model	model	model	model	model
6	Ali EC16 - 35	6.68E+06	2.38E-02	2.54E-06	model	model	model	model	model	model
7	Ali EC35 - 44	6.68E+06	2.38E-02	2.54E-06	model	model	model	model	model	model
8	Aro EC5 - 7	7.84E-01	6.24E+03	1.78E+03	model	model	model	model	model	model
9	Aro EC7 - 8	2.37E+00	1.73E+03	5.90E+02	model	model	model	model	model	model
10	Aro EC8 - 10	1.84E+01	3.20E+02	6.46E+01	model	model	model	model	model	model
11	Aro EC10 - 12	2.91E+01	3.21E+01	2.45E+01	model	model	model	model	model	model
12	Aro EC12 - 16	5.81E+01	1.14E+00	5.75E+00	model	model	model	model	model	model
13	Aro EC16 - 21	1.64E+02	5.62E-03	6.53E-01	model	model	model	model	model	model
14	Aro EC21 - 35	1.46E+03	1.61E-06	6.61E-03	model	model	model	model	model	model
15	Aro EC35 - 44	1.46E+03	1.61E-06	6.61E-03	model	model	model	model	model	model
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Environment Agency

	Soil-to-water partition coefficient ($cm^3\ g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg\ L^{-1}$)	Soil-to-plant concentration factor for green vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)
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CLEA Software Version 1.06

Report generated	03/11/2010
Report title	Moneystone Quarry - BTEX & PCBs
Created by	AG at Abbeydale BEC

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BASIC SETTINGS

Land Use	Residential (lifetime exposure)				
Building	Bungalow				
Receptor	Female (com)	Start age class	17	End age class	18
Soil	Silty clay loam				

Exposure Duration 59 years

Exposure Pathways

Direct soil and dust ingestion	✓	Dermal contact with indoor dust	✓	Inhalation of indoor dust	✓
Consumption of homegrown produce	✖	Dermal contact with soil	✓	Inhalation of soil dust	✓
Soil attached to homegrown produce	✖			Inhalation of indoor vapour	✓
				Inhalation of outdoor vapour	✓

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Land Use Residential (lifetime exposure)

Age Class	Exposure Frequencies (days yr^{-1})						Occupation Periods (hr day^{-1})		Soil to skin adherence factors (mg cm^{2})		Direct soil ingestion rate (g day^{-1})
	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with indoor dust	Dermal contact with soil	Inhalation of dust and vapour, indoor	Inhalation of dust and vapour, outdoor	Indoors	Outdoors	Indoor	Outdoor	
1	180	180	180	180	365	365	23.0	1.0	0.06	1.00	0.10
2	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10
3	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10
4	365	365	365	365	365	365	23.0	1.0	0.06	1.00	0.10
5	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
6	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
7	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
8	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
9	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
10	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
11	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
12	365	365	365	365	365	365	19.0	1.0	0.06	1.00	0.10
13	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
14	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
15	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
16	365	365	365	365	365	365	15.0	1.0	0.06	0.30	0.05
17	365	365	365	365	365	365	16.0	1.0	0.06	0.30	0.05
18	365	365	365	365	365	365	16.0	1.0	0.06	0.30	0.05

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Receptor Female (com)

Age Class	Body weight (kg)	Body height (m)	Inhalation rate (m^3 day^{-1})	Max exposed skin factor: Indoor (m^2 m^{-2})	Max exposed skin factor: Outdoor (m^2 m^{-2})	Total skin area (m^2)	Consumption rates (g FW kg^{-1} BW day^{-1}): Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
1	5.60	0.7	8.5	0.00	0.00	3.43E-01	7.12	10.69	16.03	1.83	2.23	3.82
2	9.80	0.8	13.3	0.00	0.00	4.84E-01	6.85	3.30	5.46	3.96	0.54	11.96
3	12.70	0.9	12.7	0.00	0.00	5.82E-01	6.85	3.30	5.46	3.96	0.54	11.96
4	15.10	0.9	12.2	0.00	0.00	6.36E-01	6.85	3.30	5.46	3.96	0.54	11.96
5	16.90	1.0	12.2	0.00	0.00	7.04E-01	3.74	1.77	3.38	1.85	0.16	4.26
6	19.70	1.1	12.2	0.00	0.00	7.94E-01	3.74	1.77	3.38	1.85	0.16	4.26
7	22.10	1.2	12.4	0.00	0.00	8.73E-01	3.74	1.77	3.38	1.85	0.16	4.26
8	25.30	1.2	12.4	0.00	0.00	9.36E-01	3.74	1.77	3.38	1.85	0.16	4.26
9	27.50	1.3	12.4	0.00	0.00	1.01E+00	3.74	1.77	3.38	1.85	0.16	4.26
10	31.40	1.3	12.4	0.00	0.00	1.08E+00	3.74	1.77	3.38	1.85	0.16	4.26
11	35.70	1.4	12.4	0.00	0.00	1.19E+00	3.74	1.77	3.38	1.85	0.16	4.26
12	41.30	1.4	13.4	0.00	0.00	1.29E+00	3.74	1.77	3.38	1.85	0.16	4.26
13	47.20	1.5	13.4	0.00	0.00	1.42E+00	3.74	1.77	3.38	1.85	0.16	4.26
14	51.20	1.6	13.4	0.00	0.00	1.52E+00	3.74	1.77	3.38	1.85	0.16	4.26
15	56.70	1.6	13.4	0.00	0.00	1.60E+00	3.74	1.77	3.38	1.85	0.16	4.26
16	59.00	1.6	13.4	0.00	0.00	1.63E+00	3.74	1.77	3.38	1.85	0.16	4.26
17	70.00	1.6	14.8	0.08	0.08	1.78E+00	2.94	1.40	1.79	1.61	0.22	2.97
18	70.90	1.6	12.0	0.00	0.00	1.80E+00	2.94	1.40	1.79	1.61	0.22	2.97

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Building Bungalow

Building footprint (m^2)	7.80E+01
Living space air exchange rate (hr^{-1})	5.00E-01
Living space height (above ground, m)	2.40E+00
Living space height (below ground, m)	0.00E+00
Pressure difference (soil to enclosed space, Pa)	2.60E+00
Foundation thickness (m)	1.50E-01
Floor crack area (cm^2)	7.07E+02
Dust loading factor ($\mu g\ m^{-3}$)	5.00E+01

Soil Silty clay loam

Porosity, Total ($cm^3\ cm^{-3}$)	5.80E-01
Porosity, Air-Filled ($cm^3\ cm^{-3}$)	1.20E-01
Porosity, Water-Filled ($cm^3\ cm^{-3}$)	4.60E-01
Residual soil water content ($cm^3\ cm^{-3}$)	2.10E-01
Saturated hydraulic conductivity ($cm\ s^{-1}$)	1.17E-03
van Genuchten shape parameter *m* (dimensionless)	3.07E-01
Bulk density ($g\ cm^{-3}$)	1.07E+00
Threshold value of wind speed at 10m ($m\ s^{-1}$)	7.20E+00
Empirical function (F_x) for dust model (dimensionless)	1.22E+00
Ambient soil temperature (K)	2.83E+02
Soil pH	7.00E+00
Soil Organic Matter content (%)	2.00E+00
Fraction of organic carbon ($g\ g^{-1}$)	1.16E-02
Effective total fluid saturation (unitless)	6.76E-01
Intrinsic soil permeability (cm^2)	1.56E-08
Relative soil air permeability (unitless)	4.66E-01
Effective air permeability (cm^2)	7.28E-09

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Environment Agency

Soil - Vapour Model

Depth to top of source (no building) (cm)	0
Depth to top of source (beneath building) (cm)	65
Default soil gas ingress rate?	Yes
Soil gas ingress rate ($cm^3 s^{-1}$)	2.50E+01
Building ventilation rate ($cm^3 s^{-1}$)	2.60E+04
Averaging time surface emissions (yr)	59
Finite vapour source model?	No
Thickness of contaminated layer (cm)	200

Air Dispersion Model

Mean annual windspeed at 10m ($m s^{-1}$)	5.00
Air dispersion factor at height of 0.8m *	2400.00
Air dispersion factor at height of 1.6m *	19000.00
Fraction of site cover ($m^2 m^{-2}$)	0.75

* Air dispersion factor in $g m^{-2} s^{-1}$ per $kg m^{-3}$

Soil - Plant Model

	Dry weight conversion factor	Homegrown fraction		Soil loading factor	Preparation correction factor
		Average	High		
	g DW g^{-1} FW	dimensionless		g g^{-1} DW	dimensionless
Green vegetables	0.096	0.05	0.33	1.00E-03	2.00E-01
Root vegetables	0.103	0.06	0.40	1.00E-03	1.00E+00
Tuber vegetables	0.210	0.02	0.13	1.00E-03	1.00E+00
Herbaceous fruit	0.058	0.06	0.40	1.00E-03	6.00E-01
Shrub fruit	0.166	0.09	0.60	1.00E-03	6.00E-01
Tree fruit	0.157	0.04	0.27	1.00E-03	6.00E-01

Gardener type: Average

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Report generated	03-Nov-10
Report title	Moneystone Quarry - BTEX & PCBs
Created by	AG at Abbeydale BEC

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RESULTS

Environment Agency

		Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?	
		oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal
1	Benzene	3.23E+02	8.79E+00	8.56E+00	0.03	0.97	1.00	2.18E+03 (sol)	No	No
2	Ethylbenzene	1.11E+05	6.42E+03	6.07E+03	0.05	0.95	1.00	1.01E+03 (vap)	No	No
3	Toluene	2.48E+05	2.24E+04	2.06E+04	0.08	0.92	1.00	1.66E+03 (vap)	No	No
4	Xylene, o-	2.00E+05	2.43E+03	2.40E+03	0.01	0.99	1.00	9.32E+02 (sol)	No	No
5	Xylene, m-	2.00E+05	2.28E+03	2.26E+03	0.01	0.99	1.00	1.22E+03 (vap)	No	No
6	Xylene, p-	2.00E+05	2.19E+03	2.16E+03	0.01	0.99	1.00	1.12E+03 (sol)	No	No
7	Phenol	9.75E+05	6.86E+03	6.81E+03	0.01	0.99	1.00	7.68E+04 (vap)	No	No
8	PCB-77	1.33E-03	NR	NR	1.00	NR	NR	1.28E+03 (sol)	No	No
9	PCB-81	1.33E-03	NR	NR	1.00	NR	NR	1.28E+03 (sol)	No	No
10	PCB-126	1.33E-03	NR	NR	1.00	NR	NR	1.42E+03 (sol)	No	No
11	PCB-169	1.33E-03	NR	NR	1.00	NR	NR	1.54E+03 (vap)	No	No
12	PCB-105	1.33E-03	NR	NR	1.00	NR	NR	1.40E+03 (vap)	No	No
13	PCB-114	1.33E-03	NR	NR	1.00	NR	NR	1.40E+03 (vap)	No	No
14	PCB-118	1.33E-03	NR	NR	1.00	NR	NR	1.40E+03 (vap)	No	No
15	PCB-123	1.33E-03	NR	NR	1.00	NR	NR	1.36E+03 (sol)	No	No
16	PCB-156	1.33E-03	NR	NR	1.00	NR	NR	1.54E+03 (vap)	No	No
17	PCB-157	1.33E-03	NR	NR	1.00	NR	NR	1.54E+03 (vap)	No	No
18	PCB-167	1.33E-03	NR	NR	1.00	NR	NR	1.54E+03 (vap)	No	No
19	PCB-189	1.33E-03	NR	NR	1.00	NR	NR	1.63E+03 (vap)	No	No
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Environment Agency

	Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?	
	oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal
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Environment Agency

		Soil Distribution				Media Concentrations													
		Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
		%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
1	Benzene	63.9	35.0	1.1	100.0	8.56E+00	8.09E+02	4.28E+00	3.64E-09	4.60E-10	1.00E-02	4.56E-06	5.76E-07	NA	NA	NA	NA	NA	NA
2	Ethylbenzene	92.1	7.6	0.3	100.0	6.07E+03	1.50E+05	3.03E+03	2.58E-06	3.26E-07	1.51E+00	1.47E-03	1.86E-04	NA	NA	NA	NA	NA	NA
3	Toluene	84.2	15.3	0.5	100.0	2.06E+04	8.42E+05	1.03E+04	8.76E-06	1.11E-06	9.38E+00	6.80E-03	8.59E-04	NA	NA	NA	NA	NA	NA
4	Xylene, o-	91.8	8.0	0.2	100.0	2.40E+03	4.09E+04	1.20E+03	1.02E-06	1.29E-07	4.21E-01	4.89E-04	6.18E-05	NA	NA	NA	NA	NA	NA
5	Xylene, m-	92.8	7.0	0.2	100.0	2.26E+03	4.13E+04	1.13E+03	9.61E-07	1.21E-07	4.21E-01	4.75E-04	6.00E-05	NA	NA	NA	NA	NA	NA
6	Xylene, p-	92.1	7.6	0.2	100.0	2.16E+03	4.12E+04	1.08E+03	9.21E-07	1.16E-07	4.21E-01	4.65E-04	5.87E-05	NA	NA	NA	NA	NA	NA
7	Phenol	69.2	30.8	0.0	100.0	6.81E+03	4.08E+01	3.40E+03	2.90E-06	3.66E-07	4.06E-02	7.76E-04	9.80E-05	NA	NA	NA	NA	NA	NA
8	PCB-77	100.0	0.0	0.0	100.0	1.33E-03	4.91E-08	6.65E-04	5.66E-13	7.15E-14	2.08E-11	1.02E-12	1.29E-13	NA	NA	NA	NA	NA	NA
9	PCB-81	100.0	0.0	0.0	100.0	1.33E-03	4.91E-08	6.65E-04	5.66E-13	7.15E-14	2.08E-11	1.02E-12	1.29E-13	NA	NA	NA	NA	NA	NA
10	PCB-126	100.0	0.0	0.0	100.0	1.33E-03	8.67E-09	6.66E-04	5.67E-13	7.16E-14	4.57E-12	5.33E-13	6.74E-14	NA	NA	NA	NA	NA	NA
11	PCB-169	100.0	0.0	0.0	100.0	1.33E-03	1.57E-09	6.66E-04	5.67E-13	7.16E-14	9.86E-13	2.84E-13	3.59E-14	NA	NA	NA	NA	NA	NA
12	PCB-105	100.0	0.0	0.0	100.0	1.33E-03	2.22E-08	6.65E-04	5.66E-13	7.16E-14	7.45E-12	5.68E-13	7.17E-14	NA	NA	NA	NA	NA	NA
13	PCB-114	100.0	0.0	0.0	100.0	1.33E-03	2.22E-08	6.65E-04	5.66E-13	7.16E-14	7.45E-12	5.68E-13	7.17E-14	NA	NA	NA	NA	NA	NA
14	PCB-118	100.0	0.0	0.0	100.0	1.33E-03	2.22E-08	6.65E-04	5.66E-13	7.16E-14	7.45E-12	5.68E-13	7.17E-14	NA	NA	NA	NA	NA	NA
15	PCB-123	100.0	0.0	0.0	100.0	1.33E-03	2.22E-08	6.65E-04	5.66E-13	7.16E-14	7.45E-12	5.68E-13	7.17E-14	NA	NA	NA	NA	NA	NA
16	PCB-156	100.0	0.0	0.0	100.0	1.33E-03	3.91E-09	6.66E-04	5.67E-13	7.16E-14	1.69E-12	2.94E-13	3.72E-14	NA	NA	NA	NA	NA	NA
17	PCB-157	100.0	0.0	0.0	100.0	1.33E-03	3.91E-09	6.66E-04	5.67E-13	7.16E-14	1.69E-12	2.94E-13	3.72E-14	NA	NA	NA	NA	NA	NA
18	PCB-167	100.0	0.0	0.0	100.0	1.33E-03	3.91E-09	6.66E-04	5.67E-13	7.16E-14	1.69E-12	2.94E-13	3.72E-14	NA	NA	NA	NA	NA	NA
19	PCB-189	100.0	0.0	0.0	100.0	1.33E-03	7.05E-10	6.66E-04	5.67E-13	7.16E-14	3.80E-13	1.56E-13	1.97E-14	NA	NA	NA	NA	NA	NA
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	Soil Distribution				Media Concentrations													
	Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
	%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
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		Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
		Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
1	Benzene	6.10E-06	0.00E+00	1.59E-06	2.96E-08	1.36E-03	0.00E+00	0.00E+00	0.45	0.00	0.12	0.00	99.44	0.00	0.00	0.00
2	Ethylbenzene	4.32E-03	0.00E+00	1.13E-03	2.10E-05	2.06E-01	7.13E-05	1.85E-03	2.02	0.00	0.53	0.01	96.54	0.00	0.03	0.87
3	Toluene	1.47E-02	0.00E+00	3.83E-03	7.13E-05	1.28E+00	1.43E-04	7.41E-03	1.13	0.00	0.29	0.01	97.99	0.00	0.01	0.57
4	Xylene, o-	1.71E-03	0.00E+00	4.47E-04	8.30E-06	5.73E-02	1.57E-04	2.00E-03	2.77	0.00	0.73	0.01	92.99	0.00	0.25	3.24
5	Xylene, m-	1.61E-03	0.00E+00	4.21E-04	7.82E-06	5.73E-02	1.57E-04	2.00E-03	2.62	0.00	0.68	0.01	93.19	0.00	0.25	3.24
6	Xylene, p-	1.54E-03	0.00E+00	4.03E-04	7.50E-06	5.74E-02	1.57E-04	2.00E-03	2.51	0.00	0.66	0.01	93.32	0.00	0.26	3.25
7	Phenol	4.85E-03	0.00E+00	3.81E-03	2.36E-05	5.53E-03	4.99E-03	5.70E-04	24.71	0.00	19.38	0.12	28.17	0.00	24.71	2.90
8	PCB-77	9.47E-10	0.00E+00	3.47E-10	4.60E-12	2.83E-12	6.98E-10	0.00E+00	47.37	0.00	17.34	0.23	0.14	0.00	34.92	0.00
9	PCB-81	9.47E-10	0.00E+00	3.47E-10	4.60E-12	2.83E-12	6.98E-10	0.00E+00	47.37	0.00	17.34	0.23	0.14	0.00	34.92	0.00
10	PCB-126	9.49E-10	0.00E+00	3.47E-10	4.61E-12	6.22E-13	6.98E-10	0.00E+00	47.45	0.00	17.37	0.23	0.03	0.00	34.92	0.00
11	PCB-169	9.49E-10	0.00E+00	3.47E-10	4.61E-12	1.35E-13	6.98E-10	0.00E+00	47.46	0.00	17.37	0.23	0.01	0.00	34.92	0.00
12	PCB-105	9.49E-10	0.00E+00	3.47E-10	4.61E-12	1.01E-12	6.98E-10	0.00E+00	47.43	0.00	17.36	0.23	0.05	0.00	34.92	0.00
13	PCB-114	9.49E-10	0.00E+00	3.47E-10	4.61E-12	1.01E-12	6.98E-10	0.00E+00	47.43	0.00	17.36	0.23	0.05	0.00	34.92	0.00
14	PCB-118	9.49E-10	0.00E+00	3.47E-10	4.61E-12	1.01E-12	6.98E-10	0.00E+00	47.43	0.00	17.36	0.23	0.05	0.00	34.92	0.00
15	PCB-123	9.49E-10	0.00E+00	3.47E-10	4.61E-12	1.01E-12	6.98E-10	0.00E+00	47.43	0.00	17.36	0.23	0.05	0.00	34.92	0.00
16	PCB-156	9.49E-10	0.00E+00	3.47E-10	4.61E-12	2.31E-13	6.98E-10	0.00E+00	47.46	0.00	17.37	0.23	0.01	0.00	34.92	0.00
17	PCB-157	9.49E-10	0.00E+00	3.47E-10	4.61E-12	2.31E-13	6.98E-10	0.00E+00	47.46	0.00	17.37	0.23	0.01	0.00	34.92	0.00
18	PCB-167	9.49E-10	0.00E+00	3.47E-10	4.61E-12	2.31E-13	6.98E-10	0.00E+00	47.46	0.00	17.37	0.23	0.01	0.00	34.92	0.00
19	PCB-189	9.49E-10	0.00E+00	3.48E-10	4.61E-12	5.19E-14	6.98E-10	0.00E+00	47.47	0.00	17.38	0.23	0.00	0.00	34.92	0.00
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	Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
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			Oral Health Criteria Value ($\mu g\ kg^{-1}\ BW\ day^{-1}$)		Inhalation Health Criteria Value ($\mu g\ kg^{-1}\ BW\ day^{-1}$)	Oral Mean Daily Intake ($\mu g\ day^{-1}$)	Inhalation Mean Daily Intake ($\mu g\ day^{-1}$)	Air-water partition coefficient (K_{aw}) ($cm^3\ cm^{-3}$)	Coefficient of Diffusion in Air ($m^2\ s^{-1}$)	Coefficient of Diffusion in Water ($m^2\ s^{-1}$)	log K_{oc} ($cm^3\ g^{-1}$)	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor ($g\ g^{-1}$ DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
1	Benzene	ID	0.29	ID	1.4	NR	NR	1.16E-01	8.77E-06	6.64E-10	1.83	2.13	0.1	0.5	10	1	1
2	Ethylbenzene	TDI	100	TDI	220	5	130	1.39E-01	7.04E-06	5.31E-10	2.65	3.15	0.1	0.5	10	1	1
3	Toluene	TDI	223	TDI	1400	10	520	1.15E-01	7.78E-06	5.88E-10	2.31	2.73	0.1	0.5	10	1	1
4	Xylene, o-	TDI	180	TDI	60	11	140	9.20E-02	7.01E-06	5.31E-10	2.63	3.12	0.1	0.5	10	1	1
5	Xylene, m-	TDI	180	TDI	60	11	140	1.12E-01	7.03E-06	5.31E-10	2.69	3.2	0.1	0.5	10	1	1
6	Xylene, p-	TDI	180	TDI	60	11	140	1.07E-01	7.04E-06	5.31E-10	2.65	3.15	0.1	0.5	10	1	1
7	Phenol	TDI	700	TDI	10	350	40	8.35E-06	7.90E-06	6.36E-10	1.92	1.48	0.3	0.5	1	1	1
8	PCB-77	TDI	0.000002	NR	0	0.000049	0	7.11E-04	4.52E-06	3.63E-10	6.22	6.68	0.14	0.5	1	1	1
9	PCB-81	TDI	0.000002	NR	0	0.000049	0	7.11E-04	4.52E-06	3.63E-10	6.22	6.68	0.14	0.5	1	1	1
10	PCB-126	TDI	0.000002	NR	0	0.000049	0	4.25E-04	4.32E-06	3.47E-10	6.75	7.2	0.14	0.5	1	1	1
11	PCB-169	TDI	0.000002	NR	0	0.000049	0	2.54E-04	4.14E-06	3.33E-10	7.27	7.73	0.14	0.5	1	1	1
12	PCB-105	TDI	0.000002	NR	0	0.000049	0	1.04E-03	4.32E-06	3.47E-10	6.73	7.19	0.14	0.5	1	1	1
13	PCB-114	TDI	0.000002	NR	0	0.000049	0	1.04E-03	4.32E-06	3.47E-10	6.73	7.19	0.14	0.5	1	1	1
14	PCB-118	TDI	0.000002	NR	0	0.000049	0	1.04E-03	4.32E-06	3.47E-10	6.73	7.19	0.14	0.5	1	1	1
15	PCB-123	TDI	0.000002	NR	0	0.000049	0	1.04E-03	4.32E-06	3.47E-10	6.73	7.19	0.14	0.5	1	1	1
16	PCB-156	TDI	0.000002	NR	0	0.000049	0	6.20E-04	4.14E-06	3.33E-10	7.26	7.71	0.14	0.5	1	1	1
17	PCB-157	TDI	0.000002	NR	0	0.000049	0	6.20E-04	4.14E-06	3.33E-10	7.26	7.71	0.14	0.5	1	1	1
18	PCB-167	TDI	0.000002	NR	0	0.000049	0	6.20E-04	4.14E-06	3.33E-10	7.26	7.71	0.14	0.5	1	1	1
19	PCB-189	TDI	0.000002	NR	0	0.000049	0	3.70E-04	3.98E-06	3.21E-10	7.78	8.24	0.14	0.5	1	1	1
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	Oral Health Criteria Value (µg kg^{-1} BW day^{-1})		Inhalation Health Criteria Value (µg kg^{-1} BW day^{-1})		Oral Mean Daily Intake (µg day^{-1})	Inhalation Mean Daily Intake (µg day^{-1})	Air-water partition coefficient (K_{aw}) (cm^3 cm^{-3})	Coefficient of Diffusion in Air (m^2 s^{-1})	Coefficient of Diffusion in Water (m^2 s^{-1})	log K_{oc} (cm^3 g^{-1})	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g^{-1} DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
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		Soil-to-water partition coefficient ($cm^3 g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg L^{-1}$)	Soil-to-plant concentration factor for green vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)
1	Benzene	7.84E-01	6.24E+03	1.78E+03	model	model	model	0.00E+00	0.00E+00	model
2	Ethylbenzene	5.18E+00	5.53E+02	1.80E+02	model	model	model	0.00E+00	0.00E+00	model
3	Toluene	2.37E+00	1.73E+03	5.90E+02	model	model	model	0.00E+00	0.00E+00	model
4	Xylene, o-	4.95E+00	3.86E+02	1.73E+02	model	model	model	0.00E+00	0.00E+00	model
5	Xylene, m-	5.68E+00	4.95E+02	2.00E+02	model	model	model	0.00E+00	0.00E+00	model
6	Xylene, p-	5.18E+00	4.75E+02	2.00E+02	model	model	model	0.00E+00	0.00E+00	model
7	Phenol	9.65E-01	1.15E+01	8.41E+04	model	model	model	0.00E+00	0.00E+00	model
8	PCB-77	1.93E+04	3.86E-04	6.63E-02	model	model	model	0.00E+00	0.00E+00	model
9	PCB-81	1.93E+04	3.86E-04	6.63E-02	model	model	model	0.00E+00	0.00E+00	model
10	PCB-126	6.52E+04	6.74E-05	2.18E-02	model	model	model	0.00E+00	0.00E+00	model
11	PCB-169	2.16E+05	1.18E-05	7.41E-03	model	model	model	0.00E+00	0.00E+00	model
12	PCB-105	6.23E+04	1.68E-04	2.27E-02	model	model	model	0.00E+00	0.00E+00	model
13	PCB-114	6.23E+04	1.68E-04	2.27E-02	model	model	model	0.00E+00	0.00E+00	model
14	PCB-118	6.23E+04	1.68E-04	2.27E-02	model	model	model	0.00E+00	0.00E+00	model
15	PCB-123	6.23E+04	1.68E-04	2.18E-02	model	model	model	0.00E+00	0.00E+00	model
16	PCB-156	2.11E+05	2.94E-05	7.41E-03	model	model	model	0.00E+00	0.00E+00	model
17	PCB-157	2.11E+05	2.94E-05	7.41E-03	model	model	model	0.00E+00	0.00E+00	model
18	PCB-167	2.11E+05	2.94E-05	7.41E-03	model	model	model	0.00E+00	0.00E+00	model
19	PCB-189	6.99E+05	5.14E-06	2.49E-03	model	model	model	0.00E+00	0.00E+00	model
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	Soil-to-water partition coefficient ($cm^3 g^{-1}$)	Vapour pressure (Pa)	Water solubility (mg L^{-1})	Soil-to-plant concentration factor for green vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)
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APPENDIX L - EXPLORATORY HOLE LOCATION AND SAMPLING STRATEGY

Exploratory Hole Locations and Soil Sampling Strategies

When investigating the site different strategies will need to be employed on different parts of the site. There are three main approaches: Targeted, Non-targeted and a combination of both *(Reference B)*. Also to be considered is the sampling pattern and sample frequency, which will be dictated by the potential risk, the site end use, and type of contamination encountered.

Targeted

Where there is sufficient information to indicate where contamination might be found (such as fuel tanks in the processing area) then targeted exploratory hole locations and sampling can be employed. The sampling pattern will depend on the number and size of likely potential sources of contamination and the probable migration routes of any mobile contaminants.

Areas to target could be former or current locations of aboveground or underground storage tanks, pipe lines, electricity substations and cables, areas of stressed or sparse vegetation, areas sensitive to contamination (to prove uncontaminated) and any other known potentially contaminating usage.

The frequency of sampling will depend on the aims of the investigation, the degree of confidence required, the nature of the contamination (e.g. Mobile or immobile) and the number of stages of investigation. Fewer samples would be required to identify the presence of contamination compared with proving the absence of contamination.

Non-targeted

Where there is insufficient information and no signs of contamination at the surface then non-targeted exploratory hole locations and sampling will need to be employed. The objectives of non-targeted sampling should be to eliminate the presence of a given size of hotspots to a given confidence level, determine average concentrations and to determine spatial distribution of contaminants.

Areas requiring non-targeted sampling would be cleared industrial areas, such as the clay body plant, large infilled areas, such as former lagoons, tips and stockpiles.

There are four main sampling patterns that can be employed when using non-targeted methods:

1. Simple random
2. Stratified random
3. Square grid
4. Herringbone

Of the above methods herringbone is the most efficient, especially for elongate hotspots. Potential sampling grid sizes range between 50m to 100m centres for exploratory investigations increasing to 20m to 25m centres for main investigations. If a high level of confidence is required then smaller grids of up to 10m centres may be required.

Combined

A combined approach could use targeted sampling in an area of a suspected hotspot, with non-targeted sampling on the remainder of the site. Another approach would be to use non-targeted sampling across the site but using professional judgement when deciding the sampling density e.g. sampling every 0.5m in made ground then every 1 to 2m in natural strata.

Sampling Depth

The depth samples are taken can be based on professional judgement based on the materials encountered or at regular depths or a combination of both. The sampling depths should be appropriate to the final site levels, likely source of contamination (e.g. Is it near surface from spillage or at depth from underground tanks), the likely receptor and the intended risk assessment.

For human receptors several sample should be taken in the top 1m with samples extending to at least 1m below proposed finished levels. Typically sample depths of 0.1m to 0.2m, 0.3m to 0.5m and 0.8m to 1m should be taken unless material type dictates otherwise.

With groundwater being the receptor regular samples in made ground of 0.5m to 1m intervals should be taken, with further samples taken to reflect changes in material type. A sample of natural strata should be taken close to the boundary with made ground, with a further sample 1m below this to determine the extent of contamination migration. Sampling of each change in strata can then be employed until the water table is reached. A sample should be taken just above the water table, as soluble contaminants tend to concentrate in the capillary zone.

The justification for each sampling location (or group of locations) should be given for both the lateral and vertical distribution.

Groundwater Sampling and Monitoring

Groundwater monitoring should establish the depth to groundwater and the groundwater flow direction. It should establish if the groundwater is contaminated, and provide enough information to accurately assess the risk to any aquifers, rivers and lakes.

One groundwater sample represents a relatively large volume of water due to the homogenous nature of water bodies, as a result much fewer monitoring wells and samples are required when compared to soil samples in order to characterise any ground water contamination.

The location of monitoring wells is critical in order to effectively and efficiently characterise any groundwater contamination. Monitoring wells should be placed in the centre of known hotspot areas to determine the amount, type and phase of contaminants. Wells can then be placed at increasing distances from the source to delimit the extent of any groundwater contamination migration. In order to gauge background levels a well should be placed upstream of the source, with a well located at the downstream edge of the site to monitor the levels of contamination exiting the site.

If possible wells should be located between the known source and the designated receptor (e.g. River Churnet) to determine if contaminants are reaching the receptor, or to predict when they are likely to reach the receptor.

If contaminants are identified then 2 - 3 sets of samples over a short period of time should be undertaken followed by sampling at greater intervals of say 3 months. This number of samples is required to determine migration patterns and seasonal variations.