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ENVIRONMENTAL MANAGEMENT SOLUTIONS LTD

**Preliminary Contaminated
Land Investigation
of
Knott Mill
Commercial Street
Manchester
For
Bingham Davis**

Report No. EMS/1240b

Date March 2008

Bingham Davis
Site at Commercial Street, Manchester
Preliminary Contaminated Land Investigation

Contents Amendment Record

This report has been issued and amended as follows:

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1. Summary

Bingham Davis, 12 Temple Street, Liverpool, L2 5RH has commissioned Environmental Management Solutions Limited (EMS) to undertake a preliminary contamination investigation on the site known as Knott Mill, Commercial Street, Manchester.

The preliminary investigation has revealed elevated levels of some contaminants on the site. These appear to be associated with the made ground. The contaminants do not appear to have considerable mobility as evidenced by the much lower levels of contaminants within the strata located immediately beneath the made ground. There was no evidence at any time during the investigation, or from the laboratory testing, of odorous volatile hydrocarbon contamination. Recommendations are provided.

2. Introduction

Bingham Davis, 12 Temple Street, Liverpool, L2 5RH has commissioned Environmental Management Solutions Limited (EMS) to undertake a preliminary contamination investigation on the site known as Knott Mill, Commercial Street, Manchester. The site investigation is required prior to redevelopment of the site as commercial offices.

The site is located at National Grid Reference 383430 397430. The site covers and area of approximately 0.05 hectares; a site location plan is included within appendix A of this report.

Initial site works were undertaken on the 3rd and 4th of March 2008 by Jo Perkins, an Environmental Consultant with EMS.

3. Objectives of the Investigation

Objectives of the investigation

The object of the preliminary investigation is to explore the extent of contamination on the site and, if any is present, make further recommendations if contamination is discovered during the investigation. In particular, the potential risk to nearby controlled waters and future site employees will be discussed.

Timescale of Assessment and Level of Confidence Required

The preliminary assessment is designed to provide an overall assessment of the state of soil contamination and discover potential areas of concern. Further refinement of knowledge and delimitation of contamination may be required.

The preliminary assessment report needs to be completed as soon as possible.

Management Limitations

An initial budget for the land contamination, analytical testing and ground investigations has been agreed prior to work commencing. This will dictate the number of trial hole locations, the quantity and range of investigation, however, the budget is considered suitable, and not limiting, for a preliminary investigation.

Limitations of the Report

This report is based on the information that has been made available by the client regarding the site and on site investigations undertaken. The conclusions drawn in the report are considered correct although any subsequent additional information may allow refinement of the conclusions. It should be noted that:

- The report has been prepared under the express instructions and solely for the use of Bingham Davis
- The findings of this report represent the professional opinion of experienced contaminated land consultants. EMS does not provide legal advice and the advice of lawyers may also be required.
- All work carried out in preparing this report has utilised and is based upon EMS current professional knowledge and understanding of current relevant UK standards and codes, technology and legislation. Changes in this legislation and guidance may occur at any time in the future and cause any conclusions to become inappropriate or incorrect. EMS does not accept responsibility for advising Bingham Davis or other interested parties of the facts or implications of any such changes.
- The report is limited to the boundaries identified by Bingham Davis on this site and confirmed within this report.

- The extent of the investigation was designed in-line with the client's budget.
- Although every effort was made to establish a representative assessment of the site, this cannot be guaranteed due to the random nature of contamination. Sampling methods also potentially introduce an element of error.
- This report represents the conditions and findings on the date of the survey. Over time site conditions may alter.

4. Methodology

Previous investigation reports

A desk top study has been previously produced by EMS for the site and issued as report number EMS/1240. The main conclusions from this are listed below:

- The desk study has revealed several potential historic contaminating sources on and surrounding the site including industrial works, railways fuel sources and potential sources of spoil including gas and iron works.
- As the site is to be commercial units without landscaping a large number of potential pathways to human receptors are likely to be severed. However, the risk from volatile contamination from fuel aromatic/aliphatic hydrocarbons will require further assessment.
- The risk to construction staff from asbestos exposure and acute contaminants such as cyanide will require further assessment.
- There is currently considered a high potential risk to structures from contamination on the site.
- The risk to controlled waters is currently considered high due to the location of the site above a major aquifer and adjacent to surface waters including the River Medlock. Groundwater modelling as part of the preliminary investigation (including depth below ground level and direction of flow) is recommended to ensure preliminary risk assessment can be completed.
- The low number and age of areas of infilled land surrounding the site are unlikely to be significant sources of ground gas. However, the potential for gassing made ground associated with the railway, gasworks and iron works cannot currently be ruled out. Gas monitoring may be requested by the local authority.

Type of Investigation

It is recommended that the investigation is undertaken over two stages. It is understood from the client that demolition of the current structures has yet to begin. Monitoring wells may be installed prior to demolition within the courtyard area at this time. The use of a shell and auger drilling rig will be required to allow drilling within the sand and gravel superficial deposits. An initial round of soil testing can be undertaken during drilling. Installation and settlement of monitoring wells for groundwater analysis can also occur. We would recommend a minimum of three wells.

All installations will additionally have a bentonite seal at the surface of the installation. Clean drilling techniques will be used at all times. All installations will require a clear demarking zone to protect them from disturbance during demolition.

Once demolition has been undertaken, shallow trial pitting within the former footprints of the units may be considered to provide a full representation of the site. The use of shallow trial pits is not considered to present additional risk to the underlying aquifer, again, due to the lack of clay based protective superficial deposits identified by this desk study on the site.

Sampling - EMS Methodology

Samples will be taken from the trial pits and placed within 500 ml glass sampling jars stored within a cool box at the first possible opportunity to ensure sample preservation. Samples taken specifically for volatile organic compound (VOC) analysis will be stored immediately in air tight vials and also placed within a cool box to ensure preservation. Each sample will be labeled with a unique identifying reference number and this number noted on the trial hole logs. The 500 ml jars will be formed from dark coloured glass to prevent UV exposure of the samples. The samples destined for laboratory analysis will be transported via courier as soon as reasonably practicable to the laboratory by direct delivery in the associated cool boxes.

On site samples will be taken, as far as possible, at regular intervals. These intervals will be 200 and 600 mm to assess the risks from surface contamination, with samples at 1000 mm and every 1000 mm thereafter to define the vertical spread of contamination. Samples will also be taken at each change of material and within areas of staining, obvious contamination or odour.

The samples taken on site will be sub-sampled for the purpose of laboratory analysis. Sample numbers will be determined by budget, thus careful selection to fulfill the confidence criteria will be required. A representative range of samples through the varying strata will be selected. In addition, any areas of obvious staining or contamination will be prioritized for initial analysis. The remaining samples taken on site will be stored in suitable conditions to allow further testing if required.

Broad Testing Schedule – Initial Screen Methodology

For the initial testing screen, it is recommended that a minimum of 9 samples from the boreholes are analysed by a general environmental test suite. This will test for a range of contaminants including heavy metals and sulphates. Additionally, it is recommended that specialised PAH and extractable petroleum hydrocarbon (EPH) testing was undertaken to provide an overview of the level of hydrocarbon contamination on the site. If hydrocarbon contamination is revealed from these tests it is recommended that aliphatic/aromatic fractionated hydrocarbon analysis should be undertaken at a later date to allow hydrocarbon risk assessment to be undertaken within the guidelines produced by the Environment Agency. If extensive hydrocarbon contamination is suspected during the preliminary investigation, it is recommended that samples are analysed for fractionated analysis during the first round of testing.

As the most significant pathway for human exposure on the site is likely to be inhalation of volatile contaminants permeating through floor voids it is recommended that a series of samples are taken for BTEX and volatile hydrocarbon analysis and submitted to the laboratory to allow assessment of volatile hydrocarbon contamination levels (if any).

On site surveying for below ground asbestos debris should be carried out at the time of investigation, and soil/debris samples taken if deemed necessary.

This initial screen will allow investigation into the majority of potential contaminants identified by the conceptual model.

5. On-Site Investigation

Shell and Auger Locations

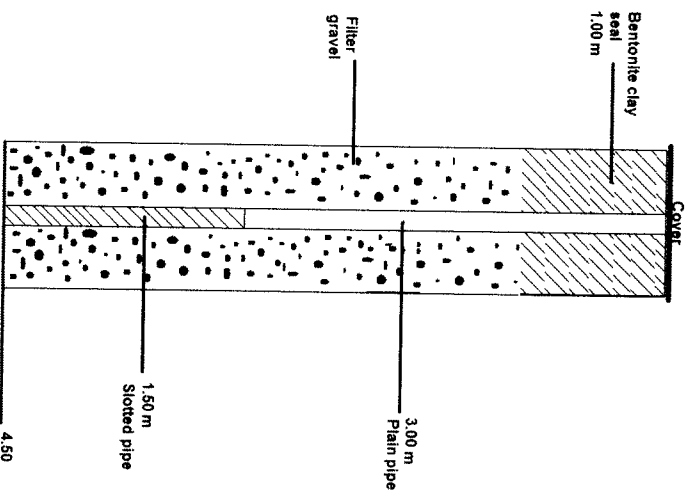
The first stage of the on-site investigation involved initial positioning of the boreholes and confirmation of the safety of the locations. A preliminary borehole location plan had been designed; this did not require refinement on site and all trial holes were positioned as pre-selected by the engineer on site.

Boreholes were dug as referenced on the borehole location plan within Appendix B of this report. All samples taken for storage and laboratory testing are detailed within the trial hole logs of appendix C of this report.

For on-site and strata observations see section 6 of this report.

Monitoring Installations

Wells were installed in each borehole with 1.5 meters of slotting in the lower sealed end of each pipe. The remainder of the installations were formed from solid pipe. Clean filter and packing gravel was used to backfill the holes to 1 m below ground level (bgl). Bentonite clay was used to provide an impermeable surface seal to a depth of 1 m. Lockable covers bedded in concrete were installed to provide adequate protection from vehicles. A schematic representation is shown in the diagram below.



Sample Selection

The recovered borehole samples were sub-sampled for the purposes of laboratory analysis. It was considered appropriate to undertake laboratory testing over the range of strata located on site. The sub-samples were chosen for the reasons detailed in the table below:

Trial Hole	Sub-Sample Number	Depth	Selection criterion	Testing suite
1	EMS/1240/TH1/200	200 mm	Assess the levels and range of contaminants within the made ground at this depth	General, PAH and EPH
2	EMS/1240/TH2/200			VOC
3	EMS/1240/TH3/200			
1	EMS/1240/TH1/600	600 mm	Assess the levels and range of contaminants on the interchange between the made and natural ground at this depth	General, PAH and EPH
2	EMS/1240/TH2/600			VOC
3	EMS/1240/TH3/600			
1	EMS/1240/TH1/2000	2000 mm	Assess the levels and range of contaminants at this depth. Assess the vertical movement of contaminants from the made ground to the natural deposits.	General, PAH and EPH
2	EMS/1240/TH2/2000			
3	EMS/1240/TH3/2000			

6. On-Site Observations

The office block is to be positioned on the site currently containing a two storey brick built workshop with a single storey extension. The courtyard area is currently covered with hardcore and not paved.

Trial Hole Logs

An experienced consultant supervised the site works and logged the recorded material in accordance with BS5930. The trial hole logs are included within appendix C of this report.

Other Observations

Construction of the boreholes revealed made ground (fill) formed from a mixture of stone, ash and crushed brick to a depth of approximately 500-600 mm. Beneath this a soft brown clayey SAND was present to a depth of 1.6 meters. Intermixing of the fill and clayey SAND strata was evident in the upper region adjacent to the interface.

At a depth of approximately 1.6 meters the natural strata became a coarse brown slightly clayey SAND with decreasing levels of CLAY with depth. Coarse brown sand with small to medium gravel deposits were found from 2.4 meters to the sandstone bedrock which was struck between 4 and 4.2 meters in each hole.

No groundwater was evident during drilling and drilling required addition of considerable quantities of water.

There was no evidence of beneath ground asbestos or hydrocarbon staining at any time during the investigation.

7. Samples and Analysis

Preliminary testing was undertaken in line an initial agreed budget.

On site, samples were taken from the trial pits and placed within 500 ml dark glass sampling jars or VOC vials and stored within a cool box at the first possible opportunity to ensure sample preservation. The samples selected for laboratory analysis were transported in cool boxes by a courier company contracted by the laboratory.

The samples were analysed by RegenIQ Analytical Services, Hillhouse International Business Park, Thornton Cleveleys, Lancashire, FY5 4QD for laboratory analysis. RegenIQ are a MCERTS and UKAS accredited laboratory. A general suite of tests with speciated PAH and EPH were requested to be undertaken on the 9 soil samples submitted. 6 VOC samples were also analysed as part of this investigation. Testing was undertaken in accordance with in house test methods; the full list of determinants screened for during these tests is listed on the test certificates included within appendix E of this report.

Analytical testing involved use of a general heavy metal screen (to include arsenic and cyanide). In addition, sulphur compounds and phenol were analyzed at this stage; to give indication of the risk to buildings and structures. Polycyclic aromatic hydrocarbon (PAH), Volatile organic compounds (VOC) and Total petroleum hydrocarbon (EPH) tests were undertaken to provide a general impression of hydrocarbon contamination on the site

The samples were targeted to provide the best representation of potentially contaminated areas throughout the site and those most relevant to human health exposure for this site. This has been detailed within section 5 of this report.

8. Analytical Results

As highlighted in the Desk Study which accompanies this report, risk assessment of a site is undertaken via the source-pathway-receptor linkage concept. Thus, for a risk to be present a source of contamination capable of causing harm to a receptor (such as groundwater or humans) has to be present on the site. The Environment Agency has developed a guideline approach to risk assessment of contaminated sites; this recommends the use of a tiered approach with an initial generic comparison against Soil Guideline Values (SGVs) being the first step to site human health risk assessment. The primary purpose of the SGVs is to provide 'intervention values' for the assessment of risk in relation to land contamination.

Due to the number of potential contaminants which may occur on sites, SGVs for many contaminants are still in development and have yet to be published by the government. Therefore, where SGV values are not available, the widely accepted Soil Screening Values (SSVs) developed as part of the ATRISK program have been used. These values have been developed utilising peer reviewed literature within the guidelines presented in the Environment Agency contaminated land guidance documentation CLR7 to CLR10. Further screening values have been obtained from the Building Research Establishment (BRE) and Water Regulations Advisory Scheme (WRAS) to allow preliminary assessment of the risk to buildings and structures on the site.

In addition, the Total Petroleum Hydrocarbon (EPH) test has no comparative guideline value due to the varying compositions of fractions that make up the resulting figure. Thus the results of the EPH tests are indicative only; further testing may be required if hydrocarbon contamination is located on the site.

The site is to remain as commercial land use. Therefore commercial generic threshold levels shall be utilised as an initial screen.

The laboratory tests have revealed elevated levels of some contaminants within the some of the samples tested.

Heavy Metal Contamination Summary – Risk to Human Health

The samples taken from the trial pits and site arisings have shown, overall, very low levels of heavy metals when compared to the generic thresholds for human health risk assessment.

An elevated level of lead has been detected within a sample taken from the made ground on the site. This gave a reading of 1184 mg/kg when compared to the SGV value of 750 mg/kg. It is considered these levels of lead will present a low risk to humans if contained beneath a capping layer.

Hydrocarbon Summary – Risk to Human Health.

It can be seen that the levels of PAH on the site are very low to undetectable in all samples tested when compared to the relevant SGV and SSV guideline value.

Levels of EPH on the site have been shown to be very low within the natural strata. There is evidence of EPH contamination within the made ground with an upper value of 1654 mg/kg in the samples taken at 200 mm below ground level and 69 mg/kg in the samples taken at 600 mm. However, no evidence of volatile contamination was noted during the ground investigation in the form of notable odours. This is supported by the results of the VOC tests which have shown no, or very low, detectable levels in any of the samples taken during the preliminary investigation. The specialised PAH tests have revealed low levels of indicator compounds with three or less benzene rings and water partition coefficients below than 4.5 (such as naphthalene). These factors make volatilization of the EPH and PAH compounds unlikely to be a significant factor in human exposure (EA Technical Report P5-079) if the results of this preliminary investigation are representative of conditions across the site.

It is considered that this level of EPH contamination will present a low risk to humans if contained beneath a capping layer.

Risk to Buildings and Structures

The Building Research Establishment (BRE) recommend that Sulphate risk to concrete is undertaken utilising a 2:1 soil:water extraction which reveals the level of soluble sulphate within the sample analysed. From this, a concrete classification can be calculated which is then used to allow selection of a suitable cement. All test results have given readings of less than 0.02 g/l. These readings are well within the DS-1 sulphate class (0.5 to 1.5 g/l) and the risk to concrete from sulphate on the site is considered low.

Water Regulations Advisory Scheme (WRAS) guidelines within the document "The Selection of Materials for Water Supply Pipes to be Laid in Contaminated Land" with regards to arsenic contamination, the WRAS state that "Following recommendations of the Foundation for Water Research guidance notes, the laying of water pipes across any land where arsenic or cyanide are identified or suspected is unacceptable without site remediation". The guidance level given in this document is 10 mg/kg⁻¹. 5 out of 9 readings for arsenic within the samples have exceeded this threshold.

WRAS recommends pipe should not be laid unprotected in ground with pH greater than 8; two samples have tested marginally above this pH threshold.

WRAS threshold levels for EPH (Threshold = 50 mg/kg) have been significantly exceeded in the samples taken within the made ground. The test results for lead have also exceeded the WRAS threshold.

Overall, the risk to unprotected water pipes is considered to be high.

Risk to Groundwater

The levels of heavy metals on the site are considered unlikely to present a risk to groundwater with the exception of lead which may require further investigation.

The levels of hydrocarbons, particularly EPH, will require further investigation with regards to groundwater risk. It appears, from this preliminary study, that some hydrocarbon contamination is associated with the made ground. The extent of the made ground beneath the building footprints is currently unknown and requires further investigation during the second stage of the investigation.

9. Recommendations

The preliminary investigation has revealed elevated levels of some contaminants on the site. These appear to be associated with the made ground. The contaminants do not appear to have considerable mobility as evidenced by the much lower levels of contaminants within the strata located immediately beneath the made ground. There was no evidence at any time during the investigation, or from the laboratory testing, of odorous volatile hydrocarbon contamination.

It must be noted this investigation constitutes the first stage of a two stage process to assess levels of contamination on the site. No investigation beneath building footprints was undertaken as part of this study. If, during the second stage, extensive made ground or fill of different properties to that found during this investigation is discovered beneath the building footprints it is recommended that a full general suites and VOC sampling are undertaken on samples obtained from the material.

Risk to human health

The risk to human health from the contaminants within the made ground is likely to be low on the site if it is capped as part of the development. However, this conclusion may require refinement depending on the outcome of the second stage of the investigation.

If the results of this stage are representative of contamination across the entire site it is considered capping the site with hardstanding in the form of floor slabs and parking excluding landscaping beds from the redevelopment will be satisfactory to prevent human exposure to both lead and EPH contamination. No VOC contamination is suspected in the area of redevelopment thus the exposure of humans to contamination permeating through floor voids is considered to be a very low risk.

No beneath ground asbestos contamination was noted during the investigation. Levels of acute contaminants are low within the samples taken. The risk to construction workers is considered low if the results from this stage of the investigation are applicable beneath the building footprints.

Water pipes

If water pipes are to be laid on the site it is recommended these are installed within protective trenches. These trenches should be formed from a suitable barrier membrane and backfilled with clean import. Validation testing on imported material may be required. Alternatively, the water supplier may be contacted regarding suitability of pipeline materials.

Risk to Controlled Waters

The risk to controlled waters from contamination within the made ground may require further investigation particularly with regards to lead, EPH and PAH contamination. In addition, the risk to controlled waters from potential contamination beneath the current units has not been assessed.

Currently, the following points are indicative of a low risk to groundwater from the site, however, confirmation by scientific testing is likely to be required to confirm these assumptions:

- The mobility of the contaminants appears to be relatively low due to the low levels of contaminants found beneath the made ground. This is particularly relevant in the area of the courtyard as this has not been paved and thus an active leaching pathway is present in the form of rainwash through the hardcore material and yet little movement appears to have occurred. This will require confirmation in the form of leachate analysis on further samples taken within the made ground.
- The site is to be capped by hardcover parking and building floor slabs. This will prevent vertical movement, via rain-wash, of any contamination thus leaving the dominant pathway to be that of horizontal movement.
- No groundwater was encountered during the drilling process: additional water was required to allow drilling to be completed. A highly reactive perched water table is unlikely to be present due to the unconfined nature of the underlying sandstone aquifer, thus, a considerable rise in groundwater to just below surface level, and thus, the level of the made ground, is considered unlikely. This will require confirmation in the form of groundwater monitoring over a range of weather conditions. In addition, the depth of made ground beneath the current building footprints in comparison to the water table will also require assessment. Wells were installed during this investigation which will aid this process.

Ground Gas

No ground gas monitoring or risk assessment has been undertaken as part of this preliminary investigation.

Conceptual Model

The conceptual model for the site has been updated to include the findings from the mine stabilization works and this preliminary investigation – this update is based on the results of the first stage of investigations and may require refinement after completion of the second stage of site works.

Contaminant	Pathway	Receptor	Risk
Heavy metals, semi-metals from: industry, railways, fuel sources, general background contamination	Ingestion, inhalation and direct contact	Future employees, construction workers and potentially neighbours. Building materials such as water pipes may be affected by some heavy metals.	Low for future employees Low for construction workers and structures
Heavy metals, semi-metals from: industry, railways, fuel sources, general background contamination	Uptake into plants and ecosystems, indirect transfer to humans by consumption of plants	None	Near Zero
Heavy metals, semi-metals from: industry, railways, fuel sources, general background contamination	Horizontal and vertical movement	Major aquifer, abstractions and surface waters including River Medlock and Canals	Low/medium

Contaminant	Pathway	Receptor	Risk
Heavy metals, semi-metals from: industry, railways, fuel sources, general background contamination	Construction disturbance of soil layers – particularly relevant for acute contaminants like cyanide	Soil (upper layers) will in turn act as a source for other receptors such as humans	Low
Oil/Fuel Hydrocarbons from: industry and fuel sources	Ingestion, inhalation and direct contact	Future employees, construction workers and potentially neighbours. Building materials such as water pipes may be affected by some hydrocarbons.	Low to humans if site is capped High to water pipes
Oil/Fuel Hydrocarbons from: industry and fuel sources	Uptake into plants and ecosystems, indirect transfer to humans by consumption of plants	None	Near Zero
Oil/Fuel Hydrocarbons from: industry and fuel sources	Horizontal and vertical movement	Major aquifer, abstractions and surface waters including River Medlock and Canals	Medium – requires further investigation
Oil/Fuel Hydrocarbons from: industry and fuel sources	Construction disturbance of soil layers	Soil (upper layers) will in turn act as a source for other receptors such as humans and groundwater	Medium – requires further investigation
Aromatic Hydrocarbons from: industry and fuel sources along with general background contamination	Ingestion, inhalation and direct contact	Future employees, construction workers and potentially neighbours. Building materials such as water pipes may be affected by some hydrocarbons.	Low to humans if site is capped High to water pipes
Aromatic Hydrocarbons from: industry and fuel sources along with general background contamination	Uptake into plants and ecosystems, indirect transfer to humans by consumption of plants	None	Near Zero
Aromatic Hydrocarbons from: industry and fuel sources along with general background contamination	Horizontal and vertical movement	Major aquifer, abstractions and surface waters including River Medlock and Canals	Medium – requires further investigation
Aromatic Hydrocarbons from: industry and fuel sources along with general background contamination	Construction disturbance of soil layers	Soil (upper layers) will in turn act as a source for other receptors such as humans and groundwater	Medium – requires further investigation
Polycyclic aromatic hydrocarbons from: industry, railways, fuel sources, general background contamination	Ingestion, inhalation and direct contact	Future employees, construction workers and potentially neighbours. Building materials such as water pipes may be affected by some hydrocarbons.	Low to humans if site is capped High to water pipes

Contaminant	Pathway	Receptor	Risk
Polycyclic aromatic hydrocarbons from: industry, railways, fuel sources, general background contamination	Horizontal and vertical movement	Major aquifer, abstractions and surface waters including River Medlock and Canals	Low/Medium – requires further investigation
Polycyclic aromatic hydrocarbons from: industry, railways, fuel sources, general background contamination	Construction disturbance of soil layers	Soil (upper layers) will in turn act as a source for other receptors such as humans	Medium – requires further investigation
Chlorinated aliphatic hydrocarbons fuel and railway sources	Ingestion, inhalation and direct contact	Future employees, construction workers and potentially neighbours. Direct contact may also affect building materials for some of these contaminants (carbon tetrachloride, 1,2-dichloroethane, 1,1,1-trichloroethane, trichloroethane and tetrachloroethane)	Low – highly volatile contaminants and considered unlikely to have persisted, particularly as no on-site source has been identified
Chlorinated aliphatic hydrocarbons fuel and railway sources	Uptake into plants and ecosystems, indirect transfer to humans by consumption of plants	None	Near Zero
Chlorinated aliphatic hydrocarbons fuel and railway sources	Horizontal and vertical movement	Major aquifer, abstractions and surface waters including River Medlock and Canals	Low – highly volatile contaminants and considered unlikely to have persisted, particularly as no on-site source has been identified
Chlorinated aliphatic hydrocarbons fuel and railway sources	Construction disturbance of soil layers	Soil (upper layers) will in turn act as a source for other receptors such as humans	Low – highly volatile contaminants and considered unlikely to have persisted, particularly as no on-site source has been identified

Contaminant	Pathway	Receptor	Risk
Asbestos industry including units on site	Inhalation	Human – particularly construction workers on this site	Low beneath ground unless found during second stage of site works. Asbestos present in current units however, removal is planned prior to demolition so low
Acetone and Organolead compounds fuel sources	Ingestion, inhalation and direct contact	Future employees, construction workers, neighbours.	Low – highly volatile contaminants and considered unlikely to have persisted, particularly as no on-site source has been identified
Acetone and Organolead compounds fuel sources	Horizontal and vertical movement	Major aquifer, abstractions and surface waters including River Medlock and Canals	Low – highly volatile contaminants and considered unlikely to have persisted, particularly as no on-site source has been identified
Acetone and Organolead compounds fuel sources	Construction disturbance of soil layers	Soil (upper layers) will in turn act as a source for other receptors	Low – highly volatile contaminants and considered unlikely to have persisted, particularly as no on-site source has been identified

Contaminant	Pathway	Receptor	Risk
Acetone and Organolead compounds fuel sources	Run-off	Drainage, Soil, eventually ecosystems including human exposure	Low – highly volatile contaminants and considered unlikely to have persisted, particularly as no on-site source has been identified
Phenol from industry	Ingestion, inhalation and direct contact	Future employees, construction workers, potentially neighbours, water supply pipes	Low
Phenol from industry	Uptake into plants and ecosystems, indirect transfer to humans by consumption of plants	None	Near Zero
Phenol from industry	Horizontal and vertical movement	Major aquifer, abstractions and surface waters including River Medlock and Canals	Low
Phenol from industry	Construction disturbance of soil layers	Soil (upper layers) will also in turn act as a source for other receptors	
PCB's railway and industry sources	Ingestion, inhalation and direct contact	Future employees, construction workers, potentially neighbours.	Low – PCB's are relatively stable and unlikely to penetrate hardstanding
PCB's railway and industry sources	Uptake into plants and ecosystems, indirect transfer to humans by consumption of plants	None	Near Zero
PCB's railway and industry sources	Horizontal and vertical movement	Major aquifer, abstractions and surface waters including River Medlock and Canals	Low – PCBs are relatively insoluble
PCB's railway and industry sources	Construction disturbance of soil layers	Soil (upper layers) will also in turn act as a source for other receptors such as humans	Medium – potential for construction worker exposure should be considered

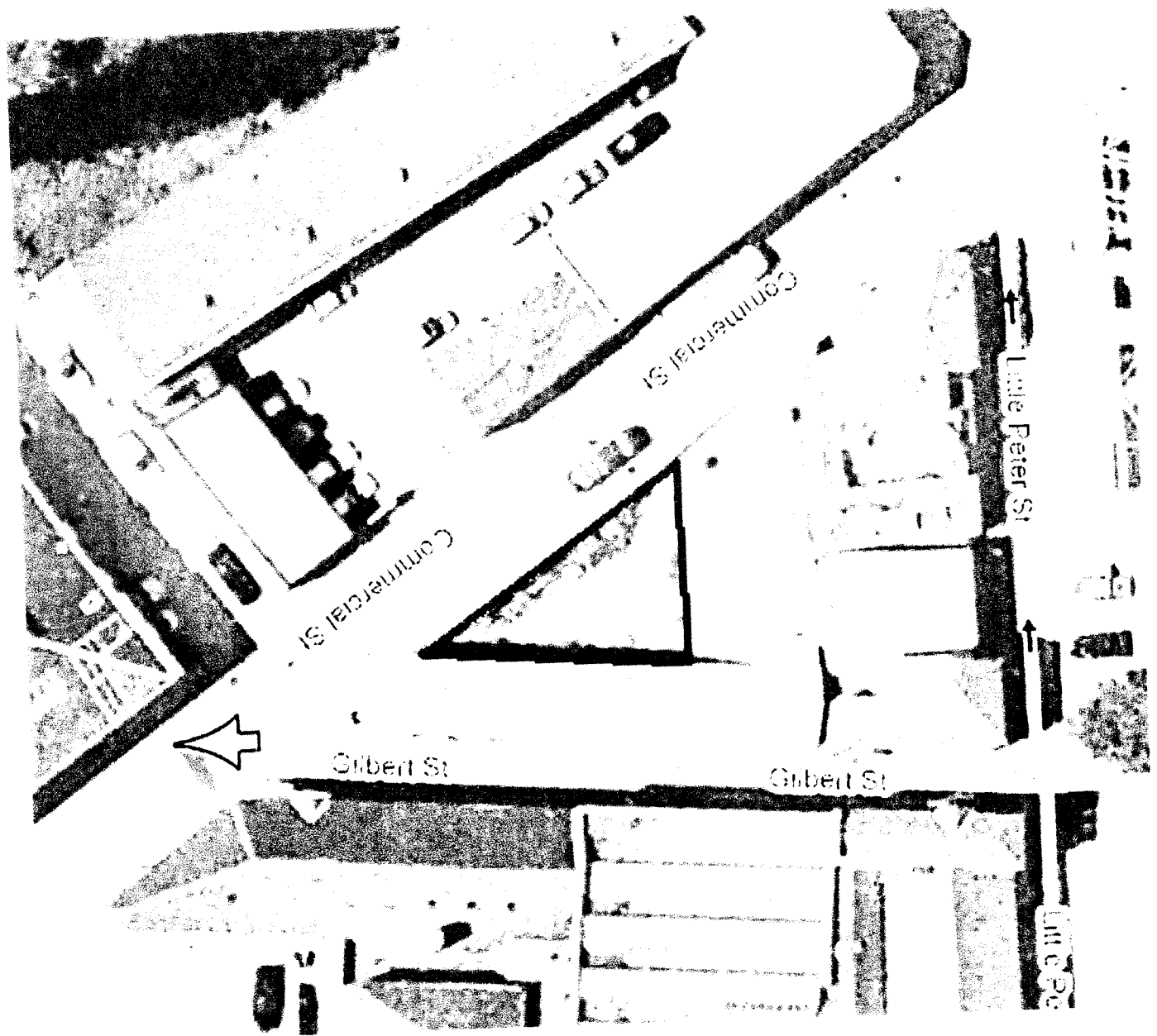
Contaminant	Pathway	Receptor	Risk
Sulphur, Sulphate (SO₄²⁻), Sulphide (S²⁻) from: industry, railways, fuel sources, general background contamination	Direct contact	Construction materials	Low however, further sampling should be undertaken if extensive made ground is located beneath building footprints
Sulphur, Sulphate (SO₄²⁻), Sulphide (S²⁻) from: industry, railways, fuel sources, general background contamination	Uptake into plants and ecosystems, indirect transfer to humans by consumption of plants	None	Near Zero
Sulphur, Sulphate (SO₄²⁻), Sulphide (S²⁻) from: industry, railways, fuel sources, general background contamination	Horizontal and vertical movement	Major aquifer, abstractions and surface waters including River Medlock and Canals	Low however, further sampling should be undertaken if extensive made ground is located beneath building footprints
Sulphur, Sulphate (SO₄²⁻), Sulphide (S²⁻) from: industry, railways, fuel sources, general background contamination	Construction disturbance of soil layers	Soil (upper layers) will also in turn act as a source for other receptors	Low however, further sampling should be undertaken if extensive made ground is located beneath building footprints
Ground Gas from made ground including railway and gas work land.	Inhalation/respiration: Diffusion and movement along pressure gradients/man-made pathways/rock fractures etc.	Future residents, construction workers, neighbours and passers-by. Ecosystems. Structures.	Medium. Considered unlikely but cannot currently be ruled out.

Contaminant	Pathway	Receptor	Risk
Carbon Dioxide and Trace Gases (halogenated and sulphuretted compounds) from dissolved ground gas	Dissolution of gas into ground and surface water to form corrosive acids. Leaching and migration/diffusion (including new pathways created if current hard-standing is removed)	Soil, groundwater, eventually rivers and ecosystems, Structures, particularly metal structures.	Medium. Considered unlikely but cannot currently be ruled out.

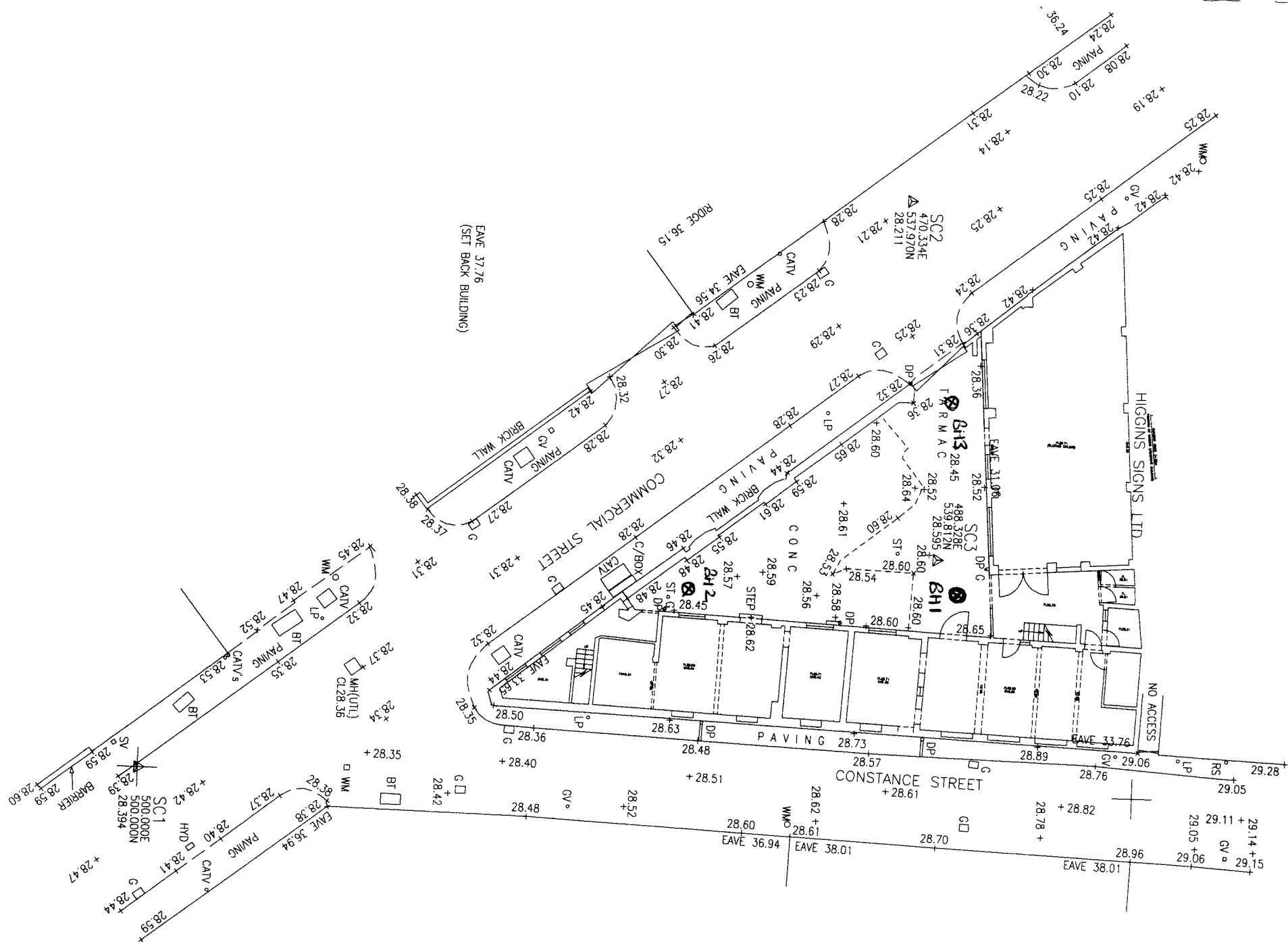
10. Appendix

- a) Site location plan
- b) Trial hole location plan
- c) Trial hole logs
- d) Photographic record
- e) Analytical results

Appendix A Site location plan



Appendix B Trial hole location plan

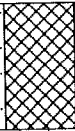
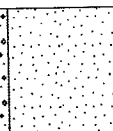
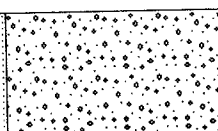
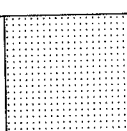


Appendix C Trial hole logs

	BOREHOLE No. 3
--	----------------

[illegible]

Figure 1

Description	Reduced	Legend	Depth	Sample/Tests			Field Records	
				Depth	Sample			Test
					Type	No.		
Ground Surface	0.00							
Made Ground MADE GROUND- brick and ashfill	-0.50			D	BH3/200		G-SP-EPH	
Sand Clayey SAND with a small amount of intermixed fill	-1.60			D	BH3/600		G-SP-EPH	
Sand Coarse brown SAND with a small amount of clay	-2.40			S		N = 1		
Sand and Gravel Coarse brown SAND with small amounts of GRAVEL	-4.00			D S	BH3/2000	N = 16	G-SP-EPH	
Sandstone SANDSTONE	-4.95			C		Refusal		
			8.00					

Appendix D Photographic record

Commercial Street, Manchester Photographic Record



View from south of North of the building, a view of
Commercial Street



View from south of North of the building, a view of
Commercial Street

Appendix E Analytical results



SUMMARY REPORT

CLIENT Environmental Management Solutions Ltd

Lloyd George House

Fordshill Road

Rotherwas

Hereford

HR2 6NS

CONTACT Jamie Perkins

JOB NAME Commercial Street Manchester

JOB REF. EMS/1240

ORDER NO.

LAB REF. 08/226

ISSUE NO. 1

DATE SCHEDULED 05/03/08

DATE TESTED 5-18/3/8

DATE REPORTED 18/03/08

Lab sample ID
Client sample ID
Date sampled
Sample type
Matrix code

08/226/1	08/226/2	08/226/3	08/226/4	08/226/5
BH1/200	BH1/600	BH1/2000	BH2/200	BH2/600
03/03/08	03/03/08	03/03/08	03/03/08	03/03/08
Soil	Soil	Soil	Soil	Soil
2a	5	5	2a	5

Analyte

LOD

Units

ISO 17025

MCERTS

Method ref.

Analyte	B	0.02	g/l	Y	Y	4
pH	D			Y	Y	12
Sulphate (2:1 water soluble)	A	1	mg/kg	Y	Y	8
Cyanide (total)	A	1	mg/kg	Y	Y	7
Phenols screen	A	1	mg/kg	Y	Y	9
Sulphide	D	5	mg/kg	Y	Y	2
Arsenic	D	1	mg/kg	Y	Y	3
Boron (water soluble)	D	0.5	mg/kg	Y	Y	2
Cadmium	D	5	mg/kg	Y	Y	2
Copper	D	5	mg/kg	Y	Y	2
Chromium	D	5	mg/kg	Y	Y	2
Lead	D	0.5	mg/kg	Y	Y	2
Mercury	D	5	mg/kg	Y	Y	2
Nickel	D	5	mg/kg	Y	Y	2
Selenium	D	5	mg/kg	Y	Y	2
Sulphur (total)	D	5	mg/kg	Y	Y	2
Zinc	D	5	mg/kg	Y	Y	2
VOC (GC/MS)	A	10	ug/kg			29
PAH (specified) (GC/MS)	A	0.1	mg/kg			24
EPH (<Pb - Cd) (GC/MS)	A	10	mg/kg			26

7.5	7.7	7.0	8.1	7.7
<0.02	<0.02	<0.02	<0.02	<0.02
1	<1	<1	<1	<1
1	2	1	<1	3
20	4	2	14	5
35	21	7	16	7
<1	<1	<1	<1	1
<0.5	<0.5	<0.5	0.5	<0.5
382	54	24	91	30
18	35	22	20	19
411	90	26	1184	324
<0.5	<0.5	<0.5	0.9	<0.5
43	30	15	29	14
<5	<5	<5	<5	<5
521	<300	<300	985	<300
164	97	50	134	58
#	#	-	#	#
#	#	#	#	#
64	<10	<10	1854	69

NOTES

1. All results shown BTEX and VOC are reported as dry weight (GC/MS)
2. Gases (air and water) are reported as dry weight (GC/MS)
3. Gases (air and water) are reported as dry weight (GC/MS)
4. All results are reported as dry weight (GC/MS)
5. All results are reported as dry weight (GC/MS)
6. All results are reported as dry weight (GC/MS)
7. All results are reported as dry weight (GC/MS)
8. All results are reported as dry weight (GC/MS)

ADDITIONAL NOTES

John Gustafson

Laboratory Manager

PAGE 1 OF 2



SUMMARY REPORT

CLIENT Environmental Management Solutions Ltd

Lloyd George House

Fordshill Road

Rotherwas

Hereford

HR2 6NS

CONTACT Jamie Perkins

JOB NAME Commercial Street Manchester

JOB REF. EMS/1240

ORDER NO.

LAB REF. 08/226
ISSUE NO. 1

DATE SCHEDULED 05/03/08

DATE TESTED 5-18/3/8

DATE REPORTED 18/03/08

Lab sample ID	
Client sample ID	
Date sampled	
Sample type	
Matrix code	

08/226/6	08/226/7	08/226/8	08/226/9
BH2/2000	BH3/200	BH3/600	BH3/2000
03/03/08	04/03/08	04/03/08	04/03/08
Soil	Soil	Soil	Soil
5	2a	3	1

Analyte

LOD

Units

ISO 17025

MCERTS

Method ref.

Analyte	D	D	0.02	g/l	Y	Y	Y	4
pH	D	D	0.02	g/l	Y	Y	Y	12
Sulphate (2:1 water soluble)	A	A	1	mg/kg	Y	Y	Y	8
Cyanide (total)	A	A	1	mg/kg	Y	Y	Y	7
Phenols screen	A	A	1	mg/kg	Y	Y	Y	9
Sulphide	D	D	5	mg/kg	Y	Y	Y	2
Arsenic	D	D	1	mg/kg	Y	Y	Y	3
Boron (water soluble)	D	D	0.5	mg/kg	Y	Y	Y	2
Cadmium	D	D	5	mg/kg	Y	Y	Y	2
Copper	D	D	5	mg/kg	Y	Y	Y	2
Chromium	D	D	5	mg/kg	Y	Y	Y	2
Lead	D	D	5	mg/kg	Y	Y	Y	2
Mercury	D	D	0.5	mg/kg	Y	Y	Y	2
Nickel	D	D	5	mg/kg	Y	Y	Y	2
Selenium	D	D	5	mg/kg	Y	Y	Y	2
Sulphur (total)	D	D	300	mg/kg	Y	Y	Y	2
Zinc	D	D	5	mg/kg	Y	Y	Y	2
VOC (GC/MS)	A	A	10	µg/kg	Y	Y	Y	29
PAH (specialist) (GC/MS)	A	A	0.1	mg/kg	Y	Y	Y	24
EPH (>C10 - C40) (GC/MS)	A	A	10	mg/kg	Y	Y	Y	26

NOTES:

1. All results except BTEX, GPO and VOC are reported as dry weight (95°C)
2. Solvents (Znlu and ediacious material (Agon, metal etc.) are refused during Grading. Results have been corrected for any losses in extraction material removed from the sample
3. Analyses subject 'A' were performed on two sample of submitted
4. Analyses subject 'D' were performed on two sample of submitted
5. # indicates separate report appended ' ' and other subordinated analyses
6. Samples with matrix code 7 are not covered by the MCERTS accreditation
7. Sampling was performed by client and is within the terms of our accreditation
8. NCD indicates No Asbestos Detected

AUTHORISED BY

John Gustafson
Laboratory Manager

PAGE 2 OF 2



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Registered Office: 100 Barboll Square, Manchester M2 3AB Registered in England No. 06006660



1023



Analysis :

VOLATILE ORGANIC COMPOUNDS

File No. 08/226
Sample Matrix Soil

Sample ID	BH 1 / 200	08/226/1
3/3/08		

all values in µg/kg

Compound	CAS No.	
dichlorodifluoromethane	075-71-8	<10
chloromethane	074-87-3	<10
chloroethene	075-01-4	<10
bromomethane	074-83-9	<10
chloroethane	075-00-3	<10
trichlorofluoromethane	075-69-4	<10
diethyl ether	060-29-7	<10
1,1-dichloroethene	075-35-4	<10
1,1,2-trichlorotrifluoroethane	076-13-1	<10
carbon disulphide	075-15-0	<10
iodomethane	074-88-1	<10
allyl chloride	107-06-1	<10
trans-1,2-dichloroethane	156-60-5	<10
chloropropene	107-05-1	<10
1,1-dichloroethane	075-34-3	<10
acrylonitrile	107-13-1	<10
cis-1,2-dichloroethane	156-59-2	<10
2,2-dichloropropane	594-20-7	<10
bromochloromethane	074-97-5	<10
trichloromethane	66-66-3	<10
tetrachloromethane	66-23-5	<10
1,1,1 trichloroethane	071-55-9	<10
1,1-dichloropropane	663-58-6	<10
benzene	071-43-2	<10
1,2-dichloroethane	107-06-2	<10
trichloroethene	079-01-6	<10
tribromomethane	074-95-3	<10
1,2-dichloropropane	079-87-5	<10
trichlorofluoromethane	075-27-4	<10
trichloroethane	060-62-6	<10
dimethyl methylacrylate	10661-01-6	<10
cis-1,3-dichloro-1-propene	106-88-3	<10
toluene	127-18-4	<10
tetrachloroethene		<10
trans-1,3-dichloro-1-propene	10061-02-6	<10
ethyl methacrylate	097-63-2	<10
1,1,2-trichloroethane	079-00-5	<10
tribromochloromethane	124-48-1	<10
1,3-dichloropropane	142-29-9	<10
1,2-dibromoethane	106-93-4	<10
chlorobenzene	106-90-7	<10
ethylbenzene	100-41-4	<10
1,1,1,2-tetrachloroethane	630-20-6	<10
m,p-xylene	106-46-1	<10
o-xylene	095-47-6	<10
styrene	100-42-5	<10
tribromomethane	075-25-2	<10
iso-propylbenzene	026-73-6	<10
n-propylbenzene	100-65-1	<10
bromobenzene	106-46-1	<10
1,3,5-trimethylbenzene	106-67-8	<10
2-chlorotoluene	096-49-8	<10
1,1,2,2-tetrachloroethane	079-34-5	<10
1,2,3-trichloropropane	096-18-4	<10
4-chlorotoluene	106-40-4	<10
tert-butylbenzene	108-67-5	<10
1,2,4-trimethylbenzene	085-63-6	<10
sec-butylbenzene	135-98-8	<10
p-isopropyltoluene	099-87-6	<10
pentachloroethane	079-01-7	<10
1,3-dichlorobenzene	041-73-1	<10
1,4-dichlorobenzene	106-46-7	<10
n-butylbenzene	104-51-8	<10
1,2-dichlorobenzene	096-60-1	<10
hexachloroethane	067-72-1	<10
1,2-dibromo-3-chloropropane	096-12-8	<10
hexachlorobutadiene	067-69-3	<10

This page forms part of an analytical report and should not be separated from the Summary Report Page which indicates the reports full contents



Analysis :

VOLATILE ORGANIC COMPOUNDS

File No. **08/226**
Sample Matrix **Soil**

Sample ID	BH 1 / 600	08/226/2
-----------	------------	----------

3/3/08

all values in µg/kg

Compound	CAS No.	
dichlorodifluoromethane	075-71-8	<10
chloromethane	074-87-3	<10
chloroethene	075-01-4	<10
bromomethane	074-83-9	<10
chloroethane	075-00-3	<10
trichlorofluoromethane	075-69-4	<10
diethyl ether	055-29-7	<10
1,1-dichloroethene	075-35-4	<10
1,1,2-trichlorotrifluoroethane	078-13-1	<10
carbon disulfide	075-15-0	<10
isobutene	074-88-4	<10
allyl chloride	107-95-1	<10
trans-1,2-dichloroethene	156-60-6	<10
chloropropene	107-06-1	<10
1,1-dichloroethane	075-34-3	<10
acrylonitrile	107-13-1	<10
cis-1,2-dichloroethene	150-59-2	<10
2,2-dichloropropane	594-20-7	<10
bromochloromethane	074-97-5	<10
trichloromethane	007-06-0	<10
tetrachloromethane	056-23-5	<10
1,1,1-trichloroethane	071-55-6	<10
1,1-dichloropropene	500-58-0	<10
benzene	071-43-2	<10
1,2-dichloroethane	107-06-2	<10
trichloroethene	079-01-0	<10
chloromethane	074-85-3	<10
1,2-dichloropropane	078-87-5	<10
1,1,1,1-tetrafluoroethane	075-87-4	<10
methyl methacrylate	080-62-6	<10
cis-1,3-dichloro-1-propene	10061-01-5	<10
toluene	106-96-5	<10
trichloroethene	127-18-4	<10

trans-1,3-dichloro-1-propene	10061-02-6	<10
ethyl methacrylate	097-63-2	<10
1,1,2-trichloroethane	079-00-5	<10
dibromochloromethane	124-46-1	<10
1,3-dichloropropane	140-28-9	<10
1,2-dibromoethane	106-93-4	<10
chlorobenzene	105-90-7	<10
ethylbenzene	100-41-4	<10
1,1,1,2-tetrachloroethane	630-20-6	<10
m,pd-xylene	05-35-5/05-12-3	<10
o-xylene	095-47-0	<10
styrene	100-42-5	<10
tribromomethane	075-25-2	<10
iso-propylbenzene	620-72-0	<10
n-propylbenzene	105-65-1	<10
bromobenzene	105-69-1	<10
1,3,5-trimethylbenzene	105-67-0	<10
2-chloropropene	095-49-6	<10
1,1,2,2-tetrachloroethane	079-34-5	<10
1,2,3-trichloropropane	505-18-4	<10
4-chlorophene	105-43-4	<10
tert-butylbenzene	105-67-6	<10
1,2,4-trimethylbenzene	095-53-6	<10
sec-butylbenzene	135-98-8	<10
p-isompropyltoluene	099-87-6	<10
pentachloroethane	075-01-7	<10
1,3-dichlorobenzene	541-73-1	<10
1,4-dichlorobenzene	105-45-7	<10
n-butylbenzene	104-51-8	<10
1,2-dichlorobenzene	095-60-1	<10
hexachloroethane	057-72-1	<10
1,2-dibromo-3-chloropropane	095-12-6	<10
hexachlorocyclopentadiene	097-68-3	<10

This page forms part of an analytical report and should not be separated from the Summary Report. Data which indicates the results for controls



Analysis :

VOLATILE ORGANIC COMPOUNDS

File No. 08/226
Sample Matrix Soil

Sample ID	BH 2 / 200	08/226/4
-----------	------------	----------

3/3/08

all values in µg/kg

Compound	CAS No.	
dichlorodifluoromethane	075-71-8	<10
chloromethane	074-87-3	<10
chloroethene	075-01-4	<10
bromomethane	074-83-9	<10
chloroethane	075-00-3	<10
trichlorofluoromethane	075-69-4	<10
dimethyl ether	080-29-7	<10
1,1-dichloroethene	075-35-4	<10
1,1,2-trichloroethane	076-12-1	<10
carbon disulfide	076-15-0	<10
iodomethane	074-85-4	<10
allyl chloride	107-06-1	<10
trans-1,2-dichloroethene	156-60-5	<10
chloropropene	107-05-1	<10
1,1-dichloroethane	075-34-3	<10
perchloric acid	107-10-4	<10
cis-1,2-dichloroethene	155-59-2	<10
2,2-dichloropropane	594-20-7	<10
bromodichloromethane	074-97-3	<10
trichloromethane	067-66-3	<10
tetrachloromethane	006-23-9	<10
1,1,1-trichloroethane	071-55-0	<10
1,1-dichloropropane	553-58-5	<10
benzene	071-43-2	<10
1,2-dichloroethane	107-06-2	<10
trichloroethene	079-01-6	<10
dibromomethane	074-95-3	<10
1,2-dichloropropane	078-87-5	<10
bromodichloromethane	075-27-4	<10
methyl methacrylate	080-62-6	<10
cis-1,3-dichloro-1-propene	10061-01-5	<10
toluene	108-88-3	<10
tetrachloroethane	127-18-4	<10

trans-1,3-dichloro-1-propene	10061-02-6	<10
ethyl methacrylate	097-63-2	<10
1,1,2-trichloroethane	079-00-5	<10
dibromochloromethane	124-48-1	<10
1,3-dichloropropane	142-28-8	<10
1,2-dichloroethane	106-93-4	<10
chloroform	102-00-7	<10
acetylene	100-41-4	<10
1,1,1,2-tetrachloroethane	530-20-6	<10
m,p-xylene	95-26-3/95-47-2	<10
o-xylene	95-47-0	<10
styrene	100-42-5	<10
tribromomethane	076-20-2	<10
isopropylbenzene	503-73-0	<10
n-propylbenzene	103-65-1	<10
bromobenzene	108-86-1	<10
1,3,5-trimethylbenzene	108-87-6	<10
2-chloroethene	095-40-9	<10
1,1,2,2-tetrachloroethane	079-34-5	<10
1,2,3-trichloropropane	594-16-4	<10
4-chlorotoluene	105-46-1	<10
tert-butylbenzene	106-67-8	<10
1,2,4-trimethylbenzene	95-63-6	<10
sec-butylbenzene	135-95-8	<10
p-isopropyltoluene	099-87-6	<10
pentachloroethane	076-01-7	<10
1,3-dichlorobenzene	541-73-1	<10
1,4-dichlorobenzene	105-46-7	<10
n-butylbenzene	104-51-8	<10
1,2-dichlorobenzene	095-50-1	<10
hexachloroethane	507-72-1	<10
1,2-dibromo-3-chloropropane	046-12-8	<10
hexachlorobutadiene	087-69-3	<10

This page forms part of an analytical report and should not be separated from the Summary Report Page which indicates the reports full contents



Analysis :

VOLATILE ORGANIC COMPOUNDS

File No. 08/226
Sample Matrix Soil

Sample ID	BH 2 / 600	08/226/5
-----------	------------	----------

3/3/08

all values in µg/kg

Compound	CAS No.	
dichlorodifluoromethane	075-71-8	<10
chloromethane	074-87-3	<10
chloroethane	075-01-4	<10
bromomethane	074-83-9	<10
chloroethane	075-00-3	<10
trichlorofluoromethane	075-69-4	<10
dimethyl ether	060-29-7	<10
1,1-dichloroethene	075-35-4	<10
1,1,2-trichlorofluoroethane	076-13-1	<10
carbon disulfide	075-15-0	<10
carbon disulfide	074-88-4	<10
iodomethane	107-06-1	<10
ethyl chloride	156-60-5	<10
trans-1,2-dichloroethene	107-06-1	<10
chloropropene	075-34-3	<10
1,1-dichloroethane	107-13-1	<10
acrylonitrile	156-59-2	<10
cis-1,2-dichloroethene	594-20-7	<10
2,2-dichloropropane	074-97-5	<10
bromochloromethane	057-66-3	<10
trichloromethane	056-23-5	<10
tetrachloromethane	071-55-6	<10
1,1,1-trichloroethane	663-58-6	<10
1,1-dichloropropene	071-43-2	<10
benzene	107-06-2	<10
1,2-dichloroethane	079-01-6	<10
trichloroethane	074-95-3	<10
diiodomethane	078-07-5	<10
1,2-dichloropropane	075-27-4	<10
bromodichloromethane	080-62-6	<10
methyl methacrylate	10061-01-5	<10
cis-1,3-dichloro-1-propene	103-58-3	<10
toluene	127-18-4	<10
tetrachloroethane		<10

trans-1,3-dichloro-1-propene	10061-02-6	<10
ethyl methacrylate	097-63-2	<10
1,1,2-trichloroethane	079-00-5	<10
dibromochloromethane	124-48-1	<10
1,3-dichloropropane	142-28-9	<10
1,2-dibromoethane	106-63-4	<10
chlorobenzene	108-90-7	<10
ethylbenzene	100-41-4	<10
1,1,1,2-tetrachloroethane	635-20-6	<10
m,p-xylene	198-29-3/106-42-3	<10
o-xylene	096-47-6	<10
styrene	100-42-5	<10
tribromomethane	075-25-2	<10
iso-propylbenzene	526-73-8	<10
n-propylbenzene	103-65-1	<10
bromobenzene	108-96-1	<10
1,3,5-trimethylbenzene	108-67-8	<10
2-chlorotoluene	095-49-6	<10
1,1,2,2-tetrachloroethane	079-34-5	<10
1,2,3-trichloropropane	076-18-4	<10
4-chlorotoluene	106-43-4	<10
tert-butylbenzene	108-67-8	<10
1,2,4-trimethylbenzene	095-63-6	<10
sec-butylbenzene	135-98-6	<10
p-isopropyltoluene	099-87-6	<10
pentachloroethane	078-01-7	<10
1,3-dichlorobenzene	541-73-1	<10
1,4-dichlorobenzene	106-46-7	<10
n-butylbenzene	104-61-8	<10
1,2-dichlorobenzene	095-60-1	<10
hexachloroethane	067-72-1	<10
1,2-dibromo-3-chloropropane	066-12-8	<10
hexachlorocyclopentadiene	067-68-3	<10

100% of the sample was analyzed and shown to be 100% representative of the sample. The sample was analyzed and shown to be 100% representative of the sample. The sample was analyzed and shown to be 100% representative of the sample.

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Analysis :

VOLATILE ORGANIC COMPOUNDS

File No. 08/226
Sample Matrix Soil

BH 3 / 200	08/226/7
------------	----------

3/3/08

all values in µg/kg

Compound	CAS No.	
dichlorodifluoromethane	075-71-8	<10
chloromethane	074-87-3	<10
chloroethene	075-01-4	<10
bromomethane	074-83-9	<10
chloroethane	075-00-3	<10
trichlorofluoromethane	075-69-4	<10
diethyl ether	060-29-7	<10
1,1-dichloroethene	075-35-4	<10
1,1,2-trichlorofluoroethane	075-13-1	<10
carbon disulphide	075-15-0	<10
isomethane	074-88-4	<10
allyl chloride	107-05-1	<10
trans-1,2-dichloroethene	156-60-5	<10
chloropropene	107-05-1	<10
1,1-dichloroethane	075-34-3	<10
acrylonitrile	107-13-1	<10
cis-1,2-dichloroethene	156-59-2	<10
2,2-dichloropropene	694-20-7	<10
bromochloromethane	074-97-5	<10
trichloromethane	067-66-3	<10
tetrachloromethane	056-23-5	<10
1,1,1-trichloroethane	071-55-6	41
1,1-dichloropropene	563-58-6	<10
benzene	071-43-2	<10
1,2-dichloroethane	107-06-2	<10
trichloroethene	079-01-6	<10
dibromomethane	074-95-3	<10
1,2-dichloropropene	078-87-5	<10
monochloromethane	075-27-4	<10
methyl methacrylate	080-62-6	<10
cis-1,3-dichloro-1-propene	10061-01-5	<10
toluene	108-88-3	<10
tetraclorolethene	127-18-4	<10

trans-1,3-dichloro-1-propene	10061-02-6	<10
ethyl methacrylate	097-63-2	<10
1,1,2-trichloroethane	079-00-5	<10
dibromochloromethane	124-48-1	<10
1,3-dichloropropene	142-28-9	<10
1,2-dibromomethane	105-93-4	<10
chlorobenzene	108-90-7	<10
ethylbenzene	100-41-4	<10
1,1,1,2-tetrachloroethane	630-20-6	<10
m&p-xylene	106-38-3/106-42-3	<10
o-xylene	095-47-0	<10
styrene	100-42-5	<10
tribromomethane	075-25-2	<10
iso-propylbenzene	520-73-0	<10
n-propylbenzene	103-05-1	<10
bromobenzene	108-86-1	<10
1,3,5-trimethylbenzene	108-67-8	<10
2-chlorotoluene	095-49-0	<10
1,1,2,2-tetrachloroethane	079-34-5	<10
1,2,3-trichloropropene	090-19-4	<10
4-chlorotoluene	105-43-4	<10
tet butylbenzene	108-67-0	<10
1,2,4-trimethylbenzene	095-63-6	<10
sec-butylbenzene	135-98-8	<10
p isopropyltoluene	099-87-6	<10
pentachloroethane	076-01-7	<10
1,3-dichlorobenzene	541-73-1	<10
1,4-dichlorobenzene	100-48-7	<10
n-butylbenzene	104-51-8	<10
1,2-dichlorobenzene	095-50-1	<10
hexachloroethane	067-72-1	<10
1,2-dibromo-3-chloropropene	096-12-8	<10
hexachlorobutadiene	097-69-0	<10

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Analysis :

VOLATILE ORGANIC COMPOUNDS

File No. **08/226**
Sample Matrix **Soil**

Sample ID	BH 3 / 600	08/226/8
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3/3/08

all values in µg/kg

Compound	CAS No.	
dichlorodifluoromethane	075-71-8	<10
chloromethane	074-87-3	<10
chloroethene	075-01-4	<10
bromomethane	074-83-9	<10
chloroethane	075-00-3	<10
trichlorofluoromethane	075-69-4	<10
diethyl ether	060-29-7	<10
1,1-dichloroethene	075-35-4	<10
1,1,2-trichlorotrifluoroethane	070-13-1	<10
carbon disulphide	075-15-0	<10
iodomethane	074-88-4	<10
allyl chloride	107-05-1	<10
trans-1,2-dichloroethene	156-50-5	<10
chloropropene	107-05-1	<10
1,1 dichloroethane	075-34-3	<10
acrylonitrile	107-13-1	<10
cis-1,2-dichloroethylene	156-59-2	<10
2,2-dichloropropene	594-20-7	<10
bromochloromethane	074-97-5	<10
trichloromethane	067-66-3	<10
tetrachloromethane	056-23-5	<10
1,1,1-trichloroethane	071-55-9	<10
1,1-dichloropropene	563-58-6	<10
benzene	071-43-2	<10
1,2-dichloroethane	107-06-2	<10
trichloroethene	079-01-6	<10
dibromomethane	074-95-3	<10
1,2-dichloropropane	078-87-5	<10
bromodichloromethane	075-27-4	<10
methyl methacrylate	080-62-6	<10
cis-1,3-dichloro-1-propene	10061-01-5	<10
toluene	108-88-3	<10
1,2-dichlorobenzene	107-46-4	<10

trans-1,3-dichloro-1-propene	10061-02-6	<10
ethyl methacrylate	097-63-2	<10
1,1,2-trichloroethane	079-00-5	<10
dibromochloromethane	124-48-1	<10
1,3-dichloropropene	142-28-9	<10
1,2 dibromomethane	106-93-4	<10
chlorobenzene	105-90-7	<10
ethylbenzene	100-41-4	<10
1,1,1,2-tetrachloroethane	630-20-6	<10
m&p-xylene	108-38-3/106-42-3	<10
o-xylene	095-47-8	<10
styrene	100-42-5	<10
tribromomethane	075-25-2	<10
iso-propylbenzene	526-73-6	<10
n-propylbenzene	103-65-1	<10
bromobenzene	108-86-1	<10
1,3,5-trimethylbenzene	108-07-8	<10
2-chlorotoluene	095-49-0	<10
1,1,2,2-tetrachloroethane	079-34-5	<10
1,2,3-trichloropropene	096-18-4	<10
4-chlorotoluene	105-43-4	<10
tert-butylbenzene	108-67-8	<10
1,2,4-trimethylbenzene	096-08-6	<10
sec-butylbenzene	135-98-8	<10
p-isopropyltoluene	099-87-6	<10
pentachloroethane	076-01-7	<10
1,3-dichlorobenzene	541-73-1	<10
1,4-dichlorobenzene	105-46-7	<10
n-butylbenzene	104-51-8	<10
1,2-dichlorobenzene	055-50-1	<10
hexachloroethane	057-72-1	<10
1,2-dibromo-3-chloropropane	096-12-8	<10
bavachlorobenzene	097-62-1	<10

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Analysis :

POLYNUCLEAR AROMATIC HYDROCARBONS

Job No. 08/226
Sample Matrix Soil

all values in mg/kg

Compound	Sample ID	08/226/1 BH 1 / 200	08/226/2 BH 1 / 600	08/226/3 BH 1 / 2000	08/226/4 BH 2 / 200	08/226/5 BH 2 / 600
naphthalene	091-20-3	<0.1	<0.1	<0.1	6.9	<0.1
2-methylnaphthalene	091-57-6	<0.1	<0.1	<0.1	1.7	<0.1
1-methylnaphthalene	090-12-0	<0.1	<0.1	<0.1	2.9	<0.1
acenaphthylene	208-96-8	<0.1	<0.1	<0.1	1.1	<0.1
acenaphthene	083-32-9	0.1	<0.1	<0.1	16.7	<0.1
fluorene	086-73-7	0.1	<0.1	<0.1	10.5	<0.1
phenanthrene	085-01-8	1.2	<0.1	<0.1	76.8	<0.1
anthracene	120-12-7	0.2	<0.1	<0.1	17.2	<0.1
fluoranthene	206-44-0	2.1	<0.1	<0.1	66.6	<0.1
pyrene	129-00-0	2.0	<0.1	<0.1	54.3	<0.1
benzofluoranthene	056-55-3	0.1	<0.1	<0.1	23.4	<0.1
chrysene	218-01-9	1.0	<0.1	<0.1	23.8	<0.1
benzofluoranthene	205-99-2	1.5	0.2	<0.1	19.9	<0.1
benzokifluoranthene	207-08-9	0.5	<0.1	<0.1	5.7	<0.1
benzofluoranthene	050-32-8	1.4	0.1	<0.1	14.4	<0.1
indeno[1,2,3-cd]pyrene	050-32-8	0.6	<0.1	<0.1	2.3	<0.1
dibenzofluoranthene	193-39-5	0.2	<0.1	<0.1	0.6	<0.1
benzofluoranthene	053-70-3	0.6	0.1	<0.1	3.0	<0.1
coronene	191-24-2	0.8	0.1	<0.1	4.1	<0.1

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Analysis :

POLYNUCLEAR AROMATIC HYDROCARBONS

Job No. 08/226
Sample Matrix Soil

all values in mg/kg		Sample ID	08/226/6 BH 2 / 2000	08/226/7 BH 3 / 200	08/226/8 BH 3 / 600	08/226/9 BH 3 / 2000
Compound	CAS No.					
naphthalene	091-20-3		<0.1	0.5	<0.1	<0.1
2-methylnaphthalene	091-57-6		<0.1	0.1	<0.1	<0.1
1-methylnaphthalene	090-12-0		<0.1	0.1	<0.1	<0.1
acenaphthylene	208-96-8		<0.1	0.3	<0.1	<0.1
acenaphthene	083-32-9		<0.1	1.0	<0.1	<0.1
fluorene	086-73-7		<0.1	1.1	<0.1	<0.1
phenanthrene	085-01-8		<0.1	11.4	<0.1	<0.1
anthracene	120-12-7		0.1	4.0	0.1	<0.1
fluoranthene	206-44-0		<0.1	16.2	0.1	<0.1
pyrene	129-00-0		<0.1	13.5	0.1	<0.1
benzo[a]anthracene	056-55-3		<0.1	6.8	<0.1	<0.1
chrysene	218-01-9		<0.1	6.8	<0.1	<0.1
benzo[b]fluoranthene	205-99-2		<0.1	6.2	<0.1	<0.1
benzo[k]fluoranthene	207-08-9		<0.1	2.4	<0.1	<0.1
benzo[a]pyrene	050-32-8		<0.1	4.9	<0.1	<0.1
indeno[1,2,3-cd]pyrene	050-32-8		<0.1	1.1	<0.1	<0.1
dibenzof[a,h]anthracene	193-39-5		<0.1	0.5	<0.1	<0.1
benzo[ghi]perylene	053-70-3		<0.1	1.1	<0.1	<0.1
coronene	191-24-2		<0.1	1.5	<0.1	<0.1

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