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Phase 3 Investigation At Sterling Inks UK Ltd, Netherley Road, Tarbock Green, Prescott, L35 1QE

**on behalf of
GDB Investments, Oak House,
Weston Under Redcastle,
Shrewsbury, Shropshire
SY4 5XA**

Draft for Client Comment

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Report QA Number 15/036



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1.0 Introduction

1.1 Background

Peak Associates Environmental Consultants Limited (Peak Associates) was commissioned by Graham Boulger of GDB Investments. to conduct a further ground investigation at Sterling Inks UK Ltd, Netherley Road, Tarbock Green, Prescott, L35 1QE.

It is intended to divest the site and an assessment of ground conditions is required as part of the sale. It is understood that the site is to be redeveloped for residential use.

Woodford Industries Limited (WI) undertook a combined Phase 1 and 2 investigation in 2000. They reported that the site was previously used as a fuel filling station, with four underground storage tanks (USTs, 1 x diesel, 3 x petrol) located beneath the current car park area, as shown in the WI report. The location of these tanks was verified by the client, and it was reported that the tanks were last used pre-1984 and were filled with cement-based slurry in 1986, although evidence supporting this has not been seen.

There is no information relating to ground conditions at the time of decommissioning of the tanks, and it was considered possible that residual contamination from leaks or spills related to these tanks may still be present within the underlying soils. However the Phase 2 investigation undertaken by Woodford Industries Limited in 2000 did not identify significant concentrations of contaminants.

Peak Associates conducted a Phase 2 investigation (QA15019a, May 2015) based on the scope of the WI investigation. This investigation was designed to update the results of the 2000 investigation. However, the investigation identified concentrations of petrol range hydrocarbons, presumed to be associated with the former USTs, and concentrations of solvents, understood to be associated with site processes. These contaminants were detected at elevated concentrations that required further information as to their extent across the site in order to assess the impacts to future site users.

This report should be read in conjunction with the Peak Associates Phase 2 report for the site, as referenced above.

1.2 Site Description

The site comprises an approximately rectangular plot of land of 0.65 Ha, located on Netherley Road, Tarbock Green, Prescott, L35 1QE (NGR SJ 46252 87648). The site currently comprises a large building housing the Sterling Colours operation, plus R&B Tanker Repairs, with ancillary areas including car parking and storage. The majority of the site is surfaced with hard stand.

The site building is located in the north eastern part of the site. In front of the building is a car park area. It is understood that the former underground storage tanks were located in this area, as shown on Plan 1. Along the western side of the site were drum storage areas.

The area in the south western part of the site previously occupied by Martin's Garden Centre was vacant at the time of the investigation. At the boundary between this area and the main site was a thin strip of unsurfaced ground, over which waste materials (including containers of substances) had been allowed to accumulate.

The site is located in a predominantly rural setting, surrounded by agricultural land, residential properties and small industrial sites.

2.0 Ground Investigation Works

2.1 Scope Of Works

The intrusive investigation comprised one day of drilling using a window sample rig to advance eight boreholes each to a depth of 3.0m below ground level. Samples of made ground and natural deposits were submitted for analysis for a range of contaminants including metals, inorganic compounds, hydrocarbons, volatile organic compounds, phenols and asbestos fibres. Plan 1 shows the locations of the boreholes.

The borehole locations were selected to investigate the extent of contamination detected during the previous Phase 2 investigation.

2.2 Fieldworks

A total of eight boreholes (WS21-28) were advanced, logged and sampled. The locations of these boreholes were selected to further investigate the nature and extent of contamination identified during the Phase 2 investigation undertaken in March/April 2015.

The boreholes were excavated on 10 June 2015. The field works were supervised by staff from Peak Associates, who logged the samples in accordance with BS5930. The exploratory borehole logs are presented in Appendix 1.

Soil samples were stored in plastic and glass containers supplied by the laboratory, and placed in cooler boxes with ice packs. All samples were collected from the site by courier at the end of the day and delivered to the laboratory of QTS Environmental Limited in Kent the following morning.

Particular care was taken to ensure that the sampling tools were cleaned between sampling positions to minimise the potential for cross contamination.

On completion of the boreholes, and the logging and sampling of the arisings, groundwater monitoring wells were installed in WS22 and WS27. Groundwater was not encountered during the advancement of the other six boreholes. The arisings from the remaining boreholes were replaced within the boreholes in the order that they were extracted.

Following an equilibration period of two weeks, the wells were developed, to remove any fine material, and purged of at least three times the well volume of water, prior to the collection of groundwater samples.

Groundwater samples were stored in plastic and glass containers supplied by the laboratory, and placed in cooler boxes with ice packs. All samples were collected

from the site by courier at the end of the day and delivered to ALcontrol Laboratories in Deeside the following morning.

2.3 Strata Encountered

The borehole logs are presented in Appendix 1, and photographs of the borehole arisings are shown in Appendix 2. The geological sequence encountered is described below. All of the boreholes were completed in firm to stiff clay at a depth of 3m below ground level (bgl).

Made Ground

Hard standing (tarmac) was encountered in two of the eight locations (WS21 and WS23). WS24, WS25, WS26 and WS27 were located in gaps in broken concrete. WS24 and WS28 were located on soft ground.

Topsoil and subsoil with rootlets were encountered in WS22, WS24, WS26 and WS28, underlain by made ground.

Made ground was encountered in all locations to depths of 0.5-1.0 m. A layer of brown or black sandy, granular fill with some brick fragments and clayey patches was encountered in WS21, WS22, WS23 and WS27. Strong odours were detected in the made ground in WS22 and WS27. Shallow groundwater strikes were also observed in these two wells, and therefore groundwater monitoring wells were installed. A slight odour was detected in WS23, but groundwater was not encountered.

Topsoil with plant material, plastic, metal and large brick fragments was encountered in WS24.

Limestone aggregate was encountered in WS21, WS25, WS26 and WS28, with some brick fragments. In addition, a land drain was struck in WS26 at a depth of 1.5m bgl.

The made ground encountered is consistent with that encountered during the previous Peak Associates Phase 2 investigation.

Natural Soil and Rock

Beneath the made ground, the natural ground was encountered at depths of 0.5-1.0 m bgl in all boreholes. The natural ground is interpreted as being comprised of a soft brown silty clay with occasional pebbles, gravel and plant material, becoming firm, then stiff orange/brown clay with grey sandy mottling with depth. This is consistent with the WI report, the previous Peak Associates Phase 2 report and the geological map, which report glacial drift deposits in the vicinity of the site.

A slight hydrocarbon odour was detected in the clay deposits in WS27 at 1.0-1.4m bgl.

2.4 Chemical Testing

A total of 10 representative samples of the made ground and natural soils within the boreholes were submitted for chemical analysis for a range of contaminants. These samples included all material where visual or olfactory indications of contamination were encountered.

In addition, two groundwater samples were submitted for chemical analysis for a range of contaminants.

The laboratory chemical test result certificates are presented in Appendix 2.

3.0 Contamination Assessment

3.1 Assessment Criteria

In relation to human health, the contamination test data for the soils have been compared with 'Tier 1' contamination screening criteria for a residential (with plant uptake) end use, which are based primarily on the available published Soil Guideline Values and the CIEH/LQM published generic assessment criteria, both derived using the CLEA model, and the C4SLs for six priority contaminants.

A copy of the current Peak Associates Tier 1 screening values is presented in Appendix 4.

In relation to diffuse potential contaminants in soils, such as metals, any found to exceed the Tier 1 screening criteria are subject to statistical tests to establish the UCL95 (upper confidence limit at 95th percentile of the mean) of that particular contaminant, after testing to confirm if the distribution is 'normal'. The presence of potential statistical outliers is also established, to determine if there is an anomaly or second population.

The results of the groundwater laboratory tests were compared against UK Drinking Water Standards, where available. Where this is not available, an appropriate level such as WHO Drinking Water Standard or Environmental Quality Standard has been used.

3.2 Soil Test Results

Of the 10 samples submitted to the laboratory for chemical analysis, six samples were analysed for a suite including metals, phenols, sulphide, sulphate, cyanide, pH and PAH (Polycyclic Aromatic Hydrocarbons). Four samples were analysed for TPH-CWG (Total Petroleum Hydrocarbons – Criteria Working Group) and BTEX (benzene, toluene, ethylbenzene and xylene) analysis. Four samples were analysed for VOCs + TICs (Volatile Organic Compounds with Tentatively Identified Compounds) and four samples were analysed for the presence of asbestos fibres.

An elevated concentration of lead of 235 mg/kg was detected above the C4SL of 200 mg/kg for a residential with home grown produce end use in the sample from WS25.

Two concentrations of copper (133 mg/kg in WS22 and 219 mg/kg in WS25) were detected at concentrations below the screening value of 2330 mg/kg for human health risks but at concentrations above the limit of 130mg/kg, above which plant growth may be inhibited. In addition, one concentration of zinc (321 mg/kg in WS25) was detected at a concentration below the screening criteria of 3750 mg/kg for human health risks but above the limit of 300 mg/kg, above which plant growth may be inhibited. All other metals, where detected, were detected at concentrations below their respective screening criteria.

Of the six samples analysed, total cyanide was not detected above detection limits. Sulphide was detected in five samples, at concentrations below the screening value. Water soluble sulphate was detected in all six samples analysed, at concentrations below the screening value for human health risks. However, the water soluble sulphate concentration of 540mg/l detected in the sample from WS23 is slightly over the limit of 500mg/l above which concrete protection measures may be required in the construction of foundations.

Values of pH were detected in the range 6.7 to 7.3, within the accepted range of 5 to 9.

Total phenols were detected at a trace concentration in one of the six samples analysed, below the screening criterion.

PAH were detected at elevated concentrations in three of the six of the samples analysed, at concentrations exceeding the C4SL for Benzo(a)pyrene (BaP) of 5 mg/kg for a residential (with home grown produce) end use. The C4SLs use BaP as a surrogate marker for other PAHs. Elevated concentrations of BaP were detected in the samples from WS22 (6.93 mg/kg), WS23 (51.3 mg/kg) and WS25 (7.06 mg/kg). PAH were not detected above detection levels in the remaining three samples.

Of the four samples analysed for the presence of TPH CWG, concentrations of petrol range hydrocarbons (short chain length aliphatic compounds) were detected in the samples from WS22 and WS27. The concentration of one fraction from the sample from WS22 (20.0mg/kg of aliphatic >C8-C10) exceeded the respective screening criteria. TPH-CWG were not detected in the samples from WS27 and WS28.

Four samples were analysed for BTEX. Concentrations of BTEX were detected in the samples from WS22 and WS27B, below their respective screening criteria, but at concentrations expected given the concentrations of petrol range organics detected in the TPH CWG analysis. BTEX were not detected in the samples from WS27A and WS28.

Four samples were analysed for VOCs and TICs. Trace concentrations of ethylbenzene, m&p-xylene, 1,3,5-Trimethylbenzene and 1,2,4-Trimethylbenzene were detected in the sample from WS23. Trace concentrations of ethylbenzene, m&p-xylene and o-xylene were detected in the sample from WS25. VOCs were not detected in the samples from WS24 and WS26.

Trace concentrations of 1-ethyl-3-methyl benzene, 1-methyl naphthalene and 2-methyl naphthalene were tentatively identified in the sample from WS23. No TICs were detected in the samples from WS24, WS25 and WS26. There are no generic screening criteria for these compounds. The VOCs and TICs described in this paragraphs are the paragraphs above are likely to have originated from the use of petrol on the site.

Four samples were examined for the presence of asbestos fibres. The sample from WS26 contained chrysotile (white asbestos) insulation board within the soil. Asbestos fibres were not observed in the remaining three samples examined.

3.3 Groundwater Test Results

The two samples submitted to the laboratory for chemical analysis were analysed for a suite including metals, phenols, sulphide, sulphate, cyanide, pH and PAH (Polycyclic Aromatic Hydrocarbons), TPH-CWG (Total Petroleum Hydrocarbons – Criteria Working Group) and BTEX (benzene, toluene, ethylbenzene and xylene) analysis and VOCs + TICs (Volatile Organic Compounds with Tentatively Identified Compounds).

Metals were detected at concentrations below their respective screening criteria.

Sulphide, phenols, cresols and xylenols were not detected above detection limits. Sulphate was detected at concentrations below the screening criteria.

Values of pH of 7.31 (WS22) to 7.52 (WS27) were detected, within the accepted range of 5 to 9.

PAH were detected at elevated concentrations in both samples, at concentrations exceeding the WHO screening level for BaP of 0.7µg/l (3.36µg/l in WS22 and 5.92µg/l in WS27), the UK drinking water standard of 0.1µg/l of total PAH and the Surface Water Abstraction Directive of 1µg/l for Class A3 surface waters (29.9µg/l in WS22 and 45.7µg/l in WS27).

Elevated concentrations of petrol range hydrocarbons (short chain length aliphatic compounds) were detected in both groundwater samples (919µg/l in WS22 and 379µg/l in WS27). The concentrations of total TPH were also elevated in both samples (5860µg/l in WS22 and 4770µg/l in WS27), above the screening value of 200µg/l for dissolved/emulsified hydrocarbons and indicative of the presence of free product. This corresponds with the slight hydrocarbon sheen and odours noted during groundwater sampling.

Both groundwater samples were analysed for BTEX as part of the TPH-CWG analysis suite. BTEX were not detected above detection limits, with the exception of 20µg/l of m&p-xylene detected in WS27, below the EQS for xylenes of 30µg/l.

Both groundwater samples were analysed for VOCs and TICs. In the sample from WS22, the following VOCs were detected: 1,3,5-Trimethylbenzene (2.16µg/l), 'mixed hydrocarbons' (859µg/l). In the sample from WS27, the following VOCs were detected: ethylbenzene (1.64µg/l), m&p-xylene (20.3µg/l), 1,3,5-Trimethylbenzene (2.56µg/l), 1,2,4-Trimethylbenzene (6.74µg/l), mixed hydrocarbons (1180µg/l). While there are no published screening values for the majority of these compounds, the concentration of xylenes detected is below the screening value of 30µg/l, while the 'mixed hydrocarbons' concentrations are considered to be elevated.

3.4 Qualitative Risk Assessment

As with the previous investigation, made ground of variable composition was encountered in all boreholes across the site, underlain by natural clay. The majority of the samples collected for analysis were taken from made ground.

One isolated concentration of lead (235mg/kg) was detected in the sample from WS25, above the C4SL of 200mg/kg for a residential end use with homegrown produce. In addition, two concentrations of copper and one concentration of zinc were detected at levels below their respective screening criteria for a residential end use, but at concentrations that may inhibit plant growth. Elevated concentrations of metals were not detected in groundwater samples. Over the two phases of intrusive investigation at the site there have been five metals concentrations at potentially phytotoxic concentrations. Removal or capping of made ground within proposed garden areas, or designing the site layout so that these areas are located beneath buildings or hard stand would eliminate potentially adverse impacts to receptors from these concentrations of metals.

Elevated concentrations of PAH were detected in the soil samples from WS22, WS23 and WS25 at concentrations of BaP above the screening value of 5mg/kg. The concentration detected in the sample from WS23 was particularly elevated at 51.3mg/kg of BaP.

Trace concentration of VOCs were also detected in the soil sample from WS23, and VOCs including xylenes and 'mixed hydrocarbons' were detected in the groundwater samples from WS22 and WS27. In addition, elevated concentrations of total petroleum hydrocarbons in the petrol/gasoline range, were detected in WS22 and WS27, in soil and groundwater samples.

The concentrations of PAH and VOCs described above, combined with the elevated concentrations of hydrocarbons from the previous Phase 2 investigation, are indicative of a plume of hydrocarbon contamination, likely to have originated from the former underground fuel storage tanks. Once again the data indicate that there remains a source of TPH in the fill that will need to be further risk assessed and managed (remediated) in any future development. The level of management and remediation will be higher for change from industrial to residential end use than continued industrial use.

The concentrations of BaP are indicative of an area where the concentrations of TPH have been higher, and residual concentrations of BaP have been left as the plume has passed through. As such, Polycyclic aromatic hydrocarbon (PAH) double ratio plot analysis was undertaken on the soil quality data in order to better understand the source of any high or unexpected PAH levels (Jones Environmental Laboratory). Soil samples were analysed from the following boreholes:

- WS01, WS03, WS06 and WS08 (25th March 2015)
- WS22, WS23 and WS25 (10th June 2015)

This analysis is shown in Appendix 5. For the soil samples, the analysis indicates that the PAH content present is likely to be derived from coal (WS01) and a mixture of coal ash and tarmac for the remaining samples. Soils containing elevated concentrations of PAH are not considered to be suitable for retention in proposed garden areas. If this cannot be addressed by the site layout design, remediation will be required.

The concentrations of VOCs detected are likely to require a ground gas survey for VOCs and also for CO₂ (as a degradation product of hydrocarbons) for the

development. Design of floor slabs utilising vapour barriers and passive venting would be prudent.

Chrysotile (white) asbestos insulation board was detected in the soil sample from WS26. Loose fibres of chrysotile were also detected previously in the sample from WS03, located on open ground. The presence of asbestos in soil samples will have implications for development of the site. However, asbestos has been detected in only two of the ten near surface samples tested, both of which were located on unsurfaced ground. In addition, the type of asbestos detected (chrysotile) is the least hazardous, and fibres held within insulation board have a reduced capacity to become airborne.

Current guidance (CIRIA C733) on mitigation of risks posed by asbestos contamination recommends that, where possible, asbestos within soils is left in situ, and the site layout designed to cover or cap the areas where asbestos has been identified. Should the site layout require the removal of asbestos containing soils (ACSs), the work will need to be undertaken under a method statement to minimise the potential for asbestos fibres to become airborne and the potential exposure of site users (demolition/construction workers), as outlined in the Control of Asbestos Regulations 2012 document.

3.5 Conceptual Site Model

Over two phases of investigation at the site, a number of sources of contamination have been identified as follows:

- Solvents, associated with on-site processes;
- Petrol range hydrocarbons, associated with former USTs;
- Metals detected in shallow soils;
- Asbestos fibres at near-surface levels, originating from former roofing materials.

In order for each of the above sources to present a risk to receptors, there must be a pollutant linkage – a ‘pathway’ – between them. The following table describes the source-pathway-receptor linkages for each of the sources identified.

Source	Pathway	Receptor	Mitigation
Solvents (at low concentrations, in isolated hotspots)	Inhalation of vapours or ingestion of soils	Site users	Ground gas survey likely to be required to assess for the presence of VOC vapours and CO ₂ as a degradation product of the TPH and VOCs. Future developments may require a vapour barrier and granular layer for passive venting.
Petrol range hydrocarbons, including BaP	Migration through shallow groundwater, potentially off site, inhalation of vapours	Site users, off site users, potentially off site surface water bodies.	Excavation of a trench to collect impacted groundwater for off-site disposal until concentrations of hydrocarbons in shallow groundwater reach acceptable levels. Excavation and disposal of

			impacted soils.
PAHs in soils	Ingestion of soils	Site users	Made ground containing PAH derived from coal ash, soot and tarmac should be removed from private garden areas and either disposed of off site or placed beneath buildings or areas of permanent hard stand.
Lead	Ingestion of soils	Site users	Ensure that the impacted soils are sited beneath hard stand.
Asbestos fibres	Inhalation of fibres	Site users	Current guidance (C733) recommends that ACSs remain in situ, and be covered or capped as part of any redevelopment scheme. Should removal of ACSs be required as part of the development of the site, the work will require a site-specific method statement to prevent the spread of and exposure to asbestos fibres in accordance with CAR 2012.

3.6 Other Considerations

Geotechnical testing for foundation design has not been undertaken for this investigation. While the natural ground below the fill encountered across the site comprised firm to stiff dry clay, apparently suitable for shallow foundations, it would be prudent to consult an engineer to provide a proper assessment to allow detail foundation design to be undertaken. The strata encountered do seem typical of that reported for the local area.

A slightly elevated concentration of water soluble sulphate was detected in the sample from WS23. This is just above the screening value of 500mg/l, above which concrete protection measures may be required. Elevated concentrations of water soluble sulphate were not detected in groundwater samples.

4.0 Conclusions and Recommendations

Eight additional boreholes were excavated across the site to depths of 3.0m bgl. A total of 10 soil samples and two groundwater samples were submitted for laboratory analysis to provide further information relating to the contamination encountered during the recent Phase 2 investigation at the site.

While trace concentrations of solvents were detected in the soil samples from WS03 and WS04 during the previous investigation, solvents were not detected in soil samples in this area of the site during this recent further investigation. However, an elevated concentration of BaP was detected in the sample from WS25, located in the same part of the site. It is likely that contaminants detected in this area have originated from leaks and spills of substances used in this area.

BTEX were detected in the soil samples from WS22 and WS27, and trace concentrations of VOCs were detected in the samples from WS23 and WS25. The levels detected are likely to require a ground gas survey for VOCs and also for CO₂ (as a degradation product of hydrocarbons) for the development. Design of floor slabs utilising vapour barriers and passive venting would be prudent.

Further investigation has identified the presence of a plume of hydrocarbon contamination, likely to have originated from the former USTs, located in the south eastern corner of the site. Elevated concentrations of hydrocarbons have been detected in four boreholes in this area (WS08, WS22, WS23 and WS27), including in the groundwater samples from WS22 and WS27. It is likely, due to the elevated concentrations of BaP detected, that some ground remediation will be required in this area prior to redevelopment.

It is recommended that the remedial work involve the excavation of a trench to collect impacted groundwater for off-site disposal. It may be possible to discharge the water to foul or surface water drains via interceptor. Once concentrations of groundwater have reached acceptable levels, it is recommended that impacted soils also be removed from site and disposed of appropriately. Validation sampling will confirm that soil and groundwater remaining in situ contain residual hydrocarbons at acceptable levels for the proposed development.

In any development proposal the LPA and Environment Agency are likely to require either removal of the source of the plume or management of the plume as part of the development. As any removal of significant volumes of material is likely to be expensive, at this stage the management or draining down of the shallow natural and artificial groundwaters along with passive venting for any potential ground gas issues is seen as the most viable option.

Elevated concentrations of PAH, including BaP, were detected in the samples from WS22, WS23 and WS25. PAH double ratio plot analysis indicates that the PAH detected are likely to originate from coal ash or tarmac. It is recommended that made ground of this type be removed from proposed garden areas and either disposed of off site, or placed beneath buildings or permanent hard stand.

Over the two intrusive investigations at the site a total of five potentially phytotoxic concentrations of metals have been detected in the soil samples from WS03, WS05, WS22 and WS25. However, the growth of plants is unlikely to be significantly affected if the material were to be located beneath hard stand and/or imported top soil brought in for any planting scheme.

One elevated concentration of lead was detected in the soil sample from WS25, above the screening level for residential use with home grown produce. In order to mitigate against any potential health risks, it is recommended that either this location is sited beneath buildings or permanent hard stand. Alternatively, if this is a proposed garden area, the soil should be removed and relocated beneath areas of permanent hard stand. If a site design can incorporate a capping layer this is likely to be the most cost effective option for dealing with any metal, inorganic or asbestos issue.

Asbestos containing materials in the form of chrysotile (white asbestos) have been detected in two soil samples at the site (WS03 and WS26). It is understood that the source of asbestos is former roofing materials from the site building that fell onto the site following a fire some years ago. The majority of the asbestos containing materials were removed from site; however fibres remain in shallow soils and on unsurfaced ground. It appears that the occurrence of asbestos fibres in soil is not widespread (fibres were not detected in the sample from WS24, located on unsurfaced ground in the vicinity of WS03, and only detected in two of the ten shallow samples analysed). However, it is recommended that the proposed site layout be designed to allow the ACSs to remain in situ and be covered or capped in accordance with current guidance (CIRIA C733). Should the site layout require removal of ACSs, the work should be undertaken under the requirements of CAR 2012, to prevent the spread of and exposure to airborne asbestos fibres.

Plans

NOTES

- 1. DO NOT SCALE.
- 2. This drawing is to be read in conjunction with all other relevant drawings.
- 3. All boundaries are approximate.

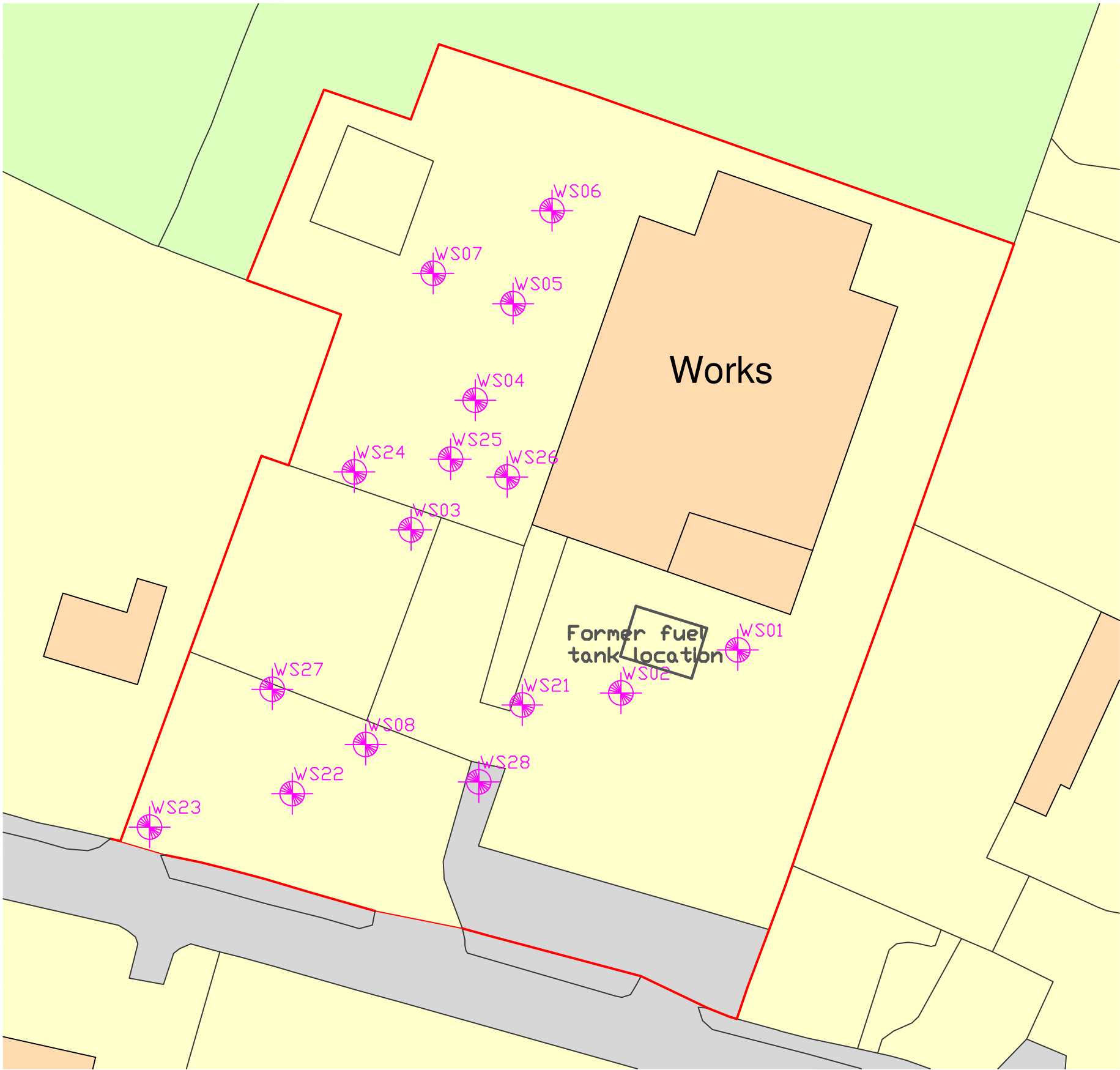
KEY

 WS01

Approximate location of borehole.



Site boundary.



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DESCRIPTION	REV	DATE	DRN	PM
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PEAK ASSOCIATES
ENVIRONMENTAL CONSULTANTS LTD

CLIENT
Sterling Colours Limited

PLAN NO.
Plan 2

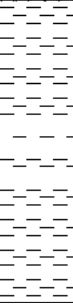
PLAN TITLE
Approximate borehole location plan.

DRAWN	PS	PROJECT MANAGER	JM
CHECKED	JM	APPROVED	JM
DATE	1 July 2015	SCALE	1:500 @ A3
DRAWING NUMBER	657/002	REVISION	-

Appendix 1

Borehole Logs

Peak Associates Environmental Consultants Ltd Tel: 01925 491011 email: contact@peak-associates.com							Borehole No WS21 Sheet 1 of 1		
Project Name SCT				Project No. 15/657		Co-ords: -		Hole Type WS	
Location: Woodend, Netherley Rd, Tarbock Green, Prescott, Merseyside, L35 1QE						Level: -		Scale 1:50	
Client: Sterling Inks UK Ltd						Dates: 10/06/2015		Logged By JM	

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		1.00-1.20	D		0.10		 MADE GROUND: tarmac.		
					1.00		 MADE GROUND: black and brown, granular fill, sandy till, limestone aggregate, slightly clayey in places, dry.		
					3.00		 Firm, dark brown, CLAY. Slight organic odour, becoming orange brown at 1.2 m with grey sandy mottling.	1	
								2	
								3	
							End of Borehole at 3.00 m	4	
								5	
								6	
								7	
								8	
								9	

Remarks: No visual or olfactory evidence of hydrocarbons.									
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Project Name
SCT

Project No.
15/657

Co-ords: -

Hole Type
WS

Location: Woodend, Netherley Rd, Tarbock Green, Prescott,
Merseyside, L35 1QE

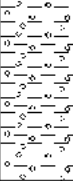
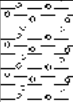
Level: -

Scale
1:50

Client: Sterling Inks UK Ltd

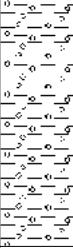
Dates: 10/06/2015

Logged By
JM

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10-0.80	D		0.10			TOPSOIL with stones, including grass and roots (poor returns).	
					0.80			FILL. Brown granular fill, including brick fragments. Black stains and wet at 0.4 m. Strong odour.	1
					2.00			Firm, brown CLAY with pebbles, slight stain at top, turning orange-brown by 1.0 m. Dry.	2
		2.00-2.70	D		2.70			Firm CLAY. Strong odour. Wet.	
					3.00			Firm-stiff CLAY	3
								End of Borehole at 3.00 m	4
									5
									6
									7
									8
									9

Remarks: Strong odours.

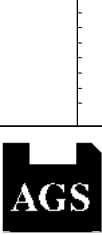


Peak Associates Environmental Consultants Ltd Tel: 01925 491011 email: contact@peak-associates.com							Borehole No WS23 Sheet 1 of 1		
Project Name SCT			Project No. 15/657		Co-ords: -		Hole Type WS		
Location: Woodend, Netherley Rd, Tarbock Green, Prescott, Merseyside, L35 1QE					Level: -		Scale 1:50		
Client: Sterling Inks UK Ltd					Dates: 10/06/2015		Logged By JM		
Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10-0.50	D		0.02			MADE GROUND: tarmac.	1
					0.10			MADE GROUND. Brown, granular fill, including black fragments.	
					0.50			MADE GROUND. Brown, sandy/clayey fill, stones. Slight solvent odour.	
								Stiff, brown sandy CLAY with pebbles. Black stain at 0.55 m. Dry. Continues to stiff orange-brown clay, grey mottling, brown plant material. Sandy break at approx. 1.7 m, slightly damp. No odour.	
					3.00			End of Borehole at 3.00 m	3
									4
									5
									6
									7
									8
									9
Remarks: No visual or olfactory evidence of hydrocarbons.									

[illegible]

Peak Associates Environmental Consultants Ltd Tel: 01925 491011 email: contact@peak-associates.com							Borehole No WS25 Sheet 1 of 1	
Project Name SCT			Project No. 15/657		Co-ords: -		Hole Type WS	
Location: Woodend, Netherley Rd, Tarbock Green, Prescott, Merseyside, L35 1QE					Level: -		Scale 1:50	
Client: Sterling Inks UK Ltd					Dates: 10/06/2015		Logged By JM	

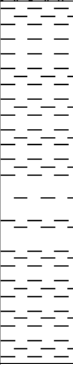
Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40-0.70	D		0.40		 MADE GROUND. Grey, limestone gravel, silty matrix, brick fragments, black granular material.		
					0.70				 MADE GROUND. Black, clayey material, brick fragments, becoming more granular and gravelly. Dampness at top. No odour.
							 Stiff, dark brown, silty and sandy CLAY with organic material. Becoming orange-brown, sandy mottling. Dry. Some staining at top. No visual or olfactory evidence of hydrocarbons.	1	
								2	
								3	
					3.00		End of Borehole at 3.00 m	4	
								5	
								6	
								7	
								8	
								9	

Remarks: No visual or olfactory evidence of hydrocarbons.								
---	--	--	--	--	--	--	--	---

Peak Associates Environmental Consultants Ltd Tel: 01925 491011 email: contact@peak-associates.com							Borehole No WS26 Sheet 1 of 1	
Project Name SCT			Project No. 15/657		Co-ords: -		Hole Type WS	
Location: Woodend, Netherley Rd, Tarbock Green, Prescott, Merseyside, L35 1QE					Level: -		Scale 1:50	
Client: Sterling Inks UK Ltd					Dates: 10/06/2015		Logged By JM	

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40-0.60	D		0.05			TOPSOIL with plants.	1 2 3 4 5 6 7 8 9
					0.20			MADE GROUND. Limestone aggregate (sand to cobble size).	
								MADE GROUND. Bricks, sand, roots.	
					0.70			MADE GROUND. Bricks, wood, glass, coal, clayey matrix.	
					0.90			Stiff, brown CLAY with sandy mottling, becoming yellow-orange-brown, pebbles. Lenses of sand-coarse sand. Land drain clay pipe.	

Remarks: No visual or olfactory evidence of hydrocarbons.								
---	--	--	--	--	--	--	--	---

Peak Associates Environmental Consultants Ltd Tel: 01925 491011 email: contact@peak-associates.com							Borehole No WS27 Sheet 1 of 1		
Project Name SCT			Project No. 15/657		Co-ords: -		Hole Type WS		
Location: Woodend, Netherley Rd, Tarbock Green, Prescott, Merseyside, L35 1QE					Level: -		Scale 1:50		
Client: Sterling Inks UK Ltd					Dates: 10/06/2015		Logged By JM		
Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30-0.60	D		0.60			MADE GROUND. Poor returns. Brown, granular fill, bricks, damp at 0.3-0.6 m, sheen and hydrocarbon odour (possibly petrol).	1
		1.10-1.60	D					Firm, brown CLAY with roots. Slight organic odour. Soft, yellow, sandy at 1.0-1.4 m, with hydrocarbon odours.	
					3.00			End of Borehole at 3.00 m	3
									4
									5
									6
									7
									8
									9
Remarks: Strong odours, possible petrol.									

Peak Associates Environmental Consultants Ltd Tel: 01925 491011 email: contact@peak-associates.com							Borehole No WS28 Sheet 1 of 1	
Project Name SCT			Project No. 15/657		Co-ords: -		Hole Type WS	
Location: Woodend, Netherley Rd, Tarbock Green, Prescott, Merseyside, L35 1QE					Level: -		Scale 1:50	
Client: Sterling Inks UK Ltd					Dates: 10/06/2015		Logged By JM	

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		1.30-1.50	D		0.10		 TOPSOIL with plants.		
					0.50		 Stiff, sandy CLAY.		
					0.70		 MADE GROUND. Loose, grey aggregate.		
							 Stiff, brown, sandy CLAY with pebbles and organic material. Lens of damp clayey sand at 1.3-1.5 m, no visual or olfactory evidence of hydrocarbons.		

Remarks: No visual or olfactory evidence of hydrocarbons.								

Appendix 2

Photographs



Photo 1: Location of WS21



Photo 2: Made ground at WS21



Photo 3: Natural clay at WS21



Photo 4: Location of WS22



Photo 5: Made ground at WS22



Photo 6: natural clays with staining at the top in WS22



Photo 7: Location of WS23



Photo 8: Arisings from WS23



Photo 9: Location of WS24



Photo 10: Arisings from WS24



Photo 11: Arisings from WS24



Photo 12: Arisings from WS24



Photo 13: Location of WS25



Photo 14: Made ground from WS25



Photo 15: Natural clay from WS25



Photo 16: Location of WS26



Photo 17: Arisings from WS26



Photo 18: Arisings from WS26



Photo 19: Fragments of clay pipe from WS26



Photo 20: Location of WS27



Photo 21: Arisings from WS27



Photo 22: Location of WS28



Photo 23: Arisings from WS28

Appendix 3

Chemical Test Results (Laboratory Certificates)



Jo Matthew
Peak Associates Ltd
Room C27, Third Floor
Gordon Manley Building
Environment Centre
Lancaster University
LA1 4YQ



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t: 01622 850410
russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 15-32326

Site Reference: SCT

Project / Job Ref: 15/657

Order No: 15/1152

Sample Receipt Date: 11/06/2015

Sample Scheduled Date: 11/06/2015

Report Issue Number: 1

Reporting Date: 17/06/2015

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

A handwritten signature in black ink, appearing to read 'R Jarvis'.

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

A handwritten signature in black ink, appearing to read 'K Old'.



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Maidstone
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Tel : 01622 850410



Soil Analysis Certificate						
QTS Environmental Report No: 15-32326	Date Sampled	10/06/15	10/06/15	10/06/15	10/06/15	10/06/15
Peak Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: SCT	TP / BH No	JM-SCT-24-21	JM-SCT-24-22A	JM-SCT-24-23	JM-SCT-24-24	JM-SCT-24-25
Project / Job Ref: 15/657	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 15/1152	Depth (m)	1.00 - 3.00	0.10 - 0.80	0.10 - 0.50	GL - 0.80	0.40 - 0.70
Reporting Date: 17/06/2015	QTSE Sample No	152534	152535	152537	152538	152539

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025		Not Detected	Not Detected	Not Detected	
Sample Matrix	Material Type	N/a	NONE					
Asbestos Type	PLM Result	N/a	ISO17025					
pH	pH Units	N/a	MCERTS	6.7	7.1	7.3	7.3	7.2
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	46	284	540	16	120
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.05	0.28	0.54	0.02	0.12
Sulphide	mg/kg	< 5	NONE	13	31	35	< 5	5
Arsenic (As)	mg/kg	< 2	MCERTS	7	14	6	6	119
W/S Boron	mg/kg	< 1	NONE	< 1	2	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.2	1.8	0.4	0.2	1.5
Chromium (Cr)	mg/kg	< 2	MCERTS	47	25	46	37	22
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	32	133	121	57	219
Lead (Pb)	mg/kg	< 3	MCERTS	30	74	37	38	235
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	30	83	31	33	70
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	59	173	191	114	321
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	4.6	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Graham Revell

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ⁽⁵⁾



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Soil Analysis Certificate						
QTS Environmental Report No: 15-32326	Date Sampled	10/06/15	10/06/15			
Peak Associates Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: SCT	TP / BH No	JM-SCT-24-26	JM-SCT-24-28			
Project / Job Ref: 15/657	Additional Refs	None Supplied	None Supplied			
Order No: 15/1152	Depth (m)	0.20 - 0.70	1.30 - 1.50			
Reporting Date: 17/06/2015	QTSE Sample No	152540	152543			

Determinand	Unit	RL	Accreditation			
Asbestos Screen	N/a	N/a	ISO17025	Detected		
Sample Matrix	Material Type	N/a	NONE	Insulation board in soil		
Asbestos Type	PLM Result	N/a	ISO17025	Chrysotile		
pH	pH Units	N/a	MCERTS		6.9	
Total Cyanide	mg/kg	< 2	NONE		< 2	
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS		42	
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS		0.04	
Sulphide	mg/kg	< 5	NONE		21	
Arsenic (As)	mg/kg	< 2	MCERTS		3	
W/S Boron	mg/kg	< 1	NONE		< 1	
Cadmium (Cd)	mg/kg	< 0.2	MCERTS		< 0.2	
Chromium (Cr)	mg/kg	< 2	MCERTS		24	
Chromium (hexavalent)	mg/kg	< 2	NONE		< 2	
Copper (Cu)	mg/kg	< 4	MCERTS		9	
Lead (Pb)	mg/kg	< 3	MCERTS		17	
Mercury (Hg)	mg/kg	< 1	NONE		< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS		18	
Selenium (Se)	mg/kg	< 3	NONE		< 3	
Zinc (Zn)	mg/kg	< 3	MCERTS		20	
Total Phenols (monohydric)	mg/kg	< 2	NONE		< 2	

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Graham Revell

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ⁽⁵⁾



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Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 15-32326	Date Sampled	10/06/15	10/06/15	10/06/15	10/06/15	10/06/15
Peak Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: SCT	TP / BH No	JM-SCT-24-21	JM-SCT-24-22A	JM-SCT-24-23	JM-SCT-24-24	JM-SCT-24-25
Project / Job Ref: 15/657	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 15/1152	Depth (m)	1.00 - 3.00	0.10 - 0.80	0.10 - 0.50	GL - 0.80	0.40 - 0.70
Reporting Date: 17/06/2015	QTSE Sample No	152534	152535	152537	152538	152539

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	1.32	38.70	< 0.1	0.64
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.79	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	1.99	70.90	< 0.1	2.05
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	2.06	61.10	< 0.1	1.62
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	10.90	358	< 0.1	14
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	3.28	75.80	< 0.1	3.12
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	27.30	305	< 0.1	20.60
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	22.80	224	< 0.1	18
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	7.50	70.50	< 0.1	5.74
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	8.77	66.10	< 0.1	7.15
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	9.22	62.10	< 0.1	8.58
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	3.40	23.70	< 0.1	2.93
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	6.93	51.30	< 0.1	7.06
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	3.68	26.70	< 0.1	4.41
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.42	2.95	< 0.1	0.47
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	2.86	21.10	< 0.1	3.67
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	113	1460	< 1.6	100

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 15-32326	Date Sampled	10/06/15				
Peak Associates Ltd	Time Sampled	None Supplied				
Site Reference: SCT	TP / BH No	JM-SCT-24-28				
Project / Job Ref: 15/657	Additional Refs	None Supplied				
Order No: 15/1152	Depth (m)	1.30 - 1.50				
Reporting Date: 17/06/2015	QTSE Sample No	152543				

Determinand	Unit	RL	Accreditation				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1			
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6			

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C



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Soil Analysis Certificate - TPH CWG Banded

QTS Environmental Report No: 15-32326	Date Sampled	10/06/15	10/06/15	10/06/15	10/06/15
Peak Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: SCT	TP / BH No	JM-SCT-24-22B	JM-SCT-24-27A	JM-SCT-24-27B	JM-SCT-24-28
Project / Job Ref: 15/657	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 15/1152	Depth (m)	2.00 - 2.70	0.30 - 0.60	1.10 - 1.60	1.30 - 1.50
Reporting Date: 17/06/2015	QTSE Sample No	152536	152541	152542	152543

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	10.80	< 0.01	1.46	< 0.01	
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	38.90	< 0.05	14.60	< 0.05	
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	20	< 2	7	< 2	
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	7	< 2	< 2	< 2	
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	16	< 10	< 10	< 10	
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	93	< 21	23	< 21	
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	14	< 2	5	< 2	
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	10	< 2	2	< 2	
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	
Aromatic (C5 - C35)	mg/kg	< 21	NONE	24	< 21	< 21	< 21	
Total >C5 - C35	mg/kg	< 42	NONE	118	< 42	< 42	< 42	

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C



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Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 15-32326	Date Sampled	10/06/15	10/06/15	10/06/15	10/06/15	
Peak Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: SCT	TP / BH No	JM-SCT-24-22B	JM-SCT-24-27A	JM-SCT-24-27B	JM-SCT-24-28	
Project / Job Ref: 15/657	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: 15/1152	Depth (m)	2.00 - 2.70	0.30 - 0.60	1.10 - 1.60	1.30 - 1.50	
Reporting Date: 17/06/2015	QTSE Sample No	152536	152541	152542	152543	

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	
Ethylbenzene	ug/kg	< 2	MCERTS	351	< 2	85	< 2	
p & m-xylene	ug/kg	< 2	MCERTS	2507	< 2	690	< 2	
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C



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Soil Analysis Certificate - Volatile Organic Compounds (VOC)

QTS Environmental Report No: 15-32326	Date Sampled	10/06/15	10/06/15	10/06/15	10/06/15
Peak Associates Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: SCT	TP / BH No	JM-SCT-24-23	JM-SCT-24-24	JM-SCT-24-25	JM-SCT-24-26
Project / Job Ref: 15/657	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 15/1152	Depth (m)	0.10 - 0.50	GL - 0.80	0.40 - 0.70	0.20 - 0.70
Reporting Date: 17/06/2015	QTSE Sample No	152537	152538	152539	152540

Determinand	Unit	RL	Accreditation					
Dichlorodifluoromethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Vinyl Chloride	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Chloromethane	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Chloroethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Bromomethane	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Trichlorofluoromethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
trans-1,2-Dichloroethene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
cis-1,2-Dichloroethene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
2,2-Dichloropropane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Chloroform	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Bromochloromethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,1,1-Trichloroethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,1-Dichloropropene	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Carbon Tetrachloride	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,2-Dichloroethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
1,2-Dichloropropane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Trichloroethene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Bromodichloromethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Dibromomethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
TAME	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
cis-1,3-Dichloropropene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
trans-1,3-Dichloropropene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
1,3-Dichloropropane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Tetrachloroethene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Dibromochloromethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,2-Dibromoethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Chlorobenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,1,1,2-Tetrachloroethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethyl Benzene	ug/kg	< 2	MCERTS	54	< 2	13	< 2	< 2
m,p-Xylene	ug/kg	< 2	MCERTS	53	< 2	74	< 2	< 2
o-Xylene	ug/kg	< 2	MCERTS	< 2	< 2	8	< 2	< 2
Styrene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Bromoform	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Isopropylbenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,1,2,2-Tetrachloroethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,2,3-Trichloropropane	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
n-Propylbenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Bromobenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
2-Chlorotoluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,3,5-Trimethylbenzene	ug/kg	< 5	MCERTS	92	< 5	< 5	< 5	< 5
4-Chlorotoluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
tert-Butylbenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,2,4-Trimethylbenzene	ug/kg	< 5	MCERTS	429	< 5	< 5	< 5	< 5
sec-Butylbenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
p-Isopropyltoluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,3-Dichlorobenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,4-Dichlorobenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
n-Butylbenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,2-Dichlorobenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
1,2-Dibromo-3-chloropropane	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Hexachlorobutadiene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C



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Maidstone
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Tel : 01622 850410

Soil Analysis Certificate - Volatile Organic Compounds TIC (VOC)		
QTS Environmental Report No: 15-32326	Date Sampled	10/06/15
Peak Associates Ltd	Time Sampled	None Supplied
Site Reference: SCT	TP / BH No	JM-SCT-24-23
Project / Job Ref: 15/657	Additional Refs	None Supplied
Order No: 15/1152	Depth (m)	0.10 - 0.50
Reporting Date: 17/06/2015	QTSE Sample No	152537

Compound No	Compound Name	% Match	Units	RL	Estimated Concentration
1	Benzene, 1-ethyl-3-methyl-	90	µg/kg	< 10	< 10
2	Naphthalene,1-methyl-	96	µg/kg	< 10	26
3	Naphthalene,2-methyl-	95	µg/kg	< 10	29
4	N/a	N/a	µg/kg	< 10	< 10
5	N/a	N/a	µg/kg	< 10	< 10

There were no / other compounds identified with a match of >90%



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Soil Analysis Certificate - Volatile Organic Compounds TIC (VOC)		
QTS Environmental Report No: 15-32326	Date Sampled	10/06/15
Peak Associates Ltd	Time Sampled	None Supplied
Site Reference: SCT	TP / BH No	JM-SCT-24-24
Project / Job Ref: 15/657	Additional Refs	None Supplied
Order No: 15/1152	Depth (m)	GL - 0.80
Reporting Date: 17/06/2015	QTSE Sample No	152538

Compound No	Compound Name	% Match	Units	RL	Estimated Concentration
1	N/a	N/a	µg/kg	< 10	< 10
2	N/a	N/a	µg/kg	< 10	< 10
3	N/a	N/a	µg/kg	< 10	< 10
4	N/a	N/a	µg/kg	< 10	< 10
5	N/a	N/a	µg/kg	< 10	< 10

There were no / other compounds identified with a match of >90%



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Soil Analysis Certificate - Volatile Organic Compounds TIC (VOC)		
QTS Environmental Report No: 15-32326	Date Sampled	10/06/15
Peak Associates Ltd	Time Sampled	None Supplied
Site Reference: SCT	TP / BH No	JM-SCT-24-25
Project / Job Ref: 15/657	Additional Refs	None Supplied
Order No: 15/1152	Depth (m)	0.40 - 0.70
Reporting Date: 17/06/2015	QTSE Sample No	152539

Compound No	Compound Name	% Match	Units	RL	Estimated Concentration
1	N/a	N/a	µg/kg	< 10	< 10
2	N/a	N/a	µg/kg	< 10	< 10
3	N/a	N/a	µg/kg	< 10	< 10
4	N/a	N/a	µg/kg	< 10	< 10
5	N/a	N/a	µg/kg	< 10	< 10

There were no / other compounds identified with a match of >90%



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Soil Analysis Certificate - Volatile Organic Compounds TIC (VOC)		
QTS Environmental Report No: 15-32326	Date Sampled	10/06/15
Peak Associates Ltd	Time Sampled	None Supplied
Site Reference: SCT	TP / BH No	JM-SCT-24-26
Project / Job Ref: 15/657	Additional Refs	None Supplied
Order No: 15/1152	Depth (m)	0.20 - 0.70
Reporting Date: 17/06/2015	QTSE Sample No	152540

Compound No	Compound Name	% Match	Units	RL	Estimated Concentration
1	N/a	N/a	µg/kg	< 10	< 10
2	N/a	N/a	µg/kg	< 10	< 10
3	N/a	N/a	µg/kg	< 10	< 10
4	N/a	N/a	µg/kg	< 10	< 10
5	N/a	N/a	µg/kg	< 10	< 10

There were no / other compounds identified with a match of >90%



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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 15-32326	
Peak Associates Ltd	
Site Reference: SCT	
Project / Job Ref: 15/657	
Order No: 15/1152	
Reporting Date: 17/06/2015	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
& 152534	JM-SCT-24-21	None Supplied	1.00 - 3.00	16.2	Brown clayey sand with stones
& 152535	JM-SCT-24-22A	None Supplied	0.10 - 0.80	21.1	Black sand with stones
& 152536	JM-SCT-24-22B	None Supplied	2.00 - 2.70	22.9	Brown clay
& 152537	JM-SCT-24-23	None Supplied	0.10 - 0.50	6.7	Black gravelly sand with stones
& 152538	JM-SCT-24-24	None Supplied	GL - 0.80	14	Brown sandy clay with vegetation
& 152539	JM-SCT-24-25	None Supplied	0.40 - 0.70	16.5	Black gravelly sand with stones
& 152540	JM-SCT-24-26	None Supplied	0.20 - 0.70	17.8	Brown sandy clay
& 152541	JM-SCT-24-27A	None Supplied	0.30 - 0.60	14	Brown gravelly sand with stones
& 152542	JM-SCT-24-27B	None Supplied	1.10 - 1.60	12.3	Brown clay
& 152543	JM-SCT-24-28	None Supplied	1.30 - 1.50	13.7	Brown clayey sand with vegetation

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

& samples received in inappropriate containers for hydrocarbon analysis



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Soil Analysis Certificate - Methodology & Miscellaneous Information	
QTS Environmental Report No: 15-32326	
Peak Associates Ltd	
Site Reference: SCT	
Project / Job Ref: 15/657	
Order No: 15/1152	
Reporting Date: 17/06/2015	

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



Peak Associates
38 Padgate Lane
Warrington
Cheshire
WA1 3RU

Attention: Jo Matthew

CERTIFICATE OF ANALYSIS

Date: 01 July 2015
Customer: H_PEAK_WAR
Sample Delivery Group (SDG): 150625-29
Your Reference: 15/657
Location: SCT
Report No: 319429

We received 2 samples on Thursday June 25, 2015 and 2 of these samples were scheduled for analysis which was completed on Wednesday July 01, 2015. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

SDG:	150625-29	Location:	SCT	Order Number:	15/1154
Job:	H_PEAK_WAR-123	Customer:	Peak Associates	Report Number:	319429
Client Reference:	15/657	Attention:	Jo Matthew	Superseded Report:	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
11598794	JM-SCT-26-22			24/06/2015
11598795	JM-SCT-26-27			24/06/2015

Only received samples which have had analysis scheduled will be shown on the following pages.

Order Number: 15/1154
Report Number: 319429
Superseded Report:

No Determination Possible

Container

Dissolved Metals P
1lplastic (ALE221)
1000ml glass bottle
Dissolved Metals P
1lplastic (ALE221)
1000ml glass bottle

Page 3 of 24

Order Number: 15/1154
Report Number: 319429
Superseded Report:

Page 4 of 24



CERTIFICATE OF ANALYSIS

SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

PAH Spec MS - Aqueous (W)

Results Legend			Customer Sample R	JM-SCT-26-22	JM-SCT-26-27			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		Water(GW/SW) 24/06/2015 25/06/2015 150625-29 11598794	Water(GW/SW) 24/06/2015 25/06/2015 150625-29 11598795			
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units		Method					
Naphthalene (aq)	<0.1 µg/l	TM178	<1	<2				
Acenaphthene (aq)	<0.015 µg/l	TM178	<0.15	<0.3				
Acenaphthylene (aq)	<0.011 µg/l	TM178	<0.11	<0.22				
Fluoranthene (aq)	<0.017 µg/l	TM178	3.64	3.29				
Anthracene (aq)	<0.015 µg/l	TM178	0.406	0.312				
Phenanthrene (aq)	<0.022 µg/l	TM178	1.03	0.794				
Fluorene (aq)	<0.014 µg/l	TM178	0.168	<0.28				
Chrysene (aq)	<0.013 µg/l	TM178	1.88	2.32				
Pyrene (aq)	<0.015 µg/l	TM178	4.9	4.65				
Benzo(a)anthracene (aq)	<0.017 µg/l	TM178	1.56	1.74				
Benzo(b)fluoranthene (aq)	<0.023 µg/l	TM178	4.74	8.49				
Benzo(k)fluoranthene (aq)	<0.027 µg/l	TM178	1.9	3.52				
Benzo(a)pyrene (aq)	<0.009 µg/l	TM178	3.36	5.92				
Dibenzo(a,h)anthracene (aq)	<0.016 µg/l	TM178	0.68	1.31				
Benzo(g,h,i)perylene (aq)	<0.016 µg/l	TM178	3.81	7.93				
Indeno(1,2,3-cd)pyrene (aq)	<0.014 µg/l	TM178	1.63	5.42				
PAH, Total Detected USEPA 16 (aq)	<0.344 µg/l	TM178	29.9	45.7				



CERTIFICATE OF ANALYSIS

SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

TPH CWG (W)

Results Legend			Customer Sample R		JM-SCT-26-22		JM-SCT-26-27					
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference			Water(GW/SW)		Water(GW/SW)					
M	mCERTS accredited.				24/06/2015		24/06/2015					
aq	Aqueous / settled sample.											
diss.filt	Dissolved / filtered sample.											
tot.unfilt	Total / unfiltered sample.											
*	Subcontracted test.											
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery				25/06/2015 150625-29 11598794		25/06/2015 150625-29 11598795					
(F)	Trigger breach confirmed											
1-5&#pound;	Sample deviation (see appendix)											
Component	LOD/Units	Method										
GRO Surrogate % recovery**	%	TM245	79	1	73	1						
GRO >C5-C12	<50 µg/l	TM245	919	1 #	379	1 #						
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245	<3	1 #	<3	1 #						
Benzene	<7 µg/l	TM245	<7	1 #	<7	1 #						
Toluene	<4 µg/l	TM245	<4	1 #	<4	1 #						
Ethylbenzene	<5 µg/l	TM245	<5	1 #	<5	1 #						
m,p-Xylene	<8 µg/l	TM245	<8	1 #	20	1 #						
o-Xylene	<3 µg/l	TM245	<3	1 #	<3	1 #						
Sum of detected Xylenes	<11 µg/l	TM245	<11	1	20	1						
Sum of detected BTEX	<28 µg/l	TM245	<28	1	<28	1						
Aliphatics >C5-C6	<10 µg/l	TM245	17	1	<10	1						
Aliphatics >C6-C8	<10 µg/l	TM245	163	1	38	1						
Aliphatics >C8-C10	<10 µg/l	TM245	190	1	43	1						
Aliphatics >C10-C12	<10 µg/l	TM245	253	1	143	1						
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174	595		799							
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	1010		258							
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	1840		1270							
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	3450		2330							
Aromatics >EC5-EC7	<10 µg/l	TM245	<10	1	<10	1						
Aromatics >EC7-EC8	<10 µg/l	TM245	<10	1	<10	1						
Aromatics >EC8-EC10	<10 µg/l	TM245	127	1	50	1						
Aromatics >EC10-EC12	<10 µg/l	TM245	168	1	96	1						
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174	119		83							
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	378		245							
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	998		1730							
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	1500		2060							
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	5860		4770							



CERTIFICATE OF ANALYSIS

SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

VOC MS (W)

Results Legend		Customer Sample R Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	JM-SCT-26-22		JM-SCT-26-27				
#	ISO17025 accredited.		Water(GW/SW)		Water(GW/SW)				
M	mCERTS accredited.		24/06/2015		24/06/2015				
aq	Aqueous / settled sample.		25/06/2015		25/06/2015				
diss.filt	Dissolved / filtered sample.		150625-29		150625-29				
tot.unfilt	Total / unfiltered sample.		11598794		11598795				
*	Subcontracted test.								
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery								
(F)	Trigger breach confirmed								
1-5&#pound;@	Sample deviation (see appendix)								
Component	LOD/Units	Method							
Dibromofluoromethane**	%	TM208	110	1	111	1			
Toluene-d8**	%	TM208	97.8	1	95.9	1			
4-Bromofluorobenzene**	%	TM208	90.7	1	89.2	1			
Dichlorodifluoromethane	<1 µg/l	TM208	<1	1	<1	1			
Chloromethane	<1 µg/l	TM208	<1	1 #	<1	1 #			
Vinyl chloride	<1 µg/l	TM208	<1	1 #	<1	1 #			
Bromomethane	<1 µg/l	TM208	<1	1 #	<1	1 #			
Chloroethane	<1 µg/l	TM208	<1	1 #	<1	1 #			
Trichlorofluoromethane	<1 µg/l	TM208	<1	1 #	<1	1 #			
1,1-Dichloroethene	<1 µg/l	TM208	<1	1 #	<1	1 #			
Carbon disulphide	<1 µg/l	TM208	<1	1 #	<1	1 #			
Dichloromethane	<3 µg/l	TM208	<3	1 #	<3	1 #			
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1	1 #	<1	1 #			
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1	1 #	<1	1 #			
1,1-Dichloroethane	<1 µg/l	TM208	<1	1 #	<1	1 #			
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1	1 #	<1	1 #			
2,2-Dichloropropane	<1 µg/l	TM208	<1	1	<1	1			
Bromochloromethane	<1 µg/l	TM208	<1	1 #	<1	1 #			
Chloroform	<1 µg/l	TM208	<1	1 #	<1	1 #			
1,1,1-Trichloroethane	<1 µg/l	TM208	<1	1 #	<1	1 #			
1,1-Dichloropropene	<1 µg/l	TM208	<1	1 #	<1	1 #			
Carbontetrachloride	<1 µg/l	TM208	<1	1 #	<1	1 #			
1,2-Dichloroethane	<1 µg/l	TM208	<1	1	<1	1			
Benzene	<1 µg/l	TM208	<1	1 #	<1	1 #			
Trichloroethene	<1 µg/l	TM208	<1	1 #	<1	1 #			
1,2-Dichloropropane	<1 µg/l	TM208	<1	1 #	<1	1 #			
Dibromomethane	<1 µg/l	TM208	<1	1 #	<1	1 #			
Bromodichloromethane	<1 µg/l	TM208	<1	1 #	<1	1 #			
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1	1 #	<1	1 #			
Toluene	<1 µg/l	TM208	<1	1 #	<1	1 #			
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1	1 #	<1	1 #			
1,1,2-Trichloroethane	<1 µg/l	TM208	<1	1 #	1.68	1 #			



CERTIFICATE OF ANALYSIS

SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

VOC MS (W)

Results Legend		Customer Sample R	JM-SCT-26-22	JM-SCT-26-27				
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Water(GW/SW) 24/06/2015 25/06/2015 150625-29 11598794	Water(GW/SW) 24/06/2015 25/06/2015 150625-29 11598795			
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
1,3-Dichloropropane	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
Tetrachloroethene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
Dibromochloromethane	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
1,2-Dibromoethane	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
Chlorobenzene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
Ethylbenzene	<1 µg/l	TM208	<1	1.64				
			1 #	1 #				
m,p-Xylene	<1 µg/l	TM208	<1	20.3				
			1 #	1 #				
o-Xylene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
Styrene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
Bromoform	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
Isopropylbenzene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
1,1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1	<1				
			1	1				
1,2,3-Trichloropropane	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
Bromobenzene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
Propylbenzene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
2-Chlorotoluene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
1,3,5-Trimethylbenzene	<1 µg/l	TM208	2.16	2.56				
			1 #	1 #				
4-Chlorotoluene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
tert-Butylbenzene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1	6.74				
			1 #	1 #				
sec-Butylbenzene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
4-iso-Propyltoluene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
1,3-Dichlorobenzene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
1,4-Dichlorobenzene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
n-Butylbenzene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
1,2-Dichlorobenzene	<1 µg/l	TM208	<1	<1				
			1	1				
1,2-Dibromo-3-chloroprop ane	<1 µg/l	TM208	<1	<1				
			1	1				
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
Hexachlorobutadiene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1	<1				
			1 #	1 #				
Naphthalene	<1 µg/l	TM208	<1	<1				
			1 #	1 #				

SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

VOC MS (W)

[illegible]



SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
TM061	Method for the Determination of EPH, Massachusetts Dept. of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM101	Method 4500B & C, AWWA/APHA, 20th Ed., 1999	Determination of Sulphide in soil and water samples using the Kone Analyser		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID		
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters		
TM245	By GC-FID	Determination of GRO by Headspace in waters		
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter		
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC		

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.



SDG:	150625-29	Location:	SCT	Order Number:	15/1154
Job:	H_PEAK_WAR-123	Customer:	Peak Associates	Report Number:	319429
Client Reference:	15/657	Attention:	Jo Matthew	Superseded Report:	

Test Completion Dates

Lab Sample No(s)	11598794	11598795
Customer Sample Ref.	JM-SCT-26-22	JM-SCT-26-27
AGS Ref.		
Depth		
Type	LIQUID	LIQUID
Anions by Kone (w)	30-Jun-2015	30-Jun-2015
Dissolved Metals by ICP-MS	30-Jun-2015	30-Jun-2015
EPH CWG (Aliphatic) Aqueous GC (W)	01-Jul-2015	01-Jul-2015
EPH CWG (Aromatic) Aqueous GC (W)	01-Jul-2015	01-Jul-2015
GRO by GC-FID (W)	29-Jun-2015	29-Jun-2015
Mercury Dissolved	29-Jun-2015	29-Jun-2015
PAH Spec MS - Aqueous (W)	01-Jul-2015	01-Jul-2015
pH Value	01-Jul-2015	01-Jul-2015
Phenols by HPLC (W)	01-Jul-2015	01-Jul-2015
Sulphide	01-Jul-2015	01-Jul-2015
TPH CWG (W)	01-Jul-2015	01-Jul-2015
VOC MS (W)	27-Jun-2015	27-Jun-2015



SDG:	150625-29	Location:	SCT	Order Number:	15/1154
Job:	H_PEAK_WAR-123	Customer:	Peak Associates	Report Number:	319429
Client Reference:	15/657	Attention:	Jo Matthew	Superseded Report:	

ASSOCIATED AQC DATA

Anions by Kone (w)

Component	Method Code	QC 1173
Chloride	TM184	99.0 94.64 : 106.82
Phosphate (Ortho as PO4)	TM184	96.40 : 108.40
Sulphate (soluble)	TM184	101.6 96.47 : 104.74
TON as NO3	TM184	93.05 : 112.12

Dissolved Metals by ICP-MS

Component	Method Code	QC 1182
Aluminium	TM152	107.07 88.58 : 117.87
Antimony	TM152	79.47 68.28 : 121.27
Arsenic	TM152	98.67 89.45 : 113.51
Barium	TM152	100.53 90.47 : 113.85
Beryllium	TM152	102.0 84.68 : 120.26
Boron	TM152	104.4 82.95 : 121.47
Cadmium	TM152	98.93 90.40 : 113.29
Chromium	TM152	97.47 90.01 : 114.05
Cobalt	TM152	101.2 87.14 : 117.85
Copper	TM152	99.07 88.43 : 114.27
Lead	TM152	99.73 89.53 : 109.90
Lithium	TM152	103.47 84.32 : 123.11
Manganese	TM152	98.4 91.43 : 113.17
Molybdenum	TM152	99.33 80.73 : 113.85
Nickel	TM152	99.33 87.68 : 113.94
Phosphorus	TM152	100.93 86.68 : 118.34
Selenium	TM152	100.13 91.03 : 113.34
Strontium	TM152	102.93 90.44 : 114.09
Tellurium	TM152	101.73 80.93 : 116.91
Thallium	TM152	99.07 90.27 : 111.31



SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

Dissolved Metals by ICP-MS

		QC 1182
Tin	TM152	90.13 83.07 : 112.37
Titanium	TM152	101.07 92.65 : 111.58
Uranium	TM152	96.13 88.60 : 110.35
Vanadium	TM152	101.07 88.43 : 116.60
Zinc	TM152	100.0 89.84 : 113.06

EPH CWG (Aliphatic) Aqueous GC (W)

Component	Method Code	QC 1187
Total Aliphatics >C12-C35	TM174	97.5 66.67 : 110.42

EPH CWG (Aromatic) Aqueous GC (W)

Component	Method Code	QC 1188
Total Aromatics >EC12-EC35	TM174	100.67 63.00 : 121.00

GRO by GC-FID (W)

Component	Method Code	QC 1176
Benzene by GC	TM245	100.5 77.50 : 122.50
Ethylbenzene by GC	TM245	100.5 77.50 : 122.50
m & p Xylene by GC	TM245	101.0 77.50 : 122.50
MTBE GC-FID	TM245	99.5 77.50 : 122.50
o Xylene by GC	TM245	102.0 77.50 : 122.50
QC	TM245	106.15 74.88 : 125.54
Toluene by GC	TM245	101.5 77.50 : 122.50

Mercury Dissolved



SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

Mercury Dissolved

Component	Method Code	QC 1126
Mercury Dissolved (CVAf)	TM183	101.0 73.51 : 120.83

PAH Spec MS - Aqueous (W)

Component	Method Code	QC 1176
Acenaphthene by GCMS	TM178	100.0 92.89 : 110.56
Acenaphthylene by GCMS	TM178	91.5 83.00 : 113.00
Anthracene by GCMS	TM178	94.0 91.25 : 113.75
Benz(a)anthracene by GCMS	TM178	93.0 81.40 : 124.90
Benzo(a)pyrene by GCMS	TM178	97.5 83.95 : 128.95
Benzo(b)fluoranthene by GCMS	TM178	102.0 87.50 : 132.50
Benzo(ghi)perylene by GCMS	TM178	86.5 82.05 : 112.05
Benzo(k)fluoranthene by GCMS	TM178	102.5 86.45 : 131.45
Chrysene by GCMS	TM178	100.5 85.00 : 124.00
Dibenzo(ah)anthracene by GCMS	TM178	86.5 82.81 : 122.26
Fluoranthene by GCMS	TM178	97.5 90.00 : 120.00
Fluorene by GCMS	TM178	98.5 86.85 : 116.85
Indeno(123cd)pyrene by GCMS	TM178	99.0 90.97 : 118.18
Naphthalene by GCMS	TM178	98.0 89.55 : 113.25
Phenanthrene by GCMS	TM178	97.0 86.30 : 116.30
Pyrene by GCMS	TM178	95.5 91.25 : 113.75

pH Value

Component	Method Code	QC 1133	QC 1155
pH	TM256	101.48 98.25 : 103.10	101.35 99.20 : 102.85

Phenols by HPLC (W)



SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

Phenols by HPLC (W)

Component	Method Code	QC 1109
2,3,5 Trimethyl-Phenol by HPLC (W)	TM259	101.0 78.51 : 104.18
2-Isopropyl Phenol by HPLC (W)	TM259	105.0 84.55 : 110.90
Cresols by HPLC (W)	TM259	99.67 88.26 : 108.20
Napthol by HPLC (W)	TM259	86.0 89.63 : 104.79
Phenol by HPLC (W)	TM259	108.0 70.80 : 95.54
Xylenols by HPLC (W)	TM259	97.17 94.74 : 115.71

Sulphide

Component	Method Code	QC 1160
Sulphide	TM101	98.67 89.29 : 110.21

VOC MS (W)

Component	Method Code	QC 1179
1,1,1,2-Tetrachloroethane	TM208	106.5 77.50 : 122.50
1,1,1-Trichloroethane	TM208	102.0 77.50 : 122.50
1,1-Dichloroethane	TM208	101.5 77.50 : 122.50
1,2-Dichloroethane	TM208	108.5 77.50 : 122.50
2-Chlorotoluene	TM208	102.5 77.50 : 122.50
4-Chlorotoluene	TM208	102.5 77.50 : 122.50
Benzene	TM208	105.5 77.50 : 122.50
Bromomethane	TM208	116.5 75.87 : 132.10
Carbontetrachloride	TM208	104.0 77.50 : 122.50
Chlorobenzene	TM208	103.0 77.50 : 122.50
Chloroform	TM208	104.0 77.50 : 122.50
Chloromethane	TM208	108.5 77.12 : 138.43
Cis-1,2-Dichloroethene	TM208	101.0 77.50 : 122.50
Dichloromethane	TM208	101.0 77.50 : 122.50



SDG:	150625-29	Location:	SCT	Order Number:	15/1154
Job:	H_PEAK_WAR-123	Customer:	Peak Associates	Report Number:	319429
Client Reference:	15/657	Attention:	Jo Matthew	Superseded Report:	

VOC MS (W)

		QC 1179
Ethylbenzene	TM208	100.0 78.88 : 104.73
Hexachlorobutadiene	TM208	95.5 72.12 : 118.38
o-Xylene	TM208	101.0 82.27 : 108.61
p/m-Xylene	TM208	100.5 74.83 : 118.29
Tert-butyl methyl ether	TM208	94.5 68.24 : 122.50
Tetrachloroethene	TM208	104.0 77.50 : 122.50
Toluene	TM208	103.5 77.50 : 122.50
Trichloroethene	TM208	104.5 77.50 : 122.50
Vinyl Chloride	TM208	101.5 64.36 : 126.94

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.

The figure detailed is the percentage recovery result for the AQC.

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.



SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

Chromatogram

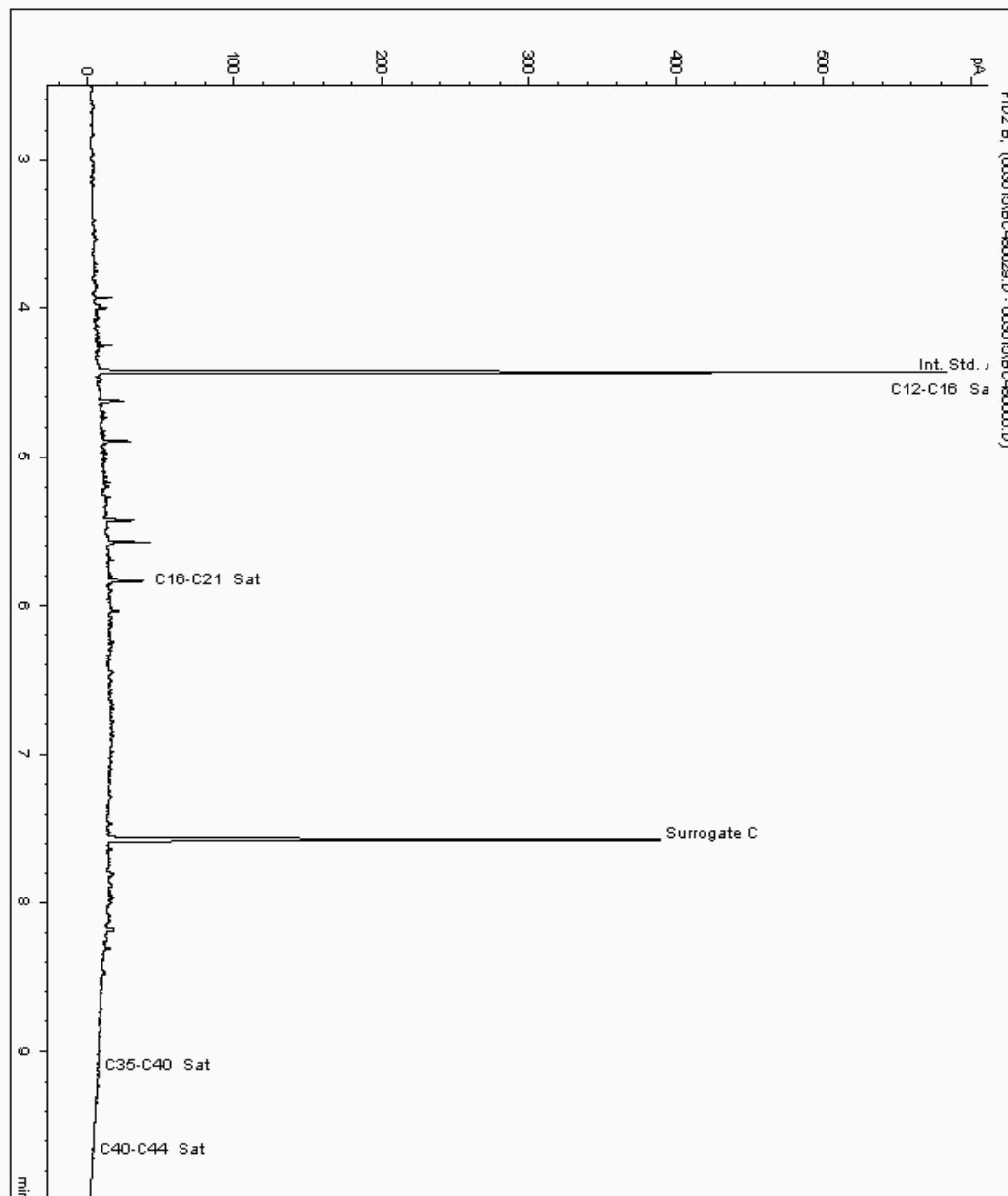
Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

Sample No : 11605891
Sample ID : JM-SCT-26-22

Depth :

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 11019208-
Date Acquired : 01/07/2015 00:50:58 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.008





CERTIFICATE OF ANALYSIS

SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

Chromatogram

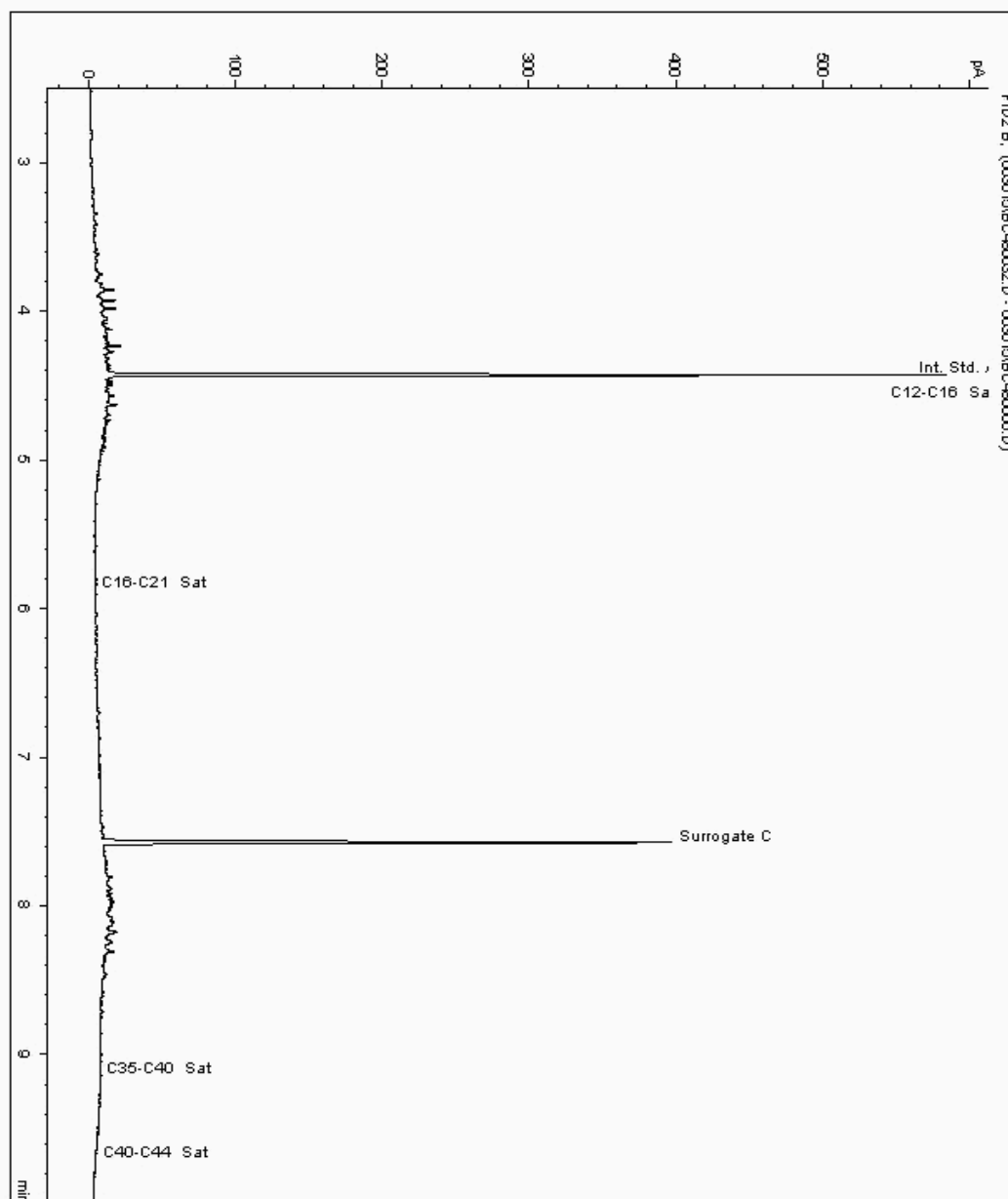
Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

Sample No : 11605918
Sample ID : JM-SCT-26-27

Depth :

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 11019221-
Date Acquired : 01/07/2015 01:28:39 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.008





CERTIFICATE OF ANALYSIS

SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

Chromatogram

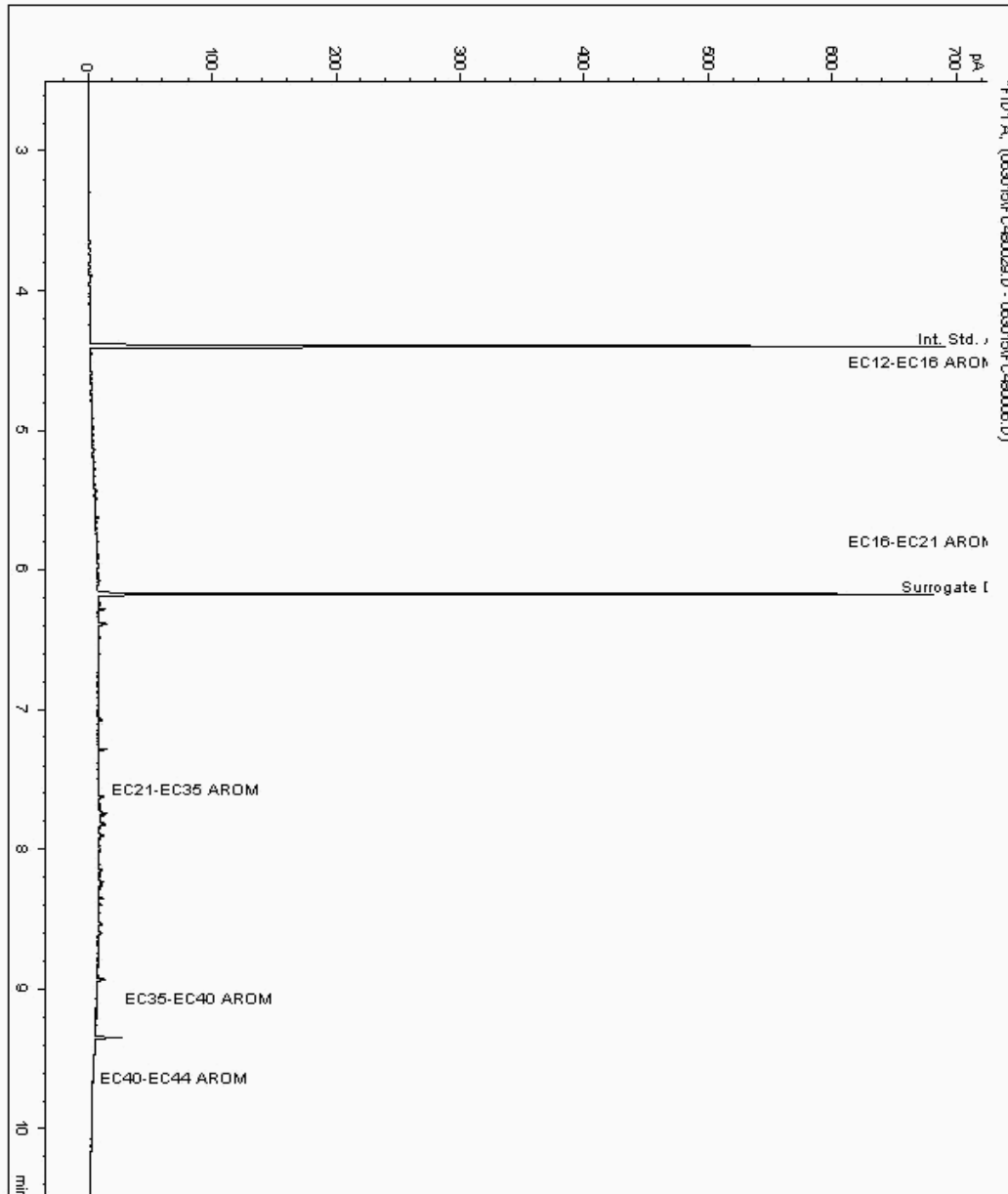
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 11605891
Sample ID : JM-SCT-26-22

Depth :

Alcontrol/Geochem Analytical Services
Speciated TPH - AROM (C12 - C40)

Sample Identity: 11019209-
Date Acquired : 01/07/2015 00:50:58 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.008





CERTIFICATE OF ANALYSIS

SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

Chromatogram

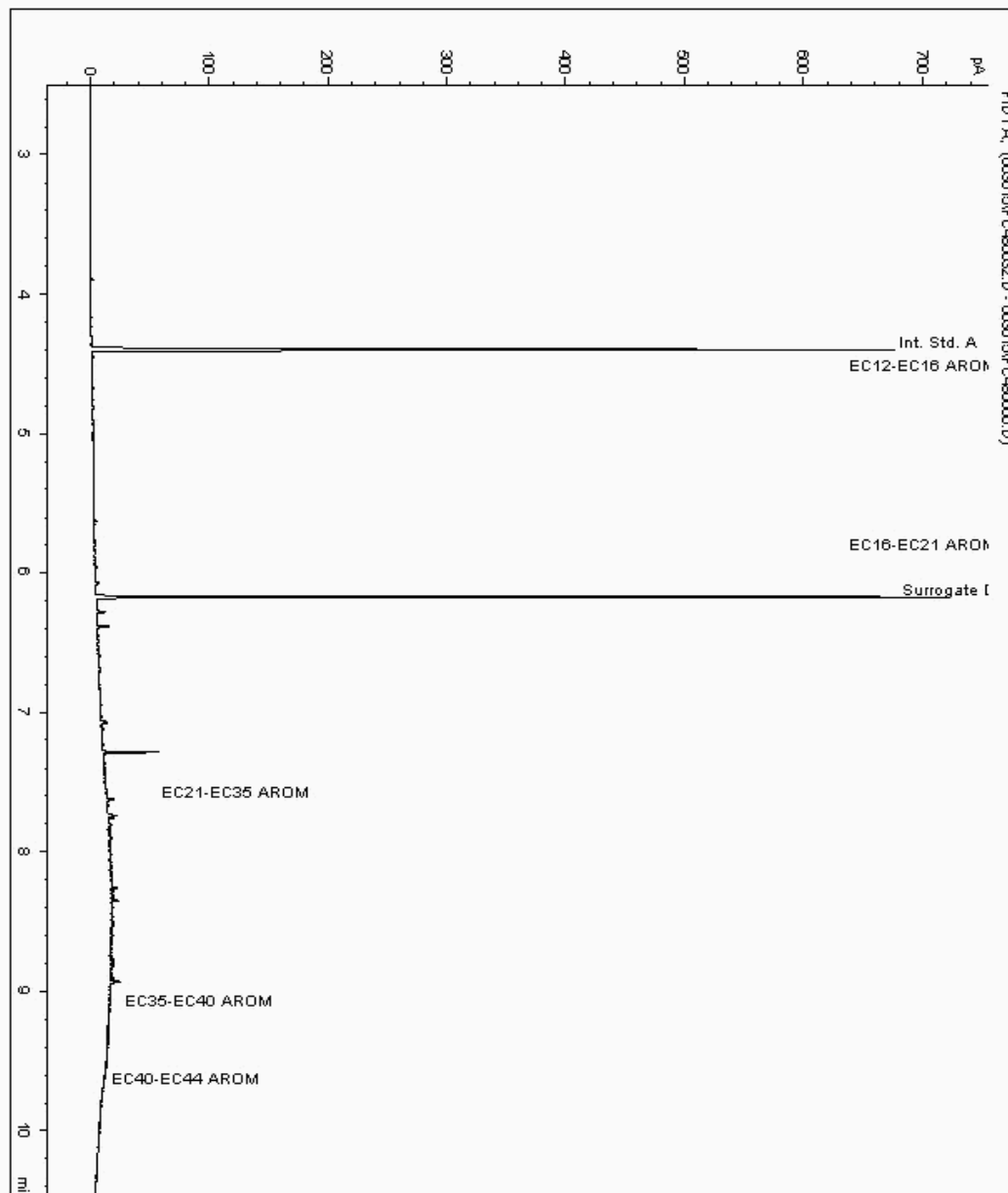
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 11605918
Sample ID : JM-SCT-26-27

Depth :

Alcontrol/Geochem Analytical Services
Speciated TPH - AROM (C12 - C40)

Sample Identity: 11019222-
Date Acquired : 01/07/2015 01:28:38 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.008





SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

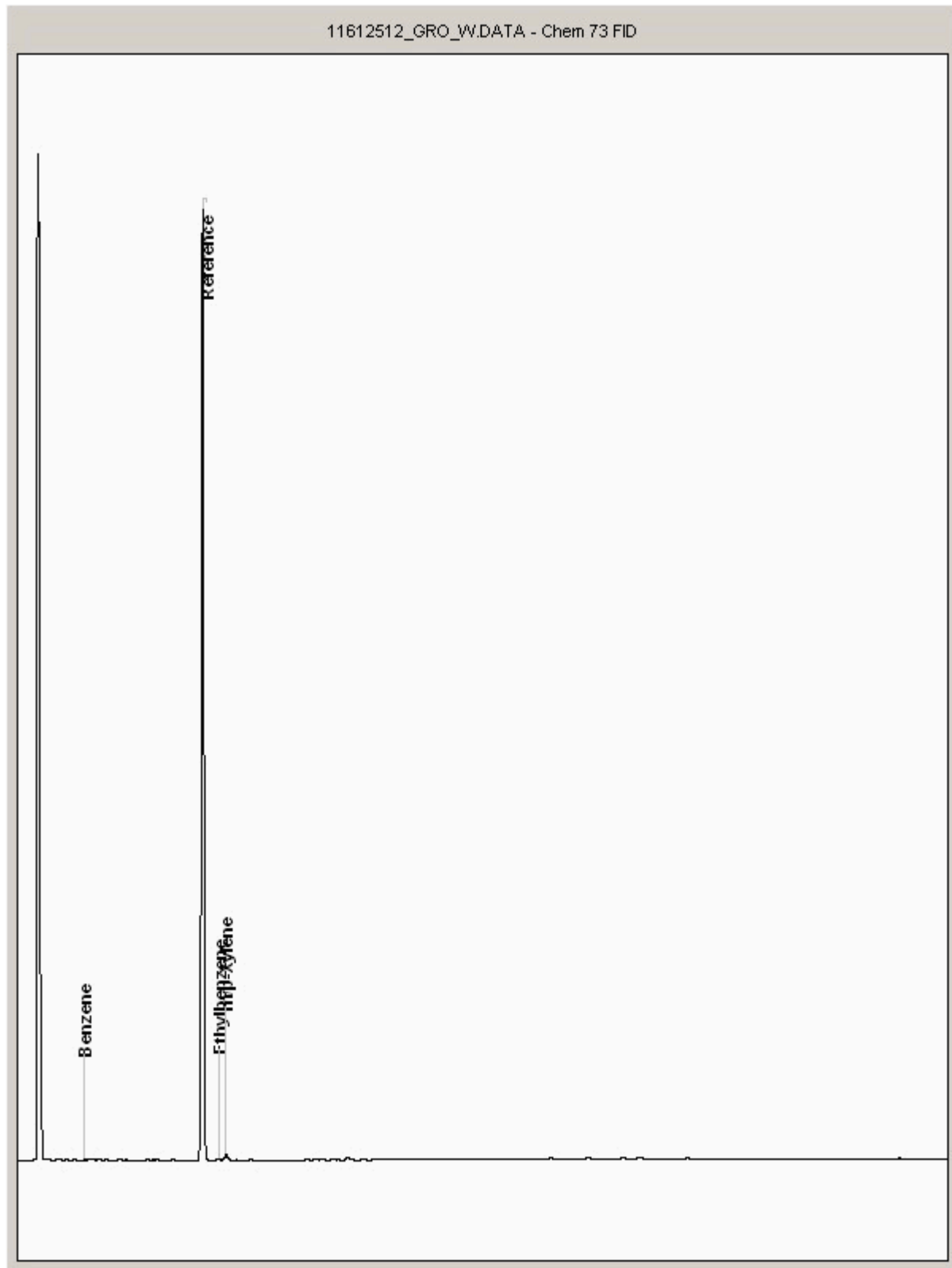
Order Number: 15/1154
Report Number: 319429
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 11612512
Sample ID : JM-SCT-26-27

Depth :





CERTIFICATE OF ANALYSIS

SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

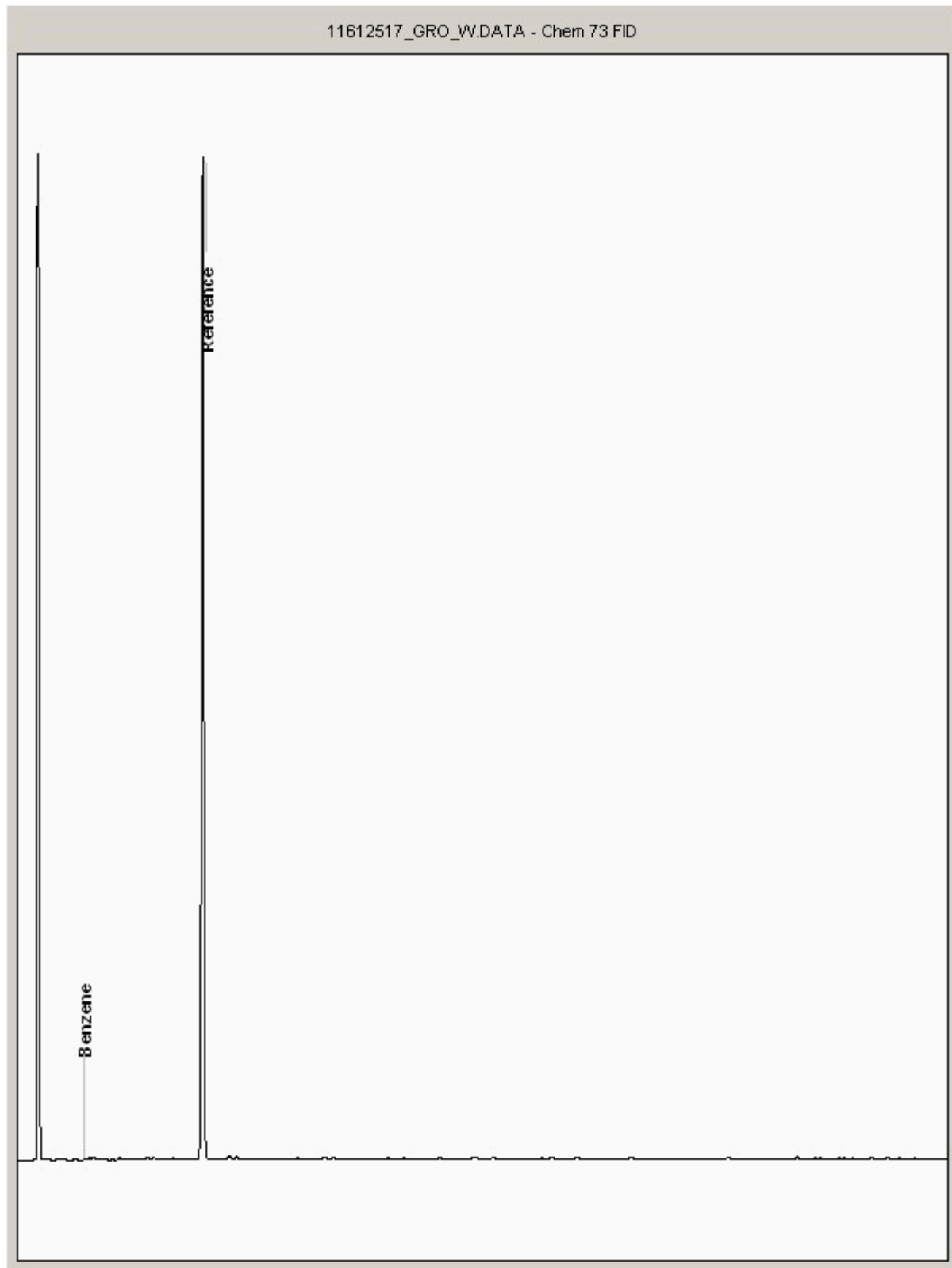
Order Number: 15/1154
Report Number: 319429
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 11612517
Sample ID : JM-SCT-26-22

Depth :





SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA Leach tests, flash point, ammonium as NH₄ by the BRE method, VOC TICS, SVOC TICS, TOF-MS SCAN/SEARCH and TOF-MS TICS.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for both soil jars, tubs and volatile jars. All waters and vials will be discarded 10 days after the analysis is completed (e-mailed). All material removed during an asbestos containing material screen and analysed for the presence of asbestos will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be screened in house for the presence of large asbestos containing material fragments/pieces. If no asbestos containing material is found this will be reported as 'no asbestos containing material detected'. If asbestos containing material is detected it will be removed and analysed by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If asbestos containing material is present no further analysis will be undertaken. At no point is the fibre content of the soil sample determined.

7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample -similarly, if a headspace or sediment is present in the volatile sample. This will be flagged up as an invalid VOC on the test schedule or recorded on the log sheet.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP -No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals -total metals must be requested separately.

11. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.

12. Results relate only to the items tested

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

14. **Product analyses** -Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 14).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. Our MCERTS accreditation for PAHs by GCMS applies to all product types apart from Kerosene, where naphthalene only is not accredited.

19. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

20. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

23. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials -whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

24. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C₄-C₁₀ range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

SOLID MATRICES EXTRACTION SUMMARY

ANALYSIS	D/C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
SOLVENT EXTRACTABLE MATTER	D&C	DOM	SOX THERM	GRAMMETRIC
CYCLOHEXANE EXT. MATTER	D&C	CYCLOHEXANE	SOX THERM	GRAMMETRIC
THIN LAYER CHROMATOGRAPHY	D&C	DOM	SOX THERM	ATROSCAN
ELEMENTAL SULPHUR	D&C	DOM	SOX THERM	HPLC
PHENOLSBY GCMS	WET	DOM	SOX THERM	GCMS
HERBICIDES	D&C	HBXANEACETONE	SOX THERM	GCMS
PESTICIDES	D&C	HBXANEACETONE	SOX THERM	GCMS
EPH (DRO)	D&C	HBXANEACETONE	END OVEREND	GCFID
EPH (MINOIL)	D&C	HBXANEACETONE	END OVEREND	GCFID
EPH (CLEANED UP)	D&C	HBXANEACETONE	END OVEREND	GCFID
EPH CWG BY GC	D&C	HBXANEACETONE	END OVEREND	GCFID
PCB TOT / PCB CON	D&C	HBXANEACETONE	END OVEREND	GCMS
POLYAROMATIC HYDROCARBONS (MS)	WET	HBXANEACETONE	MICROWAVE TM218.	GCMS
C8-C40 (C8-C40) EZ FLASH	WET	HBXANEACETONE	SHAKER	GCEZ
POLYAROMATIC HYDROCARBONS RAPID GC	WET	HBXANEACETONE	SHAKER	GCEZ
SEM VOLATILE ORGANIC COMPOUNDS	WET	DOMACETONE	SONICATE	GCMS

LIQUID MATRICES EXTRACTION SUMMARY

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAHMS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GCMS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GCFID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GCFID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GCFID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GCMS
PCB TOTAL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GCMS
SVOC	DOM	LIQUID/LIQUID SHAKE	GCMS
FREESULPHUR	DOM	SOLID PHASE EXTRACTION	HPLC
PEST COCOPP	DOM	LIQUID/LIQUID SHAKE	GCMS
TRIAZINE HERBS	DOM	LIQUID/LIQUID SHAKE	GCMS
PHENOLSMS	DOM	SOLID PHASE EXTRACTION	GCMS
TPH by INFRARED (IR)	TCE	LIQUID/LIQUID SHAKE	HPLC
MINERAL OIL by IR	TCE	LIQUID/LIQUID SHAKE	HPLC
GLYCOLS	NONE	DIRECT INJECTION	GCMS

Identification of Asbestos in Bulk Materials

The results for asbestos identification for soil samples are obtained from possible Asbestos Containing Material, removed during the 'Screening of soils for Asbestos Containing Materials', which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace -Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in MDHS 100.

The identification of asbestos containing materials falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-



SDG: 150625-29
Job: H_PEAK_WAR-123
Client Reference: 15/657

Location: SCT
Customer: Peak Associates
Attention: Jo Matthew

Order Number: 15/1154
Report Number: 319429
Superseded Report:

Appendix General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICS and SVOC TICS.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP -No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals -total metals must be requested separately.

11. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** -Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill /made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
\$	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than :
- Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix 4

Tier 1 Screening Values

Peak Associates Limited Tier 1 Screening Values

Introduction

During the course of 2008, significant changes to the Environment Agency Contaminated Land Exposure Assessment (CLEA) model were introduced resulting in the requirement for revision of Peak Associates' adopted Tier 1 Screening Values. The following tables, Table A, B, C and D present the current Peak Associates Tier 1 Screening Values, which are adopted for the initial assessment of soil chemical test results, in relation to chronic risk to human health.

The Tier 1 screening values presented include the current Environment Agency Soil Guideline Values (SGV's) available at the time of producing this guidance. As new SGV's are published, Peak Associates Tier 1 Screening Values will be updated accordingly.

Where no SGV is available, Peak Associates adopt the LQM/CIEH Generic Assessment Criteria (GAC), as presented in their publication entitled 'The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment' (2nd edition), Land Quality Press, Nottingham, 2009.

Published SGV's and the LQM/CIEH GAC's were developed using the CLEA software, version 1.4, for three standard land uses, which include residential with vegetable consumption, allotment land use and industrial land use.

SGV's and LQM/CIEH GAC's have not been published for any other standard land uses, such as residential without vegetable consumption hence Peak Associates are in the process of generating these for a range of typical potential contaminants. These have been generated using the CLEA software versions 1.4, 1.5 and 1.6 with parameters obtained from the current published SGV reports, and the LQM/CIEH report.

SGV's have only been published for a soil organic matter (SOM) of 6%. However, as many soils and made ground deposits have significantly less than 6% SOM, GAC's have been generated by LQM/CIEH for SOM's of 1% and 2.5%.

The LQM/CIEH publication does not include GAC's for contaminants for which SGV's have already been published hence Peak Associates have generated Tier 1 screening values for SOM's of 1% and 2.5% for the organic chemical contaminants for which SGV's are available, and are in the process of generating Tier 1 screening values for the CLEA 'residential with vegetable consumption' land use category for a range of typical contaminants.

The CLEA model generated SGV's, LQM/CIEH GAC's and Peak Associates Tier 1 screening values are subject to the following limitations:

- They do not cover other types of risk to humans, such as fire, suffocation or explosion, or short-term and acute exposures¹.
- They do not cover risks to the environment, such as groundwater, ecosystems or buildings.
- They do not provide a definitive test for telling when human health risks are significant.
- They are not a legal requirement in assessing land contamination risks. They are not part of the legal regime for Part 2A of the Environmental Protection Act 1990.

The Tier 1 screening values adopted by Peak Associates represent ‘trigger values’ for contaminant concentrations above which the soil may pose a ‘possibility of significant harm’ to human health, although further investigation and evaluation of risk will usually be required.

It should be noted that the CLEA model should not be applied to soils containing free phase organic chemical compounds.

In relation to chemical mixtures, Science Report SC050021/SR3 (Updated technical background to the CLEA model, Environment Agency, 2008), states in Section 2.3.3 ‘that the possibility exists that the mixture of chemicals to which humans are exposed will have a greater cumulative effect on health than that predicted by toxicological risk assessment of the individual chemicals.’ But it adds that ‘many of the more complex interactions are unlikely at exposures below the HCV’ (Health Criteria Value). On this basis, Peak Associates screen each compound individually and compare the representative average soil concentrations against the SGV for each individual compound, as at concentrations at or below the SGV the Average Daily Exposure (ADE) should be equal to or below the Tolerable Daily Soil Intake or Index Dose.

EA Report SC050021/SR3 also states that ‘if multiple chemicals are present that act via the same threshold toxicological mode of action, dose addition may give rise to health effect even when exposure to each individual chemical is below its representative TDI’ (Tolerable Daily Intake). For such groups, the EA state that they may propose a ‘group TDI’ which adopts potency factors such as, for example, Toxic Equivalence Factors (TEF’s) for dioxin-like compounds. The SGV documents for such chemicals will include guidance on how to adjust for site specific variations in group composition, such as the relative weight fraction.

In relation to threshold substances, where a group TDI is not available, potential for dose addition may be achieved by calculating the Hazard Quotient (HQ), which is the ratio of the ADE to the TDSI. The individual HQ’s are then summed to give the Hazard Index (HI), if the HI exceeds unity (i.e. $HI > 1$), then this equates to exceeding a TDI from potential dose addition. An alternative simple screening method is to calculate the representative average soil concentration for each contaminant divided by the SGV, and sum these results to give an indication for the potential for dose addition to exceed the SGV.

The Environment Agency view in relation to non-threshold carcinogens is that ‘there is a theoretical risk of cancer at any level of exposure, and hence combination effects may increase the risk of cancer irrespective of the mode of action. Unless there is evidence

¹ With the exception of cyanide, and also for phenol in relation to commercial land use.

for a common mode of action, this potential increase in cancer risk does not affect Index Dose derivation (though site specific assessment may account for an approach similar to using HI for threshold substances).’ Where several non-threshold substances share a common mode of genotoxic action, the Environment Agency may propose a group Index Dose, ID.

With respect to Polycyclic Aromatic Hydrocarbons (PAH’s), in the absence of any Environment Agency published group Index Dose, or evidence of any common mode of action for PAH compounds, Peak Associates current policy for PAH compounds is to compare the representative soil concentration for each compound against the corresponding Tier 1 screening value for each compound.

Revision and/or addition to Peak Associates Tier 1 screening values is an on-going exercise, taking into account the issue of new SGV’s and TOX reports by the Environment Agency.

Peak Tier 1 Screening Values**Table A – Inorganics and Metals**

Determinand	Residential /w plant uptake (mg/kg)	Residential /w'out plant uptake (mg/kg)	Industrial (mg/kg)	Source
Arsenic	32 ^(a)	35 ^(b)	640 ^(a)	^(a) SGV ^(b) CLEA
Cadmium	10 ^(a)	17 ^(b)	230 ^(a)	^(a) SGV ^(b) CLEA ^(c) LQM/CIEH
Chromium (III)	627 ^(c)	TBC ^(b)	8840 ^(c)	^(b) CLEA ^(c) LQM/CIEH
Chromium (VI)	4.3 ^(c)	TBC ^(b)	35 ^(c)	^(b) CLEA ^(c) LQM/CIEH
Lead	450 ^(d)	450 ^(d)	750 ^(d)	^(d) Former SGV
Mercury (inorganic)	170 ^(a)	238 ^(b)	3,600 ^(a)	^(a) SGV ^(b) CLEA
Nickel	130 ^(a)	130 ^(b)	1,800 ^(a)	^(a) SGV ^(b) CLEA
Selenium	350 ^(a)	600 ^(b)	13,000 ^(a) (230 ¹)	^(a) SGV ^(b) CLEA
Copper	2330 ^(c) (130 ¹)	TBC ^(b) (130 ¹)	71,700 ^(c) (130 ¹)	^(c) LQM/CIEH ^(b) CLEA
Boron	291 ^(c) (3 ¹)	TBC ^(b) (3 ¹)	192,000 ^(c) (3 ¹)	^(b) CLEA ^(c) LQM/CIEH
Zinc	3750 ^(c) (300 ¹)	TBC ^(b) (300 ¹)	665,000 ^(c) (300 ¹)	^(b) CLEA ^(c) LQM/CIEH
Tin	70 ^(e)	18231 ^(e) (70 ¹)	18231 ^(e) (70 ¹)	SNIFFER ^(e)
Sulphur	5000	5000	20000	PEAK
Sulphide	200	200	1000	PEAK
Sulphate	2000	2000	50000	PEAK
Free Cyanide	20	20	20	PEAK
Thiocyanate	20	20	20	PEAK
pH	5-9	5-9	5-9	PEAK

⁽¹⁾ If the soil or fill sampled is intended for landscaping, these (lower levels) should ensure healthy plant growth. The higher levels to protect human health are likely to be phytotoxic to plants and may hold other unacceptable environmental risks.

PEAK – Value derived for buildings/human health from former ICRL published threshold values.

TBC – To be confirmed

Table B – VOCs

Determinand	Residential /w plant uptake (mg/kg DW)			Residential /w'out plant uptake (mg/kg DW) TBC			Industrial (mg/kg DW)			Source
	1 %	2.5 %	6 %	1 %	2.5 %	6 %	1 %	2.5 %	6 %	
ORGANICS (%SOM)										
Benzene	0.08 ^(b)	0.16 ^(b)	0.33 ^(a)	0.27 ^(b)	0.5 ^(b)	1 ^(b)	28 ^(b)	50 ^(b)	95 ^(a)	^(a) SGV ^(b) CLEA
Toluene	120 ^(b)	270 ^(b)	610 ^(a)	600 ^(b)	1300 ^(b)	2700 ^(b)	870 ^{(sol)(b)}	1920 ^{(sol)(b)}	4,400 ^{(sol)(a)}	^(a) SGV ^(b) CLEA
Ethylbenzene	65 ^(b)	154 ^(b)	350 ^(a)	170 ^(b)	380 ^(b)	840 ^(b)	520 ^{(sol)(b)}	1220 ^{(sol)(b)}	2800 ^{(sol)(a)}	^(a) SGV ^(b) CLEA
Xylenes										^(a) SGV ^(b) CLEA
-m-xylene	44 ^(b)	103 ^(b)	240 ^(a)	55 ^(b)	130 ^(b)	300 ^(b)	625 ^{(sol)(b)}	1470 ^{(sol)(b)}	3500 ^{(sol)(a)}	
-o-xylene	45 ^(b)	106 ^(b)	250 ^(a)	60 ^(b)	140 ^(b)	320 ^(b)	480 ^{(sol)(b)}	1120 ^{(sol)(b)}	2600 ^{(sol)(a)}	
-p-xylene	42 ^(b)	98 ^(b)	230 ^(a)	30 ^(b)	125 ^(b)	290 ^(b)	580 ^{(sol)(b)}	1350 ^{(sol)(b)}	3200 ^{(sol)(a)}	
Phenol	184 ^(b)	290 ^(b)	420 ^(a)	TBC	TBC	TBC	(31,000) ^{1(b)}	(35,000) ^{1(b)}	3200 ^(a) (38,000) ^{1(a)}	^(a) SGV ^(b) CLEA ^(c) LQM/CIEH
1,2 Dichloroethane	0.0054 ^(c)	0.0080 ^(c)	0.014 ^(c)	TBC	TBC	TBC	0.71 ^(c)	1.0 ^(c)	1.8 ^(c)	^(c) LQM/CIEH
1,1,1 Trichloroethane	6.2 ^(c)	13 ^(c)	28 ^(c)	TBC	TBC	TBC	700 ^(c)	1400 ^(c)	3100 ^(c)	^(c) LQM/CIEH
1,1,1,2 Tetrachloroethane ² (PCA)	0.9 ^(c)	2.1 ^(c)	4.8 ^(c)	TBC	TBC	TBC	120 ^(c)	260 ^(c)	590 ^(c)	^(c) LQM/CIEH
Tetrachloroethene	0.94 ^(c)	2.1 ^(c)	4.8 ^(c)	TBC	TBC	TBC	130 ^(c)	290 ^(c)	660 ^(c)	^(c) LQM/CIEH
Trichloroethene	0.11 ^(c)	0.22 ^(c)	0.49 ^(c)	TBC	TBC	TBC	12 ^(c)	25 ^(c)	55 ^(c)	^(c) LQM/CIEH
Vinyl Chloride	0.00047 ^(c)	0.00064 ^(c)	0.00099 ^(c)	TBC	TBC	TBC	0.063 ^(c)	0.081 ^(c)	0.12 ^(c)	^(c) LQM/CIEH

¹ Protective of long term exposure.² Tier 1 screening values are higher for isomer 1,1,2,2 (PCA). Use the lower values for 1,1,1,2 PCA, unless tests are undertaken to confirm isomer species present.^(sol) Tier 1 screening value presented exceeds the solubility saturation limit.^(vap) Tier 1 screening value presented exceeds the vapour saturation limit, which is shown in brackets.

Table C – PAHs

Determinand	Residential /w plant uptake ^(a) (mg/kg)			Residential /w'out plant uptake ^(b) (mg/kg)			Industrial ^(a) (mg/kg)			Source
	1 %	2.5 %	6 %	1 %	2.5 %	6 %	1 %	2.5 %	6 %	
ORGANICS (%SOM)										
Acenaphthene	210	480	1000	2020	3090	3910	85000 (57) ^(sol)	98000 (141) ^(sol)	100000	^(a) LQM/CIEH ^(b) CLEA
Acenaphthylene	170	400	850	1950	3020	3870	84000 (86) ^(sol)	97000 (212) ^(sol)	100000	^(a) LQM/CIEH ^(b) CLEA
Anthracene	2300	4900	9200	19800	22200	23300	530000	540000	540000	^(a) LQM/CIEH ^(b) CLEA
Benzo(a)anthracene	3.1	4.7	5.9	3.71	5.23	6.22	90	95	97	^(a) LQM/CIEH ^(b) CLEA
Benzo(a)pyrene	0.83	0.94	1.0	1.0	1.0	1.04	14	14	14	^(a) LQM/CIEH ^(b) CLEA
Benzo(b)fluoranthene	5.6	6.5	7.0	6.99	7.25	7.36	100	100	100	^(a) LQM/CIEH ^(b) CLEA
Benzo(ghi)perylene	44	46	47	46.8	47.3	47.5	650	660	660	^(a) LQM/CIEH ^(b) CLEA
Benzo(k)fluoranthene	8.5	9.6	10	10.1	10.3	10.4	140	140	140	^(a) LQM/CIEH ^(b) CLEA
Chrysene	6	8	9.3	8.84	9.74	10.1	140	140	140	^(a) LQM/CIEH ^(b) CLEA
Dibenz(ah)anthracene	0.76	0.86	0.9	0.86	0.91	0.93	13	13	13	^(a) LQM/CIEH ^(b) CLEA
Fluoranthene	260	460	670	972	993	1000	23000	23000	23000	^(a) LQM/CIEH ^(b) CLEA
Fluorene	160	380	780	1850	2480	2870	64000 (31) ^(sol)	69000	71000	^(a) LQM/CIEH ^(b) CLEA
Indeno(123-cd)pyrene	3.2	3.9	4.2	4.16	4.35	4.43	60	61	62	^(a) LQM/CIEH ^(b) CLEA
Naphthalene	1.5	3.7	8.7	1.64	3.92	9.22	200 (76) ^(sol)	480 (183) ^(sol)	1100 (432) ^(sol)	^(a) LQM/CIEH ^(b) CLEA
Phenanthrene	92	200	380	837	928	970	22000	22000	23000	^(a) LQM/CIEH ^(b) CLEA
Pyrene	560	1000	1600	2330	2380	2400	54000	54000	54000	^(a) LQM/CIEH ^(b) CLEA

^(sol) Tier 1 screening value presented exceeds the solubility saturation limit (which is shown in brackets)

Table D – TPH

Determinand	Residential /w plant uptake ^(a) (mg/kg DW)			Residential /w'out plant uptake ^(b) (mg/kg DW)			Industrial ^(a) (mg/kg DW)			Source
	1 %	2.5 %	6 %	1 %	2.5 %	6 %	1 %	2.5 %	6 %	
ORGANICS (%SOM)										
TOTAL TPH (C6-C40)	250	500	500	250	500	500	1000	1500	1500	PEAK
TPH FRACTIONS										
Aliphatic EC 5-6	30	55	110	TBC	TBC	TBC	3400 (304) ^(sol)	6200 (558) ^(sol)	13000 (1150) ^(sol)	^(a) LQM/CIEH ^(b) CLEA
Aliphatic EC >6-8	73	160	370	TBC	TBC	TBC	8300 (144) ^(sol)	18000 (322) ^(sol)	42000 (736) ^(sol)	^(a) LQM/CIEH ^(b) CLEA
Aliphatic EC >8-10	19	46	110	TBC	TBC	TBC	2100 (78) ^(sol)	5100 (190) ^(vap)	12000 (451) ^(vap)	^(a) LQM/CIEH ^(b) CLEA
Aliphatic EC >10-12	93 (48) ^(vap)	230 (118) ^(vap)	540 (283) ^(vap)	93	TBC	TBC	10000 (48) ^(sol)	24000 (118) ^(vap)	49000 (283) ^(vap)	^(a) LQM/CIEH ^(b) CLEA
Aliphatic EC >12-16	740 (24) ^(sol)	1700 (59) ^(sol)	3000 (142) ^(sol)	TBC	TBC	TBC	61000 (24) ^(sol)	83000 (59) ^(sol)	91000 (142) ^(sol)	^(a) LQM/CIEH ^(b) CLEA
Aliphatic EC >16-35	45000 (8.48) ^(sol)	64000 (21) ^(sol)	76000	TBC	TBC	TBC	1600000	1800000	1800000	^(a) LQM/CIEH ^(b) CLEA
Aliphatic EC >35-44	45000 (8.48) ^(sol)	64000 (21) ^(sol)	76000	TBC	TBC	TBC	1600000	1800000	1800000	^(a) LQM/CIEH ^(b) CLEA
Aromatic EC 5-7	65	130	280	TBC	TBC	TBC	28000 (1220) ^(sol)	49000 (2260) ^(sol)	90000 (4710) ^(sol)	^(a) LQM/CIEH ^(b) CLEA
Aromatic EC >7-8	120	270	611	TBC	TBC	TBC	59000 (869) ^(vap)	110000 (1920) ^(sol)	190000 (4360) ^(vap)	^(a) LQM/CIEH ^(b) CLEA
Aromatic EC >8-10	27	65	151	TBC	TBC	TBC	3700 (613) ^(vap)	8600 (1500) ^(vap)	18000 (3580) ^(vap)	^(a) LQM/CIEH ^(b) CLEA
Aromatic EC>10-12	69	160	346	TBC	TBC	TBC	17000 (364) ^(sol)	29000 (899) ^(sol)	34500 (2150) ^(sol)	^(a) LQM/CIEH ^(b) CLEA
Aromatic EC>12-16	140	310	593	TBC	TBC	TBC	36000	37000	37800	^(a) LQM/CIEH

Table D – TPH

Determinand	Residential /w plant uptake ^(a) (mg/kg DW)			Residential /w'out plant uptake ^(b) (mg/kg DW)			Industrial ^(a) (mg/kg DW)			Source
	1 %	2.5 %	6 %	1 %	2.5 %	6 %	1 %	2.5 %	6 %	
ORGANICS (%SOM)										
							(169) ^(sol)			^(b) CLEA
Aromatic EC>16-21	250	480	770	TBC	TBC	TBC	28000	28000	28000	^(a) LQM/CIEH ^(b) CLEA
Aromatic EC>21-35	890	1100	1230	TBC	TBC	TBC	28000	28000	28000	^(a) LQM/CIEH ^(b) CLEA
Aromatic EC>35-44	890	1100	1230	TBC	TBC	TBC	28000	28000	28000	^(a) LQM/CIEH ^(b) CLEA
Aliphatic + Aromatic EC >44-70	1200	1300	1300	TBC	TBC	TBC	28000	28000	28000	^(a) LQM/CIEH ^(b) CLEA

^(sol) Tier 1 screening value presented exceeds the solubility saturation limit, which is presented in brackets.

^(vap) Tier 1 screening value presented exceeds the vapour saturation limit, which is presented in brackets.

Final Category 4 Screening Levels based on the risk management decisions outlined above⁹

Substance	Residential (with home- grown produce)	Residential (without home- grown produce)	Allotments	Commercial	Public Open Space 1	Public Open Space 2
Arsenic	37 mg/kg	40 mg/kg	49 mg/kg	640 mg/kg	79 mg/kg	168 mg/kg
Benzene	0.87 mg/kg	3.3 mg/kg	0.18 mg/kg	98 mg/kg	140 mg/kg	230 mg/kg
Benzo(a)pyrene	5 mg/kg	5.3 mg/kg	5.7 mg/kg	76 mg/kg	10 mg/kg	21 mg/kg
Cadmium	26 mg/kg	149 mg/kg	4.9 mg/kg	410 mg/kg	220 mg/kg	880 mg/kg
Chromium VI	21 mg/kg	21 mg/kg	170 mg/kg	49 mg/kg	23 mg/kg	250 mg/kg
Lead	200 mg/kg	310 mg/kg	80 mg/kg	2330 mg/kg	630 mg/kg	1300 mg/kg

This table should be read in conjunction with the Final C4SL R&D report.

Environmental Quality Standards Used to Assess Water Quality

Determinant	Quality Standard (ug/l)	Source of Screening Concentration
Aluminium	200	UK DWS ⁴
Arsenic	50	EQS
Boron	2000	EQS
Cadmium	5	EQS
Chromium	20	EQS ¹
Copper	40	EQS ¹
Iron	300	SWAD A1 ⁵
Lead	125	EQS ¹
Nickel	150	EQS ¹
Selenium	10	UK DWS
Zinc	125	EQS ¹
Mercury	1	EQS
pH Value	6 to 9	EQS
TPH	5000	Interceptor Standard ³
Benzene	30	EQS
Toluene	50	EQS
Ethyl Benzene	30	EQS for Benzene adopted
Xylenes	30	EQS
BOD	3-5 mg/l	SWAD A1 - A2 ⁵
COD	10-100 mg/l	Typical Effluent Discharge Concentrations from STW
Sulphate	250	SWAD A1 ⁵
Chloride	200	SWAD A1 ⁵
Ammonia	1.5 mg/l	SWAD A2 ⁵
Cyanide	50	SWAD A1 ⁵
Suspended Solids	25 mg/l	SWAD A1 ⁵
Nitrate	50 mg/l	SWAD A1 ⁵
Phosphate	0.4 mg/l	SWAD A1 ⁵
Dissolved or Emulsified hydrocarbons	200	SWAD A2 ⁵
Phenols	1	SWAD A2 ⁵
PAH's		
Napthalene	10	EQS
Benzo(a)pyrene	0.7	WHO ²
PAH Total ⁶	0.2, 0.2, 1	SWAD A1, A2 and A3 ⁵
PAH Total ⁶	0.1	UK DWS ⁴

Notes:

¹ EQS = Environmental Quality Standard For Freshwater (assumes CaCO₃ = 150-200mg/l)

² WHO = World Health Organisation

³ Interceptor Standard = Design discharge concentration (5mg/l) for a class 1 interceptor (PPG 3)

⁴ UK DWS = UK Drinking Water Standard

⁵ SWAD A1, A2, A3 = Surface Water Abstraction Directive - Imperative or Guideline Values for Class A1, A2 and A3 surface waters

⁶ Sum of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene and Benzo(ghi)perylene

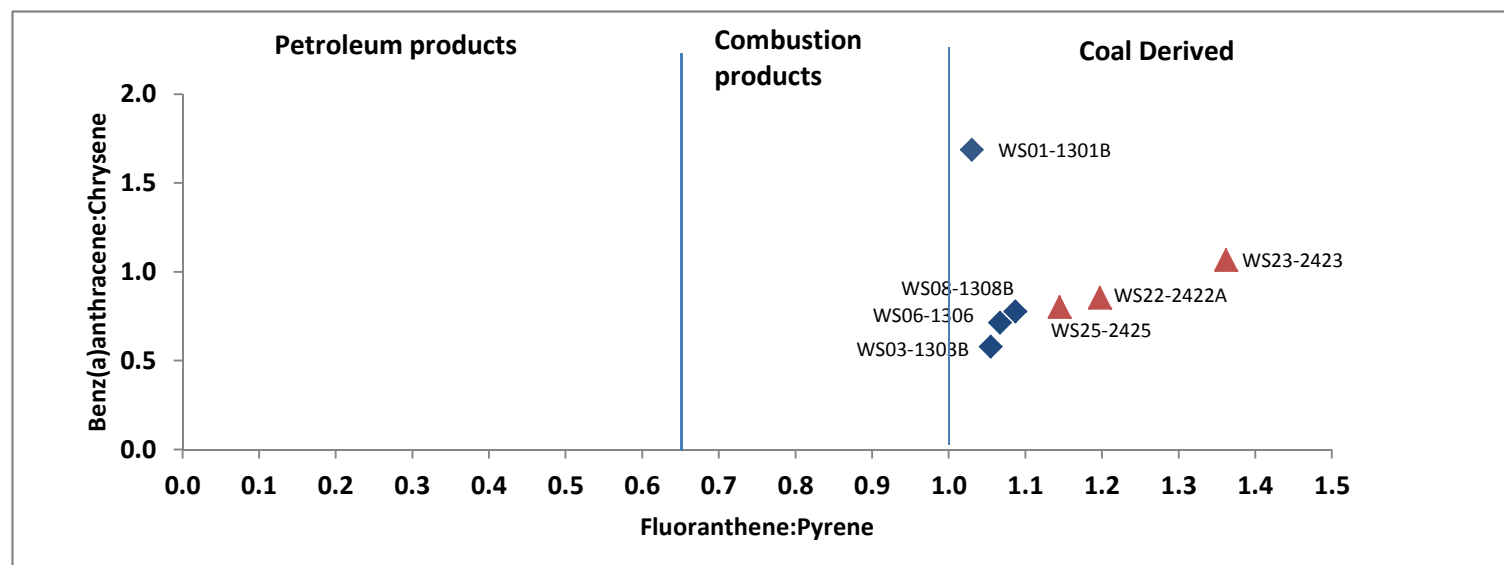
Appendix 5

PAH Double Plot Analysis

Double plot analysis for SCT boreholes

23 July 2015 P.Shanahan

Date	25/3/2015 (week 13)						10/6/2015 (week 24)						24/6/2015 (week 26)	
Sample	JMSCT1301B	JMSCT1303B	JMSCT1305	JMSCT1306	JMSCT1307	JMSCT1308B	JMSCT2421	JMSCT2422A	JMSCT2423	JMSCT2424	JMSCT2425	JMSCT2428	JMSCT2622	JMSCT2627
Window sample (WS)	WS01	WS03	WS05	WS06	WS07	WS08	WS21	WS22	WS23	WS24	WS25	WS28	WS22	WS27
Fluoranthene	0.68	0.77	0.82	0.16	0.46	0.25	<0.1	27.3	305	<0.1	20.6	<0.1	3.64	3.29
Pyrene	0.66	0.73	0.57	0.15	0.4	0.23	<0.1	22.8	224	<0.1	18	<0.1	4.9	4.65
Benzo(a)anthracene	0.27	0.22	<0.1	0.1	0.13	0.14	<0.1	7.5	70.5	<0.1	5.74	<0.1	1.56	1.74
Chrysene	0.16	0.38	0.28	0.14	<0.1	0.18	<0.1	8.77	66.1	<0.1	7.15	<0.1	1.88	2.32
Fluoranthene:Pyrene	1.03	1.05		1.07		1.09		1.20	1.36		1.14		0.74	0.71
Benzo(a):Chrysene	1.69	0.58		0.71		0.78		0.86	1.07		0.80		0.83	0.75



Water samples should not be used in double plot