



the journey is the reward

AREA 2 - BEREWOOD

WATERLOOVILLE, HAMPSHIRE

**GENERIC QUANTITATIVE RISK
ASSESSMENT AND GEOTECHNICAL
DESIGN REPORT**

FEBRUARY 2013

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**AREA 2 - BEREWOOD
GENERIC QUANTITATIVE RISK ASSESSMENT**

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0. EXECUTIVE SUMMARY

Brief	The brief was to undertake a site investigation and assessment to confirm that the ground contamination assessment undertaken for the wider development site was applicable to the specific development area. This report provides an assessment of the identified and potential ground conditions of the site, with regard to the proposed works.
Current Site Status	The site, Berewood – Area 2, is in Waterloooville, located to the immediate west of the A3 (London Road) and to the south of Milk Lane access road. The site is located in a mixed rural and residential area with residential areas to the south & south-east of the site and also to the east, across the A3, of the site. The site is currently in agricultural use with the land to the south-west, west and north also currently in agricultural use, with some additional woodland areas
Geology	Reference to the British Geological Survey (BGS) Map (Sheet 316, Fareham, Scale 1:50,000) indicate the site to overlie units of the Wittering Formation (sand, silt and clay) over the London Clay Formation.
Hydrogeology	The Environment Agency Groundwater Vulnerability Map (Sheet 52, Southern Hampshire, Scale 1:100,000) indicate the site to be overlying a Secondary A aquifer, interpreted as the Wittering Formation, which in turn overlies an Unproductive stratum, interpreted as the London Clay Formation. The site is not located within a Groundwater Source Protection Zone.
Hydrology	The nearest identified surface water feature are some drains located approximately 50m to the west and north-west of the site.
Ground Investigation	Site investigation works were undertaken by Mayer Brown Ltd between the 21st and 25th January 2013. The fieldworks for the ground investigation comprised: 27no. window sample boreholes to a maximum depth of 4.0mbgl, with 13no. gas / water standpipe installations. All investigation locations were scanned for the presence of unexploded ordnance.
Ground Conditions	The ground conditions at the site comprise: Topsoil overlying units of the Wittering Formation to the full depth of the ground investigation. As part of the ground investigation, thirteen groundwater and ground gas monitoring standpipes were installed in selected boreholes across the site. Subsequent monitoring visits, undertaken on the 1st and 7th February 2013, have shown groundwater to be present at shallow depth (between 1.30mbgl and ground level) across the site. Furthermore, initial rising head tests were carried out in selected monitoring wells (WS111, WS116 and WS122). The tests showed rapid re-ingress & rise of groundwater in the wells to between 0.13mbgl and 0.58mbgl, indicating the presence of a high groundwater table in area.
Ground Contamination Assessment and Recommendations	The outline conceptual model, formed from the results of the preliminary risk assessment, did not identify any specific potential contaminant sources relating to the past and present uses of the site except for slightly elevated background concentrations of arsenic in the soil and naturally occurring carbon dioxide ground gas. The results of the site investigation and chemical result screening have confirmed that neither of these sources of contamination are present on the site and no additional sources of contamination have been identified from this investigation.

Geotechnical Conclusions and Recommendations	All foundations should be constructed within the Wittering Formation. An ultimate limit state (ULS) bearing resistance analysis has been carried out assuming a foundation depth of 0.75mbgl and a width of 1.00m. These calculations give a ULS bearing resistance of 125kN/m². Groundwater monitoring of the site has shown the groundwater to be very close to the ground surface Settlement in the order of 12mm should be expected for strip foundations constructed in the Wittering Formation. A preliminary axial pile carry capacity analysis has been carried out to demonstrate the range of axial capacities that could be achieved if a piled solution is adopted. The laboratory testing has shown that the Wittering Formation is non-plastic and consequently not subject to seasonal volume change. Therefore ground bearing ground floor slabs are considered appropriate for this site. Groundwater monitoring of the site has shown the groundwater to be very close to the ground surface which may make construction of the foundation excavations difficult given the sand content of the Wittering Formation. Chemical tests carried out on Wittering Formation indicate the material to be consistent with Design Sulphate Class 1. Based on the absence of groundwater an ACEC classification of AC-1 should be adopted for the site. To ensure adequate durability all concrete should be designed accordingly. A preliminary design Californian bearing ratio of 3% has been used for the initial design of accessways and hardstandings. It is recommended that once final design levels are known that further CBR testing is carried out to inform the detailed design.
<i>This sheet is intended to provide a summary only of the initial indicative assessment study of the site in relation to ground contamination. It does not provide a definitive engineering analysis for the purposes of costing or construction, and is subject to the limitation of the agreed brief.</i>	

1. INTRODUCTION

1.1 INSTRUCTION

Mayer Brown Ltd. was commissioned by Grainger Plc. in January 2013 to undertake a Ground Investigation and Generic Quantitative Risk Assessment for Area 2 of the Berewood development, Waterlooville, Hampshire, with regard to the proposed construction of new residential properties and associated access roads.

The brief was to undertake a site investigation and assessment to confirm that the ground contamination assessment undertaken for the wider development site was applicable to the development area. This report provides an assessment of the identified and potential ground conditions of the site, with regard to the proposed works in accordance with the Model Procedures for the Management of Land Contamination (CLR 11), published by the Environment Agency.

This report is prepared in line with the agreed brief and is subject to the report conditions shown in Appendix A.

1.2 LEGAL CONTEXT

Part IIA of the Environmental Protection Act 1990 (inserted by Section 57 of the Environment Act 1995) provides a regime for the control of specific threats to health or the environment from land contamination. In accordance with the Act and the statutory guidance document 'The Contaminated Land (England) Regulations 2000', the definition of contaminated land is intended to embody the concept of risk assessment. Within the meaning of the Act, land is only "contaminated land" where it appears to the Regulatory Authority, by reason of substances within or under the land, that:

- Significant harm is being caused, or there is a significant possibility of such harm being caused; or
- Pollution of controlled waters is being, or is likely to be, caused."

Inherent in this definition is the requirement for contamination risk assessment to be undertaken on a site specific basis, as the potential for harm is determined by the site's end use and its specific environmental setting.

The guidance defines “risk” as the combination of:

- The probability, or frequency, of occurrence of a defined hazard (for example, exposure of a property to a substance with the potential to cause harm); and
- The magnitude (including the seriousness) of the consequences.

1.3 METHODOLOGY

This report has been prepared in accordance with published Environment Agency guidance (‘Model Procedures for the Management of Land Contamination – Contaminated Land Report (CLR) 11’). CLR 11 provides the technical framework for structured decision making about land contamination and builds on previous work carried out under the Contaminated Land Research Programme (of the former Department of the Environment). CLR 11 has adopted and refined the well recognised methodology and terminology that has been used in contaminated land risk assessment for a number of years.

1.3.1. Pollutant linkage concept

In the context of land contamination, there are three essential elements to any risk:

- A **contaminant source** – a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of controlled waters.
- A **receptor** – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property, or a water body.
- A **pathway** – a route or means by which a receptor can be exposed to, or affected by, a contaminant.

Each of these elements can exist independently, but they create a risk only where they are linked together, so that a particular contaminant affects a particular receptor through a particular pathway. This kind of linked combination of contaminant–pathway–receptor is described as a pollutant linkage.

1.3.2. Conceptual model

An important thread throughout the overall process of risk assessment is the need to formulate and develop a **conceptual model** for the site, which supports the identification and assessment of pollutant linkages. A conceptual model represents the characteristics of the site in diagrammatic or written form that shows the possible relationships between contaminants, pathways and receptors (pollutant linkages).

1.3.3. Risk assessment

CLR 11 advocates a phased approach to risk assessment comprising the following in order, as necessary:

Preliminary Risk Assessment – a desk study consisting of a review of documentary, anecdotal and site walk over evidence.

Generic Quantitative Risk Assessment (GQRA) - comparison of contaminant concentrations obtained from site investigation with generic assessment criteria.

Detailed Quantitative Risk Assessment (DQRA) - comparison of contaminant concentrations obtained from site investigation with site-specific assessment criteria.

This document constitutes a Preliminary and Generic Quantitative Risk Assessment.

1.4 PROPOSED USE

It is currently understood that the Berewood Area 2 development of the wider West of Waterlooville development area will be comprised of residential properties and access roads. Sustainable drainage features will also be constructed in association with the roads.

A change in site use may result in the need for re-assessment of risk criteria and the conclusions and recommendations resulting from the risk assessment could therefore significantly change.

1.5 REPORT SCOPE AND LIMITATIONS

This report is based upon a review of readily available historical and current information, previous site investigations and assessments undertaken since 2004 and the recent site investigation data detailed herein.

The report presents an interpretation of the borehole and laboratory data provided by the Mayer Brown Site Investigation undertaken between the 21st and 25th January 2013. In addition, this report outlines the basic ground conditions encountered in the exploratory holes and the results of any monitoring of ground installations.

This information has been collated, processed and used to provide an interpretation of the ground conditions, with recommendations on potential ground contamination risks for the proposed development.

The recommendations and opinions expressed in this report are based on the strata observed in the exploratory holes, the results of the site and laboratory tests, and information obtained as part of the desk study or provided by others. Mayer Brown take no responsibility for conditions that have not been revealed by the exploratory holes, or which occur between them. Whilst every effort has been made to interpret the conditions between investigation locations, such information is only indicative and liability cannot be accepted for its accuracy. Information provided from other sources is taken in good faith and Mayer Brown cannot guarantee its accuracy.

The information contained in this report is intended for the use of Grainger Plc. Mayer Brown can take no responsibility for the use of this information by any other party or for uses other than that described in this report.

2. PRELIMINARY RISK ASSESSMENT

2.1 SITE LOCATION AND DESCRIPTION

The site is in Waterloooville, located to the immediate west of the A3 (London Road) and to the south of Milk Lane access road. The site is located in a mixed rural and residential area with residential areas to the south & south-east of the site and also to the east, across the A3, of the site. The site is currently in agricultural use with the land to the south-west, west and north also currently in agricultural use, with some additional woodland areas.

2.2 SITE HISTORY

According to the Ordnance Survey maps provided and reviewed from 1870 to 2012 (scales 1:2,500, 1:10,000, 1:1,250, 1:10,560) the site has not been developed in modern times and has mainly been in agricultural & rural use until present day. The residential development located to the south & south-east and east of the site, is shown to have commenced around the 1920's – 1930's and continued until present day. The gas valve compound, associated with the main gas pipeline, located to the south of the site is first shown on the 1982 map extract.

2.3 PREVIOUS REPORTS

Various reports have been prepared for the wider West of Waterloooville development area, over 200ha, since 2004 and include desk top studies, ground investigations, unexploded ordnance assessments, historical buildings reports and archaeological reports. The geotechnical and geo-environmental assessments have been undertaken by Card Geotechnics, Soil Mechanics, Hydrock and Mayer Brown. Some of these assessments relate to the wider development area and others relate to specific areas of interest within the wider development, such as Plant Farm, sites for a proposed cemetery and an area that was previously intended to be the first phase of development.

Details of all of these reports and the most recent of these previous investigations are presented in the Site Assessment Report produced by Card Geotechnics in October 2010 for Grainger Plc. The Card Geotechnics Site Assessment Report concluded that the only potentially significant contamination on the wider site was associated with localised deposits of Made Ground in the vicinity of Plant Farm but that these were not likely to require significant remediation.

The report also identified the potential for significant ground gas to be present in localised areas of the site while site wide low-moderate concentrations of carbon dioxide were identified (up to 5.1% by volume).

Concentrations of arsenic and several other contaminants were also identified at concentrations that exceed the Water Regulations Advisory Scheme (WRAS) for plastic water pipes in the soil.

The report goes on to state: “As development plans are finalised, there will be a requirement for development specific investigation to validate the findings of the previous generic ground investigations. Such investigation should also include appropriate geotechnical investigation and assessment to support design of the foundations for the proposed types of development.”

These conclusions have also been used to help determine the scope of the Mayer Brown site investigation for Area 2 - Berewood that is reported in the following sections of this document.

2.4 DOCUMENTATED GROUND CONDITIONS

Ground conditions recorded in readily available sources are summarised below.

2.4.1. Geology

Reference to the British Geological Survey (BGS) Map (Sheet 316, Fareham, Scale 1:50,000) indicate the site to overlie units of the Wittering Formation (sand, silt and clay) over the London Clay Formation.

2.4.2. Hydrogeology

The Environment Agency Groundwater Vulnerability Map (Sheet 52, Southern Hampshire, Scale 1:100,000) indicate the site to be overlying a Secondary A aquifer, interpreted as the Wittering Formation, which in turn overlies an Unproductive stratum, interpreted as the London Clay Formation.

The site is not located within a Groundwater Source Protection Zone.

2.4.3. Hydrology

The nearest identified surface water feature are some drains located approximately 50m to the west and north-west of the site.

2.4.4. Radon

Radon is a naturally occurring radioactive gas which may be harmful to human health. Radon is generally released into the atmosphere in areas underlain by granite and limestone. Harmful concentrations of radon may build up if it becomes trapped in an enclosed space such as a building. National Radiological Protection Board data presented within the Landmark Envirocheck Report indicates that the percentage of houses exceeding the Action Levels for Radon in this area is less than 1%. Therefore the British Geological Survey recommends that radon protection measures are not necessary in new dwellings or extensions.

2.5 ENVIRONMENTAL DATA SEARCH

A search of an environmental database was undertaken together with information from various other organisations as part of the desk study and is summarised in the following sections. The following summary is generally limited to locations within 250m of the site boundaries unless it is considered that installations or activities beyond that range could potentially have an impact on the site or be affected by the redevelopment of the site.

Table 2.1 Data search results

Discharge consents	There are no recorded discharge consents located within 250m of the site.
Pollution incidents	There are recorded pollution incidents within 250m of the site.
Water abstractions	There are no recorded water abstractions located within 250m of the site.
Fuel Stations	There are no recorded fuel stations within 250m of the site.
Landfill Sites	There are no historical or current landfill sites within 250m of the site.

The site is located in an area which is not affected by coal mining. The following ground hazards were identified:

Compressible ground stability hazards – No hazard

Collapsible ground stability hazards – Very Low hazard

Ground dissolution stability hazards – No hazard

Landslide ground stability hazard – Very low hazard

Shrinking or swelling clay ground stability hazard – Moderate hazard

Running sand ground stability hazards – Very low hazard

2.6 DEPARTMENT OF ENVIRONMENT – INDUSTRY PROFILES

The Department of the Environment Industry Profiles are not available or applicable for the current or past uses of the site.

2.7 OUTLINE CONCEPTUAL SITE MODEL

On the basis of the above, a number of possible pollutant linkages have been identified at the Site, which are summarised in Table 2.2.

Table 2.2 Outline conceptual model

Source	Pathway	Receptor
Ground-gas potentially originating from underlying natural soils	Vertical migration of ground gas leading to accumulation in confined spaces and inhalation	Buildings on-site and future construction workers & occupiers/users of the Site
Naturally elevated metal concentrations in underlying soils	Direct contact	Buried services

2.8 CONCLUSIONS OF PRELIMINARY RISK ASSESSMENT (PRA)

The preliminary risk assessment identified a number of possible pollutant linkages that required further investigation and assessment. Consequently, a generic quantitative risk assessment was undertaken, incorporating a geo-environmental and geotechnical site investigation designed to address the potential pollutant linkages identified in the outline conceptual model and compare the chemical analysis results with generic assessment criteria.

3. FIELDWORK SUMMARY OF SCOPE AND RATIONALE

3.1 RATIONALE AND SUMMARY OF SCOPE

Site investigation works were undertaken by Mayer Brown Ltd between the 21st and 26th January 2013. The scope and rationale of the ground investigation are presented below.

- 27no. window sample boreholes (WS) to a maximum depth of 4.0mbgl.
- Scanning of all investigation locations for unexploded ordnance
- Collection of representative samples to undergo geotechnical and chemical laboratory testing as detailed in later sections of this report.
- Installation of 13no. gas / water monitoring standpipes/wells.

The rationale for the investigation is presented below in Table 3.1.

Table 3.1 Exploratory hole location rationale

Location	Rational	Max Depth (mbgl)
WS101-107	7no. windowless sample boreholes to assess the nature and stratigraphy of the subsurface materials along the line of the proposed access road and allow the collection of representative samples for geotechnical analysis.	4.00
WS108-110, WS113-115, WS117-121, WS123-124, WS126-127	15no. windowless sample boreholes to assess the nature and stratigraphy of the subsurface materials across the proposed residential development areas and allow the collection of representative samples for geotechnical and chemical analysis. Installation of ground gas and water monitoring standpipes with particular focus on assessing ground gas.	4.00
WS111, WS112, WS116, WS122 and WS125	5no. windowless sample boreholes to assess the nature and stratigraphy of the subsurface materials at the proposed locations of drainage features. Installation of water monitoring standpipes.	4.00

The layout of the exploratory positions is presented in Figure 2.

3.2 SAMPLING

Prior to the investigation it was determined that the primary receptors that would potentially be at risk on this site would be the future site users. It was therefore considered appropriate to target the near surface soil, at a depth representative of the material that is likely to remain following site clearance, for chemical analysis as this is the material most likely to be encountered by the receptor following the development of the site.

No evidence of contamination was encountered during the investigation to indicate that analysis of any additional samples was appropriate.

3.3 MONITORING

Due to the conditions encountered (high groundwater levels), two monitoring return visits to the site were considered appropriate to provide sufficient data for this assessment. These two visits were undertaken on the 1st and 7th February 2013.

No groundwater sampling was undertaken.

3.4 SITE INVESTIGATION STANDARDS

Methods employed during the investigation were generally undertaken in accordance with BS10175 and BS5930.

4. GROUND CONDITIONS ENCOUNTERED

4.1 SOIL CONDITIONS

Ground conditions encountered during the recent ground investigation were broadly consistent with those identified in the published literature and in summary comprised Topsoil overlying Wittering Formation to the full depth of the investigation.

Variations in strata thicknesses are summarised in Table 4.1 below, engineering logs are presented in Appendix B.

Table 4.1 Summary of encountered ground conditions

Location	Topsoil		Wittering Formation	
	From (mbgl)	To (mbgl)	From (mbgl)	To (mbgl)
WS101	0.0	0.8	0.8	4.0
WS102	0.0	0.3	0.3	4.0
WS103	0.0	0.3	0.3	4.0
WS104	0.0	0.8	0.8	4.0
WS105	0.0	0.3	0.3	4.0
WS106	0.0	0.3	0.3	4.0
WS107	0.0	0.3	0.3	4.0
WS108	0.0	0.3	0.3	4.0
WS109	0.0	0.6	0.6	4.0
WS110	0.0	0.4	0.4	4.0
WS111	0.0	0.4	0.4	4.0
WS112	0.0	0.4	0.4	4.0
WS113	0.0	0.5	0.5	1.5
WS114	0.0	0.5	0.5	1.5
WS115	0.0	0.3	0.3	2.0
WS116	0.0	0.5	0.5	4.0
WS117	0.0	0.3	0.3	4.0
WS118	0.0	0.3	0.3	1.5
WS119	0.0	0.3	0.3	1.5
WS120	0.0	0.3	0.3	1.5
WS121	0.0	0.3	0.3	4.0
WS122	0.0	0.3	0.3	4.0
WS123	0.0	0.3	0.3	4.0
WS124	0.0	0.3	0.3	4.0
WS125	0.0	0.3	0.3	4.0
WS126	0.0	0.3	0.3	1.5
WS127	0.0	0.3	0.3	4.0

4.1.1. Topsoil

Topsoil was encountered at all investigative positions to depths between 0.3 and 0.5m and comprised in generally dark brown silty clayey sand with flint gravel.

4.1.2. Wittering Formation

Units of the Wittering Formation were encountered immediately below the Topsoil at all borehole locations. The encountered Wittering Formation units generally comprised orange brown slightly silty slightly clayey fine sand.

4.2 OBSTRUCTIONS

No obstructions were encountered during the drilling of the boreholes on this site.

4.3 GROUNDWATER CONDITIONS

As part of the ground investigation, thirteen groundwater and ground gas monitoring standpipes were installed in selected boreholes across the site. Subsequent monitoring visits, undertaken on the 1st and 7th February 2013, have shown groundwater to be present at shallow depth (between 1.30mbgl and ground level) across the site.

Furthermore, initial rising head tests were carried out in selected monitoring wells (WS111, WS116 and WS122). The tests showed rapid re-ingress & rise of groundwater in the wells to between 0.13mbgl and 0.58mbgl, indicating the presence of a high groundwater table in area.

4.4 VISUAL / OLFACTORY EVIDENCE OF CONTAMINATION

No visual or olfactory evidence of contamination was noted in any of the boreholes during the investigation.

4.5 GROUND GAS

A preliminary ground gas assessment for the site is presented in this document, based on one round of ground gas monitoring of the installed wells within the residential development area, undertaken in accordance with the recommendations of CIRIA C665.

5. GENERIC RISK ASSESSEMNT

5.1 CONTAMINATION ASSESSMENT METHODOLOGY

In order to assess the human health and environmental risks posed by potential contaminants within the underlying soils and groundwater, Mayer Brown undertook an initial screen of the laboratory results using generic assessment criteria. Generic assessment criteria (GAC) are contaminant concentration values used for comparison purposes to assess the risk associated with contaminant concentrations found on site and are derived using non-site-specific information.

5.1.1. Soils

In order to assess the soil analyses results with regard to potential human health risks, Mayer Brown have adopted generic assessment criteria derived in accordance with the UK framework set out in the most recent CLR (Contaminated Land Report) documents. Ongoing research by the EA is being undertaken to produce toxicology reports (TOX series) for each of the contaminants identified within the CLR framework and then to produce published Soil Guideline Values (SGVs) using the Contaminated Land Exposure Assessment (CLEA) Model.

To date, SGVs have been published for only a limited suite of contaminants, with SGVs derived for each contaminant for three different land use scenarios namely:

- residential;
- allotments; and
- commercial and industrial.

Where available, published Soil Guideline Values (SGV) have been adopted. Where SGVs are not available, Mayer brown has adopted the generic assessment criteria published by LQM/CIEH (second edition) and EIC/AGS/CL:AIRE, generated using the CLEA v1.06 software and associated handbook. As further guidance is developed, it would be appropriate to review the Tier 1 screening process.

A full list of the GACs together with an indication of the method used for their derivation is provided in Appendix C. GACs applicable to residential end use have been used for the assessment of the site. Contaminant concentrations below the GACs are considered not to warrant further risk assessment. However, concentrations of contaminants above the GACs may require further consideration through statistical analysis, if appropriate, or further detailed assessment using site specific data.

Assessment framework

In regards to human health, the CLEA model states that, 'the contamination is assumed to be at or within 1m of the surface' (CLR10 pg10). It is considered that at depths greater than 1m, the probability of human exposure via the direct contact pathways are significantly reduced, leaving inhalation of volatile compounds as the dominant pathway with regard to human health risks. Typically, volatile compounds only significantly affect the indoor inhalation pathway. Therefore, for the purposes of statistical analysis, data from the top 1.0 to 1.5m is used for assessment of risks to human health via direct contact pathways in accordance with the CLEA model, dependant on proposed future site levels.

Statistical analysis

The CLEA guidelines state that for each contaminant, the upper 95th percentile confidence limit on the mean measured concentration (95%UCL) should be calculated and this value should be compared to the GAC. Maximum value tests should also be performed in accordance with the method outlined in Annex 1 of CLR7.

The objective of these tests is to decide whether the maximum concentration observed should be treated as an outlier or whether it can reasonably be considered to come from the same underlying population as the other samples.

Annex 1 of CLR 7 describes a simplistic method for calculation of the 95%UCL value based on the arithmetic mean of the sample distribution, assuming the contaminant concentrations fall within a normal distribution. However, it is known that contaminant concentrations often tend towards other distribution forms.

Therefore, in order to calculate what are considered to be more representative 95%UCL values, the contaminant concentrations have first been assessed to determine if each contaminant distribution is closer to a normal or another distribution. If a dataset was found to be normally distributed, the arithmetic mean was used to calculate the 95%UCL using the 'One sample t-test' as described in CLR 7. If the distribution was determined to be significantly removed from normal, the one-sided Chebychev Theorem was used to calculate the 95%UCL. Constituent non-detects were assigned a value equal to the reported analytical laboratory limit of detection, considered reasonably conservative in accordance with CLR principles. Any identified outliers are excluded from the datasets used in calculation of the 95%UCL value, with justification.

5.1.2. Ground gas

The criteria used to assess the ground gas monitoring results, where monitored, have been taken from the following guidance documents:

- Assessing risks posed by ground gases to buildings, CIRIA Report C665, 2007
- Code of practice for the characterisation and remediation from ground gas in affected developments, British Standard BS 8485, 2007

The values recorded at the site have been compared to guideline values given in CIRIA Report C665, (2007) 'Assessing risks posed by ground gases to buildings'.

The frequency and period of monitoring is assessed based on the gas generation potential of the source material and the sensitivity of the development, in accordance with Table 5.5 of CIRIA C665.

These typical monitoring recommendations vary between four sets of readings over a one month period for a commercial development and a very low generation potential source to 24 rounds over 24 months for a residential property and a very high generation potential source. However, these are recognised as typical recommendations that may require fewer or additional readings depending on site specific circumstances.

Where possible, monitoring rounds are undertaken during a range of atmospheric conditions to enable their influence on gas conditions to be assessed. As monitoring over the recommended periods is frequently impractical on development sites, the monitoring rounds undertaken are usually conducted during the worst case conditions (e.g. low and falling atmospheric pressure) during the time available, as far as reasonably practicable, in order to limit the level of uncertainty resulting from the reduced monitoring period.

The Characteristic Situation for a monitoring location is determined using the worst case gas screening value for methane or carbon dioxide from all of the monitoring rounds at that location. Following the precautionary principal, the most stringent of the Characteristic Situations for the monitoring locations within the site is generally used to classify the site as a whole.

5.2 SOIL ASSESSMENT

5.2.1. General

A total of 23no. near surface soil samples collected during the site investigation were submitted to a UKAS accredited laboratory for analysis for a suite of heavy metals, phytotoxic metals (harmful to plants), phenols, speciated polycyclic aromatic hydrocarbons (PAHs), fractionated total petroleum hydrocarbons (TPH), BTEX compounds and several inorganic parameters. The results of the laboratory analyses are summarised in Appendix D, in which they are compared to the relevant generic assessment criteria. A full set of all the laboratory test certificates is presented as Appendix E.

The range of potentially hazardous contaminants present on the site can be wide and varied and the suite has been chosen to reflect both commonly found contaminants and others indicated by research to have a significant risk of being present. It is, however, possible that others may exist for which analyses have not been carried out or which were outside the scope of completed exploratory holes.

The decision to recommend acceptability or a requirement for remediation is based on the evaluation of a number of factors which when combined present a statutory or non-statutory risk that may require remedial action.

5.2.2. Analysis Results

All of the heavy metal, hydrocarbon and inorganic contaminants of concern included in the analysis of the samples from the area of the proposed development were identified at concentrations well below the relevant GACs and below the Water Regulations Advisory Scheme material selection threshold levels for buried services. Therefore heavy metals, hydrocarbons and inorganic compounds, including asbestos, are not considered to represent a significant source of contamination with regard to human health, buried services or environmental receptors.

5.3 STATISTICAL ANALYSIS

Statistical analysis was not considered appropriate for the samples from this site.

5.4 GROUND-GAS ASSESSMENT

The presence and concentrations of ground gases in the installed monitoring wells were monitored in accordance with CIRIA C665 on one occasion to provide preliminary data on the ground gas conditions at the site. The monitoring results are presented in Appendix F.

During the gas monitoring round, the only well with a response zone that was not completely submerged was WS127, which had 0.11m of un-submerged response zone available to monitor. The steady state flow rates of <0.1l/hr were recorded in all wells. A slightly elevated concentration of carbon dioxide was detected in WS127 of 1.4% by volume and flammable gas as methane at a steady state of <0.1% by volume. No measureable concentrations of carbon dioxide or flammable gas as methane were detected in any of the other wells.

The recorded concentrations and flow rates indicate a preliminary classification of Characteristic Situation 1 (very low risk) or NHBC "Green" for the site is an appropriate classification, based on the data available. This characterisation is based on the concentrations of both carbon dioxide and flammable gas as methane falling well below the recommended additional factors/typical maximum concentrations in CIRIA C665 and the Gas Screening Values (GSVs) falling well below the boundary between Characteristic 1 and 2 (NHBC Green and Amber 1) at WS127. However, due to the ground conditions at this site, the most relevant basis for this assessment is considered to be the lack of any notable ground gas generating material within the soil beneath the site.

It should be noted that the preliminary monitoring round was undertaken during a period of low and falling atmospheric pressure. These atmospheric pressure conditions are considered most likely to produce the highest ground gas flow rates.

The high groundwater levels in the wells and the resultant submerged response zones means that the ground gas data gathered is not representative of a significant portion of the underlying soils and it was considered that further monitoring would not provide any more reliable or significant data for the assessment. This assessment has therefore been based primarily on a risk based assessment approach, as per BS 8485, involving professional judgement, rather than strictly complying to the approach presented in CIRIA C665.

6. CONCEPTUAL SITE MODEL

It is currently understood that the Berewood Area 2 development of the wider West of Waterlooville development area will be comprised of residential properties, access roads and drainage features.

6.1 SOURCES

The outline conceptual model, formed from the results of the preliminary risk assessment, did not identify any specific potential contaminant sources relating to the past and present uses of the site except for slightly elevated background concentrations of arsenic in the soil and naturally occurring carbon dioxide ground gas. The results of the site investigation and chemical result screening have confirmed that neither of these sources of contamination are present on the site and no additional sources of contamination have been identified from this investigation.

6.2 PATHWAYS AND RECEPTORS

As no significant sources of contamination have been identified, further discussion of pathways and receptor is not considered appropriate.

7. GEOTECHNICAL ASSESSMENT

7.1 INTRODUCTION

The geotechnical assessment and the subsequent foundation design recommendations will use the findings of the ground investigation and the results of the in-situ and geotechnical testing carried out in the boreholes and on representative samples of the material encountered.

7.2 GEOTECHNICAL TESTS

A programme of geotechnical laboratory testing was carried out on representative samples collected from the strata encountered during the ground investigation.

Details of the specific procedure used in each case are shown below in Table 7.1 and the geotechnical test certificates are presented in Appendix I.

Table 7.1 Summary of Geotechnical Testing

Test	Standard (BS1377:1990) unless otherwise indicated	No.
Classification Tests		
Particle Size Distribution (Wet Sieve)	Part 2, Clause 9.2	5
Particle Size Distribution (Sedimentation)	Part 2, Clause 9.5	2
Compaction and Consolidation Tests		
Laboratory CBR Tests	Part 4, Clause 7.4	5
Shear Strength Tests		
Direct Shear	Part 7, Clause 4.5	2
Chemical Tests		
Sulphate Content 2:1 soil water extract	Part 3, Clause 5.3	6
pH value	Part 3, Clause 9.0	6

7.3 GEOLOGICAL AND GEOTECHNICAL PARAMETERS

This section discusses the key geotechnical characteristics of each encountered stratum as determined from field observations, in-situ and laboratory geotechnical testing.

7.3.1. Topsoil

Topsoil was encountered at all investigative positions to depths between 0.3 and 0.5m.

No geotechnical laboratory testing was undertaken on samples of the Topsoil as the material will be stripped prior to construction.

7.3.2. Wittering Formation

Wittering Formation comprising orange brown slightly silty slightly clayey fine sand was encountered across the site immediately below the Topsoil. The full thickness of the stratum was not proven.

In-Situ Testing

Standard Penetration Testing

Standard penetration testing (SPT) was carried out throughout the Wittering Formation. The distribution of SPT N values is shown on Table 7.2 and presented graphically in Figure 3.

Table 7.2 Distribution of SPT N Values in the Wittering Formation

Borehole	Depth (mbgl)	SPT N Value	Dominant Waste Type	Borehole	Depth (mbgl)	SPT N Value	Dominant Waste Type
WS101	1.00	20	Sand	WS105	1.00	13	Sand
	2.00	8	Sand		2.00	28	Sand
	3.00	9	Sand		3.00	37	Sand
	4.00	6	Sand		4.00	47	Sand
WS102	1.00	14	Sand	WS106	1.00	19	Sand
	2.00	15	Sand		2.00	21	Sand
	3.00	12	Sand		3.00	30	Sand
	4.00	18	Sand		4.00	30	Sand
WS103	1.00	18	Sand	WS107	1.00	26	Sand
	2.00	20	Sand		2.00	21	Sand
	3.00	22	Sand		3.00	20	Sand
	4.00	11	Sand		4.00	24	Sand
WS104	1.00	21	Sand	WS108	2.00	16	Sand
	2.00	17	Sand		3.00	14	Sand
	3.00	23	Sand		4.00	19	Sand
	4.00	22	Sand				

Borehole	Depth (mbgl)	SPT N Value	Dominant Waste Type	Borehole	Depth (mbgl)	SPT N Value	Dominant Waste Type
WS109	1.00	30	Sand	WS121	1.00	38	Sand
	2.00	15	Sand		2.00	27	Sand
	3.00	18	Sand		3.00	28	Sand
	4.00	15	Sand		4.00	>50	Sand
WS110	1.00	17	Sand	WS124	1.00	20	Sand
	2.00	15	Sand		2.00	43	Sand
	3.00	9	Sand		3.00	28	Sand
	4.00	8	Sand		4.00	39	Sand
WS115	1.00	16	Sand	WS127	1.00	22	Sand
	2.00	13	Sand		2.00	>50	Sand
	3.00	13	Sand		3.00	50	Sand
	4.00	9	Sand		4.00	30	Sand
WS117	1.00	10	Sand				
	2.00	11	Sand				
	3.00	12	Sand				
	4.00	17	Sand				

The standard penetration testing returned N-values of between 8 and 50. Careful inspection of the SPT N data reveals a broad scatter of N-values with no easily discernable trend with increase in depth.

Clegg Hammer Testing

Clegg impact hammer testing was carried out across the site to determine a preliminary equivalent Californian bearing ratio (CBR). The Clegg hammer results sheets are presented in Appendix I and show a range of 4th drop impact values of 3 to 9 which correlate to equivalent CBRs in the range 3 to 10%.

Dynamic Cone Penetration (DCP) Testing

Dynamic cone penetration testing was carried out at eight locations across the site. The results of the DCP testing give average estimated CBR values of between 4.4 and 16.3% with a mean value of 7.6%. The DCP test certificates are presented in Appendix I.

Classification Testing

Particle Size Distribution

Five representative samples of the Wittering Formation underwent wet sieving to determine their granulometric composition. A further two samples underwent sedimentation analysis to identify the magnitude and distribution of the <63µm fraction of the stratum.

The results of all the particle size distribution analyses are presented in Table 7.3 and the laboratory test certificates are located in Appendix I.

Table 7.3 Granulometric Composition of the Wittering Formation

Location (BH no.)	Depth (mbgl)	Granulometric Composition (%)			
		Gravel	Sand	Silt	Clay
BH101	0.80-1.00	0	83.6	16.4	
BH104	1.50-2.00	0.3	78.7	21.1	
BH108	1.60-2.00	18.5	58.8	22.6	
BH110	0.50-1.00	0	83.9	16.1	
BH115	0.50-1.00	2.2	73.6	24.2	
BH106	1.60-2.00	0	81.1	11.6	7.4
BH117	1.50-2.00	0	74.7	10.1	15.2

The particle size distribution analyses confirm the coarse-grained nature of the Wittering Formation with all samples tested comprising sand-sized particles with subordinate amounts of gravel. The fine-grained content of the material ranged between 15 and 25%.

Based on the results of the PSD analyses the uniformity coefficient (C_u) and coefficient of curvature (C_c) have been determined for the sample where the d_{10} particle size is known.

Table 7.4 Uniformity Coefficient and Coefficient of Curvature of the Wittering Formation

Location (BH no.)	Depth (mbgl)	d_{60} (mm)	d_{10} (mm)	d_{30} (mm)	C_u	C_c
BH106	1.60-2.00	0.10	0.04	0.07	2.5	1.23

A C_u of < 6 is indicative of an even – graded material.

Shear Strength

The coarse-grained nature of the Wittering Formation means that it will be free draining and therefore porewater pressures will dissipate quickly when loads are applied to the material.

Under these conditions drained and undrained shear strength parameters are the same.

Two representative samples of the Wittering Formation underwent laboratory direct shear testing using the small shear box. The results of the laboratory shear strength determinations are presented in Table 7.5 and the laboratory test certificates are presented in Appendix I

Table 7.5 Results of the Shear Box Testing

Location	Depth (mbgl)	Shear Strength Parameters	
		c (kN/m ²)	ϕ (°)
BH117	1.50	7.5	33.5
BH127	2.50	0	30.5

An empirical relationship between angle of internal friction and SPT N values is widely recognised and for N – values of 8 to 50 gives range of ϕ values of 28 to 40°. The results of the laboratory direct shear test give a range of shear strength parameters including values for c' . Due to the non-linearity of the Mohr-Coulomb failure envelope at low confining stresses and the transient nature of the apparent cohesion parameter it is common practice to disregard it in all geotechnical design. Therefore shear strength parameters $c' = 0$ and $\phi' = 30^\circ$ are considered appropriate for the Wittering Formation.

Other Geotechnical Parameters

Californian Bearing Ratio

Five laboratory Californian bearing ratio (CBR) tests were carried out on representative samples of the Wittering Formation. The results of the CBR testing are presented in Table 7.6, whilst the laboratory test certificates are in Appendix I.

Table 7.6 Results of the Laboratory Californian Bearing Ratio Testing

Location	Depth (mbgl)	Moisture Content (%)		Californian Bearing Ratio (%)	
		Top	Bottom	Top	Bottom
BH107	0.50-1.00	20		1.4	1.4
BH103	GL-0.5	23		0.73	0.73
BH104	0.30-1.00	23		1.00	1.00
BH106	1.60-2.00	25	23	0.78	0.61
BH107	1.50-2.00	24	23	1.8	2.7

Comparison of the laboratory CBR values with those derived from the in-situ DCP and Clegg Hammer testing indicates that the in-situ CBRs are approximately three times higher than the laboratory values. Furthermore the in-situ results are closer to the values published for sands - 5 to 20% and for silty sands - 5 to 30%. Therefore for preliminary design purposes a conservative CBR value of 3% is considered appropriate.

Modulus of Deformation (E_d)

For coarse-grained materials the deformation modulus for square and long strip foundations can be obtained by multiplying the static cone resistance by a factor of 2.5 or 3.5 respectively. Where only SPT data is available the static cone resistance q_c (in kg/cm^2) can be obtained by multiplying the N value by an empirical factor. For sand and silty sand a value of 2.0 is recommended.

Based on the above determination a modulus of deformation of 10MN/m^2 is considered appropriate.

Table 7.7 Deformation Modulus for the Wittering Formation

Wittering Formation	Characteristic SPT N Value	Equivalent Static Cone Resistance (kg/cm ²)	Static Cone Resistance (MN/m ²)	Deformation Modulus E _d (MN/m ²)
Silty Sands and Sands	15	30	2.9	10

7.4 AGGRESSIVE GROUND SOIL CHEMISTRY

Chemical testing was carried out on six representative samples of the Wittering Formation in accordance with Box C10, BRE Special Digest 1. The results are summarised in Table 7.8

Table 7.8 Summary of the Results of Chemical Testing for Concrete Classification

Chemical Test	Value		
	Minimum	Maximum	Mean
pH	7.7	7.9	7.8
Soluble Sulphate (g/l)	0.04	0.11	0.08

The results from the laboratory chemical testing for aggressive chemical environment for concrete classification have been assessed in accordance with BRE Special Digest 1. The range of values reported within the Wittering Formation places the material within Design Sulphate Class DS-1

Given the range of pH values and the high groundwater table an Aggressive Chemical Environment for Concrete (ACEC) Class of AC-1s is appropriate for this material.

7.5 CHARACTERISTIC GEOTECHNICAL PARAMETERS

Based on the laboratory test results, in-situ testing and subsequent analysis a range of characteristic geotechnical parameters which should be used in all geotechnical and foundation design calculations are presented in Table 7.9.

Table 7.9 Characteristic Geotechnical Parameters

Stratum	Geotechnical Parameter		Notes	Characteristic Value
Topsoil	Not Provided as material will be removed prior to construction			
Wittering Formation	Unit Weight	bulk γ	Engineering Judgement	19kN/m ³
	Undrained and drained shear strength	c (kN/m ²)	from laboratory Direct Shear testing	0
		$\phi = 0^\circ$		30°
	Deformation Modulus E_d (MN/m ²)		Relationship with SPT N	10MN/m ²
	Californian Bearing Ratio (%)		DCP & Clegg Hammer & Laboratory testing	3%

8. FOUNDATION AND GROUND ENGINEERING

8.1 INTRODUCTION

The geotechnical assessment below relates to the details of the proposed development. It is understood that the proposed development comprises the construction of a number of 2 storey domestic residences and all associated accessways and hardstandings.

Three windowless sample boreholes were undertaken across the site. The ground conditions encountered are presented in Table 4.1 and in brief comprises Topsoil over Wittering Formation to the full depth of the investigation.

8.2 SHALLOW FOUNDATIONS

8.2.1. Depth of Foundations

All foundations should be constructed beneath the Topsoil within the Wittering Formation. Due to the coarse-grained nature of the Wittering Formation there is no requirement to deepen foundations to allow for soil volume change.

Allowable Bearing Resistance

Bearing resistance analysis was carried out in order to check the Ultimate Limit State bearing resistance of the Wittering Formation. Calculations were carried out in accordance with Eurocode 7.

For the bearing resistance analysis a foundation depth and width of 0.75m has been used. Based on the groundwater observations a groundwater table coincident with the ground surface has been used in the analysis.

Table 8.1 Ground Models used in the Bearing Resistance Calculations

Ground Model	Stratum	Foundation Depth	Shear Strength Parameters			
			Total		Effective	
			c_u	ϕ_u	c'	ϕ'
GM1	Wittering Formation	0.75nbgl	0	30	0	30

The UK has implemented Design Approach 1 (DA1) of BS EN1997-1:2004 (Eurocode 7: Geotechnical Design), which requires two design combinations to be satisfied:

Combination 1 (C1): A1 “+” M1 “+” R1

Combination 2 (C2): A2 “+” M2 “+” R1

Where A, M and R refer to groups of partial factors relating to actions, materials and resistance respectively.

Table 8.2 Partial Factors Applied to the Bearing Resistance Analysis

	Combination 1			Combination 2		
	A1	M1	R1	A2	M2	R1
Tangent of the Angle of Shearing Resistance ($\tan \phi$)		1.00			1.25	
Cohesion Intercept (c')		1.00			1.25	
Undrained Cohesion c_u		1.00			1.40	
Permanent Action	1.35					
Variable Action	1.50					
Resistance						1.00

The summary of the bearing checks are presented in Table 8.3

Table 8.3 Summary of ULS Bearing Capacity Checks

EC7 Calculation Method	Ground Model	Design Approach 1	
		C1	C2
Bearing Resistance (kN/m^2)	GM1	215	115

These calculations indicate that combination 2 presents the most critical case. The results given represent the ultimate limit state that is the maximum load that can be supported by the soil without failure occurring within the soil mass.

The bearing resistances calculated are appropriate for a 0.75m wide strip foundation constructed at 0.75mbgl in the Wittering Formation.

Therefore ULS bearing resistance of 115kN/m² is considered appropriate for the Wittering Formation. Increasing the width of the foundation to 1.00m will increase the bearing resistance to 125kN/m²

Serviceability Limit State

Eurocode 7 states that calculations of settlement must always be carried out on footings on soft clays - and should be carried out on footings on firm to stiff clays when the risk is anything other than negligible.

The site under consideration is underlain by fine sand; therefore, verification of serviceability limit state is not required. However, for the sake of completeness a settlement analysis has been carried out with an applied foundation load of 125kN/m².

Partial factors for the settlement analysis have all been taken as 1.

Immediate settlement

The coarse-grained nature of the Wittering Formation means that the settlement will occur immediately any load increment is applied to the soil.

The depth of the analysis has been determined using Fadum's Charts and is limited to the depth where the increase in vertical stress is less than 20% of the in-situ stress

The immediate settlement, s_0 , was determined following the procedure described by Christian and Carrier where:

$$s_0 = \frac{\Delta q_d B \mu_0 \mu_1}{E_{uk}}$$

where μ_0 and μ_1 are settlement factors
 E_{uk} is the undrained Young's modulus

The results of the settlement analyses are presented in Table 8.4

Table 8.4 Results of Settlement Analyses

Settlement Analysis	Stratum	Immediate Settlement (mm)
Ground Model 1	Wittering Formation	12

The results of the settlement analyses are presented in Table 8.4 and show that settlement in the order of 12mm may be expected if a load equivalent to the bearing resistance is applied to a 1.00m wide strip foundation.

8.3 PILED FOUNDATIONS

In the event that ground conditions are too restrictive consideration should be given to the adoption of piled foundations.

In the following sections the skin friction and end bearing resistance of a pile constructed within the Wittering Formation will be determined. The pile design has been carried out following using the partial factors recommended in the UK National Annex to BSEN 1997.

Values for axially loaded pile have been determined using the following relationships:

Characteristic End Bearing

$$R_{bk} = \frac{A_b \rho_d N_q}{\gamma_{Rd}}$$

and Characteristic Shaft Resistance

$$R_{sk} = \frac{\overline{k_s} \rho_d \tan \delta A_s}{\gamma_{Rd}}$$

The pile design has been carried out using the National annex to EC7. The design approach and combination of partial factors and their values are presented in Table 8.5.

Table 8.5 Design Approach and Partial Factors used in Pile Design

DRIVEN PILE								
COMBINATION	DESIGN ACTION LOAD	γ_G	MATERIAL FACTORS	ALL PARTIAL FACTORS	DESIGN RESISTANCE	γ_B	γ_S	γ_{RD}
1	A1	1.35	M1	1.0	R1	1.0	1.0	1.5
2	A2	1.0	M1	1.0	R4	1.3	1.3	1.5
BORED PILE								
1	A1	1.35	M1	1.0	R1	1.25	1.15	1.5
2	A2	1.00	M1	1.0	R4	1.6	1.3	1.5
CFA PILES								
1	A1	1.35	M1	1.0	R1	1.1	1.10	1.5
2	A2	1.00	M1	1.0	R4	1.45	1.40	1.5

The determination of the skin friction and end bearing resistance was carried out using design approaches as detailed above.

The results of both approaches are presented in Table 8.6

Table 8.6 Design Pile Resistances

Pile Diameter (m)	Pile type	Combination	Design Pile Resistance (kN)					
			Skin Friction (R_{sd})		End Bearing (R_{bd})		Design Axial Load (kN)	
			5m	10m	5m	10m	5m	10m
0.3	Driven	C1	66	278	89	78	103	237
		C2	51	214	68	60	79	183
	Bored	C1	57	242	71	62	85	202
		C2	51	214	55	49	71	175
	CFA	C1	60	253	81	71	94	216
		C2	47	199	61	54	72	169
0.5	Driven	C1	110	463	245	220	236	455
		C2	84	356	189	169	182	329
	Bored	C1	95	402	196	176	194	385
		C2	84	356	153	138	158	329
	CFA	C1	100	421	223	200	215	414
		C2	78	331	169	152	165	322

Although higher axial loadings can generally be achieved by driving piles; there may be local environmental restraints that preclude this construction method (noise and vibration). Therefore It is recommended that the advice is sought of the local building control before detailed design is undertaken.

When dimensioning a pile the design applied load must be multiplied by the appropriate partial factor, γ_G (Table 8.5).

8.4 GROUND FLOOR SLABS

Ground bearing ground floor slabs are appropriate for this site as there soil poses no risk of undergoing seasonal volume changes.

8.5 CHEMICAL ATTACK ON BURIED CONCRETE

Laboratory chemical testing of pH and sulphate concentrations has indicated a Design Sulfate Classification of DS-1 in accordance with BRE Special Digest 1. Given the soil conditions encountered and the absence of groundwater, an ACEC classification of AC-1 is considered appropriate

8.6 FOUNDATION EXCAVATIONS

Groundwater monitoring has shown the groundwater table to be at or near the ground surface. Given the sand-dominated nature of the Wittering Formation this may cause instability of the excavations or running sands.

8.7 HIGHWAYS AND HARDSTANDINGS

8.7.1. Lime or Cement Stabilisation

It is understood that consideration is being given to the use of lime stabilisation to improve ground conditions prior to the construction of the accessways. However, the ground investigation has shown the Wittering Formation to be sand; therefore lime stabilisation is not appropriate. The CBR of the subgrade could be improved by the use of cement stabilisation. Unlike lime stabilisation no reaction with the subgrade material is required since cementing takes place as a result of hydration.

The other main difference to lime stabilisation is that compaction must be undertaken within two hours of mixing due to the rapid setting of the cement and material mixture. If left for longer, the bonds formed will be broken during compaction and some degree of strength will be lost.

If the addition of cement is decided upon the advice of an experienced ground improvement specialist is recommended.

8.7.2. Construction of Granular Sub-base

An initial design of the thickness of granular sub-base required to spread the load of passing traffic on the surface of the subgrade has been undertaken following the design method for unpaved roads in the UK Highways Agency Design Manual for Roads and Bridges HD25/94, Volume 7 Section 2, Part 2.

TensarPave Software has been used to modify the design by mechanical reinforcement of the granular fill using geogrid. The number and placement of these grids is derived empirically from full scale pavement tests and trafficking trials.

Using a CBR of 3%, representing the Wittering Formation, a stabilised layer of 300mm of granular fill is required with a basal layer of SS30G and a geocomposite at fill/subgrade interface (Appendix K).

This initial design is based on the proposed traffic loading of the stabilised sub-base prior to the placement of any running course.

Until the final design levels are known a preliminary design CBR of 3% should be used for the design of all hardstandings and accessways. However, when the final site levels are achieved it is recommended that additional CBR testing is undertaken.

If a granular reinforced sub-base solution is adopted it is recommended that the design is verified by a specialist sub-contractor.

9. CONCLUSIONS AND RECOMMENDATIONS

9.1 CONTAMINATION

The outline conceptual model, formed from the results of the preliminary risk assessment, did not identify any specific potential contaminant sources relating to the past and present uses of the site except for slightly elevated background concentrations of arsenic in the soil and naturally occurring carbon dioxide ground gas. The results of the site investigation and chemical result screening have confirmed that neither of these sources of contamination are present on the site and no additional sources of contamination have been identified from this investigation.

In order to mitigate the generic risks associated with development on potentially contamination land the following mitigation measures are recommended:

- Compliance with relevant Health and Safety procedures during construction works.
- Contractors on site should wear appropriate PPE to mitigate the risks from the chemical and physical impacts to the Made Ground at the site. Care should also be taken when entering excavations on site due to the potential presence of ground gas.
- The local authority should be informed if any sources of contamination are identified during the development that have not been assessed in this report. These sources should then be assessed and dealt with appropriately, with the agreement of the local authority.

These mitigation measures, as with any such mitigation or remedial measures, are subject to agreement with the regulatory authority, be it the Local Authority for human health related issues or the Environment Agency for environmental issues.

It is recommended that any removal and disposal of sub-soil arisings and/or groundwater from the site should be undertaken in a controlled manner to a licensed facility, with due regard to Duty of Care responsibilities. In addition, an appropriate degree of health and safety provision should be incorporated to protect both the site workers and the general public alike.

During any ground works, it is recommended that skin contact with soils is kept to a minimum in accordance with good working practice / specific control measures and the HSE guidance document 'Protection of Workers and the General Public During the Development of Contaminated Land', 1991.

9.2 GEOTECHNICAL

The ground investigation revealed the site to be underlain by Topsoil over Wittering Formation, comprising a silty fine sand, to the full depth of the investigation.

Foundations

The proposed development comprises the construction of residential properties and associated accessways and hardstandings. It is unclear at this stage what the final development levels will be; however, a foundation analysis has been carried out assuming a shallow foundation constructed within the Wittering Formation.

An ultimate limit state (ULS) bearing resistance analysis has been carried out assuming a foundation depth of 0.75mbgl and widths of 0.75m and 1.00m. These calculations give a ULS bearing resistances of 115 and 125kN/m² for 0.75 and 1.00m wide strip foundations constructed in the Wittering Formation.

Although not required by EC7 a serviceability limit state (SLS) settlement analysis has been carried out assuming a foundation load of 125kN/m² applied at 0.75mbgl. The results indicate a settlement in the order 12mm should be expected.

Other Foundation Considerations

The laboratory testing has shown that the Wittering Formation is non-plastic and consequently not subject to seasonal volume change. Therefore ground bearing ground floor slabs are considered appropriate for this site.

A preliminary axial pile carrying capacity has been carried out to demonstrate the range of values that can be achieved should a piled foundation solution be selected.

Concrete Aggressivity

Chemical tests carried out on Wittering Formation indicate the material to be consistent with Design Sulphate Class 1. Based on the shallow groundwater table an ACEC classification of AC-1s should be adopted for the site. To ensure adequate durability all concrete should be designed accordingly.

Californian Bearing Ratio

A preliminary design Californian bearing ratio of 3% has been used for the initial design of accessways and hardstandings. It is recommended that once final design levels are known that further CBR testing is carried out to inform the detailed design.

Accessways and Hardstandings

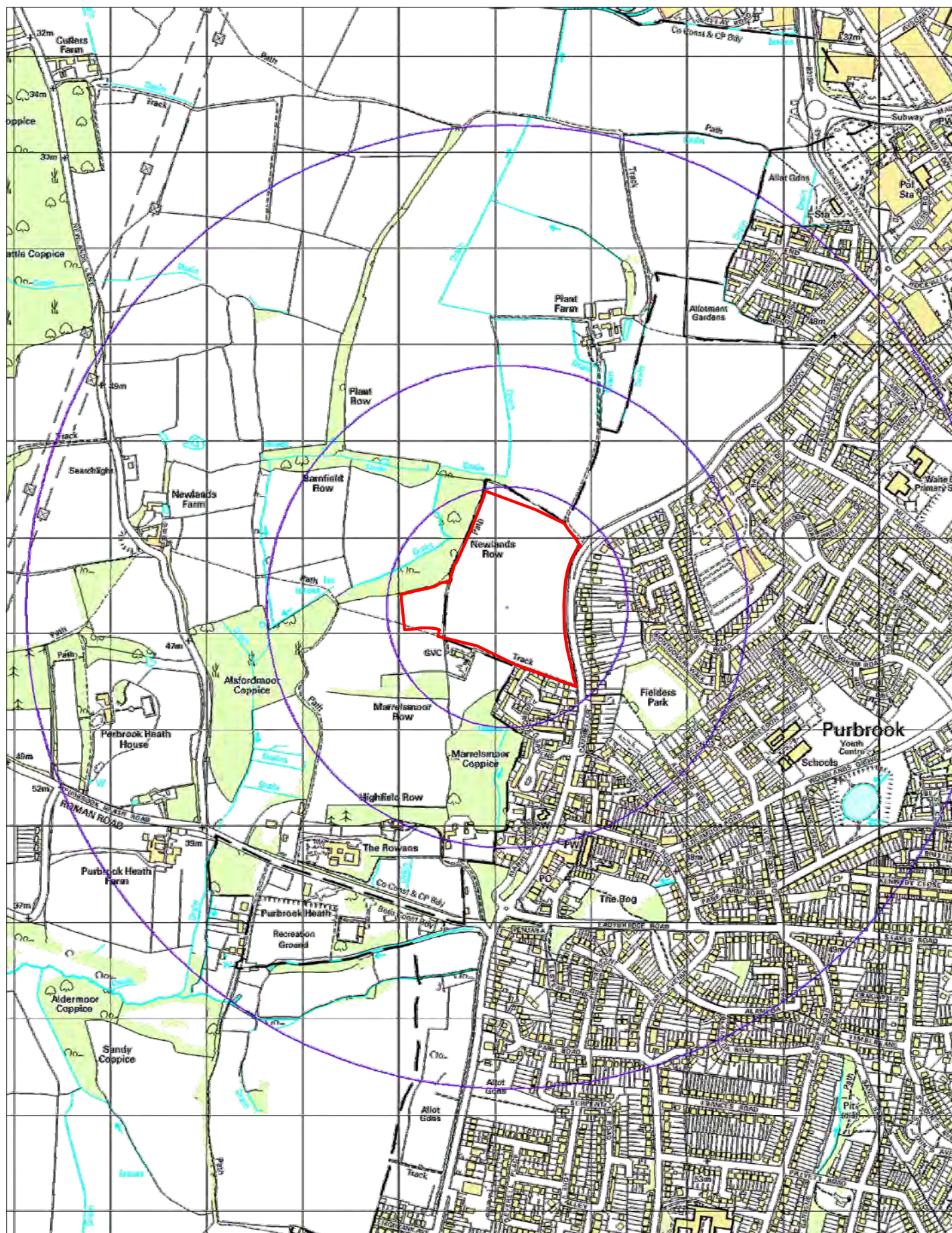
It is understood that lime stabilisation is being an option under consideration to improve the ground conditions prior to sub-base placement. The laboratory testing carried out as part of ground investigation indicates the Wittering Formation is predominantly a fine sand and therefore lime stabilisation may not be appropriate. However, cement stabilisation can be used on granular materials as it does not rely on any interaction with the “to be stabilised” material.

It is recommended that the advice of an experienced ground improvement specialist is sought.

Reinforced Granular Subgrade

An initial design of a reinforced granular sub-base has been carried out using a design CBR of 3%. The results indicate a granular subgrade 300mm thick reinforced with a basal layer of Tensar SS30G (or equivalent product) and a geocomposite at the subgrade / sub-base interface will provide sufficient resistance to the applied traffic loading.

FIGURE 1: SITE LOCATION PLAN



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client
GRANGER PLC

title
AREA 2 - BEREWOOD, WATERLOOVILLE
SITE LOCATION PLAN

scale NTS@A4 drawn by AP checked by RP

date NOVEMBER 2012 cad file

drawing number

FIGURE 1

rev.

0

FIGURE 2: INVESTIGATION LOCATION PLAN

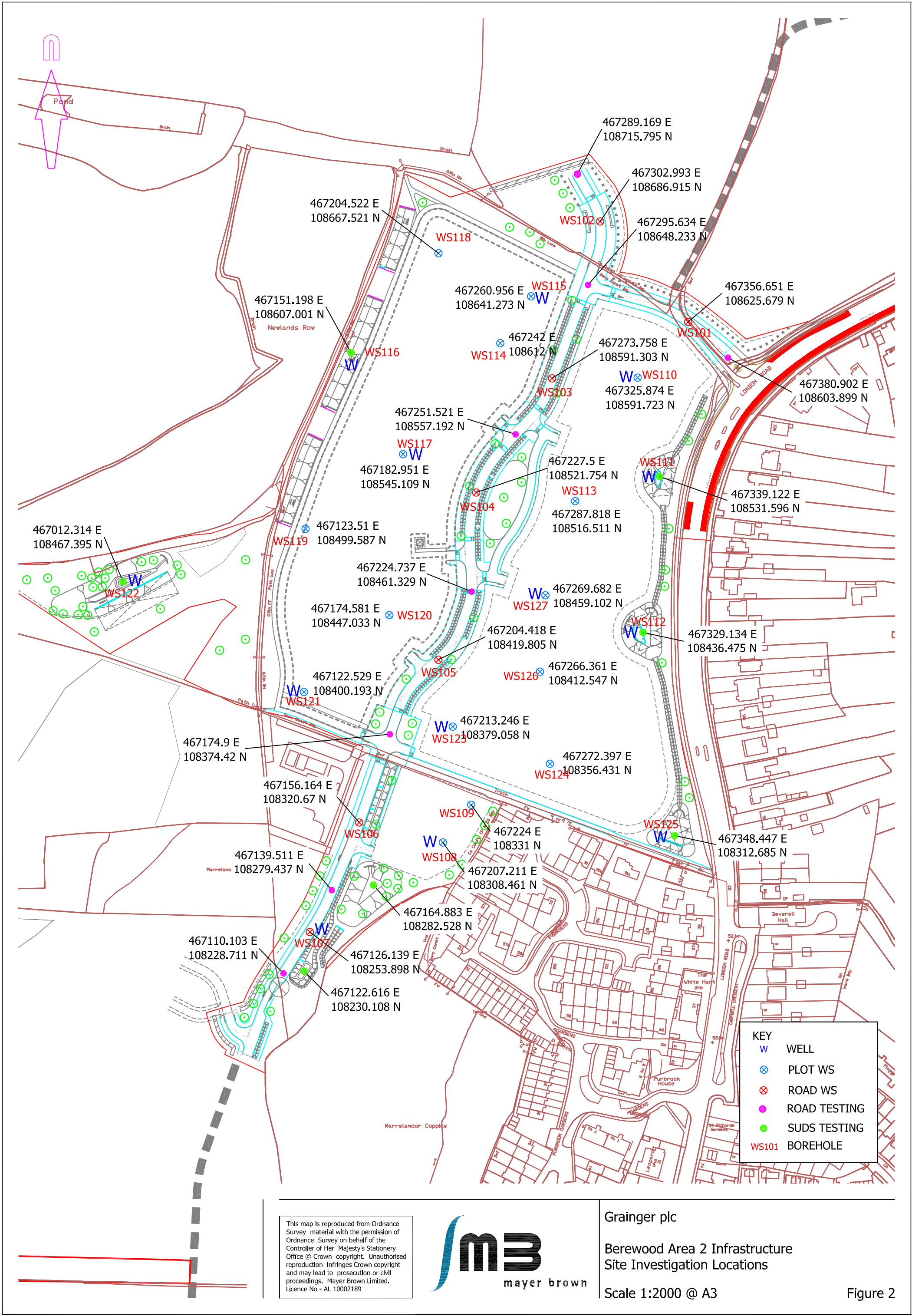
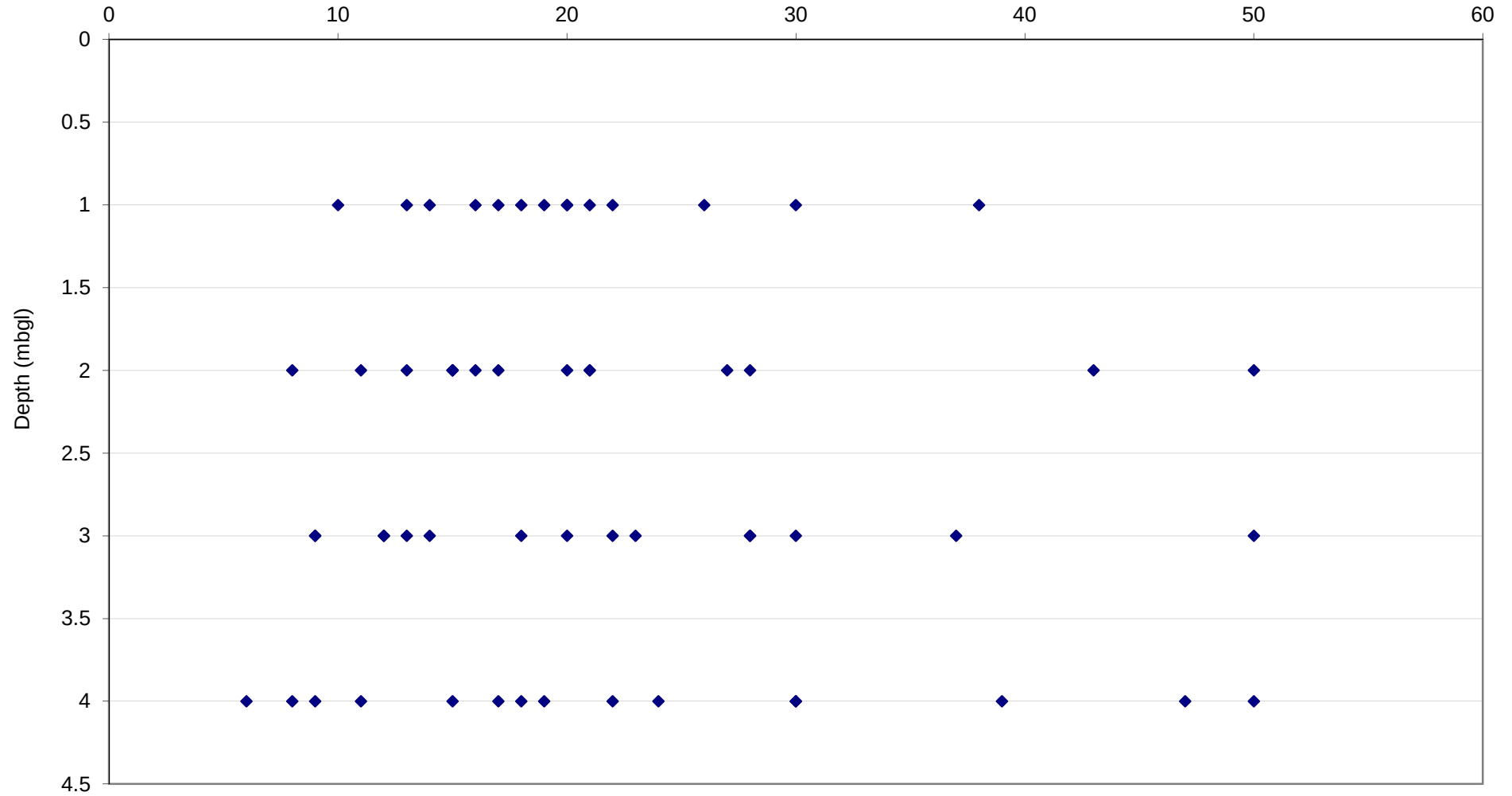


FIGURE 3 SPT V DEPTH

SPT N Value



APPENDIX A: REPORT CONDITIONS

*This report is produced solely for the benefit of **Granger Plc.** and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.*

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, study of readily accessible referenced historical records, information supplied by those parties noted in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented in good faith without exhaustive clarification. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to detailed activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, not revealed by this research cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categorical assurances that they will be accepted by Authorities or Funds etc. without question, as such bodies may have unpublished, often more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to Mayer Brown Ltd. In time improved practices or amended legislation may necessitate a re-assessment.

The report is necessarily limited to those aspects of land contamination specifically reported on and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents that may occur. The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists this can only practically be better assessed following extensive on and off site intrusive investigations and monitoring.

APPENDIX B: ENGINEERING LOGS



Borehole Log

Borehole No
WS101

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467356.00 - 108625.00	Hole Type WLS
Location: Waterlooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 21-01-2013 -		Logged By AP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.80-1.00	D		0.80			MADE GROUND (Brown medium to coarse rounded fling GRAVEL with geotextile membrane at 0.5mbgl and 0.8mbgl. Becoming orange brown and slightly sandy from 0.5mbgl.)	
		1.00	C	2,4,4,5,5,6				Orange brown fine to medium slightly clayey to clayey laminated SAND	1
		2.00	C	1,2,2,2,2,2					2
		2.50-3.00	C						
		3.00	C	1,1,1,2,3,3					3
		4.00	C	1,1=150,1,2,3	4.00				4
									5

Remarks:	
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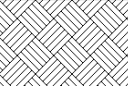
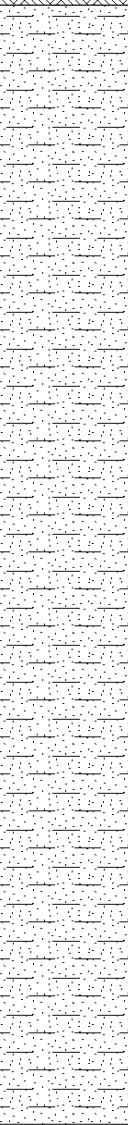


Borehole Log

Borehole No
WS102

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467302.00 - 108686.00	Hole Type WLS
Location: Waterlooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 21-01-2013 -		Logged By AP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.40-1.00	C		0.30			TOPSOIL (Dark brown slightly silty fine SAND)	
		1.00	C	3,3,3,3,4,4				Orange brown fine to medium slightly clayey to clayey laminated SAND	1
		2.00 2.00-3.00	C C	2,3,3,3,4,5					2
		3.00	C	2,3,3,2,3,4					3
		4.00	C	4,4,4,3,5,6	4.00				4
									5

Remarks:	
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Borehole Log

Borehole No

WS103

Sheet 1 of 1

Project Name

Berewood Area 2

Project No

16054

Co-ords: 467273.00 - 108591.00

Hole Type

WLS

Location: Waterloooville

Level: m AOD

Scale

1:25

Client: Granger PLC

Dates: 21-01-2013 -

Logged By

AP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL (Dark brown slightly silty fine SAND)	
		0.50	D					Orange brown fine to medium slightly clayey to clayey laminated SAND	
		1.00 1.00-2.00	C C	2,4,4,4,5,5					1
		2.00	C	3,4,5,5,5,5					2
		3.00	C	2,1,5,6,6,6					3
		4.00	C	2,2,2,3,3,3	4.00				4
									5

Remarks:



Borehole Log

Borehole No
WS104

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467227.00 - 108521.00	Hole Type WLS
Location: Waterloooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 21-01-2013 -		Logged By AP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.30-1.00	C		0.30			TOPSOIL (Dark brown slightly silty fine SAND)	
		1.00	C	2,5,4,6,6,7				Orange brown fine to medium slightly clayey to clayey laminated SAND	1
		1.50-2.00	C						
		2.00	C	3,5,4,4,4,5					2
		3.00	C	3,3,6,6,5,6					3
		4.00	C	2,2,5,5,6,6	4.00				4
									5

Remarks:	
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Borehole Log

Borehole No
WS105

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467204.00 - 108419.00	Hole Type WLS
Location: Waterloooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 21-01-2013 -		Logged By AP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL (Dark brown slightly silty fine SAND)	
								Orange brown fine to medium slightly clayey to clayey laminated SAND	
		1.00	C	2,2,3,3,3,4					1
		2.00	C	5,5,5,7,7,9					2
		3.00	C	1,1,2,3,8,14					3
		4.00	C	4,6,8,10,14,15	4.00				4
									5

Remarks:	
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Borehole Log

Borehole No
WS106

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467156.00 - 108320.00	Hole Type WLS
Location: Waterloooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 22-01-2013 -		Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL (Dark brown slightly silty fine SAND)	
								Orange brown fine to medium slightly clayey to clayey laminated SAND	
		1.00	C	2,3,3,5,5,6					1
		2.00	C	1,3,5,5,5,6					2
		3.00	C	2,2,5,7,8,10					3
		4.00	C	3,4,6,6,8,10	4.00				4
									5

Remarks:	
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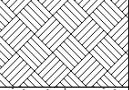
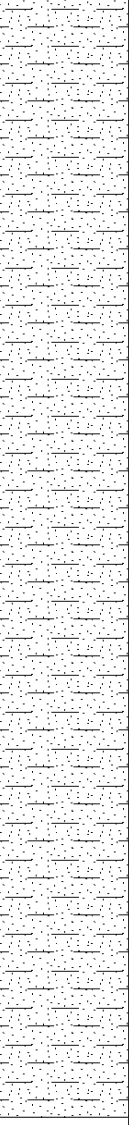


Borehole Log

Borehole No
WS107

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467126.00 - 108253.00	Hole Type WLS
Location: Waterlooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 22-01-2013 -		Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.30-1.00	C		0.30			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
		1.00	C	3,5,5,7,7,7				Orange brown fine to medium slightly clayey to clayey laminated SAND	1
		1.50-2.00	C						
		2.00	C	3,4,6,5,5,5					2
		2.50-3.00	C						
		3.00	C	2,4,5,5,5,5					3
		3.50-4.00	D						
		4.00	C	1,2,5,5,7,7	4.00				4
									5

Remarks: Collapse to 2.5mbgl	
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Borehole Log

Borehole No

WS108

Sheet 1 of 1

Project Name

Berewood Area 2

Project No

16054

Co-ords: 467207.00 - 108308.00

Hole Type

WLS

Location: Waterlooville

Level: m AOD

Scale

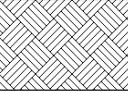
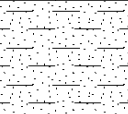
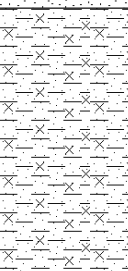
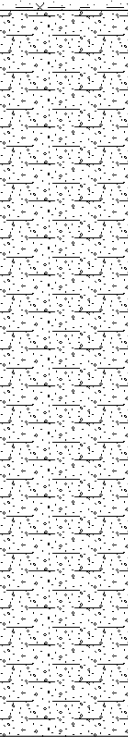
1:25

Client: Granger PLC

Dates: 22-01-2013 -

Logged By

SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES		0.30			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	1
					0.70			Orange brown fine to medium slightly clayey to clayey laminated SAND	
					1.60			Soft to firm light brown mottled grey slightly silty sandy CLAY	
		1.60-2.00	D					Orange brown mottled grey slightly clayey slightly gravelly fine to medium SAND. Gravel is fine to medium sub-angular to rounded flint.	2
		2.00	C	2,2,3,3,5,5					
		2.50-3.00	D						
		3.00	C	2,3,3,3,4,4					3
		3.50-4.00	C						
		4.00	C	1,2,6,5,4,4	4.00				4
									5

Remarks:



Borehole Log

Borehole No
WS109

Sheet 1 of 1

Project Name
Berewood Area 2

Project No
16054

Co-ords: 467224.00 - 108331.00

Hole Type
WLS

Location: Waterloooville

Level: m AOD

Scale
1:25

Client: Granger PLC

Dates: 22-01-2013 -

Logged By
SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES		0.60			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
		1.00	C	3,5,6,7,9,8				Orange brown fine to medium slightly clayey to clayey laminated SAND	
		1.50	ES						
		2.00	C	3,3,3,4,4,4					
		3.00	C	3,4,4,4,6,5					
		4.00	C	2,3,3,4,4,4	4.00				
									5

Remarks:

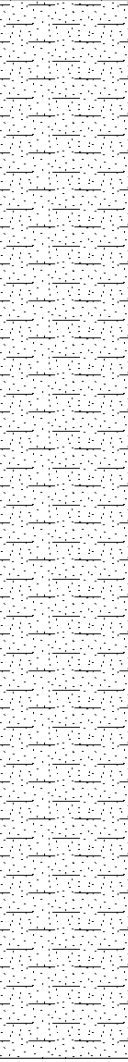


Borehole Log

Borehole No
WS110

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467325.00 - 108591.00	Hole Type WLS
Location: Waterloooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 23-01-2013 -		Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.50 0.50-1.00	ES C		0.50			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
		1.00	C	2,2,3,4,5,5				Orange brown fine to medium slightly clayey to clayey laminated SAND	1
		1.50-2.00	C						
		2.00	C	2,2,3,4,4,4					2
		2.50-3.00	C						
		3.00	C	2,2,2,3,2,2					3
		3.50-4.00	D						
		4.00	C	2,2,2,2,2,2	4.00				4
									5

Remarks:	
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Borehole Log

Borehole No

WS111

Sheet 1 of 1

Project Name

Berewood Area 2

Project No

16054

Co-ords: 467339.00 - 108531.00

Hole Type

WLS

Location: Waterlooville

Level: m AOD

Scale

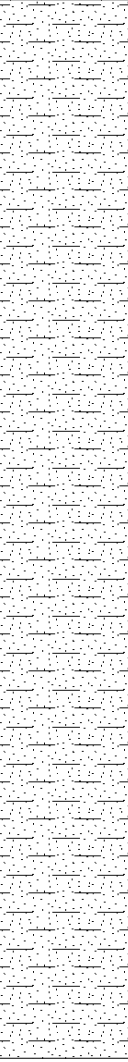
1:25

Client: Granger PLC

Dates: 23-01-2013 -

Logged By

SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
					0.50			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
								Orange brown fine to medium slightly clayey to clayey laminated SAND	1 2 3 4 5

Remarks:

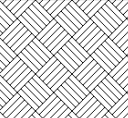
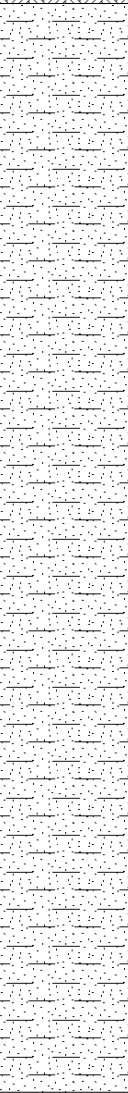


Borehole Log

Borehole No
WS112

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467329.00 - 108436.00	Hole Type WLS
Location: Waterlooville		Level: m AOD	Scale 1:25
Client: Granger PLC		Dates: 23-01-2013 -	Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
					0.40			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
								Orange brown fine to medium slightly clayey to clayey laminated SAND	1 2 3 4 5

Remarks:	
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Borehole Log

Borehole No

WS113

Sheet 1 of 1

Project Name

Berewood Area 2

Project No

16054

Co-ords: 467287.00 - 108516.00

Hole Type

WLS

Location: Waterlooville

Level: m AOD

Scale

1:25

Client: Granger PLC

Dates: 23-01-2013 -

Logged By

SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES		0.50			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
		1.50	ES		2.00			Orange brown fine to medium slightly clayey to clayey laminated SAND	1
									2
									3
									4
									5

Remarks:



Borehole Log

Borehole No
WS114

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467242.00 - 108612.00	Hole Type WLS
Location: Waterloooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 23-01-2013 -		Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES		0.50			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
		1.50	ES		2.00			Orange brown fine to medium slightly clayey to clayey laminated SAND	1
									2
									3
									4
									5

Remarks:	
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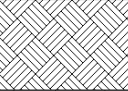
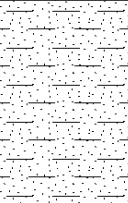
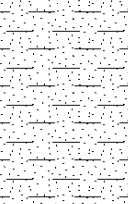
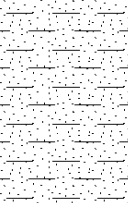
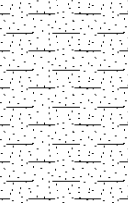
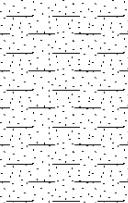


Borehole Log

Borehole No
WS115

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467260.00 - 108641.00	Hole Type WLS
Location: Waterloooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 23-01-2013 -		Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.50 0.50-1.00	ES D		0.30			TOPSOIL (Dark brown slightly silty fine SAND)	
		1.00	C	3,3,4,4,4,4				Orange brown fine to medium slightly clayey to clayey laminated SAND	1
		1.50-2.00	C						
		2.00	C	1,2,3,3,3,4					2
		3.00	C	3,2,3,3,4,3					3
		4.00	C	2,2,2,2,2,3	4.00				4
									5

Remarks:	
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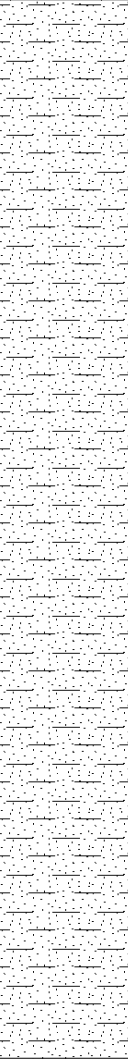


Borehole Log

Borehole No
WS116

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467151.00 - 108607.00	Hole Type WLS
Location: Waterlooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 23-01-2013 -		Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
					0.50			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
								Orange brown fine to medium slightly clayey to clayey laminated SAND	1
									2
									3
					4.00				4
									5

Remarks:	
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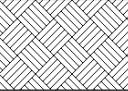
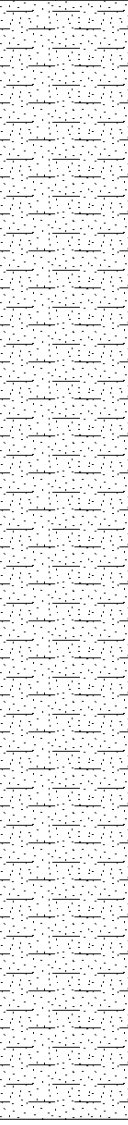


Borehole Log

Borehole No
WS117

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467182.00 - 108545.00	Hole Type WLS
Location: Waterloooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 23-01-2013 -		Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.50 0.50-1.00	ES C		0.30			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
		1.00	C	1,1,1,1,4,4				Orange brown fine to medium slightly clayey to clayey laminated SAND	1
		1.50-2.00	D						
		2.00	C	3,3,3,2,3,3					2
		2.50-3.00	C						
		3.00	C	2,2,3,3,2,4					3
		3.40-3.90	C						
		4.00	C	3,3,4,4,4,5	4.00				4
									5

Remarks:	
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Borehole Log

Borehole No
WS118

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467204.00 - 108667.00	Hole Type WLS
Location: Waterloooville		Level: m AOD	Scale 1:25
Client: Granger PLC		Dates: 24-01-2013 -	Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL (Dark brown slightly silty fine SAND)	
		0.50	ES					Orange brown fine to medium slightly clayey to clayey laminated SAND	
									1
		1.50	ES						
					2.00				2
									3
									4
									5

Remarks:	
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Borehole Log

Borehole No

WS119

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467123.00 - 108499.00	Hole Type WLS
Location: Waterloooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 24-01-2013 -		Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.30			0.30			TOPSOIL (Dark brown slightly silty fine SAND)	
		0.50	ES					Orange brown fine to medium slightly clayey to clayey laminated SAND	
		1.50	ES						1
					2.00				2
									3
									4
									5

Remarks:



Borehole Log

Borehole No
WS120

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467174.00 - 108447.00	Hole Type WLS
Location: Waterloooville		Level: m AOD	Scale 1:25
Client: Granger PLC		Dates: 24-01-2013 -	Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.30			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
		0.50						Orange brown fine to medium slightly clayey to clayey laminated SAND	
		1.50	ES		2.00				1
									2
									3
									4
									5

Remarks:



Borehole Log

Borehole No

WS121

Sheet 1 of 1

Project Name

Berewood Area 2

Project No

16054

Co-ords: 467122.00 - 108400.00

Hole Type

WLS

Location: Waterlooville

Level: m AOD

Scale

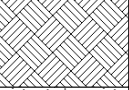
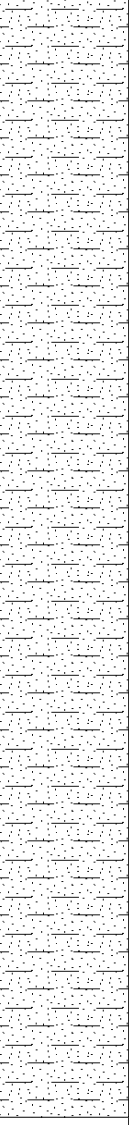
1:25

Client: Granger PLC

Dates: 24-01-2013 -

Logged By

SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
		0.50 0.50-1.00	ES C					Orange brown fine to medium slightly clayey to clayey laminated SAND	
		1.00	C	5,5,8,10,10,10					1
		1.50-2.00	C						
		2.00	C	4,5,6,7,6,8					2
		2.50-3.00	C						
		3.00	C	4,4,6,6,6,8					3
		3.50-4.00	C						
		4.00	C	14,11,13,13,13,14	4.00				4
									5

Remarks: Collapsed to 3.0mbgl

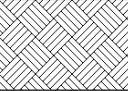
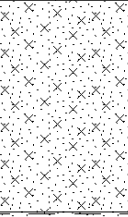
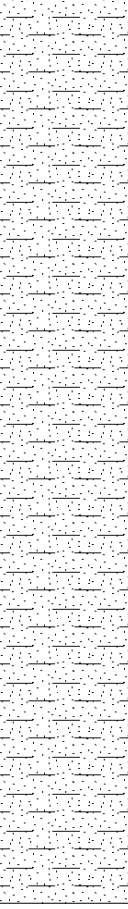


Borehole Log

Borehole No
WS122

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467012.00 - 108467.00	Hole Type WLS
Location: Waterloooville		Level: m AOD	Scale 1:25
Client: Granger PLC		Dates: 24-01-2013 -	Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
					1.00			Dark brown silty fine to medium SAND	1
								Orange brown fine to medium slightly clayey to clayey laminated SAND	2
					4.00				3
									4
									5

Remarks: Collapsed to 3.0mbgl	
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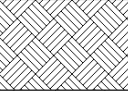
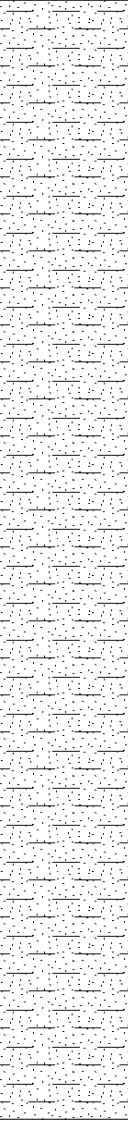


Borehole Log

Borehole No
WS123

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467213.00 - 108379.00	Hole Type WLS
Location: Waterloooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 24-01-2013 -		Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL (Dark brown slightly silty fine SAND)	
		0.50	ES					Orange brown fine to medium slightly clayey to clayey laminated SAND	1
									2
		1.50	ES						3
					4.00				4
									5

Remarks: Collapsed to 3.0mbgl	
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Borehole Log

Borehole No
WS124

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467272.00 - 108356.00	Hole Type WLS
Location: Waterlooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 24-01-2013 -		Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.50 0.50-1.00	ES C		0.30			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
		1.00	C	3,4,5,5,5,5				Orange brown fine to medium slightly clayey to clayey laminated SAND	1
		1.50-2.00	C						
		2.00	C	5,8,8,9,13,13					2
		2.50-3.00	C						
		3.00	C	6,5,6,8,7,7					3
		4.00	C	5,7,9,9,10,11	4.00				4
									5

Remarks:	
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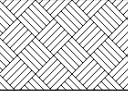
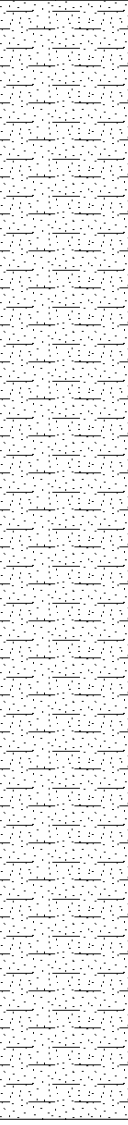


Borehole Log

Borehole No
WS125

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467348.00 - 108312.00	Hole Type WLS
Location: Waterloooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 25-01-2013 -		Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL (Dark brown slightly silty fine SAND)	
								Orange brown fine to medium slightly clayey to clayey laminated SAND	
					4.00				

Remarks:	
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Borehole Log

Borehole No
WS126

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467266.00 - 108412.00	Hole Type WLS
Location: Waterloooville		Level: m AOD	Scale 1:25
Client: Granger PLC		Dates: 25-01-2013 -	Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES		0.30			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
		1.50	ES					Orange brown fine to medium slightly clayey to clayey laminated SAND	1
					2.00				2
									3
									4
									5

Remarks:

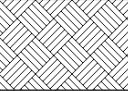
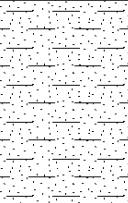
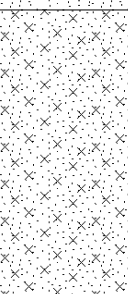
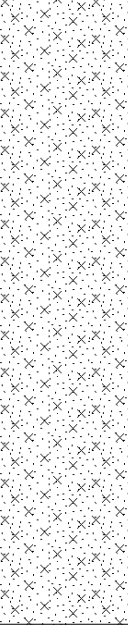


Borehole Log

Borehole No
WS127

Sheet 1 of 1

Project Name Berewood Area 2	Project No 16054	Co-ords: 467269.00 - 108459.00	Hole Type WLS
Location: Waterlooville	Level: m AOD		Scale 1:25
Client: Granger PLC	Dates: 25-01-2013 -		Logged By SS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m AOD)	Reference	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL (Dark brown silty, slightly gravelly fine to medium SAND. Gravel is fine sub-angular to rounded flint.)	
		0.50 0.50-1.00	ES C					Orange brown fine to medium slightly clayey to clayey laminated SAND	
		1.00	C	4,5,5,6,5,6	1.00			Orange brown mottled grey slightly silty fine to medium SAND	1
		1.50-2.00	C						
		2.00	C	8,12,16,16,17,18					2
		2.50-3.00	D						
		3.00	C	9,10,13,11,13,13					3
		3.50-4.00	C						
		4.00	C	8,7,7,8,7,8	4.00				4
									5

Remarks: Collapsed to 3.0mbgl	
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APPENDIX C: GENERIC ASSESSMENT CRITERIA

SOIL - TIER ONE HUMAN HEALTH SCREENING VALUES

Status	End Use	Issue No	Issue Date
ISSUE	Residential	1	01/09/10
</			

NOTES

- 1) Compare individual samples values against Soil Screening Values (SSV). If exceedances are noted consider further in relation to averaging areas and statistical analysis.
- 2) These values are for initial screening for potential **risk to human health only**. They are **not remediation thresholds**. **Screening for other receptors to be done separately as appropriate for the site, e.g. for water, ecology, building materials.**
- 3) Screening criteria denoted with an asterisk (*) were capped at the lower vapour/aqueous saturation limits for Tier 1 human health risk assessment purposes and considered **conservative**. Where concentrations are recorded at levels greater than the SSV, free phase (NAPL) contamination may be present and should be considered qualitatively. Further information to support the interpretation of assessment criteria that exceed theoretical soil saturation limits is provided in Section 4.12 of the CLEA Software Handbook (SR4).
- 4) Screening criteria denoted with hash (#) were capped at 1000000mg/kg. It is noted that aesthetic (e.g. odour) and other site specific factors may also be relevant when providing advice relating to these compounds.
- 5) SSVs are given here only for commonly encountered chemical constituents listed above.
- 6) SSVs derived for certain constituents may be low in relation to standard laboratory Limits of Detection (LoD). It is the responsibility of the project engineer to check with the laboratory that appropriate detection limits can be achieved. As a target, an LoD would be no larger than 10% of the SSV, but this is not practicable for some constituents. Clearly an LoD greater than the SSV would prevent use of this SSV screening and/or be interpreted as if all samples exceeded the SSV.
- 7) **Human Health Soil Screening Values (SSV) were** calculated using a Soil Organic Matter (SOM) value of 1.0%, 2.5% and 6%. This is equivalent to an Fraction Organic Carbon (FOC) values of approx. 0.6%, 1.45% and 3.5% respectively (For reference FOC = 0.58*SOM). **Note that some soils have different SOM/FOC, which may give require more stringent SSVs for organic compounds. It is the responsibility of the project engineer to check the SOM with the site specific conditions.**
- 8) In general, SSVs above 100mg/kg are rounded down to 3 significant figures. Similarly, SSVs below 100mg/kg are rounded down to 2 significant figures

APPENDIX D: SOIL SCREENING SUMMARY

1. CLEA Soil Guideline Value (CLEA v.1.06)
2. LQM CIEH GAC (2nd Edition)
3. SGV Report 10
4. EIC/AGS/CL/AIRE GAC (CLEA v.1.06)
5. Acute effects infant 1 dose 3g soil
%SOM = FOC (100/0.58)

NA Not available
NFD No ACM Detected
- Not analysed
NDP No Detection Possible (see laboratory certificates)
ND None Detected

APPENDIX E: CHEMICAL ANALYSIS RESULTS



Mayer Brown Ltd
Lion House
Oriental Road
Woking
Surrey
GU22 8AR

Attention: Antony Platt

CERTIFICATE OF ANALYSIS

Date: 14 February 2013
Customer: H_MAYERBROW_WOK
Sample Delivery Group (SDG): 130130-32
Your Reference:
Location: Waterloooville
Report No: 212070

We received 23 samples on Wednesday January 30, 2013 and 23 of these samples were scheduled for analysis which was completed on Thursday February 14, 2013. 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





SDG:	130130-32	Location:	Waterlooville	Order Number:	R/GTWVile6.9
Job:	H_MAYERBROW_WOK-6	Customer:	Mayer Brown Ltd	Report Number:	212070
Client Reference:		Attention:	Antony Platt	Superseded Report:	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
6838979	WS108		0.50	22/01/2013
6838980	WS109		0.50	22/01/2013
6838981	WS109		1.50	22/01/2013
6838982	WS110		0.50	23/01/2013
6838983	WS113		0.50	23/01/2013
6838984	WS113		1.50	23/01/2013
6838985	WS114		0.50	23/01/2013
6838986	WS114		1.50	23/01/2013
6838987	WS115		0.50	23/01/2013
6838988	WS117		0.50	23/01/2013
6838989	WS118		0.50	24/01/2013
6838990	WS118		1.50	24/01/2013
6838991	WS119		0.50	24/01/2013
6838992	WS119		1.50	24/01/2013
6838993	WS120		0.50	24/01/2013
6838995	WS120		1.50	24/01/2013
6838996	WS121		0.50	24/01/2013
6838997	WS123		0.50	24/01/2013
6838998	WS123		1.50	24/01/2013
6838999	WS124		0.50	24/01/2013
6839000	WS126		0.50	25/01/2013
6839001	WS126		1.50	25/01/2013
6839002	WS127		0.50	25/01/2013

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



SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

SOLID Results Legend X Test N No Determination Possible	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container	
	6838992		WS119				1.50		250g Amber Jar (AL 60g VOC (ALEE215))	
	6838991		WS119				0.50		400g Tub (ALEE214)	
	6838990		WS118				1.50		250g Amber Jar (AL 60g VOC (ALEE215))	
	6838989		WS118				0.50		400g Tub (ALEE214)	
Ammonium Soil by Titration	All		NDPs: 0 Tests: 22							
Anions by Kone (soil)	All		NDPs: 0 Tests: 23							
Asbestos Identification (Soil)	All		NDPs: 0 Tests: 23							
Boron Water Soluble	All		NDPs: 0 Tests: 23							
Cyanide Comp/Free/Total/Thiocyanate	All		NDPs: 0 Tests: 23							
EPH CWG (Aliphatic) GC (S)	All		NDPs: 0 Tests: 23							
EPH CWG (Aromatic) GC (S)	All		NDPs: 0 Tests: 23							
GRO by GC-FID (S)	All		NDPs: 0 Tests: 23							
Metals by iCap-OES (Soil)	Antimony		NDPs: 0 Tests: 23							
	Arsenic		NDPs: 0 Tests: 23							
	Barium		NDPs: 0 Tests: 23							
	Beryllium		NDPs: 0 Tests: 23							
Cadmium			NDPs: 0 Tests: 23							
Chromium			NDPs: 0 Tests: 23							
Copper			NDPs: 0 Tests: 23							



CERTIFICATE OF ANALYSIS

SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloo
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

SOLID Results Legend X Test N No Determination Possible	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container	
	6838992	WS119					1.50		250g Amber Jar (AL	
	6838991	WS119					0.50		60g VOC (ALE215)	
									400g Tub (ALE214)	
									250g Amber Jar (AL	
Metals by iCap-OES (Soil)	Lead	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X
	Mercury	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X
	Molybdenum	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X
	Nickel	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X
	Selenium	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X
	Zinc	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X
PAH by GCMS	All	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X
pH	All	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X
Phenols by HPLC (S)	All	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X
Sample description	All	NDPs: 0 Tests: 21	X	X	X	X	X	X	X	X
Total Organic Carbon	All	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X
TPH CWG GC (S)	All	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X



SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloo
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

SOLID Results Legend X Test N No Determination Possible	Lab Sample No(s)											
	Customer Sample Reference											
	AGS Reference											
	Depth (m)											
	Container											
			6838992	6838993	6838995	6838996	6838997	6838998	6838999	6839000	6839001	6839002
			WS119	WS120	WS120	WS121	WS123	WS123	WS124	WS126	WS126	WS127
			1.50	0.50	1.50	0.50	0.50	1.50	0.50	0.50	1.50	0.50
			60g VOC (ALE215) 400g Tub (ALE214)	60g VOC (ALE215) 400g Tub (ALE214)	60g VOC (ALE215) 400g Tub (ALE214)	60g VOC (ALE215) 400g Tub (ALE214)	60g VOC (ALE215) 400g Tub (ALE214)	60g VOC (ALE215) 400g Tub (ALE214)	60g VOC (ALE215) 400g Tub (ALE214)	60g VOC (ALE215) 400g Tub (ALE214)	60g VOC (ALE215) 400g Tub (ALE214)	60g VOC (ALE215) 400g Tub (ALE214)
Ammonium Soil by Titration	All	NDPs: 0 Tests: 22	X	X	X	X	X	X	X	X	X	X
Anions by Kone (soil)	All	NDPs: 0 Tests: 23		X	X	X	X	X	X	X		X
Asbestos Identification (Soil)	All	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X	X	X
Boron Water Soluble	All	NDPs: 0 Tests: 23		X	X	X	X	X	X	X		X
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X	X	X
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 23		X	X	X	X	X	X	X		X
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 23		X	X	X	X	X	X	X		X
GRO by GC-FID (S)	All	NDPs: 0 Tests: 23	X	X	X	X	X	X	X	X	X	X
Metals by iCap-OES (Soil)	Antimony	NDPs: 0 Tests: 23		X	X	X	X	X	X	X		X
	Arsenic	NDPs: 0 Tests: 23		X	X	X	X	X	X	X		X
	Barium	NDPs: 0 Tests: 23		X	X	X	X	X	X	X		X
	Beryllium	NDPs: 0 Tests: 23		X	X	X	X	X	X	X		X
	Cadmium	NDPs: 0 Tests: 23		X	X	X	X	X	X	X		X
	Chromium	NDPs: 0 Tests: 23		X	X	X	X	X	X	X		X
	Copper	NDPs: 0 Tests: 23		X	X	X	X	X	X	X		X



CERTIFICATE OF ANALYSIS

SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

SOLID Results Legend X Test N No Determination Possible	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container	
	6838992		WS119				1.50		60g VOC (ALE215) 400g Tub (ALE214) 250g Amber Jar (AL)	
	6838993		WS120				0.50		60g VOC (ALE215) 400g Tub (ALE214) 250g Amber Jar (AL)	
	6838995		WS120				1.50		60g VOC (ALE215) 400g Tub (ALE214) 250g Amber Jar (AL)	
	6838996		WS121				0.50		60g VOC (ALE215) 400g Tub (ALE214) 250g Amber Jar (AL)	
Metals by iCap-OES (Soil)	6838997		WS123				0.50		60g VOC (ALE215) 400g Tub (ALE214) 250g Amber Jar (AL)	
	6838998		WS123				1.50		60g VOC (ALE215) 400g Tub (ALE214) 250g Amber Jar (AL)	
	6838999		WS124				0.50		60g VOC (ALE215) 400g Tub (ALE214) 250g Amber Jar (AL)	
	6839000		WS126				0.50		60g VOC (ALE215) 400g Tub (ALE214) 250g Amber Jar (AL)	
	6839001		WS126				1.50		60g VOC (ALE215) 400g Tub (ALE214) 250g Amber Jar (AL)	
	6839002		WS127				0.50		60g VOC (ALE215) 400g Tub (ALE214) 250g Amber Jar (AL)	
Lead		NDPs: 0 Tests: 23								
Mercury		NDPs: 0 Tests: 23								
Molybdenum		NDPs: 0 Tests: 23								
Nickel		NDPs: 0 Tests: 23								
Selenium		NDPs: 0 Tests: 23								
Zinc		NDPs: 0 Tests: 23								
PAH by GCMS	All	NDPs: 0 Tests: 23								
pH	All	NDPs: 0 Tests: 23								
Phenols by HPLC (S)	All	NDPs: 0 Tests: 23								
Sample description	All	NDPs: 0 Tests: 21								
Total Organic Carbon	All	NDPs: 0 Tests: 23								
TPH CWG GC (S)	All	NDPs: 0 Tests: 23								



SDG:	130130-32	Location:	Waterlooville	Order Number:	R/GTWVile6.9
Job:	H_MAYERBROW_WOK-6	Customer:	Mayer Brown Ltd	Report Number:	212070
Client Reference:		Attention:	Antony Platt	Superseded Report:	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2
6838979	WS108	0.50	Light Brown	Silty Clay Loam	0.063 - 0.1 mm	Vegetation	N/A
6838980	WS109	0.50	Light Brown	Sandy Clay Loam	0.063 - 0.1 mm	N/A	N/A
6838981	WS109	1.50	Light Brown	Sandy Loam	0.063 - 0.1 mm	N/A	N/A
6838982	WS110	0.50	Light Brown	Sandy Loam	0.063 - 0.1 mm	N/A	N/A
6838983	WS113	0.50	Light Brown	Sandy Silt Loam	0.063 - 0.1 mm	N/A	N/A
6838984	WS113	1.50	Light Brown	Loamy Sand	0.063 - 0.1 mm	N/A	N/A
6838985	WS114	0.50	Dark Brown	Sandy Clay Loam	0.063 - 0.1 mm	N/A	N/A
6838986	WS114	1.50	Light Brown	Sandy Silt Loam	0.063 - 0.1 mm	N/A	N/A
6838987	WS115	0.50	Light Brown	Sandy Clay Loam	0.063 - 0.1 mm	N/A	N/A
6838988	WS117	0.50	Light Brown	Clay Loam	0.063 - 0.1 mm	N/A	N/A
6838989	WS118	0.50	Light Brown	Sandy Clay Loam	0.063 - 0.1 mm	N/A	N/A
6838990	WS118	1.50	Light Brown	Sandy Clay Loam	0.063 - 0.1 mm	N/A	N/A
6838991	WS119	0.50	Light Brown	Sandy Silt Loam	0.063 - 0.1 mm	None	None
6838992	WS119	1.50	Beige	Silty Clay Loam	0.063 - 0.1 mm	None	None
6838993	WS120	0.50	Light Brown	Sand	<0.063 mm	None	None
6838995	WS120	1.50	Beige	Sand	0.063 - 0.1 mm	None	None
6838996	WS121	0.50	Light Brown	Sandy Silt Loam	0.063 - 0.1 mm	None	None
6838997	WS123	0.50	Light Brown	Sandy Silt Loam	0.063 - 0.1 mm	Stones	None
6838998	WS123	1.50	Beige	Sand	0.1 - 2 mm	None	None
6838999	WS124	0.50	Light Brown	Sandy Clay	0.1 - 2 mm	Vegetation	Stones
6839000	WS126	0.50	Light Brown	Silty Clay	0.1 - 2 mm	None	None
6839001	WS126	1.50	Light Brown	Silty Clay	0.063 - 0.1 mm	None	None
6839002	WS127	0.50	Light Brown	Silt Loam	0.1 - 2 mm	None	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

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 materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

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Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

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SDG: 130130-32
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Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

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CERTIFICATE OF ANALYSIS

SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
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TPH CWG (S)

Results Legend			Customer Sample R		WS108	WS109	WS109	WS110	WS113	WS113
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		0.50	0.50	1.50	0.50	0.50	1.50
M	mCERTS accredited.				Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
aq	Aqueous / settled sample.				22/01/2013	22/01/2013	22/01/2013	23/01/2013	23/01/2013	23/01/2013
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				30/01/2013	30/01/2013	30/01/2013	30/01/2013	30/01/2013	30/01/2013
(F)	Trigger breach confirmed				130130-32	130130-32	130130-32	130130-32	130130-32	130130-32
1-48*\$@	Sample deviation (see appendix)				6838979	6838980	6838981	6838982	6838983	6838984
Component	LOD/Units	Method								
GRO Surrogate % recovery**	%	TM089			104	176	125	105	118	160
AI GRO TOT	<0.044 mg/kg	TM089			<0.044 M	<0.044 M	<0.044 M	<0.044 M	<0.044 M	<0.044 M
Methyl tertiary butyl ether (MTBE)	<0.005 mg/kg	TM089			<0.005 M	<0.005 M	<0.005 M	<0.005 M	<0.005 M	<0.005 M
Benzene	<0.01 mg/kg	TM089			<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M
Toluene	<0.002 mg/kg	TM089			<0.002 M	<0.002 M	<0.002 M	<0.002 M	<0.002 M	<0.002 M
Ethylbenzene	<0.003 mg/kg	TM089			<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M
m,p-Xylene	<0.006 mg/kg	TM089			<0.006 M	<0.006 M	<0.006 M	<0.006 M	<0.006 M	<0.006 M
o-Xylene	<0.003 mg/kg	TM089			<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M
sum of detected mpo xylene by GC	<0.009 mg/kg	TM089			<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
sum of detected BTEX by GC	<0.024 mg/kg	TM089			<0.024	<0.024	<0.024	<0.024	<0.024	<0.024
Aliphatics >C5-C6	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C8-C10	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	<0.1 mg/kg	TM173			23.6	109	15.5	<0.1	<0.1	<0.1
Aliphatics >C16-C21	<0.1 mg/kg	TM173			3.06	9.58	1.61	<0.1	<0.1	<0.1
Aliphatics >C21-C35	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	1.6	<0.1	<0.1
Aliphatics >C35-C44	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aliphatics >C12-C44	<0.1 mg/kg	TM173			26.6	119	17.2	1.6	<0.1	<0.1
Aromatics >EC5-EC7	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC7-EC8	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	<0.1 mg/kg	TM173			<0.1	10.7	<0.1	<0.1	<0.1	<0.1
Aromatics >EC16-EC21	<0.1 mg/kg	TM173			<0.1	3.28	<0.1	<0.1	<0.1	<0.1
Aromatics >EC21-EC35	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	3.25	<0.1	<0.1
Aromatics >EC35-EC44	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC40-EC44	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aromatics >EC12-EC44	<0.1 mg/kg	TM173			<0.1	14	<0.1	3.25	<0.1	<0.1
Total Aliphatics >C5-35	<0.1 mg/kg	TM173			26.6	119	17.2	1.6	<0.1	<0.1
Total Aromatics >C5-35	<0.1 mg/kg	TM173			<0.1	14	<0.1	3.25	<0.1	<0.1
Total Aliphatics & Aromatics >C5-35	<0.1 mg/kg	TM173			26.6	133	17.2	4.85	<0.1	<0.1

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CERTIFICATE OF ANALYSIS

SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

TPH CWG (S)

Results Legend			Customer Sample R		WS114	WS114	WS115	WS117	WS118	WS118
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		0.50	1.50	0.50	0.50	0.50	1.50
M	mCERTS accredited.				Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
aq	Aqueous / settled sample.				23/01/2013	23/01/2013	23/01/2013	23/01/2013	24/01/2013	24/01/2013
diss.filt	Dissolved / filtered sample.									
tot.unfilt	Total / unfiltered sample.				30/01/2013	30/01/2013	30/01/2013	30/01/2013	30/01/2013	30/01/2013
*	Subcontracted test.				130130-32	130130-32	130130-32	130130-32	130130-32	130130-32
**	% 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				6838985	6838986	6838987	6838988	6838989	6838990
(F)	Trigger breach confirmed									
1-48*\$@	Sample deviation (see appendix)									
Component	LOD/Units	Method								
GRO Surrogate % recovery**	%	TM089			137	124	140	136	123	127
AI GRO TOT	<0.044 mg/kg	TM089			<0.044 M	0.0593 M	<0.044 M	<0.044 M	<0.044 M	<0.044 M
Methyl tertiary butyl ether (MTBE)	<0.005 mg/kg	TM089			<0.005 M	<0.005 M	<0.005 M	<0.005 M	<0.005 M	<0.005 M
Benzene	<0.01 mg/kg	TM089			<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M
Toluene	<0.002 mg/kg	TM089			<0.002 M	<0.002 M	<0.002 M	<0.002 M	<0.002 M	<0.002 M
Ethylbenzene	<0.003 mg/kg	TM089			<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M
m,p-Xylene	<0.006 mg/kg	TM089			<0.006 M	<0.006 M	<0.006 M	<0.006 M	<0.006 M	<0.006 M
o-Xylene	<0.003 mg/kg	TM089			<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M
sum of detected mpo xylene by GC	<0.009 mg/kg	TM089			<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
sum of detected BTEX by GC	<0.024 mg/kg	TM089			<0.024	<0.024	<0.024	<0.024	<0.024	<0.024
Aliphatics >C5-C6	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C8-C10	<0.01 mg/kg	TM089			<0.01	0.0157	<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	<0.01 mg/kg	TM089			<0.01	0.0133	<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	<0.1 mg/kg	TM173			<0.1	4.86	<0.1	<0.1	<0.1	<0.1
Aliphatics >C16-C21	<0.1 mg/kg	TM173			<0.1	3.27	<0.1	<0.1	<0.1	<0.1
Aliphatics >C21-C35	<0.1 mg/kg	TM173			1.33	6.58	<0.1	<0.1	0.825	<0.1
Aliphatics >C35-C44	<0.1 mg/kg	TM173			<0.1	1.12	<0.1	<0.1	<0.1	<0.1
Total Aliphatics >C12-C44	<0.1 mg/kg	TM173			1.33	15.8	<0.1	<0.1	0.825	<0.1
Aromatics >EC5-EC7	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC7-EC8	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	<0.01 mg/kg	TM089			<0.01	0.0145	<0.01	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC16-EC21	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC21-EC35	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC35-EC44	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC40-EC44	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aromatics >EC12-EC44	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aliphatics >C5-35	<0.1 mg/kg	TM173			1.33	14.7	<0.1	<0.1	0.825	<0.1
Total Aromatics >C5-35	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aliphatics & Aromatics >C5-35	<0.1 mg/kg	TM173			1.33	14.7	<0.1	<0.1	0.825	<0.1

Order Number: R/GTWVile6.9
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CERTIFICATE OF ANALYSIS

SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

TPH CWG (S)

Results Legend			Customer Sample R		WS119	WS119	WS120	WS120	WS121	WS123
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		0.50	1.50	0.50	1.50	0.50	0.50
M	mCERTS accredited.				Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
aq	Aqueous / settled sample.				24/01/2013	24/01/2013	24/01/2013	24/01/2013	24/01/2013	24/01/2013
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				30/01/2013	30/01/2013	30/01/2013	30/01/2013	30/01/2013	30/01/2013
(F)	Trigger breach confirmed				130130-32	130130-32	130130-32	130130-32	130130-32	130130-32
1-48*\$@	Sample deviation (see appendix)				6838991	6838992	6838993	6838995	6838996	6838997
Component	LOD/Units	Method								
GRO Surrogate % recovery**	%	TM089			96	130	125	88	117	132
AI GRO TOT	<0.044 mg/kg	TM089			<0.044 M	<0.044 M	<0.044 M	<0.044 M	<0.044 M	<0.044 M
Methyl tertiary butyl ether (MTBE)	<0.005 mg/kg	TM089			<0.005 M	<0.005 M	<0.005 M	<0.005 M	<0.005 M	<0.005 M
Benzene	<0.01 mg/kg	TM089			<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M
Toluene	<0.002 mg/kg	TM089			<0.002 M	<0.002 M	<0.002 M	<0.002 M	<0.002 M	<0.002 M
Ethylbenzene	<0.003 mg/kg	TM089			<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M
m,p-Xylene	<0.006 mg/kg	TM089			<0.006 M	<0.006 M	<0.006 M	<0.006 M	<0.006 M	<0.006 M
o-Xylene	<0.003 mg/kg	TM089			<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M
sum of detected mpo xylene by GC	<0.009 mg/kg	TM089			<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
sum of detected BTEX by GC	<0.024 mg/kg	TM089			<0.024	<0.024	<0.024	<0.024	<0.024	<0.024
Aliphatics >C5-C6	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C8-C10	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	<0.1 mg/kg	TM173			2.44	<0.1	2.08	<0.1	1.61	1.15
Aliphatics >C16-C21	<0.1 mg/kg	TM173			2.49	<0.1	1.76	<0.1	<0.1	<0.1
Aliphatics >C21-C35	<0.1 mg/kg	TM173			2.06	<0.1	1.11	<0.1	1.6	<0.1
Aliphatics >C35-C44	<0.1 mg/kg	TM173			1.45	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aliphatics >C12-C44	<0.1 mg/kg	TM173			8.43	<0.1	4.94	<0.1	3.21	1.15
Aromatics >EC5-EC7	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC7-EC8	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	0.0103	<0.01	<0.01
Aromatics >EC10-EC12	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	<0.1 mg/kg	TM173			<0.1	<0.1	1.98	<0.1	2.13	2.28
Aromatics >EC16-EC21	<0.1 mg/kg	TM173			<0.1	<0.1	2.52	<0.1	2.46	2.72
Aromatics >EC21-EC35	<0.1 mg/kg	TM173			<0.1	<0.1	6.85	<0.1	7.2	8.21
Aromatics >EC35-EC44	<0.1 mg/kg	TM173			<0.1	<0.1	1.16	<0.1	1.22	1.47
Aromatics >EC40-EC44	<0.1 mg/kg	TM173			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aromatics >EC12-EC44	<0.1 mg/kg	TM173			<0.1	<0.1	12.5	<0.1	13	14.7
Total Aliphatics >C5-35	<0.1 mg/kg	TM173			6.98	<0.1	4.94	<0.1	3.21	1.15
Total Aromatics >C5-35	<0.1 mg/kg	TM173			<0.1	<0.1	11.3	<0.1	11.8	13.2
Total Aliphatics & Aromatics >C5-35	<0.1 mg/kg	TM173			6.98	<0.1	16.3	<0.1	15	14.4

Order Number: R/GTWVile6.9
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CERTIFICATE OF ANALYSIS

SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

TPH CWG (S)

Results Legend			Customer Sample R		WS123	WS124	WS126	WS126	WS127	
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		1.50	0.50	0.50	1.50	0.50	
M	mCERTS accredited.				Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	
aq	Aqueous / settled sample.				24/01/2013	24/01/2013	25/01/2013	25/01/2013	25/01/2013	
diss.filt	Dissolved / filtered sample.									
tot.unfilt	Total / unfiltered sample.				30/01/2013	30/01/2013	30/01/2013	30/01/2013	30/01/2013	
*	Subcontracted test.				130130-32	130130-32	130130-32	130130-32	130130-32	
**	% 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				6838998	6838999	6839000	6839001	6839002	
(F)	Trigger breach confirmed									
1-48*\$@	Sample deviation (see appendix)									
Component	LOD/Units	Method								
GRO Surrogate % recovery**	%	TM089			161	127	126	91	189	
AI GRO TOT	<0.044 mg/kg	TM089			<0.044 M	<0.044 M	<0.044 M	<0.044 M	<0.044 M	
Methyl tertiary butyl ether (MTBE)	<0.005 mg/kg	TM089			<0.005 M	<0.005 M	<0.005 M	<0.005 M	<0.005 M	
Benzene	<0.01 mg/kg	TM089			<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	
Toluene	<0.002 mg/kg	TM089			<0.002 M	<0.002 M	<0.002 M	<0.002 M	<0.002 M	
Ethylbenzene	<0.003 mg/kg	TM089			<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	
m,p-Xylene	<0.006 mg/kg	TM089			<0.006 M	<0.006 M	<0.006 M	<0.006 M	<0.006 M	
o-Xylene	<0.003 mg/kg	TM089			<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	
sum of detected mpo xylene by GC	<0.009 mg/kg	TM089			<0.009	<0.009	<0.009	<0.009	<0.009	
sum of detected BTEX by GC	<0.024 mg/kg	TM089			<0.024	<0.024	<0.024	<0.024	<0.024	
Aliphatics >C5-C6	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	
Aliphatics >C6-C8	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	
Aliphatics >C8-C10	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	
Aliphatics >C10-C12	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	
Aliphatics >C12-C16	<0.1 mg/kg	TM173			3.31	2.41	1.11	<0.1	<0.1	
Aliphatics >C16-C21	<0.1 mg/kg	TM173			1.54	2.15	1.48	<0.1	<0.1	
Aliphatics >C21-C35	<0.1 mg/kg	TM173			6.84	8.92	3.58	1.21	<0.1	
Aliphatics >C35-C44	<0.1 mg/kg	TM173			1.66	<0.1	<0.1	1.09	<0.1	
Total Aliphatics >C12-C44	<0.1 mg/kg	TM173			13.4	13.5	6.17	2.29	<0.1	
Aromatics >EC5-EC7	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	
Aromatics >EC7-EC8	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	
Aromatics >EC8-EC10	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	
Aromatics >EC10-EC12	<0.01 mg/kg	TM089			<0.01	<0.01	<0.01	<0.01	<0.01	
Aromatics >EC12-EC16	<0.1 mg/kg	TM173			<0.1	1.71	<0.1	<0.1	<0.1	
Aromatics >EC16-EC21	<0.1 mg/kg	TM173			<0.1	1.4	<0.1	<0.1	<0.1	
Aromatics >EC21-EC35	<0.1 mg/kg	TM173			<0.1	6.44	<0.1	<0.1	<0.1	
Aromatics >EC35-EC44	<0.1 mg/kg	TM173			<0.1	3	<0.1	<0.1	<0.1	
Aromatics >EC40-EC44	<0.1 mg/kg	TM173			<0.1	1.09	<0.1	<0.1	<0.1	
Total Aromatics >EC12-EC44	<0.1 mg/kg	TM173			<0.1	12.6	<0.1	<0.1	<0.1	
Total Aliphatics >C5-35	<0.1 mg/kg	TM173			11.7	13.5	6.17	1.21	<0.1	
Total Aromatics >C5-35	<0.1 mg/kg	TM173			<0.1	9.56	<0.1	<0.1	<0.1	
Total Aliphatics & Aromatics >C5-35	<0.1 mg/kg	TM173			11.7	23	6.17	1.21	<0.1	

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

14:38:21 14/02/2013



CERTIFICATE OF ANALYSIS

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Client Reference:

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Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Asbestos Identification - Soil

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS108 0.50 SOLID 22/01/2013 00:00:00 130130-32 6838979 TM048	12/02/13	Paul Poynton	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS109 0.50 SOLID 22/01/2013 00:00:00 130130-32 6838980 TM048	12/02/13	Paul Poynton	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS109 1.50 SOLID 22/01/2013 00:00:00 130130-32 6838981 TM048	12/02/13	Paul Poynton	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS110 0.50 SOLID 23/01/2013 00:00:00 130130-32 6838982 TM048	12/02/13	Chris Swindells	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS113 0.50 SOLID 23/01/2013 00:00:00 130130-32 6838983 TM048	12/02/13	Simon Postlewhite	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

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Job: H_MAYERBROW_WOK-6
Client Reference:

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Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS113 1.50 SOLID 23/01/2013 00:00:00 130130-32 6838984 TM048	12/02/13	Chris Swindells	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS114 0.50 SOLID 23/01/2013 00:00:00 130130-32 6838985 TM048	12/02/13	Simon Postlewhite	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS114 1.50 SOLID 23/01/2013 00:00:00 130130-32 6838986 TM048	12/02/13	Paul Poynton	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS115 0.50 SOLID 23/01/2013 00:00:00 130130-32 6838987 TM048	12/02/13	Simon Postlewhite	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS117 0.50 SOLID 23/01/2013 00:00:00 130130-32 6838988 TM048	12/02/13	Chris Swindells	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS118 0.50 SOLID 24/01/2013 00:00:00 130130-32 6838989 TM048	12/02/13	Simon Postlewhite	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



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Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS118 1.50 SOLID 24/01/2013 00:00:00 130130-32 6838990 TM048	12/02/13	Chris Swindells	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS119 0.50 SOLID 24/01/2013 00:00:00 130130-32 6838991 TM048	12/02/13	Chris Swindells	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS119 1.50 SOLID 24/01/2013 00:00:00 130130-32 6838992 TM048	12/02/13	Chris Swindells	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS120 0.50 SOLID 24/01/2013 00:00:00 130130-32 6838993 TM048	12/02/13	Chris Swindells	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS120 1.50 SOLID 24/01/2013 00:00:00 130130-32 6838995 TM048	12/02/13	Chris Swindells	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS121 0.50 SOLID 24/01/2013 00:00:00 130130-32 6838996 TM048	12/02/13	Paul Poynton	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

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Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS123 0.50 SOLID 24/01/2013 00:00:00 130130-32 6838997 TM048	12/02/13	Paul Poynton	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS123 1.50 SOLID 24/01/2013 00:00:00 130130-32 6838998 TM048	12/02/13	Chris Swindells	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS124 0.50 SOLID 24/01/2013 00:00:00 130130-32 6838999 TM048	12/02/13	Simon Postlewhite	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS126 0.50 SOLID 25/01/2013 00:00:00 130130-32 6839000 TM048	6/02/13	Martin Cotterell	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS126 1.50 SOLID 25/01/2013 00:00:00 130130-32 6839001 TM048	12/02/13	Simon Postlewhite	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS127 0.50 SOLID 25/01/2013 00:00:00 130130-32 6839002 TM048	12/02/13	Chris Swindells	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



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Report Number: 212070
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
ASB_PREP				
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
TM024	Method 4500A & B, AWWA/APHA, 20th Ed., 1999	Determination of Exchangeable Ammonium and Ammoniacal Nitrogen as N by titration on solids		
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material		
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC		
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)		
TM132	In - house Method	ELTRA CS800 Operators Guide		
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter		
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser		
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES		
TM218	Microwave extraction – EPA method 3546	Microwave extraction - EPA method 3546		
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer		
TM243		Mixed Anions In Soils By Kone		
TM321		Organic matter Content of Soil By Titration		

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



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Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Test Completion Dates

Lab Sample No(s)	6838979	6838980	6838981	6838982	6838983	6838984	6838985	6838986	6838987	6838988
Customer Sample Ref.	WS108	WS109	WS109	WS110	WS113	WS113	WS114	WS114	WS115	WS117
AGS Ref.										
Depth	0.50	0.50	1.50	0.50	0.50	1.50	0.50	1.50	0.50	0.50
Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Ammonium Soil by Titration	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013		07-Feb-2013	07-Feb-2013	07-Feb-2013
Anions by Kone (soil)	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013
Asbestos Identification (Soil)	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013
Boron Water Soluble	06-Feb-2013	06-Feb-2013	06-Feb-2013	07-Feb-2013	06-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013
Cyanide Comp/Free/Total/Thiocyanate	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013
EPH CWG (Aliphatic) GC (S)	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013
EPH CWG (Aromatic) GC (S)	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013
GRO by GC-FID (S)	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	06-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013
Metals by iCap-OES (Soil)	07-Feb-2013	07-Feb-2013	07-Feb-2013	08-Feb-2013	07-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013
PAH by GCMS	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	07-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013
pH	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013
Phenols by HPLC (S)	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013
Sample description	05-Feb-2013	05-Feb-2013	05-Feb-2013	05-Feb-2013	05-Feb-2013	05-Feb-2013	05-Feb-2013	05-Feb-2013	05-Feb-2013	05-Feb-2013
Total Organic Carbon	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013
TPH CWG GC (S)	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013

Lab Sample No(s)	6838989	6838990	6838991	6838992	6838993	6838995	6838996	6838997	6838998	6838999
Customer Sample Ref.	WS118	WS118	WS119	WS119	WS120	WS120	WS121	WS123	WS123	WS124
AGS Ref.										
Depth	0.50	1.50	0.50	1.50	0.50	1.50	0.50	0.50	1.50	0.50
Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Ammonium Soil by Titration	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	04-Feb-2013	04-Feb-2013
Anions by Kone (soil)	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	06-Feb-2013	06-Feb-2013
Asbestos Identification (Soil)	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013	13-Feb-2013
Boron Water Soluble	07-Feb-2013	07-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	05-Feb-2013	05-Feb-2013
Cyanide Comp/Free/Total/Thiocyanate	06-Feb-2013	06-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	06-Feb-2013	06-Feb-2013
EPH CWG (Aliphatic) GC (S)	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013
EPH CWG (Aromatic) GC (S)	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013
GRO by GC-FID (S)	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	06-Feb-2013	04-Feb-2013
Metals by iCap-OES (Soil)	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	05-Feb-2013	06-Feb-2013
PAH by GCMS	06-Feb-2013	06-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	03-Feb-2013	03-Feb-2013
pH	06-Feb-2013	06-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	06-Feb-2013	06-Feb-2013
Phenols by HPLC (S)	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	07-Feb-2013	05-Feb-2013	05-Feb-2013
Sample description	05-Feb-2013	05-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	06-Feb-2013	01-Feb-2013	01-Feb-2013
Total Organic Carbon	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013	14-Feb-2013
TPH CWG GC (S)	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013	08-Feb-2013

Lab Sample No(s)	6839000	6839001	6839002
Customer Sample Ref.	WS126	WS126	WS127
AGS Ref.			
Depth	0.50	1.50	0.50
Type	SOLID	SOLID	SOLID
Ammonium Soil by Titration	04-Feb-2013	04-Feb-2013	07-Feb-2013
Anions by Kone (soil)	07-Feb-2013	06-Feb-2013	07-Feb-2013
Asbestos Identification (Soil)	07-Feb-2013	13-Feb-2013	13-Feb-2013
Boron Water Soluble	05-Feb-2013	05-Feb-2013	06-Feb-2013
Cyanide Comp/Free/Total/Thiocyanate	06-Feb-2013	06-Feb-2013	06-Feb-2013
EPH CWG (Aliphatic) GC (S)	08-Feb-2013	08-Feb-2013	08-Feb-2013
EPH CWG (Aromatic) GC (S)	08-Feb-2013	08-Feb-2013	08-Feb-2013
GRO by GC-FID (S)	05-Feb-2013	05-Feb-2013	07-Feb-2013
Metals by iCap-OES (Soil)	05-Feb-2013	05-Feb-2013	07-Feb-2013
PAH by GCMS	03-Feb-2013	07-Feb-2013	06-Feb-2013
pH	06-Feb-2013	06-Feb-2013	06-Feb-2013
Phenols by HPLC (S)	05-Feb-2013	05-Feb-2013	06-Feb-2013
Sample description	01-Feb-2013	01-Feb-2013	01-Feb-2013
Total Organic Carbon	14-Feb-2013	14-Feb-2013	14-Feb-2013
TPH CWG GC (S)	08-Feb-2013	08-Feb-2013	08-Feb-2013



SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

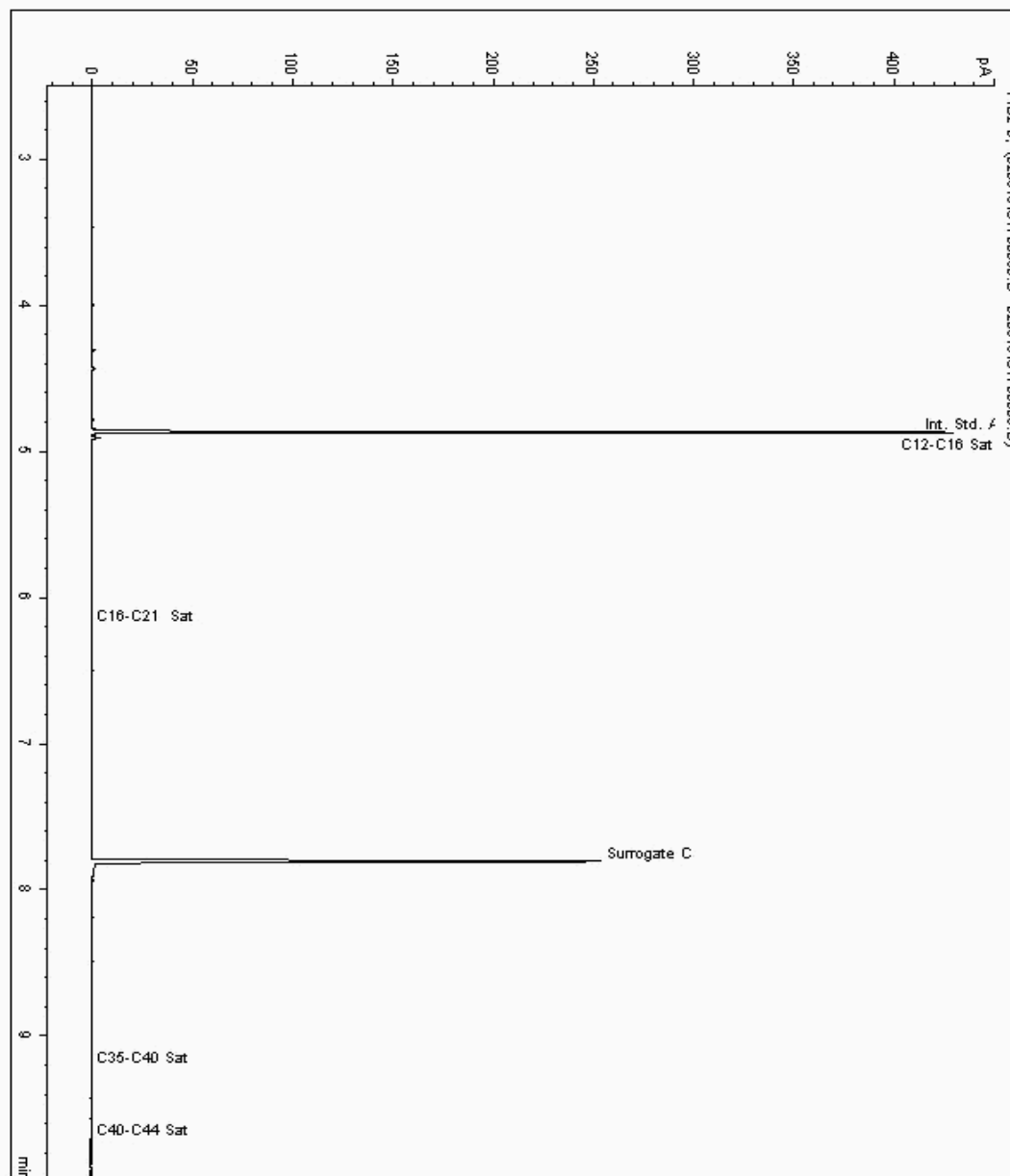
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6864583
Sample ID : WS126

Depth : 0.50

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

Sample Identity: 6592003-6864583
Date Acquired : 07/02/2013 12:15:43 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 1.050





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooille
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

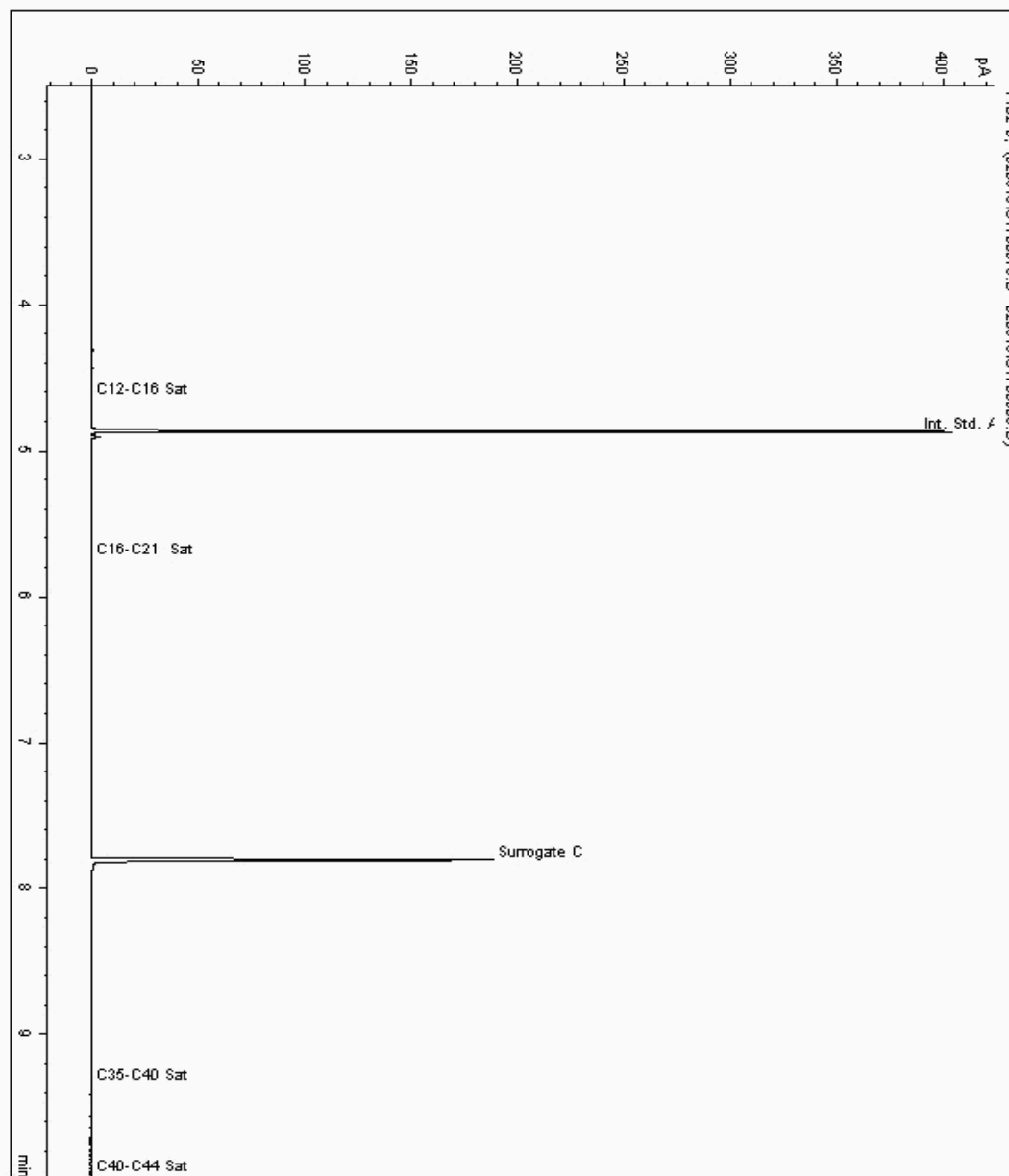
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6864624
Sample ID : WS126

Depth : 1.50

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

Sample Identity: 6592025-6864624
Date Acquired : 07/02/2013 11:55:16 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.990





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

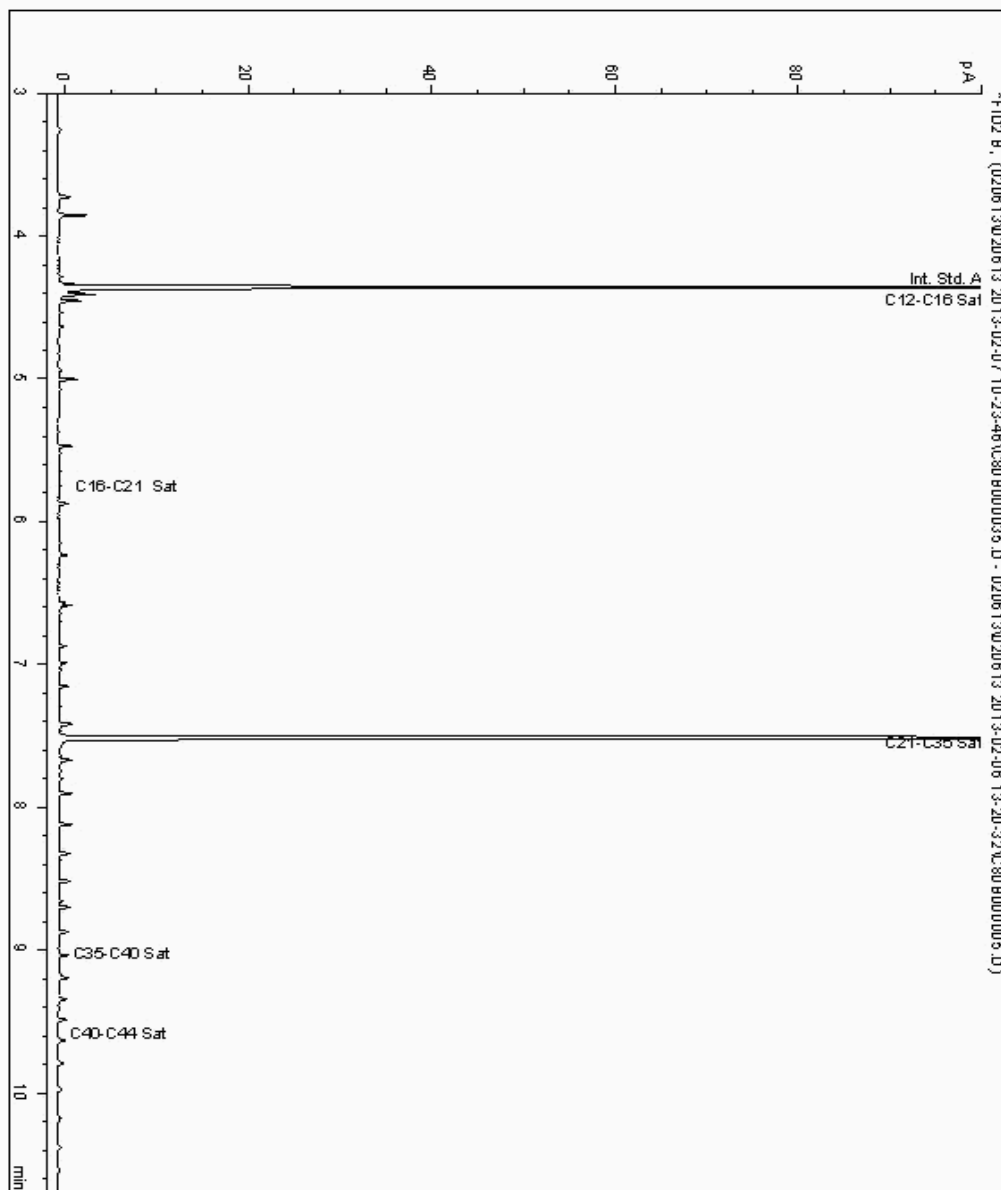
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6864667
Sample ID : WS123

Depth : 1.50

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

Sample Identity: 6591960-6864667
Date Acquired : 07/02/13 16:51:25
Units : ppb
Dilution :
CF : 1
Multiplier : 1.020





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

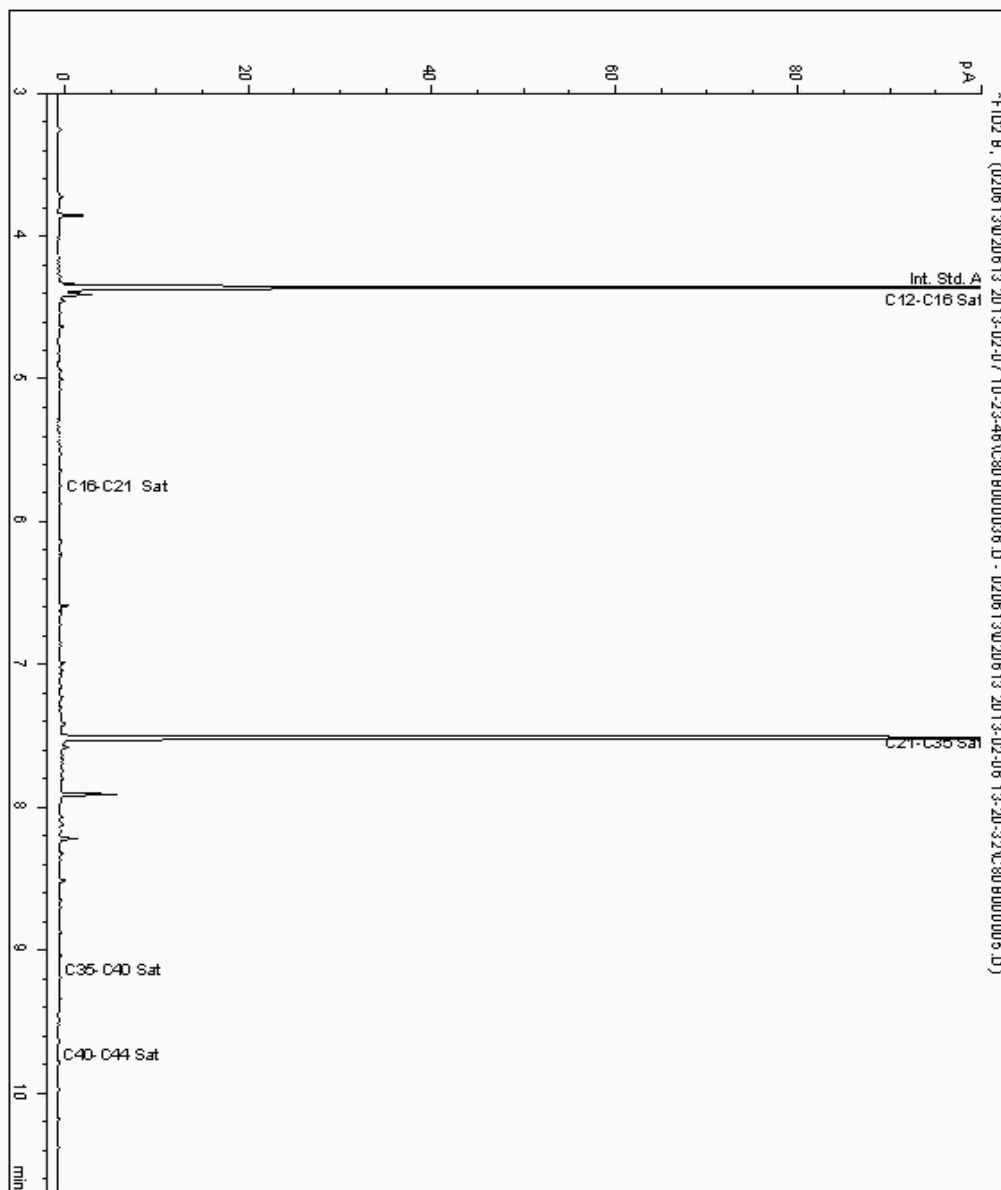
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6864690
Sample ID : WS124

Depth : 0.50

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

Sample Identity: 6591979-6864690
Date Acquired : 07/02/13 17:11:39
Units : ppb
Dilution :
CF : 1
Multiplier : 1.030





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

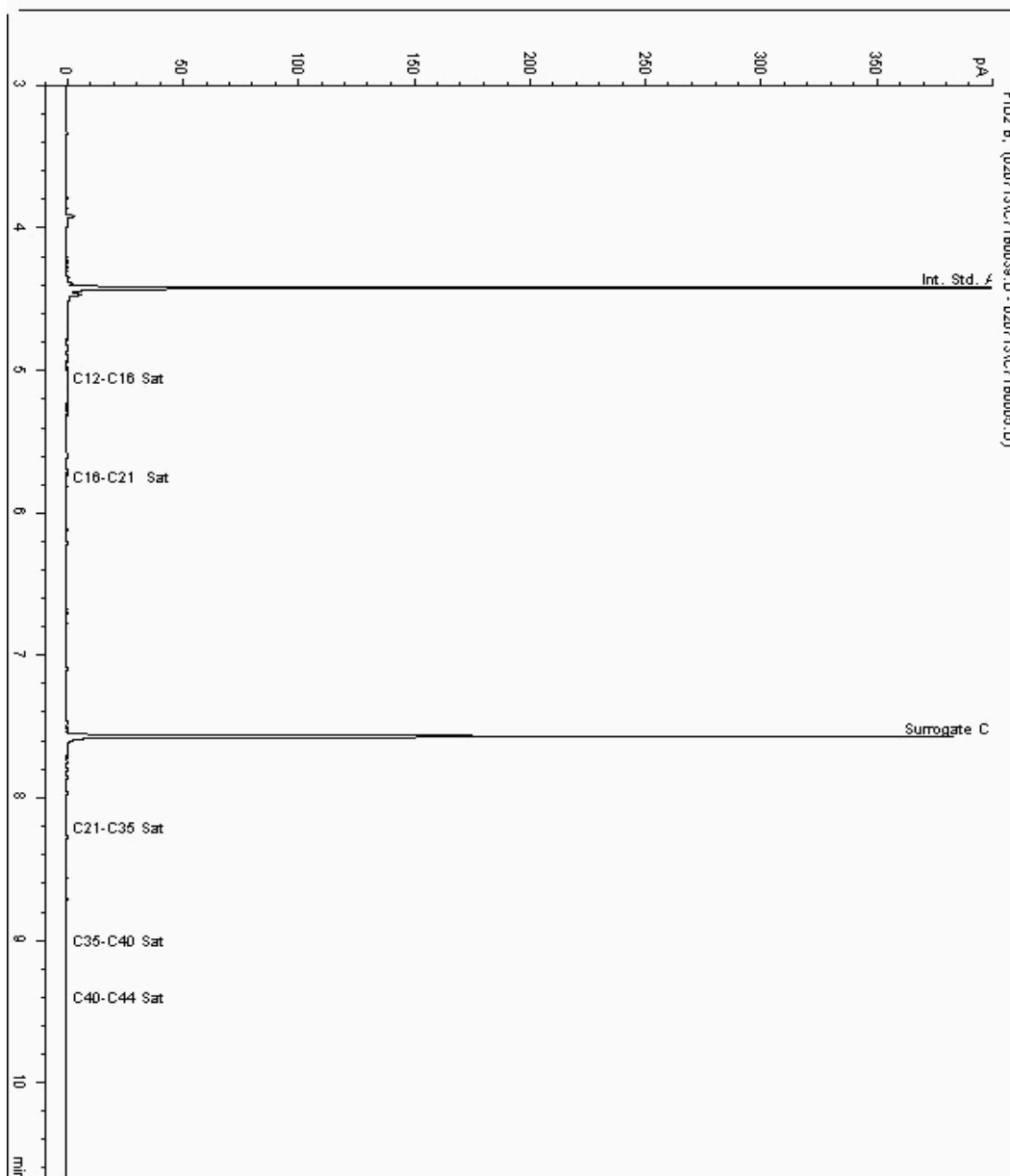
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6871168
Sample ID : WS127

Depth : 0.50

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

Sample Identity: 6592055-6871168
Date Acquired : 08/02/2013 00:13:25 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

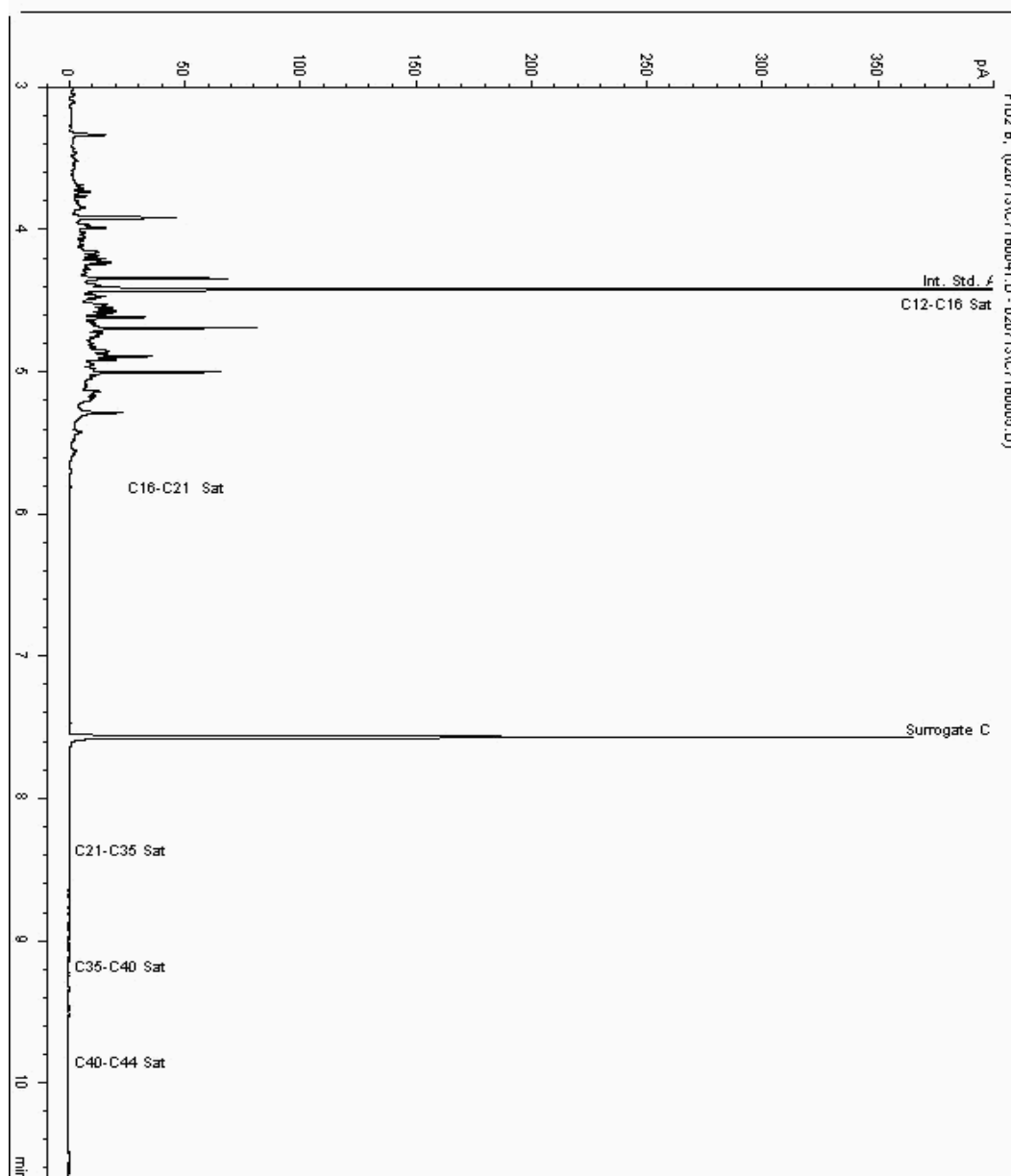
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6871865
Sample ID : WS109

Depth : 0.50

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

Sample Identity: 6591491-6871865
Date Acquired : 08/02/2013 00:53:54 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

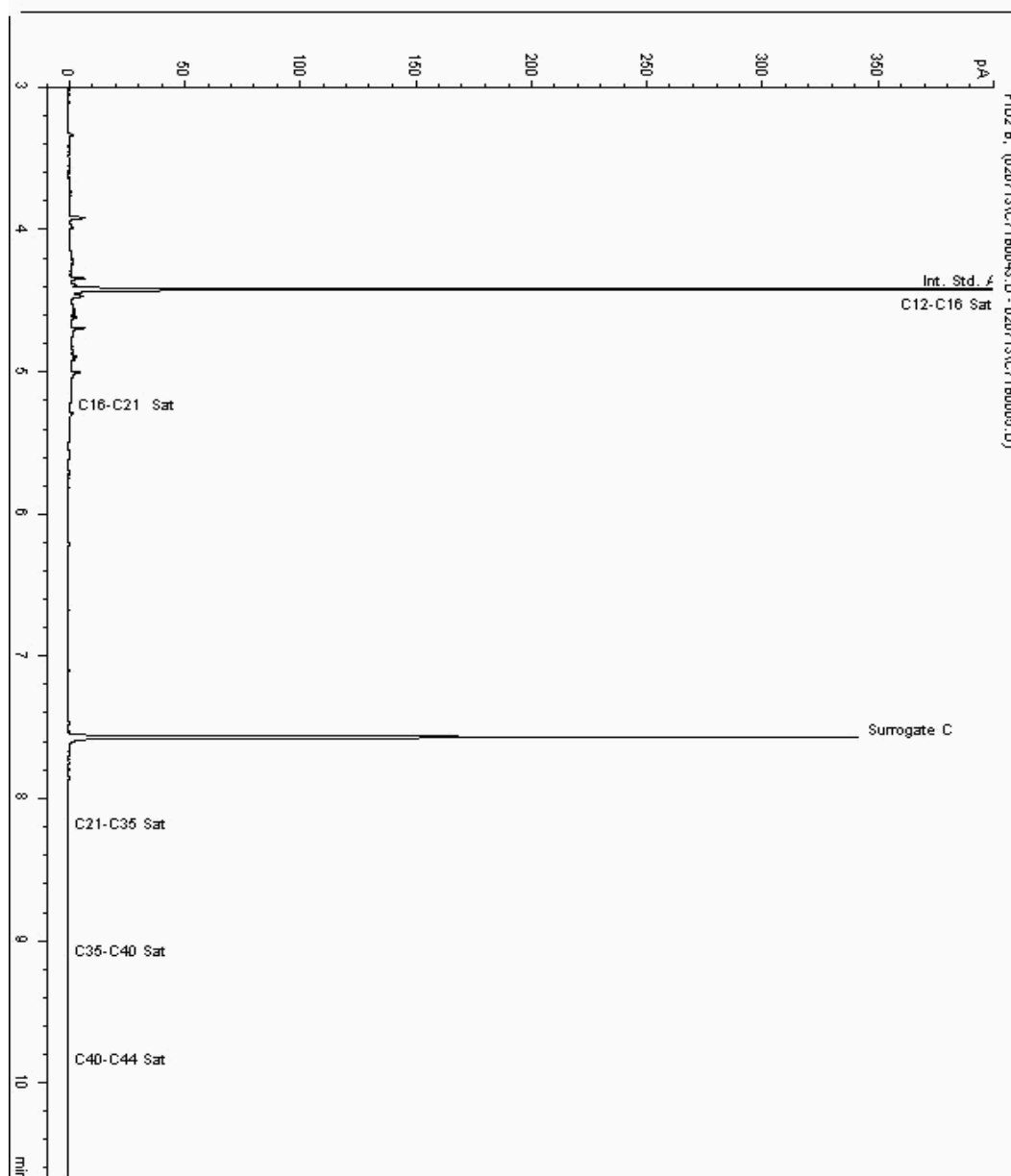
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6872036
Sample ID : WS109

Depth : 1.50

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

Sample Identity: 6591511-6872036
Date Acquired : 08/02/2013 01:34:30 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

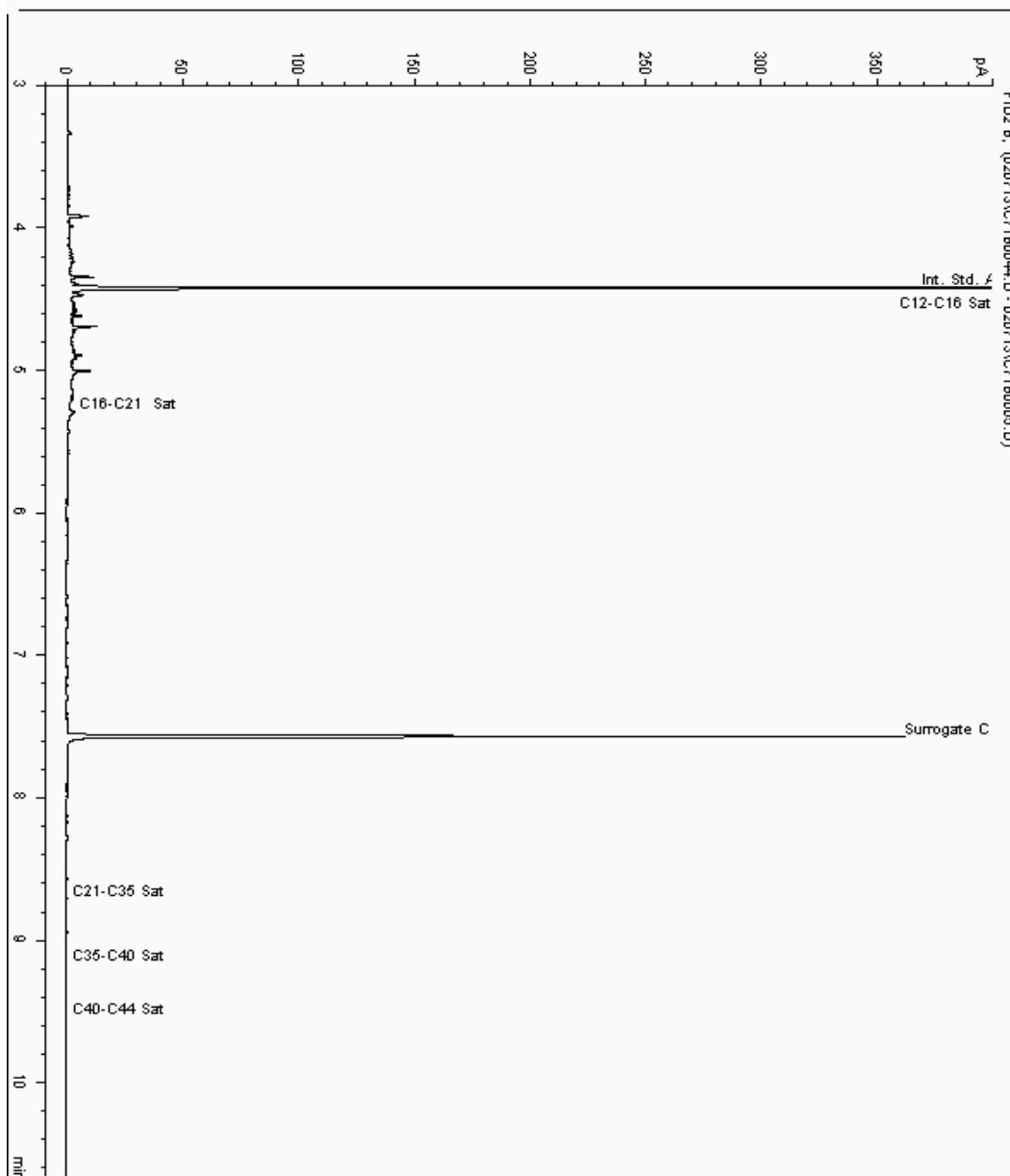
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6872138
Sample ID : WS108

Depth : 0.50

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

Sample Identity: 6591466-6872138
Date Acquired : 08/02/2013 01:54:42 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

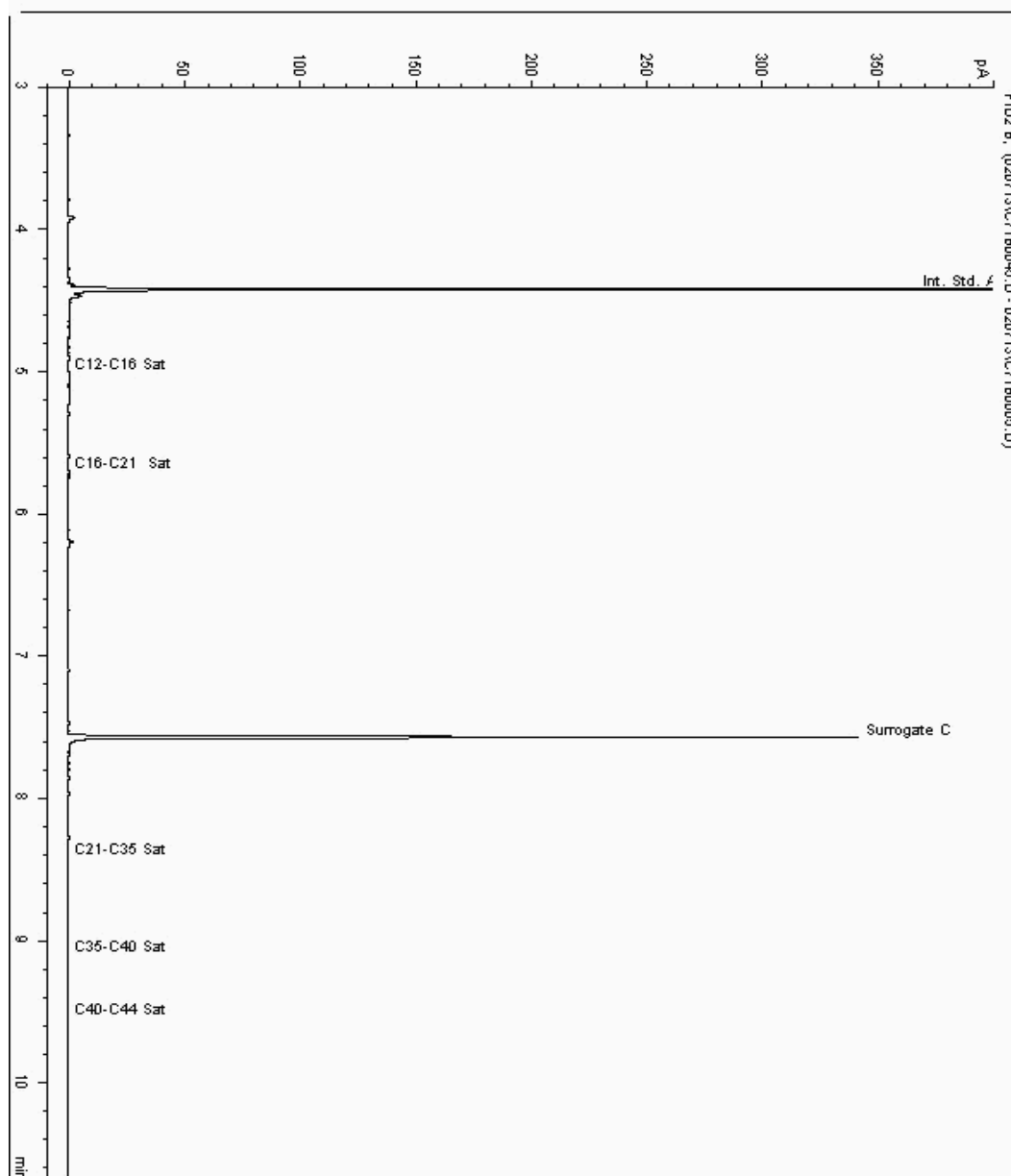
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6872243
Sample ID : WS113

Depth : 0.50

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

Sample Identity: 6591552-6872243
Date Acquired : 08/02/2013 02:15:07 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

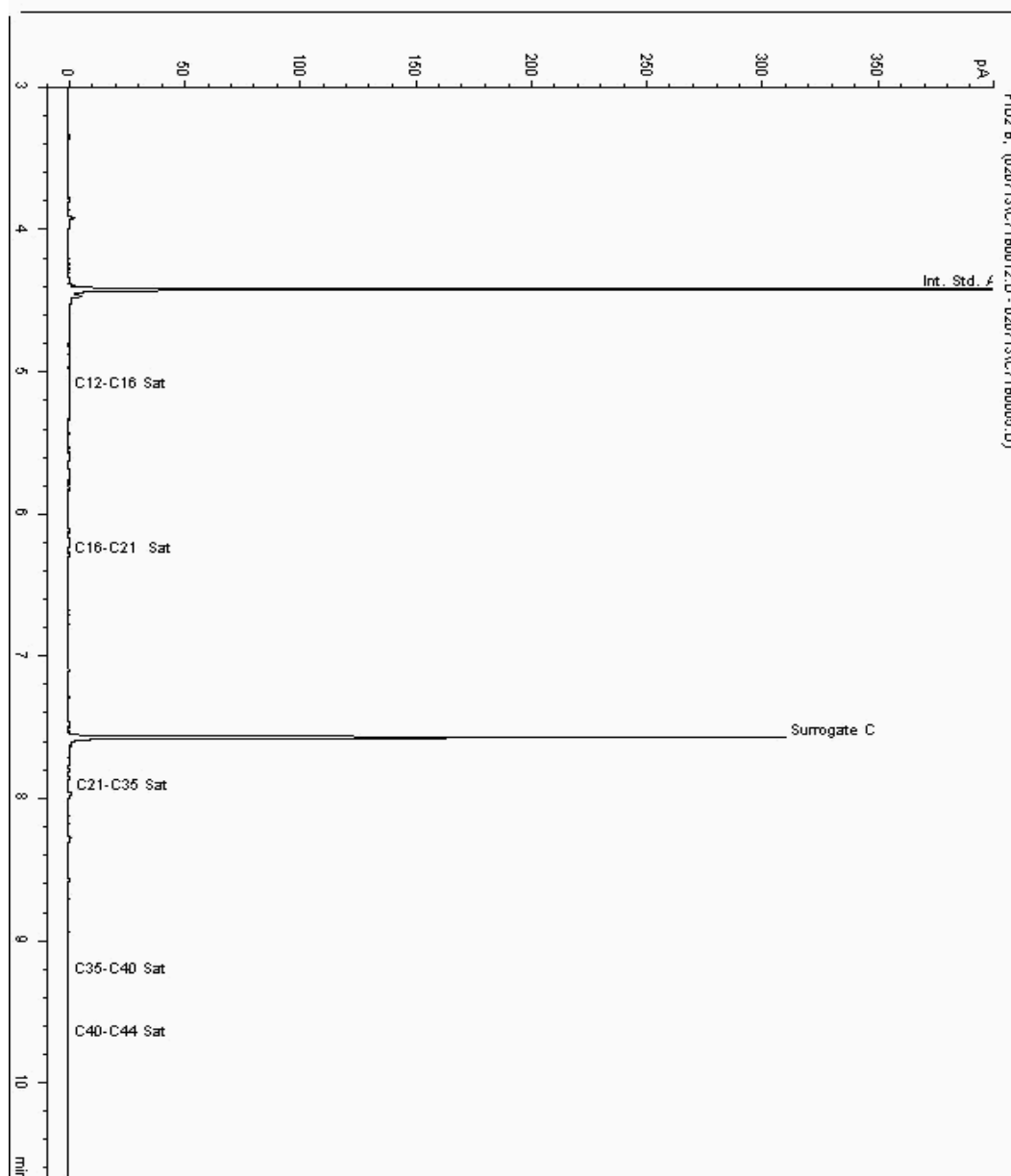
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6873111
Sample ID : WS114

Depth : 0.50

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

Sample Identity: 6591595-6873111
Date Acquired : 07/02/2013 15:53:37 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

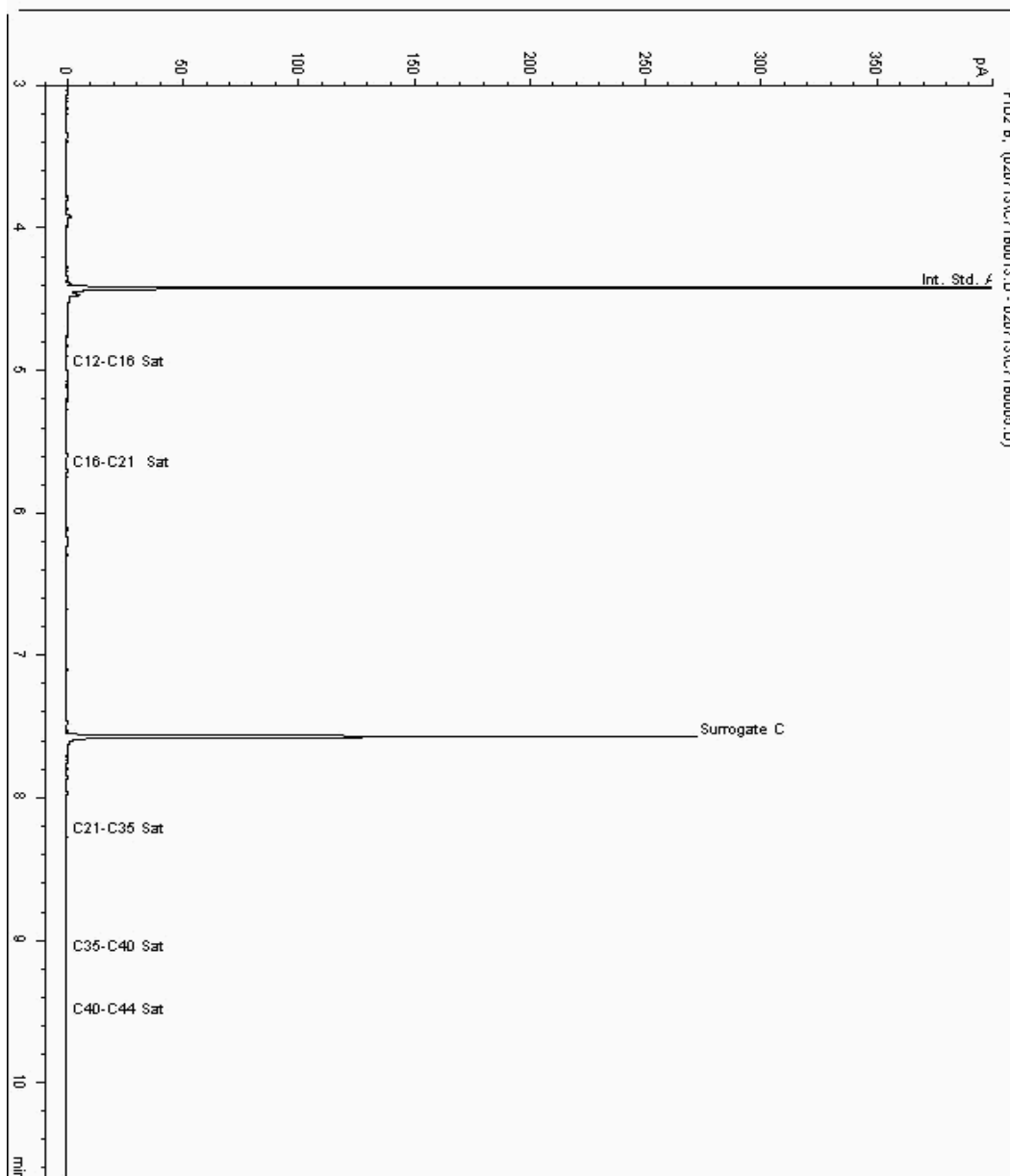
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6873324
Sample ID : WS115

Depth : 0.50

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

Sample Identity: 6591640-6873324
Date Acquired : 07/02/2013 16:13:36 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

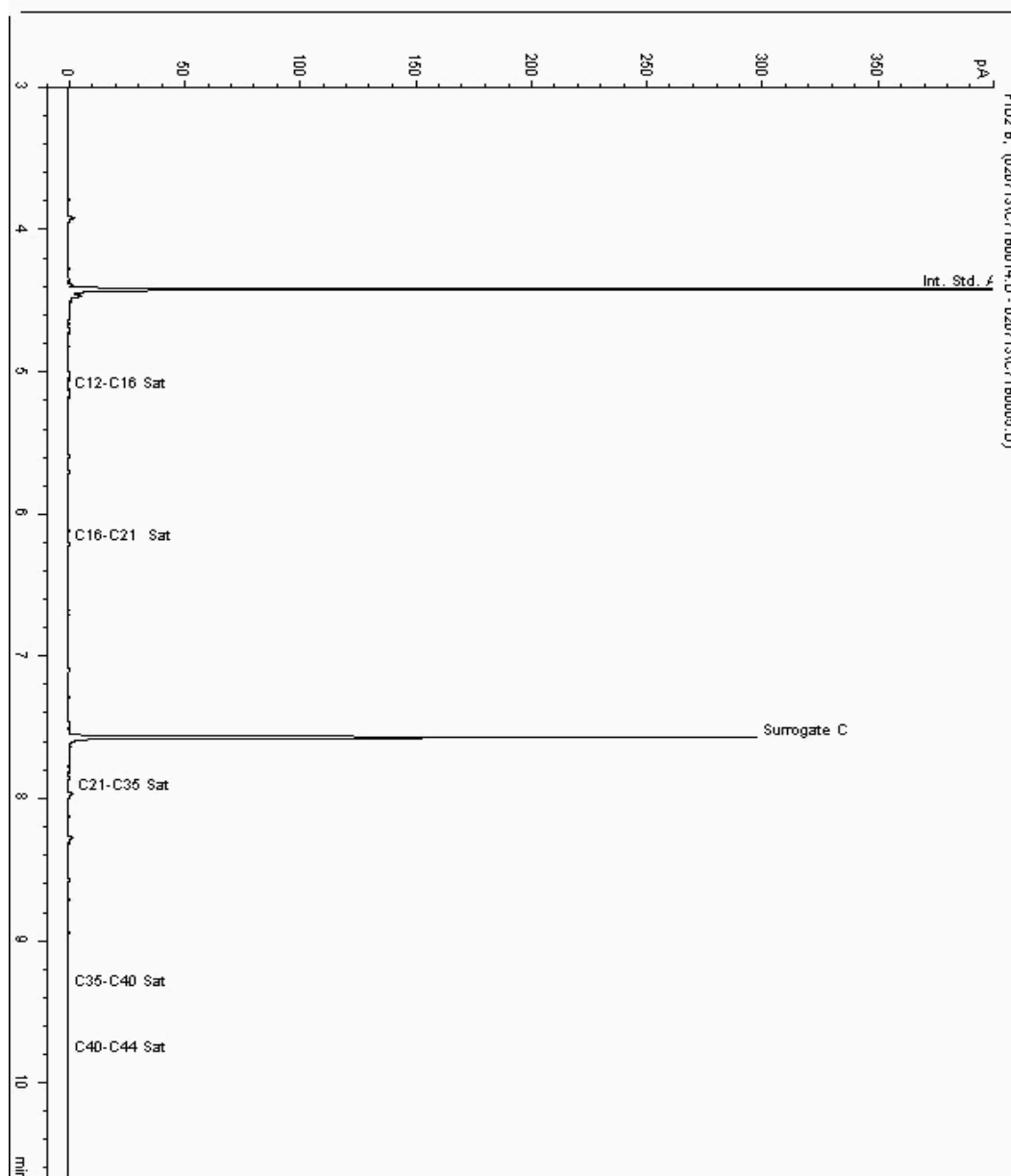
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6873427
Sample ID : WS110

Depth : 0.50

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

Sample Identity: 6591533-6873427
Date Acquired : 07/02/2013 16:33:49 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

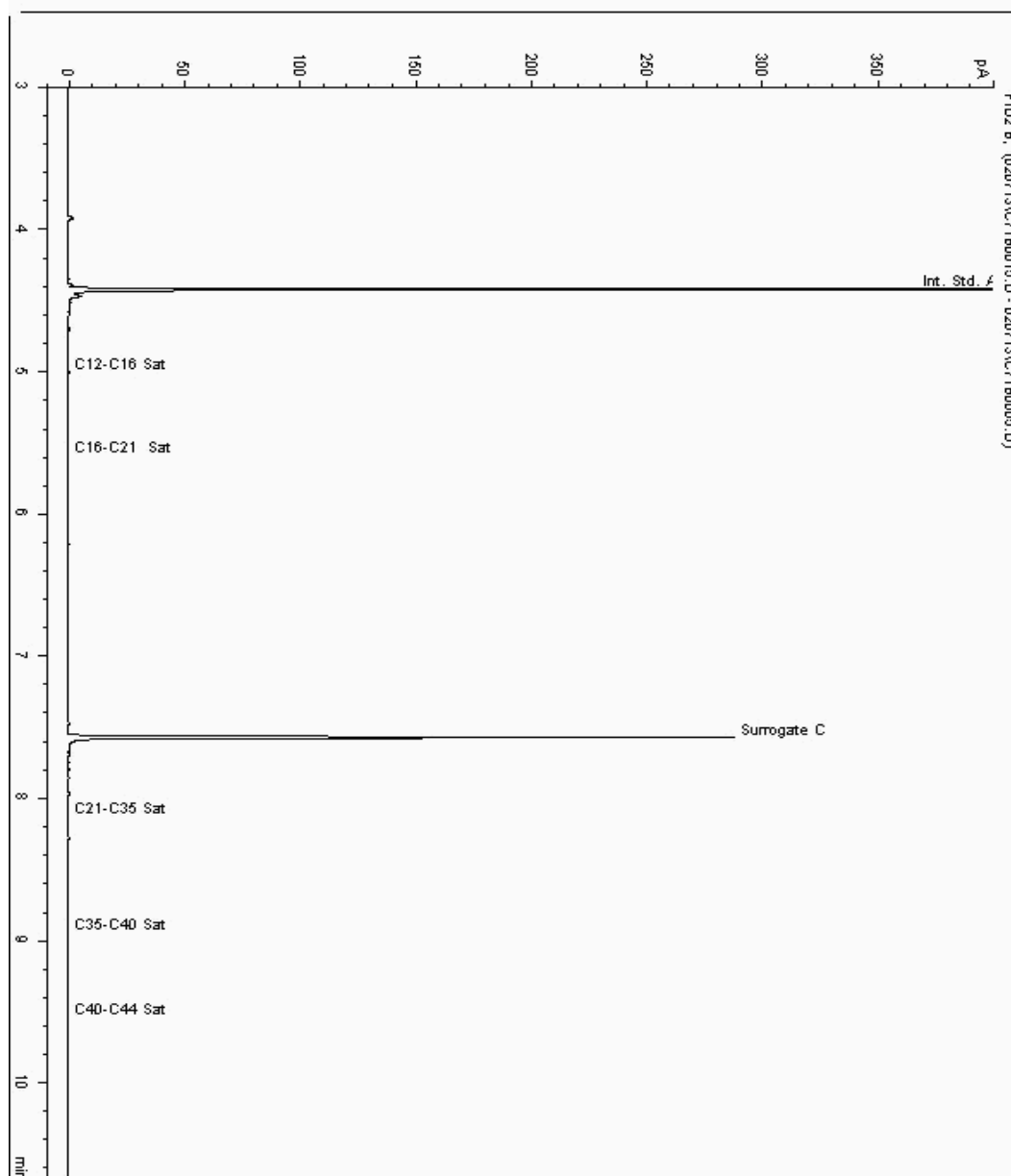
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6873584
Sample ID : WS117

Depth : 0.50

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

Sample Identity: 6591662-6873584
Date Acquired : 07/02/2013 16:53:42 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

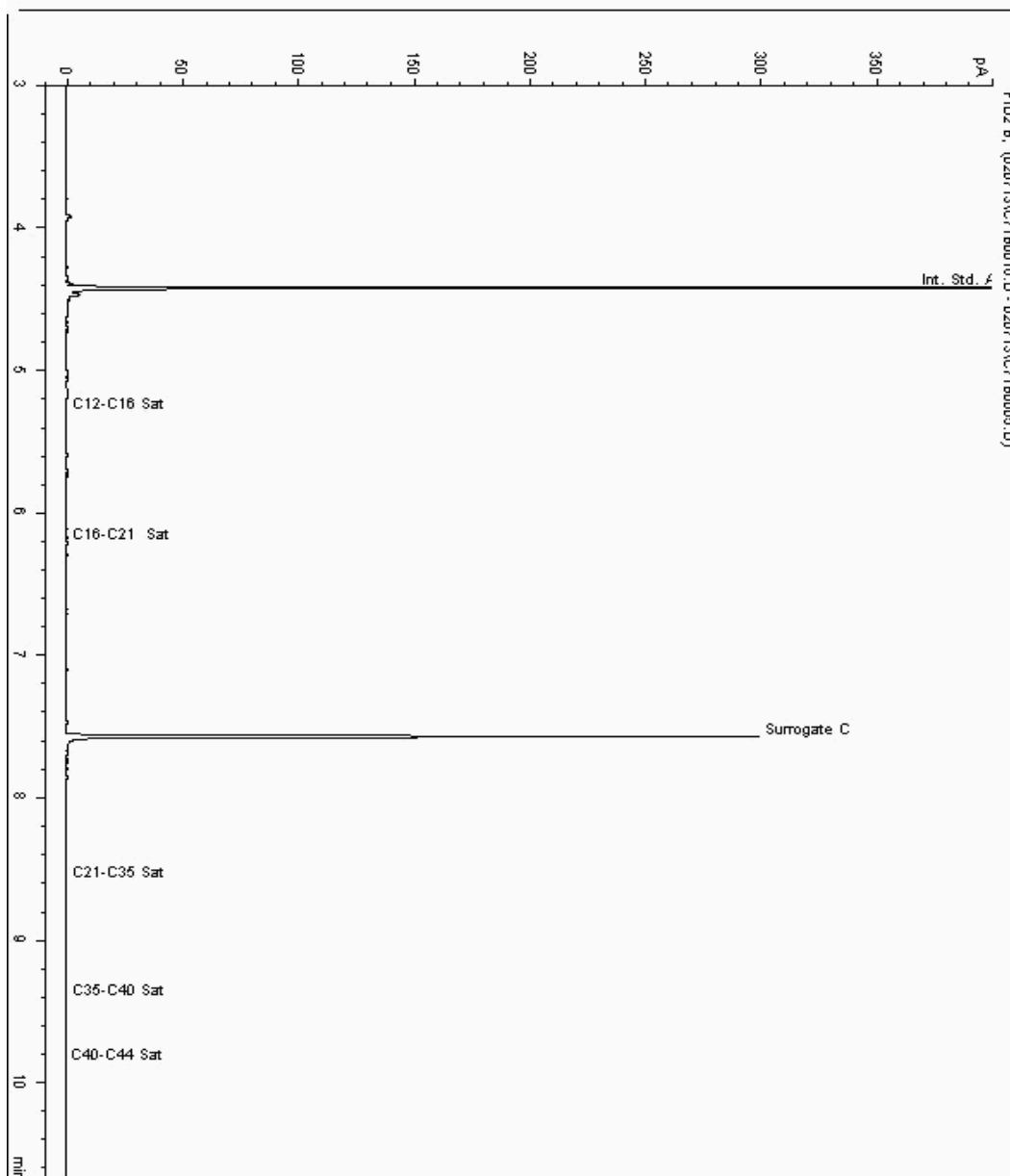
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6873622
Sample ID : WS118

Depth : 1.50

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

Sample Identity: 6591748-6873622
Date Acquired : 07/02/2013 17:13:33 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

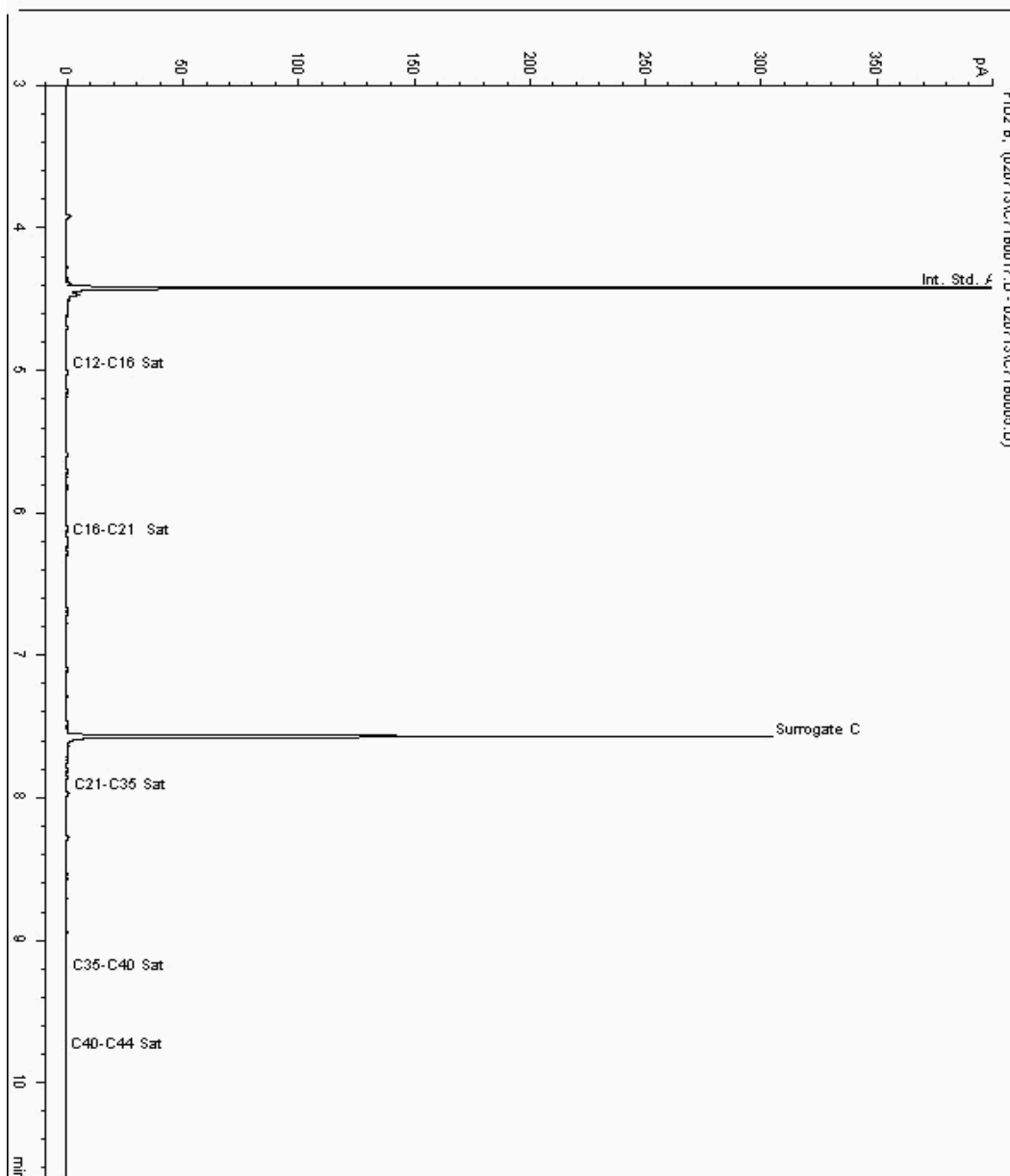
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6873695
Sample ID : WS118

Depth : 0.50

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

Sample Identity: 6591704-6873695
Date Acquired : 07/02/2013 17:33:39 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

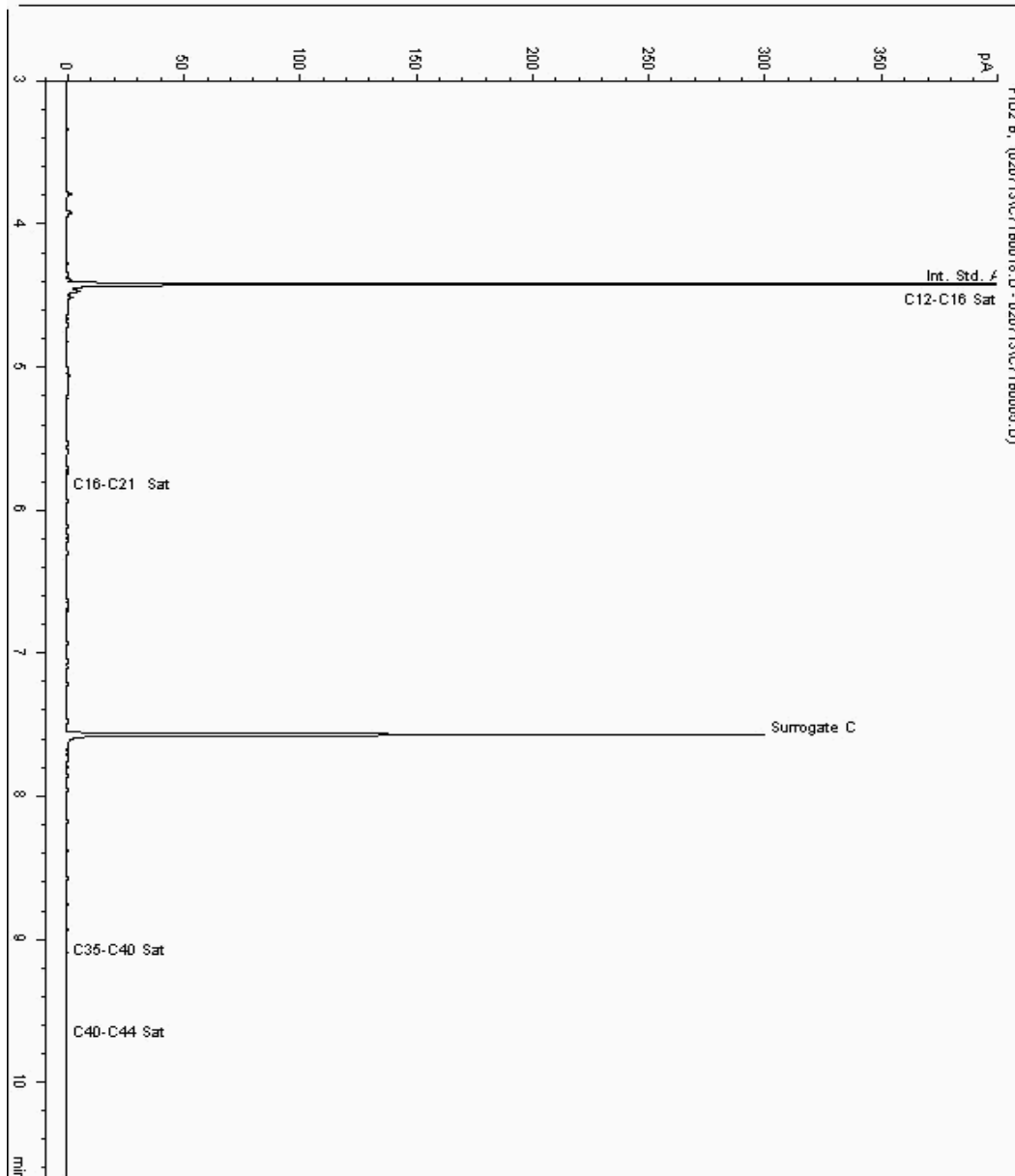
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6873746
Sample ID : WS114

Depth : 1.50

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

Sample Identity: 6591616-6873746
Date Acquired : 07/02/2013 17:53:37 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

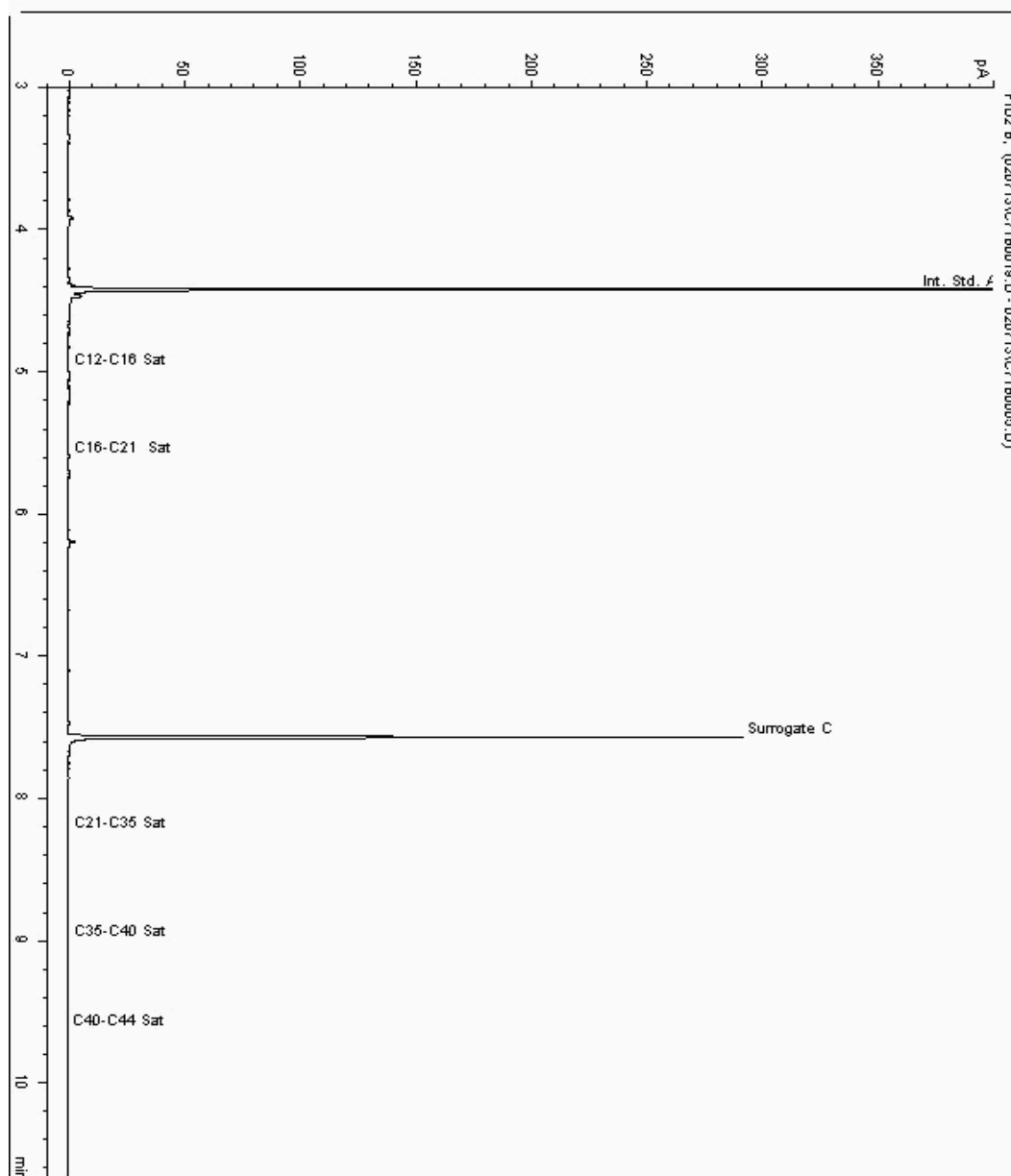
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6873780
Sample ID : WS113

Depth : 1.50

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

Sample Identity: 6591571-6873780
Date Acquired : 07/02/2013 18:13:30 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

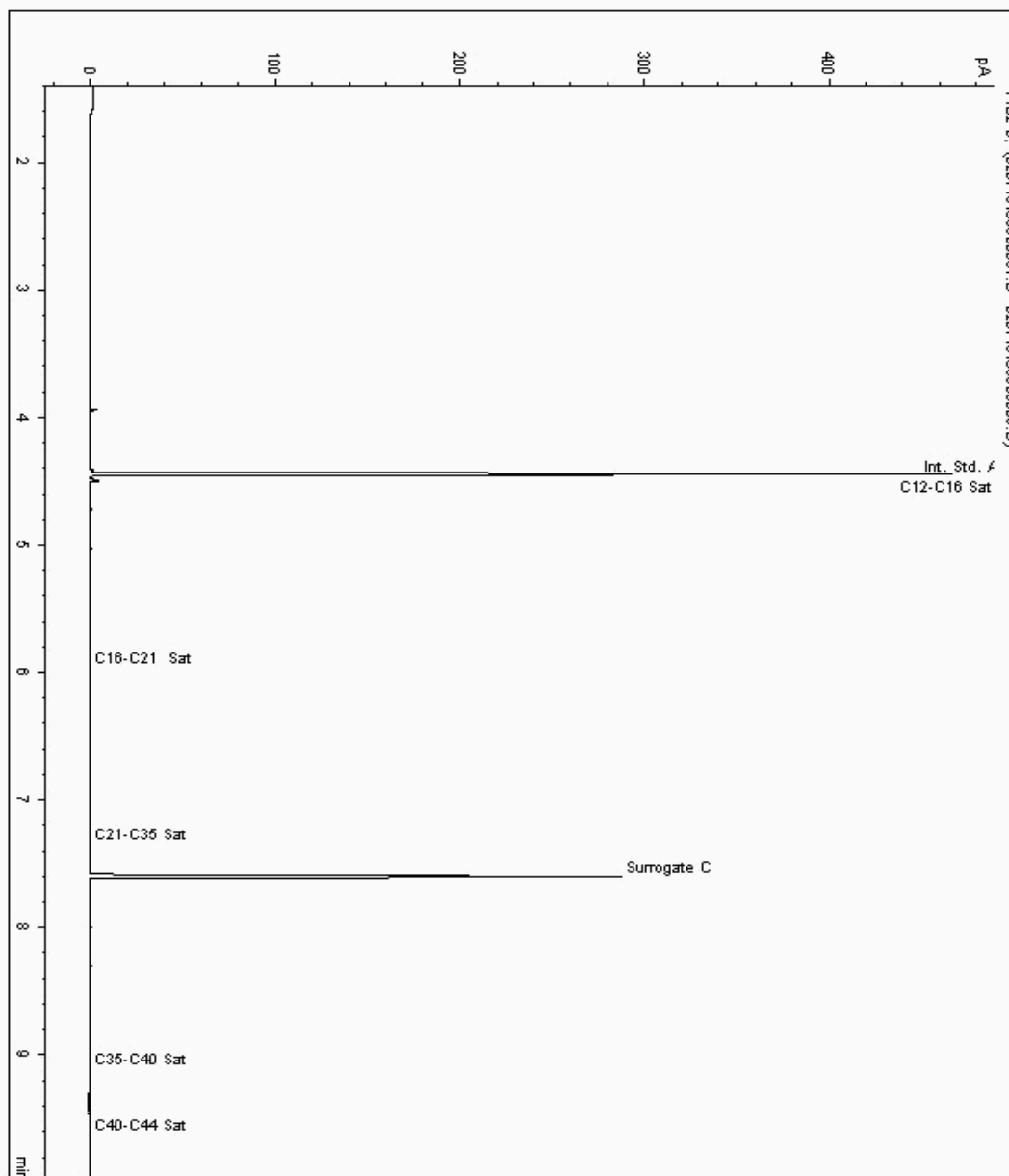
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6876211
Sample ID : WS123

Depth : 0.50

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

Sample Identity: 6591933-6876211
Date Acquired : 08/02/13 01:08:27 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.990





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

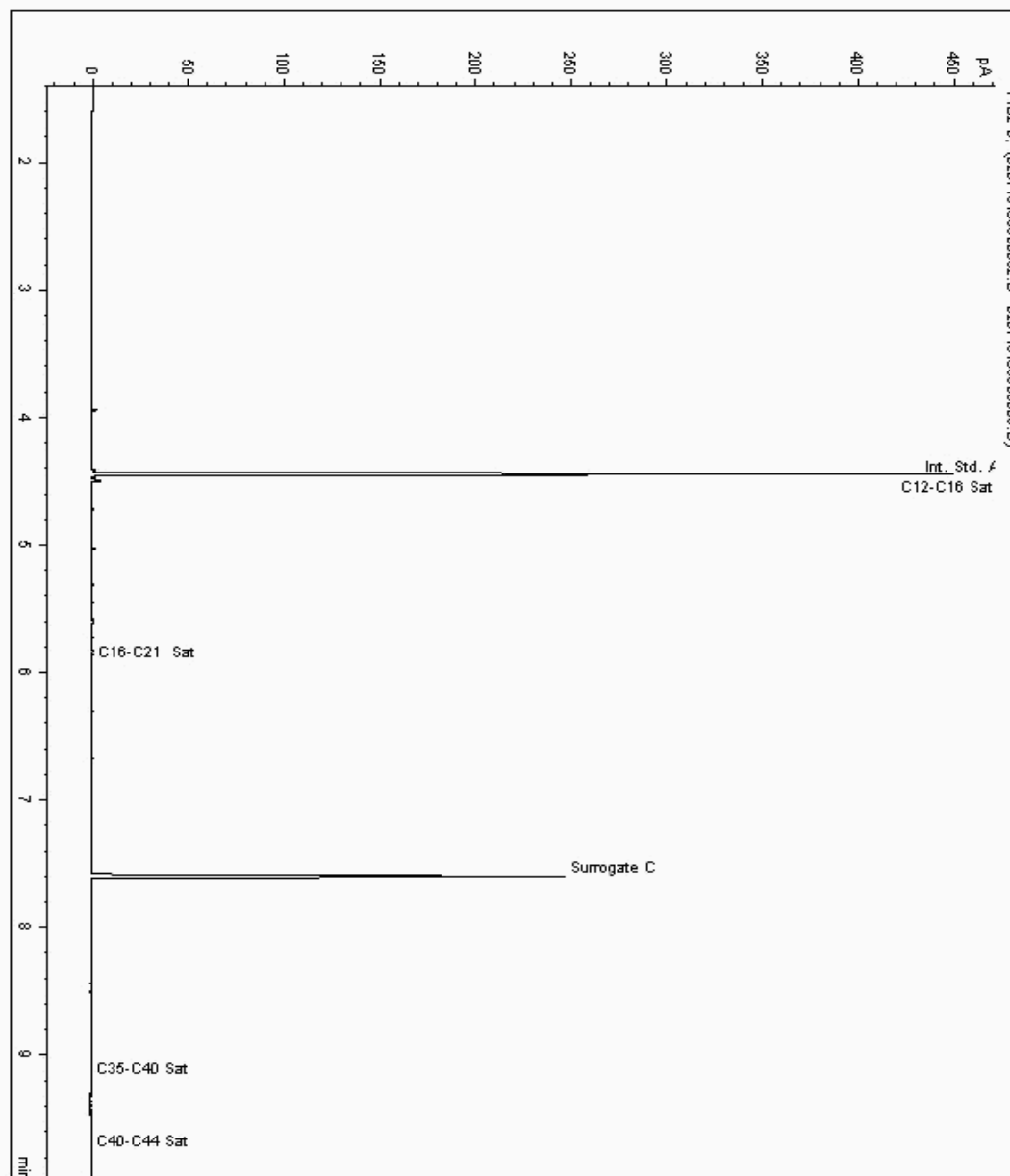
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6876302
Sample ID : WS119

Depth : 0.50

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

Sample Identity: 6591795-6876302
Date Acquired : 08/02/13 01:29:20 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 1.010





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

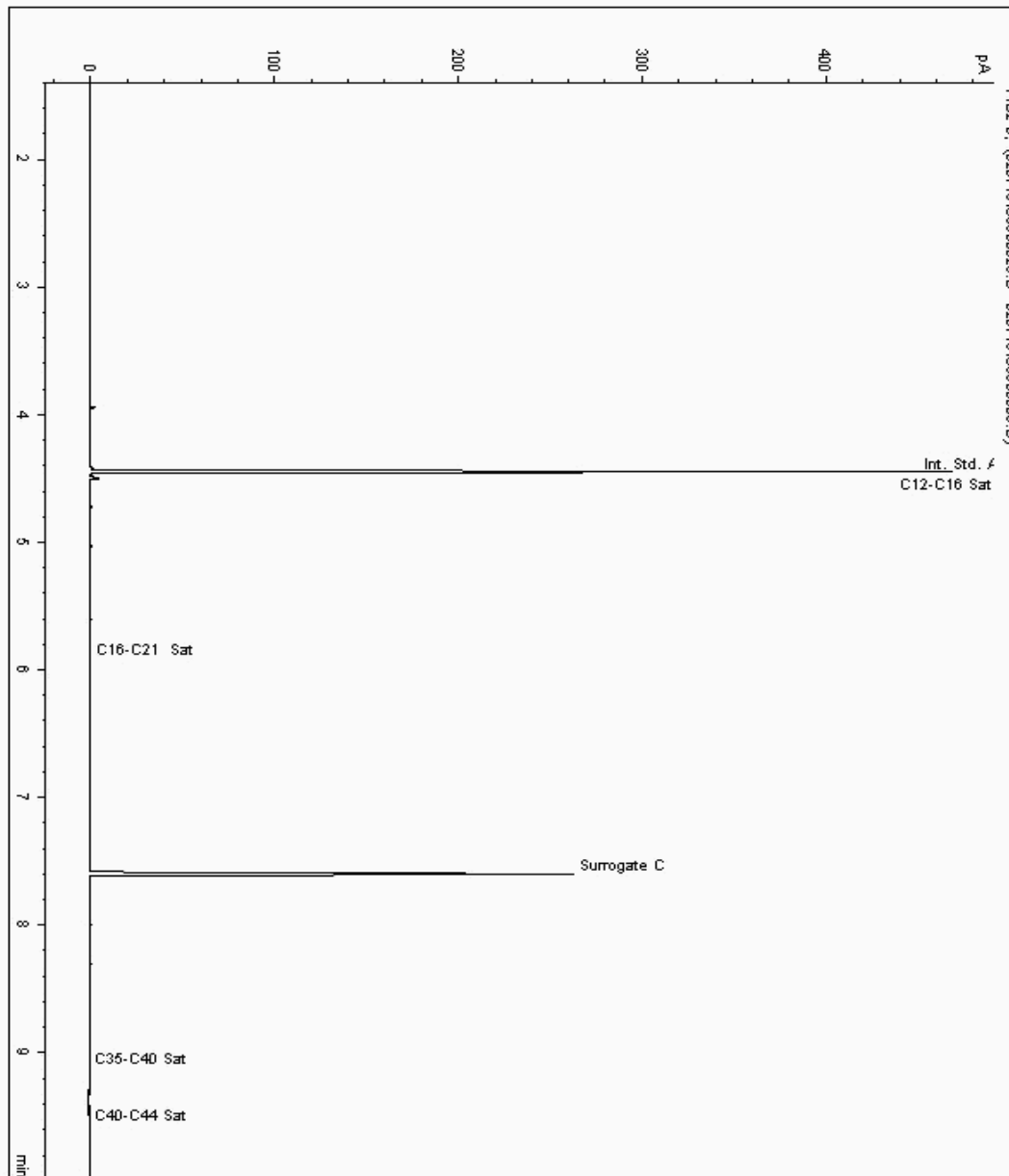
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6876339
Sample ID : WS120

Depth : 0.50

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

Sample Identity: 6591866-6876339
Date Acquired : 08/02/13 00:26:53 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.970





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

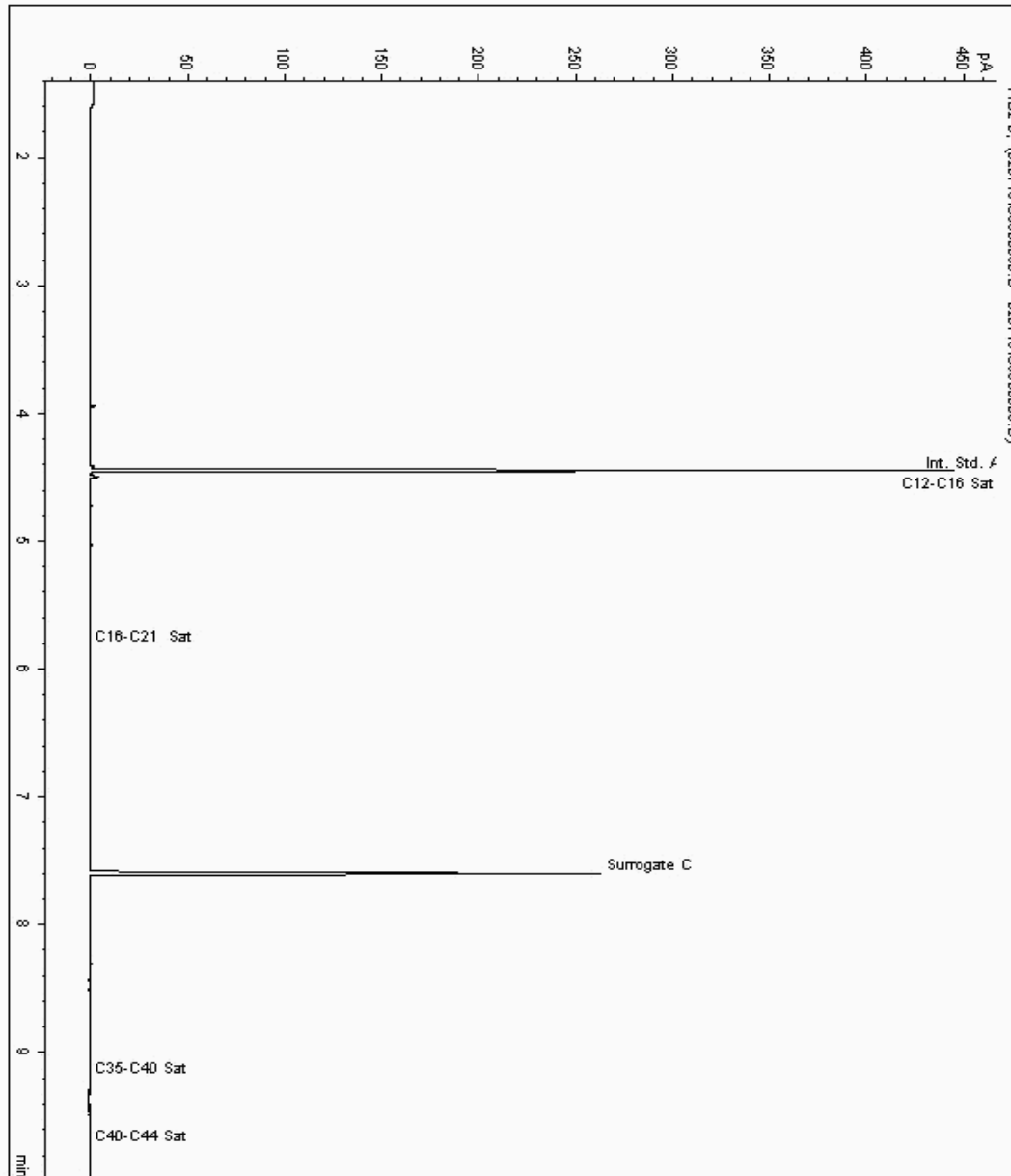
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6876458
Sample ID : WS121

Depth : 0.50

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

Sample Identity: 6591912-6876458
Date Acquired : 08/02/13 00:47:41 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.990





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

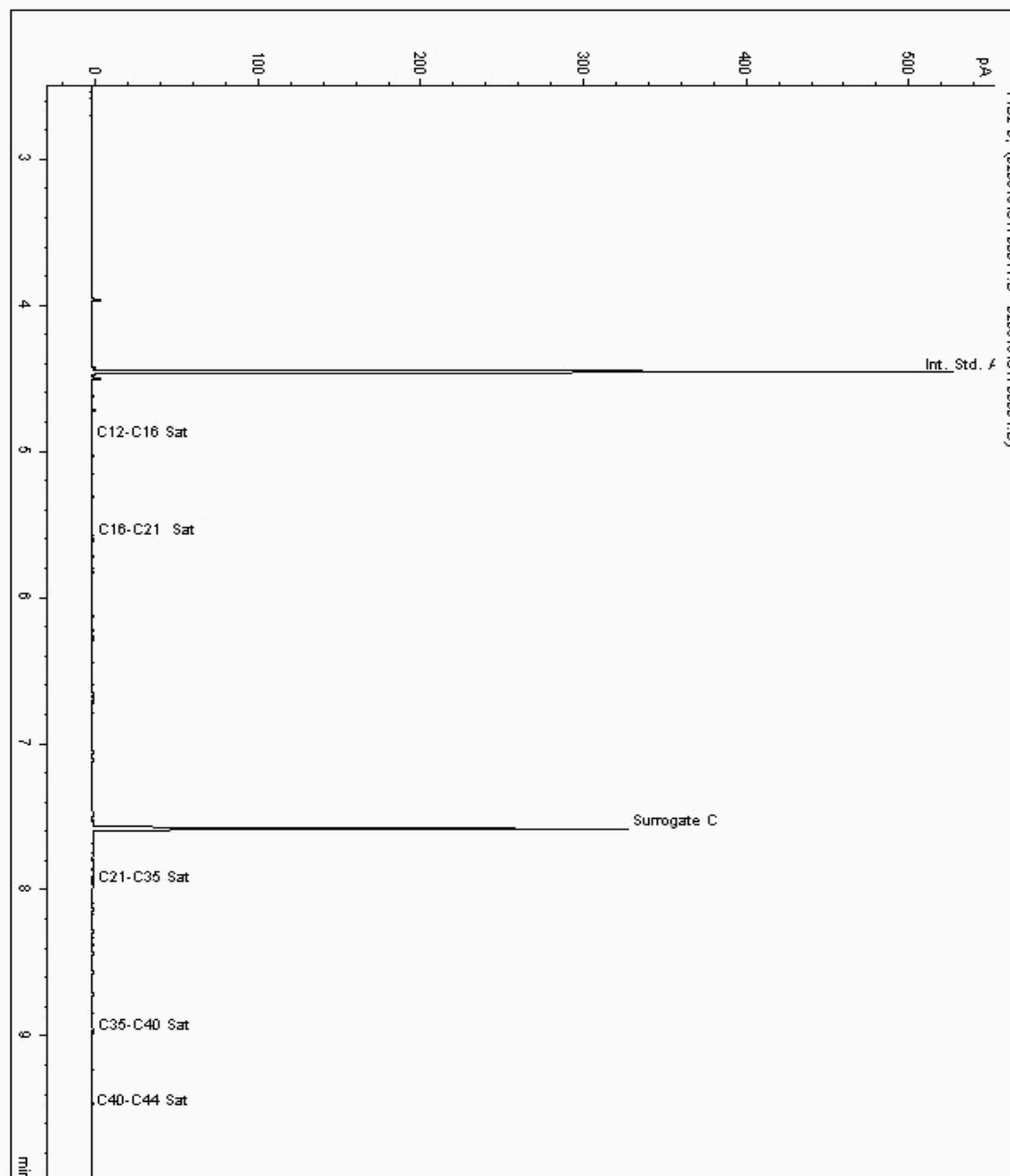
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6876614
Sample ID : WS119

Depth : 1.50

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

Sample Identity: 6591836-6876614
Date Acquired : 08/02/2013 12:15:28 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.980





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

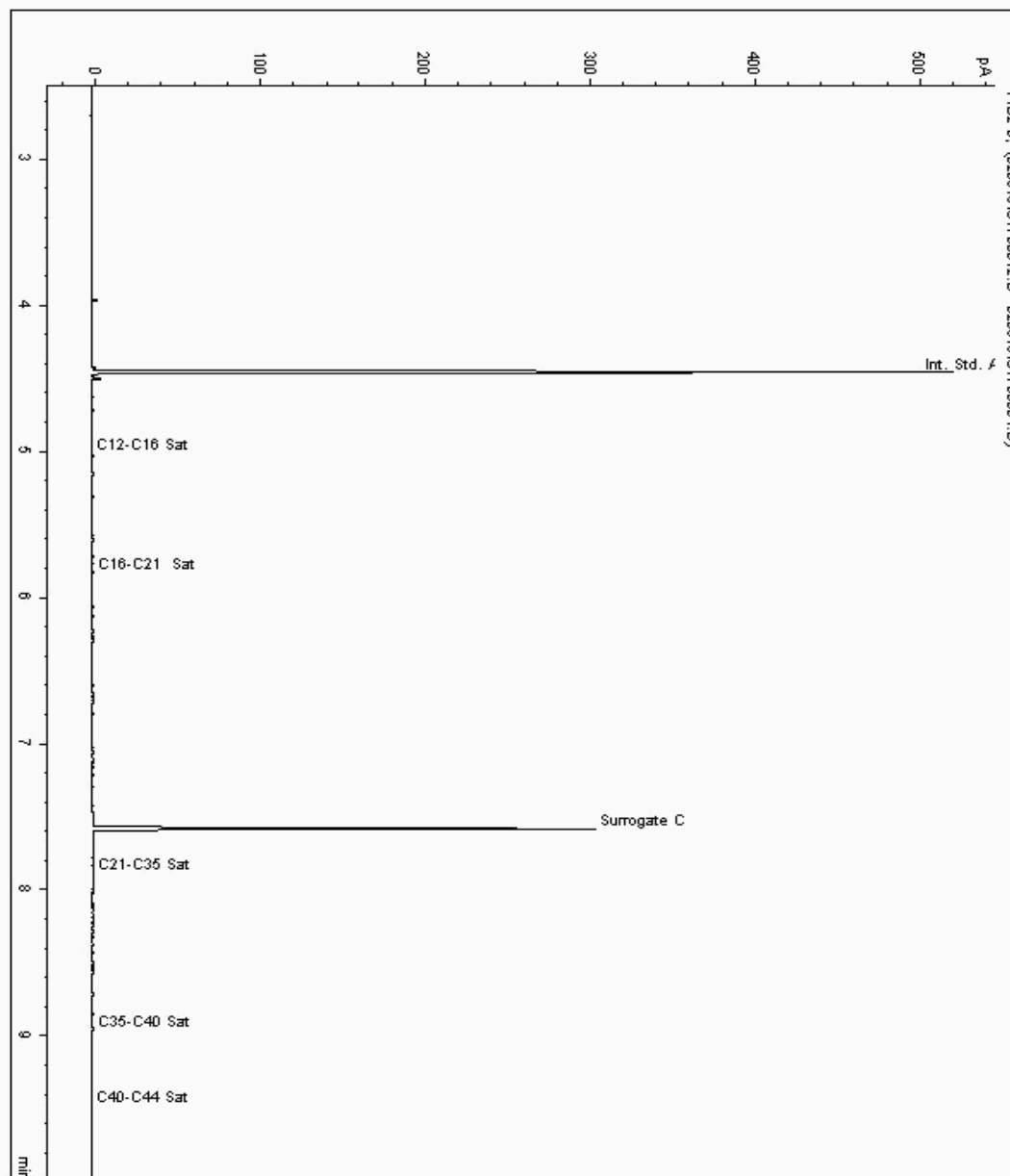
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 6878237
Sample ID : WS120

Depth : 1.50

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

Sample Identity: 6591891-6878237
Date Acquired : 08/02/2013 12:35:53 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 1.010





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

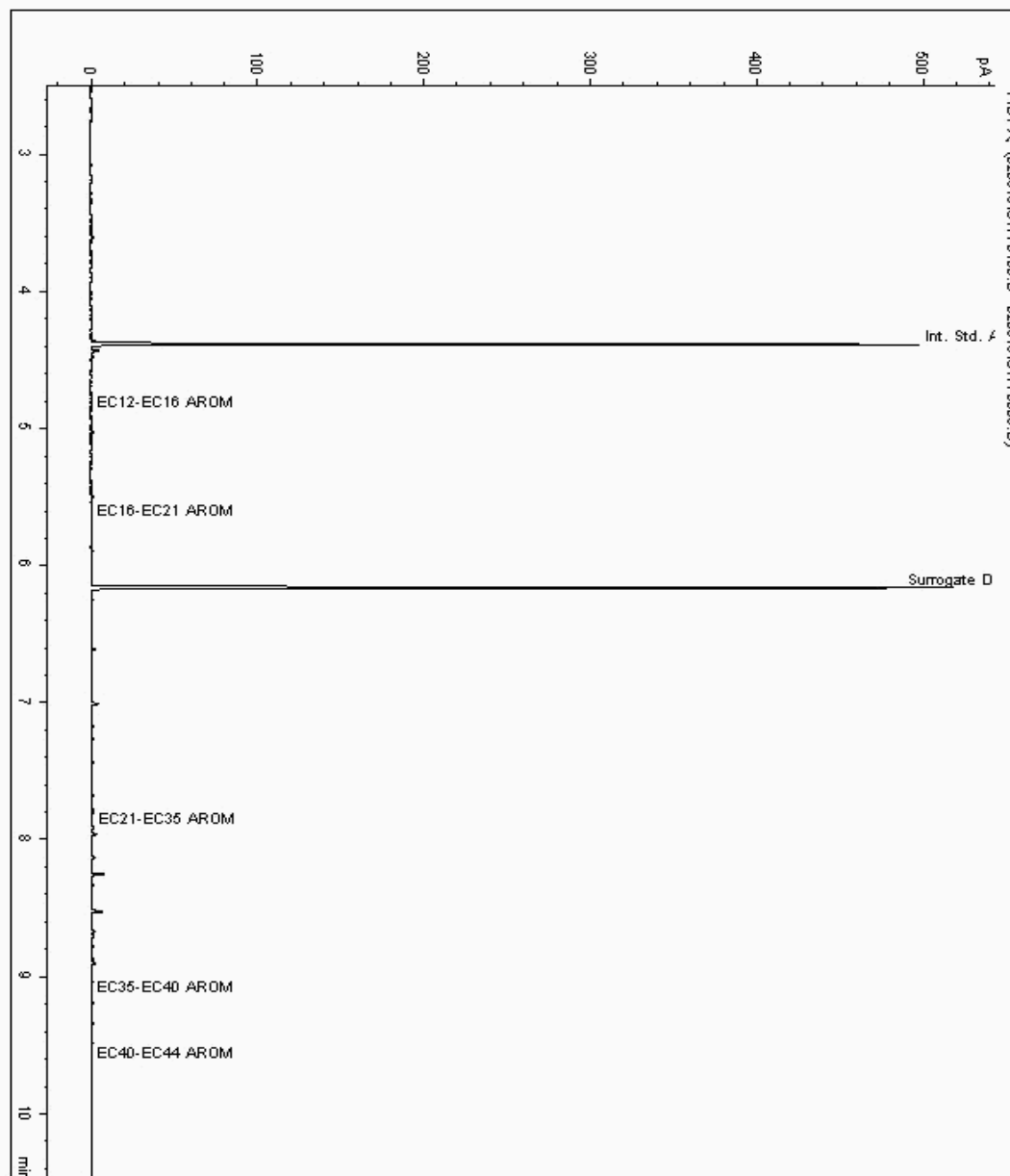
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6864583
Sample ID : WS126

Depth : 0.50

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

Sample Identity: 6592004-6864583
Date Acquired : 07/02/2013 19:03:11 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 1.050





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

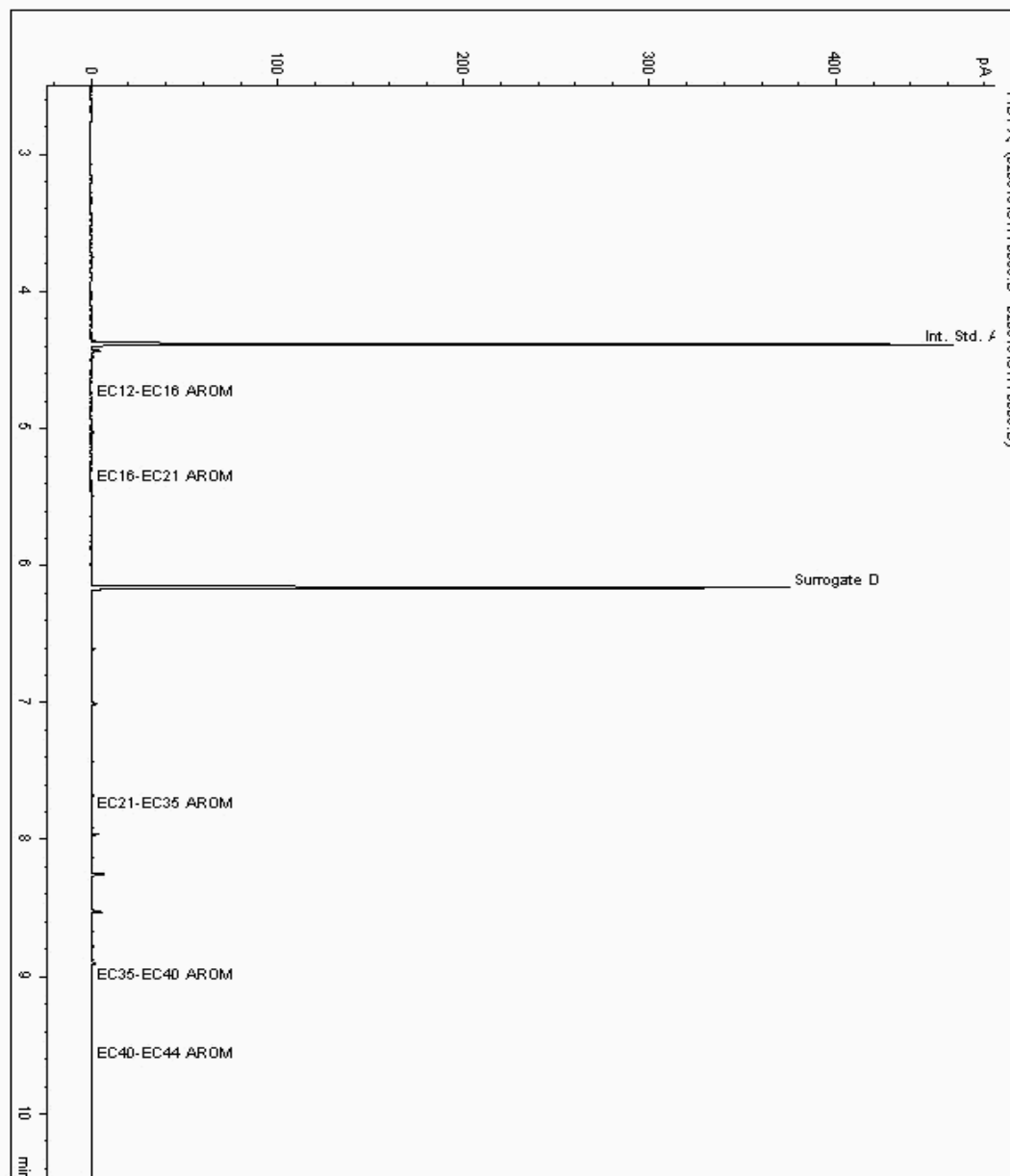
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6864624
Sample ID : WS126

Depth : 1.50

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

Sample Identity: 6592026-6864624
Date Acquired : 07/02/2013 18:42:47 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.990





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

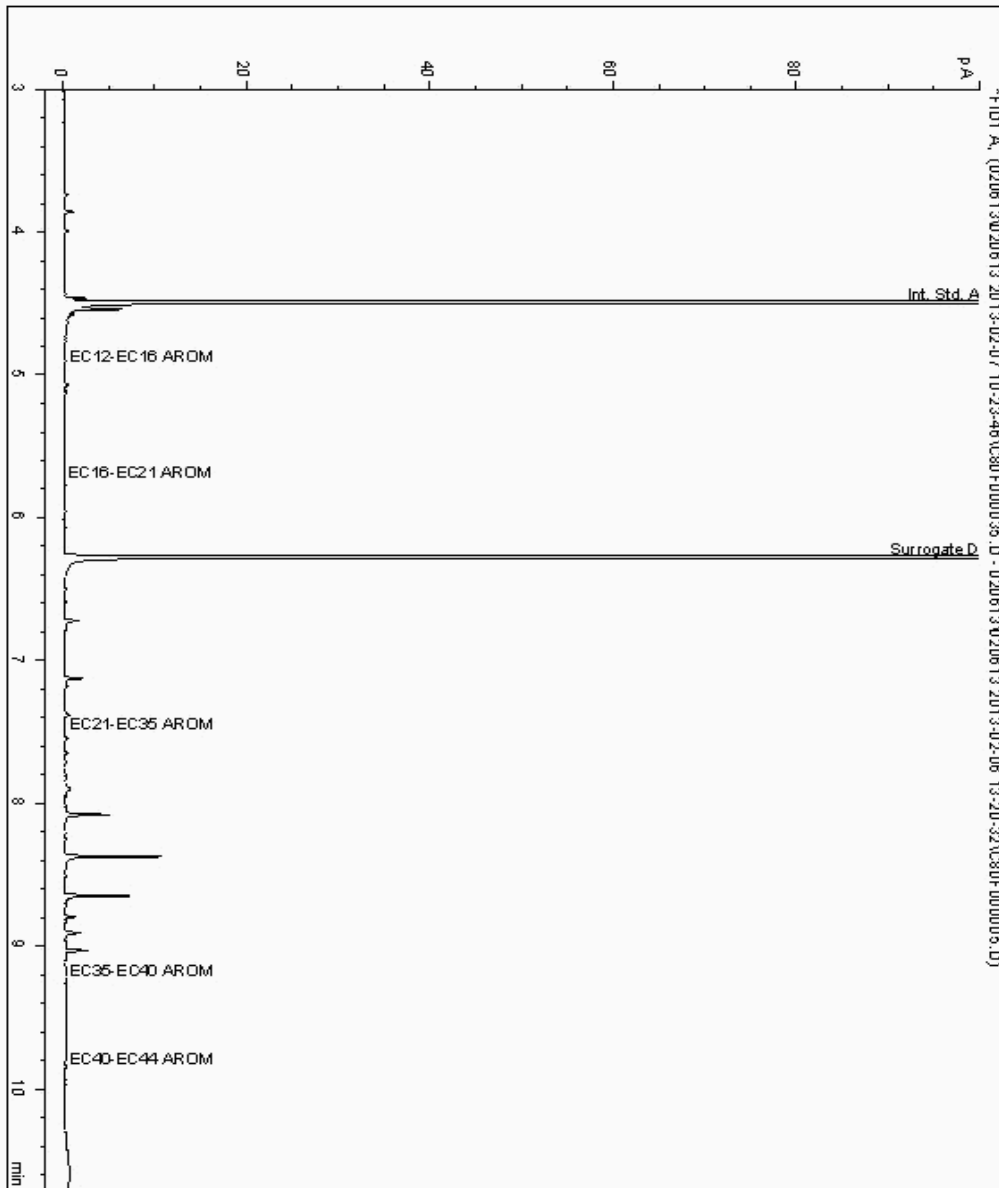
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6864667
Sample ID : WS123

Depth : 1.50

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

Sample Identity: 6591961-6864667
Date Acquired : 07/02/13 16:51:25
Units : ppb
Dilution :
CF : 1
Multiplier : 1.020





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

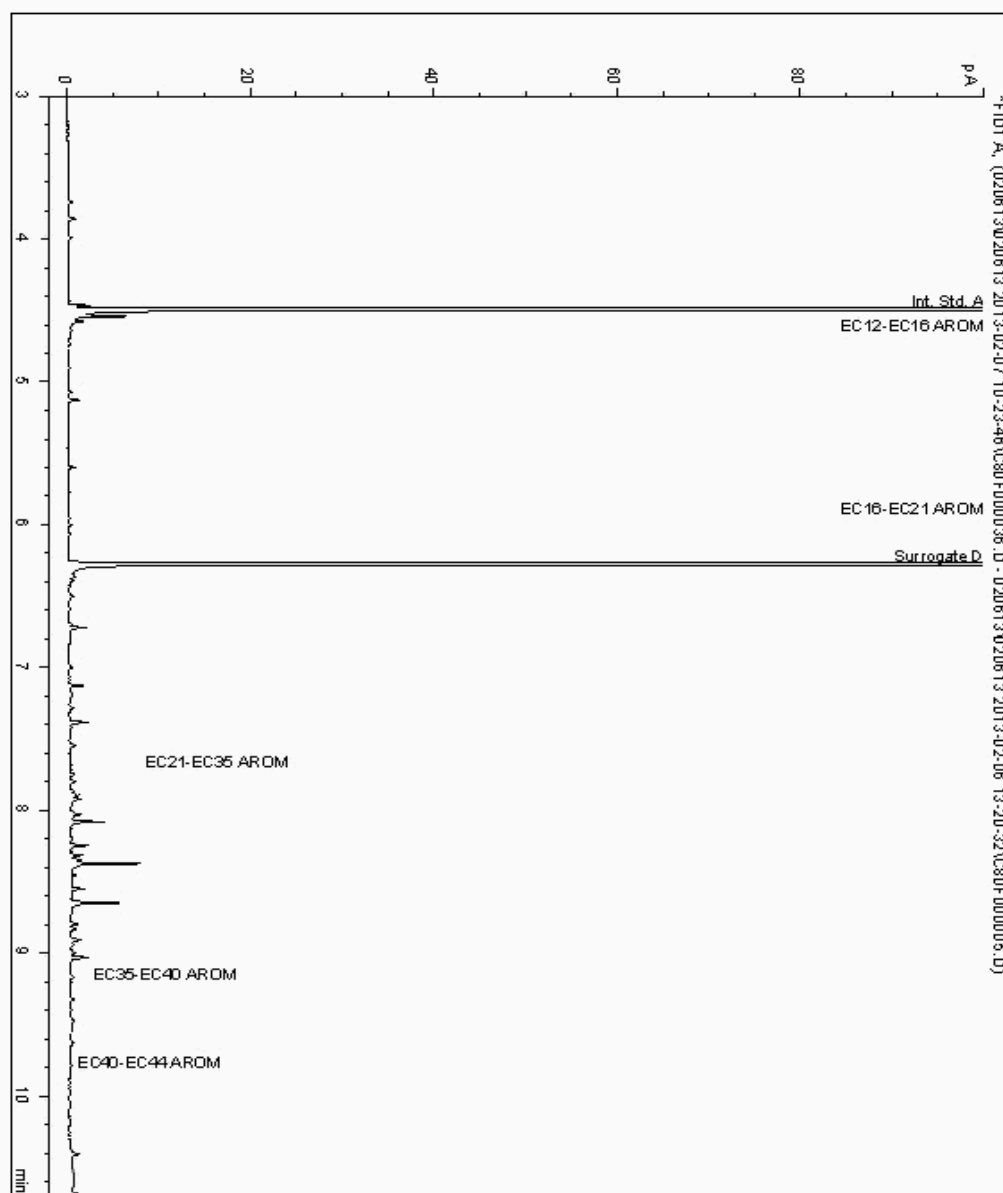
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6864690
Sample ID : WS124

Depth : 0.50

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

Sample Identity: 6591980-6864690
Date Acquired : 07/02/13 17:11:39
Units : ppb
Dilution :
CF : 1
Multiplier : 1.030





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

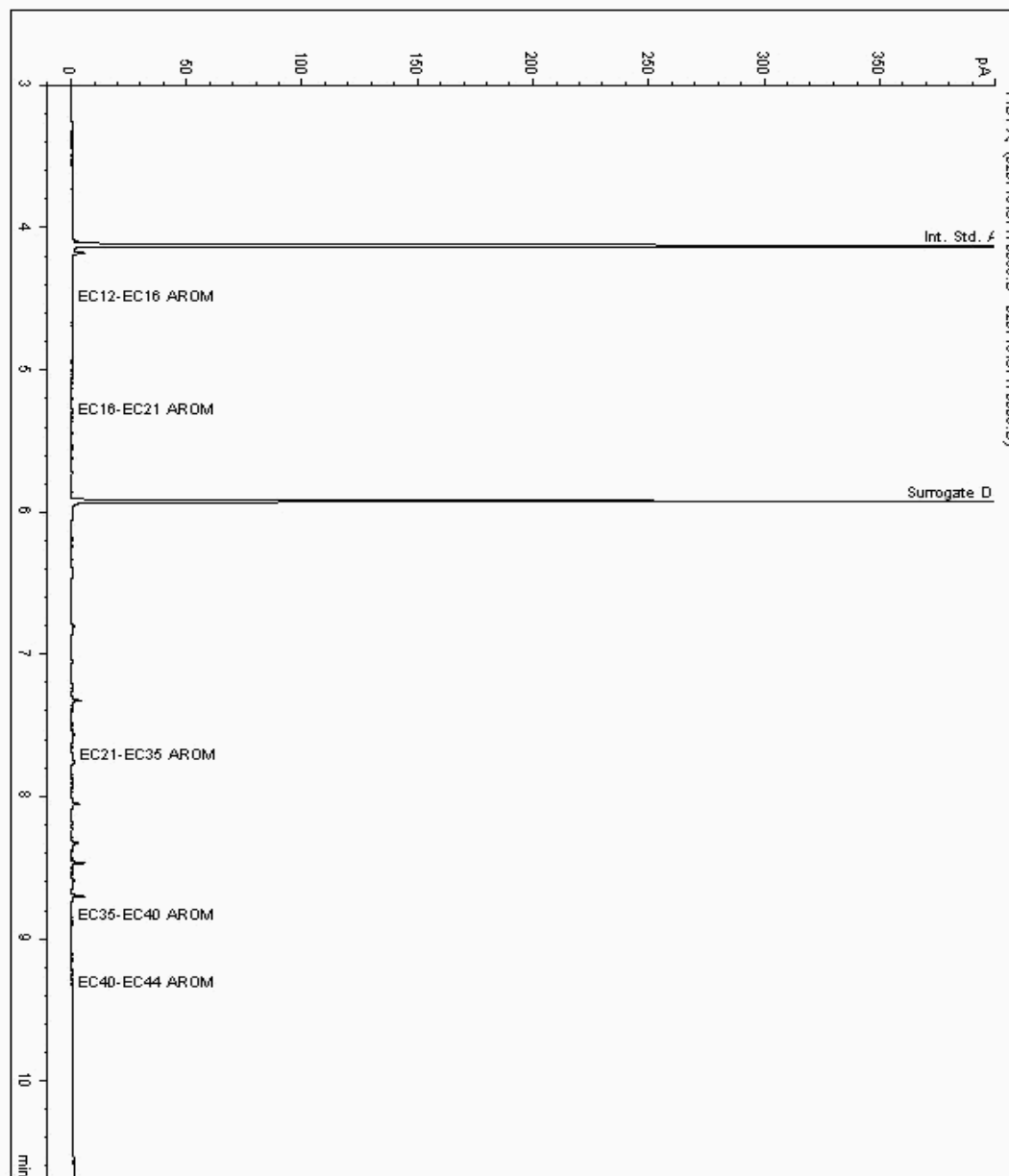
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6871168
Sample ID : WS127

Depth : 0.50

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

Sample Identity: 6592056-6871168
Date Acquired : 08/02/2013 00:13:25 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooille
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

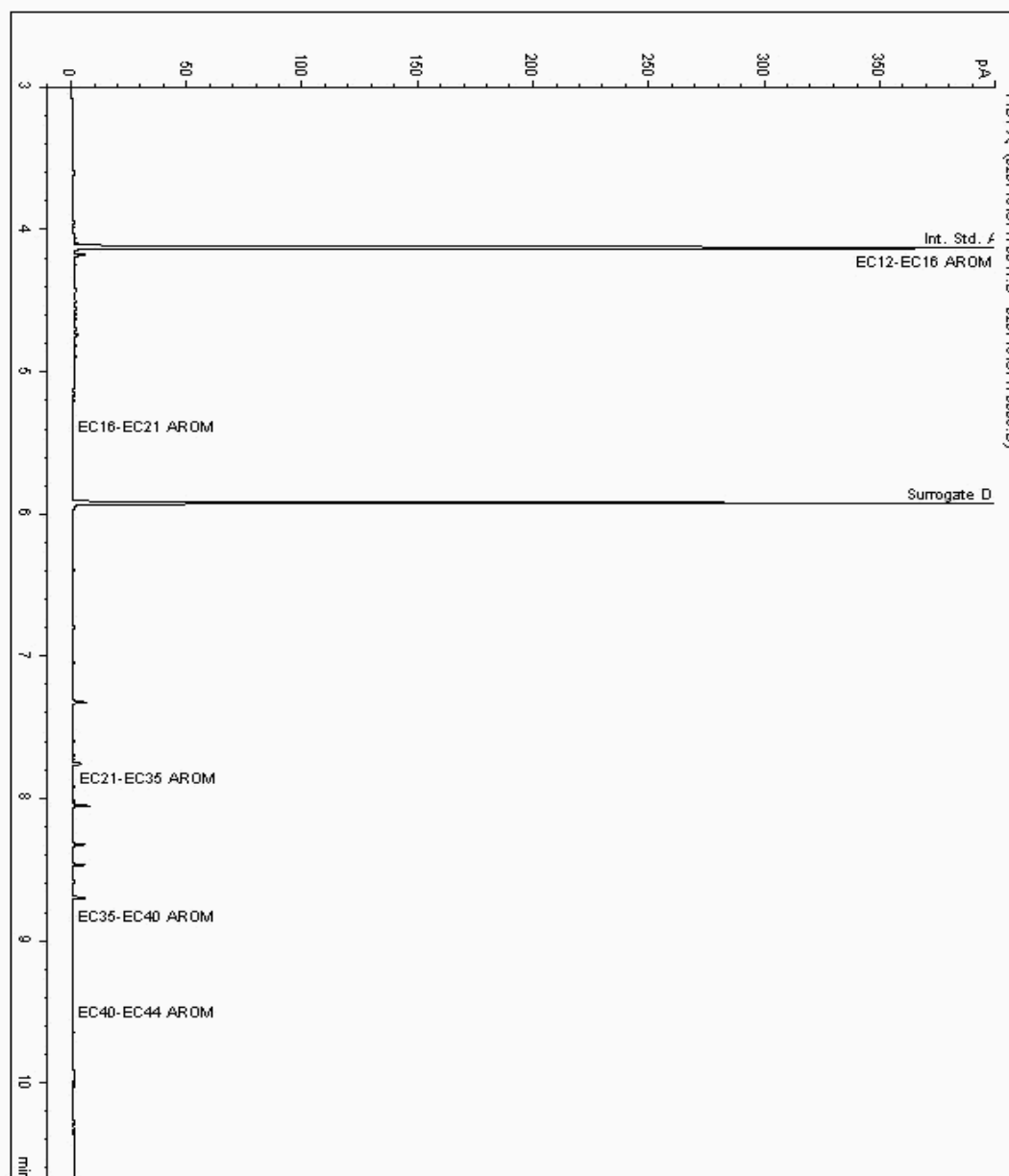
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6871865
Sample ID : WS109

Depth : 0.50

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

Sample Identity: 6591492-6871865
Date Acquired : 08/02/2013 00:53:53 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

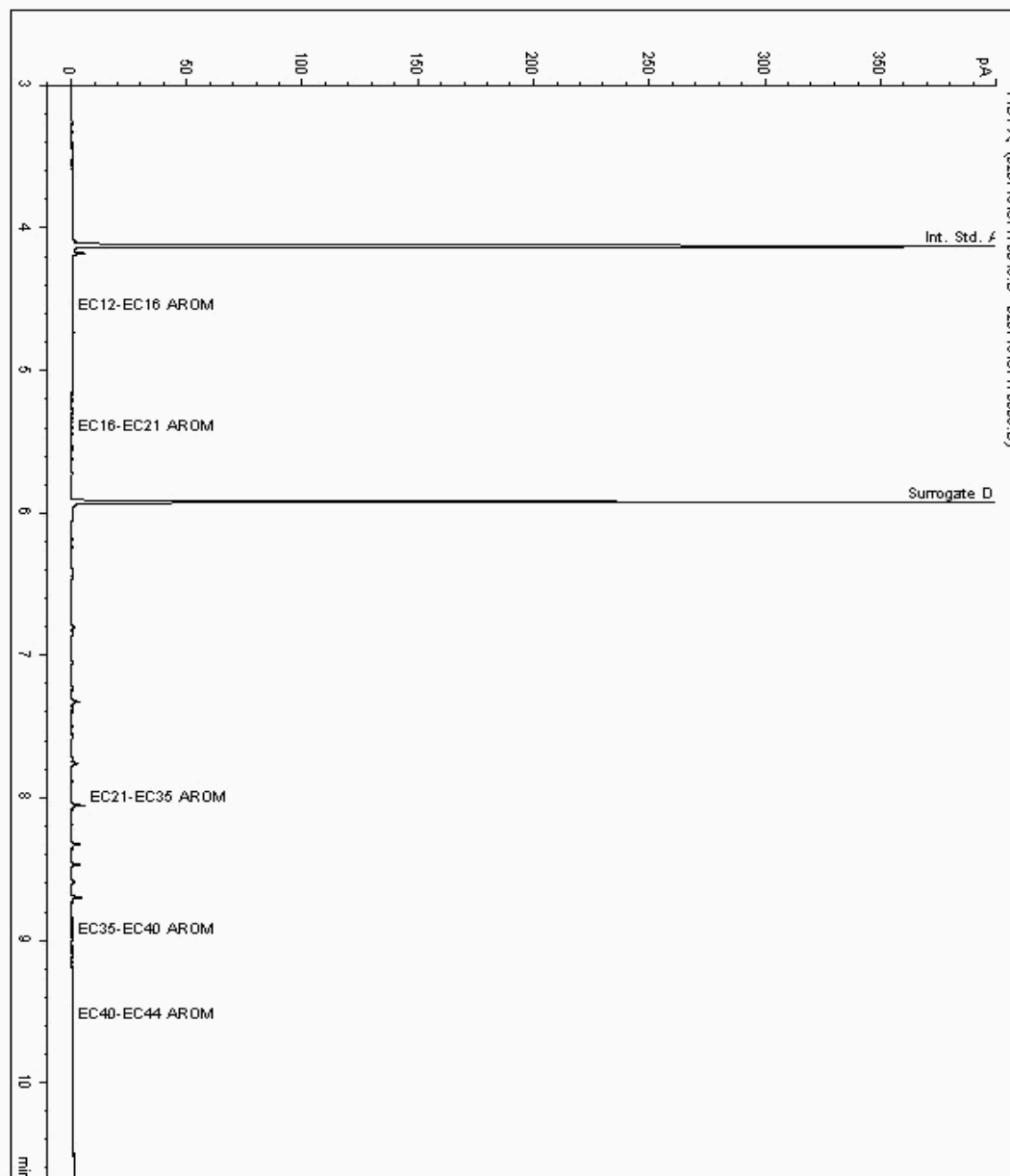
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6872036
Sample ID : WS109

Depth : 1.50

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

Sample Identity: 6591512-6872036
Date Acquired : 08/02/2013 01:34:30 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

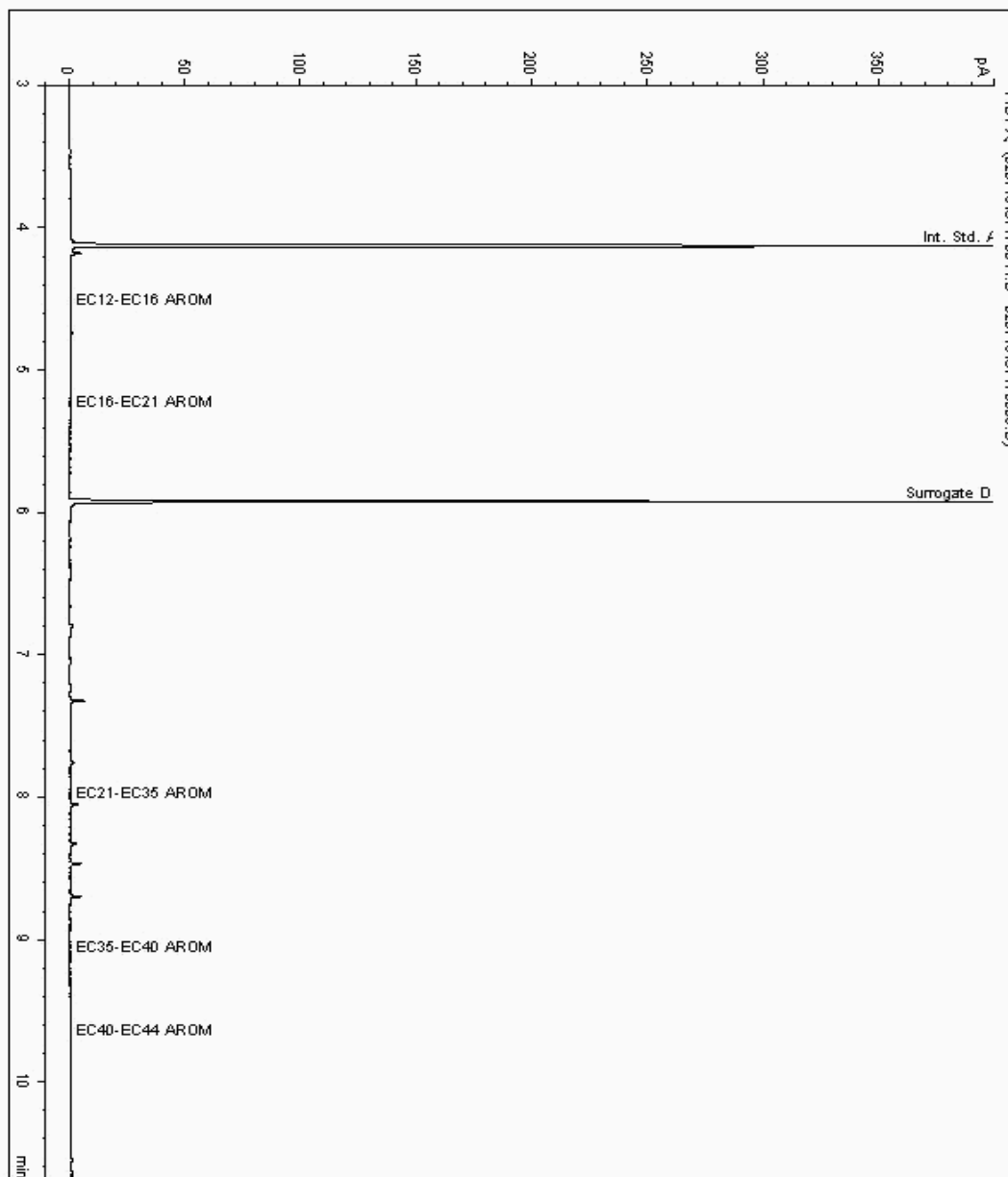
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6872138
Sample ID : WS108

Depth : 0.50

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

Sample Identity: 6591467-6872138
Date Acquired : 08/02/2013 01:54:42 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooille
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

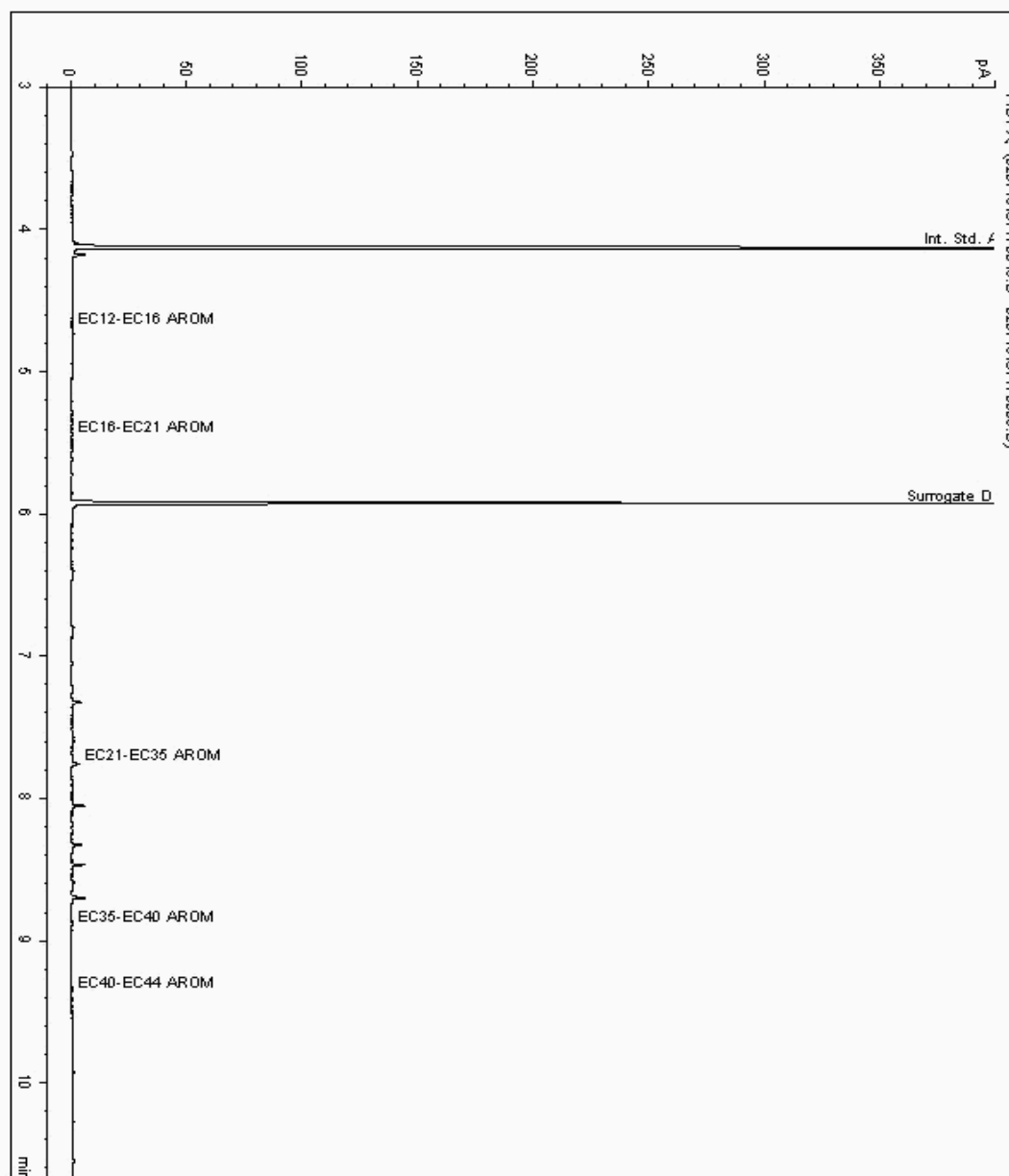
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6872243
Sample ID : WS113

Depth : 0.50

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

Sample Identity: 6591553-6872243
Date Acquired : 08/02/2013 02:15:07 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

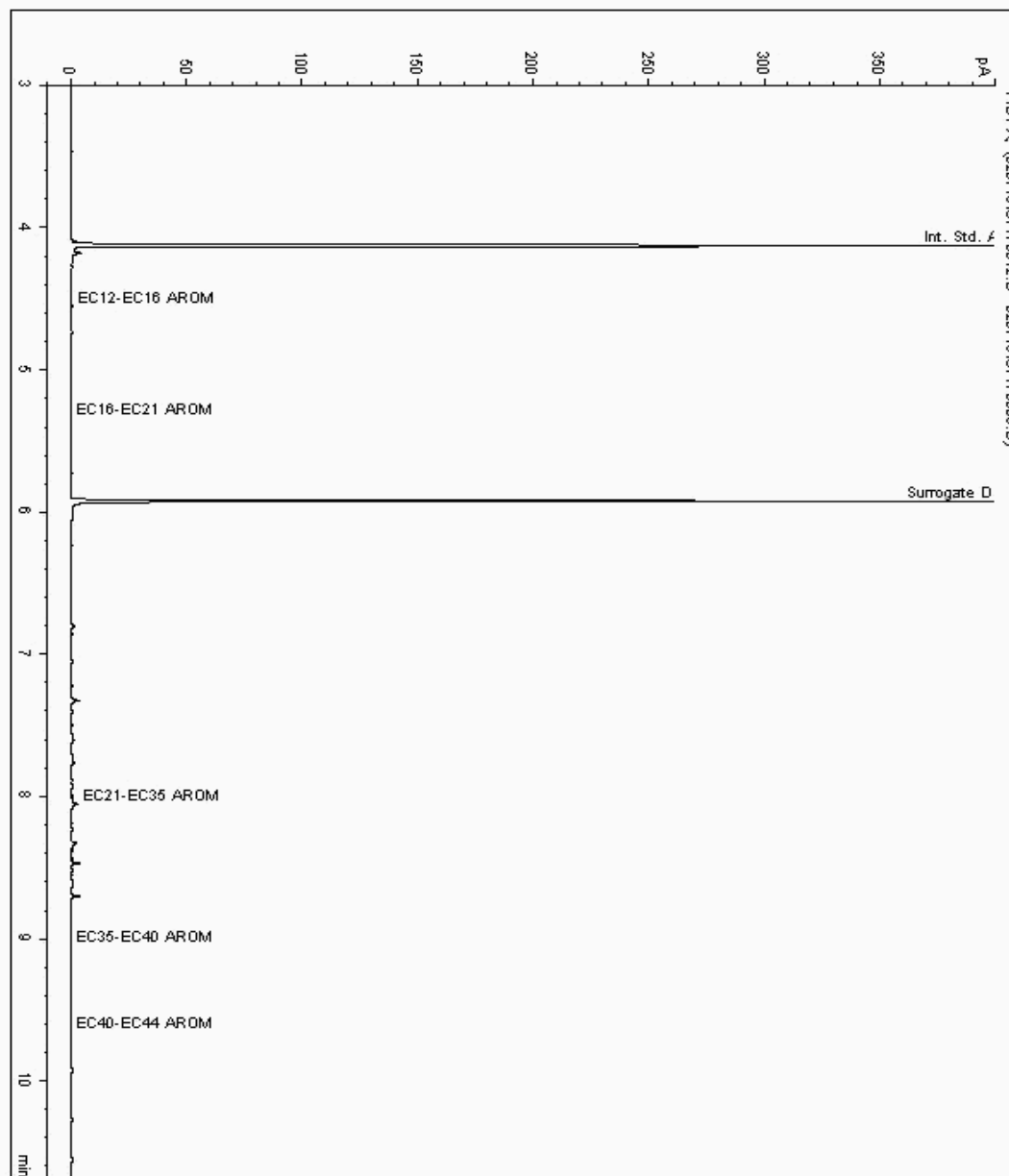
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6873111
Sample ID : WS114

Depth : 0.50

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

Sample Identity: 6591596-6873111
Date Acquired : 07/02/2013 15:53:37 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

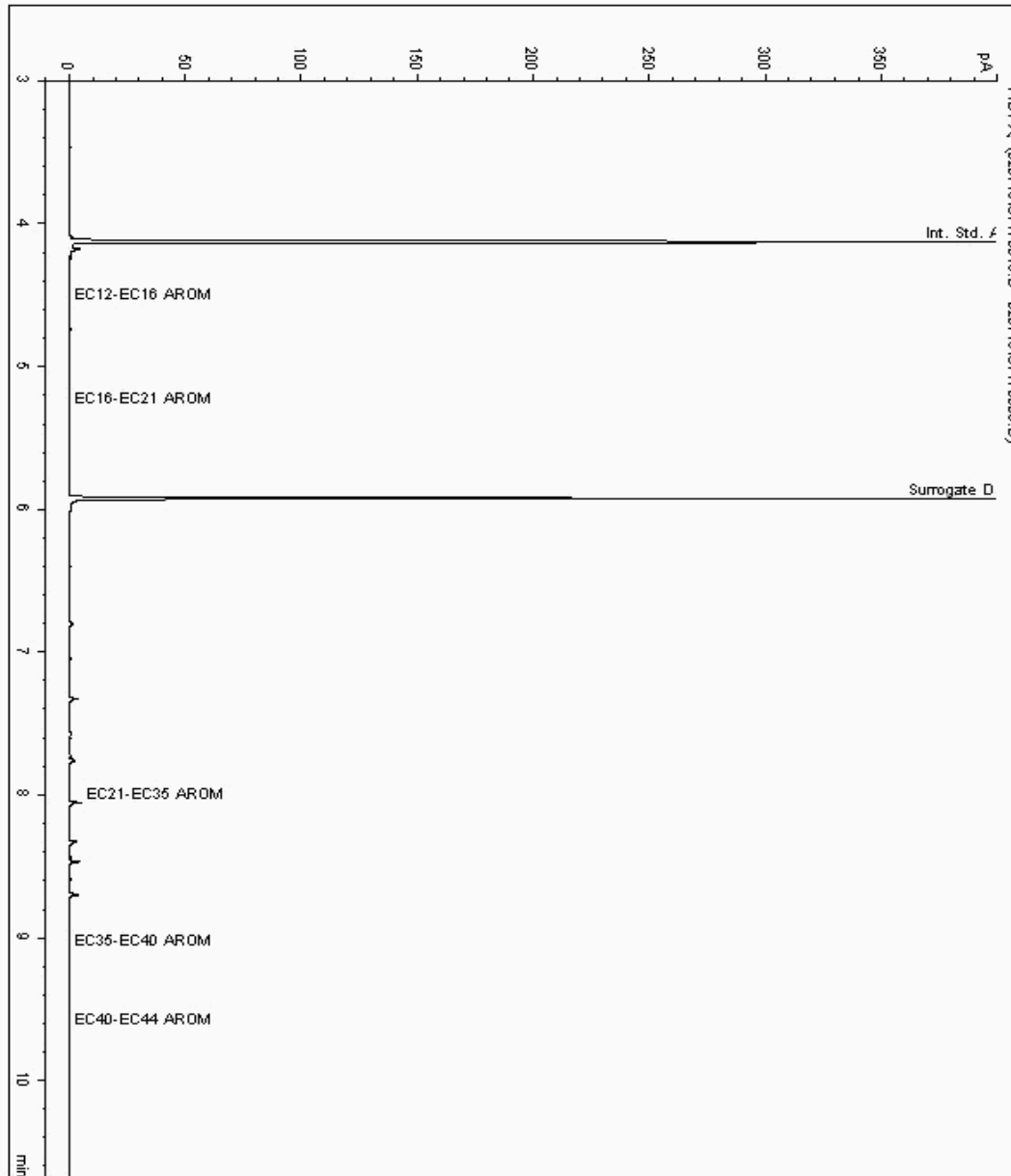
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6873324
Sample ID : WS115

Depth : 0.50

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

Sample Identity: 6591641-6873324
Date Acquired : 07/02/2013 16:13:36 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

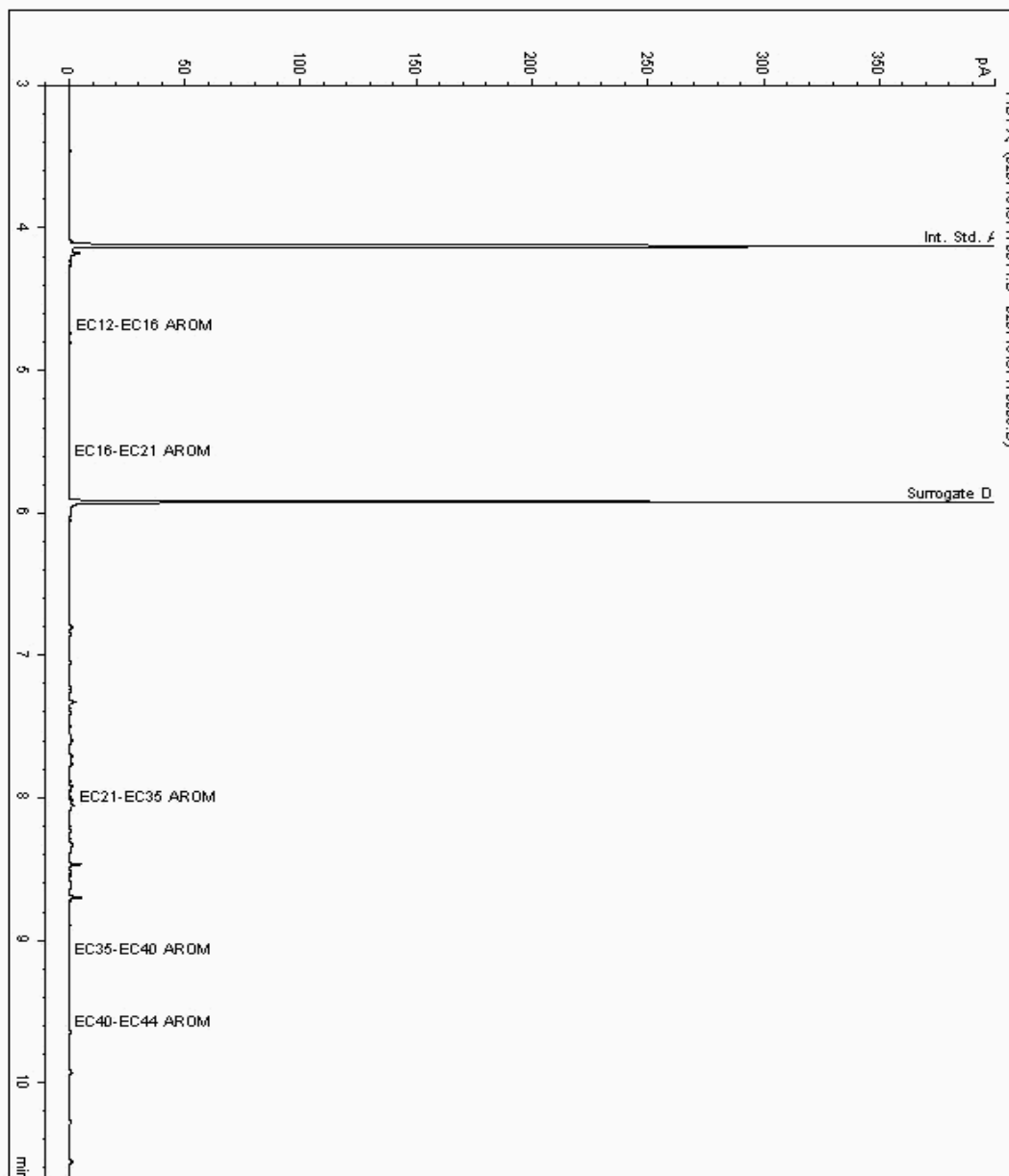
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6873427
Sample ID : WS110

Depth : 0.50

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

Sample Identity: 6591534-6873427
Date Acquired : 07/02/2013 16:33:48 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

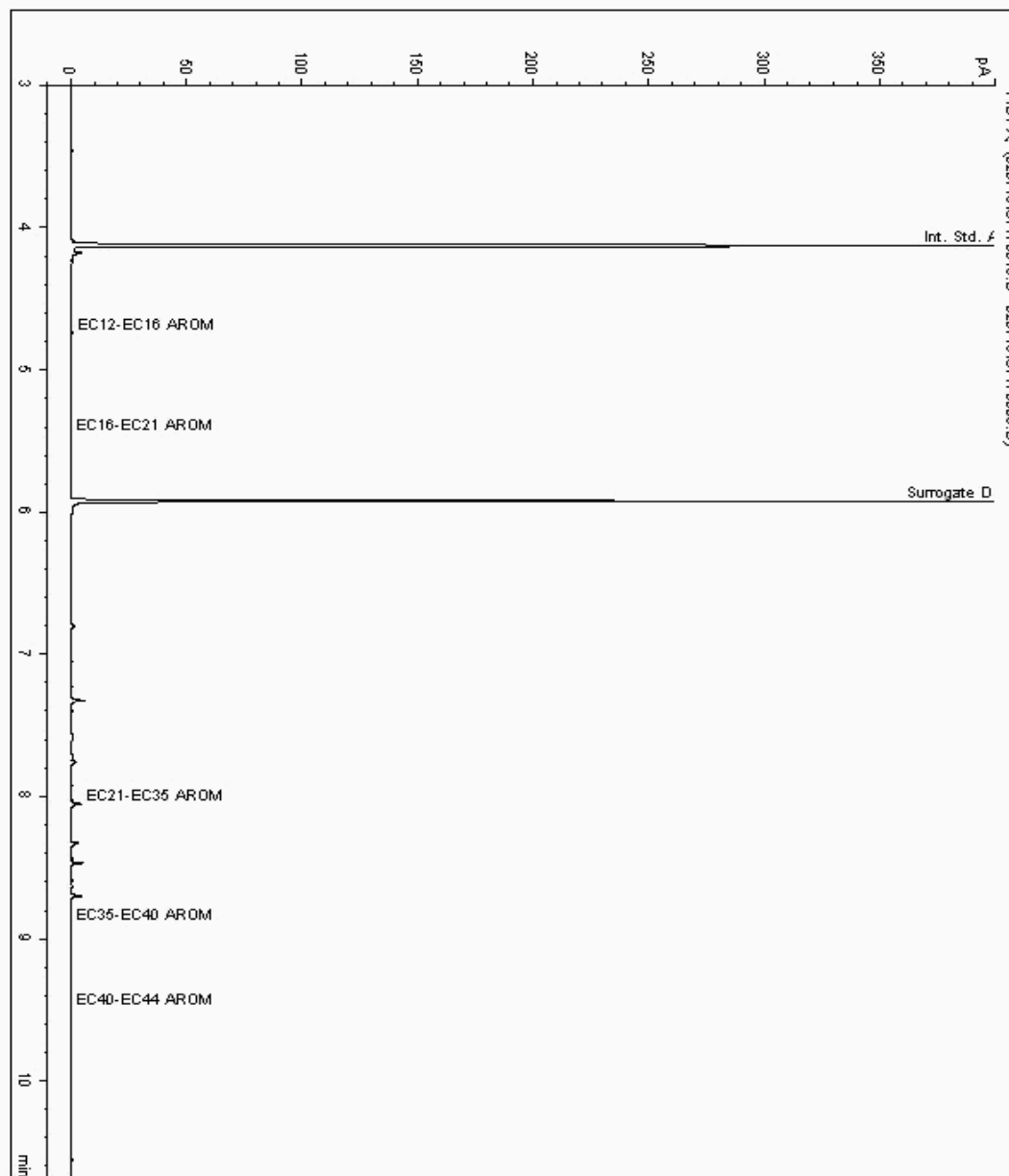
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6873584
Sample ID : WS117

Depth : 0.50

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

Sample Identity: 6591663-6873584
Date Acquired : 07/02/2013 16:53:42 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

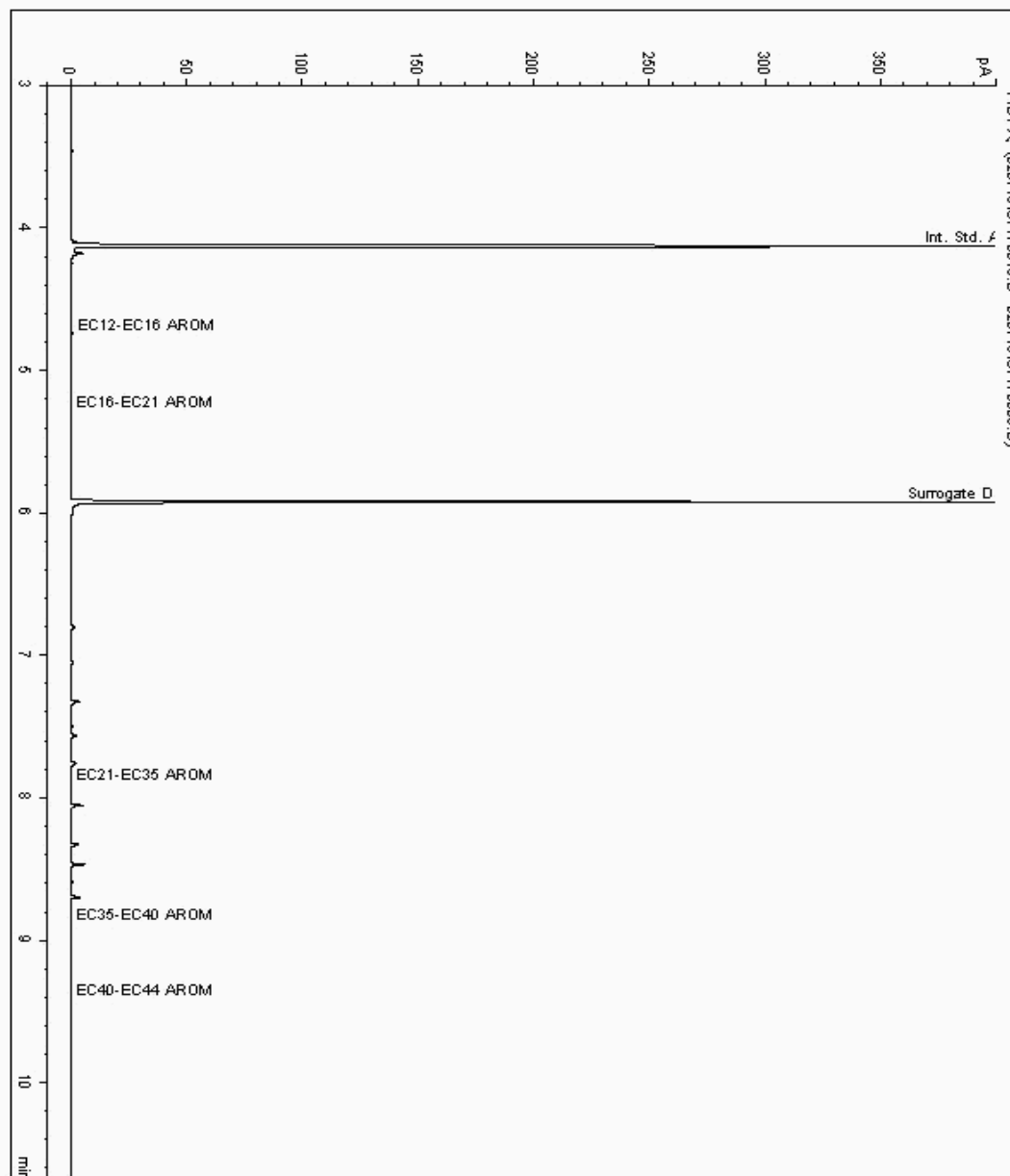
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6873622
Sample ID : WS118

Depth : 1.50

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

Sample Identity: 6591749-6873622
Date Acquired : 07/02/2013 17:13:32 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

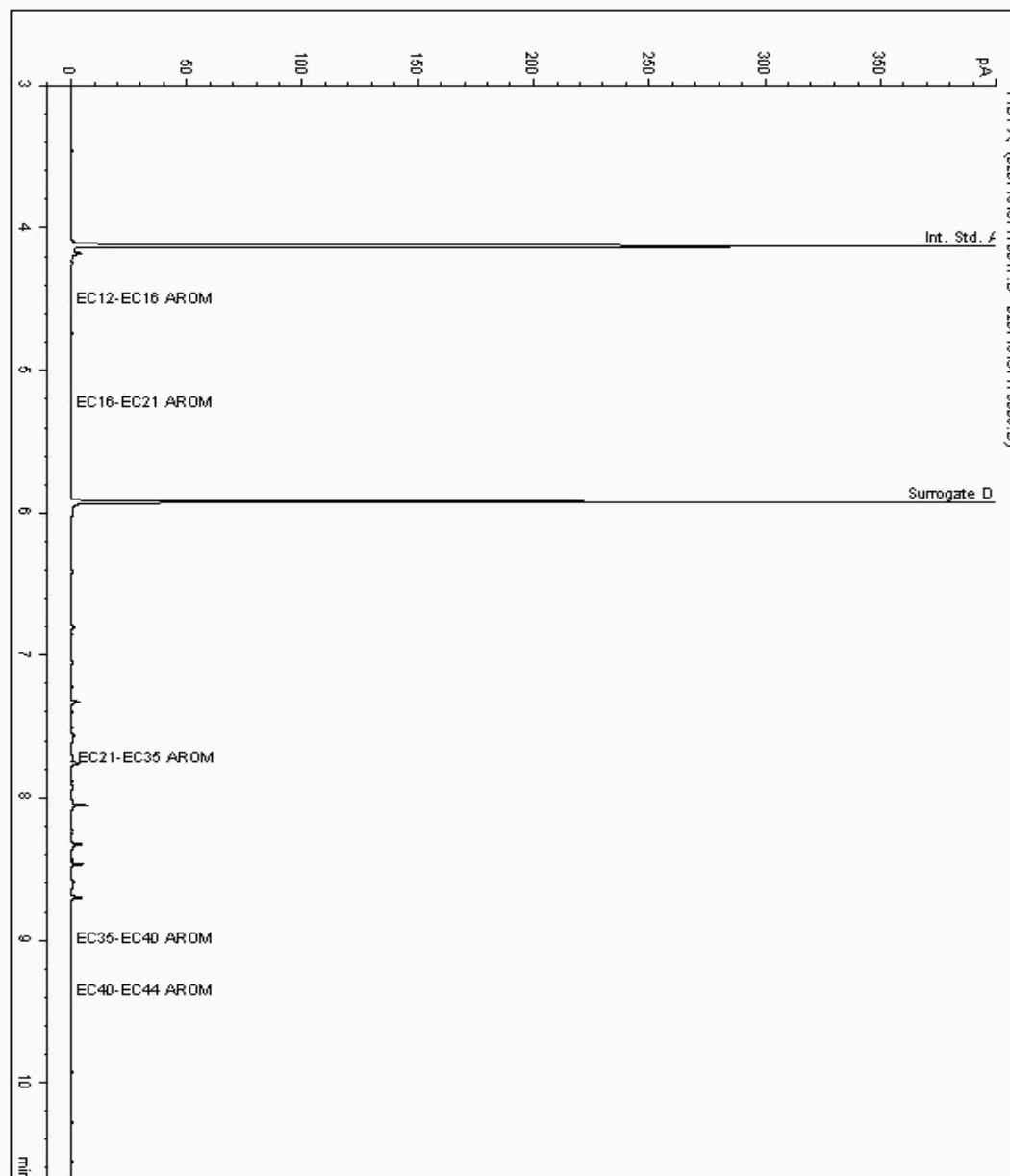
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6873695
Sample ID : WS118

Depth : 0.50

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

Sample Identity: 6591705-6873695
Date Acquired : 07/02/2013 17:33:39 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

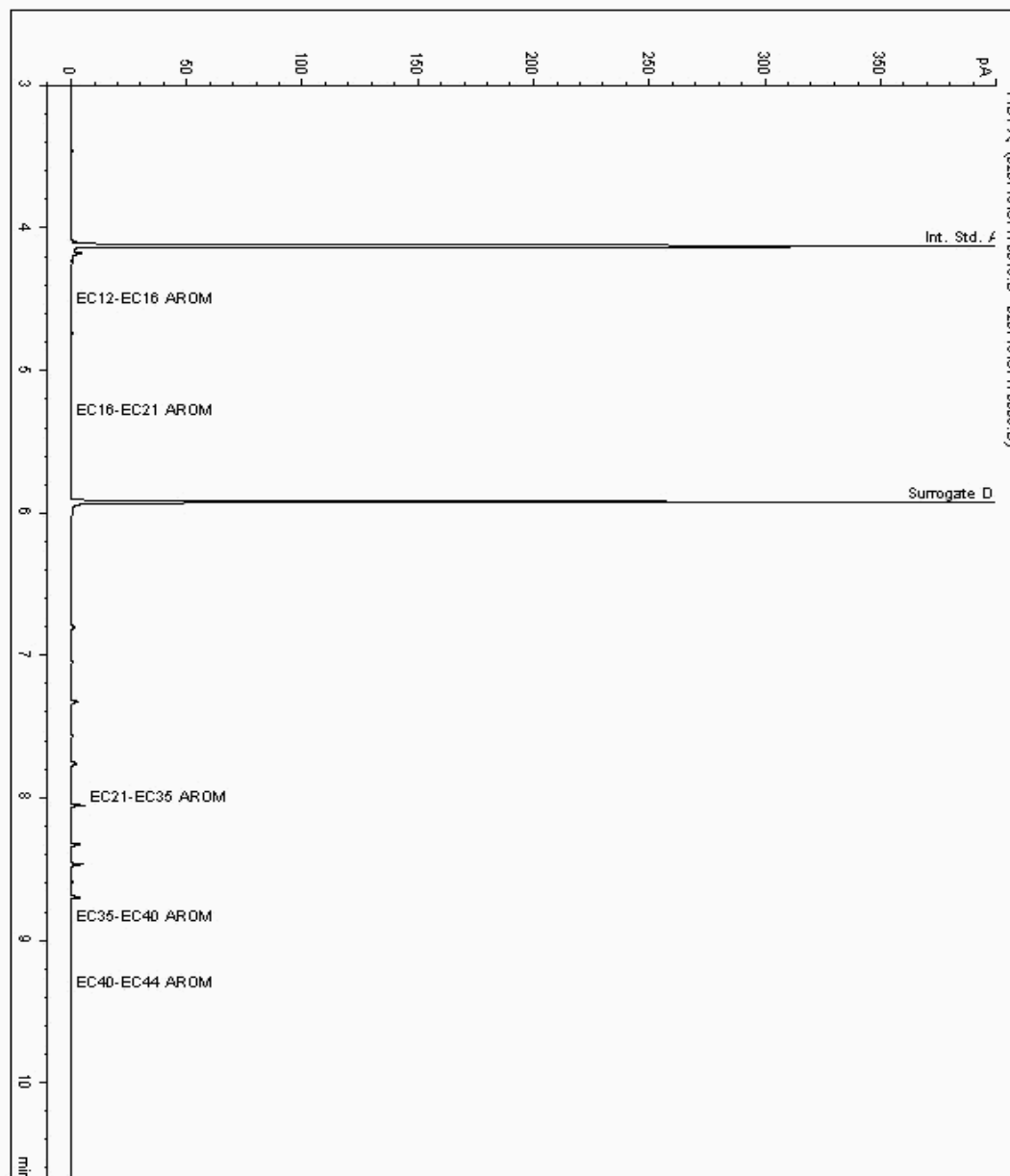
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6873746
Sample ID : WS114

Depth : 1.50

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

Sample Identity: 6591617-6873746
Date Acquired : 07/02/2013 17:53:37 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

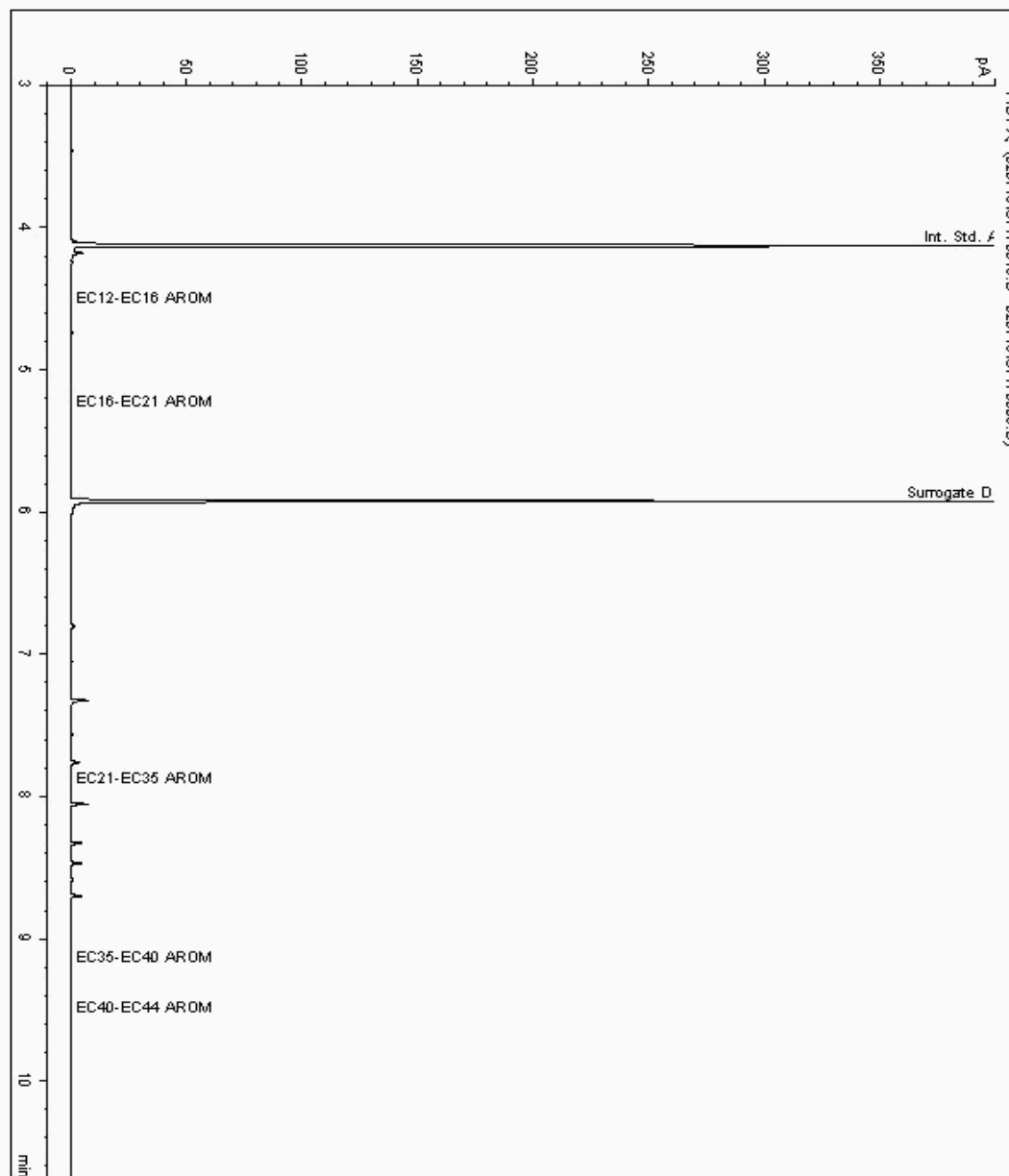
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6873780
Sample ID : WS113

Depth : 1.50

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

Sample Identity: 6591572-6873780
Date Acquired : 07/02/2013 18:13:30 PM
Units : ppb
Dilution:





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

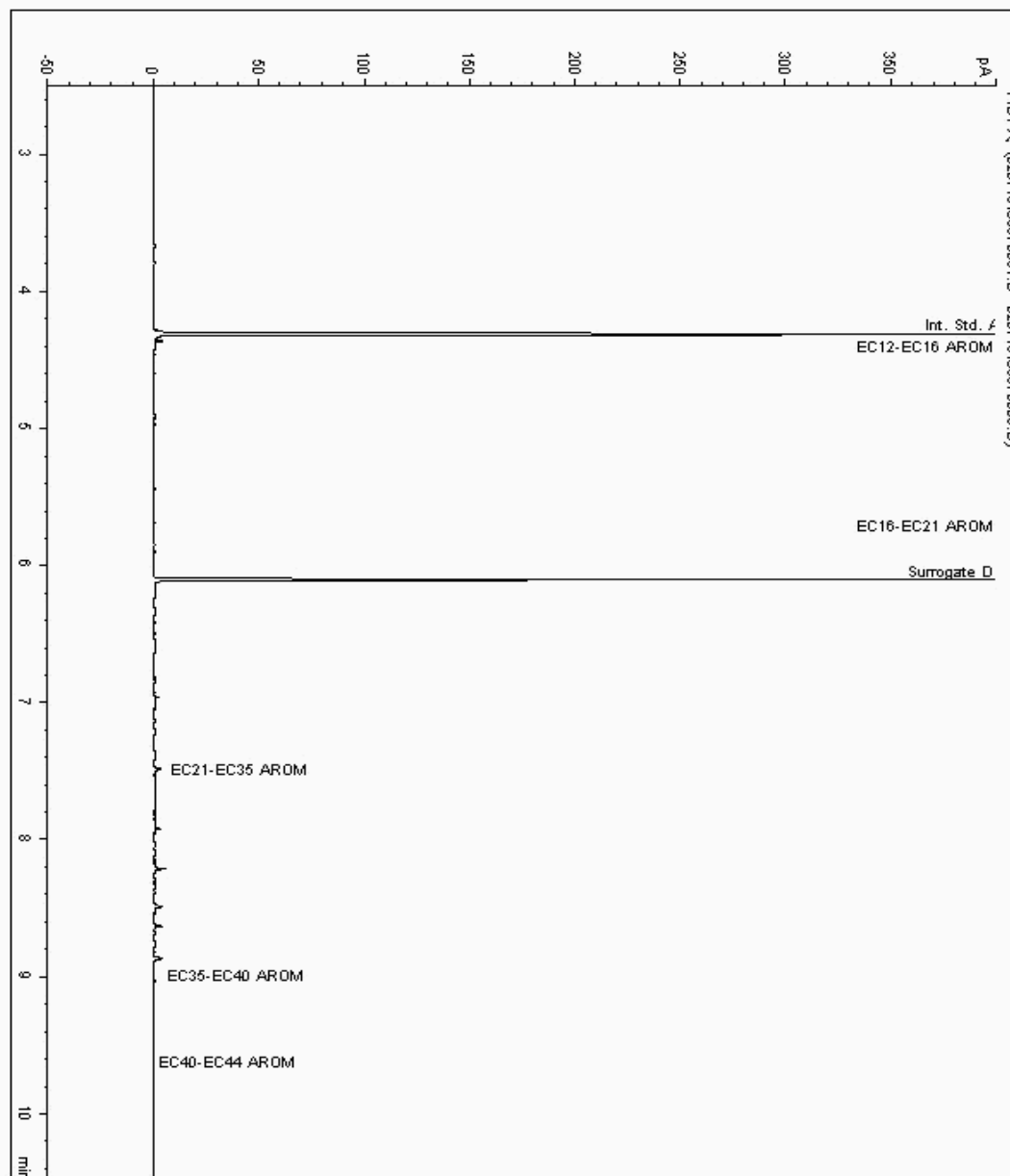
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6876211
Sample ID : WS123

Depth : 0.50

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

Sample Identity: 6591934-6876211
Date Acquired : 08/02/13 01:08:27 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.990





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

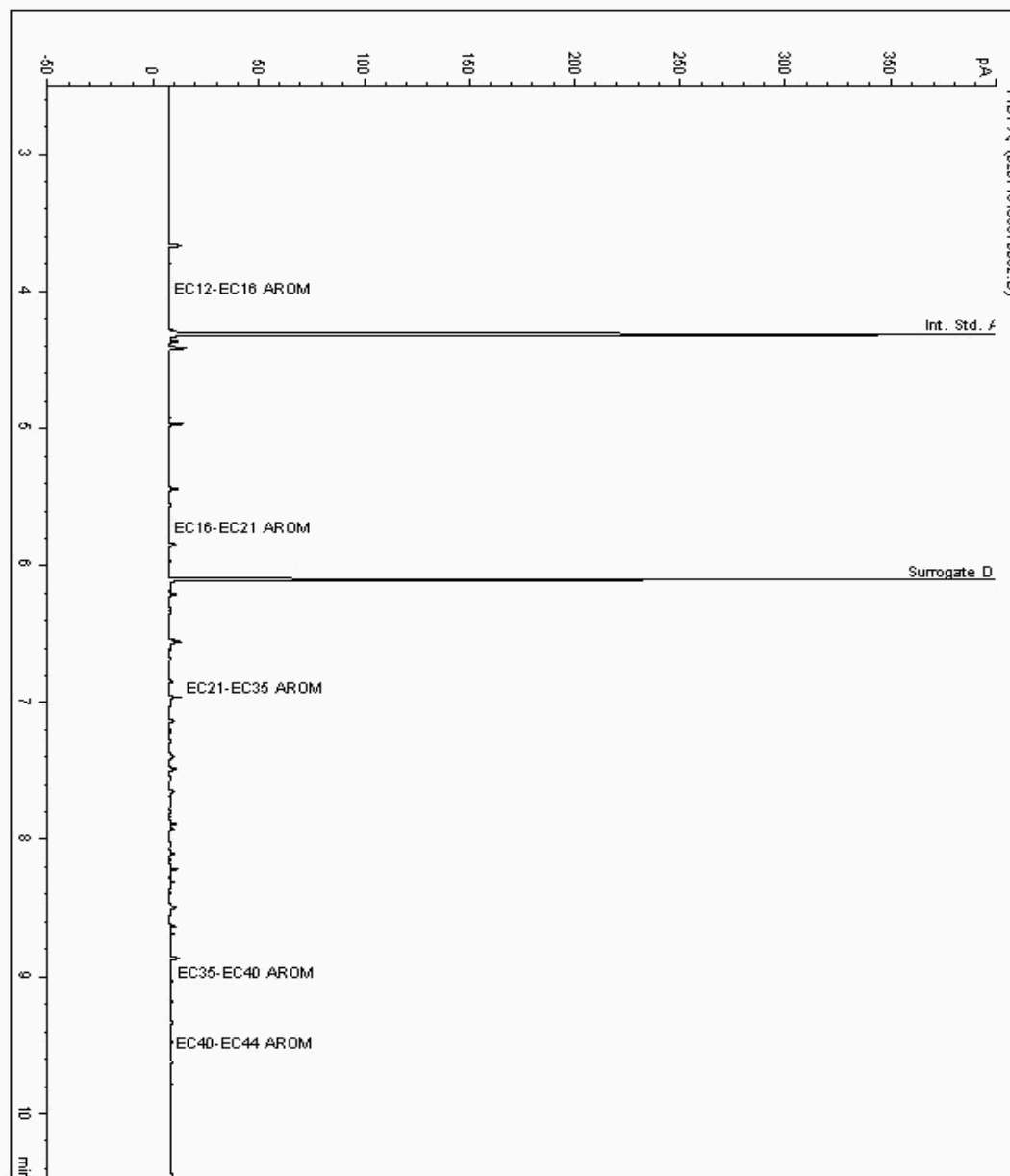
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6876302
Sample ID : WS119

Depth : 0.50

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

Sample Identity: 6591796-6876302
Date Acquired : 08/02/13 01:29:20 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 1.010





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

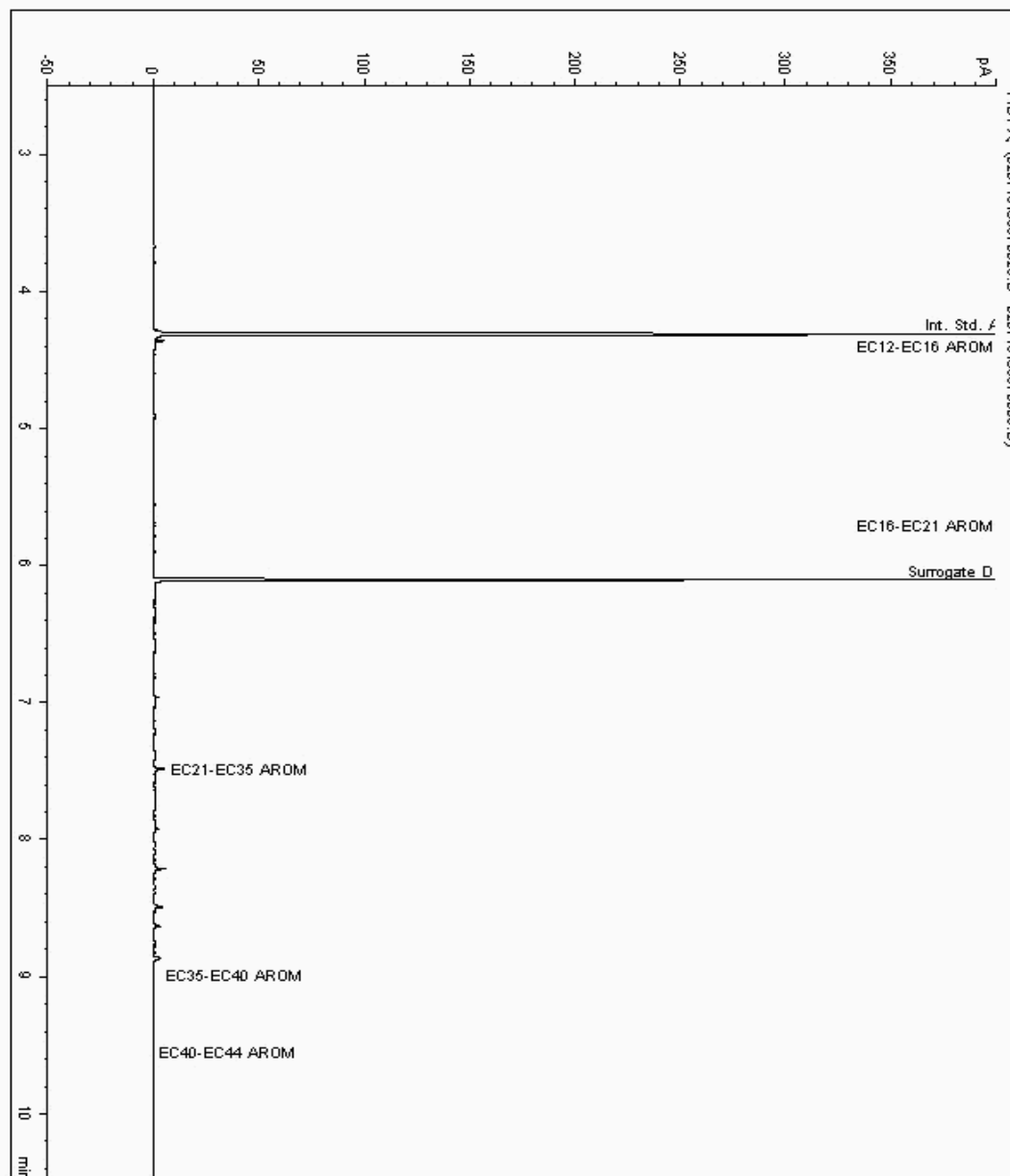
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6876339
Sample ID : WS120

Depth : 0.50

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

Sample Identity: 6591867-6876339
Date Acquired : 08/02/13 00:26:53 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.970





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

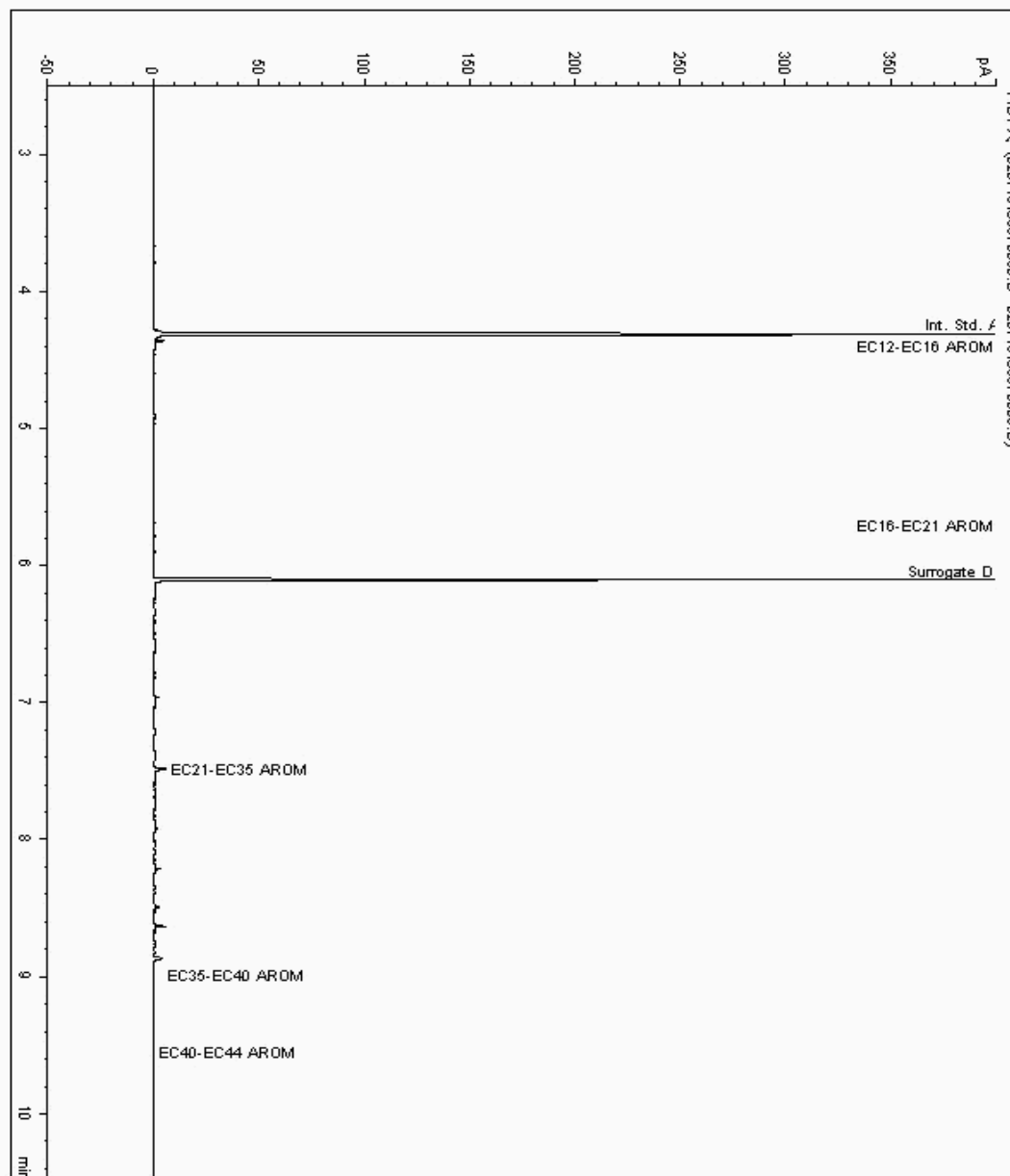
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6876458
Sample ID : WS121

Depth : 0.50

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

Sample Identity: 6591913-6876458
Date Acquired : 08/02/13 00:47:41 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.990





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

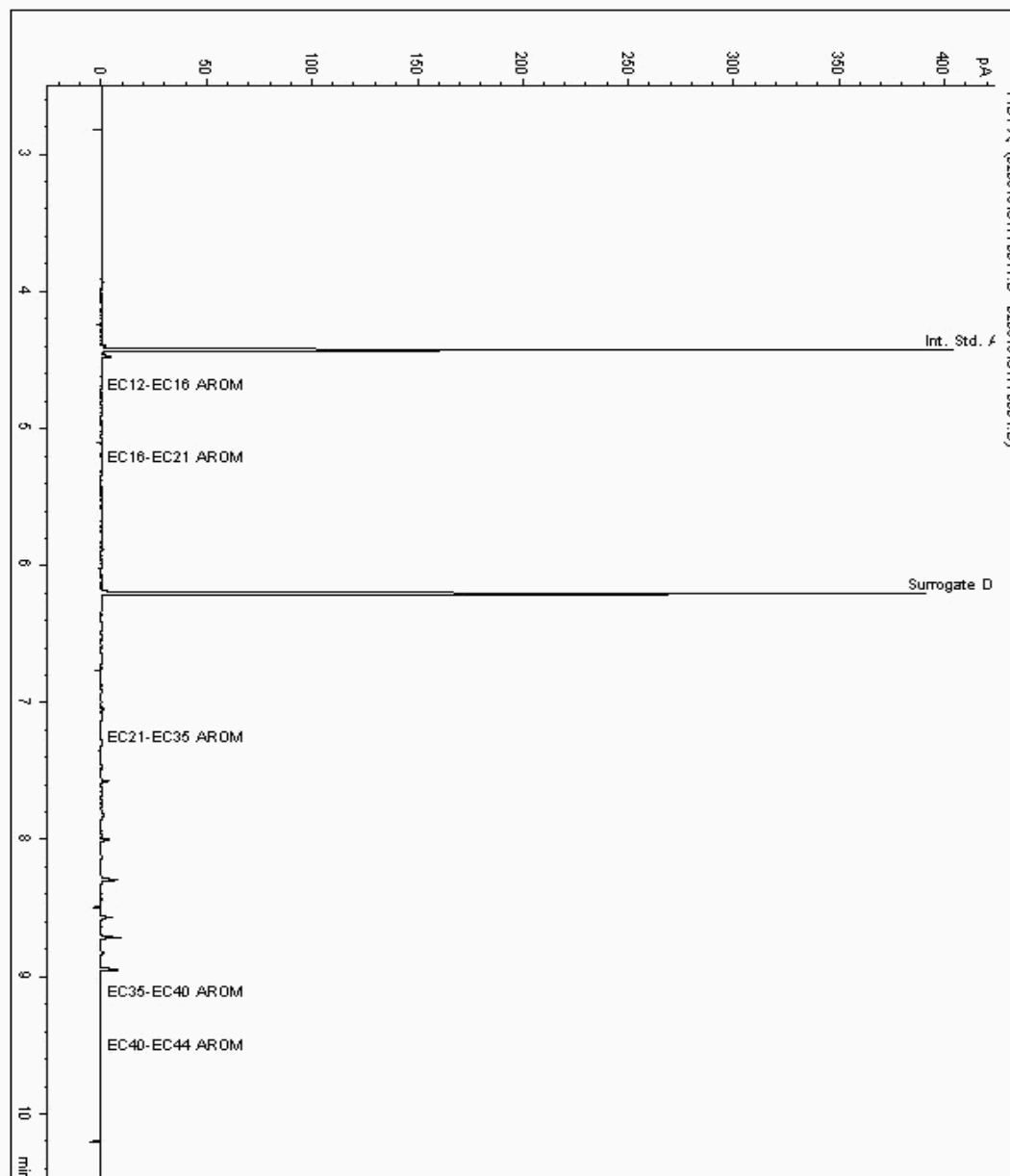
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6876614
Sample ID : WS119

Depth : 1.50

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

Sample Identity: 6591837-6876614
Date Acquired : 08/02/2013 12:15:28 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.980





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

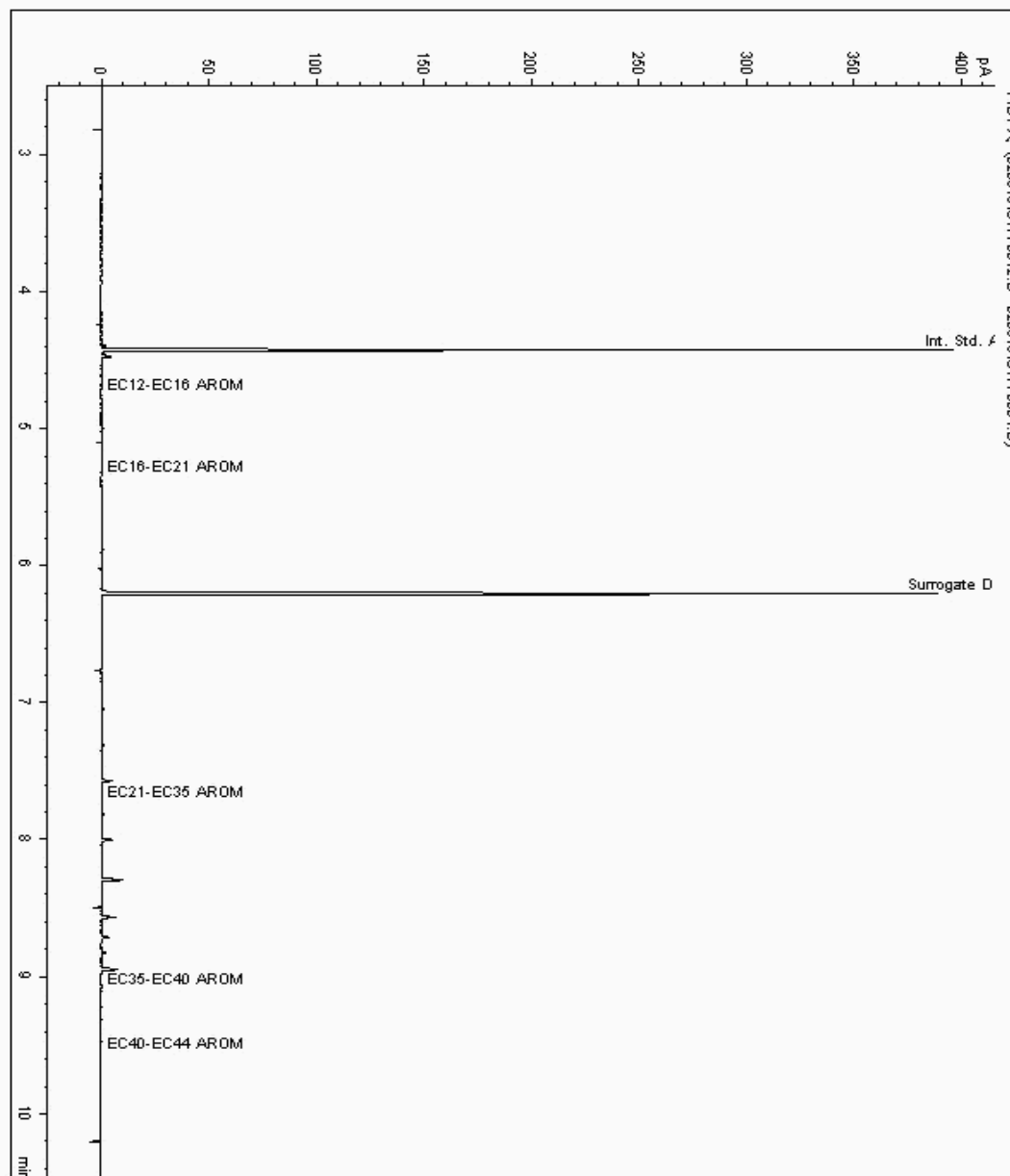
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 6878237
Sample ID : WS120

Depth : 1.50

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

Sample Identity: 6591892-6878237
Date Acquired : 08/02/2013 12:35:53 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 1.010





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

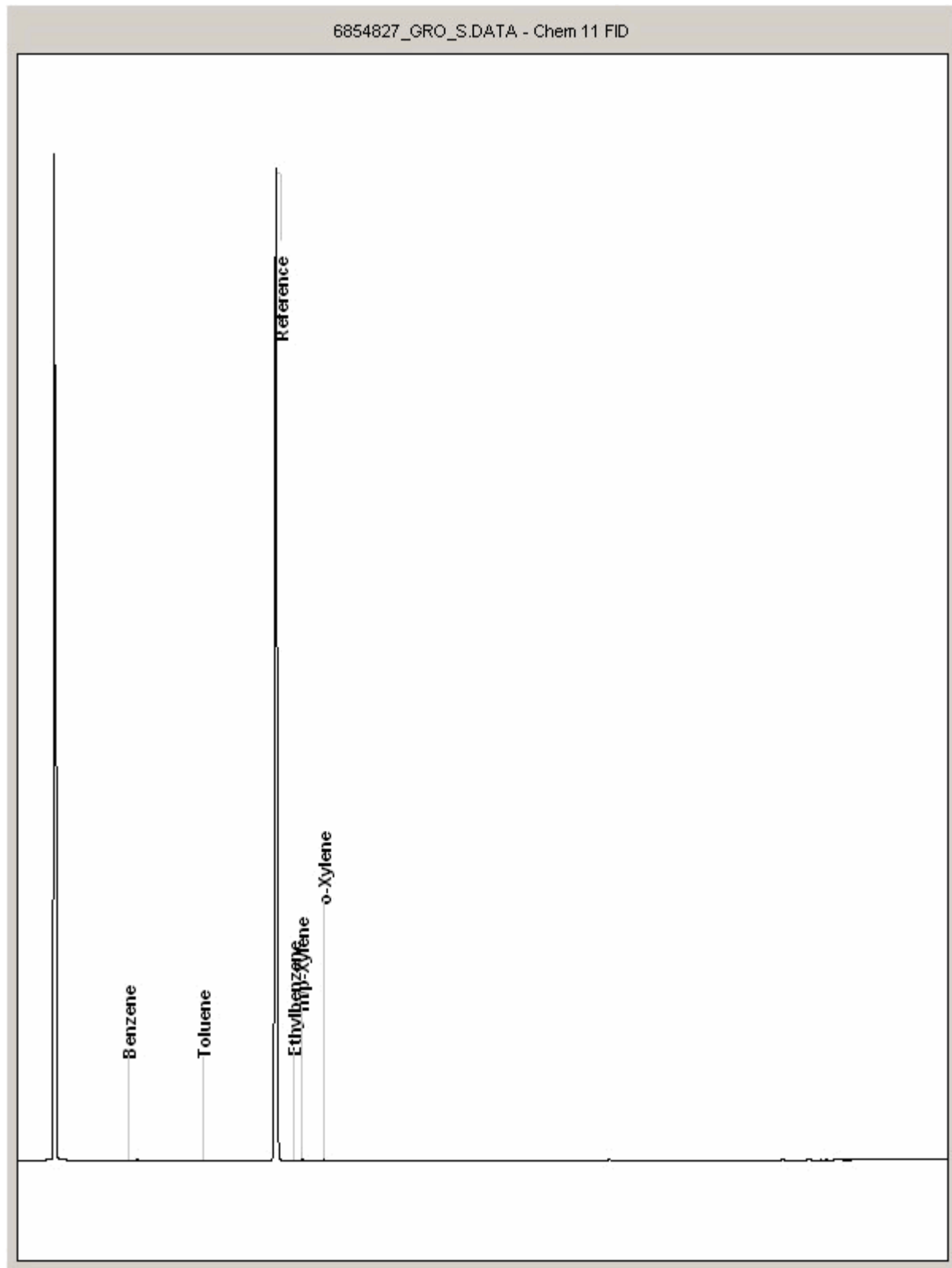
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6854827
Sample ID : WS118

Depth : 1.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

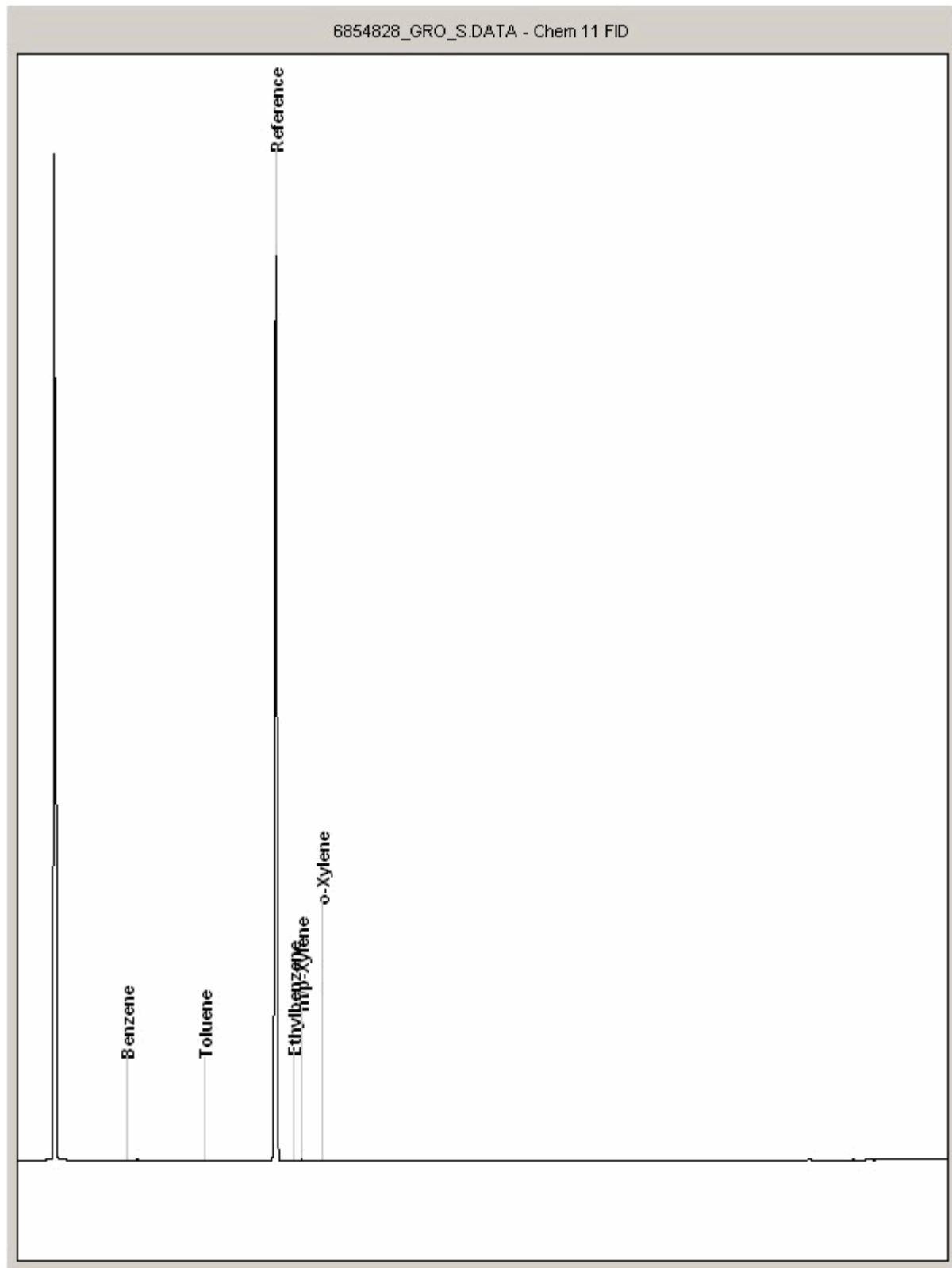
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6854828
Sample ID : WS124

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

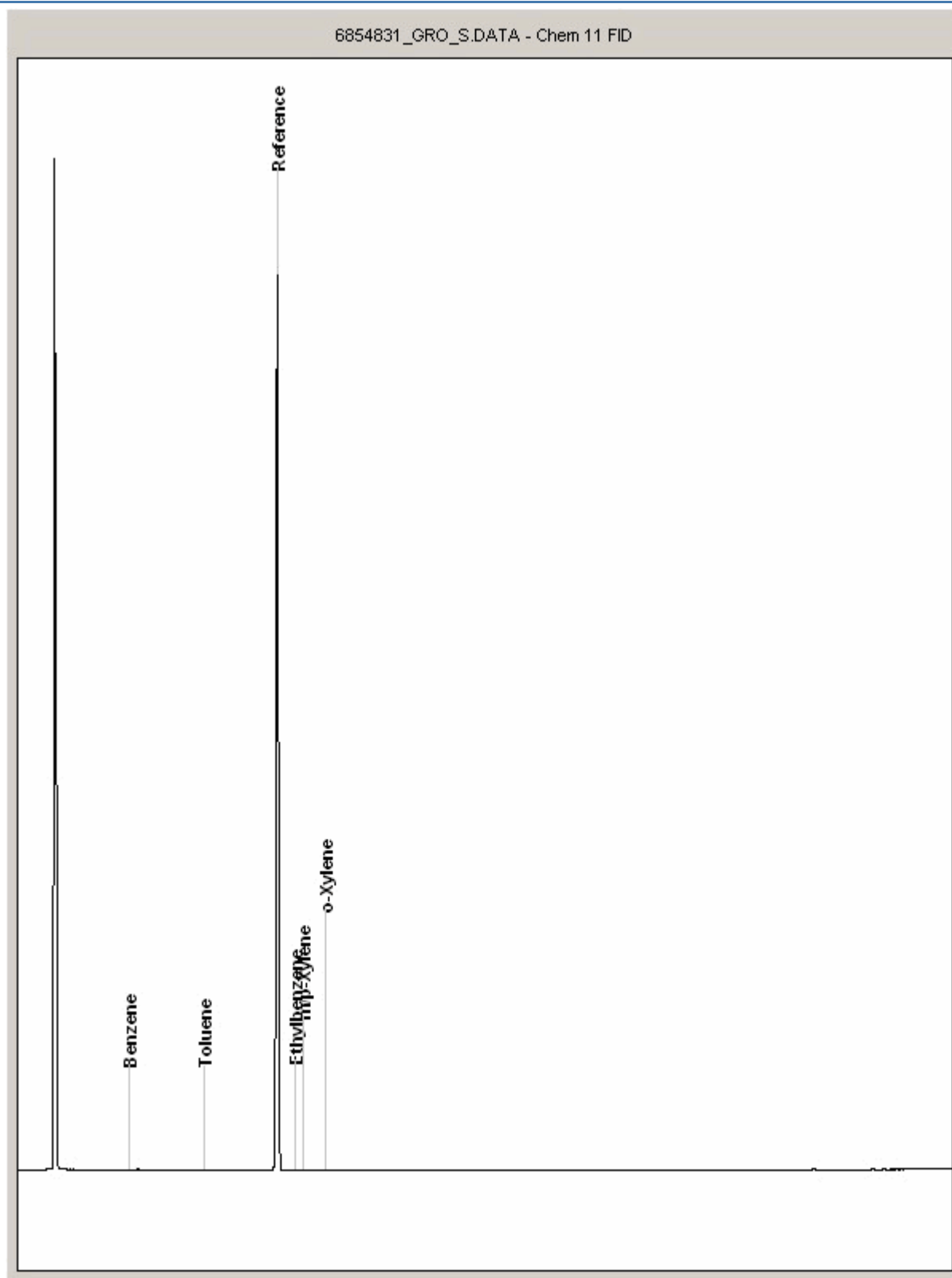
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6854831
Sample ID : WS118

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterlooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

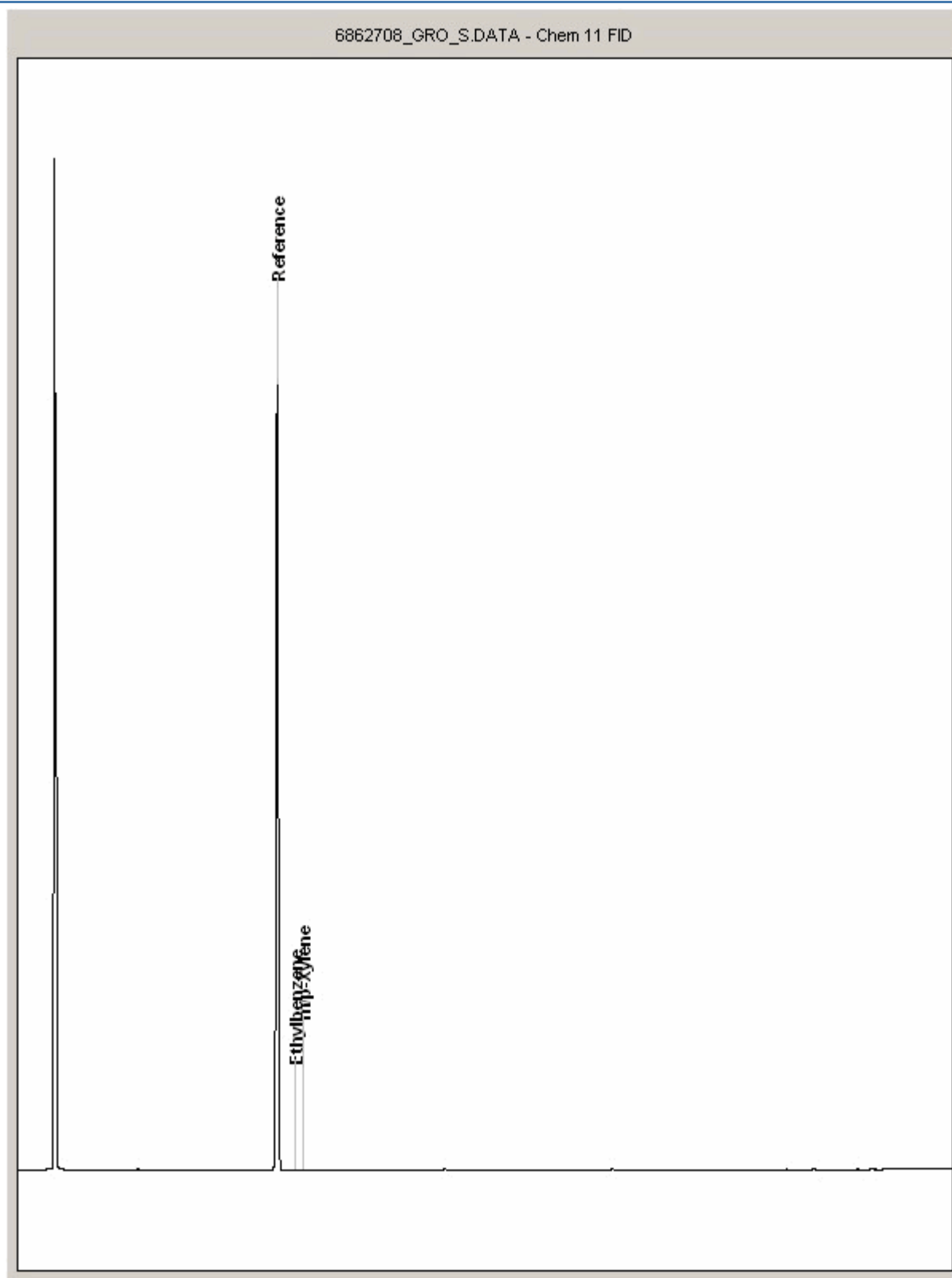
Order Number: R/GTWVille6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862708
Sample ID : WS113

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

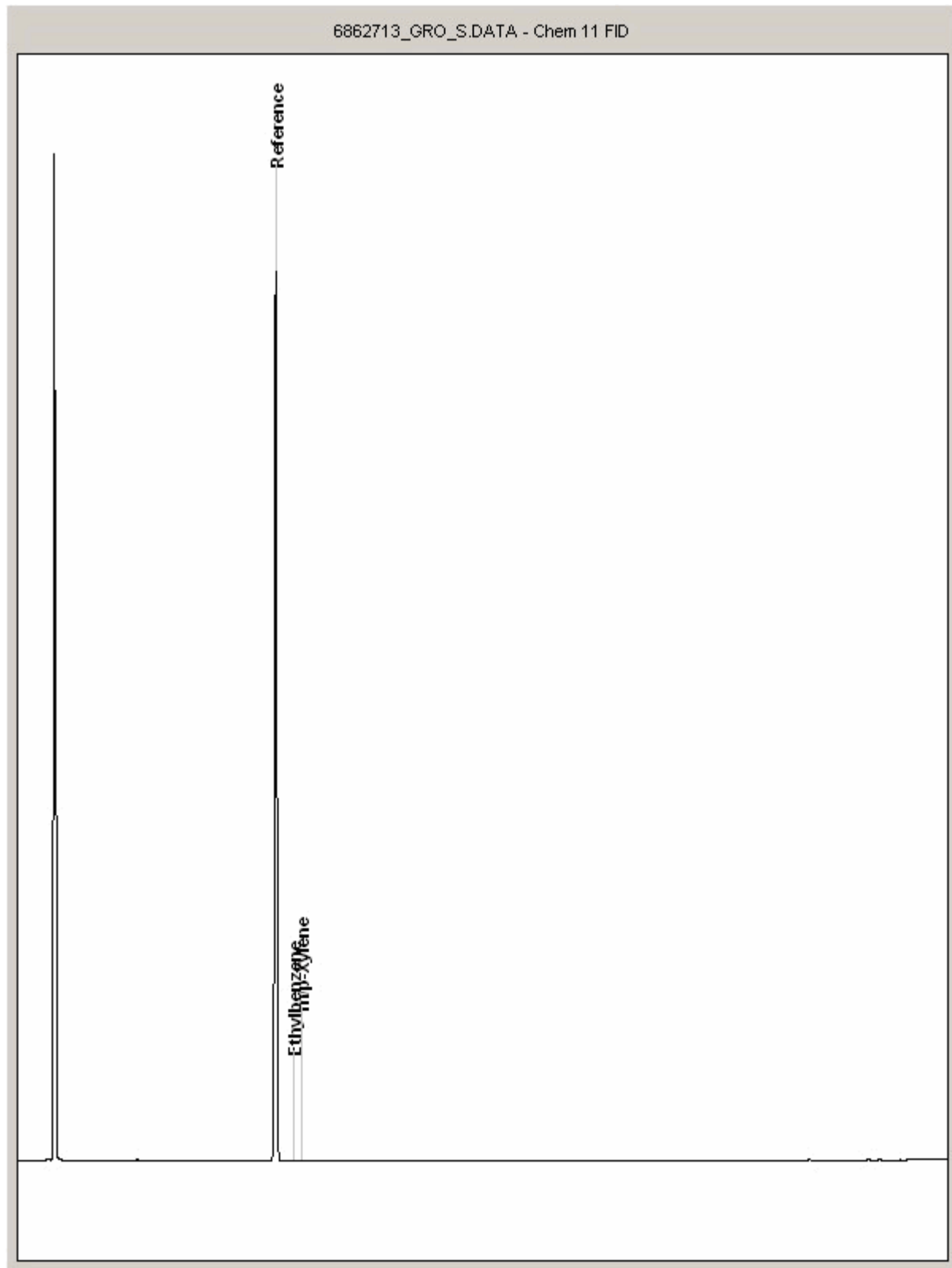
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862713
Sample ID : WS119

Depth : 1.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

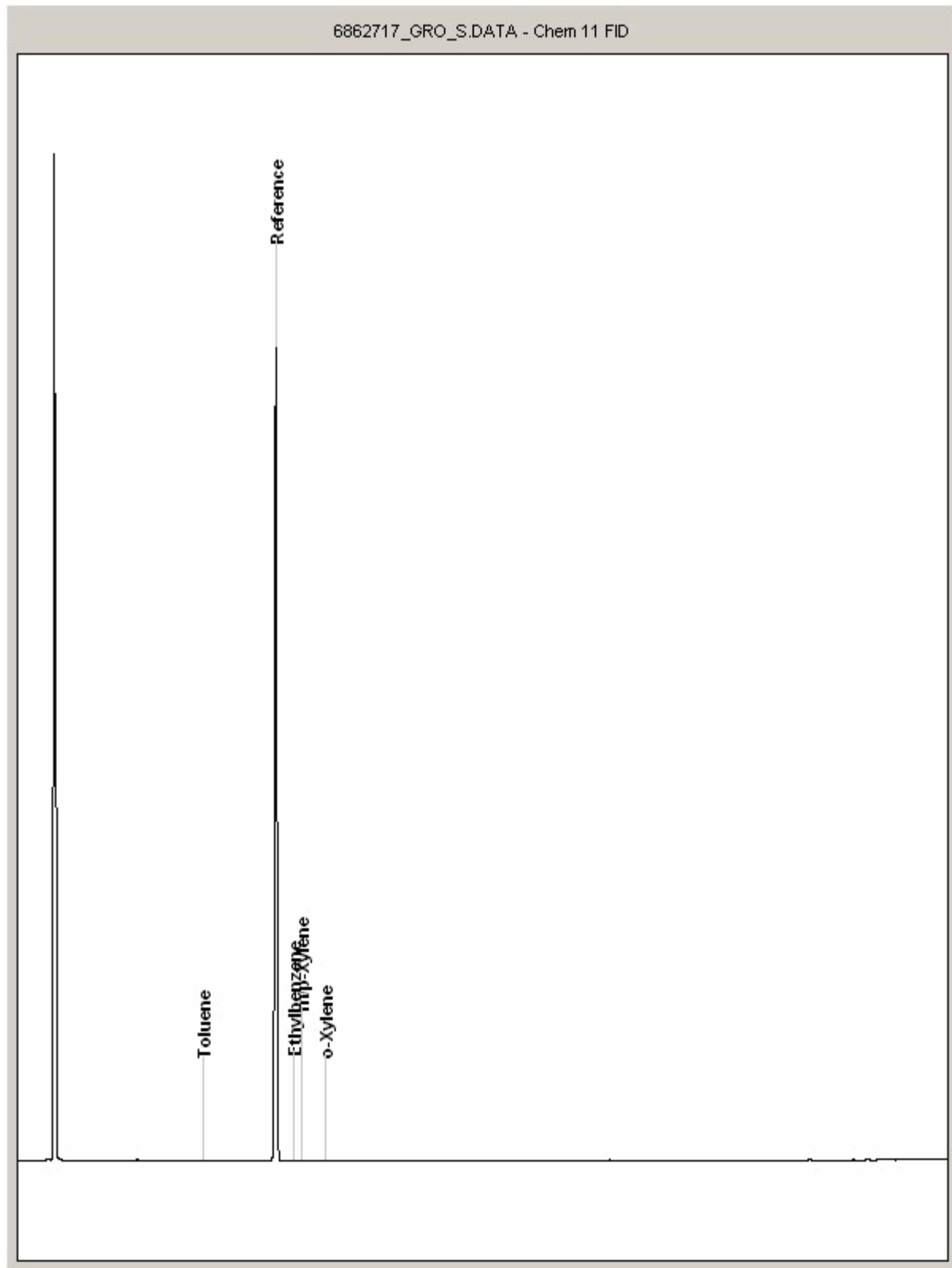
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862717
Sample ID : WS123

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

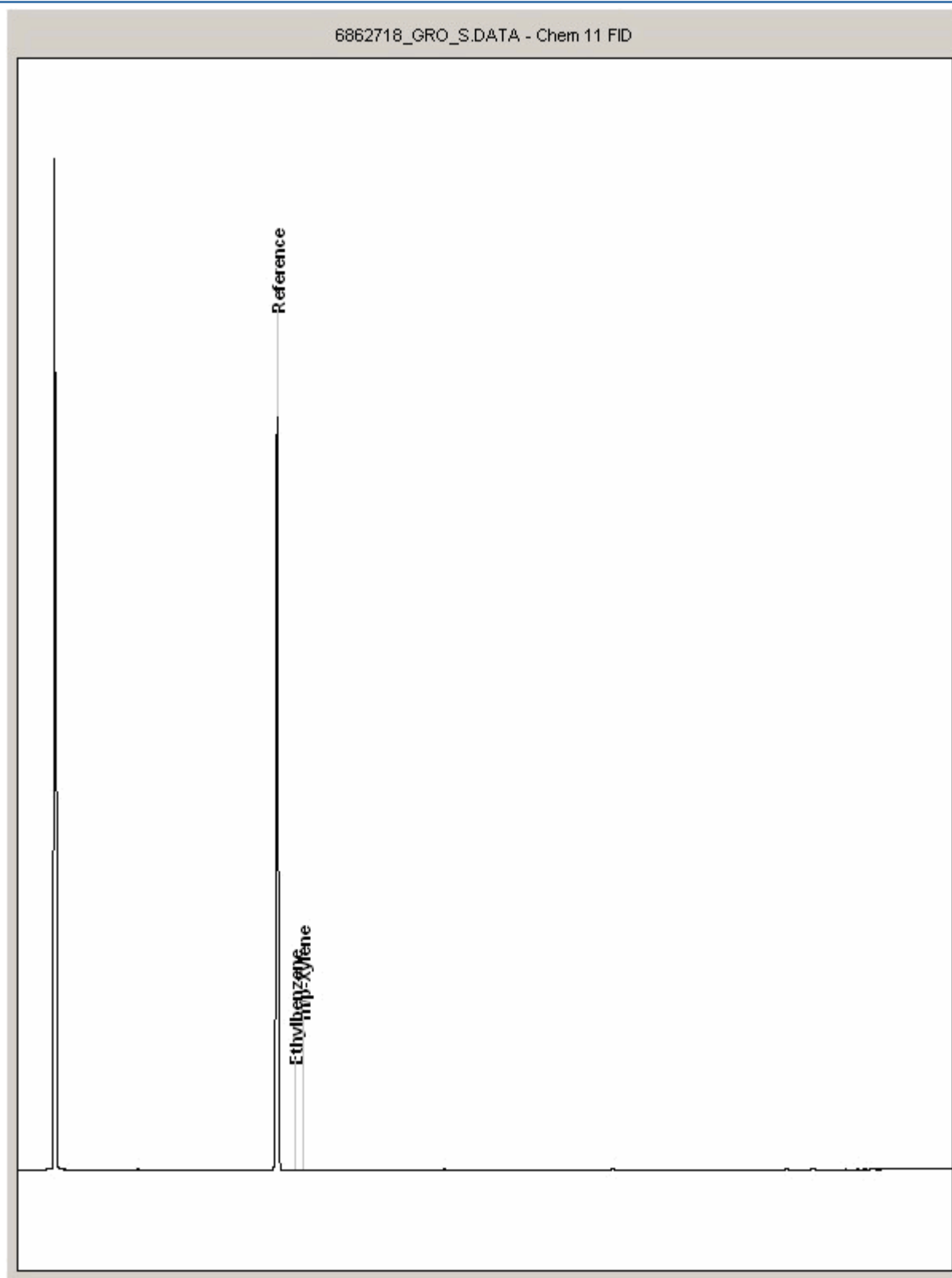
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862718
Sample ID : WS108

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

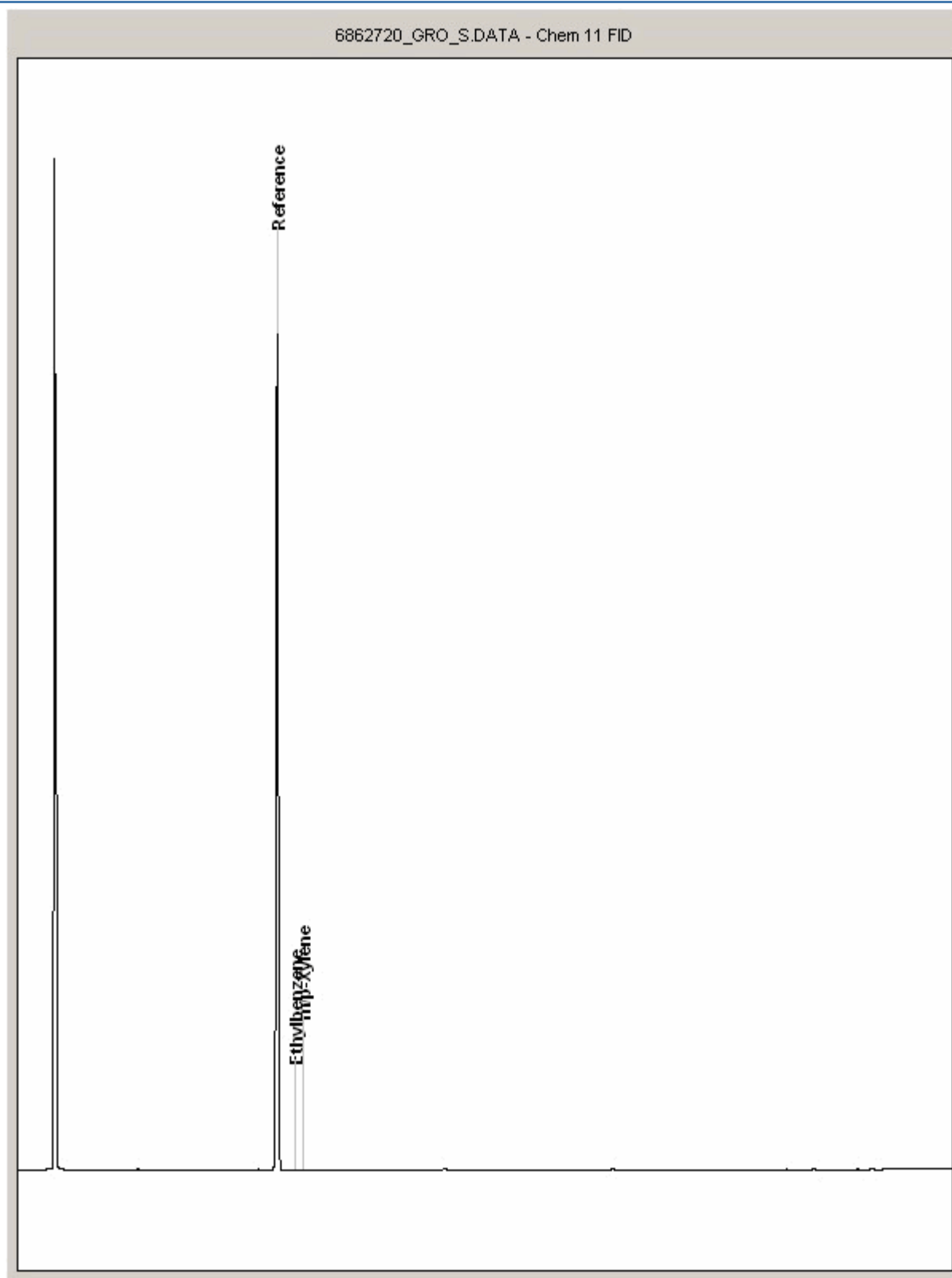
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862720
Sample ID : WS120

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

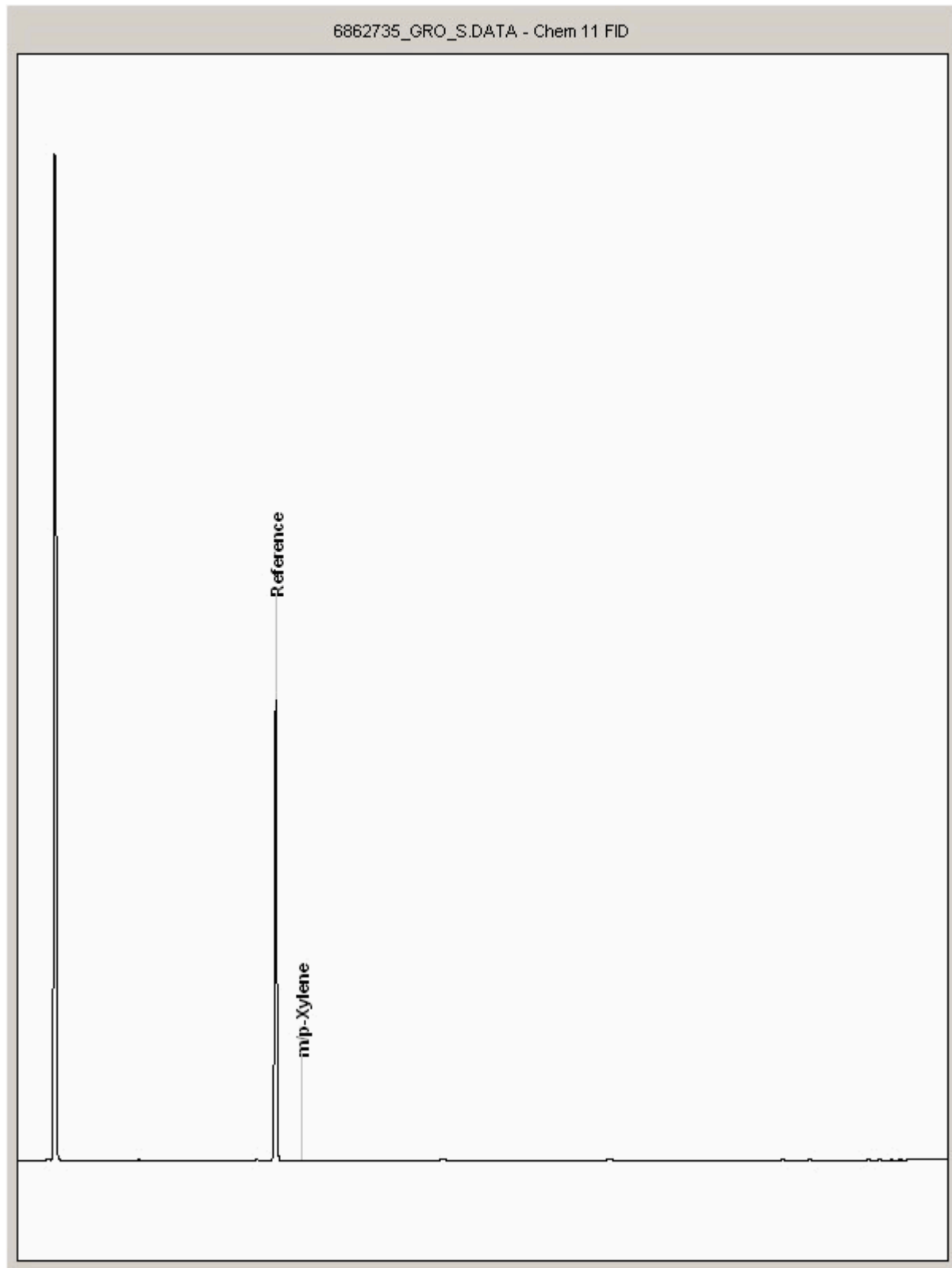
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862735
Sample ID : WS119

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

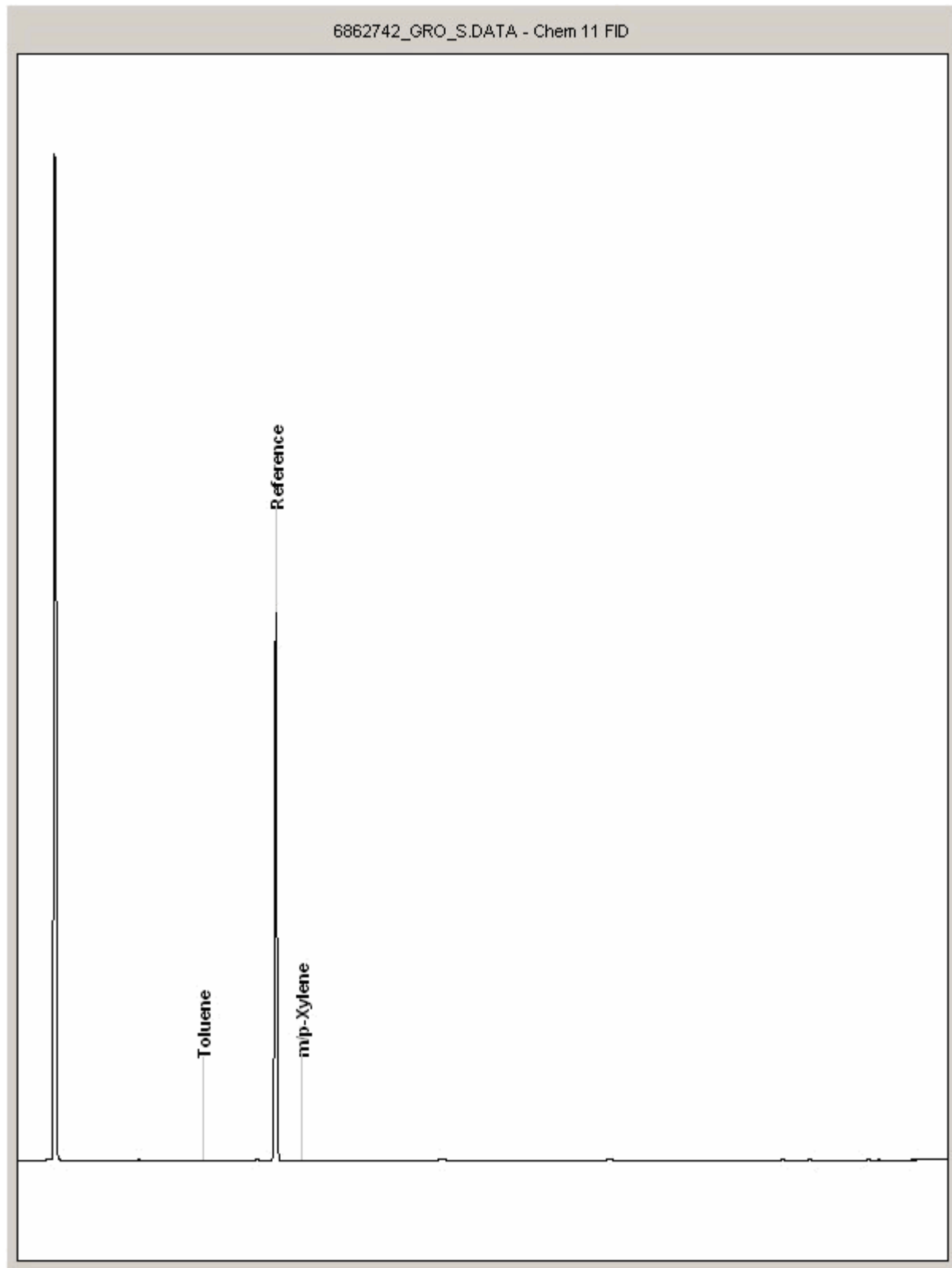
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862742
Sample ID : WS110

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

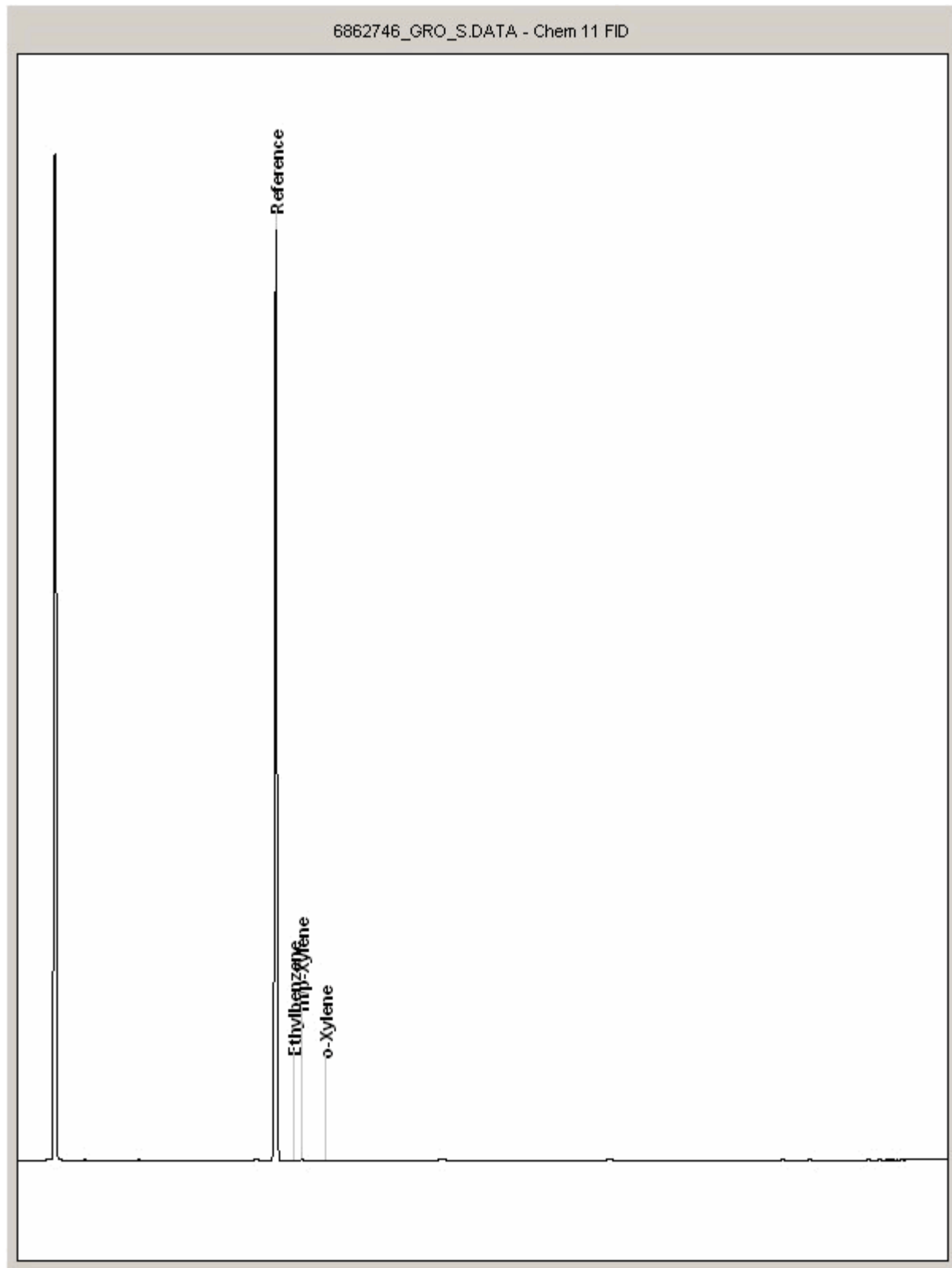
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862746
Sample ID : WS109

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

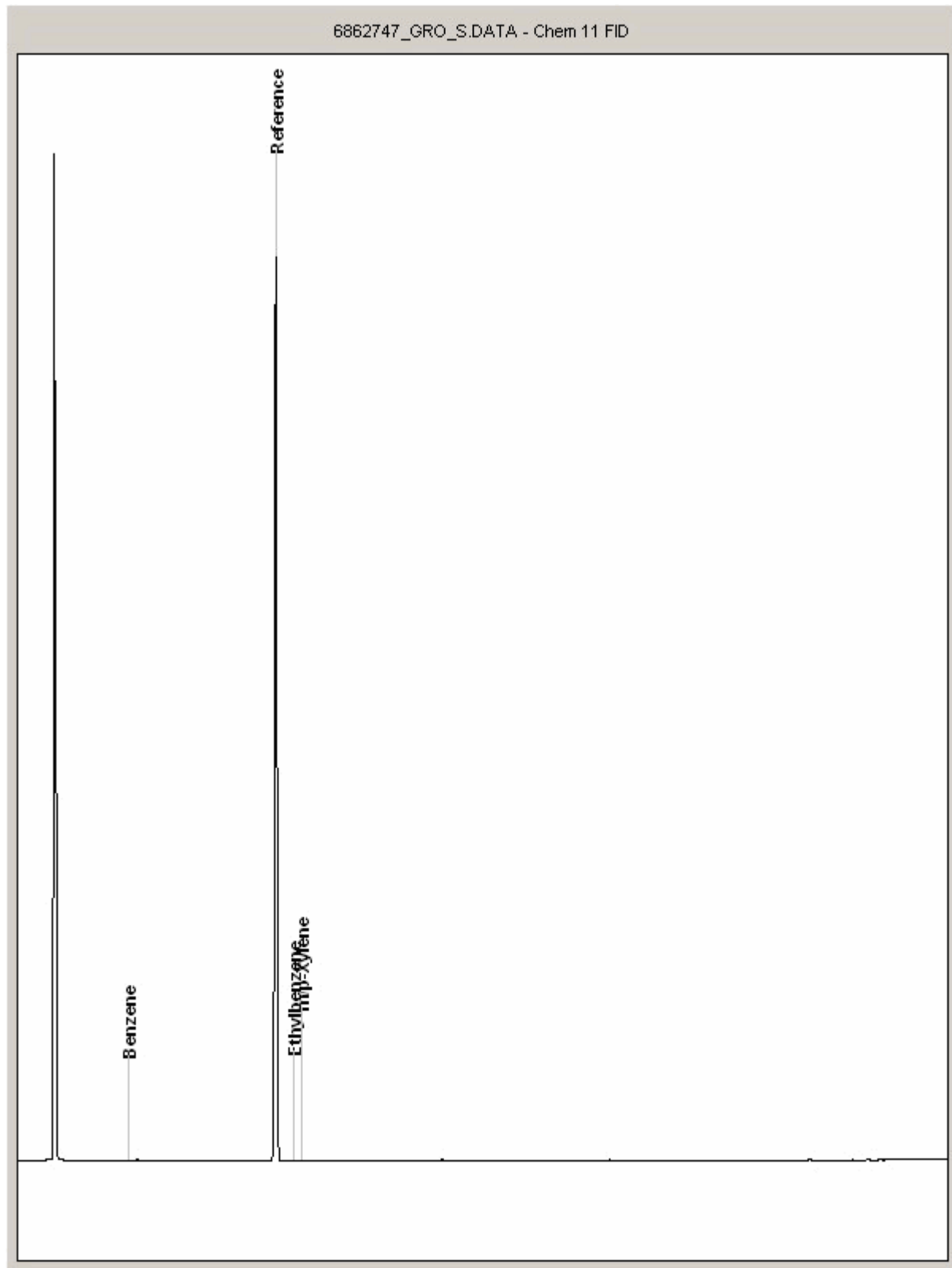
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862747
Sample ID : WS117

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

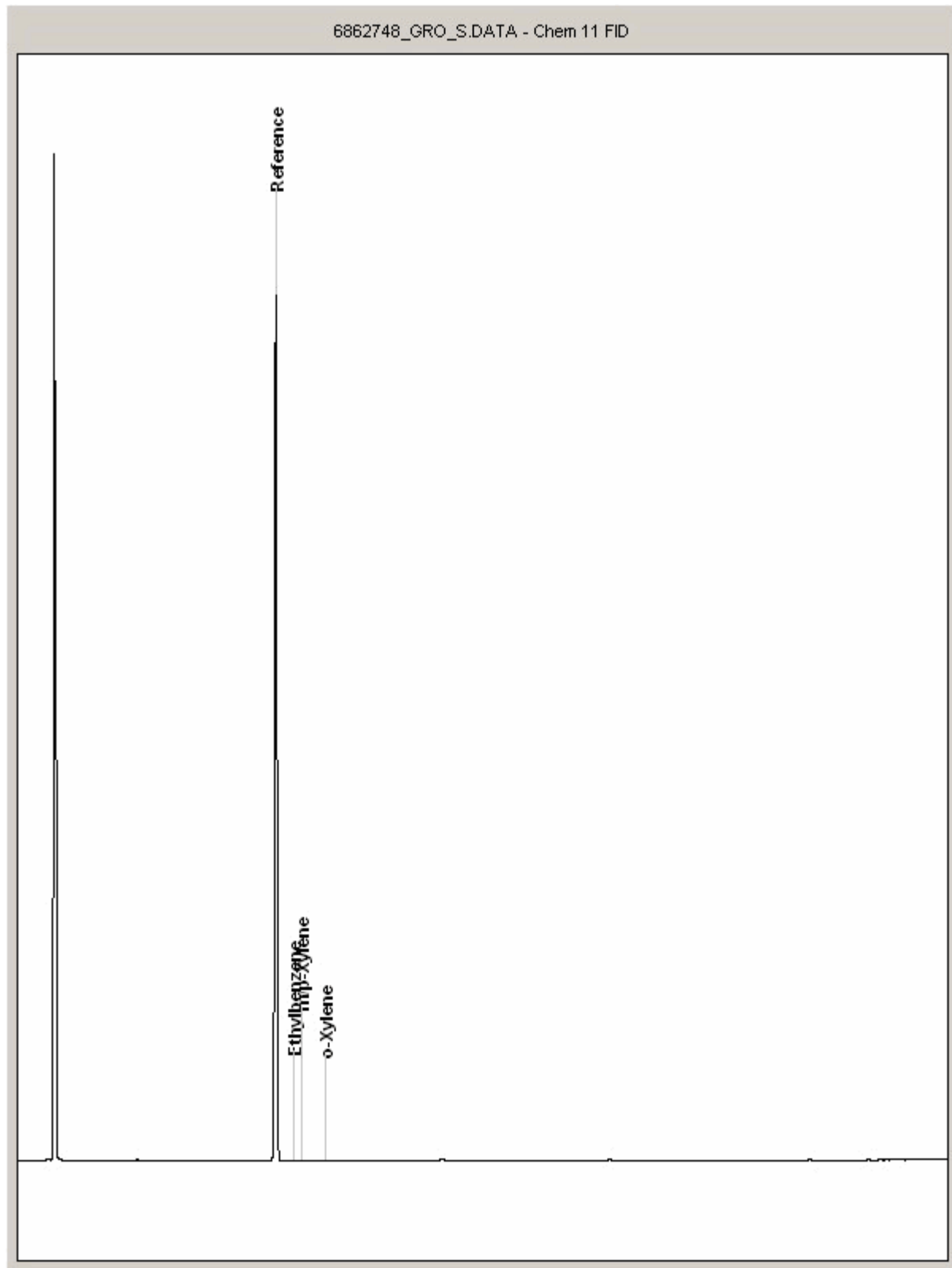
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862748
Sample ID : WS115

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

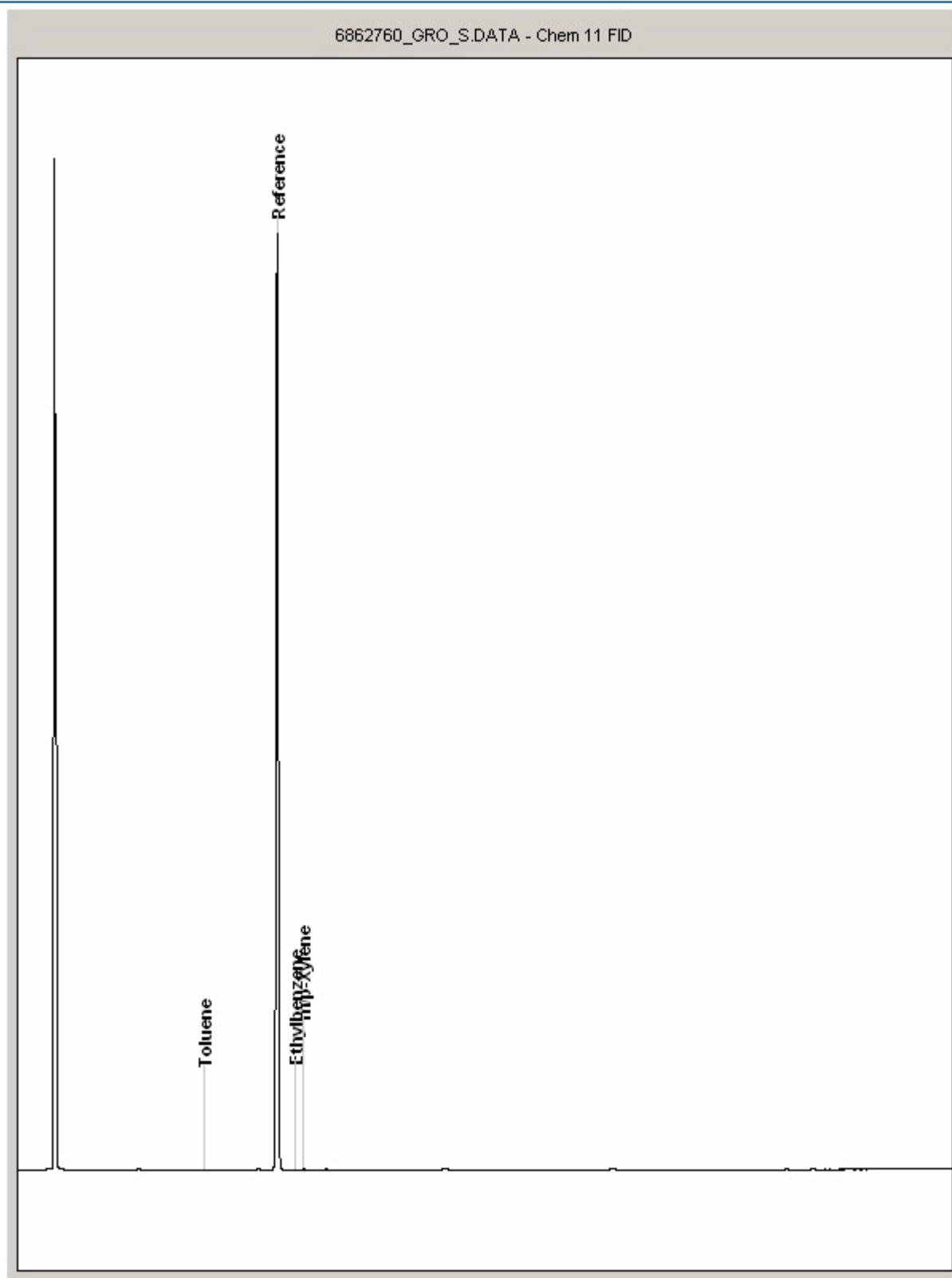
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862760
Sample ID : WS121

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

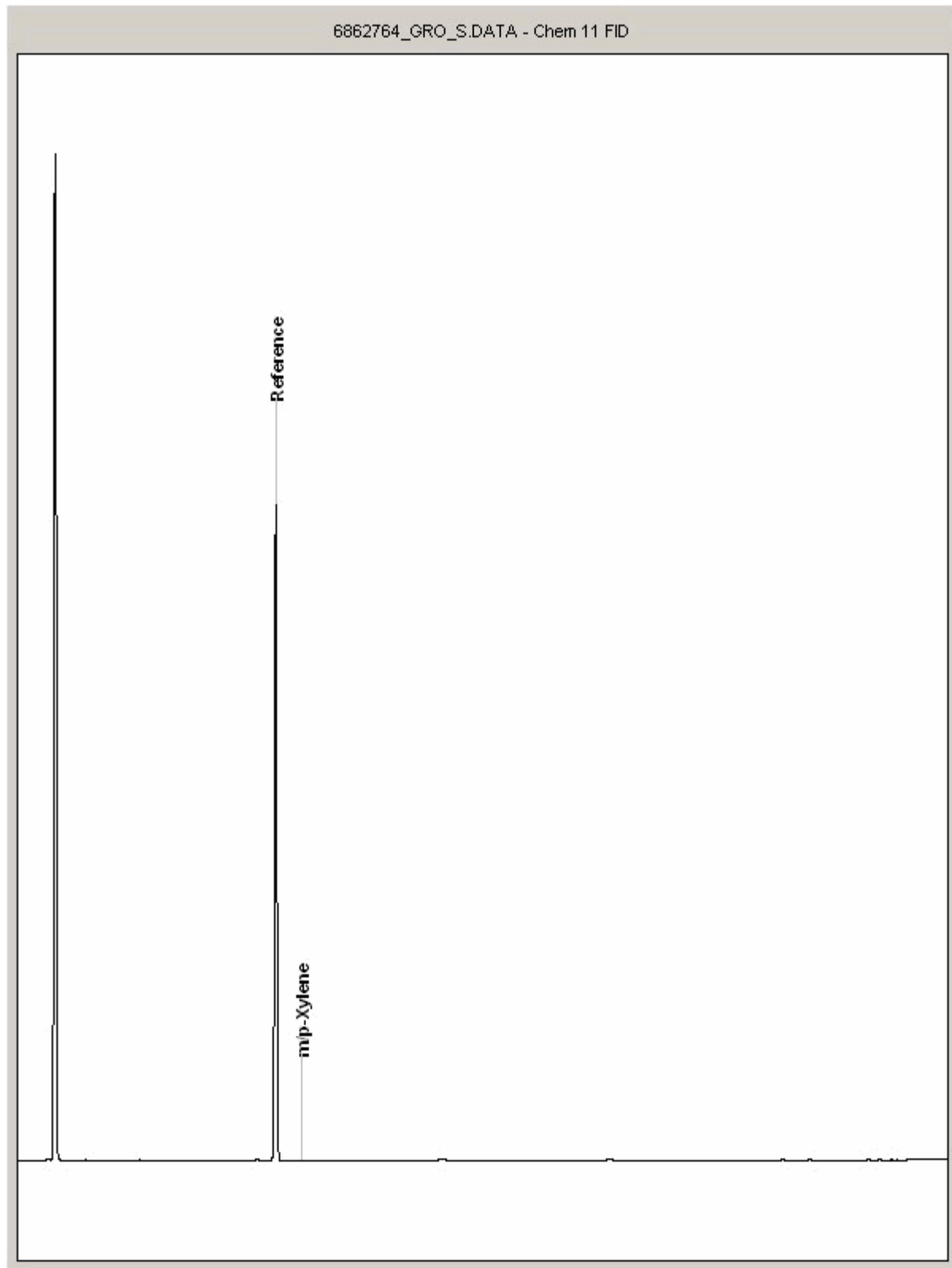
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862764
Sample ID : WS109

Depth : 1.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

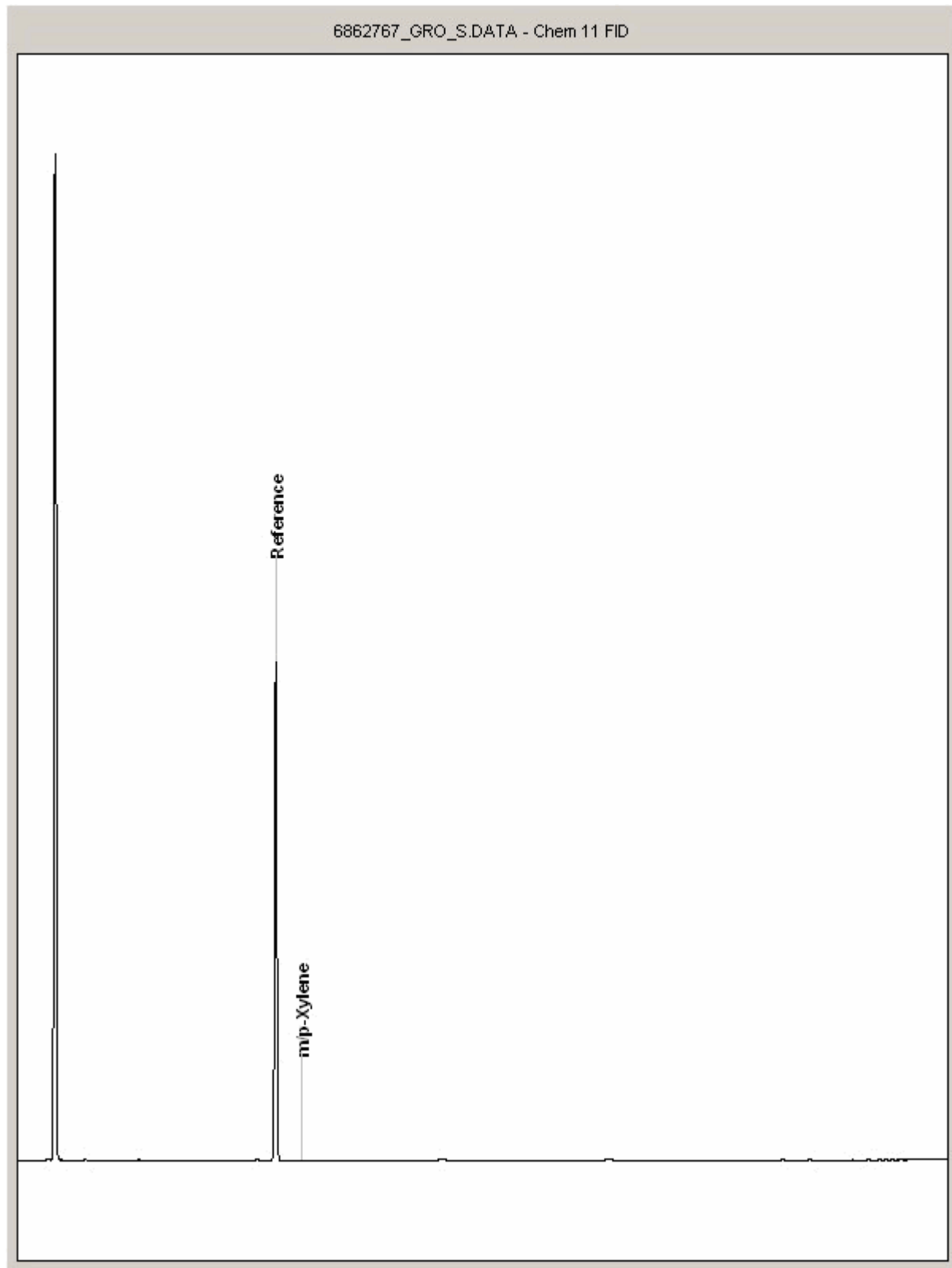
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862767
Sample ID : WS126

Depth : 1.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

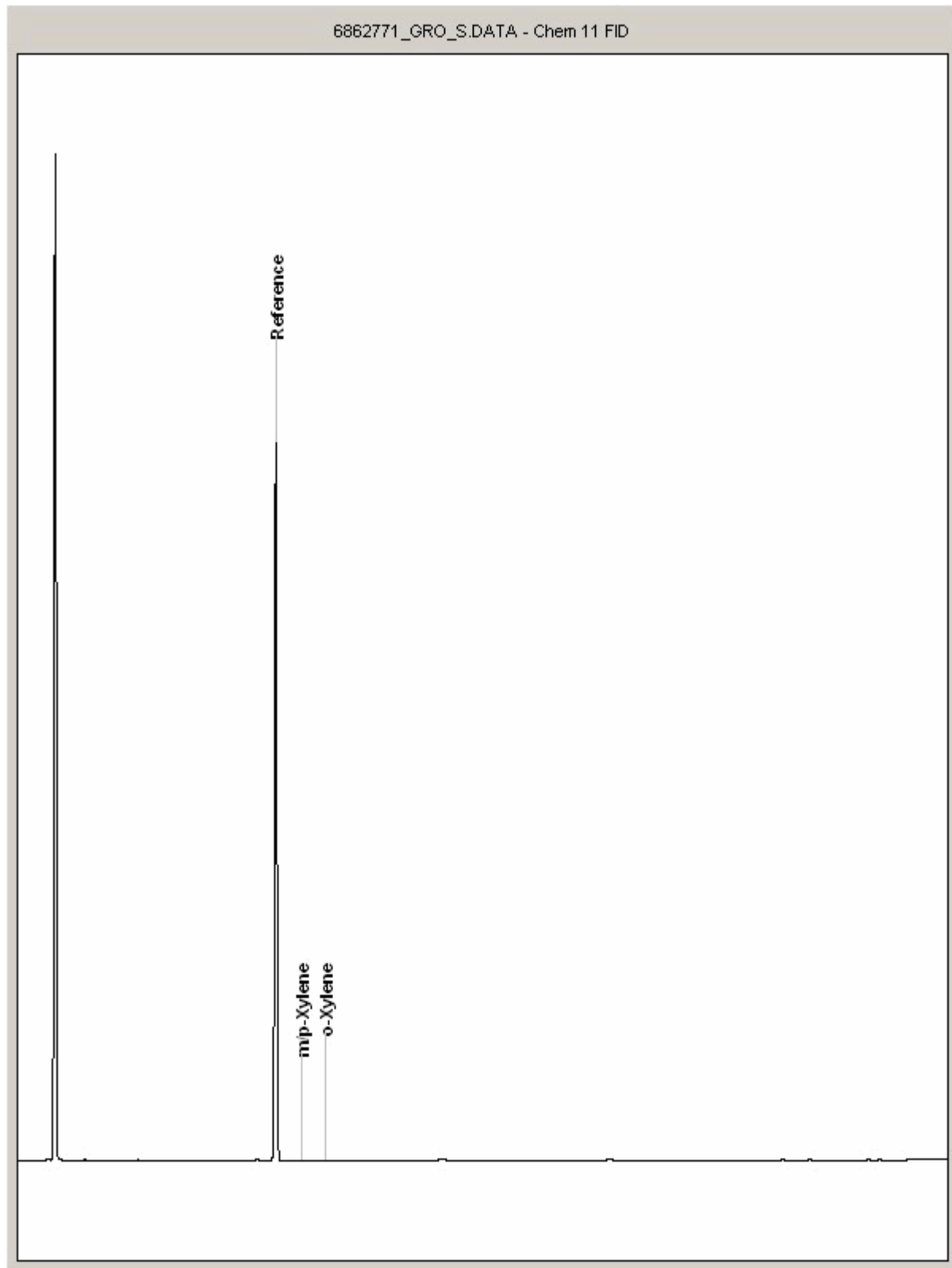
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862771
Sample ID : WS114

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

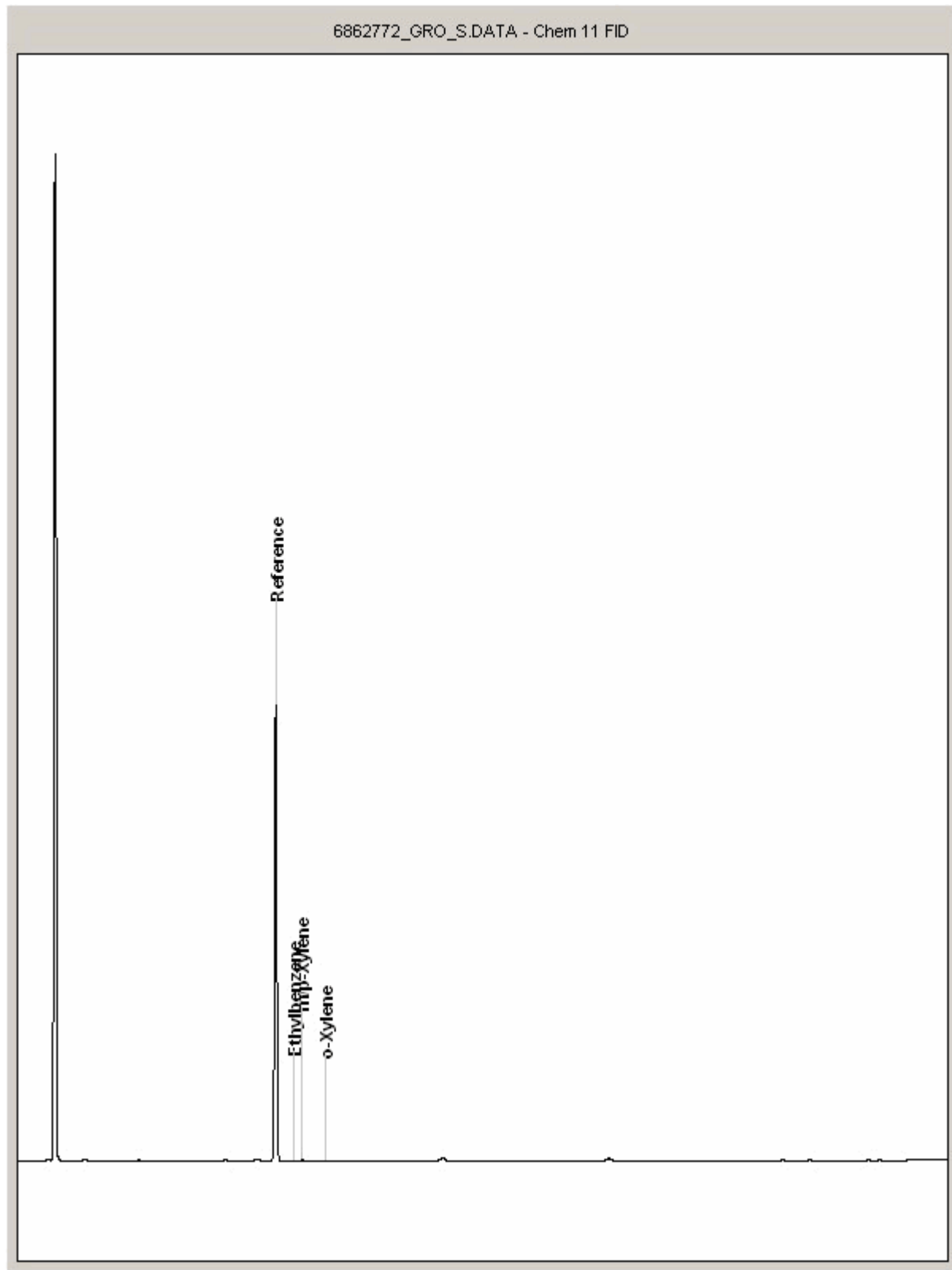
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862772
Sample ID : WS120

Depth : 1.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

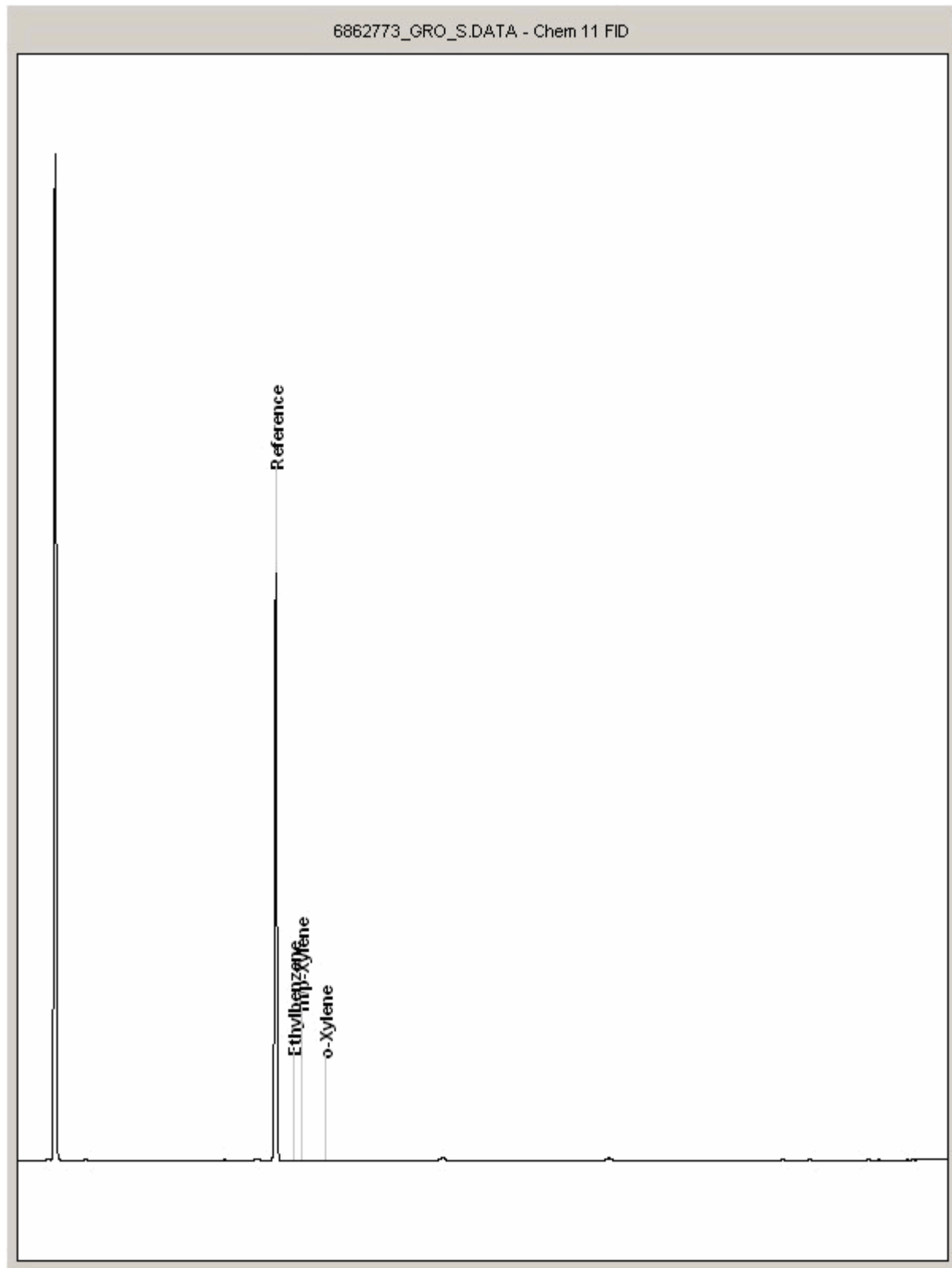
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862773
Sample ID : WS114

Depth : 1.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

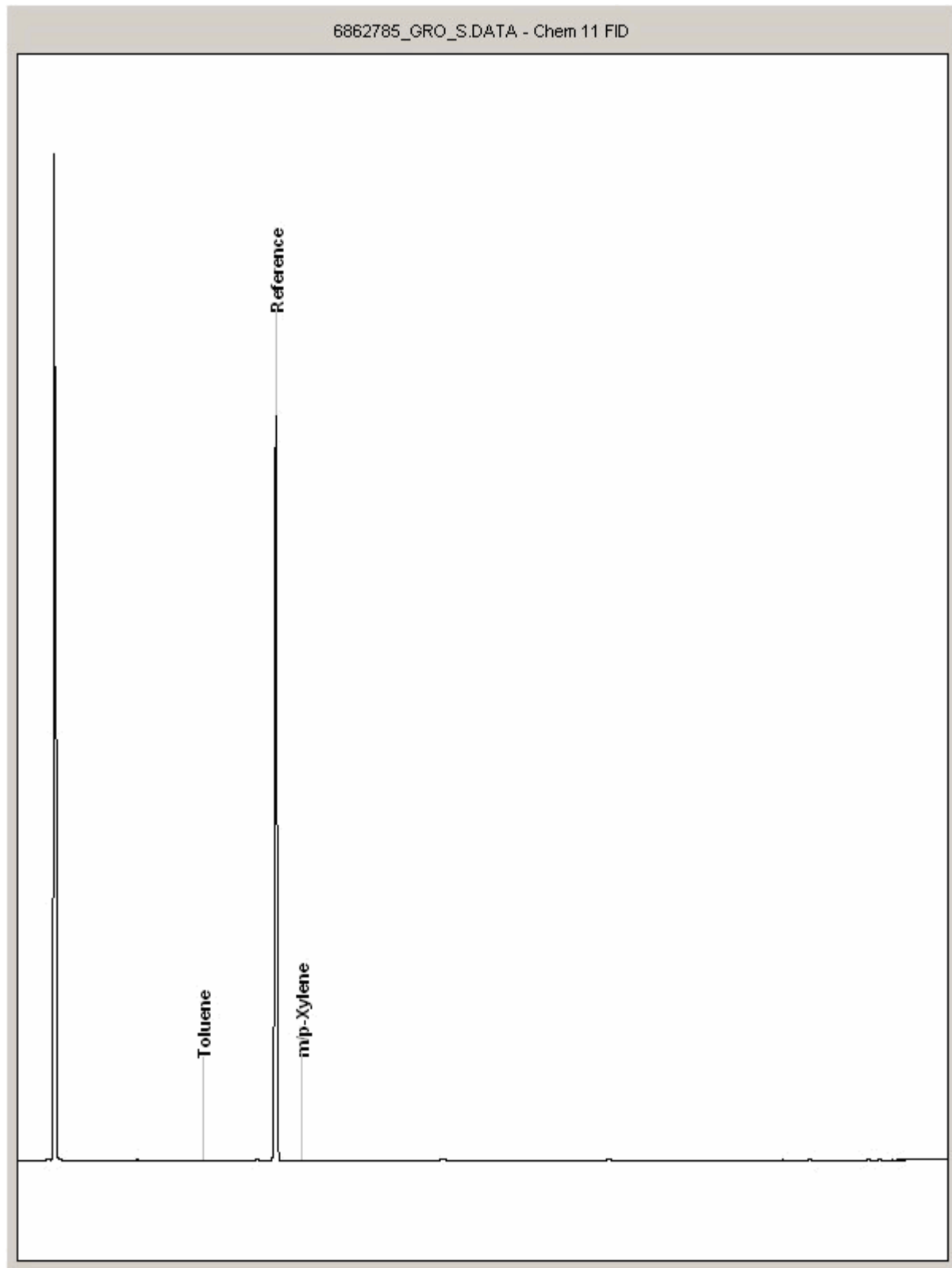
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6862785
Sample ID : WS126

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

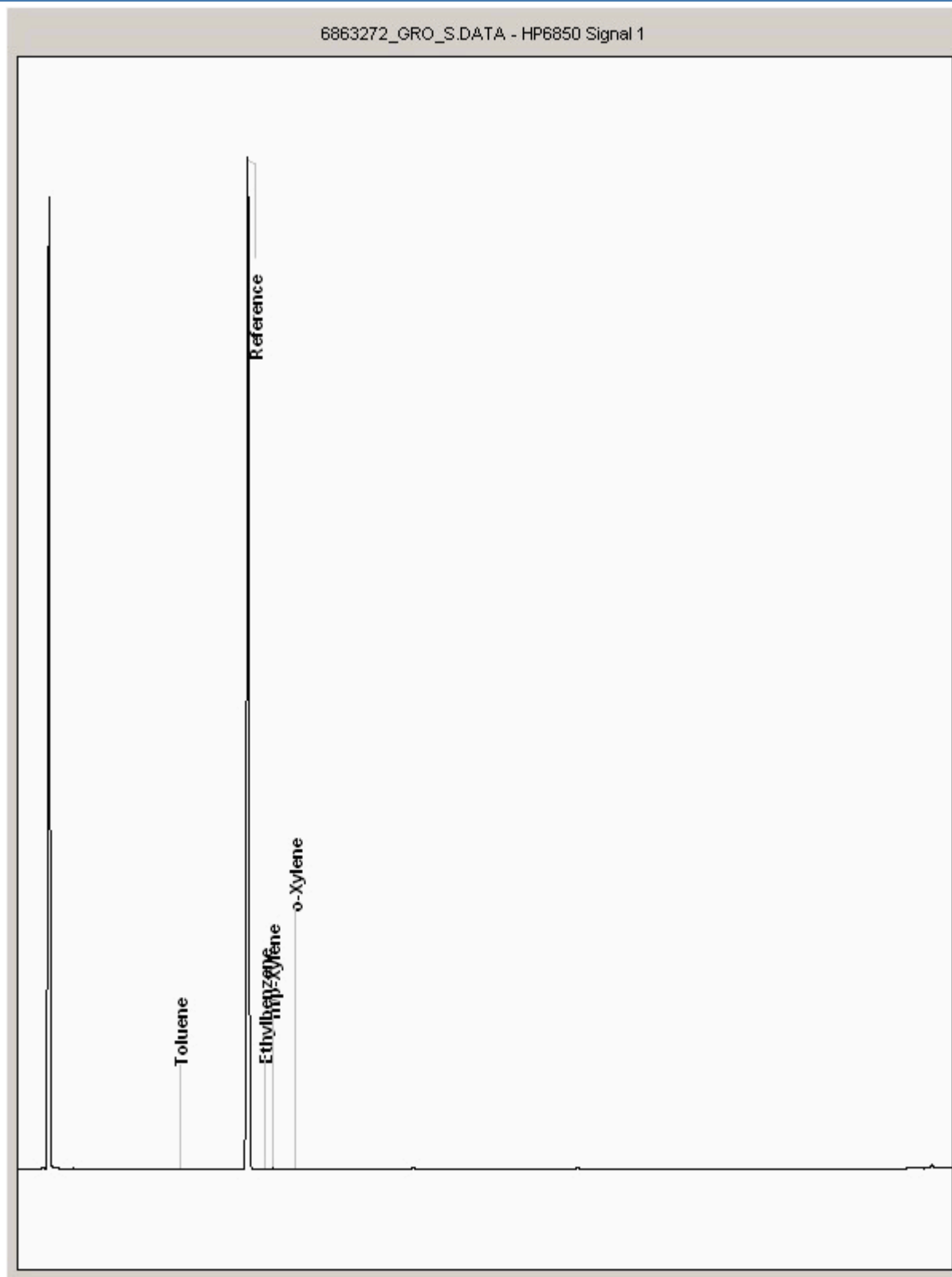
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6863272
Sample ID : WS127

Depth : 0.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

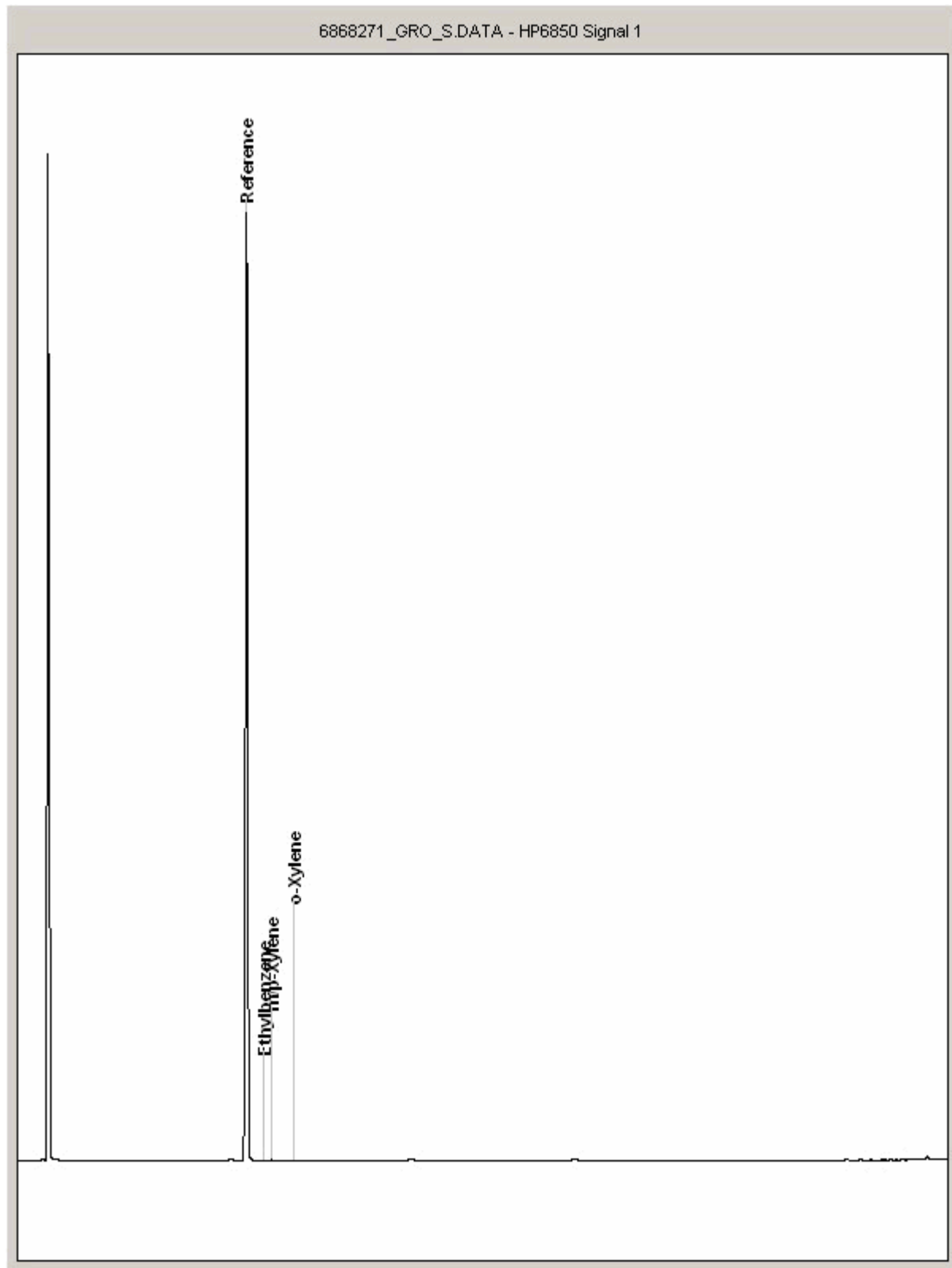
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6868271
Sample ID : WS123

Depth : 1.50





SDG: 130130-32
Job: H_MAYERBROW_WOK-6
Client Reference:

Location: Waterloooville
Customer: Mayer Brown Ltd
Attention: Antony Platt

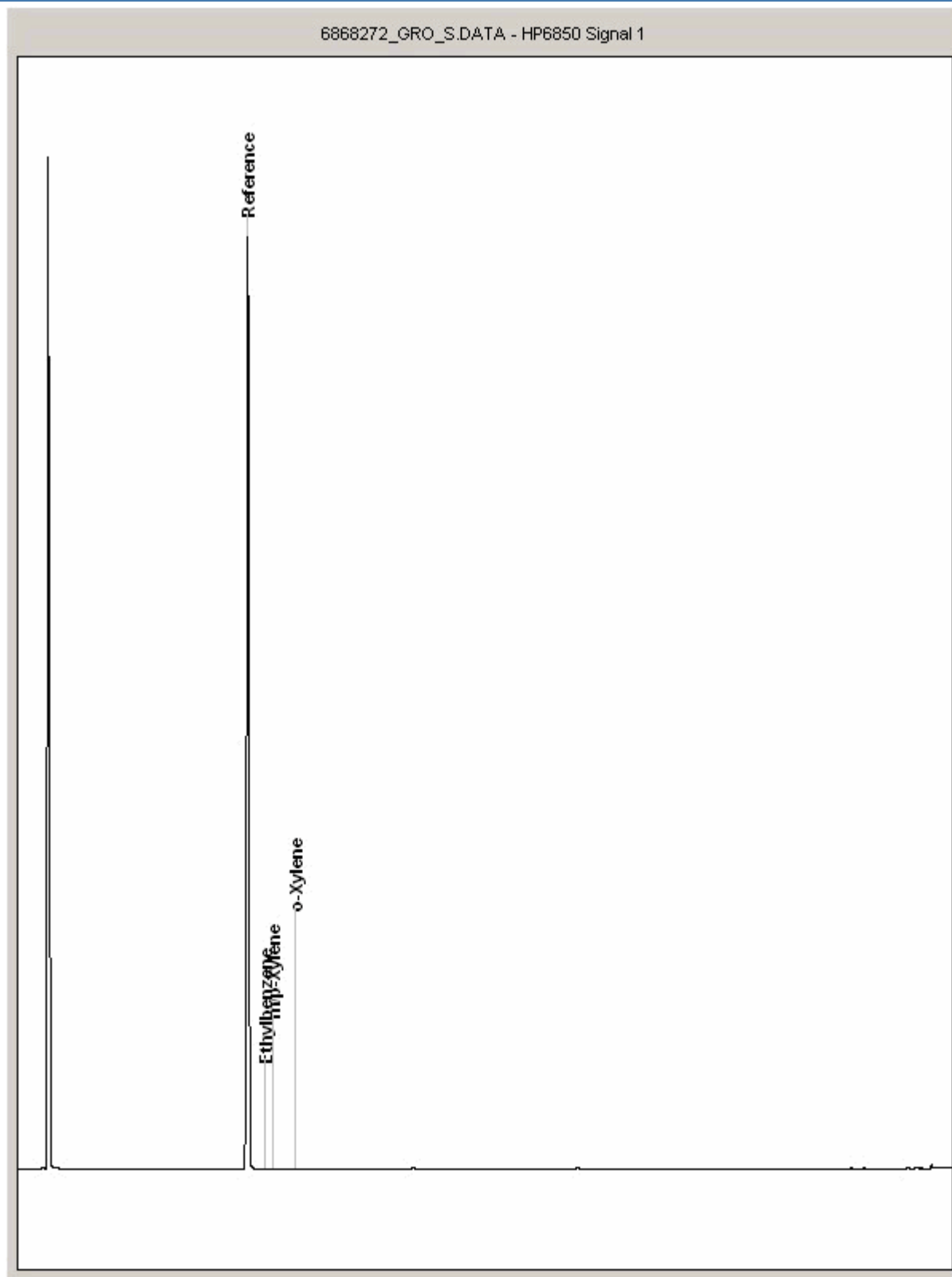
Order Number: R/GTWVile6.9
Report Number: 212070
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 6868272
Sample ID : WS113

Depth : 1.50





SDG:	130130-32	Location:	Waterlooville	Order Number:	R/GTWVile6.9
Job:	H_MAYERBROW_WOK-6	Customer:	Mayer Brown Ltd	Report Number:	212070
Client Reference:		Attention:	Antony Platt	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 2 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** -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 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
§	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 F: MONITORING DATA

GROUND GAS AND GROUNDWATER MONITORING RESULTS



SITE/REF: Berewood Area 2						General Site comments WF - Wittering Formation			
DATE: 01/02/2013		...1..... of ...1.....							
OPERATOR(S): RP/AP									
Ambient Conditions:		Barometric Pressure (mb)	CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	PID (ppm)	EQUIPMENT		
Before Monitoring		997	<0.1	<0.1	21.9	-			
After Monitoring		997	<0.1	<0.1	21.9	-			
Atmospheric Pressure Trend:		Falling				Instrument / Model Type		Serial Number	Comments
Ground Conditions:		Wet				GA2000 Gas Analyser		GA12820	
Weather Conditions:		Raining				Standard Dipmeter		79301	



Ground Gas Note: "0" readings to be recorded as instrument detection limit

Borehole ID	Time	Flow (l/hr)	Relative Pressure (mb)	Steady CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	Peak CH ₄ (%v/v)	% of Lower Explosive Limit	CO (ppm)	H ₂ S (ppm)	Balance (%)	PID (ppm)	Response Zone		Response Strata	Gas screening value CH ₄	Gas screening value CO ₂
													From (mbgl)	To (mbgl)			
WS110	09:55	<0.1	-0.12	<0.1	<0.1	21.2	<0.1	<1	0	0	78.6	-	1.0	4.0	WF	0.0001	0.0001
WS127	10:05	<0.1	-0.12	<0.1	1.4	16.4	<0.1	<1	0	0	82.1	-	1.0	3.0	WF	0.0001	0.0014
WS123	10:10	<0.1	-0.12	<0.1	0.2	21.5	<0.1	<1	0	0	78.2	-	1.0	3.0	WF	0.0001	0.0002
WS108	No Tap												1.0	4.0	WF		
WS121	10:15	<0.1	-0.12	<0.1	<0.1	21.8	<0.1	<1	0	0	78.0	-	1.0	3.0	WF	0.0001	0.0001
WS117	10:20	<0.1	-0.12	<0.1	<0.1	21.8	<0.1	<1	0	0	78.1	-	1.0	4.0	WF	0.0001	0.0001
WS115	10:25	<0.1	-0.12	<0.1	<0.1	21.9	<0.1	<1	0	0	78.1	-	1.0	4.0	WF	0.0001	0.0001

Groundwater

Borehole ID	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Free Phase LNAPL Thickness (m)	Free Phase DNAPL Thickness (m)	Water Quality Indicators					Well Volume (l)	Purge Volume (l)	Comments (samples)
					Eh	EC	pH	DO	Temp			
WS110	0.15	-	-	-	-	-	-	-	-	-	-	
WS127	1.11	-	-	-	-	-	-	-	-	-	-	
WS123	0.00	-	-	-	-	-	-	-	-	-	-	
WS108	0.00	-	-	-	-	-	-	-	-	-	-	
WS121	0.95	-	-	-	-	-	-	-	-	-	-	
WS117	0.42	-	-	-	-	-	-	-	-	-	-	
WS115	0.00	-	-	-	-	-	-	-	-	-	-	

Well volume (l) = (3.14 x (hole diameter (m)/2)² x (base dip (m) - standing water level (m)))x1000 (2l/m in 50mm well)

Gas screening value = gas concentration (%) x gas flow rate (l/hr)

%v/v - Percentage volume by total volume; mbgl - metres below ground level; ppm - parts per million; mb - millibars; l/hr - litres per hour; vv - water vial; gb - 1l glass bottle; pb - 1l plastic bottle

GROUND GAS AND GROUNDWATER MONITORING RESULTS



SITE/REF: Berewood Area 2						General Site comments WF - Wittering Formation			
DATE: 07/02/2013		...1..... of ...1.....							
OPERATOR(S): SS									
Ambient Conditions:		Barometric Pressure (mb)	CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)				PID (ppm)
Before Monitoring		-	-	<0.1	-	-	EQUIPMENT		
After Monitoring		-	-	-	-	-			
Atmospheric Pressure Trend:		Falling				Instrument / Model Type	Serial Number	Comments	
Ground Conditions:		Wet				Standard Dipmeter	79301		
Weather Conditions:		Dry							



Ground Gas Note: "0" readings to be recorded as instrument detection limit

Borehole ID	Time	Flow (l/hr)	Relative Pressure (mb)	Steady CH ₄ (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	Peak CH ₄ (%v/v)	% of Lower Explosive Limit	CO (ppm)	H ₂ S (ppm)	Balance (%)	PID (ppm)	Response Zone		Response Strata	Gas screening value CH ₄	Gas screening value CO ₂
													From (mbgl)	To (mbgl)			
WS110	-	-	-	-	-	-	-	-	-	-	-	-	1.0	4.0	WF	-	-
WS127	-	-	-	-	-	-	-	-	-	-	-	-	1.0	3.0	WF	-	-
WS123	-	-	-	-	-	-	-	-	-	-	-	-	1.0	3.0	WF	-	-
WS108	-	-	-	-	-	-	-	-	-	-	-	-	1.0	4.0	WF	-	-
WS121	-	-	-	-	-	-	-	-	-	-	-	-	1.0	3.0	WF	-	-
WS117	-	-	-	-	-	-	-	-	-	-	-	-	1.0	4.0	WF	-	-
WS115	-	-	-	-	-	-	-	-	-	-	-	-	1.0	4.0	WF	-	-

Groundwater

Borehole ID	Standing Water Level (mbgl)	Installation Base Dip (mbgl)	Free Phase LNAPL Thickness (m)	Free Phase DNAPL Thickness (m)	Water Quality Indicators					Well Volume (l)	Purge Volume (l)	Comments (samples)
					Eh	EC	pH	DO	Temp			
WS110	1.10	-	-	-	-	-	-	-	-	-	-	
WS127	1.3	-	-	-	-	-	-	-	-	-	-	
WS123	0.43	-	-	-	-	-	-	-	-	-	-	
WS108	0.20	-	-	-	-	-	-	-	-	-	-	
WS121	1.17	-	-	-	-	-	-	-	-	-	-	
WS117	0.90	-	-	-	-	-	-	-	-	-	-	
WS115	0.73	-	-	-	-	-	-	-	-	-	-	

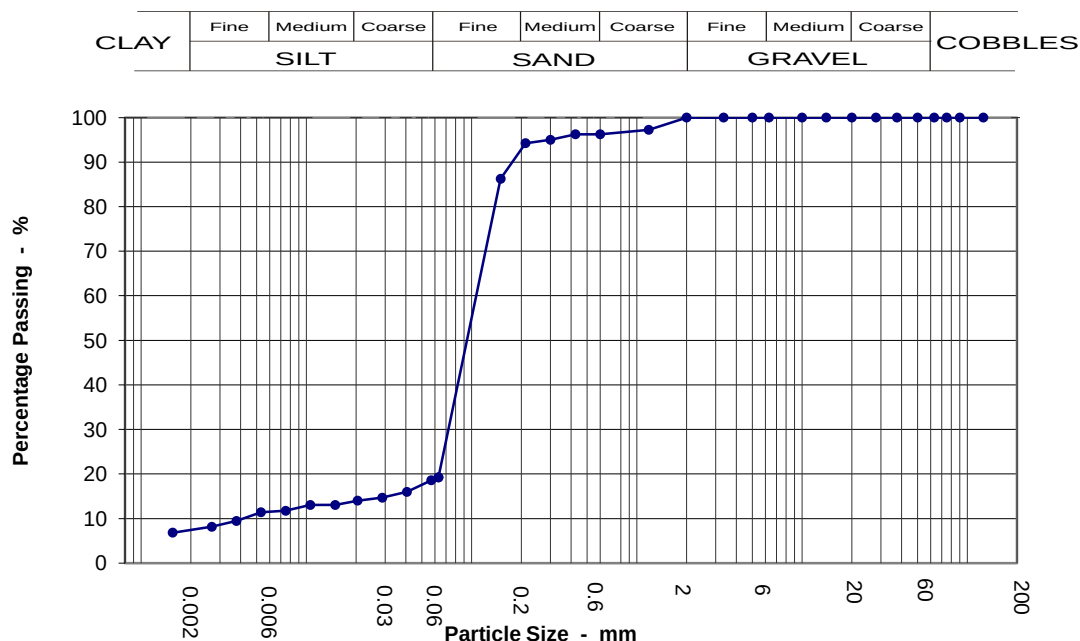
Well volume (l) = $(3.14 \times (\text{hole diameter (m)}/2)^2 \times (\text{base dip (m)} - \text{standing water level (m)})) \times 1000$ (2l/m in 50mm well)

Gas screening value = gas concentration (%) x gas flow rate (l/hr)

%v/v - Percentage volume by total volume; mbgl - metres below ground level; ppm - parts per million; mb - millibars; l/hr - litres per hour; vv - water vial; gb - 1l glass bottle; pb - 1l plastic bottle

APPENDIX G: GEOTECHNICAL LABORATORY CERTIFICATES

K4 SOILS 	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Our Report No:	14059
		Project No:	-
Location	Waterlooville	Borehole / Trial Pit No:	BH106
Visual Soil Description	Pale brown and black slightly clayey slightly silty SAND	Depth	1.60 - 2.00 m
		Sample Type/No	L - 2



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.057	19
90	100	0.041	16
75	100	0.029	15
63	100	0.020	14
50	100	0.015	13
37.5	100	0.011	13
28	100	0.008	12
20	100	0.005	11
14	100	0.004	9
10	100	0.003	8
6.3	100	0.002	7
5	100		
3.35	100		
2	100		
1.18	97		
0.6	96		
0.425	96		
0.3	95		
0.212	94		
0.15	86		
0.063	19		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause
Sedimentation	Clause 9.5
Suitable Amount Of Sample Received	Yes

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	81.1
Silt	11.6
Clay	7.4

Grading Analysis	
D100	125.0
D60	0.1
D10	
Uniformity Coefficient	N/A

K4 SOILS LABORATORY

Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU.
E-mail: k4soils@aol.com

Approved Signatories:

K.Phaure(Tech.Mgr) J.Phaure(Lab.Mgr)

Test results relate only to the sample numbers shown above

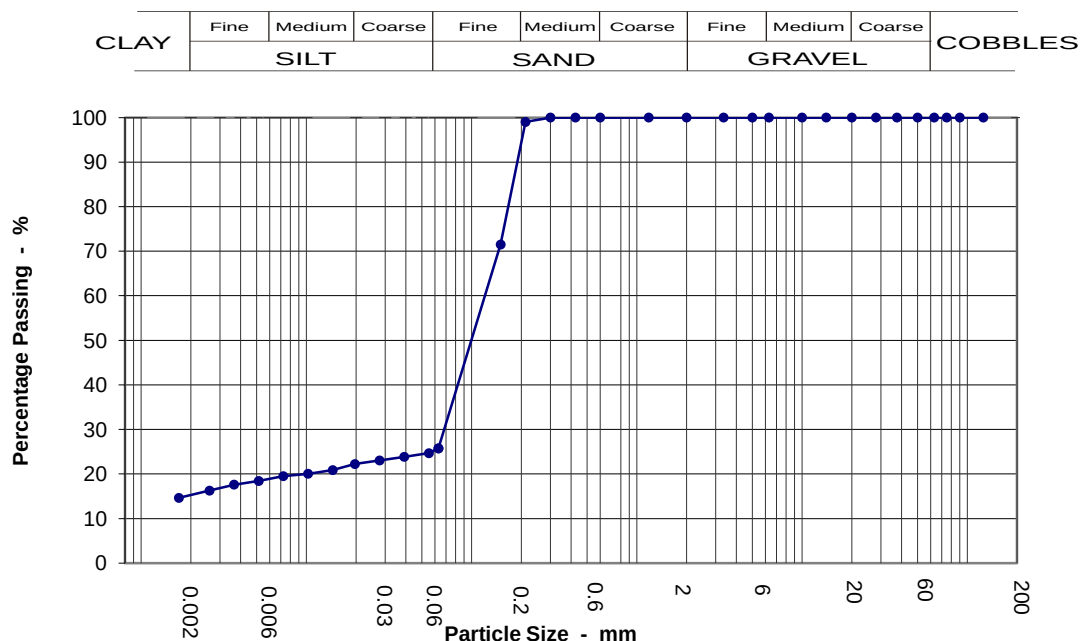
Checked and Approved

Initials: kp

Date: 20/02/2013



K4 SOILS 	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Our Report No:	14059
		Project No:	-
Location	Waterlooville	Borehole / Trial Pit No:	BH117
Visual Soil Description	Orange brown and grey slightly silty slightly clayey SAND	Depth	1.50 - 2.00 m
		Sample Type/No	D - 2



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.055	25
90	100	0.039	24
75	100	0.028	23
63	100	0.020	22
50	100	0.014	21
37.5	100	0.010	20
28	100	0.007	20
20	100	0.005	18
14	100	0.004	18
10	100	0.003	16
6.3	100	0.002	15
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	99		
0.15	72		
0.063	26		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause
Sedimentation	Clause 9.5
Suitable Amount Of Sample Received	Yes

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	74.7
Silt	10.1
Clay	15.2

Grading Analysis	
D100	125.0
D60	0.1
D10	
Uniformity Coefficient	N/A

K4 SOILS LABORATORY

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Approved Signatories:

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Test results relate only to the sample numbers shown above

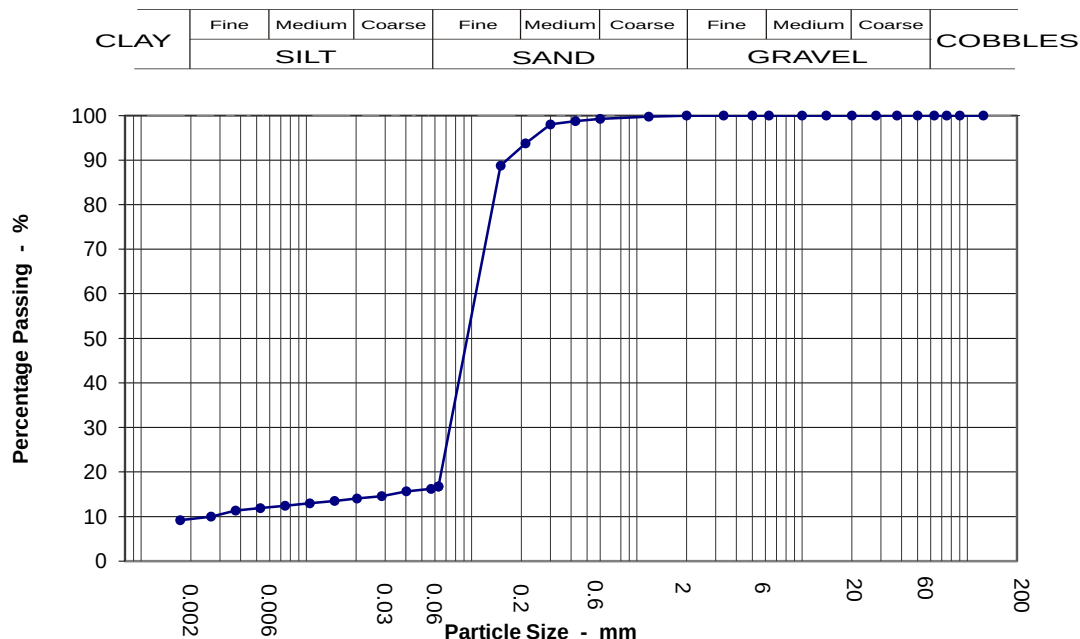
Checked and Approved

Initials: kp

Date: 20/02/2013



K4 SOILS 	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Our Report No:	14059
		Project No:	-
Location	Waterlooville	Borehole / Trial Pit No:	BH127
Visual Soil Description		Depth	2.50 - 3.00 m
		Sample Type/No	L - 3



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.057	16
90	100	0.040	16
75	100	0.029	15
63	100	0.020	14
50	100	0.015	14
37.5	100	0.010	13
28	100	0.007	12
20	100	0.005	12
14	100	0.004	11
10	100	0.003	10
6.3	100	0.002	9
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	99		
0.3	98		
0.212	94		
0.15	89		
0.063	17		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause
Sedimentation	Clause 9.5
Suitable Amount Of Sample Received	Yes

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	83.5
Silt	7.1
Clay	9.4

Grading Analysis	
D100	125.0
D60	0.1
D10	
Uniformity Coefficient	N/A

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Test results relate only to the sample numbers shown above

Checked and Approved

Initials: kp

Date: 20/02/2013





Report of California Bearing Ratio Test

BS 1377 : Part 4 : 1990:Clause 7.4

Project name: Waterloooville

Samples Received: 30/01/2013

Project Started: 08/02/2013

Client: Mayer Brown

Testing started: 19/02/2013

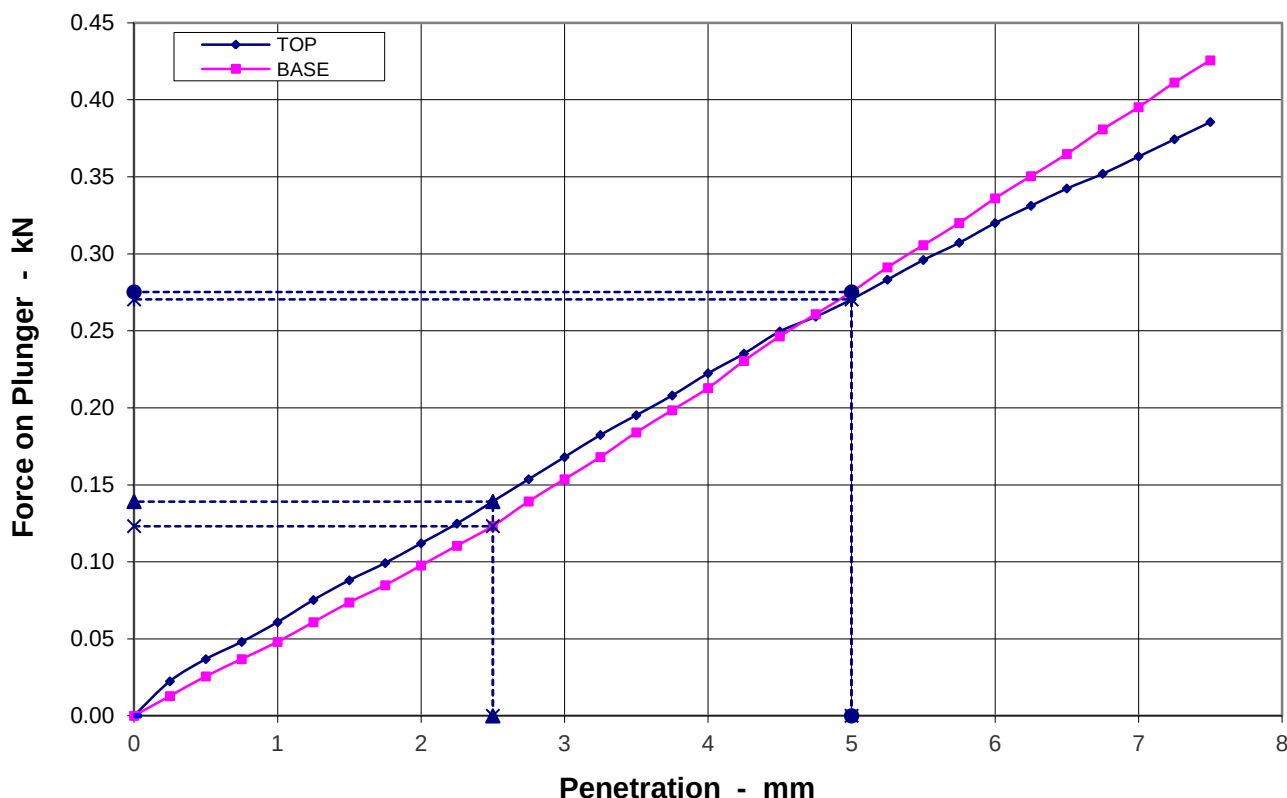
Project no: - Our job /report no: 14059

Date reported: 20/02/2013

BH / TP no: BH102 Sample no: L1

Depth (m): 0.40-1.00

Soil Description: Orange brown slightly silty clayey SAND



Preparation	Method of Compaction	
	Rammer compaction with specified effort	
	Hammer type	2.5kg Rammer
	Soaking Period	days -
	Amount of Swell	mm -

Sample Conditions		
Natural Moisture Content	%	23
Moisture Content - TOP	%	26
Moisture Content - BASE	%	21
Bulk Density	Mg/m ³	2.02
Dry Density	Mg/m ³	1.64

Test Conditions		
Sample Retained on 20 mm sieve	%	0.0
Sample Retained on 37.5 mm sieve	%	0.0
Seating Load - TOP	N	10
Seating Load - BASE	N	10
Surcharge	kg	4.4

Penetration mm	CBR Values %	
	TOP	BASE
2.5	1.1	0.93
5	1.4	1.4
Accepted CBR	1.4	1.4

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J.Phaure(Lab.Mgr)

Test results relate only to the sample numbers shown above

Checked and Approved

Initials: kp

Date: 20/02/2013



2519



Report of California Bearing Ratio Test

BS 1377 : Part 4 : 1990:Clause 7.4

Project name: Waterloooville

Samples Received: 30/01/2013

Project Started: 08/02/2013

Client: Mayer Brown

Testing started: 19/02/2013

Project no: - Our job /report no: 14059

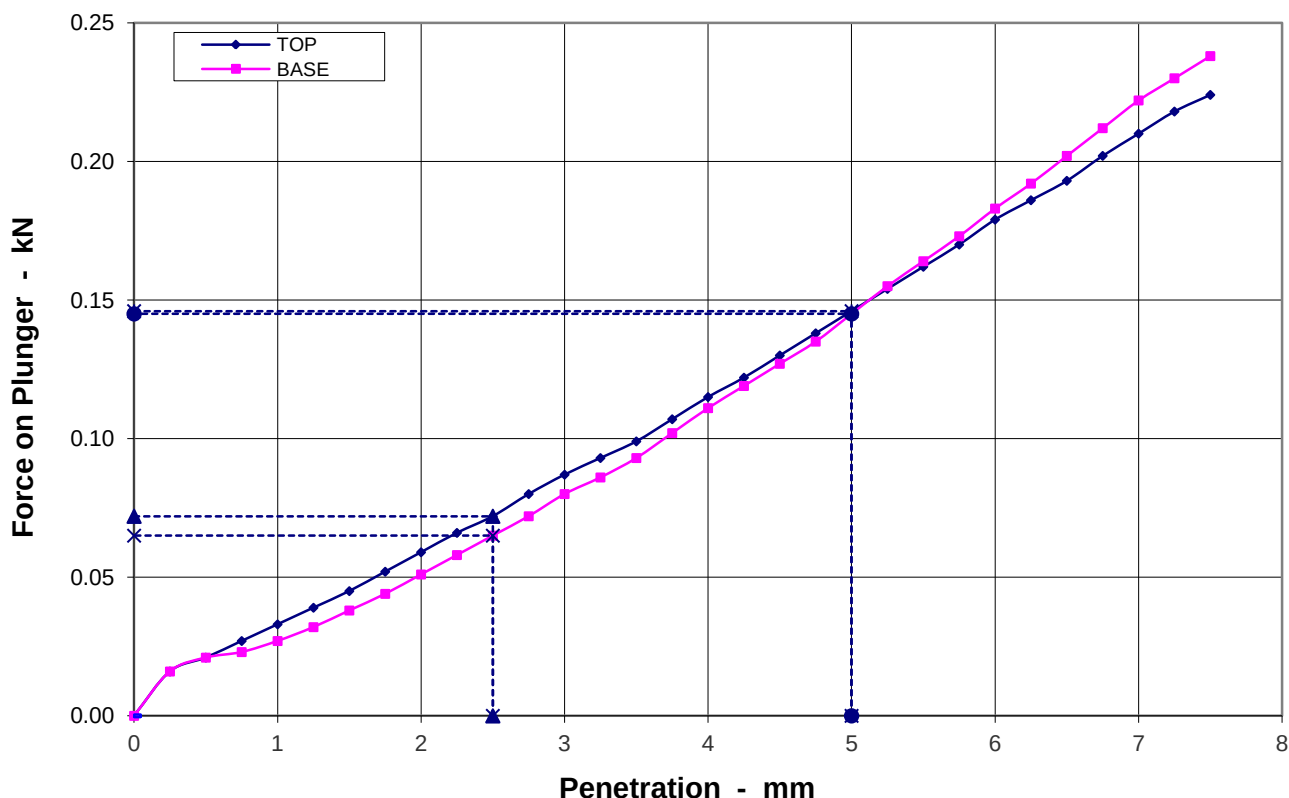
Date reported: 20/02/2013

BH / TP no: BH103

Sample no: D2

Depth (m): G.L - 0.50

Soil Description: Brown slightly gravelly slightly clayey silty SAND (gravel is fmc and sub-rounded to rounded)



Preparation	Method of Compaction	
	Rammer compaction with specified effort	
	Hammer type	2.5kg Rammer
	Soaking Period	days -
	Amount of Swell	mm -

Sample Conditions		
Natural Moisture Content	%	23
Moisture Content - TOP	%	23
Moisture Content - BASE	%	23
Bulk Density	Mg/m ³	1.88
Dry Density	Mg/m ³	1.52

Test Conditions		
Sample Retained on 20 mm sieve	%	0.3
Sample Retained on 37.5 mm sieve	%	0.0
Seating Load - TOP	N	10
Seating Load - BASE	N	10
Surcharge	kg	4.4

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.55	0.49
5	0.73	0.73
Accepted CBR	0.73	0.73

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J.Phaure(Lab.Mgr)

Test results relate only to the sample numbers shown above

Checked and Approved

Initials: kp

Date: 20/02/2013



2519



Report of California Bearing Ratio Test

BS 1377 : Part 4 : 1990:Clause 7.4

Project name: Waterloooville

Samples Received: 30/01/2013

Project Started: 08/02/2013

Client: Mayer Brown

Testing started: 19/02/2013

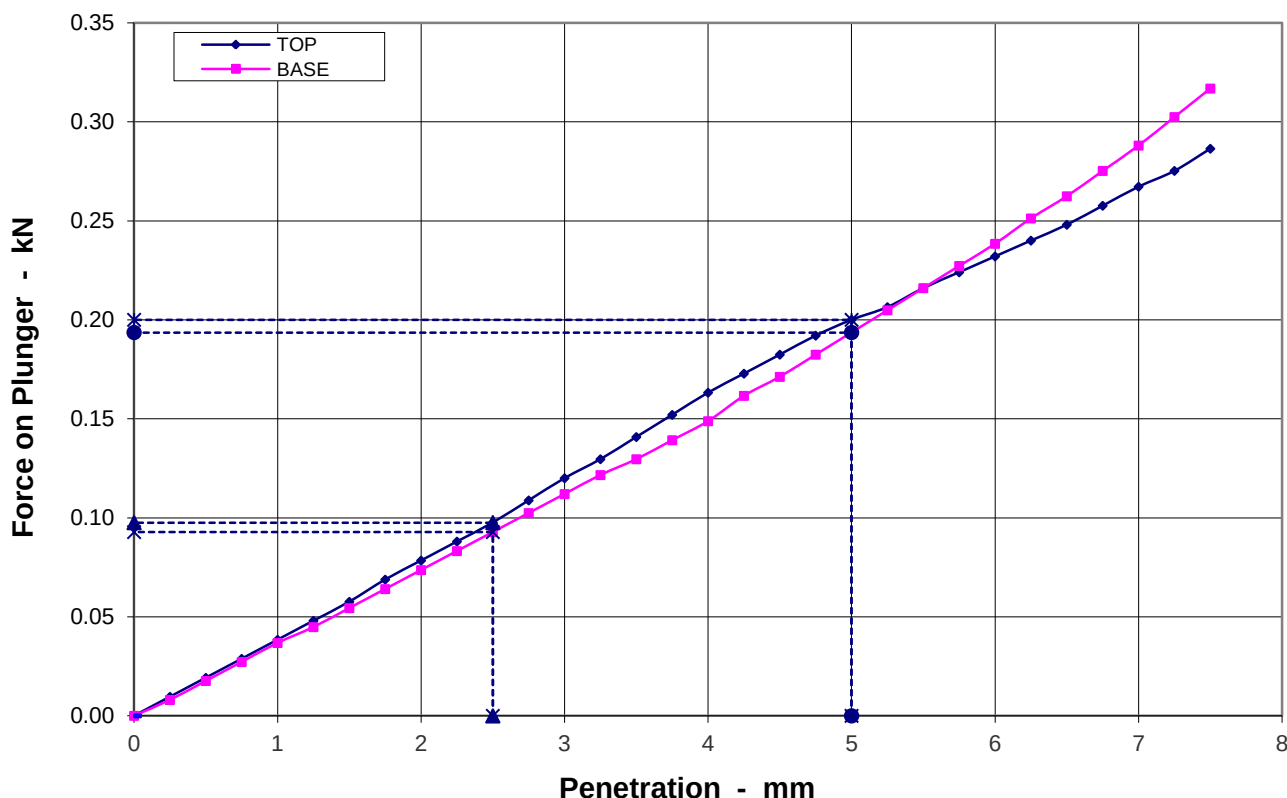
Project no: - Our job /report no: 14059

Date reported: 20/02/2013

BH / TP no: BH104 Sample no: L1

Depth (m): 0.30-1.00

Soil Description: Pale brown slightly clayey silty SAND



Preparation	Method of Compaction	
	Rammer compaction with specified effort	
	Hammer type	2.5kg Rammer
	Soaking Period	days -
	Amount of Swell	mm -

Sample Conditions		
Natural Moisture Content	%	23
Moisture Content - TOP	%	23
Moisture Content - BASE	%	22
Bulk Density	Mg/m ³	1.90
Dry Density	Mg/m ³	1.55

Test Conditions		
Sample Retained on 20 mm sieve	%	0.0
Sample Retained on 37.5 mm sieve	%	0.0
Seating Load - TOP	N	10
Seating Load - BASE	N	10
Surcharge	kg	4.4

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.74	0.70
5	1.0	1.0
Accepted CBR	1.0	1.0

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Checked and Approved

Initials: kp

Date: 20/02/2013



2519



Report of California Bearing Ratio Test

BS 1377 : Part 4 : 1990:Clause 7.4

Project name: Waterloooville

Samples Received: 30/01/2013

Project Started: 08/02/2013

Client: Mayer Brown

Testing started: 19/02/2013

Project no: - Our job /report no: 14059

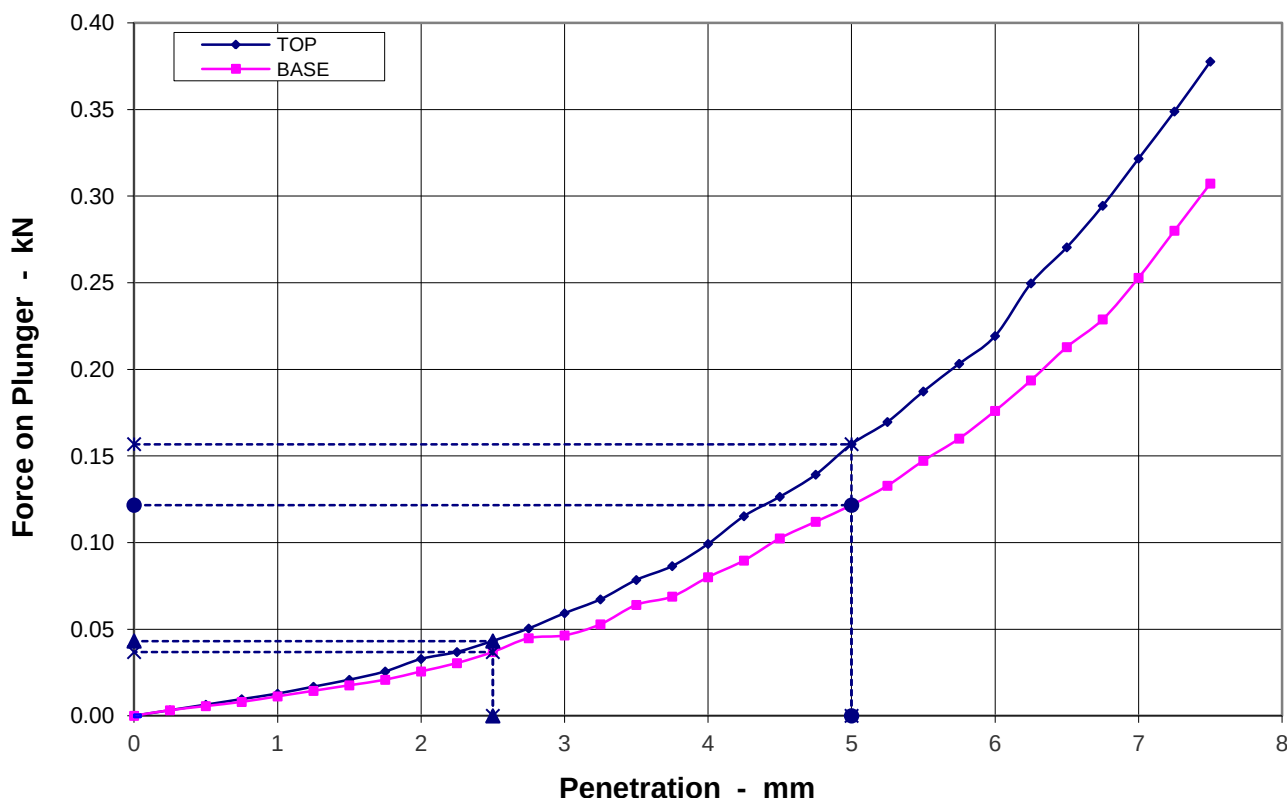
Date reported: 21/02/2013

BH / TP no: BH106

Sample no: L2

Depth (m): 1.60-2.00

Soil Description: Pale brown and black slightly clayey slightly silty SAND



Preparation	Method of Compaction	
	Rammer compaction with specified effort	
	Hammer type	2.5kg Rammer
	Soaking Period	days -
	Amount of Swell	mm -

Sample Conditions		
Natural Moisture Content	%	24
Moisture Content - TOP	%	25
Moisture Content - BASE	%	23
Bulk Density	Mg/m ³	1.88
Dry Density	Mg/m ³	1.51

Test Conditions		
Sample Retained on 20 mm sieve	%	0.0
Sample Retained on 37.5 mm sieve	%	0.0
Seating Load - TOP	N	10
Seating Load - BASE	N	10
Surcharge	kg	4.4

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.33	0.28
5	0.78	0.61
Accepted CBR	0.78	0.61

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Test results relate only to the sample numbers shown above

Checked and Approved

Initials: kp

Date: 21/02/2013



2519



Report of California Bearing Ratio Test

BS 1377 : Part 4 : 1990:Clause 7.4

Project name: Waterloooville

Samples Received: 30/01/2013

Project Started: 08/02/2013

Client: Mayer Brown

Testing started: 19/02/2013

Project no: - Our job /report no: 14059

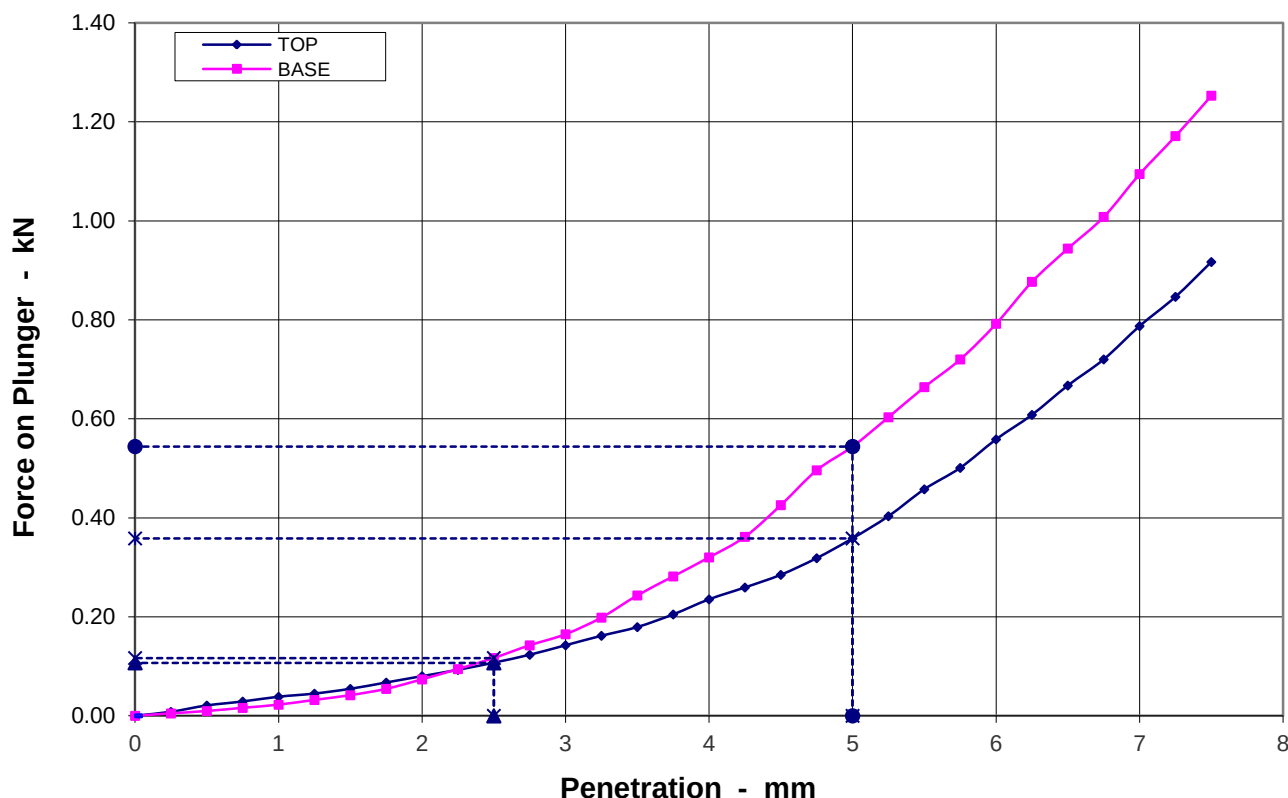
Date reported: 21/02/2013

BH / TP no: BH107

Sample no: L2

Depth (m): 1.50-2.00

Soil Description: Pale brown slightly silty slightly clayey SAND



Preparation	Method of Compaction	
	Rammer compaction with specified effort	
	Hammer type	2.5kg Rammer
	Soaking Period	days -
	Amount of Swell	mm -

Sample Conditions		
Natural Moisture Content	%	24
Moisture Content - TOP	%	24
Moisture Content - BASE	%	23
Bulk Density	Mg/m ³	1.90
Dry Density	Mg/m ³	1.54

Test Conditions		
Sample Retained on 20 mm sieve	%	0.0
Sample Retained on 37.5 mm sieve	%	0.0
Seating Load - TOP	N	10
Seating Load - BASE	N	10
Surcharge	kg	4.4

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.81	0.88
5	1.8	2.7
Accepted CBR	1.8	2.7

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Checked and Approved

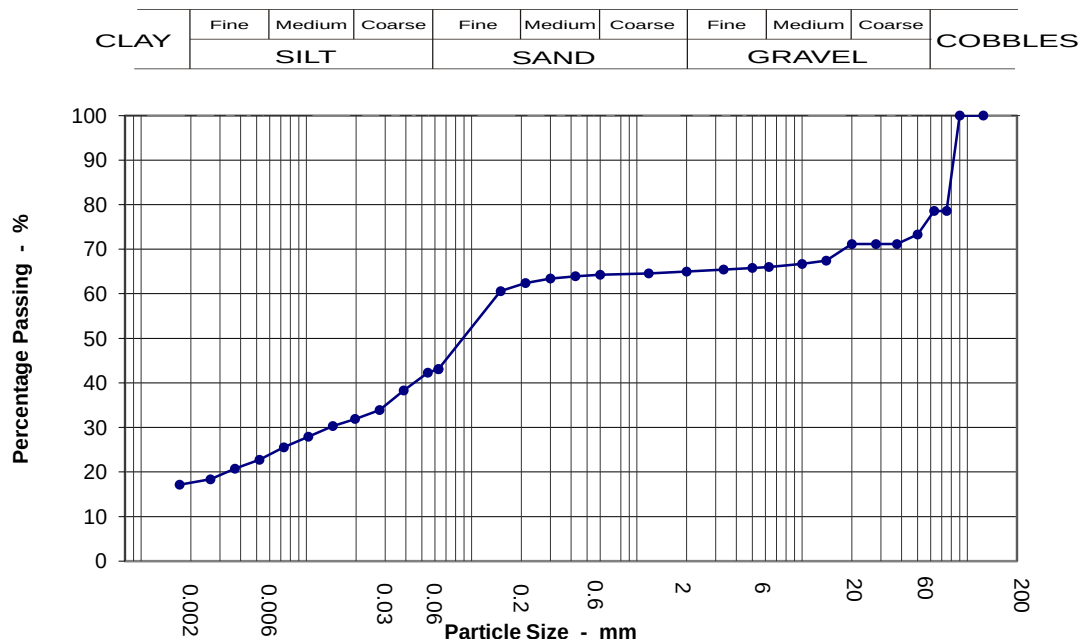
Initials: kp

Date: 21/02/2013



2519

K4 SOILS 	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Our Report No:	14059
		Project No:	-
Location	Waterlooville	Borehole / Trial Pit No:	BH124
		Depth	0.50 - 1.00 m
Visual Soil Description	Dark brown and brown gravelly clayey sandy SILT (gravel is fmc and sub-angular to angular)	Sample Type/No	L - 1



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.054	42
90	100	0.039	38
75	79	0.028	34
63	79	0.020	32
50	73	0.014	30
37.5	71	0.010	28
28	71	0.007	26
20	71	0.005	23
14	67	0.004	21
10	67	0.003	18
6.3	66	0.002	17
5	66		
3.35	65		
2	65		
1.18	65		
0.6	64		
0.425	64		
0.3	63		
0.212	62		
0.15	61		
0.063	43		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause
Sedimentation	Clause 9.5
Suitable Amount Of Sample Received	Yes

Sample Proportions	
Cobbles	21.4
Gravel	13.6
Sand	22.2
Silt	25.3
Clay	17.5

Grading Analysis	
D100	125.0
D60	0.1
D10	
Uniformity Coefficient	N/A

K4 SOILS LABORATORY

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Approved Signatories:

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Test results relate only to the sample numbers shown above

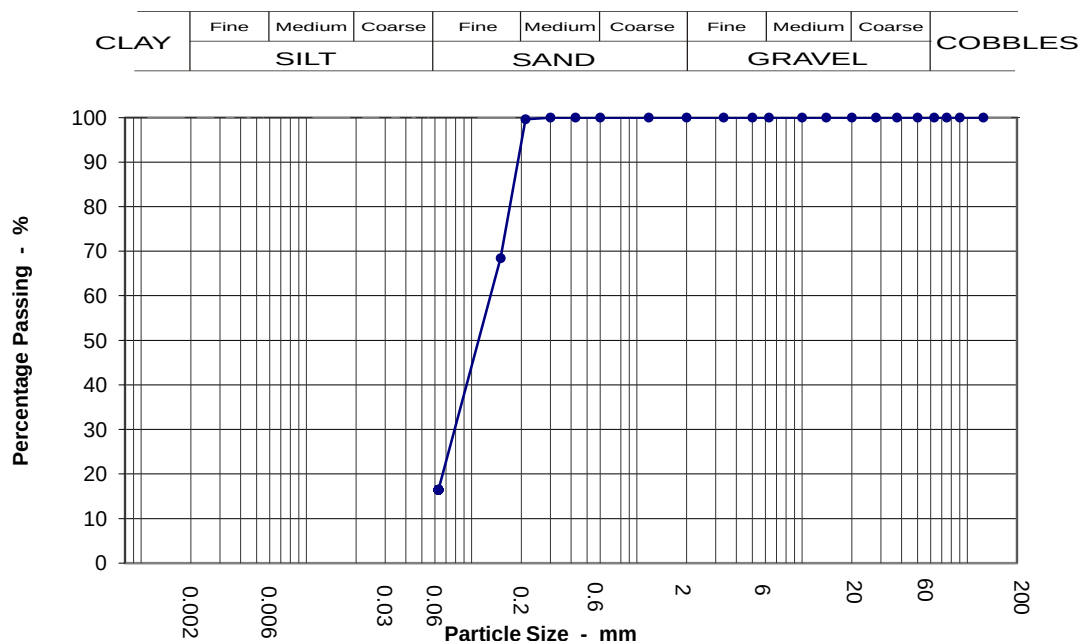
Checked and Approved

Initials: kp

Date: 20/02/2013



K4 SOILS 	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Our Report No:	14059
		Project No:	-
Location	Waterlooville	Borehole / Trial Pit No:	BH101
		Depth	0.80 - 1.00 m
Visual Soil Description	Yellow brown and pale grey slightly clayey SAND	Sample Type/No	D - 1



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	68		
0.063	16		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause
Sedimentation	N/A
Suitable Amount Of Sample Received	Yes

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	83.6
Silt & Clay	16.4

Grading Analysis	
D100	125.0
D60	0.1
D10	
Uniformity Coefficient	N/A

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Test results relate only to the sample numbers shown above

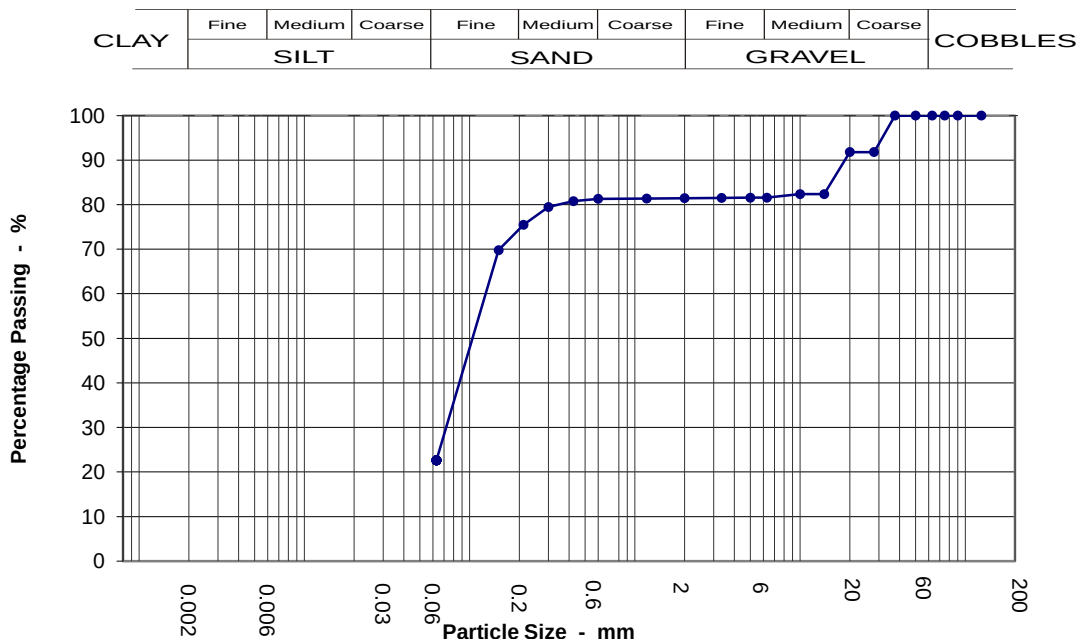
Checked and Approved

Initials: kp

Date: 20/02/2013



K4 SOILS 	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Our Report No:	14059
		Project No:	-
Location	Waterlooville	Borehole / Trial Pit No:	BH108
Visual Soil Description		Depth	1.60 - 2.00 m
		Sample Type/No	D - 1



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	92		
20	92		
14	82		
10	82		
6.3	82		
5	82		
3.35	82		
2	81		
1.18	81		
0.6	81		
0.425	81		
0.3	79		
0.212	75		
0.15	70		
0.063	23		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause
Sedimentation	N/A
Suitable Amount Of Sample Received	Yes

Sample Proportions	
Cobbles	0.0
Gravel	18.5
Sand	58.8
Silt & Clay	22.6

Grading Analysis	
D100	125.0
D60	0.1
D10	
Uniformity Coefficient	N/A

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Test results relate only to the sample numbers shown above

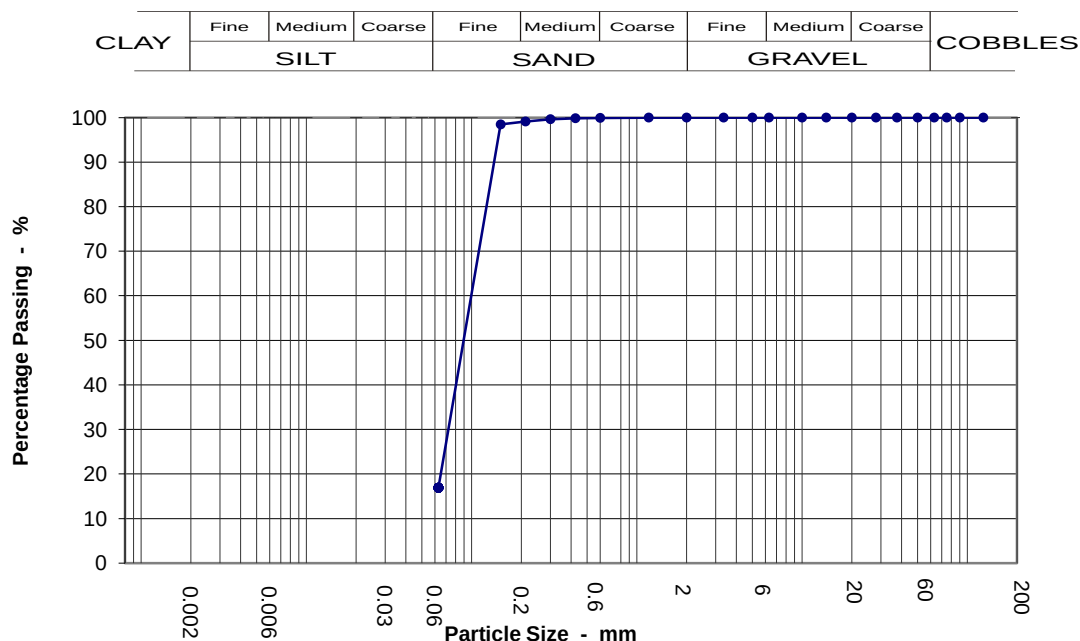
Checked and Approved

Initials: kp

Date: 20/02/2013



K4 SOILS 	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Our Report No:	14059
		Project No:	-
Location	Waterlooville	Borehole / Trial Pit No:	BH110
Visual Soil Description		Depth	0.50 - 1.00 m
	Pale brown and orange brown slightly silty slightly clayey SAND	Sample Type/No	L - 1



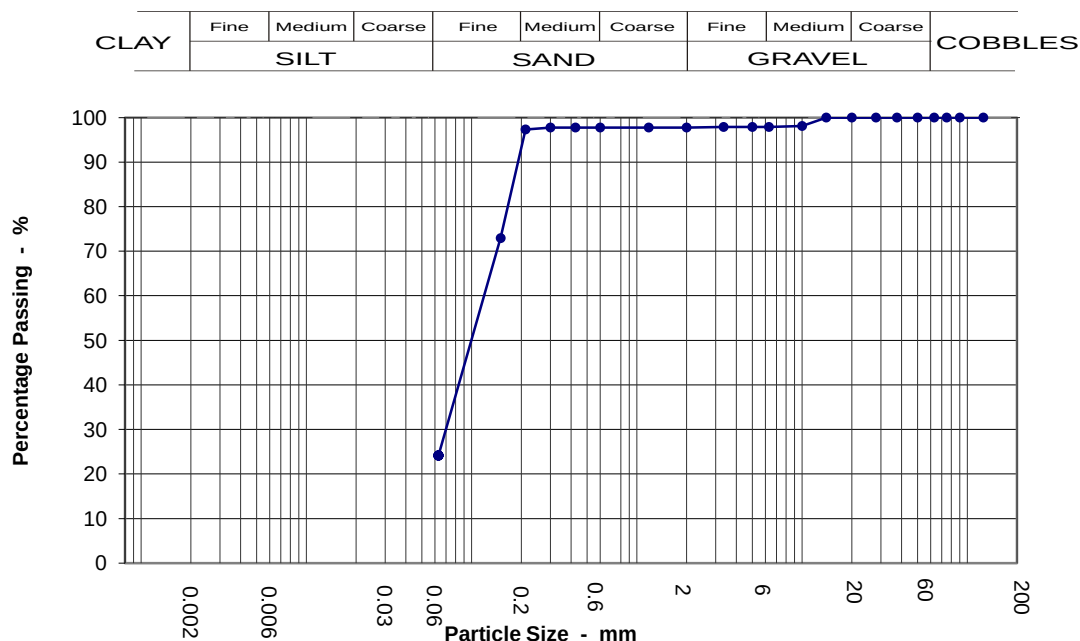
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	99		
0.15	98		
0.063	17		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause
Sedimentation	N/A
Suitable Amount Of Sample Received	Yes

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	83.1
Silt & Clay	16.9

Grading Analysis	
D100	125.0
D60	0.1
D10	
Uniformity Coefficient	N/A

K4 SOILS 	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Our Report No:	14059
		Project No:	-
Location	Waterlooville	Borehole / Trial Pit No:	BH115
Visual Soil Description	Orange brown slightly silty slightly clayey SAND with pockets of grey clay and occasional fm sandstone fragments	Depth	0.50-1.00 m
		Sample Type/No	D - 1



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	98		
6.3	98		
5	98		
3.35	98		
2	98		
1.18	98		
0.6	98		
0.425	98		
0.3	98		
0.212	97		
0.15	73		
0.063	24		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause
Sedimentation	N/A
Suitable Amount Of Sample Received	Yes

Sample Proportions	
Cobbles	0.0
Gravel	2.2
Sand	73.6
Silt & Clay	24.2

Grading Analysis	
D100	125.0
D60	0.1
D10	
Uniformity Coefficient	N/A

K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU. E-mail: k4soils@aol.com	Approved Signatories:		Checked and Approved	
	K.Phaure(Tech.Mgr)	J.Phaure(Lab.Mgr)	Initials: kp	
	Test results relate only to the sample numbers shown above		Date: 20/02/2013	
All samples connected with this report, incl any on 'hold' will be disposed off according to company policy. A copy of this policy is available on request. Sheet 3/3 MSF-11/R9				2519

Project Name: Waterlooville					K4 SOILS 
Client: Mayer Brown		Project no: -			
Our job no: 14059					
Borehole No:	Sample No:	Depth m	Description	pH	Sulphate content (g/l)
BH101	D1	0.80-1.00	Yellow brown and pale grey slightly clayey SAND	7.7	0.10
BH104	L1	0.30-1.00	Pale brown slightly clayey silty SAND	7.8	0.08
BH108	D1	1.60-2.00	Brown slightly silty slightly gravelly SAND with pockets of grey clay (gravel is fmc and rounded)	7.8	0.11
BH110	L1	0.50-1.00	Pale brown and orange brown slightly silty slightly clayey SAND	7.8	0.10
BH117	D2	1.50-2.00	Orange brown and grey slightly silty slightly clayey SAND	7.9	0.04
BH124	L1	0.50-1.00	Dark brown and brown gravelly clayey sandy SILT (gravel is fmc and sub-angular to angular)	7.8	0.04
Summary of Test Results					
Date 20/02/2013	BS 1377 : Part 3 : Clause 5 : 1990 Determination of sulphate content of soil and ground water : gravimetric method				Checked and Approved Initials : kp

CLEGG HAMMER RESULTS SHEET


Project No:	16054	
Site:	Berewood Area 2, Waterloooville	
Operator(s):	AP/SS	
Date:	21-1-2013 to 25-1-2013	Sheet: 1..... of 2.....
Instrument/Model Type:	CIST/882	Serial No.: 10501
Comments:		

Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS102 0.4m	1	3	3	3	4	3	3.8416	WS110 0.4m	1	4	7	8	9	8	9.9856
	2						1		2						1
	3						1		3						1
	4						1		4						1
Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS103 0.5m	1	3	3	3	3	3	2.9584	WS113 0.3m	1	8	8	9	7	8	7.1824
	2						1		2						1
	3						1		3						1
	4						1		4						1
Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS104 0.3m	1	4	4	4	3	4	2.9584	WS114 0.3m	1	8	8	8	8	8	8.5264
	2						1		2						1
	3						1		3						1
	4						1		4						1
Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS105 0.4m	1	5	6	6	6	6	5.9536	WS115 0.3m	1	4	4	4	5	4	4.84
	2						1		2						1
	3						1		3						1
	4						1		4						1
Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS106 0.3m	1	5	5	6	7	8	7.1824	WS117 0.3m	1	7	8	7	8	8	8.5264
	2						1		2						1
	3						1		3						1
	4						1		4						1
Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS107 0.3m	1	7	9	9	9	8	9.9856	WS118 0.3m	1	6	6	6	6	6	5.9536
	2						1		2						1
	3						1		3						1
	4						1		4						1
Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS108 0.3m	1	7	6	6	6	6	5.9536	WS119 0.3m	1	6	7	8	8	8	8.5264
	2						1		2						1
	3						1		3						1
	4						1		4						1

Note: If any reading is more than 2 IV lower then the previous reading or of the 5th reading is greater than the 4th reading by more than 2 IV, then the measurements are generally not reliable and the test should be abandoned at that location and repeated approximately 300mm away.
4th drop Impact Value to be used to determine Equivalent % CBR values

CLEGG HAMMER RESULTS SHEET


Project No:	16054	
Site:	Berewood Area 2, Waterloooville	
Operator(s):	AP/SS	
Date:	21-1-2013 to 25-1-2013	Sheet: 2..... of 2.....
Instrument/Model Type:	CIST/882	Serial No.: 10501
Comments:		

Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS120 0.3m	1	5	6	7	7	7	7.1824		1						1
	2						1		2						1
	3						1		3						1
	4						1		4						1
Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS121 0.3m	1	5	5	5	4	4	3.8416		1						1
	2						1		2						1
	3						1		3						1
	4						1		4						1
Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS123 0.3m	1	9	10	10	9	9	9.9856		1						1
	2						1		2						1
	3						1		3						1
	4						1		4						1
Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS124 0.3m	1	5	5	5	5	5	4.84		1						1
	2						1		2						1
	3						1		3						1
	4						1		4						1
Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS126 0.3m	1	6	6	6	6	6	5.9536		1						1
	2						1		2						1
	3						1		3						1
	4						1		4						1
Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
WS127 0.3m	1	5	6	6	6	6	5.9536		1						1
	2						1		2						1
	3						1		3						1
	4						1		4						1
Location	Test No.	Drop No.					Equivalent % CBR	Location	Test No.	Drop No.					Equivalent % CBR
		1	2	3	4	5				1	2	3	4	5	
	1						1		1						1
	2						1		2						1
	3						1		3						1
	4						1		4						1

Note: If any reading is more than 2 IV lower than the previous reading or of the 5th reading is greater than the 4th reading by more than 2 IV, then the measurements are generally not reliable and the test should be abandoned at that location and repeated approximately 300mm away.
4th drop Impact Value to be used to determine Equivalent % CBR values

APPEDIX H: GEOTECHNICAL CALCULATION SHEETS

Project	Waterlooville Stage 2				
	Shallow Foundation				
	Determination of Bearing Resistance	Calcs by	DF	Checked by	RP
	<u>Design Approach 1</u> Ground Model 1 Combination 1 A1 + M1 + R1 <u>Material Properties and Resistance</u> Partial factors set M1: $\gamma_{cu} = 1$ $\gamma_{\phi} = 1$ and $\gamma_c = 1$ Design undrained strength is $c_{ud} = \frac{c_{uk}}{\gamma_{cu}} = 0\text{kN/m}^2$ Design shearing resistance is $\phi_d = \tan^{-1}\left(\frac{\tan \phi_K}{\gamma_{\phi}}\right) = 30^\circ$ Design cohesion is $c'_d = \frac{c_k}{\gamma_c} = 0\text{kN/m}^2$ <u>Drained Bearing Capacity Factors</u> For overburden $N_q = \left[e^{(\pi \times \tan(\phi_d))} \times \left(\tan\left(45 + \frac{\phi_d}{2}\right) \right)^2 \right] = 18.4$ For cohesion $N_c = [(N_q - 1) \times \cot(\phi_d)] = 30.14$ For self-weight $N_\gamma = [2(N_q - 1) \times \tan(\phi_d)] = 20.09$ <u>Shape Factors</u> For overburden $s_q = \left[1 + \left(\frac{B}{L} \right) \times \sin \phi_d \right] = 1.02$ For cohesion $s_c = \frac{(s_q \times N_q - 1)}{N_q - 1} = 1$ For self-weight $s_\gamma = 1 - 0.3 \times \left(\frac{B}{L} \right) = 0.99$ <u>Bearing Resistance</u> Total overburden at foundation base is $\sigma_{vk,b} = \gamma_k \times d = 7.5\text{kN/m}^2$ Partial factors set R1: $\gamma_{Rv} = 1$				

Project	Waterlooville Stage 2			
	Shallow Foundation			
	Determination of Bearing Resistance	Calcs by	DF	Checked by
	From overburden $q_{ult_1} = N_q \times s_q \times \sigma_{vk,b} = 140\text{kN/m}^2$ From cohesion $q_{ult_2} = N_c \times s_c \times c_d = 0\text{kN/m}^2$ From self-weight $q_{ult_3} = N_\gamma \times s_\gamma \times \gamma_k \times \frac{B}{2} = 75\text{kN/m}^2$ Total resistance is $q'_{ult} = \sum_{i=1}^3 q'_{ult_i} = 215\text{kN/m}^2$ Design resistance is $q'_{Rd} = \frac{q'_{ult}}{\gamma_{Rv}} = 215\text{kN/m}^2$ <u>Design Approach 1</u> Combination 2 A2 + M2 + R1 <u>Material Properties and Resistance</u> Partial factors set M2: $\gamma_{cu} = 1.4$ $\gamma_\phi = 1.25$ and $\gamma_c = 1.25$ Design undrained strength is $c_{ud} = \frac{c_{uk}}{\gamma_{cu}} = 0\text{kN/m}^2$ Design shearing resistance is $\phi_d = \tan^{-1}\left(\frac{\tan \phi_k}{\gamma_\phi}\right) = 25$ Design cohesion is $c'_d = \frac{c_k}{\gamma_c} = 0\text{kN/m}^2$ <u>Bearing Capacity Factors</u> For overburden $N_q = \left[e^{(\pi \times \tan(\phi_d))} \times \left(\tan\left(45 + \frac{\phi_d}{2}\right) \right)^2 \right] = 10.65$ For cohesion $N_c = [(N_q - 1) \times \cot(\phi_d)] = 20.69$ For self-weight $N_\gamma = [2(N_q - 1) \times \tan(\phi_d)] = 9$ <u>Shape Factors</u> For overburden $s_q = \left[1 + \left(\frac{B}{L} \right) \times \sin \phi_d \right] = 1.02$ For cohesion $s_c = \frac{(s_q \times N_q - 1)}{N_q - 1} = 1$			

Project	Waterlooville Stage 2			
	Shallow Foundation			
	Determination of Bearing Resistance	Calcs by	DF	Checked by
	For self-weight $s_{\gamma} = 1 - 0.3 \times \left(\frac{B}{L}\right) = 0.99$			
	<u>Bearing Resistance</u>			
	Total overburden at foundation base is $\sigma_{vk,b} = \gamma_k \times d = 7.50\text{kN/m}^2$			
	Partial factors set R1: $\gamma_{Rv} = 1$			
	From overburden	$q_{ult_1} = N_q \times s_q \times \sigma_{vk,b} =$		80kN/m^2
	From cohesion	$q_{ult_2} = N_c \times s_c \times c_d =$		0kN/m^2
	From self-weight	$q_{ult_3} = N_{\gamma} \times s_{\gamma} \times \gamma_k \times \frac{B}{2} =$		33kN/m^2
	Total resistance is	$q'_{ult} = \sum_{i=1}^3 q'_{ult_i} =$		115kN/m^2
	Design Resistance is	$q'_{Rd} = \frac{q'_{ult}}{\gamma_{Rv}} =$		115kN/m^2

Project	Waterlooville Stage 2				
	Shallow Foundation				
	Determination of Bearing Resistance	Calcs by	DF	Checked by	RP
	<u>Design Approach 1</u>			Ground Model 2	
	Combination 1 A1 + M1 + R1				
	<u>Material Properties and Resistance</u>				
	Partial factors set M1: $\gamma_{cu} = 1$ $\gamma_{\phi} = 1$ and $\gamma_c = 1$				
	Design undrained strength is $c_{ud} = \frac{c_{uk}}{\gamma_{cu}} = 0\text{kN/m}^2$				
	Design shearing resistance is $\phi_d = \tan^{-1}\left(\frac{\tan \phi_K}{\gamma_{\phi}}\right) = 30^\circ$				
	Design cohesion is $c'_d = \frac{c_k}{\gamma_c} = 0\text{kN/m}^2$				
	<u>Drained Bearing Capacity Factors</u>				
	For overburden $N_q = \left[e^{(\pi \times \tan(\phi_d))} \times \left(\tan\left(45 + \frac{\phi_d}{2}\right) \right)^2 \right] = 18.4$				
	For cohesion $N_c = [(N_q - 1) \times \cot(\phi_d)] = 30.14$				
	For self-weight $N_\gamma = [2(N_q - 1) \times \tan(\phi_d)] = 20.09$				
	<u>Shape Factors</u>				
For overburden $s_q = \left[1 + \left(\frac{B}{L} \right) \times \sin \phi_d \right] = 1.03$					
For cohesion $s_c = \frac{(s_q \times N_q - 1)}{N_q - 1} = 1$					
For self-weight $s_\gamma = 1 - 0.3 \times \left(\frac{B}{L} \right) = 0.99$					
<u>Bearing Resistance</u>					
Total overburden at foundation base is $\sigma_{vk,b} = \gamma_k \times d = 7.5\text{kN/m}^2$					
Partial factors set R1: $\gamma_{Rv} = 1$					

Project	Waterlooville Stage 2			
	Shallow Foundation			
	Determination of Bearing Resistance	Calcs by	DF	Checked by
	From overburden $q_{ult_1} = N_q \times s_q \times \sigma_{vk,b} = 142\text{kN/m}^2$ From cohesion $q_{ult_2} = N_c \times s_c \times c_d = 0\text{kN/m}^2$ From self-weight $q_{ult_3} = N_\gamma \times s_\gamma \times \gamma_k \times \frac{B}{2} = 99\text{kN/m}^2$ Total resistance is $q'_{ult} = \sum_{i=1}^3 q'_{ult_i} = 240\text{kN/m}^2$ Design resistance is $q'_{Rd} = \frac{q'_{ult}}{\gamma_{Rv}} = 240\text{kN/m}^2$ <u>Design Approach 1</u> Combination 2 A2 + M2 + R1 <u>Material Properties and Resistance</u> Partial factors set M2: $\gamma_{cu} = 1.4$ $\gamma_\phi = 1.25$ and $\gamma_c = 1.25$ Design undrained strength is $c_{ud} = \frac{c_{uk}}{\gamma_{cu}} = 0\text{kN/m}^2$ Design shearing resistance is $\phi_d = \tan^{-1}\left(\frac{\tan \phi_k}{\gamma_\phi}\right) = 25$ Design cohesion is $c'_d = \frac{c_k}{\gamma_c} = 0\text{kN/m}^2$ <u>Bearing Capacity Factors</u> For overburden $N_q = \left[e^{(\pi \times \tan(\phi_d))} \times \left(\tan\left(45 + \frac{\phi_d}{2}\right) \right)^2 \right] = 10.65$ For cohesion $N_c = [(N_q - 1) \times \cot(\phi_d)] = 20.69$ For self-weight $N_\gamma = [2(N_q - 1) \times \tan(\phi_d)] = 9$ <u>Shape Factors</u> For overburden $s_q = \left[1 + \left(\frac{B}{L} \right) \times \sin \phi_d \right] = 1.03$ For cohesion $s_c = \frac{(s_q \times N_q - 1)}{N_q - 1} = 1$			

Project	Waterlooville Stage 2			
	Shallow Foundation			
	Determination of Bearing Resistance	Calcs by	DF	Checked by
	For self-weight $s_{\gamma} = 1 - 0.3 \times \left(\frac{B}{L}\right) = 0.99$			
	<u>Bearing Resistance</u>			
	Total overburden at foundation base is $\sigma_{vk,b} = \gamma_k \times d = 7.50\text{kN/m}^2$			
	Partial factors set R1: $\gamma_{Rv} = 1$			
	From overburden $q_{ult_1} = N_q \times s_q \times \sigma_{vk,b} = 80\text{kN/m}^2$			
	From cohesion $q_{ult_2} = N_c \times s_c \times c_d = 0\text{kN/m}^2$			
	From self-weight $q_{ult_3} = N_{\gamma} \times s_{\gamma} \times \gamma_k \times \frac{B}{2} = 45\text{kN/m}^2$			
	Total resistance is $q'_{ult} = \sum_{i=1}^3 q'_{ult_i} = 125\text{kN/m}^2$			
	Design Resistance is $q'_{Rd} = \frac{q'_{ult}}{\gamma_{Rv}} = 125\text{kN/m}^2$			
Design Approach		Combination	Design Resistance	
			ULS (kN/m ²)	
DA1		Combination 1	240	
		Combination 2	125	

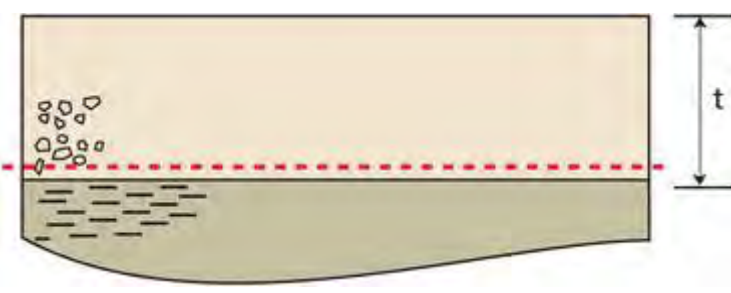
APPENDIX I: PRELIMINARY GRANULAR SUBGRADE DESIGN

Tensar International Software

Output from TensarPave version 6.04

Calculations in accordance with: Ground Stabilisation Method

Input data	Subgrade description	Dense fine sand	
	Subgrade strength	CBR (%)	3.00 (estimated)
	Area to be stabilised	(m ²)	50000.00
	Construction traffic	N _{sc} (no ESA)	5000
	In-service traffic	N _{si-c} (no ESA)	24570
	Design standard axle load	(kN)	80.00
	Function of stabilised layer	Supporting surfacing	
	Maximum surface deformation	(mm)	40
	Stabilised layer description	Granular fill	
	Maximum particle size	(mm)	<75

Section	Project:	Waterlooville Stage 2	
		Geogrid	Level (mm)
		Tensar SS30G	0
Tensar stabilisation solution		Tensar Combination Layer	

Result	Thickness	t (mm)	300
	Specification	MS_PR_SS30G	

Bearing capacity calculation	Undrained shear strength	(kPa)	72
	Stabilised layer thickness	(mm)	300
	Shape of loaded area:	Strip	
	Width of loaded area	(m)	0.750
	Applied load	(kN/m)	100.000
	Ultimate bearing capacity	(kPa)	123.360
	Factor of safety on ultimate bearing capacity	2.035	

Reference		Date	7 Mar 2013	Page	2 of 3
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Tensar International Software

Output from TensarPave version 6.04

Calculations in accordance with: Ground Stabilisation Method

Assessment of need for geocomposite at fill/subgrade interface	Subgrade PI (likely if < 10)	0	Likely
	Is geocomposite required?	Required	

Further relevant information	Further information and specifications for this Tensar <i>tech</i> stabilisation solution are given in the following documents which form part of this Tensar software output	
	Fill specification	Class 1A
	Compaction specification	In accordance with DMRB Series 600
	Outline installation method	
	The current versions of these documents may be found either by following the website link to "Tensar Documentation" in the Help menu of the TensarPave program or by contacting the office which prepared this Tensar software output	
	For program users who do not have a link to the internet the contact details of your nearest Tensar representative are:	Tensar International Limited +44 (0)1254 266843 +44 (0)1254 266868 software@tensar.co.uk Web: www.tensar-international.com

Reference		Date	7 Mar 2013	Page	3 of 3
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APPENDIX J: UXO SURVEY REPORT



BACTEC International Limited
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Rochester, Kent, ME2 4DP U.K.
Tel: +44 (0)1634 296757
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L4132RN01

1st February 2013

Mr Rasmus Palmgren
Mayer Brown Ltd
Lion House
Oriental Road
Woking
Surrey
GU22 8AR

Dear Mr Palmgren

**EXPLOSIVE ORDNANCE DISPOSAL (EOD) SERVICES
Berewood Phase 2 Infrastructure Site Waterlooville**

We are writing to confirm and to place on record our attendance at the above mentioned site on 21st to 25th January 2013 incl to provide Explosive Ordnance Disposal Engineer support to window sampling works as listed below. We confirm that no items of ordnance were discovered during these works.

WS101 to WS 127 Inclusive.

Our Engineer also carried out Ordnance Awareness and Safety Briefings to site personnel and a copy of each briefing register is attached.

We remain at your disposal for any future EOD support at this or any other Mayer Brown Ltd sites.

Yours sincerely

Rik Noke
Project Manager
BACTEC International Limited

Enc. Briefing Register



Globally Trusted | Locally Dependable

Registered in England No. 2601923 VAT Registration No. GB 573 6627 13
Registered Office: 37 Riverside, Sir Thomas Longley Road, Rochester, Kent ME2 4DP.



Form ref: 7-G
Version 7-G.3

Client	MAYER BROWN LTD	Site	WATERLOOVILLE	INO	4132
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[illegible]

Briefing by :	G. Woods
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Signed :

Q Woods
Sug hand



the journey is the reward