

[REDACTED]

From: Emily Harding (Allan B Matthews) [REDACTED]

Sent: 16 February 2015 11:37

To: Daniel Vick
[REDACTED]

Subject: WA/92/11 Condition 3 Shell Fontwell

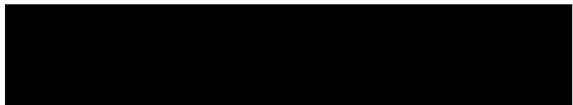
Dear Mr. Vick

This pre-commencement planning condition was discharged on the 8th April 2013 and works have now commenced on site. I attach for your information a Comprehensive Groundwater Monitoring Event report which has previously been sent to, and commented on, by the Environment Agency (see attached email dated 12th February 2015). The Environment Agency email comments are being responded to by our clients environmental consultants.

I apologise for not sending you a copy of this report earlier but this was due to an oversight on the part of my office.

Regards,

Emily Harding for
Allan B. Matthews R.I.B.A
Chartered Architect
37 Fore Street
Bovey Tracey
Devon TQ13 9AD



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Sent: 12 February 2015 16:30
To: Allen, Phillip (Wimbledon)
Cc: Luker, Mark; Jones, Geoffrey; Bucknall, James; Andrew Neale
Subject: RE: Shell Fontwell - Groundwater monitoring Report

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Phil,

We haven't been consulted yet by Arun District Council on your groundwater monitoring report though I have reviewed the report and discussed some of the details with Portsmouth Water. We have the following comments to make on our assessment:

1. Though we have previously commented on previous reports, Section 2.2 Geology (table B) of the report states that boreholes within 500m of the Shell garage indicate 20m of Reading Beds (Lambeth Grp). We have been unable to find one of the boreholes (SU90NW620A) on the BGS borehole viewer. The other borehole mentioned (SU90NW144) is situated across from the garage within the grounds of Fontwell racecourse and terminates at 10m , with gravel from 2m to 9.8m and 'limestone' being found at 9.8m. In addition to this, the Shell site sits on the feather edge of the Lambeth Group so would expect there to be only a thin layer for Lambeth Group to be present beneath the site. Unfortunately, your boreholes have are not deep enough to evaluate this further. Though your report doesn't specifically estimate the thickness of the Lambeth Beds, the conceptualisation of the underlying geology needs to be looked at further.
2. The recent groundwater monitoring results (September 2014) has identified elevated levels of hydrocarbon within monitoring borehole MW4 (Aliphatic (C21- C35) – 470ug/l and Aromatic (C16 – 35) - 927 ug/l). On this visit, no other borehole identified exceedances above detection limit apart from MW6 (only at 12ug/l); Borehole MW4 is located to the northeast of the site. The other boreholes are located across and downgradient of the tank farm towards the location of Eastergate WTW. These do not show any elevated levels. Though this seems to be an isolated hot spot for this visit, these levels do represent levels that are of concern.
3. Section 4.5 discusses the exceedances of a number of COPC in shallow GW were above the DWS (MW4), however the report considers this to present no unacceptable risk (stage 2 GORA). The report states that the TPH fractions detected are relatively immobile. However the C16 – C24 range does represents diesel & heating oil fraction. While majority is in the upper carbon fraction, we would not consider the identified hydrocarbons to be immobile.
4. Based on this elevated hotspot and that geological conceptual model is not quite right, we would require post construction groundwater monitoring to be undertaken to assess any changes to groundwater quality through construction being undertaken on site. Once this information has been presented, we will review this and provide further comment.
5. We also understand that you are undertaking site supervision during decommissioning works. We look forward to receiving this information in due course, in particular any validation sampling that is being undertaken.

Regards, Simon

Simon Deacon BSc MSc FGS
Technical Specialist

 Environment Agency, Chichester Office, Oving Road, Chichester, West Sussex, PO20 2AG

"Groundwater Protection: Policy and Practice (GP3)", sets out how we manage and protect groundwater resources and our plans for the future:

<https://www.gov.uk/government/publications/groundwater-protection-principles-and-practice-gp3>



NEW: charging for planning advice

From January 2014 we will begin charging for some of our planning advice.
For more information please speak to your local Sustainable Places team.

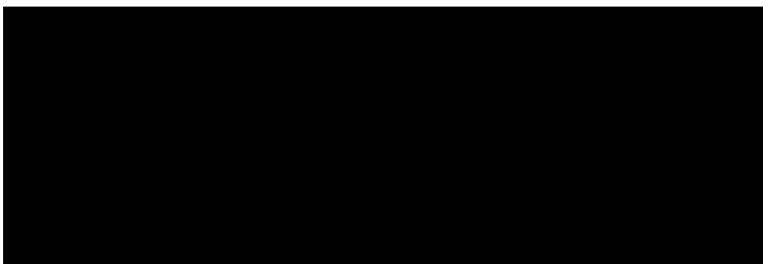
From: Allen, Phillip (Wimbledon) 
Sent: 06 January 2015 17:01
To: Deacon, Simon
Cc: Luker, Mark; Jones, Geoffrey
Subject: RE: Shell Fontwell - Groundwater monitoring Report

Simon

We would prefer not to incur a charge therefore we will submit the report via the local authority.

Regards

Phil Allen



From: Deacon, Simon 
Sent: 06 January 2015 16:46
To: Allen, Phillip (Wimbledon)
Cc: Luker, Mark
Subject: RE: Shell Fontwell - Groundwater monitoring Report

Hi Phil, link sent and report downloaded.

I'll discuss with our planning team regarding response to the monitoring report as this falls within Condition 4 of the planning permission. What normally happens is that if you want comments directly then this may be chargeable though if you go through the LPA (ARUN DC) they will consult us on the discharge of the planning conditions and this won't be chargeable. You may need to speak to your client on this.

Regards Son

Simon Deacon BSc MSc FGS
Technical Specialist
Groundwater, Hydrology & Contaminated Land

Solent South Downs Area



 Environment Agency, Chichester Office, Oving Road, Chichester, West Sussex, PO20 2AG

"Groundwater Protection: Policy and Practice (GP3)", sets out how we manage and protect groundwater resources and our plans for the future:

<https://www.gov.uk/government/publications/groundwater-protection-principles-and-practice-gp3>



NEW: charging for planning advice

From January 2014 we will begin charging for some of our planning advice.

For more information please speak to your local Sustainable Places team.

From: Allen, Phillip (Wimbledon) 
Sent: 06 January 2015 16:27
To: Deacon, Simon
Subject: Shell Fontwell - Groundwater monitoring Report

Hi Simon

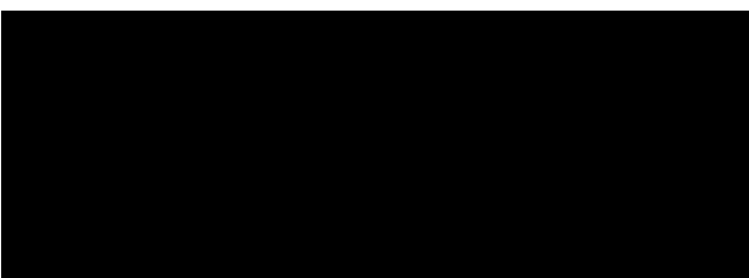
As per our telephone call today I've forwarded you a copy of the Comprehensive Groundwater Monitoring Event Report via URS' file transfer system. This report assess groundwater samples taken in September 2014. Please could you confirm that you were able to download it?

Given that a significant risk has not been identified to controlled waters, based the generic risk assessment within the report, we do not consider it likely that post-construction groundwater monitoring is considered necessary at this stage.

Construction works are likely to commence on 19th January 2014. For your records I've attached a copy of the planning conditions.

Regards

Phil Allen



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Project Number 49319164

Comprehensive Groundwater Monitoring Event

Shell Fontwell

GSAP ID: 10018981



Prepared by:

URS Infrastructure &
Environment UK Limited

Date December 2014

Report Number R49319164-006 Final

Issue No 02

Site Name: Shell Fontwell

Report Title: Comprehensive Groundwater Monitoring Event

Project No: 49319164

Report Ref: R49319164-006

Site GSAP ID 10018981

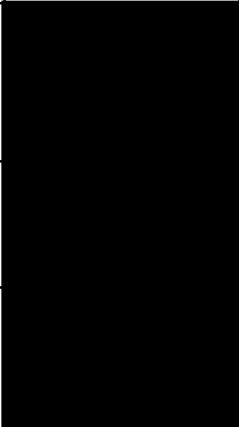
Status: Final

Client Contact Name: Mr. Nigel Clarke

Client Company Name: Shell UK Oil Products Ltd.

Issued By: URS Infrastructure & Environment UK Limited
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Document Revision Record

Issue No	Date	Details of Revisions
02	December 2014	Final Issue
01	December 2014	Original issue

LIMITATION

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the services. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in using this Report.

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Figure 2 - Borehole Location Plan

Figure 3 - Potentiometric Surface Map (September 2014)

Figure 4 - Conceptual Site Model

APPENDICES

Appendix A - Field Data Tables

Appendix B - Hydraulic Conductivity Data

Appendix C - Laboratory Analytical Results Certificates

Appendix D - Stage 2 Tables

EXECUTIVE SUMMARY

Background and Objective

URS has undertaken a Comprehensive Groundwater Monitoring Event (GME) at Shell Fontwell, Arundel Road, Fontwell, Arundel, West Sussex BN18 0SB. This report has been collated to support Shell with its environmental asset management activities.

Site Setting

The site is currently an active petrol filling station located in a mixed low density residential and commercial area. There are eight (8) active tanks with eight (8) compartments in use at the site.

Scope of Work

The scope of the GME included well restoration due to silt build-up, groundwater monitoring of five (5) monitoring wells, hydraulic conductivity testing, the collection of groundwater samples; and an assessment of potential risks to controlled waters and human health receptors.

Field Observations

No hydrocarbon odours were observed during purging of any groundwater monitoring wells. Phase-separated hydrocarbons (PSH) was not identified in any of the wells.

Geology and Hydrogeology

- The geology beneath the site comprises made ground underlain by superficial Head Deposits. The solid geology comprises strata of the Lambeth Group Formation (Secondary A Aquifer) which is in turn underlain by the Tarrant Chalk Member (Principal Aquifer).
- Groundwater was encountered in all five (5) groundwater monitoring wells at elevations ranging from 47.65 metres (m) Above Site Datum (ASD) to 49.24m ASD. The average depth to groundwater was 1.753m below ground level (bgl). Groundwater is inferred to flow in a south westerly direction.
- The nearest surface water feature to the site is a pond located 210m to west of the site with an approximate elevation of 25.0m Above Ordnance Datum (AOD). There is a stream located approximately 300m to the south west.

Conclusions

A Stage 2 risk assessment was performed on the data collected during the GME to assess potential risks to human health (on-site workers and users) and controlled waters (underlying Secondary A Aquifer, Principal Aquifer, a pond 210m west). The principal conclusions were as follows:

- Potential risks to the underlying Secondary A and underlying Principal Aquifer and surface water pond (210m west) were considered to be acceptable.
- Potential risks to on-site workers and users were not identified.

1. INTRODUCTION

URS Infrastructure & Environment UK Limited (URS) was requested by Shell UK Oil Products (Shell) to undertake a Comprehensive Groundwater Monitoring Event (GME) at Shell Fontwell, Arundel Road, Fontwell, Arundel, West Sussex BN18 0SB.

1.1. Objectives

This report has been collated to support Shell with its environmental asset management activities.

1.2. Scope of Work

- Restoration of the five (5) groundwater monitoring wells onsite which had accumulated between 0.5m and 3m of sediment in the base of the wells.
- Completion of one groundwater event in September 2013 of five (5) groundwater monitoring wells.
- Assessment of the magnitude, type and extent of chemicals of potential concern (COPC) present through the performance of laboratory and/or on-site analysis of groundwater for various chemical indicators associated with operation as a petrol filling station.
- Hydraulic conductivity testing to be undertaken at up to two locations.
- Screening of analytical results against appropriate Generic Assessment Criteria (GAC) to determine the requirement for a Detailed Quantitative Risk Assessment (DQRA).
- Completion and submission of this Comprehensive GME Report.

2. BACKGROUND INFORMATION

2.1. Site Identification Details

Table A – Site Information	
Site Name	Shell Fontwell
GSAP ID Number	10018981
Site Address	The site is located at Shell Fontwell, Arundel Road, Fontwell, Arundel, West Sussex BN18 0SB. Figure 1 provides a site location plan.
Grid Reference (easting and northing)	518183, 170323
Reported Site Area	Approximately 3,400 square metres (m²) Figure 2 provides the site layout plan.
Freehold/Leasehold	URS understands the site is leased by Shell.
Site Use	The site is currently an active petroleum filling station.
Surrounding Land Use	North: The site is bounded to the north by a hotel and its car park. East: London Road runs along the eastern boundary and is separated by a thin line of trees and shrubs. London Road has low density residential use approximately 35m east from site. South: The site is bounded to the south by a thin line of trees and shrubs on a 1.5m high embankment. Beyond the soft ground is Arundel Road, and then low density housing (40 m beyond the site boundary). West: Adjacent to the western site boundary is car park that serves two fast food restaurants approximately 45m west of site. Beyond the car park is a small strip of soft ground and a dual carriageway (the A27).

2.2. Environmental Setting

Table B – Environmental Setting	
Topography	The site is located at an approximate elevation of 24m Above Ordnance Datum (AOD). The topography of the surrounding area generally slopes downwards to the south, east and west.
Surface Water Features and Surface Water Abstractions	The nearest surface water feature to the site is a pond located 210m to west of the site with an approximate elevation of 25.0m AOD. There is a stream located approximately 300m to the south west. The URS Phase 1 Report (Ref 1) identified one surface water abstraction from a pond or lake at Eastergate Pumping Station. The abstraction is operated by Portsmouth Water Company for public water supply (22,000m³/day) and is located 677m to the southwest of site at Eastergate. There is also indicated to be a pond or lake at Slindon pumping station which is used for spray irrigation and potable public water supply (5,500m³/day) located 1407m to the north of the site and Westergate pumping station (22,000m³/day) located 1.2 kilometre (km) to the west.

Table B – Environmental Setting

Geology

Available British Geological Survey (BGS) geological maps indicate that the superficial deposits beneath the site are undifferentiated Head Deposits of gravel, sand, silt and clay. Geological maps indicate that the superficial deposits are underlain by the Lambeth Group which is underlain by undifferentiated Chalk of the Lewis Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk.

BGS borehole logs located within 500m of the site (borehole numbers SU90NW620A and SU90NW144), were reported as being drilled to depths of between 11 and 60 m below ground level (bgl). The drift was indicated to reach 6m bgl, and was underlain by 20m of Reading Beds, underlain by Chalk. The Chalk encountered is described as Chalk and marl or Chalk and flints, or very fine grained limestone.

A natural sinkhole is thought to be located 410m south east of the site.

Based on observations made during the URS Comprehensive Environmental Site Assessment (CESA) report, the site specific geology encountered is described below.

Unit	Description	Depth to Top of Unit (m)	Thickness (m)
Made Ground	Tarmac	0.0	0.08 – 0.1
Made Ground	Concrete	0.1	0.1
Made Ground	Orangey brown coarse sand (occasionally silty) with minor brick or flint fragments	0.3	0.1 – 0.6
Natural – Head Deposits	Orangey brown coarse SAND (occasionally silty)	0.5 – 0.8	3.0 - >5.2
Natural – Head Deposits	Red to brown with grey mottled sandy CLAY.	3.0 – 5.0	>3.0

Hydrogeology

The Head Deposits and The Lambeth Group underlying the Head Deposits are designated as a Secondary A Aquifer by the Environment Agency (EA) defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. The Chalk underlying the Lambeth Group is designated as a Principal Aquifer defined as layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

Table B – Environmental Setting

Groundwater Abstractions and SPZs

The site is indicated to be located within an EA designated Source Protection Zone (SPZ) – Inner Zone (Zone 1). The site is on a boundary between Zone 1 and Outer Zone 2.

The EA what's in your backyard website (accessed September 2014) indicates that the SPZ 1 inner zone relates to two potable supplies Eastergate pumping station located approximately 600m to the south west of the site and Westergate located approximately 1.2km to the west of the site.

The Envirocheck does not contain information on the extraction rate of Eastergate or Westergate pumping station. Information on water abstraction licenses within the river catchment of the site on the Environment agencies website indicates one potable water abstraction license held by Portsmouth Water Ltd which has an extraction rate of 41,000m³/day. The licence number supplied on the website (10/41/542108) is the same licence number as is provided for the Eastergate (Point A) and Westergate Pumping Station (Point B). A third water (Point C) abstraction point is held under the same licence at Slinden Pumping Station located 1.4km to the north of the site. Based on the licensed quantity they are assumed to be abstracted from the Chalk. There are fourteen other water abstractions indicated within the river catchment of the site all of which are used for agricultural purpose (spray irrigation) and are within 1.5km of the site (distance of individual abstraction points are not specified on the EA's water abstraction map).

2.3. Chronology of Activities

Table C – Chronology of Activities		
Activity	Date	Summary
Dates of accidental release or known source of COPC	May 1992	The Petroleum Officer (PO) indicated the following minor spillages are recorded for the site: – During inspection of pump 7 a possible minor release was detected on the unleaded inlet suction line and was raised with the site for investigation.
	February 2006	– West Sussex County Council (WSCC) Fire and Rescue Service attended site to deal with a motor caravan fire on the forecourt. The PO did not attend but no spillage of fuel was reported. – WSCC Fire and Rescue Service attended site to deal with a LPG release from a car. Again the PO did not attend. The incident was due to a faulty valve on the vehicle which had been disconnected from the delivery hose.
	February 2007	Evidence of staining around the pumps was noted during a preliminary site investigation by RSK in June 2007 and in a site walkover in January 2011.
Dates of closure, tank removal, soil removal etc	August – October 2011	The site was closed while forecourt renewing works were undertaken. This involved removal and replacement of all fuel dispensing pumps, fuel lines and vapour recovery pipework and replacement of hardstanding across most of the forecourt. MW1 had formerly been decommissioned and MW5 could not be located. A groundwater monitoring event (GME) of the identified wells was undertaken at the completion of these works and results are reported as part of this report.
Previous site investigations and/or remediation	April 1998	GeoDelft (April 1998) <i>Petroleum Risk Tier 1 Report</i> Minor volatile organic compound (VOC) hotspots were reported during a soil gas survey.

Table C – Chronology of Activities		
Activity	Date	Summary
	February 2008	RSK (February 2008) <i>Comprehensive Environmental Site Assessment Report</i> (ref. 310493 – R1 (02)). Seven boreholes were drilled by RSK during a Phase II investigation in August 2007 to a maximum depth of 12 metres. Twenty-five (25) soil samples were collected and groundwater monitoring wells were installed in five of the boreholes and the remaining two were backfilled. No significant hydrocarbon impact was identified. The report concluded that based on analytical results of soil and groundwater samples no unacceptable risks were identified.

Table C – Chronology of Activities		
Activity	Date	Summary
	January 2011	URS Corporation Ltd, March 2011. <i>Phase 1 Investigation Report – Shell Fontwell - Final</i> URS undertook a Phase 1 ESA of the site in January 2011. The outcomes of the investigation include the following: The site is located in an area of mixed land use, including low density residential properties to the east and south of the site boundaries and commercial properties adjacent to the western and northern site boundaries. There is a pond (potential surface water receptor) reported to be situated approximately 210m west of the site, although this was not confirmed during the URS site walkover. Potential groundwater receptors include the underlying superficial deposits (undifferentiated head deposit, Secondary-A Aquifer), bedrock geology (Lambeth Group, Secondary-A Aquifer) and Tarrant Chalk Member (Principal Aquifer). The site is located within a Source Protection Zone for the protection of drinking water supply. The following potentially complete pollutant linkages for continued petroleum use were identified: • Migration of hydrocarbon vapour and possibly subsequent inhalation by site workers, off site residents and off site restaurant and hotel workers/visitors; • Permeation of COPC into plastic potable water supply pipes with subsequent ingestion; • Particulate ingestion, inhalation, and dermal contact by contractors during site excavation; • Leaching and migration of COPC from soil into shallow and deep groundwater; and • Leaching and migration of COPC from soil into shallow and deep groundwater followed by migration to surface water.
	February 2011	URS Corporation Limited, 25 February 2011. Comprehensive Groundwater Monitoring Report – Shell Fontwell (Report Ref.: MARP0002 Final) URS undertook a groundwater monitoring event of existing monitoring wells (MW2, MW4, MW5 and MW7) and potable water supply in January 2011. No exceedances of the human health based GAC were reported in groundwater samples and no

Table C – Chronology of Activities		
Activity	Date	Summary
		exceedances of the drinking water standards in potable water samples were reported and as such no potentially complete human health pollutant linkages were identified. No COPC were reported in groundwater above the Controlled Waters GAC and metal concentrations were considered to be representative of natural groundwater conditions. Based on the results of this assessment, no significant risks to human health (based on continued petroleum use) or Controlled Waters have been identified.

Table C – Chronology of Activities		
Activity	Date	Summary
	June 2012	URS Corporation Limited, 13 June 2012. Comprehensive Environmental Site Assessment- Shell Fontwell (Report Ref: R49319164-0063 Final) The scope of work included the replacement of two damaged groundwater monitoring wells (MW1 and MW5). The boreholes were advanced within close proximity, and as replacement, for historical wells MW1 and MW5 so as to provide comparative data to historical sampling events. Groundwater monitoring was undertaken in two stages with existing wells MW2, MW4 and MW7 monitored in October 2011 following a re-pump and other forecourt redevelopment works. Replacement of two historical wells MW1 and MW5 was undertaken in January 2012 followed by sampling of these wells and gauging of all wells in February 2012. No significant risks to human health (on site workers) were identified. The Controlled Waters GAC were exceeded by reported concentrations of PAH compounds (benzo(a)anthracene and benzo(a)pyrene) and several metals (cadmium, chromium [III and IV], copper) in groundwater and naphthalene in soil. These exceedances were minor these are not considered to represent a significant risk to the underlying aquifer (Secondary-A Aquifer) or to other controlled water receptors.
	March 2013	URS Corporation Limited, 27 March 2013, Factual Groundwater Monitoring Event Report- Shell Fontwell (Report Ref: R49319164-005 Final) URS Infrastructure & Environment UK Limited (URS) undertook a Factual Groundwater Monitoring Event (GME) for the purpose of Ongoing groundwater monitoring. A groundwater monitoring round was undertaken on the 16th January 2013 when all five on-site monitoring wells were purged and sampled. No visual or olfactory evidence of hydrocarbon impact was recorded in purged water from any of the monitoring wells on site. One or more TPH compounds were reported to exceed the MDL in the January 2013 monitoring round for MW1, MW2 and MW4. TPH compounds were all reported as below MDL for MW5 and MW7. TPH compound concentrations have previously been reported below the MDL in the URS October

Table C – Chronology of Activities		
Activity	Date	Summary
		2011/February 2012 monitoring round. Benzene exceeded the MDL in the January 2013 monitoring round in MW7. All other BTEX compound concentrations were below the MDL in this monitoring round for all other monitoring locations. MTBE was reported below the MDL in all monitoring wells. One or more PAH compounds exceed the MDL in all wells with the exception of MW5. This is consistent with the previous monitoring event conducted by URS in October 2011/February 2012 with the exception that MW4 where no compounds were detected above MDL. Seven or more metals exceed the MDL in all monitoring wells across the site. This is consistent with the previous monitoring event conducted by URS in October 2011/February 2012.

2.4. Site Equipment – Storage Tank Summary

Table D – Summary of On-site Fuel Tank / Compartments					
Tank number or ID	Tank 1	Tank 2	Tank 3	Tank 3	Tank 4
Compartment number or ID	Compartment 1	Compartment 2	Compartment 3	Compartment 4	Compartment 5
Tank type⁽¹⁾	Single Walled Steel	Single Walled Steel	Single Walled Steel	Single Walled Steel	Single Walled Steel
Tank size (litres) ⁽²⁾	24,700	24,700	12,350	12,350	12,171
Product stored⁽²⁾	Diesel	Diesel	VP-diesel	VP-Unleaded	Unleaded
Status⁽²⁾	Active	Active	Active	Active	Active
Date of installation⁽³⁾	1990	1990	1990	1990	1990
Removal date or abandonment date	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Relative level (RL) of tank base	Assumed to be 4.5m bgl	Assumed to be 4.5m bgl	Assumed to be 4.5m bgl	Assumed to be 4.5m bgl	Assumed to be 4.5m bgl
Tank number or ID	Tank 5	Tank 6	Tank 7	Tank 8	Tank 9
Compartment number or ID	Compartment 6	Compartment 7	Compartment 8	Compartment 9	Compartment 10
Tank type⁽¹⁾	Single Walled Steel	Single Walled Steel	Steel	Steel	Steel
Tank size (litres) ⁽²⁾	24,700	24,700	1 Tonne	1 Tonne	1 Tonne
Product stored⁽²⁾	Diesel	Unleaded	LPG	LPG	LPG
Status⁽²⁾	Active	Active	Operational	Operational	Operational
Date of installation⁽³⁾	1990	1990	2004	2004	2004
Removal date or abandonment date	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Relative level (RL) of tank base	Assumed to be 4.5m bgl	Assumed to be 4.5m bgl	N/A Above Ground Tank	N/A Above Ground Tank	N/A Above Ground Tank

NOTES:

- 1 - Based on information provided by Shell
- 2 - Tank gauge print out obtained 06 November 2012 during site walkover
- 3 - Petroleum officer response dated 09 November 2012.

2.5. Preliminary Conceptual Site Model

Following review of the available data regarding site history, environmental setting, and proposed future use, a preliminary conceptual site model (CSM) was developed, as presented in Table E below. The CSM illustrates the potentially viable source-pathway-receptor linkages which have been identified.

Table E – Preliminary Conceptual Site Model		
Source	Pathway	Receptor
Human Health		
- Impacted soils - Soil vapour - Impacted groundwater	- Lateral and vertical vapour migration and subsequent inhalation. - Particulate - Ingestion, inhalation, dermal contact, with soil particulates. - Permeation - Migration of hydrocarbon substances through plastic potable water supply pipes.	- On-site shop staff and site users. - Visiting contractors excavating ground.*
Controlled Waters		
Potentially impacted soils or shallow groundwater (above URS Stage 2 CW GAC) – No significant sources of impact have been identified.	- Partitioning between soil and pore water. - Infiltration of impacted pore water down to the saturated zone (water table). - Dilution of impacted pore water within the saturated zone. - Horizontal migration of impacted groundwater to surface waters.	- Secondary-A Aquifer (Lambeth Group) - Principal Aquifer (Chalk) / SPZ 1 - Groundwater abstraction 660 m south-west of the site - Surface Water – Small pond located approximately 210m west of the site

* Potential risks to visiting contractors undertaking intrusive works should be managed by appropriate PPE, risk assessment and method statements. Risks to visiting contractors excavating the ground have therefore not been further assessed.

3. FIELD WORK

3.1. Summary of Field Work

Table F – Summary of Field Work																											
Date of Field Work	The GME was completed between 4 and 11 September 2014.																										
Site Activities	Field works included the following key tasks: • Restoration of the monitoring wells. Between 0.5m and 3m of sediment was encountered in the base of the wells. • Groundwater level gauging of five (5) groundwater monitoring wells (MW1, MW2, MW4, MW5 and MW7). • Collection of field measurements of groundwater quality (pH, conductivity, temperature, redox potential, dissolved oxygen) from five (5) groundwater monitoring wells. • Purging and groundwater sample collection from five (5) groundwater monitoring wells. • Hydraulic conductivity testing of three (3) groundwater monitoring wells (MW1, MW4 and MW7).																										
Details of Existing Monitoring Well Network	Five (5) groundwater monitoring wells installed by RSK in February 2008 with two being replaced as a result of damage by URS in June 2012 (MW1 and MW5). Borehole locations are shown on Figure 2. A summary of the well installation details is presented below: <table> <tr> <th>Borehole ID</th><th>Location</th><th>Monitoring Well Screening Depth</th><th>Monitoring Well Screening Strata</th></tr> <tr> <td>MW1</td><td>South west corner of the site.</td><td>1.0m – 5.5m</td><td>Head Deposits</td></tr> <tr> <td>MW2</td><td>North west corner of the site.</td><td>2.0m – 6.0m</td><td>Head Deposits</td></tr> <tr> <td>MW4</td><td>North of the site.</td><td>2.0m – 6.0m</td><td>Head Deposits</td></tr> <tr> <td>MW5</td><td>North east corner of the site.</td><td>1.0m – 5.0m</td><td>Head Deposits</td></tr> <tr> <td>MW7</td><td>South of shop.</td><td>2.0m – 6.0m</td><td>Head Deposits</td></tr> </table>			Borehole ID	Location	Monitoring Well Screening Depth	Monitoring Well Screening Strata	MW1	South west corner of the site.	1.0m – 5.5m	Head Deposits	MW2	North west corner of the site.	2.0m – 6.0m	Head Deposits	MW4	North of the site.	2.0m – 6.0m	Head Deposits	MW5	North east corner of the site.	1.0m – 5.0m	Head Deposits	MW7	South of shop.	2.0m – 6.0m	Head Deposits
Borehole ID	Location	Monitoring Well Screening Depth	Monitoring Well Screening Strata																								
MW1	South west corner of the site.	1.0m – 5.5m	Head Deposits																								
MW2	North west corner of the site.	2.0m – 6.0m	Head Deposits																								
MW4	North of the site.	2.0m – 6.0m	Head Deposits																								
MW5	North east corner of the site.	1.0m – 5.0m	Head Deposits																								
MW7	South of shop.	2.0m – 6.0m	Head Deposits																								

Table F – Summary of Field Work	
Surveying	The elevations of groundwater monitoring well standpipes installed by RSK and URS were surveyed to m ASD by ADP Group Ltd, under the supervision of URS on 8 February 2012.
Groundwater gauging and sampling	On 4 and 5 September 2014, restoration by airlifting was undertaken on all five groundwater monitoring wells due to build-up of between 0.5m and 3m sediment in their base. Groundwater level gauging and sampling was undertaken on 10 September 2014. Prior to sampling, the depth to groundwater and phase separate hydrocarbons (PSH) (if present) was gauged using a portable oil / water interface probe. Groundwater gauging results are presented in Appendix A. Between 10 and 11 September 2014, groundwater wells MW1, MW2, MW4, MW5 and MW7 were purged and sampled using a low-flow sampling method incorporating a flow through cell and dedicated tubing. During well purging activities, water was periodically monitored for temperature, pH, conductivity, dissolved oxygen (DO), and oxidation/reduction potential (ORP or Redox) using a water quality meter to determine when representative formation waters were being encountered. Following sufficient recharge, groundwater samples were collected. All groundwater samples were collected into laboratory supplied containers, labelled and placed on ice.
Field quality control sampling	The following field quality control samples were collected as part of this GME: Groundwater: one (1) duplicate sample, one (1) trip blank, and one (1) equipment blank.
Sustainability	In implementing the scope of works outlined above, URS made the following considerations of sustainability: Field work was staffed from local URS office to reduce travel impact.

3.2. Field Screening Results / Observations

Table G – Field Screening	
Groundwater Observations	Groundwater was encountered in all the monitoring wells installed at the site. Groundwater was observed to be creamy white and slightly turbid in MW1 and orange and turbid in MW2, MW4, MW5 and MW7. No hydrocarbon odours were noted during the purging of groundwater wells.
Phase Separate Hydrocarbons (PSH)	PSH was not observed in any of the groundwater monitoring wells during the September 2014 GVME.
Field Groundwater Quality Parameters	Groundwater parameters were collected during the GVME (presented in Appendix A) and the following was noted: • Redox potential (corrected to a Standard Hydrogen Electrode) ranged from 13.20 millivolts (mV) (MW1) to 231.00 mV (MW4). • Electrical conductivity ranged from 471 microSiemens ($\mu\text{S}/\text{cm}$) (MW1) to 911 $\mu\text{S}/\text{cm}$ (MW2). • The pH ranged from pH 6.65 (MW5) to pH 8.39 (MW1). • Groundwater temperature ranged from 15.89 degrees Celsius ($^{\circ}\text{C}$) (MW7) to 19.49$^{\circ}\text{C}$ (MW4). • Dissolved oxygen concentrations ranged from 0.51 milligrams per litre (mg/l) (MW1) to 4.07mg/l (MW7).

3.3. Geological/Hydrogeological Information

Table H – Hydrogeological Information	
Depth to Groundwater	Groundwater was recorded within all five (5) monitoring wells at depths ranging from 1.050m bgl (MW2) to 2.348m bgl (MW1), with an average depth of 1.754m bgl. Groundwater elevations ranged from 47.65m ASD to 49.24m ASD. Groundwater level data are presented in Appendix A .
Inferred Groundwater Flow	Groundwater is inferred to flow in a south westerly direction with a hydraulic gradient of 0.031 (Figure 3). This is consistent with the groundwater flow direction previously inferred by URS based on the February 2013 groundwater monitoring event.
Hydraulic Conductivity	Falling and rising head tests were carried out at three (3) locations on site (MW1, MW4 and MW7) which are screened undifferentiated Head Deposits of gravel, sand, silt and clay. The average hydraulic conductivities MW4 and MW7 were calculated at 0.28 metres per day (m/d), 2.33 m/d and 2.03 m/d respectively, consistent with estimated literature hydraulic conductivities for fine sand. The average hydraulic conductivity for MW1 was calculated at 0.2m/d which is lower than the literature. The geomean of the averages of all the wells tested is 1.09m/day. Hydraulic conductivity data are presented in Appendix B .

3.4. Analytical Schedules & QA/QC

Table I – Analytical Information				
Analytical Laboratory	Groundwater and vapour samples were analysed by Alcontrol Laboratories of Chester. Copies of the Chain of Custodies (COCs) and laboratory certificates are presented in Appendix C .			
Analytical Schedule	The following schedule of analysis was completed for this GME. The results and details of the analytical methodology are presented in Appendix C .			
	Analysis	Number of Groundwater Samples	Number of Potable Water Samples	Number of Vapour Samples
	Total Petroleum Hydrocarbons (TPH) Health risk fractions	7	-	-
	Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) compounds	7	-	-
	Fuel Oxygenates (methyl tertiary butyl ether (MTBE), tert-butyl ethyl ether (ETBE), di-isopropyl ether (DIPE), tert butanol (TBA), tert-amyl methyl ether (TAME), Ethanol)	7	-	-
	Polycyclic Aromatic Hydrocarbons (PAH) 16 Speciated	7	-	-
	2-methylnaphthalene	7	-	-
	n-hexane	7	-	-
Field and laboratory quality control sampling	The analytical data have been reviewed for quality assurance and control purposes (QA/QC), the results of which are presented in Appendix C. - The recommended holding times for groundwater samples were exceeded by one day. As the samples arrived at the laboratory on the day of sampling and were appropriately stored, this is not considered significant. - The relative percentage difference (RPD) between detected concentrations in the groundwater duplicate sample (DUP01) and the parent sample (MW101) were within acceptable limits. - The laboratory blanks were within acceptable limits. - Where concentrations were not detected in trip blank above the method detection limit (MDL). - COPC were not detected in the equipment blank. In general, the data are considered appropriate for reporting.			

4. STAGE 2 GENERIC QUANTITATIVE RISK ASSESSMENT

4.1. Introduction

The risk based methodology adopted in this report is based upon the UK Defra and EA "best practice" in regard to the assessment of contaminated land. An overview of the methodologies adopted as part of this assessment is provided in URS Technical Document 'Shell UK Controlled Waters & Human Health Risk Assessment Method'¹. The approach taken reflects that promoted in CLR11² and R&D Publication 66³ and the supporting guidance referenced within them.

4.2. Assessment Criteria – Human Health

Analytical results for soil vapour and groundwater samples recovered are tabulated in **Appendix D** and have been compared against Stage 2 Generic Assessment Criteria (GAC), protective of:

- On-site workers (including Shell shop staff and site users) using a continued petroleum use (CPU) end use scenario.

The land use in the vicinity of the site which is potentially more sensitive than the on-site CPU scenario is considered to be the low density residential houses with gardens that border the site to the north-east (40 m) and are located on the opposite side of London Road to the east (40 m) and the opposite side of Arundel Road to the south (40 m). As the houses are all located approximately 40 m from the potential on site soil sources (underground fuel infrastructure and pump islands) these receptors are not considered to be at risk from on-site impacts.

4.3. Assessment Criteria – Controlled Waters

Analytical results for groundwater samples recovered are tabulated in **Appendix D** and have been compared against Stage 2 Generic Assessment Criteria (GAC), protective of:

- Controlled waters: groundwater within the The Lambeth Group (Secondary A Aquifer) and deeper Chalk Formations (Principal Aquifer) and surface water (pond located 210m to west of the site). GAC based upon the minimum of UK Drinking Water Standard (DWS) and Environmental Quality Standards (EQS) for Freshwater. In the absence of a UK DWS value, an alternative Stage 2 DWS GAC has been used from a hierarchy of, WHO values, URS derived DWS using the WHO methodology and USEPA RSL. In the absence of a UK EQS value, an alternative Stage 2 GAC has been used from a hierarchy of, published PNEC, URS derived PNEC values or DWS GAC.

¹ URS Technical Document – 'Shell UK Controlled Waters & Human Health Risk Assessment Method', Dated September 2010, Ref: Issue 1.

² Model Procedures for the Management of Land Contamination, Contaminated Land Report (CLR) 11, Environment Agency & DEFRA, Dated September 2004.

³ Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66: 2008 (Volume 1), NHBC and the Environment Agency 2008.

4.4. Analytical Results Screening

Comparison of, groundwater analytical results to Stage 2 GAC is provided in **Appendix D** and GAC exceedances are summarised in the table below:

Table J – GAC Exceedances																
Receptor Type	Screening Criteria	Media	Benzene / TPH Aromatic C5-C7	TEX / TPH Aromatic C7-C10	Other Aromatic TPH	Aliphatic TPH	MTBE / TBA	Other Oxygenates	n-hexane	EDB/EDC	TPH Hazard Index	Other VOCs (vapour)	Naphthalene	Benzo(a)pyrene	Other PAHs (incl. 2-methyl naphthalene)	Metals
Human Health	CPU	Groundwater	*	*	*	*	*	*	*	n/a	*	n/a	*	*	*	n/a
Controlled Waters	Minimum of EQS/DWS	Groundwater	*	*	✓	✓	*	*	*	n/a	n/a	n/a	*	✓	✓	n/a

Notes:

- ✓ = Measured in excess of GAC
- * = Not measured in excess of GAC
- n/a = not applicable

4.5. Discussion of Key Exceedances

Human Health – CPU

COPC did not exceed CPU GAC and have not been further assessed.

Controlled Waters

The vast majority of COPC did not exceed the controlled waters GAC and have not been further assessed.

The following COPC exceeded controlled waters GAC but are not considered to present an unacceptable risk:

- TPH aromatic fraction C21-C35 in groundwater samples collected from MW4 was observed to have a Controlled Water Hazard Index (CWHI) of 10. This TPH fraction is relatively immobile and was only detected in groundwater samples collected from MW4, and not detected within any other of the down gradient wells.
- Five PAH results in MW2 and MW5 were considered to marginally exceed GAC (CWHI generally <3.0) with the highest being benzo(a)pyrene in MW2 identified to have a CWHI of 5.0. In addition, following well restoration, these results all reduced significantly from the previous results, with a reduction of 230 times (11.5 µg/l to 0.05 µg/l) in the case of benzo(a)pyrene in MW2.
- TPH aliphatic fraction C21-C35 in MW4 exceedance was considered marginal (CWHI <2.0), this TPH fraction is relatively immobile and was only detected in groundwater samples collected from MW4, and has not been further assessed.

4.6. Summary

Based on the comparison of site data to GAC:

- Potential risks were not identified to on-site workers and site users.
- Potential risks from the COPC sources on site to controlled waters receptors are considered acceptable.

5. CONCEPTUAL SITE MODEL

The Conceptual Site Model (CSM) presented here is based on the information provided in the historic reports prepared for the site, on observations made during the URS GME, and on the subsequent URS generic and detailed quantitative risk assessments.

5.1. Potential Sources, Pathways, and Receptors

The following is a list of potential sources of impact on-site:

- Operational underground storage tanks.
- Accidental releases to ground from off-set fill points and fuel dispensers.
- Accidental releases from fuel lines and vent lines.
- Site interceptor and drainage.
- Made ground.

Based on the presence of these potential sources, a GME has been completed. The GME has indicated that the COPC listed in Section 4.6 are present in the areas of the site which were investigated. These COPC have been assessed in **Tables K** and **L** below.

The potential pathways and receptors identified for assessment at Stage 2 are listed in **Tables K** and **L** below.

5.2. Review of Potential Source-Pathway-Receptor Linkages

The following pollutant linkages were evaluated at Stage 2. These are also detailed on **Figure 4**.

Table K – Human Health CSM			
Source	Pathway	Receptor	Likelihood of Pollutant Linkage Presenting an Unacceptable Risk
Potentially impacted groundwater / shallow soils	Lateral and vertical vapour migration and subsequent inhalation.	On-site shop staff, visiting staff and general public.	Unlikely: Based on Stage 2 assessment during RSK's February 2008 Comprehensive Environmental Site Assessment (310493 – R1 (02)) and during URS' February 2011 GME (MARF0002 Final).
		Off-site workers in adjacent commercial properties to the north east, south east and west.	
		Residents of terraced properties within 30m of the site boundary to the north, north west, east and west	
	Particulate - Ingestion, inhalation, dermal contact with soil particulates.	Visiting on-site contractors excavating ground.	Possible*
	Permeation – Migration of hydrocarbon substances through plastic potable water supply pipes.	On-site shop staff (ingestion of drinking water on-site).	Unlikely: COPC were not identified during potable water sampling from the shop during URS' February 2011 GME (MARF0002 Final)

* Potential risks to visiting contractors undertaking intrusive works should be managed by appropriate PPE, risk assessment and method statements. Risks to visiting contractors excavating the ground were therefore not assessed within the scope of the DQRA.

Table L – Controlled Waters CSM			
Source	Pathway	Receptor	Likelihood of Pollutant Linkage Presenting an Unacceptable Risk
Potentially impacted groundwater.	Partitioning between soil and pore water.	The Head Deposits and The Lambeth Group (Secondary A Aquifer). Chalk Formations (Principal Aquifer).	Unlikely: Based on Stage 2 assessment.
	- Leaching of impacted soils into groundwater. - Lateral migration of impacted groundwater.	Surface water (pond located 210m to west of the site and a stream located approximately 300m to the south west).	Unlikely: Based on Stage 2 assessment.

6. CONCLUSIONS

The following conclusions have been made based on the groundwater data collected, and on the Stage 2 risk assessments completed as part of this Comprehensive GME.

Field Work

Five (5) groundwater monitoring wells (MW1, MW2, MW4, MW5 and MW7) underwent well restoration by airlifting due to silt build up and were subsequently monitored and sampled at the site in September 2014. Groundwater was encountered in all five (5) groundwater monitoring wells at elevations ranging from 47.65m ASD to 49.24m ASD. The average depth to groundwater was 1.75m bgl. Groundwater is inferred to flow in a south westerly direction.

Hydrocarbon odours were not observed during the purging of groundwater monitoring wells. PSH was not identified in any of the wells.

Stage 2 Risk Assessment Results

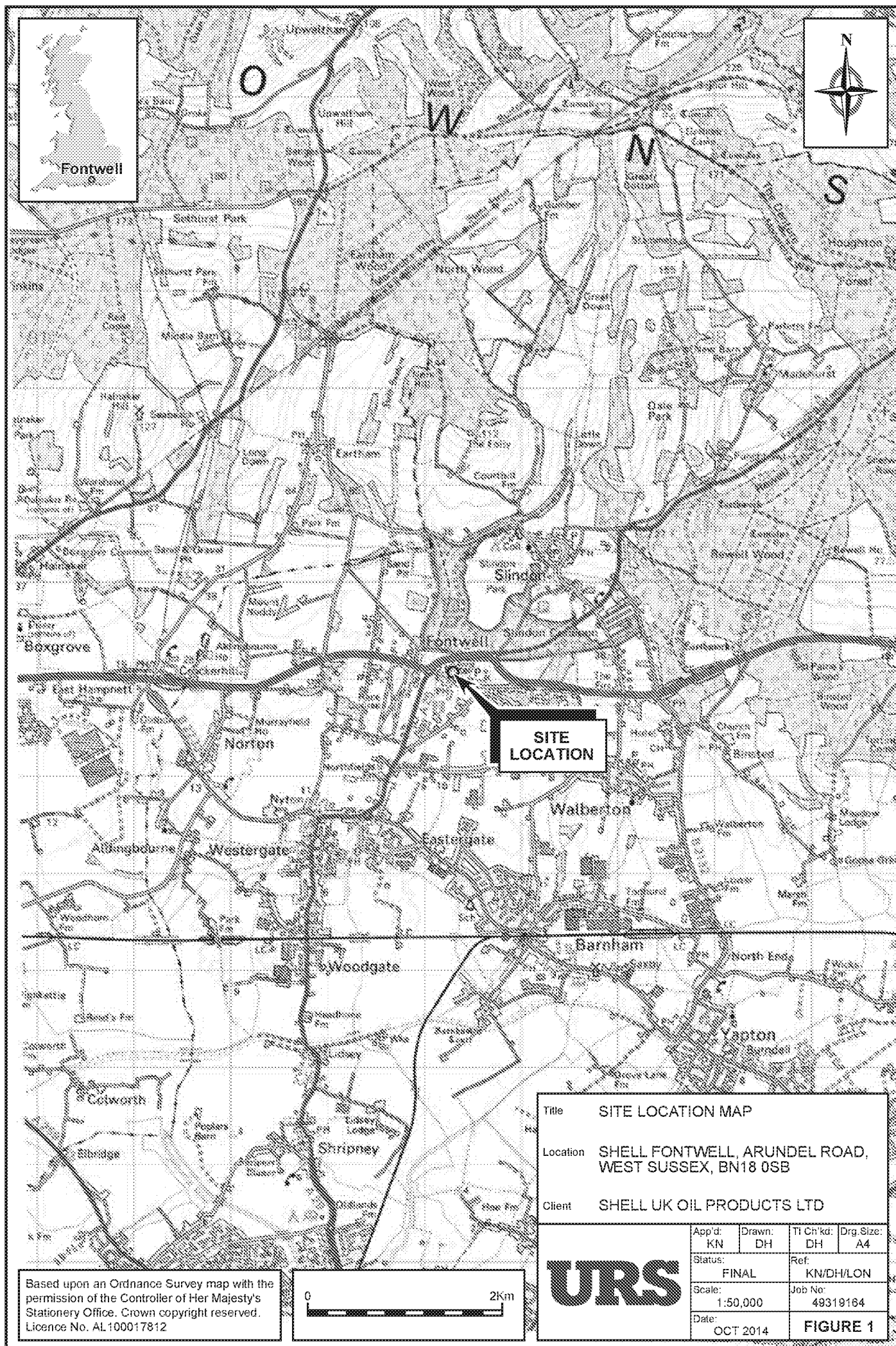
A Stage 2 risk assessment was performed on the data collected during the GME to assess potential risks to human health (on-site workers and users) and controlled waters (underlying Secondary A and Principal Aquifer and surface water). Based on the comparison of site data to GAC:

- Potential risks to on-site workers and site users were not identified.
- Potential risks from COPC sources on site to controlled waters receptors are considered acceptable.

7. REFERENCES

- GeoDelft, Petroleum Risk Tier 1 Report, April 1998.
- RSK, Comprehensive Environmental Site Assessment Report, Ref: 310493 – R1 (02), February 2008.
- URS, Preliminary Phase I Investigation Report, Ref MARP0001 Final; 10 March 2011.
- URS, Comprehensive Environmental Site Assessment Report, Ref: MARP0002, 25 February 2011.
- URS, Comprehensive Environmental Site Assessment, Ref: R49319164-0063, 13 June 2012.
- URS Corporation Limited, Factual Groundwater Monitoring Event Report, Ref: R49319164-005, 27 March 2013.

Figures



Based upon an Ordnance Survey map with the permission of the Controller of Her Majesty's Stationery Office. Crown copyright reserved. Licence No. AL100017812



Title	SITE LOCATION MAP							
Location	SHELL FONTWELL, ARUNDEL ROAD, WEST SUSSEX, BN18 0SB							
Client	SHELL UK OIL PRODUCTS LTD							
	App'd:	KN	Drawn:	DH	TI Ch'kd:	DH	Drg. Size:	A4
	Status:	FINAL			Ref:	KN/DH/LON		
	Scale:	1:50,000			Job No:	49319164		
	Date:	OCT 2014			FIGURE 1			

URS

TRACE CODES	
-------------	--

TFS	Trace is From Source to destination with visual evidence to confirm
SDC	Sources and/or Destination are Concealed
WS	Weak Signal / high interference
VA	Visual Assessment (line of site perhaps scarring)
LA	Logical Assumed(source & destination exist, line added without trace)
TFR	Taken From Records
AEE	Anything Else Encountered

ABBREVIATIONS

AB	Abandoned	FP	Fence Post	S/A	Soakaway
A/C	Air Conditioner	GV	Gate Valve	SP	Sign Post
AG	Above Ground	GU	Gully	ST	Steel
AR	Assumed Route	HV	High Voltage	SV	Sluice Valve
BOL	Bolt	IC	Inspection Cover	SVP	Soft Vent Pipe
BOL	Bolt	INT	Intercept	SV	Soft Vent Sump
BL	Ball Level	IL	Invert Level	TK	Tank
BTB	British Telecom Box	LC	Lighting Column	TL	Traffic Light
BT	British Telecom Cover	LP	Lamp Post	TP	Telegraph Pole
C	Cast Iron	LV	Low Voltage	U/I	Unidentified
CR	Cable Reinforce Cover	MR	Monitoring Well	UL	Unable to Locate
CTV	Cable TV	MW	Monitoring Well	UTR	Unable to Trace
CP	Catch Pit	NB	Notice Board	UTS	Unable to Survey
CC	Concrete	NO	Overhead	UTT	Unable to Trace
CL	Cover Level	OF	Offset File	VR	Vehicle Recovery
CWS	Combined Water Sewer	OSB	Open Surface Benchmark	VP	Vent Pipe
C	Cable	OSA	Off Survey Area	WL	Water Level
D	Down Pipe	PC	Pilot Cable	WM	Water Meter
DCB	Drivers Control Box	PE	Polyethylene	WO	Welder Pressure
ER	Earth Road	PR	Pipe Riser	LP	Low Pressure
EIC	Electricity IC	PH	Phone Mast	MP	Wash Out
EOT	End of Trip	RWP	Rain Water Pipe	H/P	High Pressure
EE	Electricity Pole	RS	Road Sign		
FR	Fire Hydrant	RE	Rodding Eye		

INTERCEPTOR DETAILS

Type	Condition	Size	Material	Depth
SUPER	OK	—	PLASTIC	2.9 MT
SUPER	OK	—	PLASTIC	—

TANK DETAILS

Tank No.	Fuel Type	Capacity	Feed To Pump
1	DIESEL	24,700 LTS	9/10
2	DIESEL	24,700 LTS	5/6/7/8
3	VP-DIESEL	12,350 LTS	1/2/3/4/5/6/7/8/9
4	V-POWER	12,056 LTS	1/2/3/4/5/6/7/8/9
5	UNLEADED	24,700 LTS	5/6/7/8/9/10
6	DIESEL	24,700 LTS	1/2/3/4
7	UNLEADED	24,700 LTS	1/2/3/4
8	LPG	-	11/12

NOTES:

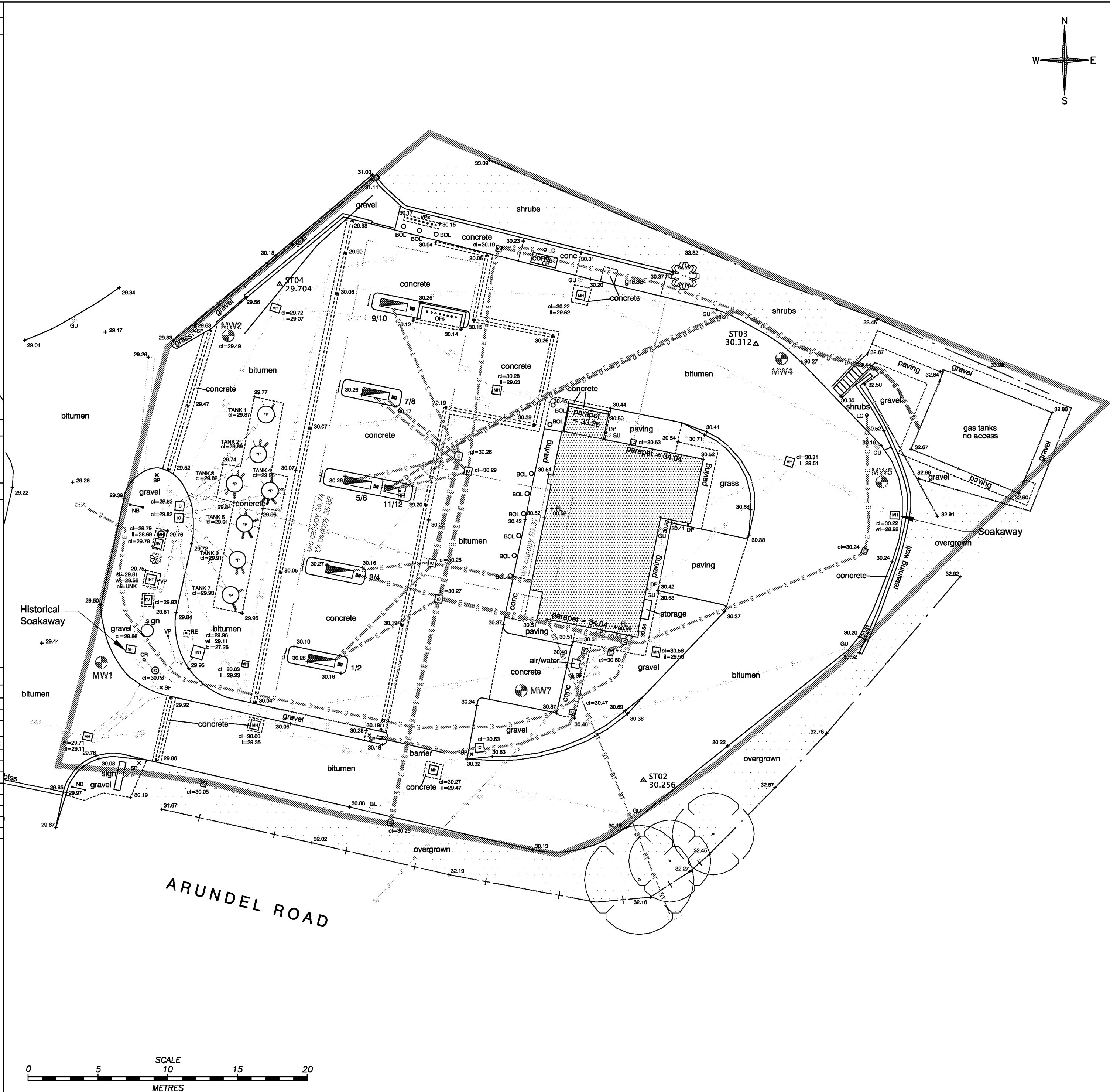
CANOPY HEIGHT IS 4.5 MTS.

TANKS:

UNABLE TO TRACE ALL FUEL, VENT &
OFF SET FILLS DUE TO BEING
PLASTIC.

WATER:

UNABLE TO TRACE WATER ON SITE,
THEREFORE ASSUMED.



NOTES

KEY:

 Approximate Site Boundary

WV1

 Monitoring Well

REV.	DESCRIPTION	DRAWN	APPROVED	DATE

FOR INFORMATION

C O N S U L T I N G E N G I N E E R S

URS

Brunel House, 54 Princess Street, Manchester, M1 6HS
TEL 0161-907-3500 FAX 0161-907-3501

CLIENT
SHELL UK OIL PRODUCTS LIMITED

PROJECT
Arundel Road, Fontwell,
Arundel, West Sussex BN18 0SB

DRAWING TITLE
Figure 2
Site Features Plan

DRAWN RDH	TRACED	CHECKED BS	APPROVED BS	DATE OCT 2014
SCALE 1: 200	DRG No. 49319164/003			REV.

DO NOT SCALE

KEY

FUEL LINE = DIESEL, KERO OR PARAFFIN
ELECTRICITY CABLE
HIGH VOLTAGE ELECTRICITY CABLE
TANK GAUGE LINE OR COMMS CABLE
OFF-SET FILL
VENT PIPE
OIL PIPE
TELECOM CABLE
BT CABLE
CABLE TELEVISION
GAS
WATER SUPPLY PIPE
FOUL WATER DRAIN
SURFACE WATER DRAIN
COMBINED DRAIN
UNIDENTIFIED - SEE NOTES
END OF TRACE
HISTORICAL DATA(REMOVED/ABANDONED)

BUILDING
CANOPY OUTLINE

MANHOLE
PILLAR
PUMP

INSPECTION COVER
GULLY
CHANGE OF GROUND LEVEL
SCAR OUTLINE

CHANGE OF SURFACE

TANK * W=WATER U=UNKNOWN F=FOAM C=CONCRETE P=PRODUCT

HISTORICAL TANK STATION LOCATION
BOREHOLE LOCATION
VAPOUR LOCATION

TRACE CODES

TFS Trace is From Source to destination with visual evidence to confirm
SDC Sources and/or destination are Concealed
WS Weak Signal / high interference
VA Visual Assessment (line of site perhaps scarring)
LA Logical Assumed source & destination exist, line added without trace
TFR Taken From Records
AEE Anything Else Encountered

ABBREVIATIONS

AB Abandoned	FP Fence Post	S/A Soakaway
A/C Air Conditioner	GV Gas Valve	SP Sign Post
AG Above Ground	GU Gully	ST Steel
AR Assumed Route	HV High Voltage	SV Sluice Valve
BOL Bolard	IC Inspection Cover	SVP Soil Vent Pipe
BH Borehole	INT Interceptor	SVS Soil Vapour Sample
BL Base Level	IL Invert Level	TK Tank
BTB British Telecom Box	LC Lighting Column	TL Traffic Light
BT British Telecom Cover	LP Lamp Post	TP Telegraph Pole
CI Cast Iron	LV Low Voltage	UJI Unidentified
CR Cable Riser	MH Manhole Cover	UTL Unable to Locate
CTV Cable TV	MW Monitoring Well	UTR Unable to Raise
CP Catch Pit	NB Notice Board	UTS Unable to Survey
Co Concrete	OH Overhead	UTT Unable to Trace
CL Cover Level	OF Offset Fill	VR Vapour Recovery
CWS Combined Water Sewer	OSBM Ordnance Survey Benchmark	VP Vent Pipe
DI Ductile Iron	OSA Off Survey Area	WL Water Level
DP Down Pipe	PC Pilot Cable	WM Water Meter
DCB Drivers Control Box	PE Polyethylene	WO Water Out
ER Earth Rod	PR Pipe Riser	LP Low Pressure
EIC Electricity IC	PM Phone Mast	M/P Wash Out
EOT End of Trace	RWP Rain Water Pipe	H/P High Pressure
EP Electricity Pole	RS Road Sign	
FH Fire Hydrant	RE Rodding Eye	

INTERCEPTOR DETAILS

Type	Condition	Size	Material	Depth
SUPER	OK	-	PLASTIC	2.9 MTS
SUPER	OK	-	PLASTIC	-

TANK DETAILS

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8	LPG	-	11/12

NOTES:

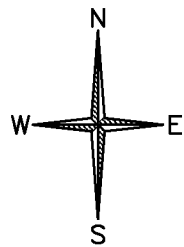
CANOPY HEIGHT IS 4.5 MTS.

TANKS:

UNABLE TO TRACE ALL FUEL, VENT & OFF SET FILLS DUE TO BEING PLASTIC.

WATER:

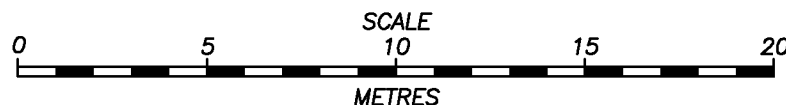
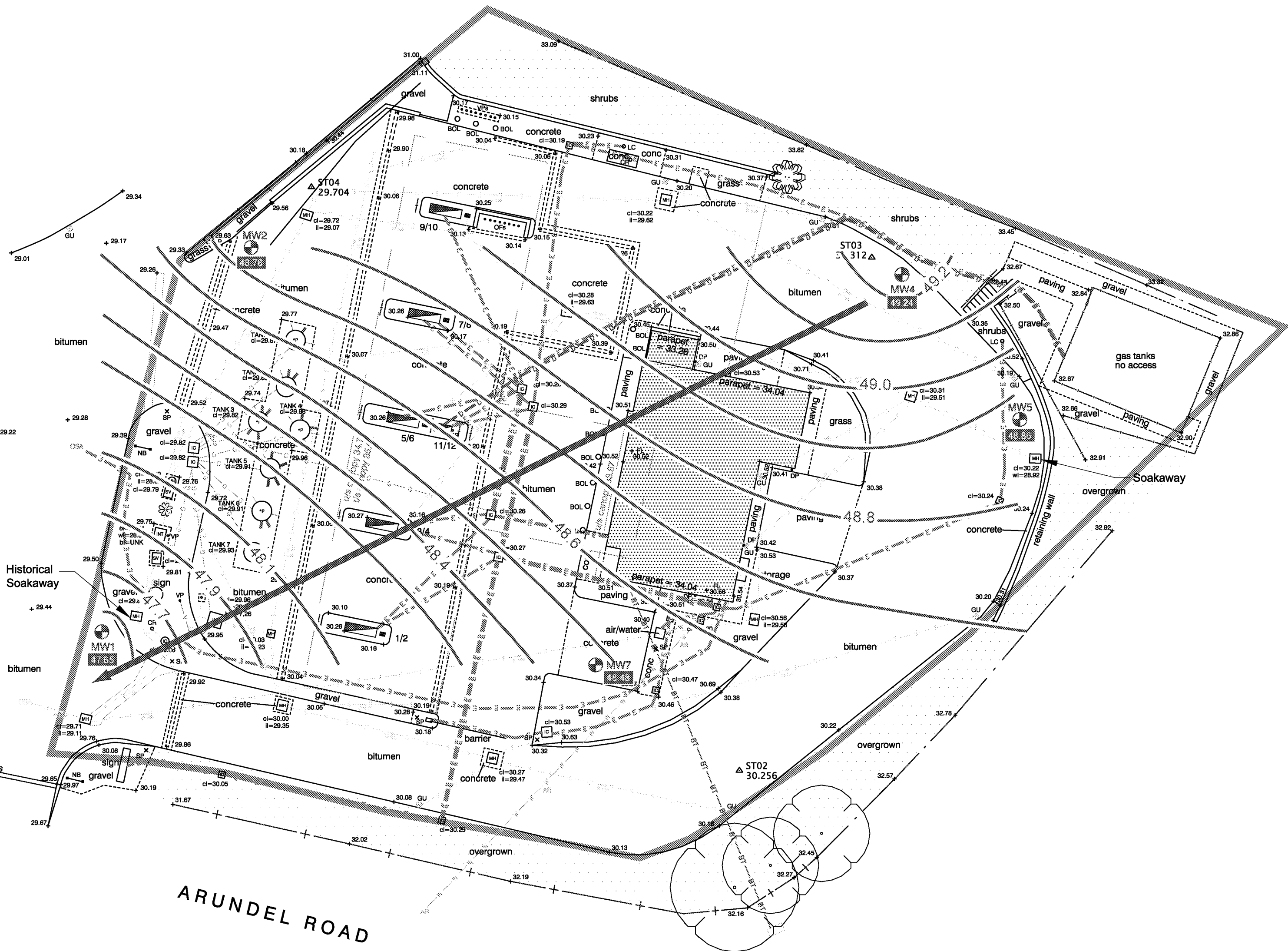
UNABLE TO TRACE WATER ON SITE, THEREFORE ASSUMED.



NOTES

KEY:

- APPROXIMATE SITE BOUNDARY
- MONITORING WELL
- GROUNDWATER CONTOUR (mAOD)
- GROUNDWATER ELEVATION (mAOD)
- GROUNDWATER FLOW DIRECTION



FOR INFORMATION

CONSULTING ENGINEERS



Brunel House, 54 Princess Street, Manchester, M1 6HS
TEL 0161-907-3500 FAX 0161-907-3501

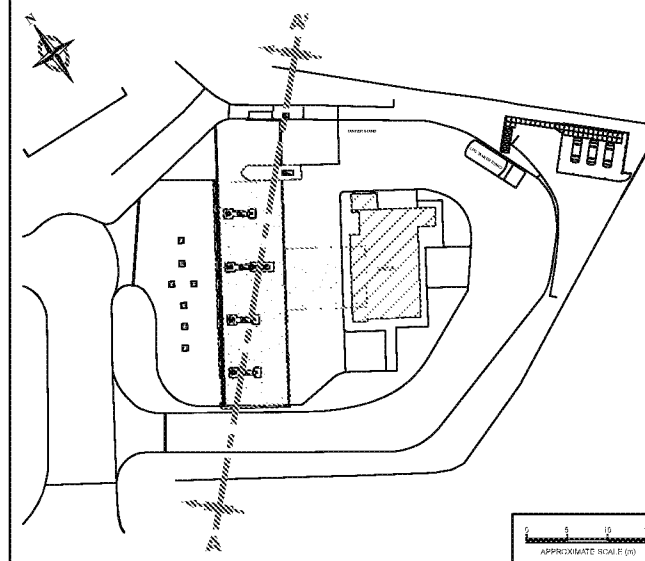
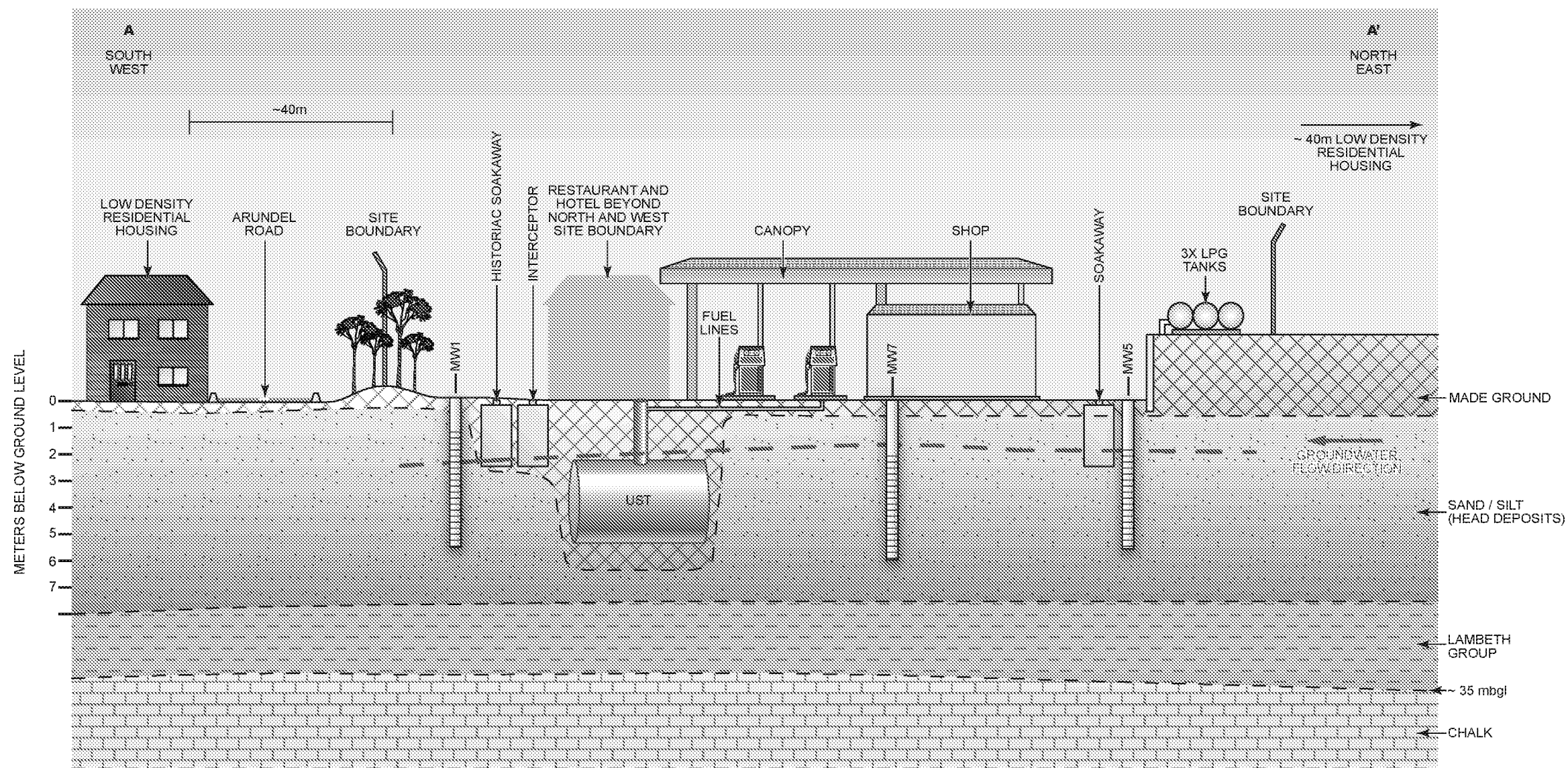
CLIENT
SHELL UK OIL PRODUCTS LIMITED

PROJECT
SHELL, FONTWELL

DRAWING TITLE
POTENTIOMETRIC SURFACE MAP -
SEPTEMBER 2014 - FIGURE 3

DRAWN RDH /LCS	TRACED	CHECKED BS	APPROVED BS	DATE OCT 2014
SCALE 1: 200	DRG No. 49319164/	FIGURE 3	REV.	

ORIGINAL DRAWING A2



Potential Chemicals of Concern

- TPH – Petroleum hydrocarbons.
- BTEX – Benzene, toluene, ethylbenzene and xylenes.
- Petroleum Additives – Methyl tertiary butyl ether (MTBE) and tertiary amyl methyl ether (TAME).
- PAHs – Polycyclic aromatic hydrocarbons.
- Heavy metals.

Potential Sources

- Operational underground Storage Tanks.
- Accidental releases to ground from off-set fill points.
- Accidental releases to ground from dispenser pumps.
- Accidental releases to ground from fuel lines.
- Drainage gullies running in a north-south orientation to the east and west of the canopy, and across the entrance and exit to the forecourt.
- Site interceptor and associated drains located near the western boundary of the site.
- The historic soakaway located near the south west boundary of the site that collects discharge from the site interceptor, surface water from the site and storm water.
- Site Drainage.
- Made Ground of unknown origin used during site construction.

Potential Pathways

Human Health

- Vapours – Potential migration of vapours through made ground to above ground buildings.

Controlled Waters

- Leaching – Potential migration of hydrocarbon substances from soils into shallow (and potentially deep) aquifers.
- Potential migration of impacted perched water into shallow (and potentially deep) aquifers.
- Potential leaching – Migration of hydrocarbon substances from soils into shallow groundwater, followed by migration to surface water.
- Direct entry of impacted surface water to shallow (and potentially deep) aquifers through excavations – i.e. through the soakaway or releases from fuel infrastructure.

Potential Receptors

Human Health

- Retail shop staff.
- The general public and visiting staff (such as contractors, including those undertaking potential site excavation works).

Controlled Waters

- Groundwater within the undifferentiated head deposits on site (Secondary aquifer).
- Groundwater within the Lambeth Group (Secondary aquifer).
- Groundwater within the Tarrant Chalk Member (Principal Aquifer).

Potential Complete Pollutant Linkages

- No complete pollutant linkages identified.

CONSULTING ENGINEERS

URS

ST. GEORGES HOUSE, 5 ST GEORGES ROAD,
WIMBLEDON, SW19 4DR
TEL - 020 8944 3300 FAX - 020 8944 3301

CLIENT
SHELL UK OIL PRODUCTS LTD
PO BOX 430
STAINES
TW18 3ZB

PROJECT
SHELL FONTWELL,
ARUNDEL ROAD,
WEST SUSSEX,
BN18 0SB

DRAWING TITLE
FIGURE 4 - CONCEPTUAL SITE MODEL

DRAWN RH	TRACED	CHECKED BS	APPROVED BS	DATE OCT 2014
SCALE NTS	DRG NO. 49319164 / FIGURE 4			REV.

Appendix A - Field Data Tables

TABLE 1
GROUNDWATER ELEVATIONS AND QUALITY MEASUREMENTS

Site	Shell Fontwell
Sample Round	10 September 2014

Borehole	Screened Section	Depth to base (m bgl)	Depth to product (m bgl)	Depth to water (m bgl)	Borehole elevation (m ASD)	Groundwater elevation (m ASD)	Sample Date	Purge Volume (L)	pH	Temperature (°C)	Conductivity (µS/cm ²)	ORP (mV)	ORP (mV) Corrected	Dissolved Oxygen (mg/L)	Comments
MW1	1.0 - 5.5	5.53	-	2.348	50.00	47.65	10/09/2014	7	8.39	17.12	480	-198.5	13.2	0.51	Slow recovery. Creamy white. Slightly turbid. NVO.
								14	8.35	16.92	471	-152.9	58.8	1.59	
								22	8.37	16.71	490	-146.2	65.5	3.18	
MW2	2.0 - 6.0	2.34	-	1.050	49.83	48.78	10/09/2014	1.5	7.63	17.21	911	-101.0	110.7	1.51	Poor/ no recovery. Orange. Turbid. NVO.
MW4	2.0 - 6.0	2.26	-	1.450	50.69	49.24	10/09/2014	2	6.91	19.49	741	19.3	231.0	3.51	Poor recovery. Orange. Turbid. NVO.
								4	6.85	19.03	725	-12.8	198.9	2.75	
								5	6.82	19.02	721	-17.7	194.0	2.07	
MW5	1.0 - 5.0	3.59	-	1.67	50.53	48.86	10/09/2014	5	6.65	16.38	644	5.8	217.5	3.67	Good recovery. Orange. Very turbid. NVO.
								10	6.76	16.37	578	13.0	224.7	4.01	
								17	6.94	16.27	677	-32.5	179.2	1.81	
MW7	2.0 - 6.0	5.49	-	2.250	50.73	48.48	10/09/2014	12	6.88	15.89	726	-4.6	207.1	4.01	Good recovery. Orange. Turbid. NVO.
								20	6.83	15.99	710	-1.3	210.4	4.07	
								28	6.84	16.15	716	-3.7	208.0	3.93	

Legend

°C - degrees celsius
L - Litres
m AOD - metres Above Site Datum
NVO - no visible or olfactory evidence of impact
pH - potential of Hydrogen (dimensionless)

m bgl - metres below ground level
mg/L - milligrams per litre
mS - milli siemens
mV - milli volts
ORP - Oxidation Reduction Potential

Notes

ORP is corrected against temperature of groundwater.

Equation: $E_h = E_m + E_{ref}$

Where: E_h = Corrected ORP value

E_m = ORP measured by probe

E_{ref} = Correction factor = $[(\text{temperature}^2) \times -0.0013] - (\text{temperature} \times 0.6656) + 222.02$ (for a 3.5mol KCl probe)

Temperature Approximate specific correction factor

10°C 215.2
15°C 211.7
20°C 208.2

Appendix B - Hydraulic Conductivity Data

Hydraulic Conductivity Test Data - Shell Fontwell

Monitoring Well	Well Radius (m)	Borehole Radius (m)	Installed Screened Interval (m bgl)	Initial Depth to NAPL (m bgl)	Initial Depth to Water (m bgl)	Depth to Base (m bgl)	Effective Saturated Screened Interval (m bgl)	Aquifer Thickness (m)	Effective Screened Strata	Aquifer Test	Test Date	K (m/s)	K m/d	Comments
MW1	0.050	0.21	1.0- 5.54	ND	2.457	5.50	3.04	5.5	Fine Sand	Slug - FH1	11/09/2014	4.05E-06	0.35	
										Slug - RH1		2.31E-06	0.20	
MW4	0.050	0.21	1.0-6.0	ND	1.455	6.00	4.55	6	Fine Sand	Slug - FH1	11/09/2014	3.82E-05	3.30	
										Slug - RH1		1.50E-05	1.30	
										Slug - FH2		3.82E-05	3.30	
										Slug - RH2		1.62E-05	1.40	
MW7	0.050	0.21	0.9-5.0	ND	2.394	5.00	2.61	5	Fine Sand	Slug - FH1	11/09/2014	2.20E-05	1.90	
										Slug - RH1		2.43E-05	2.10	
										Slug - FH2		2.20E-05	1.90	
										Slug - RH2		2.55E-05	2.20	

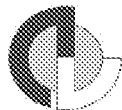
Notes:

ND = not detected
m = metres

bgl = below ground level
NAPL = non-aqueous phase liquid
UTI Unable To Interpret (data not suitable)

Min	0.20
Max	3.30
Average MW1	0.28
Average MW4	2.33
Average MW7	2.03
Geomean of averages	1.09

Appendix C - Laboratory Analytical Results Certificates



URS
St. George's House
2nd Floor
5 St. George's Road
Wimbledon
Greater London
SW19 4DR
Attention: Jane Lawrie

CERTIFICATE OF ANALYSIS

Date:	18 September 2014
Customer:	H_URS_WIM
Sample Delivery Group (SDG):	140912-76
Your Reference:	49319164
Location:	Shell Fontwell
Report No:	284574

We received 8 samples on Friday September 12, 2014 and 8 of these samples were scheduled for analysis which was completed on Thursday September 18, 2014. 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.

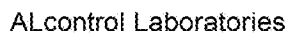
Approved By:



Sonia McWhan
Operations Manager



1291



Validated

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
9979824	DUP			10/09/2014
9979821	EQUIPMENT BLANK			10/09/2014
9979810	MW1			10/09/2014
9979812	MW2			10/09/2014
9979814	MW4			10/09/2014
9979817	MW5			10/09/2014
9979819	MW7			10/09/2014
9979825	TRIP BLANK BCBM7273V			10/09/2014

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

Order Number:
Report Number: 284574
Superseded Report:

ARUN DISTRICT COUNCIL WA/92/11
18.17.13 18/09/2014

Order Number:
Report Number: 284574
Superseded Report:

ARUN DISTRICT COUNCIL WA/92/11
18.17.13 18/09/2014

Order Number:
Report Number: 284574
Superseded Report:

MV5

Water (GW/SW)
10/09/2014
12/09/2014
140912-76
9979817

Page 6 of 46

Order Number:
Report Number: 284574
Superseded Report:

Page 7 of 46

Order Number:
Report Number: 284574
Superseded Report:

ARUN DISTRICT COUNCIL WA/92/11
18.17.13 18/09/2014

Order Number:
Report Number: 284574
Superseded Report:

Water(GW/SW)
10/09/2014
12/09/2014
140912-76
9979819

Page 9 of 46

Order Number:
Report Number: 284574
Superseded Report:

APR 17 2014
18:17:13 18/09/2014

Order Number:
Report Number: 284574
Superseded Report:

Water(GW/SW)
10/09/2014
12/09/2014
140912-76
9979819

Page 11 of 46

Order Number:
Report Number: 284574
Superseded Report:

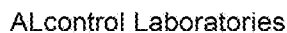
APR 17 13 18/09/2014

Order Number:
Report Number: 284574
Superseded Report:

MVV7

Water(GW/SW)
10/09/2014
12/09/2014
140912-76
9979819

APR 17 2014
18:17:13 18/09/2014



Validated

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

SVOC MS (W) - Aqueous

[illegible]

Order Number:
Report Number: 284574
Superseded Report:

MVV7

Water(GW/SW)
10/09/2014
12/09/2014
140912-76
9979819

#

Page 15 of 46

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

APR 17 2014
18:17:13 18/09/2014

Order Number:
Report Number: 284574
Superseded Report:

APR 17 2014
18:17:13 18/09/2014

Order Number:
Report Number: 284574
Superseded Report:

Method No	Reference	Description	Wet/Dry Sample *	Surrogate Corrected
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID		
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS		
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters		
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters		
TM245	By GC-FID	Determination of GRO by Headspace in waters		
TM289		Determination of Oxygenates in Waters by Headspace/GC-MS		
TM336				

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Test Completion Dates

Lab Sample No(s)	9979824	9979821	9979810	9979812	9979814	9979817	9979819	9979825
Customer Sample Ref.	DUF	EQUIPMENT BLANK	MW1	MW2	MW4	MW6	MW7	TRIP BLANK EDEM 7273V
AGS Ref.								
Depth								
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
EPH CWG (Aliphatic) Aqueous GC (W)	17-Sep-2014	17-Sep-2014	18-Sep-2014	18-Sep-2014	18-Sep-2014	17-Sep-2014	17-Sep-2014	
EPH CWG (Aromatic) Aqueous GC (W)	17-Sep-2014	17-Sep-2014	18-Sep-2014	18-Sep-2014	18-Sep-2014	17-Sep-2014	17-Sep-2014	
GRO by GC-FID (W)	15-Sep-2014	15-Sep-2014	15-Sep-2014	15-Sep-2014	15-Sep-2014	16-Sep-2014	15-Sep-2014	
n-Hexane in Waters	17-Sep-2014	17-Sep-2014	17-Sep-2014	17-Sep-2014	17-Sep-2014	17-Sep-2014	17-Sep-2014	
Oxygenates (W)	18-Sep-2014	18-Sep-2014	18-Sep-2014	18-Sep-2014	18-Sep-2014	18-Sep-2014	18-Sep-2014	
PAH Spec MS - Aqueous (W)	18-Sep-2014	17-Sep-2014	18-Sep-2014	18-Sep-2014	18-Sep-2014	18-Sep-2014	18-Sep-2014	
SVOC MS (W) - Aqueous	16-Sep-2014	17-Sep-2014	17-Sep-2014	18-Sep-2014	17-Sep-2014	17-Sep-2014	17-Sep-2014	
TPH CWG (W)	17-Sep-2014	17-Sep-2014	18-Sep-2014	18-Sep-2014	18-Sep-2014	17-Sep-2014	17-Sep-2014	
VOC MS (W)	15-Sep-2014	16-Sep-2014	15-Sep-2014	15-Sep-2014	15-Sep-2014	15-Sep-2014	15-Sep-2014	15-Sep-2014



SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

ASSOCIATED AQC DATA

EPH CWG (Aliphatic) Aqueous GC (W)

Component	Method Code	QC 97
Total Aliphatics >C12-C35	TM174	93.33 66.67 : 110.42

EPH CWG (Aromatic) Aqueous GC (W)

Component	Method Code	QC 94	QC 90
Total Aromatics >EC12-EC35	TM174	93.33 63.00 : 121.00	96.67 63.00 : 121.00

GRO by GC-FID (W)

Component	Method Code	QC 98	QC 94
Benzene by GC	TM245	95.5 79.13 : 118.84	94.0 77.50 : 122.50
Ethylbenzene by GC	TM245	96.5 79.54 : 115.99	95.5 77.50 : 122.50
m & p Xylene by GC	TM245	96.5 78.44 : 116.32	95.25 77.50 : 122.50
MTBE GC-FID	TM245	96.0 84.06 : 112.79	94.0 77.50 : 122.50
o Xylene by GC	TM245	96.5 80.83 : 114.28	95.5 77.50 : 122.50
QC	TM245	80.71 72.31 : 108.89	87.62 68.49 : 116.95
Toluene by GC	TM245	97.0 81.66 : 114.03	95.5 77.50 : 122.50

n-Hexane in Waters

Component	Method Code	QC 92
n-Hexane	TM336	101.0 67.88 : 134.28

Oxygenates (W)

Component	Method Code	QC 1050
Benzene	TM289	110.5 87.69 : 119.72
Diisopropyl ether	TM289	106.0 86.70 : 122.79
Ethanol	TM289	151.4 60.84 : 141.13

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Oxyanides (W)

		QC 1050
Ethylbenzene	TM289	100.5 76.16 : 122.57
o-Xylene	TM289	101.5 84.40 : 112.41
p/m-Xylene	TM289	101.5 83.20 : 115.01
tert Butanol	TM289	117.0 70.51 : 143.48
tert-amyl methyl ether	TM289	110.5 78.92 : 124.29
tert-butyl ethyl ether	TM289	107.0 78.17 : 124.34
tert-butyl methyl ether	TM289	110.0 87.75 : 127.35
Toluene	TM289	103.5 79.08 : 122.51

PAH Spec MS - Aqueous (W)

Component	Method Code	QC 90	QC 93
Acenaphthene by GCMS	TM178	100.5 92.89 : 110.56	102.5 91.90 : 109.30
Acenaphthylene by GCMS	TM178	98.0 83.00 : 113.00	98.0 87.74 : 109.69
Anthracene by GCMS	TM178	98.5 91.25 : 113.75	99.5 89.70 : 111.80
Benz(a)anthracene by GCMS	TM178	96.5 85.75 : 111.25	96.5 88.64 : 112.43
Benzo(a)pyrene by GCMS	TM178	103.0 86.63 : 118.58	101.5 86.69 : 118.58
Benzo(b)fluoranthene by GCMS	TM178	108.0 90.00 : 117.00	102.5 92.99 : 117.35
Benzo(ghi)perylene by GCMS	TM178	97.5 82.05 : 112.05	100.0 88.43 : 116.76
Benzo(k)fluoranthene by GCMS	TM178	107.5 96.64 : 122.46	104.0 96.79 : 121.44
Chrysene by GCMS	TM178	101.0 90.25 : 117.25	101.0 89.75 : 115.25
Dibenzo(ah)anthracene by GCMS	TM178	97.0 82.81 : 122.26	100.0 85.97 : 110.46
Fluoranthene by GCMS	TM178	99.0 90.00 : 120.00	96.5 92.24 : 110.34
Fluorene by GCMS	TM178	101.0 95.00 : 119.00	104.0 96.02 : 113.29
Indeno(123cd)pyrene by GCMS	TM178	96.5 90.97 : 118.18	101.0 84.94 : 119.98
Naphthalene by GCMS	TM178	101.0 93.40 : 109.00	101.5 88.20 : 115.80
Phenanthrene by GCMS	TM178	99.0 93.75 : 116.25	101.5 95.66 : 111.96
Pyrene by GCMS	TM178	98.0 91.25 : 113.75	99.0 93.55 : 113.17

SVOC MS (M) - Aqueous



CERTIFICATE OF ANALYSIS

SDG: 140912-76
 Job: H_URS_WIM-60
 Client Reference: 49319164

Location: Shell Fontwell
 Customer: URS
 Attention: Jane Lawrie

Order Number:
 Report Number: 284574
 Superseded Report:

SVOC MS (W) - Aqueous

Component	Method Code	QC 91	QC 90	QC 91	QC 1013
4-Bromophenylphenylether	TM176	118.4 70.65 : 107.59	92.0 70.65 : 107.59	81.6 65.62 : 120.95	96.0 65.62 : 120.95
Benzo(a)anthracene	TM176	108.0 63.76 : 117.52	87.2 63.76 : 117.52	78.48 62.83 : 114.26	95.2 62.83 : 114.26
Benzo(a)pyrene	TM176	101.6 58.84 : 109.06	80.8 58.84 : 109.06	77.2 54.19 : 105.67	93.6 54.19 : 105.67
Butylbenzyl phthalate	TM176	108.0 41.53 : 109.48	87.2 41.53 : 109.48	68.32 51.20 : 111.20	86.4 51.20 : 111.20
Hexachlorobutadiene	TM176	97.6 42.80 : 108.20	72.96 42.80 : 108.20	69.92 59.51 : 94.06	75.76 59.51 : 94.06
Naphthalene	TM176	116.0 69.71 : 117.68	92.8 69.71 : 117.68	85.6 69.48 : 118.94	99.2 69.48 : 118.94
Nitrobenzene	TM176	115.2 58.70 : 110.90	92.0 58.70 : 110.90	85.6 69.13 : 107.62	100.8 69.13 : 107.62
Phenol	TM176	66.08 30.25 : 79.75	52.4 30.25 : 79.75	47.28 30.92 : 74.19	55.92 30.92 : 74.19

VOC MS (W)

Component	Method Code	QC 93	QC 90
1,1,1,2-Tetrachloroethane	TM208	90.0 81.02 : 113.71	97.0 81.02 : 113.71
1,1,1-Trichloroethane	TM208	89.0 80.57 : 121.77	95.0 80.57 : 121.77
1,1-Dichloroethane	TM208	95.5 77.85 : 123.56	96.0 77.85 : 123.56
1,2-Dichloroethane	TM208	94.5 77.80 : 116.90	95.5 77.80 : 116.90
2-Chlorotoluene	TM208	96.5 86.52 : 110.48	105.5 86.52 : 110.48
4-Chlorotoluene	TM208	92.5 86.09 : 110.96	102.0 86.09 : 110.96
Benzene	TM208	93.0 82.08 : 117.93	97.0 82.08 : 117.93
Bromomethane	TM208	90.5 78.68 : 126.84	90.5 78.68 : 126.84
Carbon tetrachloride	TM208	89.0 82.06 : 117.49	97.5 82.06 : 117.49
Chlorobenzene	TM208	96.0 86.08 : 112.88	103.5 86.08 : 112.88
Chloroform	TM208	91.5 77.50 : 122.50	90.0 77.50 : 122.50
Chloromethane	TM208	99.5 64.99 : 145.80	97.5 64.99 : 145.80
Cis-1,2-Dichloroethene	TM208	91.5 81.39 : 113.00	90.5 81.39 : 113.00
Dichloromethane	TM208	92.5 77.87 : 117.51	89.5 77.87 : 117.51
Ethylbenzene	TM208	87.0 81.00 : 111.00	93.5 81.00 : 111.00
Hexachlorobutadiene	TM208	74.0 71.36 : 107.63	86.0 71.36 : 107.63
o-Xylene	TM208	93.0 83.41 : 111.23	99.5 83.41 : 111.23



CERTIFICATE OF ANALYSIS

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

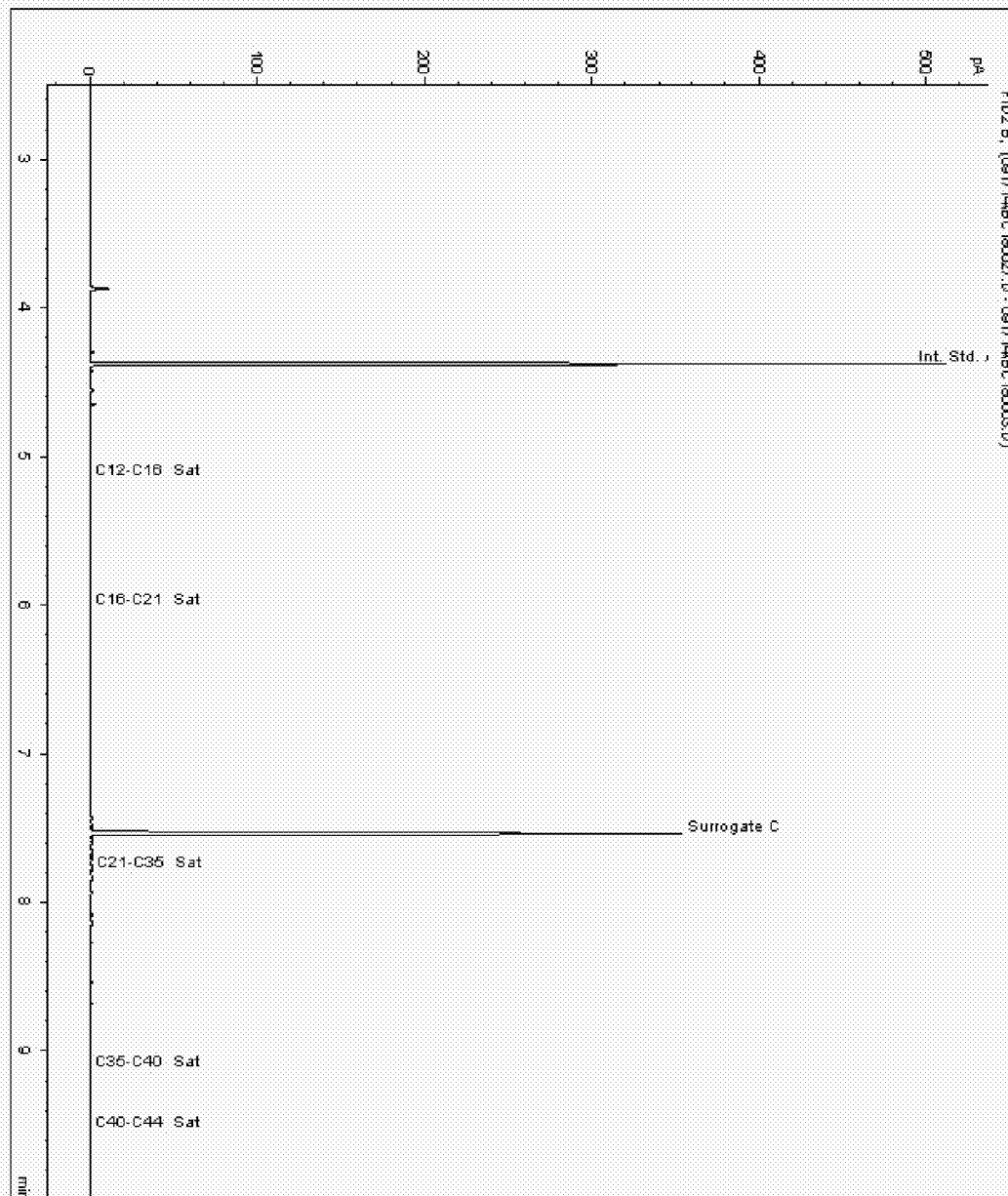
Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

Sample No : 9990143
Sample ID : MW2

Depth :

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

Sample Identity: 9488512-9990143
Date Acquired : 18/09/2014 13:43:53 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.008





CERTIFICATE OF ANALYSIS

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

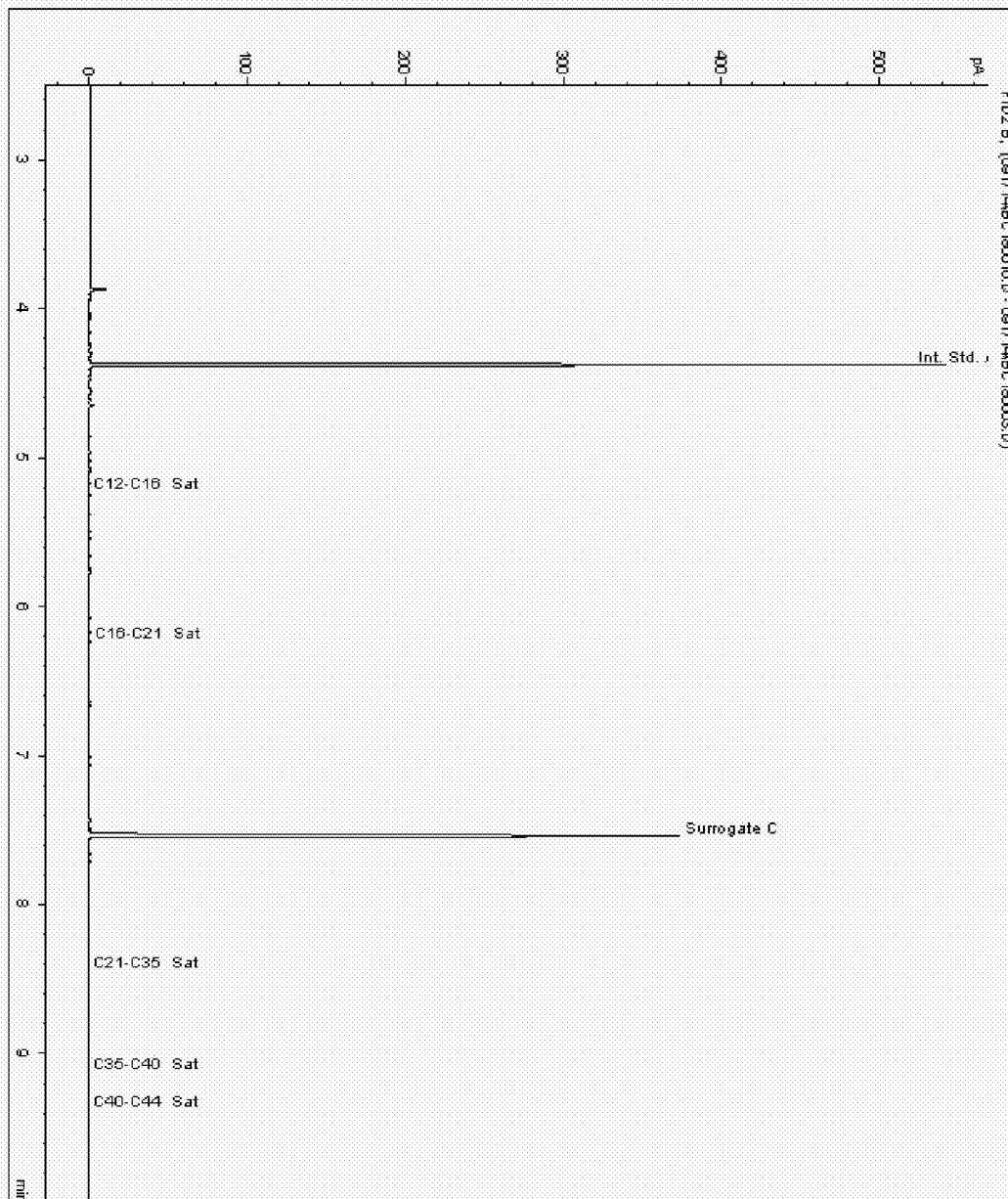
Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

Sample No : 9990200
Sample ID : MW1

Depth :

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

Sample Identity: 9488502-9990200
Date Acquired : 18/09/2014 10:30:45 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.009





CERTIFICATE OF ANALYSIS

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

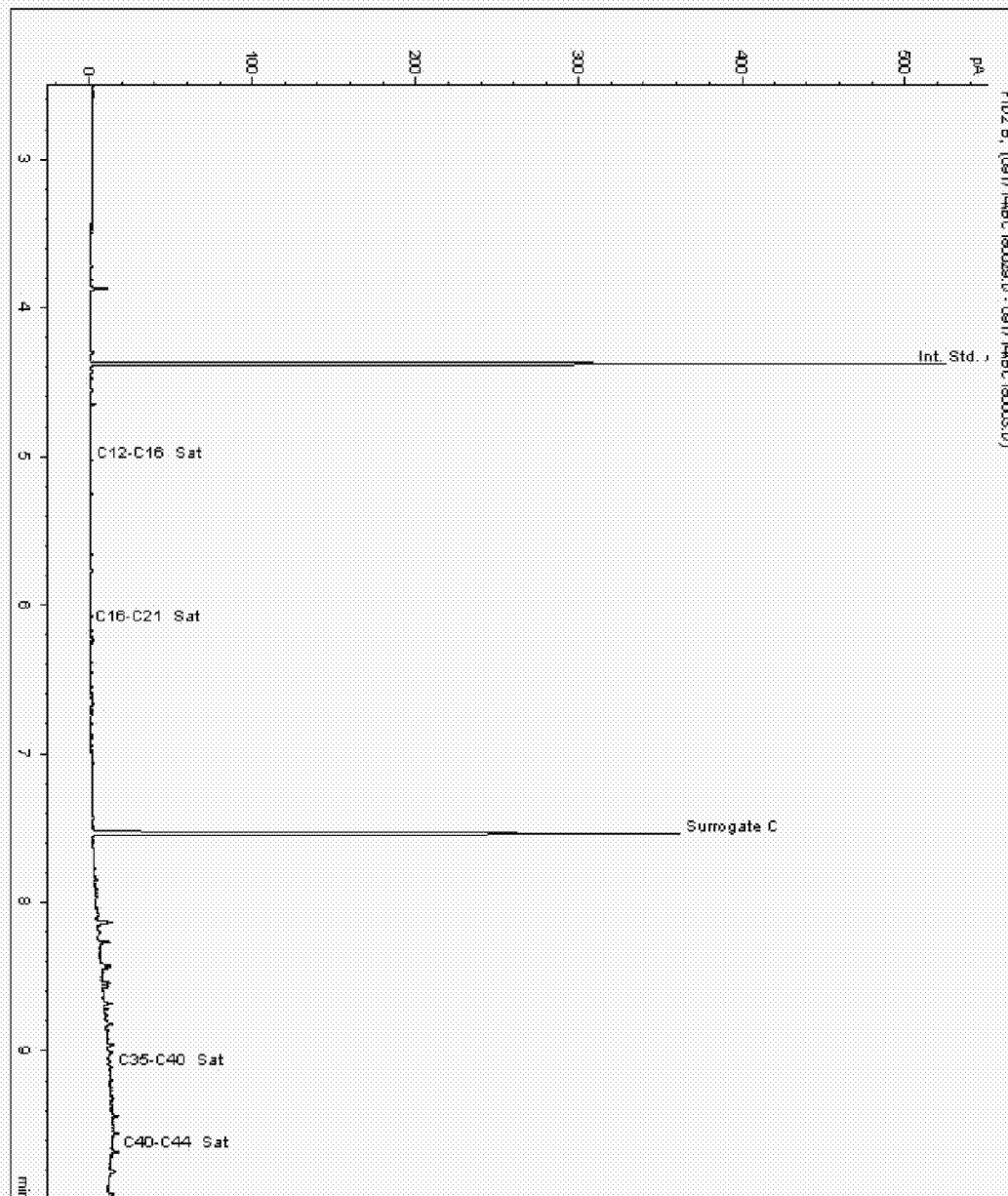
Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

Sample No : 9990212
Sample ID : MW4

Depth :

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

Sample Identity: 9488522-9990212
Date Acquired : 18/09/2014 14:11:02 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.009





CERTIFICATE OF ANALYSIS

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

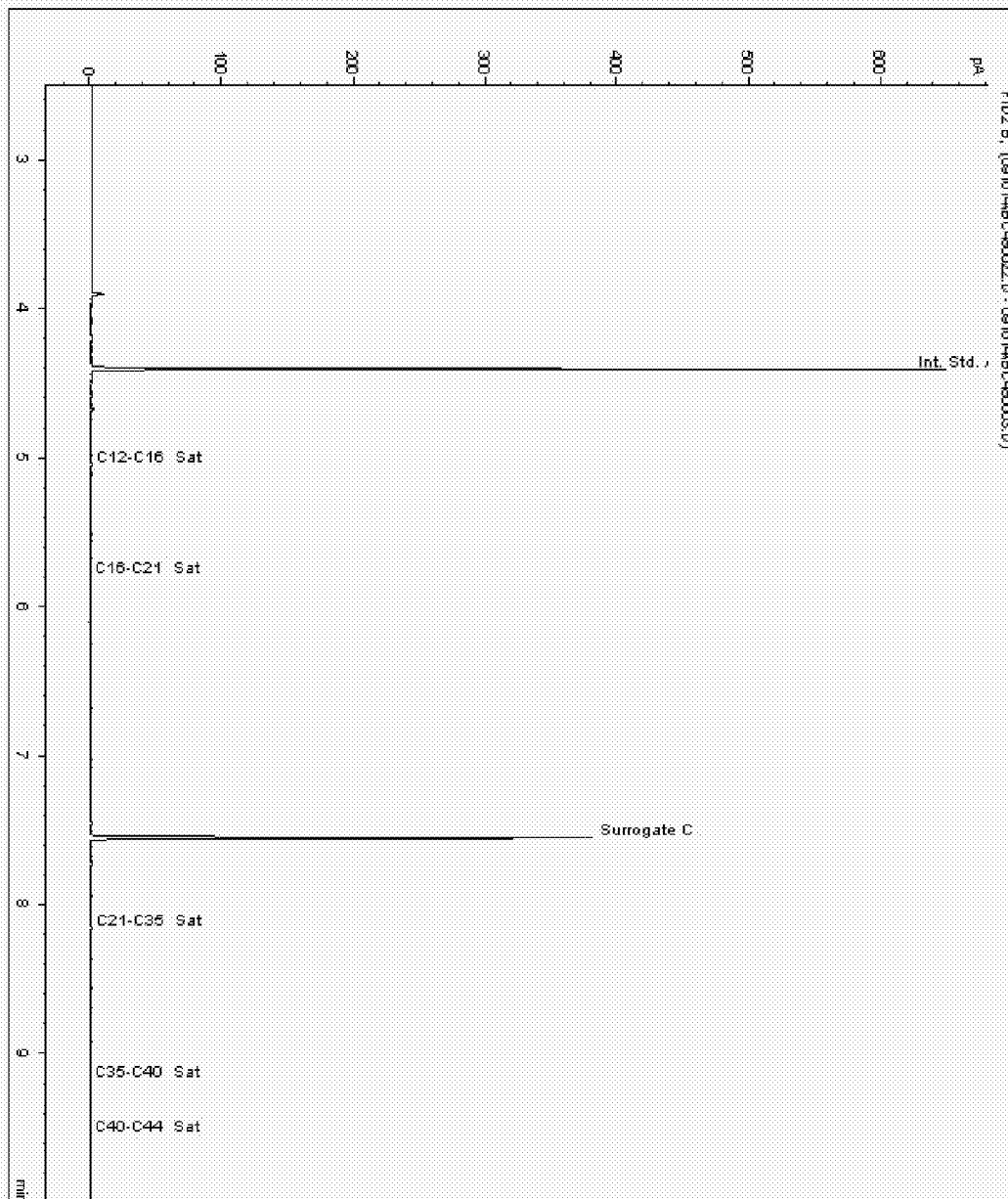
Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

Sample No : 9991030
Sample ID : MW5

Depth :

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

Sample Identity: 9488532-9991030
Date Acquired : 16/09/2014 22:51:23 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.009





CERTIFICATE OF ANALYSIS

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

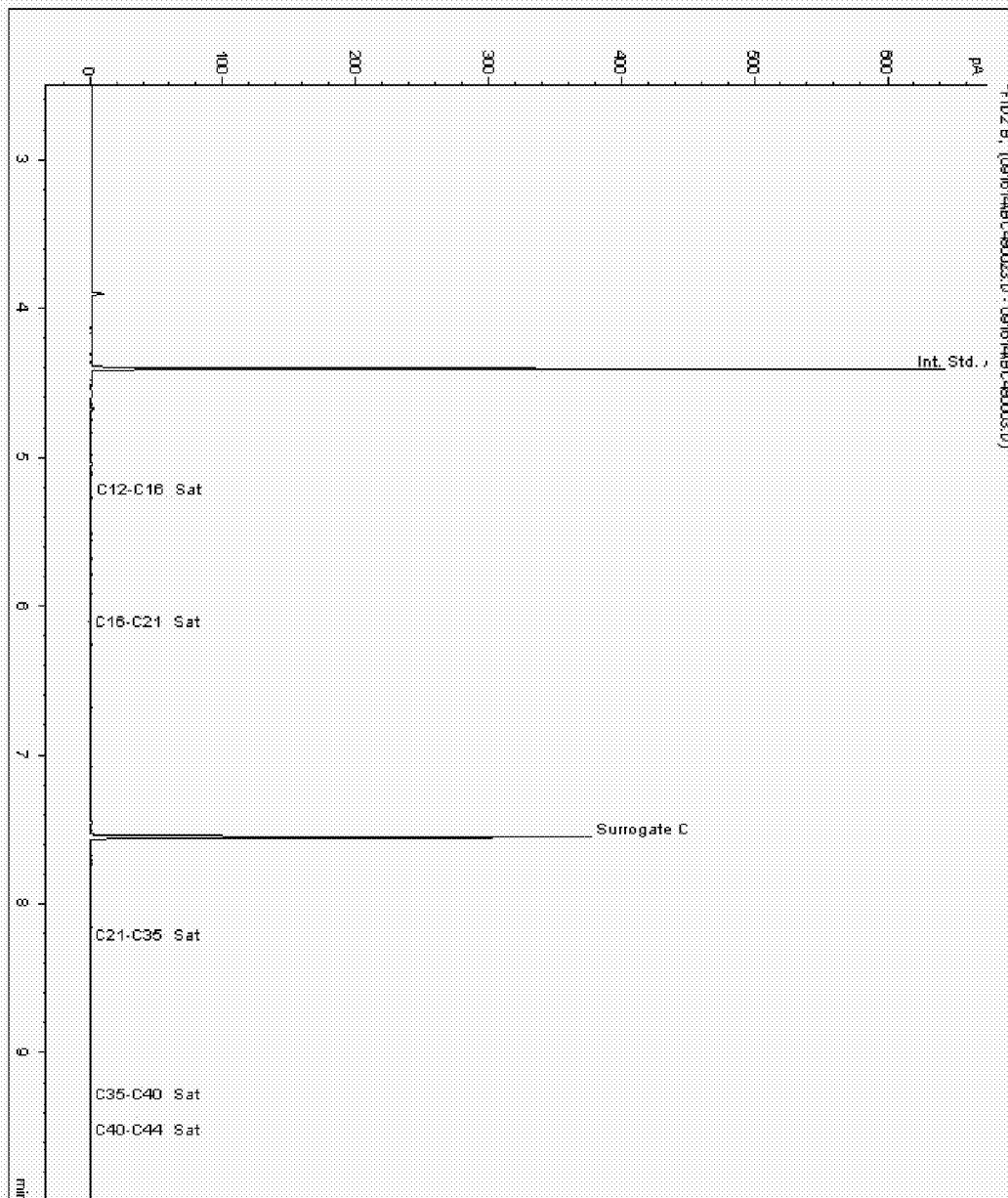
Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

Sample No : 9991048
Sample ID : MW7

Depth :

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

Sample Identity: 9488542-9991048
Date Acquired : 16/09/2014 23:10:30 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.009





CERTIFICATE OF ANALYSIS

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

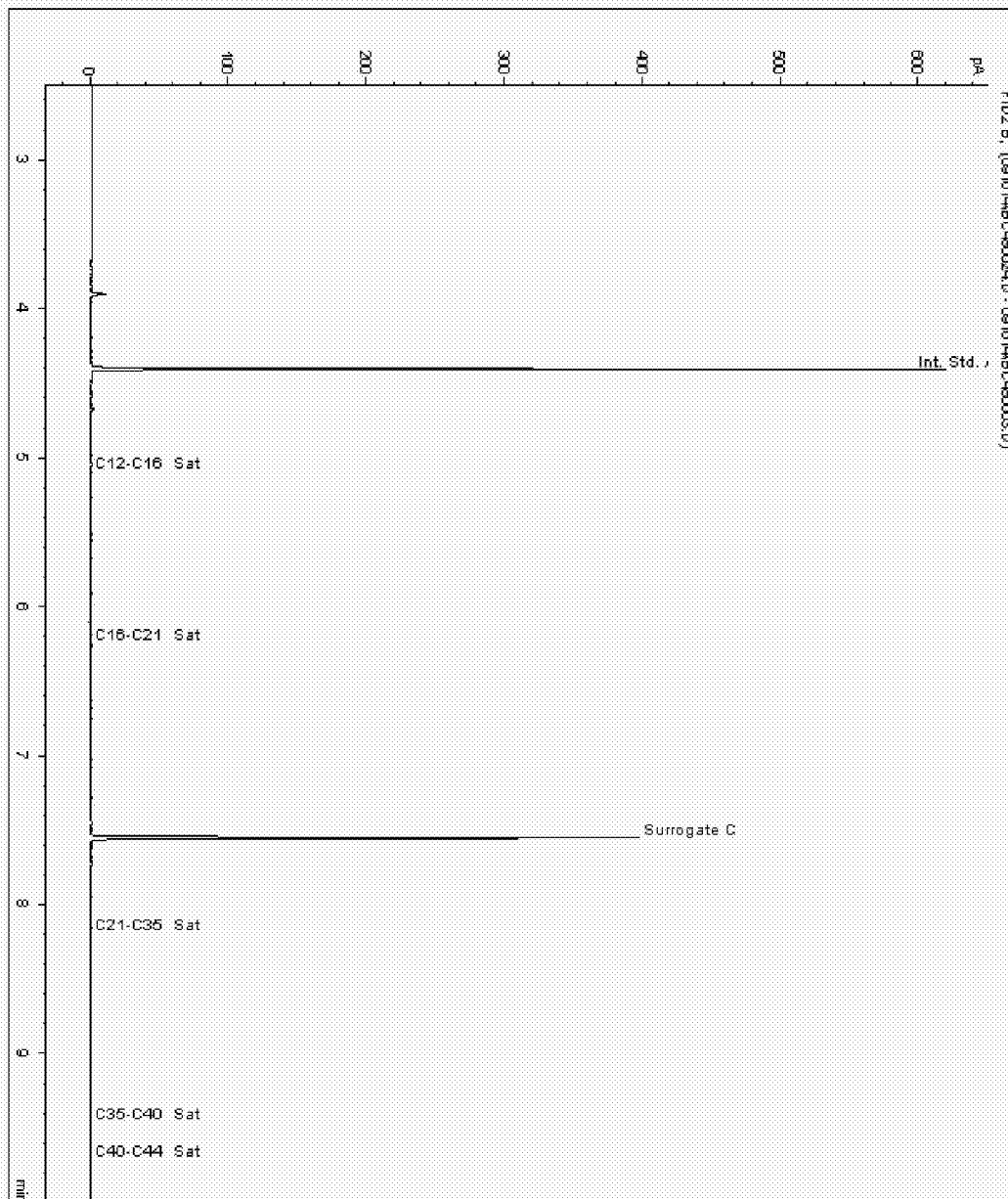
Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

Sample No : 9991067
Sample ID : DUP

Depth :

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

Sample Identity: 9488572-9991067
Date Acquired : 16/09/2014 23:29:36 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.008



Order Number:
Report Number: 284574
Superseded Report:

Depth :

Page 30 of 46



SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

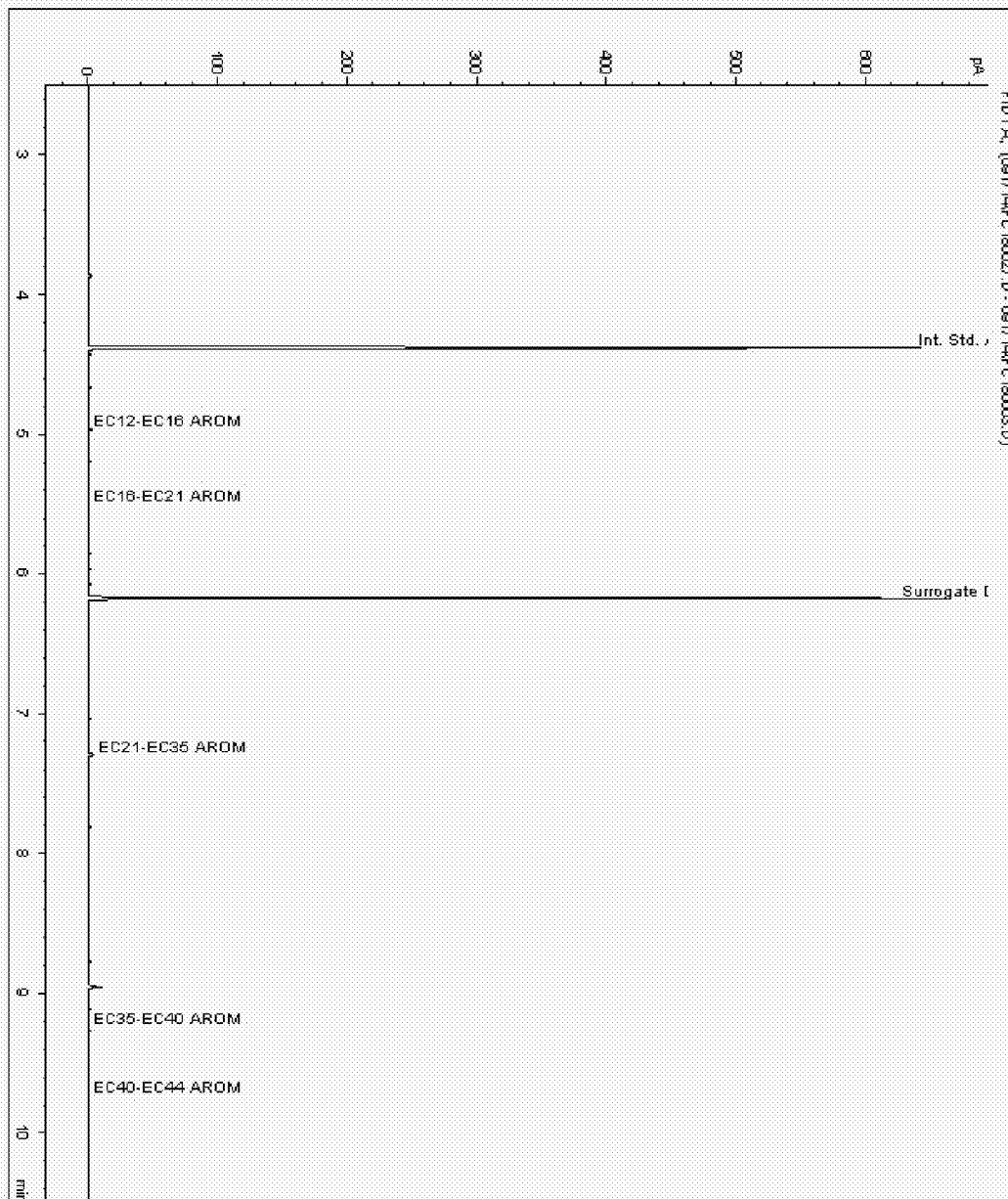
Analysis: EPH CWG (Aromatic) Aqueous GC (V)

Sample No : 9990143
Sample ID : MW2

Depth :

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

Sample Identity: 9488513-9990143
Date Acquired : 18/09/2014 13:43:53 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.008





SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

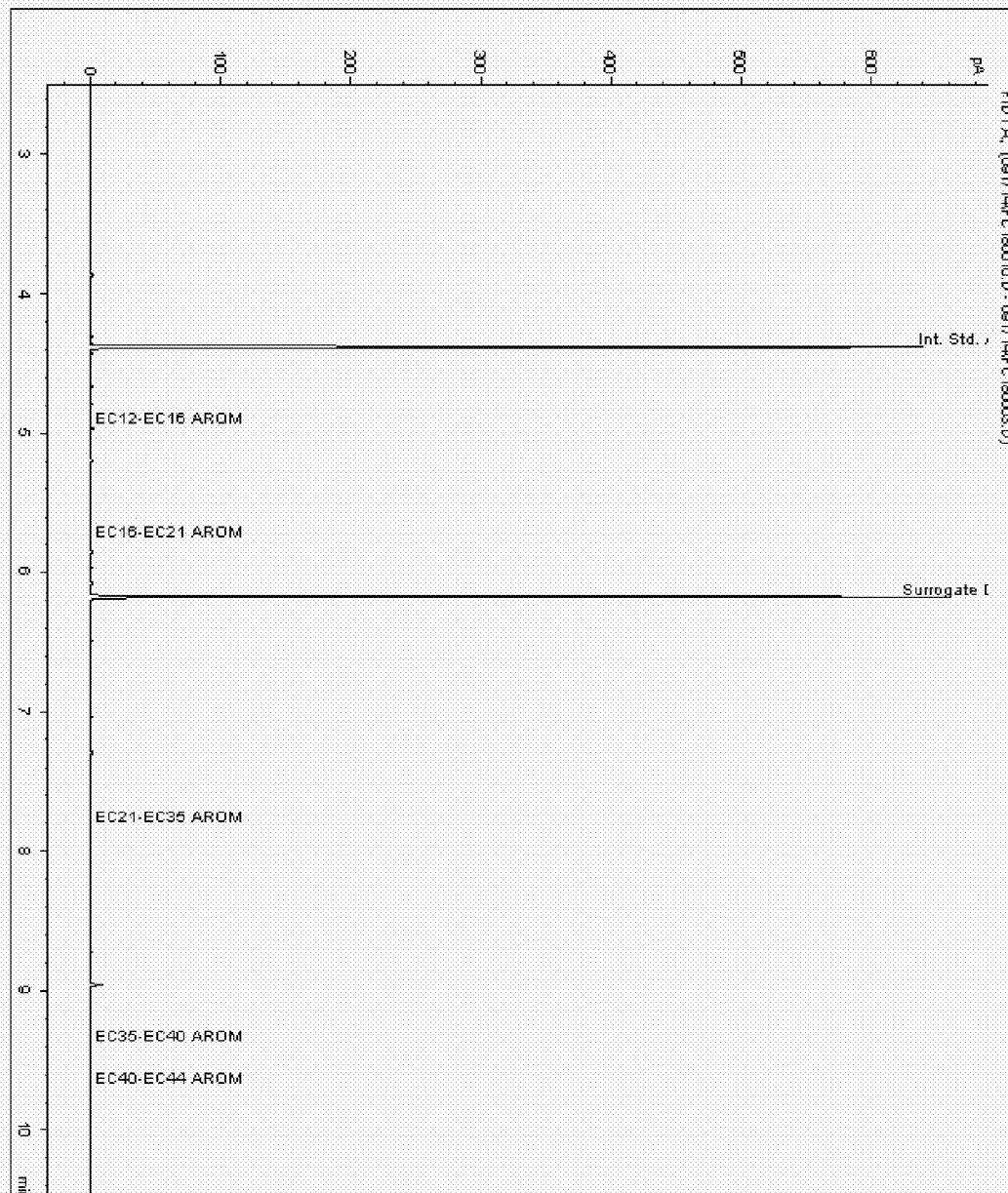
Analysis: EPH CWG (Aromatic) Aqueous GC (V)

Sample No : 9990200
Sample ID : MW1

Depth :

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

Sample Identity: 9488503-9990200
Date Acquired : 18/09/2014 10:30:45 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.009





SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

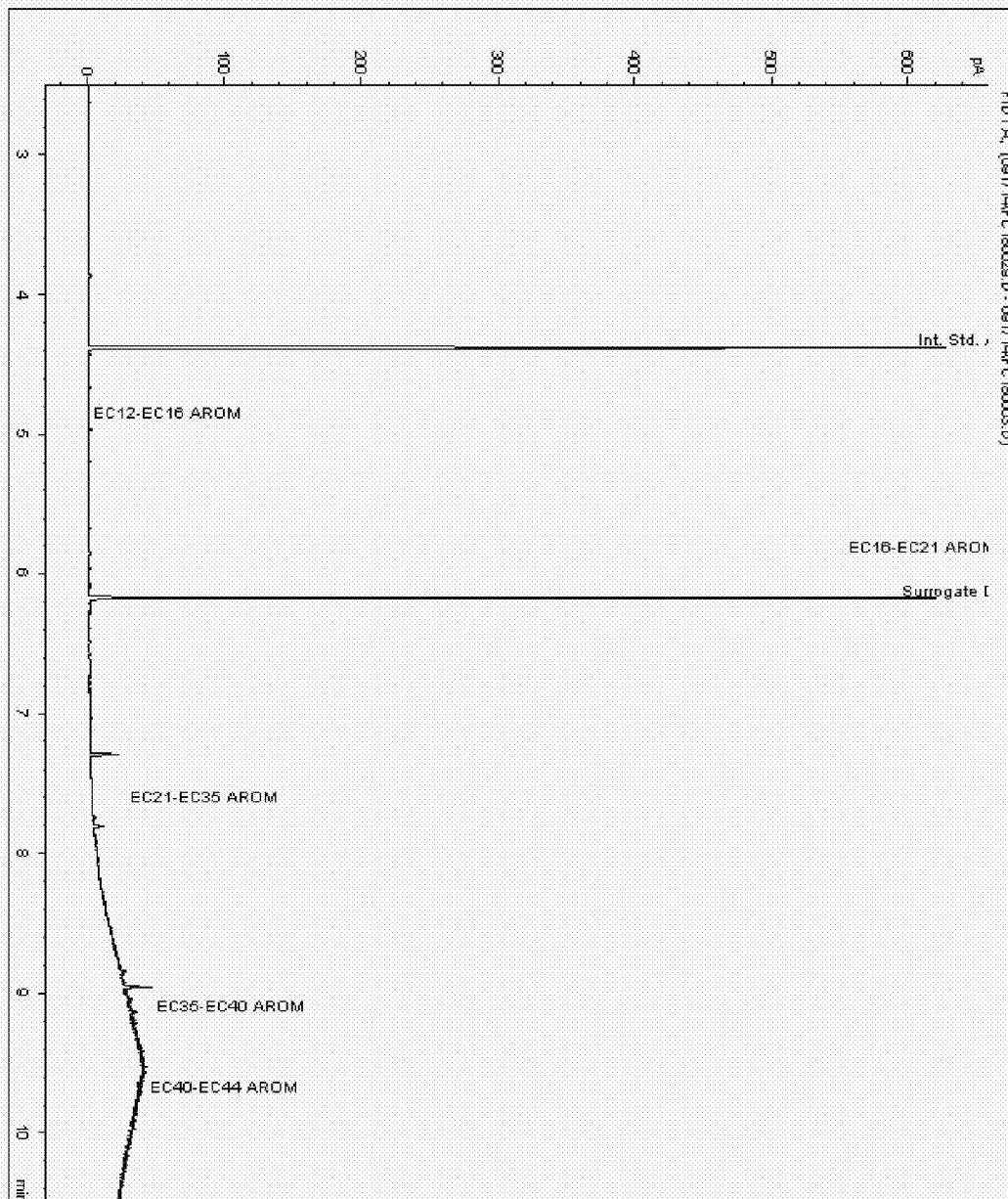
Analysis: EPH CWG (Aromatic) Aqueous GC (V)

Sample No : 9990212
Sample ID : MW4

Depth :

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

Sample Identity: 9488523-9990212
Date Acquired : 18/09/2014 14:11:01 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.009





CERTIFICATE OF ANALYSIS

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

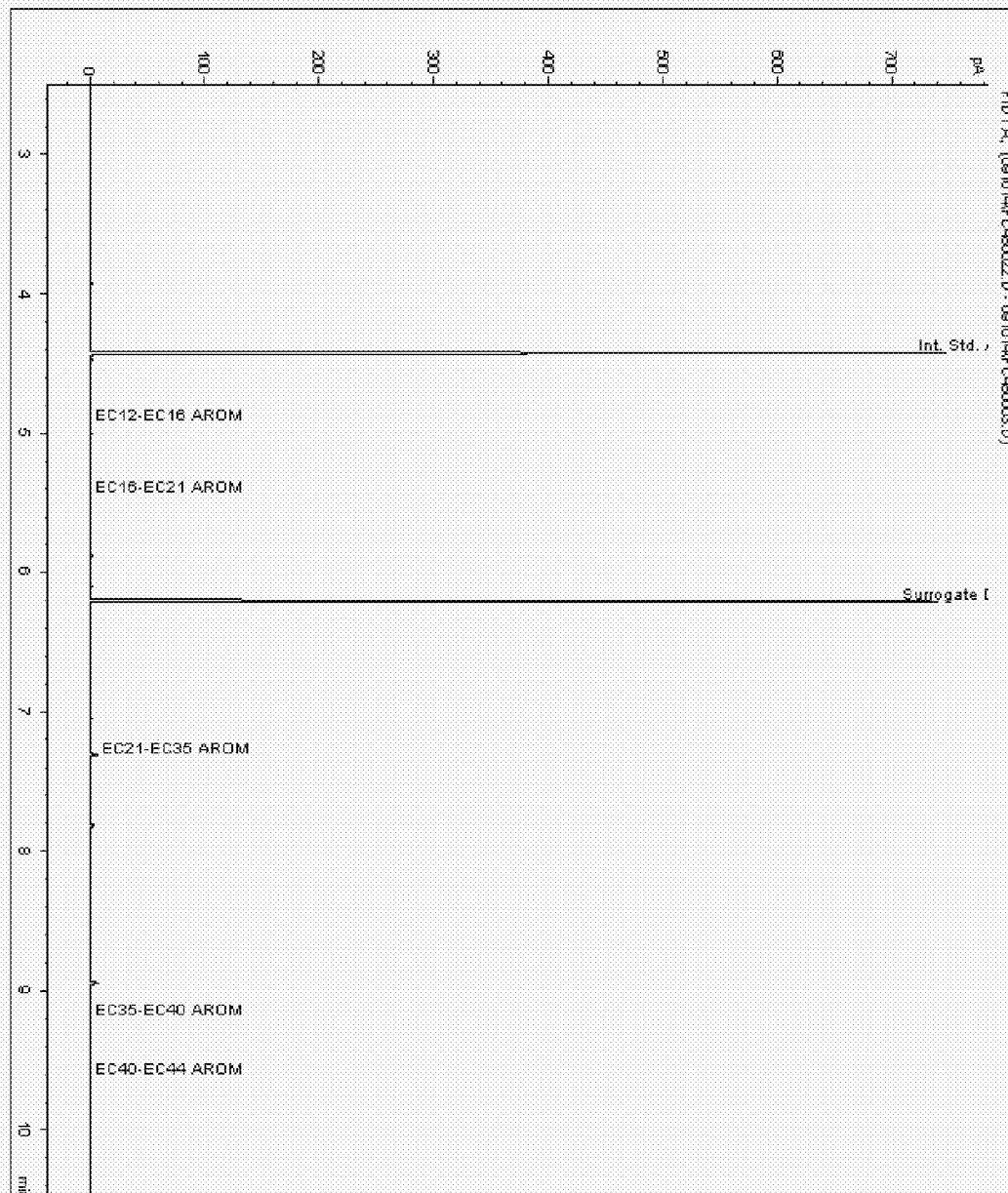
Analysis: EPH CWG (Aromatic) Aqueous GC (V)

Sample No : 9991030
Sample ID : MW5

Depth :

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

Sample Identity: 9488533-9991030
Date Acquired : 16/09/2014 22:51:24 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.009



SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

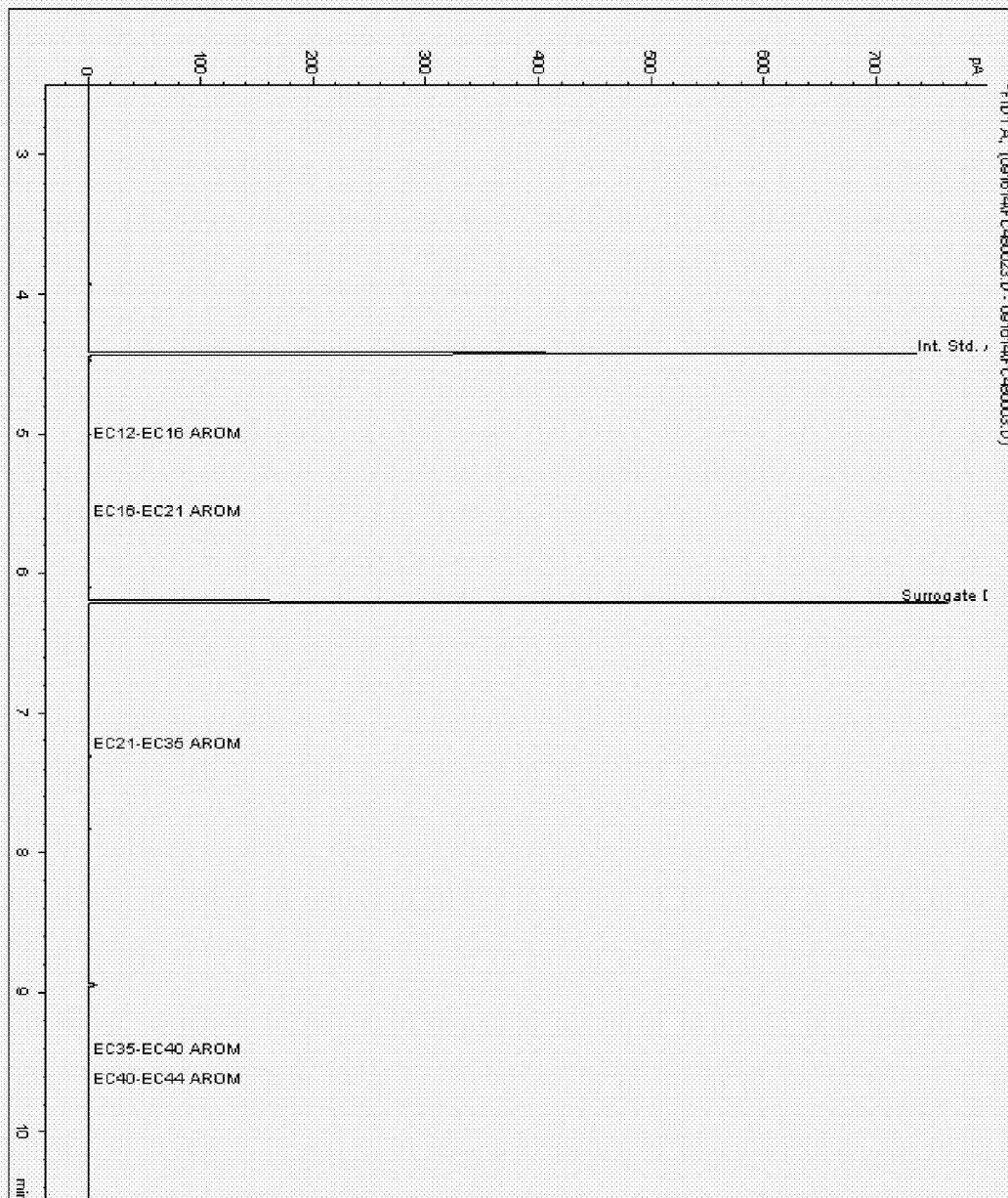
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 9991048
Sample ID : MW7

Depth :

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

Sample Identity: 9488543-9991048
Date Acquired : 16/09/2014 23:10:29 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.009





CERTIFICATE OF ANALYSIS

SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

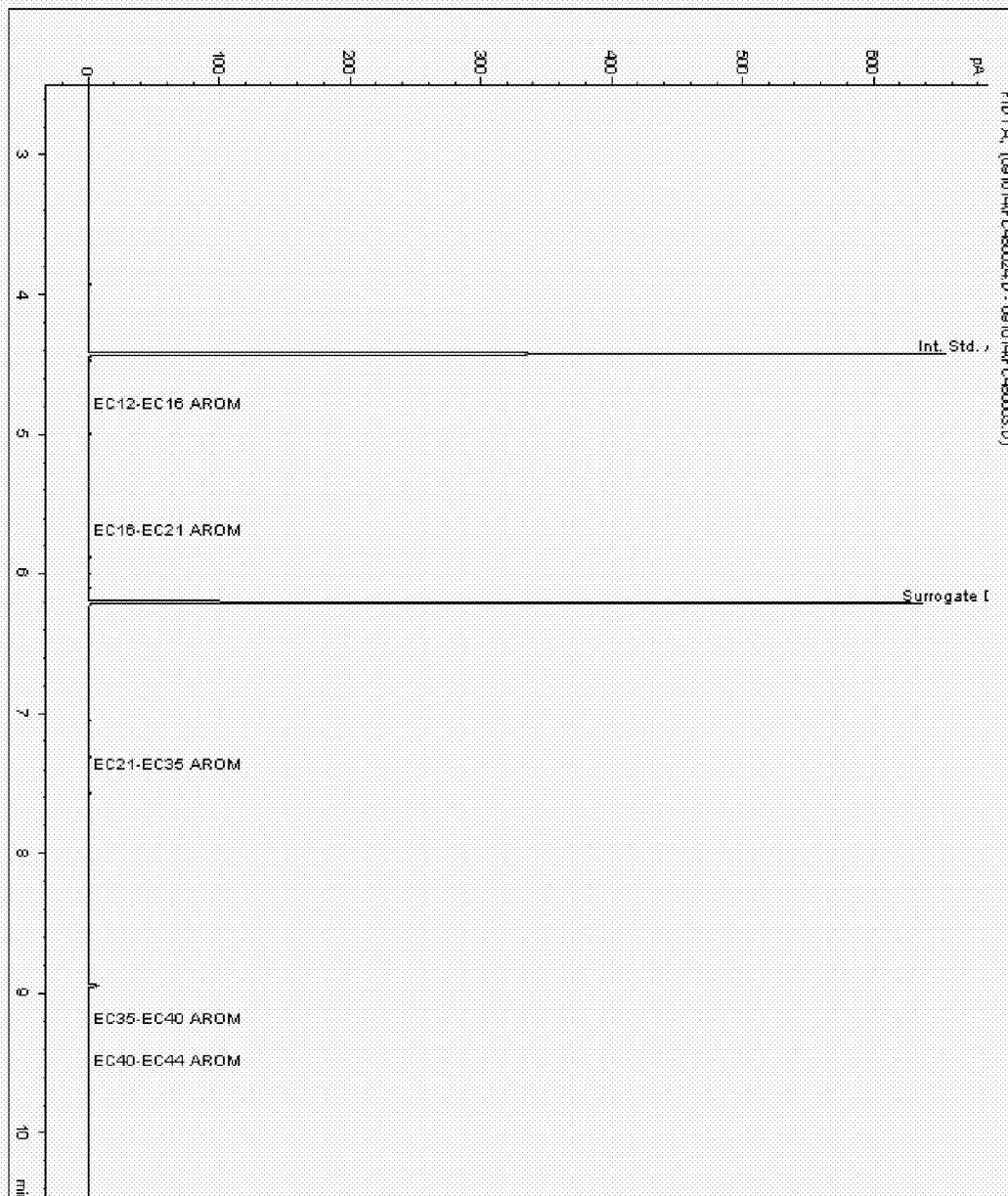
Analysis: EPH CWG (Aromatic) Aqueous GC (V)

Sample No : 9991067
Sample ID : DUP

Depth :

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

Sample Identity: 9488573-9991067
Date Acquired : 16/09/2014 23:29:37 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.008



SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

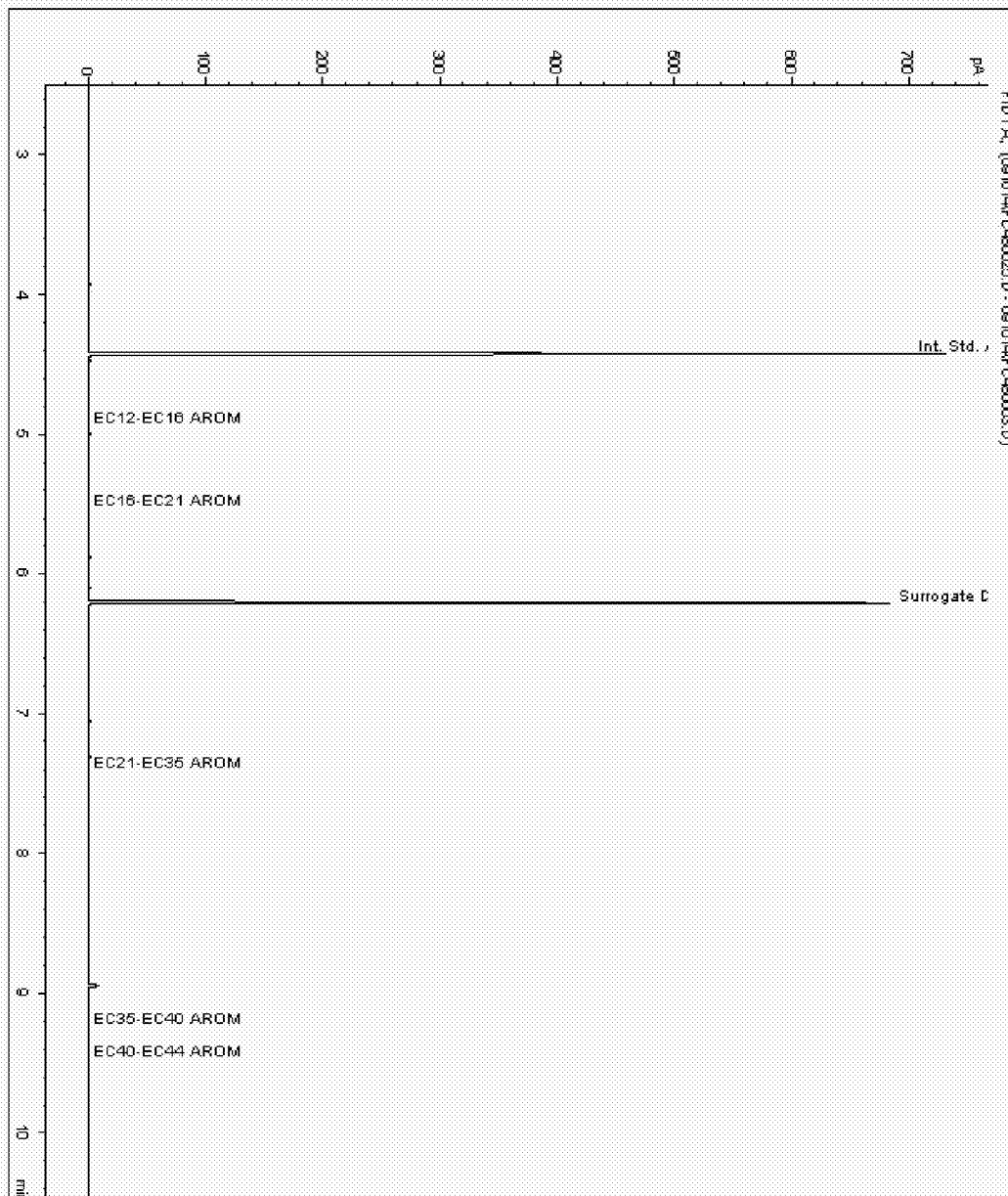
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 9991090
Sample ID : EQUIPMENT BLANK

Depth :

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

Sample Identity: 9488553-9991090
Date Acquired : 16/09/2014 23:48:42 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.008



SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

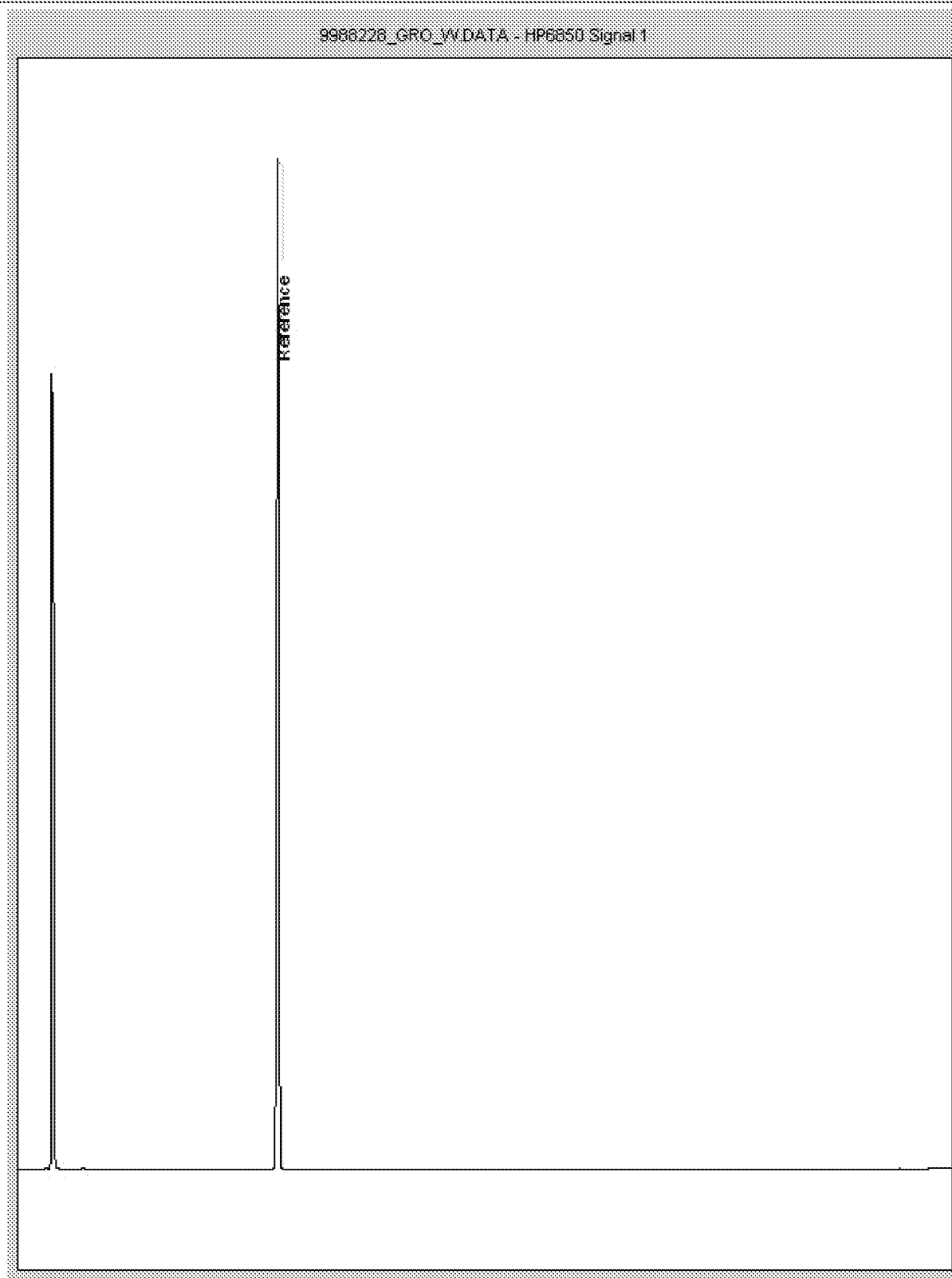
Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 9988228
Sample ID : DUP

Depth :



SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

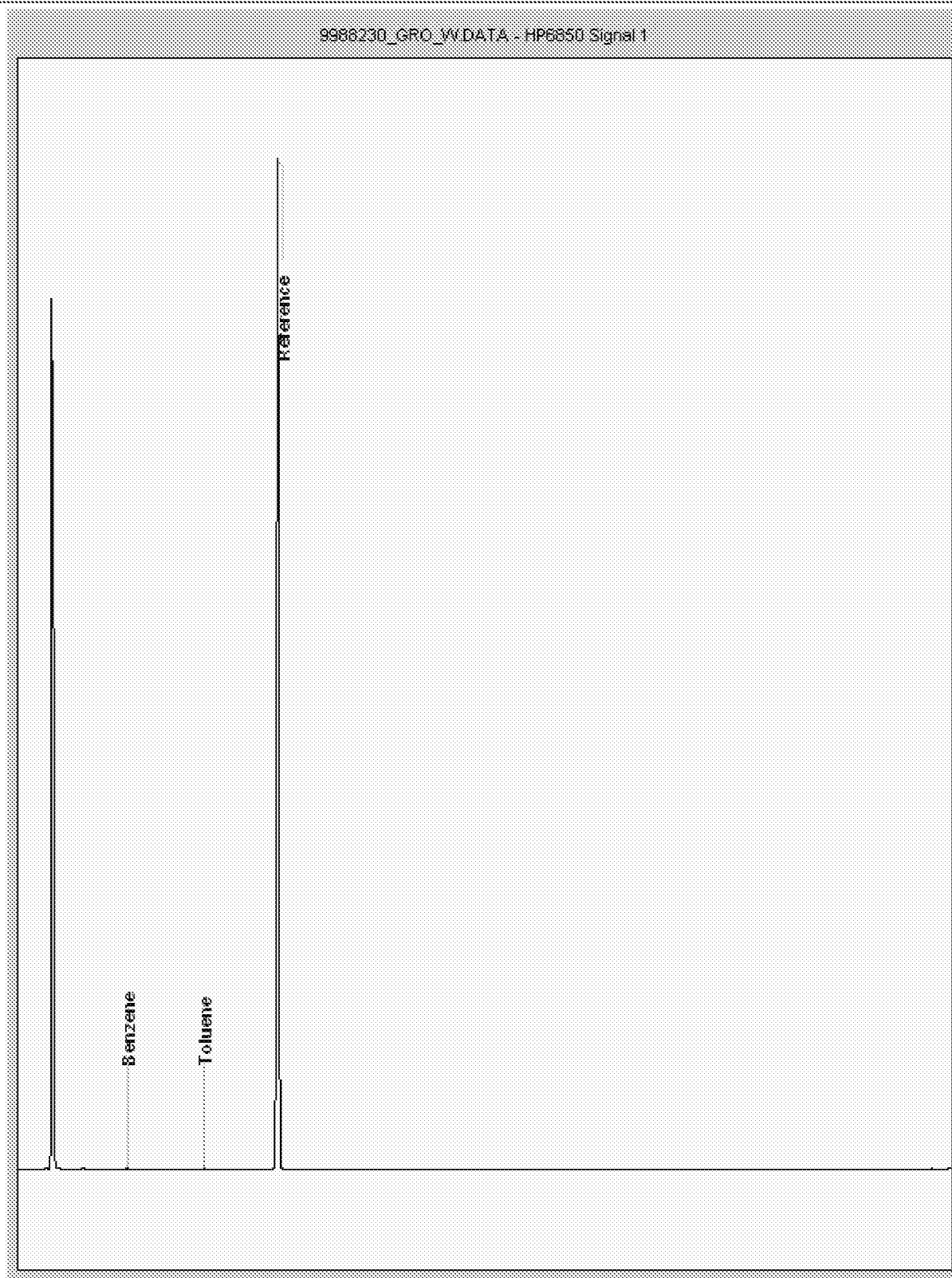
Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 9988230
Sample ID : EQUIPMENT BLANK

Depth :



SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

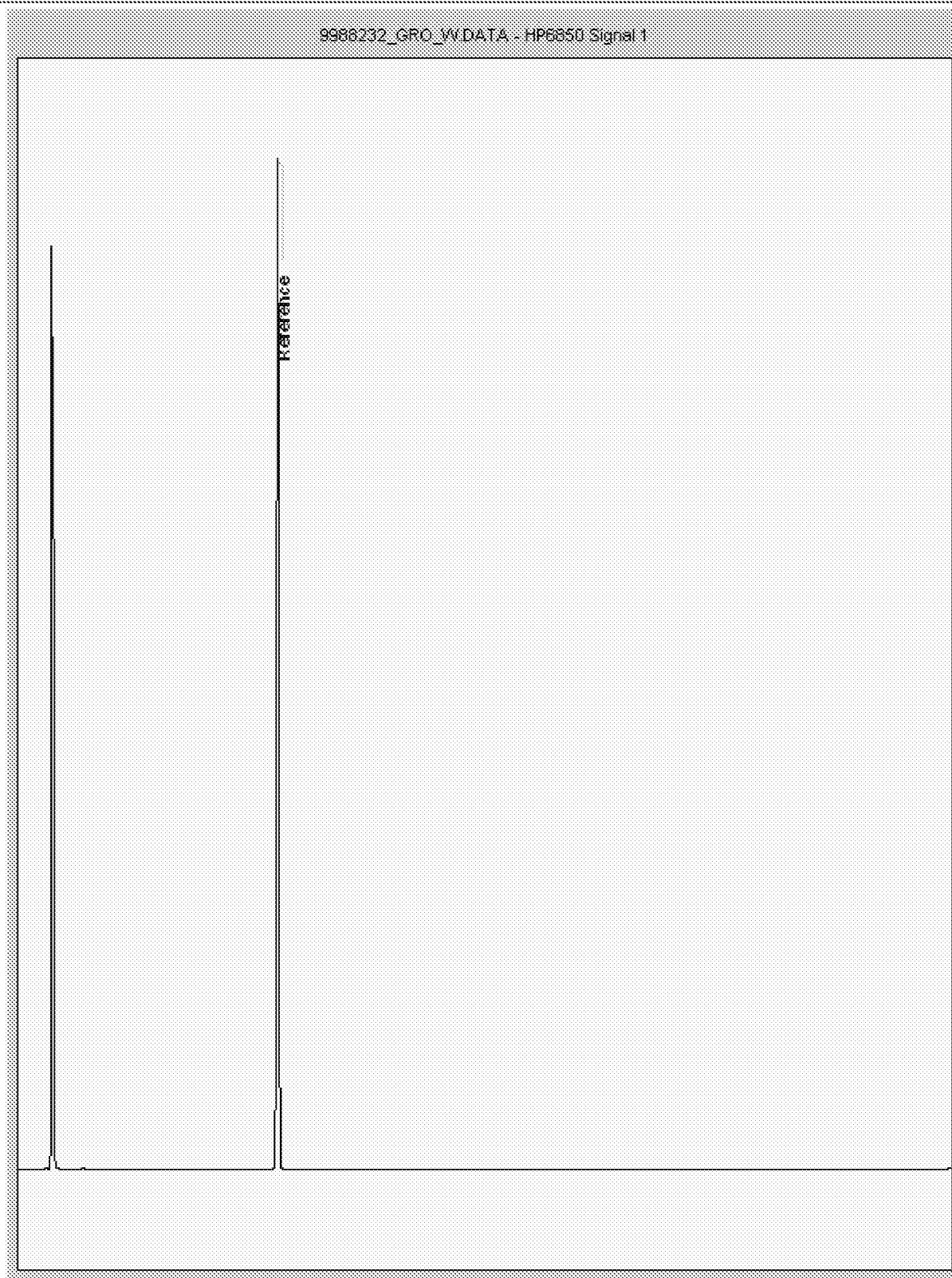
Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 9988232
Sample ID : MW7

Depth :



SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

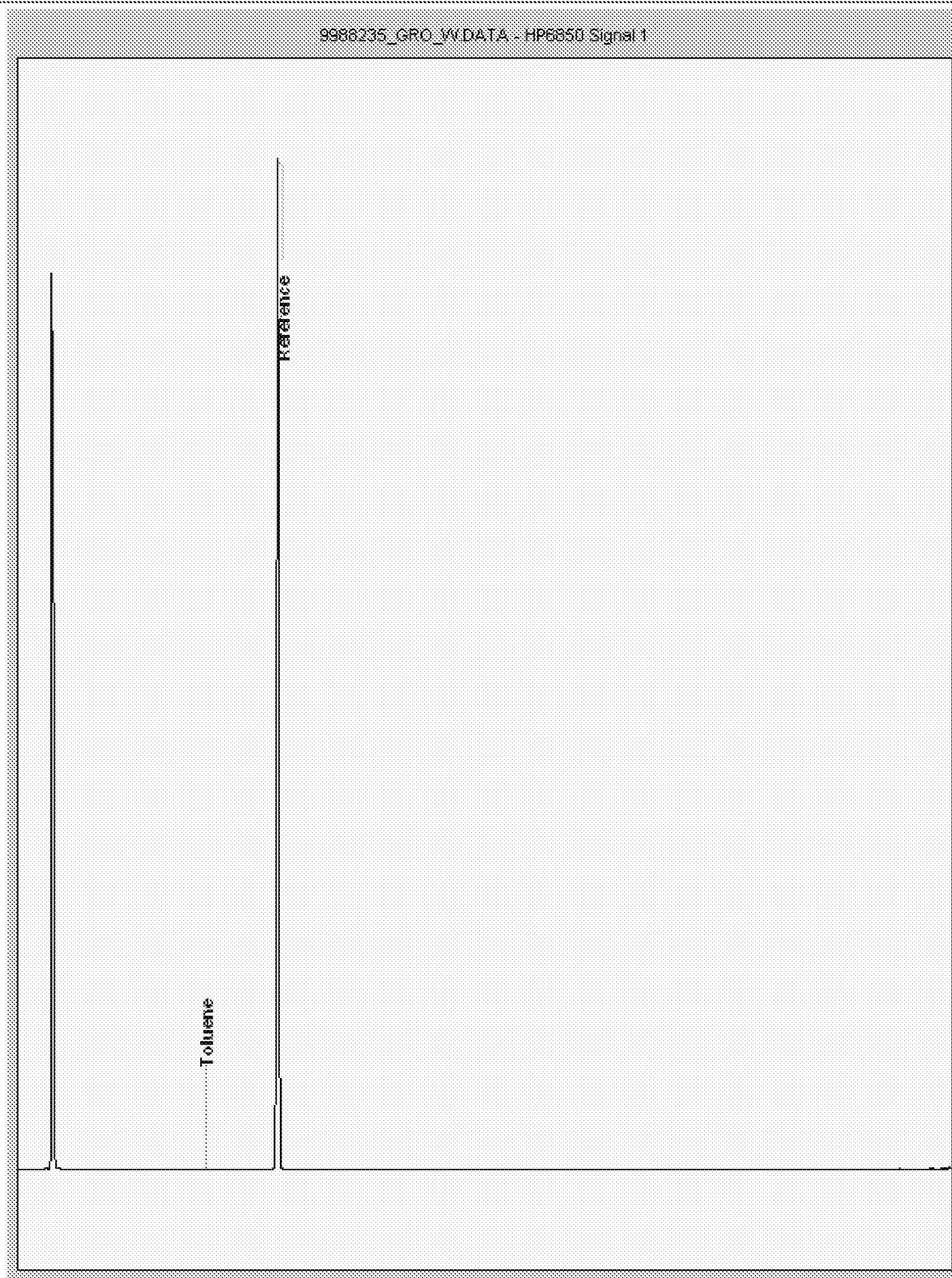
Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 9988235
Sample ID : MW4

Depth :



SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

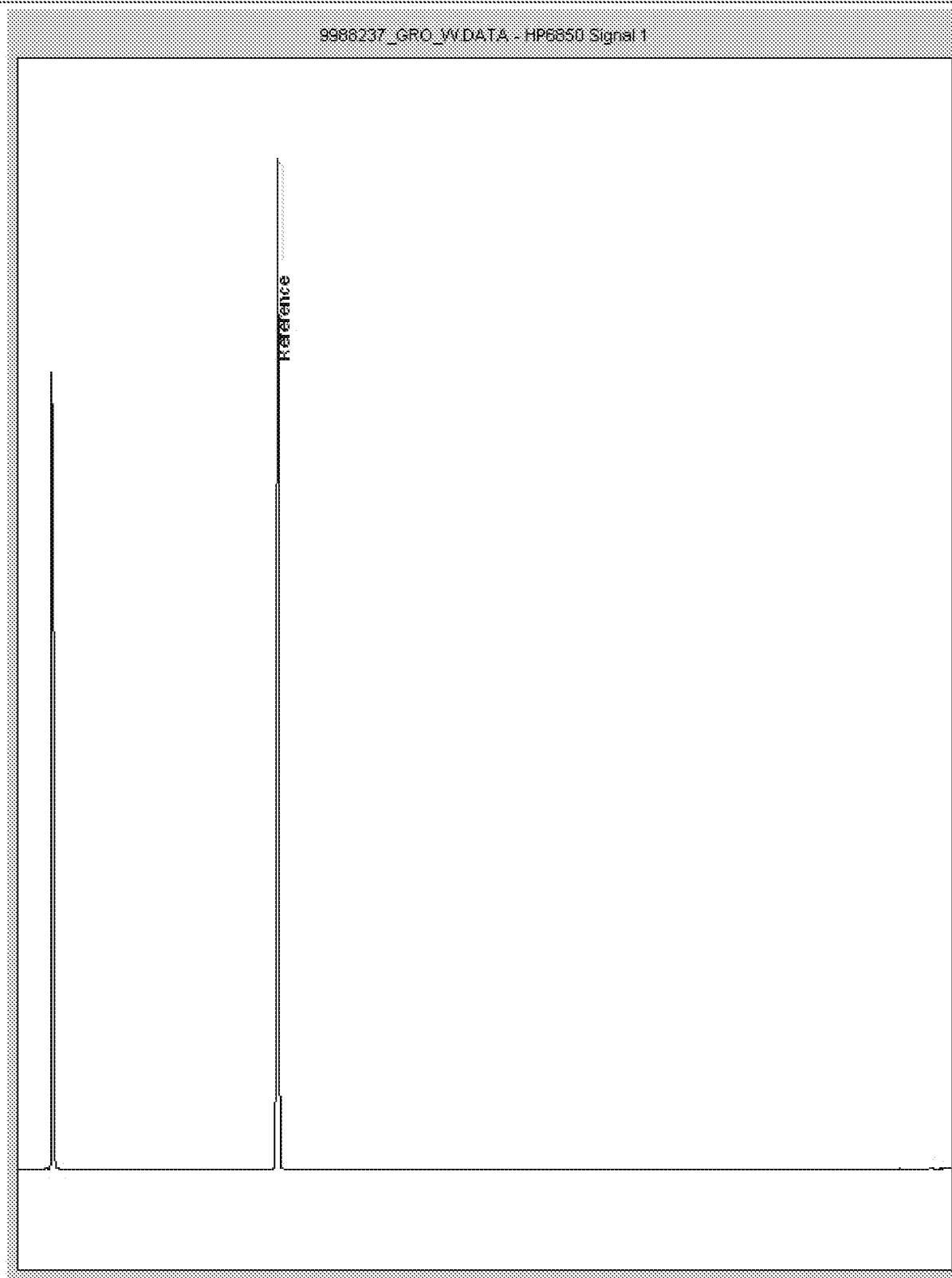
Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 9988237
Sample ID : MW2

Depth :



SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

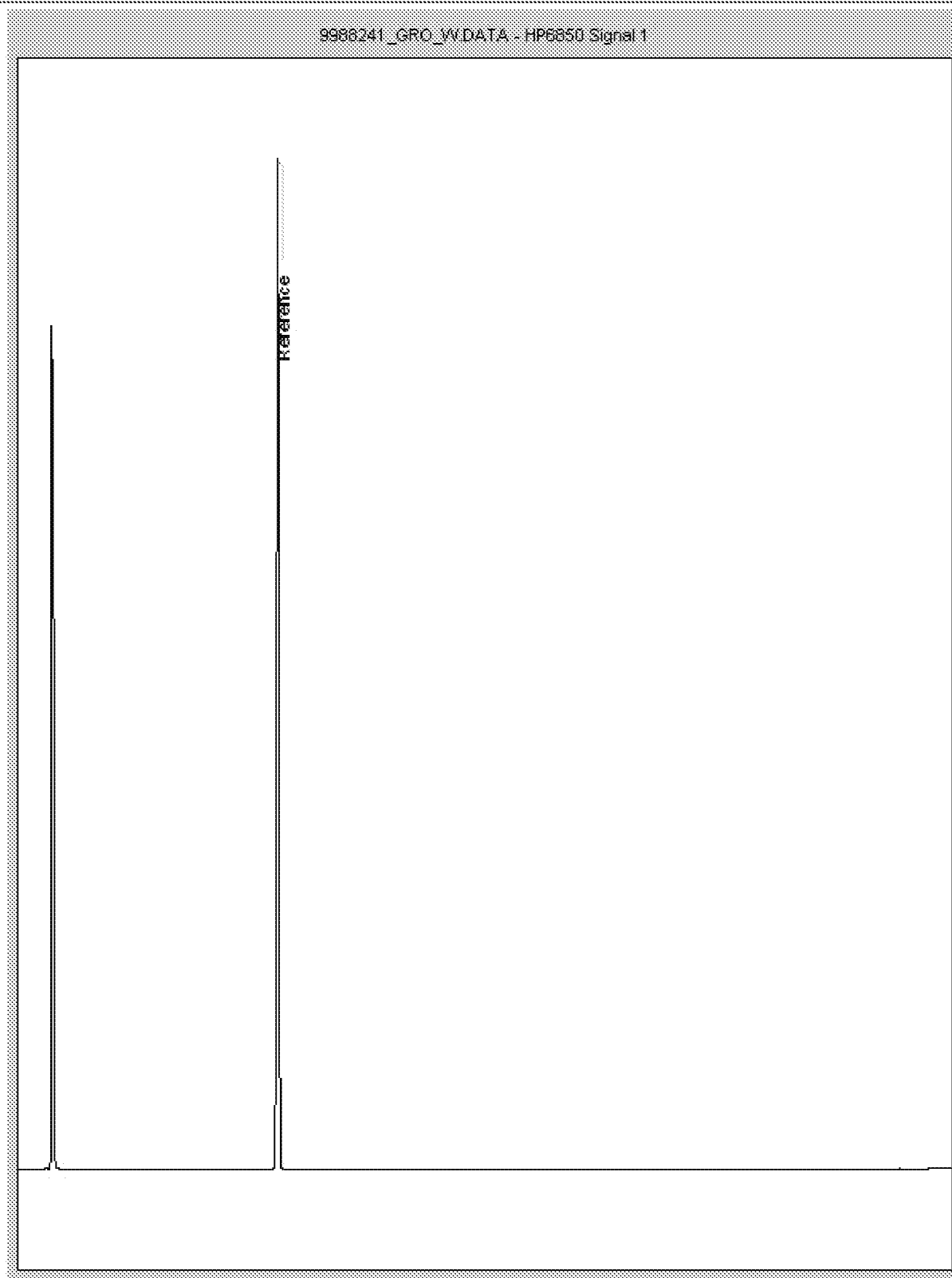
Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 9988241
Sample ID : MW1

Depth :



SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

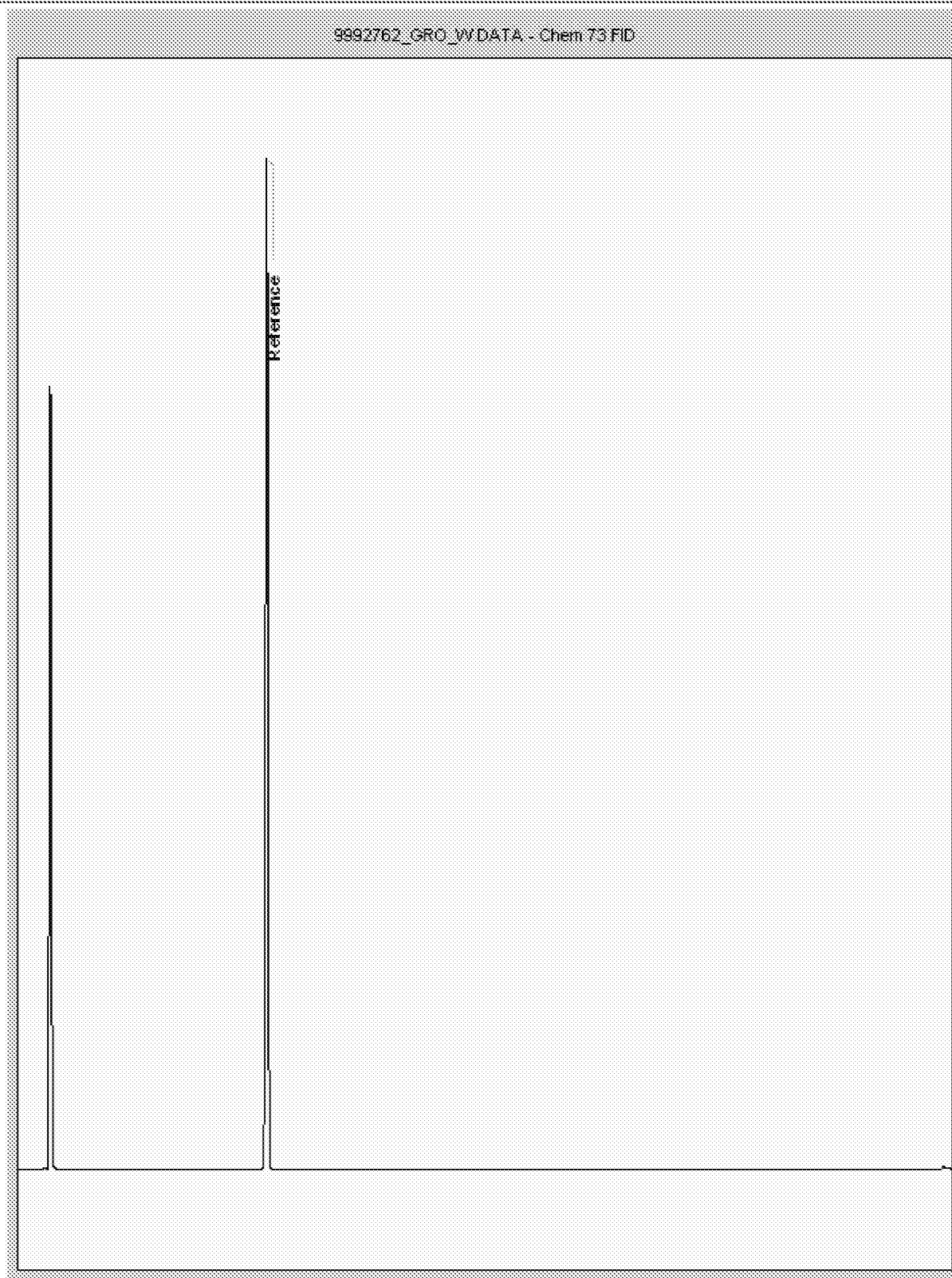
Order Number:
Report Number: 284574
Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 9992762
Sample ID : MW5

Depth :



Order Number:
Report Number: 284574
Superseded Report:



SDG: 140912-76
Job: H_URS_WIM-60
Client Reference: 49319164

Location: Shell Fontwell
Customer: URS
Attention: Jane Lawrie

Order Number:
Report Number: 284574
Superseded Report:

Appendix General

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

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

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

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

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

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

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

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

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

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

11. Results relate only to the items tested.

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

13. **Surrogate recoveries** -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
5	Samples exceeded holding time before preservation was performed
6	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.



ALcontrol Laboratories

Units 7 - 8 Hawarden Business Park, Manor Road (Off Manor Lane), Hawarden, Deeside, CH5 3US

email: customerservices@alcontrol.com

Tel : 01244 528 777 Couriers : 0845 900 3800

Client: URS
Address: Wimbledon

Date Samples Despatched : 18/9

Sampler : S O n n a

Quotation - yes/no (please specify Quotation Number)

Sheet
of

Only one project per sheet
please.

Tel:

Location [PROJ_NAME]: Sho / Fort We

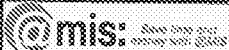
Project Code [PROJ_ID]

Job Continuation - yes / no

Continuation of ALcontrol job:

Email :

Contact Name : James J. Conley

[illegible]

Will samples be scheduled in @mis? Yes / No

KNOWN HAZARDS / Additional instructions / overseas samples

Please ensure water matrices are clearly identified for correct MCERTS accreditation.

P.O. Number

NB.-Results will not be issued without a PO number

Invoice address if different from above:

Date Received:

Time:

Signature: _____

ALcontrol Job No.

Duplicate RPD Summary

Fontwell August/ October 2011

10018981_MW2	W	WATER		µg/l	111010-10					
Chem Class	Analyte	MDL	Sample	Dup	MDL Ratio	RPD Limit	RPD Value	Comment	Pass/Fail	
BTEX	BENZENE	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
BTEX	ETHYLBENZENE	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
BTEX	M_P_XYLENE	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
BTEX	O_XYLENE	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
BTEX	TOLUENE	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	ARSENIC	0.12	1.51	1.56	13	50	-3.25733	Conc >10x MDL but <20x MDL; RPD limit = 50%	OK	
METALDIS	BORON	9.4	22.7	21.9	2.41489	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	CADMIUM	0.1	0.1	0.1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	CHROMIUM	0.22	17.2	15.7	78.1818	30	9.118541	Conc >20x MDL; RPD limit = 30%	OK	
METALDIS	COPPER	0.85	3.36	2.78	3.95294	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	HEXAVALENT_CHROMIUM	30	91	32	3.03333	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	LEAD	0.02	0.134	0.122	6.7	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	MERCURY	0.01	0.01	0.01	1	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	MOLYBDENUM	0.24	7.8	7.11	32.5	30	9.255533	Conc >20x MDL; RPD limit = 30%	OK	
METALDIS	NICKEL	0.15	1.53	1.61	10.7333	50	-5.09554	Conc >10x MDL but <20x MDL; RPD limit = 50%	OK	
METALDIS	SELENIUM	0.39	2.95	2.79	7.56410	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	TIN	0.36	1.39	0.881	3.86111	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	TOTAL_COBALT	0.08	0.159	0.165	2.75	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	ZINC	0.41	1.59	3.56	8.68293	0	0	Conc <10x MDL; No RPD Limit	OK	
PAH	ACENAPHTHENE	0.015	0.0226	0.026	1.73333	0	0	Conc <10x MDL; No RPD Limit	OK	
PAH	ACENAPHTHYLENE	0.011	0.011	0.011	1	0	0	Conc <10x MDL; No RPD Limit	OK	
PAH	ANTHRACENE	0.015	0.0346	0.015	2.30667	0	0	Conc <10x MDL; No RPD Limit	OK	
PAH	BENZO_A_ANTHRACENE	0.017	0.0301	0.017	1.77059	0	0	Conc <10x MDL; No RPD Limit	OK	
PAH	BENZO_A_PYRENE	0.009	0.0133	0.009	1.47778	0	0	Conc <10x MDL; No RPD Limit	OK	

Duplicate RPD Summary

Fontwell August/ October 2011

10018981_MW2	W	WATER	µg/l	111010-10					
Chem Class	Analyte	MDL	Sample	Dup	MDL Ratio	RPD Limit	RPD Value	Comment	Pass/Fail
PAH	BENZO_B_FLUORANTHENE	0.023	0.023	0.023	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	BENZO_G_H_I_PERYLENE	0.016	0.016	0.016	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	BENZO_K_FLUORANTHENE	0.027	0.027	0.027	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	Chrysene	0.013	0.0339	0.013	2.60769	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	DIBENZ_A_H_ANTHRACENE	0.016	0.016	0.016	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	Fluoranthene	0.017	0.0906	0.017	5.32941	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	FLUORENE	0.014	0.057	0.014	4.07143	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	INDENO_1_2_3_CD_PYRENE	0.014	0.014	0.014	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	NAPHTHALENE	0.1	0.1	0.219	2.19	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	PHENANTHRENE	0.022	0.252	0.022	11.4545	50	167.8832	Conc >10x MDL but <20x MDL, RPD limit = 50%	FAIL
PAH	PYRENE	0.015	0.0718	0.015	4.78667	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	TOTAL_PAH	0.247	0.606	0.247	2.45344	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C10_C12_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C10_C12_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C12_C16_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C12_C16_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C16_C21_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C16_C21_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C21_C35_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C21_C35_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C5_C6_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C6_C7_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C6_C8_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C7_C8_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C8_C10_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK

Duplicate RPD Summary

Fontwell August/ October 2011

10018981_MW2		W	WATER		µg/l	111010-10				
Chem Class	Analyte	MDL	Sample	Dup	MDL Ratio	RPD Limit	RPD Value	Comment	Pass/Fail	
RISKTPH	RISK_TPH_C3_C10_AROM	10	10	10	1	0	0	Conc <10x MDL; No RPD Limit	OK	
VOC	DIPE	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
VOC	ETBE	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
VOC	ETHANOL	50	50	50	1	0	0	Conc <10x MDL; No RPD Limit	OK	
VOC	MTBE	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
VOC	TAME	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
VOC	TBA	10	10	10	1	0	0	Conc <10x MDL; No RPD Limit	OK	
VOC	TOLUENE_D8	0	103	103	#Div/0!	#Div/0!	#Div/0!	#Div/0!	#Div/0!	

Duplicate RPD Summary

Fontwell Historical Data

10018981 MW7 4		SOIL		mg/kg		SOIL			
Chem Class	Analyte	MDL	Sample	Dup	MDL Ratio	RPD Limit	RPD Value	Comment	Pass/Fail
BTEX	BENZENE	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
BTEX	ETHYLBENZENE	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
BTEX	M_P_XYLENE	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
BTEX	O_XYLENE	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
BTEX	TOLUENE	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C10_C12_ALI	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C10_C12_AROM	0.1	0.1	0.1	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C12_C16_ALI	0.1	0.1	0.1	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C12_C16_AROM	0.1	0.1	0.1	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C16_C21_ALI	0.1	3.6	3.9	39	30	-8	Conc >20x MDL, RPD limit = 30%	OK
RISKTPH	RISK_TPH_C16_C21_AROM	0.1	2.9	3.5	35	30	-18.75	Conc >20x MDL, RPD limit = 30%	OK
RISKTPH	RISK_TPH_C21_C35_ALI	0.1	1.1	0.1	11	50	166.6667	Conc >10x MDL but <20x MDL, RPD limit = 50%	FAIL
RISKTPH	RISK_TPH_C21_C35_AROM	0.1	0.1	1.2	12	50	69.23077	Conc >10x MDL but <20x MDL, RPD limit = 50%	FAIL
RISKTPH	RISK_TPH_C5_C35_ALI	0.1	4.7	3.9	47	30	18.60465	Conc >20x MDL, RPD limit = 30%	OK
RISKTPH	RISK_TPH_C5_C6_ALI	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C6_C35_AROM	0.1	2.9	4.7	47	30	-47.3684	Conc >20x MDL, RPD limit = 30%	OK
RISKTPH	RISK_TPH_C6_C7_AROM	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C6_C8_ALI	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C7_C8_AROM	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C8_C10_ALI	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C8_C10_AROM	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	TOTAL_TPH	0.1	7.6	8.6	86	30	-12.3457	Conc >20x MDL, RPD limit = 30%	OK
VOC	MTBE	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	TAME	0.01	0.01	0.01	1	0	0	Conc <10x MDL, No RPD Limit	OK

Duplicate RPD Summary

Fontwell Historical Data

10018981_MW7_4		SOIL	mg/kg		SOIL				
Chem Class	Analyte	MDL	Sample	Dup	MDL Ratio	RPD Limit	RPD Value	Comment	Pass/Fail
VOC	TETRAETHYL_LEAD	0.01	0.01	0.01	1	0	0	Conc < 10x MDL, No RPD Limit	OK

Duplicate RPD Summary

Fontwell January 2013

10018981_MW7		W	WATER		µg/l	130118-65				
Chem Class	Analyte	MDL	Sample	Dup	MDL Ratio	RPD Limit	RPD Value	Comment	Pass/Fail	
BTEX	BENZENE	1	1.02	1	1.02	0	0	Conc <10x MDL; No RPD Limit	OK	
BTEX	Ethylbenzene	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
BTEX	M_P_XYLENE	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
BTEX	O_XYLENE	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
BTEX	TOLUENE	1	1	1	1	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	ARSENIC	0.12	0.514	0.445	4.28333	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	BORON	9.4	32.1	32.3	3.43617	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	CADMIUM	0.1	0.1	0.114	1.14	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	CHROMIUM	0.22	2.62	2.35	11.9091	50	10.86519	Conc >10x MDL but <20x MDL; RPD limit = 50%	OK	
METALDIS	COPPER	0.85	0.85	0.85	1	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	HEXAVALENT_CHROMIUM	30	30	30	1	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	LEAD	0.02	0.052	0.058	2.9	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	MERCURY	0.01	0.01	0.01	1	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	MOLYBDENUM	0.24	0.24	0.24	1	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	NICKEL	0.15	1.31	1.21	8.73333	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	SELENIUM	0.39	2.09	1.95	5.35897	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	TOTAL_COBALT	0.06	1.38	0.17	23	50	156.1290	Conc >10x MDL but <20x MDL; RPD limit = 50%	FAIL	
METALDIS	TOTAL_TIN	0.36	0.36	0.36	1	0	0	Conc <10x MDL; No RPD Limit	OK	
METALDIS	ZINC	0.41	2.56	2.1	6.24390	0	0	Conc <10x MDL; No RPD Limit	OK	
PAH	ACENAPHTHENE	0.015	0.0458	0.015	3.05333	0	0	Conc <10x MDL; No RPD Limit	OK	
PAH	ACENAPHTHYLENE	0.011	0.011	0.011	1	0	0	Conc <10x MDL; No RPD Limit	OK	
PAH	ANTHRACENE	0.015	0.015	0.015	1	0	0	Conc <10x MDL; No RPD Limit	OK	
PAH	BENZO_A_ANTHRACENE	0.017	0.0268	0.017	1.57647	0	0	Conc <10x MDL; No RPD Limit	OK	
PAH	BENZO_A_PYRENE	0.009	0.009	0.009	1	0	0	Conc <10x MDL; No RPD Limit	OK	

Duplicate RPD Summary

Fontwell January 2013

10018981 MW7 W		WATER		µg/l		130118-65			
Chem Class	Analyte	MDL	Sample	Dup	MDL Ratio	RPD Limit	RPD Value	Comment	Pass/Fail
PAH	BENZO_B_FLUORANTHENE	0.023	0.023	0.023	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	BENZO_G_H_I_PERYLENE	0.016	0.016	0.016	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	BENZO_K_FLUORANTHENE	0.027	0.027	0.027	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	CHRYSENE	0.013	0.013	0.013	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	DIBENZ_A_H_ANTHRACENE	0.016	0.016	0.016	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	FLUORANTHENE	0.017	0.017	0.017	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	FLUORENE	0.014	0.014	0.014	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	INDENO_1_2_3_CD_PYRENE	0.014	0.014	0.014	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	NAPHTHALENE	0.1	0.1	0.1	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	Phenanthrene	0.022	0.022	0.022	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	PYRENE	0.015	0.015	0.015	1	0	0	Conc <10x MDL, No RPD Limit	OK
PAH	TOTAL_PAH	0.247	0.247	0.247	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C10_C12_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C10_C12_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C12_C16_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C12_C16_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C16_C21_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C16_C21_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C21_C35_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C21_C35_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C5_C6_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C6_C7_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C6_C8_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C7_C8_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C8_C10_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK

Duplicate RPD Summary

Fontwell January 2013

10018981_MW7		W	WATER		µg/l	130118-65				
Chem Class	Analyte	MDL	Sample	Dup	MDL Ratio	RPD Limit	RPD Value	Comment	Pass/Fail	
RISKTPH	RISK_TPH_C3_C10_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK	
VOC	DIPE	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK	
VOC	ETBE	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK	
VOC	ETHANOL	50	50	50	1	0	0	Conc <10x MDL, No RPD Limit	OK	
VOC	MTBE	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK	
VOC	TAME	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK	
VOC	TBA	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK	

Duplicate RPD Summary

Fontwell January/February 2012

10018981_MW5		W	WATER		µg/l		120203-33			
Chem Class	Analyte	MDL	Sample	Dup	MDL Ratio	RPD Limit	RPD Value	Comment		Pass/Fail
BTEX	BENZENE	1	1	1	1	0	0	Conc <10x MDL No RPD Limit		OK
BTEX	ETHYLBENZENE	1	1	1	1	0	0	Conc <10x MDL No RPD Limit		OK
BTEX	M_P_XYLENE	1	1	1	1	0	0	Conc <10x MDL No RPD Limit		OK
BTEX	O_XYLENE	1	1	1	1	0	0	Conc <10x MDL No RPD Limit		OK
BTEX	TOLUENE	1	1.95	1.33	1.95	0	0	Conc <10x MDL No RPD Limit		OK
PAH	ACENAPHTHENE	0.015	0.015	0.0276	1.84	0	0	Conc <10x MDL No RPD Limit		OK
PAH	ACENAPHTHYLENE	0.011	0.011	0.0114	1.03636	0	0	Conc <10x MDL No RPD Limit		OK
PAH	Anthracene	0.015	0.015	0.015	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	BENZO_A_ANTHRACENE	0.017	0.017	0.017	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	BENZO_A_PYRENE	0.009	0.009	0.009	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	BENZO_B_FLUORANTHENE	0.023	0.023	0.023	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	BENZO_G_H_I_PERYLENE	0.016	0.016	0.016	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	BENZO_K_FLUORANTHENE	0.027	0.027	0.027	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	CHRYSENE	0.013	0.013	0.013	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	DIBENZ_A_H_ANTHRACENE	0.016	0.016	0.016	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	FLUORANTHENE	0.017	0.017	0.017	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	Fluorene	0.014	0.014	0.0549	3.92143	0	0	Conc <10x MDL No RPD Limit		OK
PAH	INDENO_1_2_3_CD_PYRENE	0.014	0.014	0.014	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	NAPHTHALENE	0.1	0.1	0.1	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	PHENANTHRENE	0.022	0.022	0.022	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	PYRENE	0.015	0.0699	0.0204	4.66	0	0	Conc <10x MDL No RPD Limit		OK
PAH	TOTAL_PAH	0.247	0.247	0.247	1	0	0	Conc <10x MDL No RPD Limit		OK
RISKTPH	RISK_TPH_C10_C12_ALI	10	10	10	1	0	0	Conc <10x MDL No RPD Limit		OK
RISKTPH	RISK_TPH_C10_C12_AROM	10	10	10	1	0	0	Conc <10x MDL No RPD Limit		OK

Duplicate RPD Summary

Fontwell January/February 2012

10018981 MW5 W		WATER		µg/l		120203-33			
Chem Class	Analyte	MDL	Sample	Dup	MDL Ratio	RPD Limit	RPD Value	Comment	Pass/Fail
RISKTPH	RISK_TPH_C12_C16_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C12_C16_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C16_C21_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C16_C21_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C21_C35_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C21_C35_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C5_C6_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C5_C7_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C6_C8_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C7_C8_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C8_C10_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C8_C10_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	DIPE	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	ETBE	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	ETHANOL	50	50	50	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	MTBE	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	TAME	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	TBA	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	TOLUENE_D8	0	98.5	98.9	#Div/0!	#Div/0!	#Div/0!	#Div/0!	#Div/0!

Duplicate RPD Summary

Fontwell September 2014

10018981_MW1		W	WATER		µg/l		140912-76			
Chem Class	Analyte	MDL	Sample	Dup	MDL Ratio	RPD Limit	RPD Value	Comment		Pass/Fail
BTEX	BENZENE	1	1	1	1	0	0	Conc <10x MDL No RPD Limit		OK
BTEX	ETHYLBENZENE	1	1	1	1	0	0	Conc <10x MDL No RPD Limit		OK
BTEX	M_P_XYLENE	1	1	1	1	0	0	Conc <10x MDL No RPD Limit		OK
BTEX	O_XYLENE	1	1	1	1	0	0	Conc <10x MDL No RPD Limit		OK
BTEX	TOLUENE	1	1	1	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	Acenaphthene	0.015	0.015	0.015	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	Acenaphthylene	0.011	0.011	0.011	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	Anthracene	0.015	0.015	0.015	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	BENZO_A_ANTHRACENE	0.017	0.017	0.017	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	BENZO_A_PYRENE	0.009	0.009	0.009	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	BENZO_B_FLUORANTHENE	0.023	0.023	0.023	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	BENZO_G_H_I_PERYLENE	0.016	0.016	0.016	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	BENZO_K_FLUORANTHENE	0.027	0.027	0.027	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	Chrysene	0.013	0.013	0.013	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	DIBENZ_A_H_ANTHRACENE	0.016	0.016	0.016	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	Fluoranthene	0.017	0.017	0.017	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	Fluorene	0.014	0.014	0.014	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	INDENO_1_2_3_CD_PYRENE	0.014	0.014	0.014	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	Naphthalene	0.1	0.1	0.1	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	Phenanthrene	0.022	0.022	0.022	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	Pyrene	0.015	0.015	0.015	1	0	0	Conc <10x MDL No RPD Limit		OK
PAH	TOTAL_PAH	0.344	0.344	0.344	1	0	0	Conc <10x MDL No RPD Limit		OK
RISKTPH	RISK_TPH_C10_C12_ALI	10	10	10	1	0	0	Conc <10x MDL No RPD Limit		OK
RISKTPH	RISK_TPH_C10_C12_AROM	10	10	10	1	0	0	Conc <10x MDL No RPD Limit		OK

Duplicate RPD Summary

Fontwell September 2014

10018981 MW1	W	WATER	µg/l	140912-76					
Chem Class	Analyte	MDL	Sample	Dup	MDL Ratio	RPD Limit	RPD Value	Comment	Pass/Fail
RISKTPH	RISK_TPH_C12_C16_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C12_C16_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C16_C21_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C16_C21_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C21_C35_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C21_C35_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C5_C6_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C5_C7_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C6_C8_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C7_C8_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C8_C10_ALI	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
RISKTPH	RISK_TPH_C8_C10_AROM	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
SVOC	A_2_METHYLNAPHTHALENE	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK
TPH	TOTAL AROMATICS >EC16-EC35	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	DIPE	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	ETBE	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	ETHANOL	50	50	50	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	MTBE	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	N_HEXANE	2	2	2	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	TAME	1	1	1	1	0	0	Conc <10x MDL, No RPD Limit	OK
VOC	TBA	10	10	10	1	0	0	Conc <10x MDL, No RPD Limit	OK

A duplicate sample should be taken for every 20 samples or 1 per sampling event, if less than 20 samples are collected. It is best to avoid taking duplicates of samples that are likely to return concentrations close to the detection limit, and also samples where concentrations may be close to the solubility limit, e.g. where globules of free product are present. The duplicate must not be identified as such. Instead it should be assigned a reference number similar to the sample numbering notation such that it is unrecognisable to the laboratory as a duplicate. For example if nine boreholes, BH1 to BH9 are being sampled, and a duplicate of borehole BH5 is taken, this should be referred to as BH6 and not BH5A. The lab also needs to report the duplicate sample electronically as sample_type DUP so that the S&GN database can then be used to compare results.

On receipt of the laboratory data, the following assessment should be performed:

To evaluate the precision of the data, firstly calculate the Relative Percent Difference, RPD, as follows:

$$RPD = \frac{(S - D)}{\frac{(S + D)}{2}} \times 100$$

where S = Sample Result and D = Duplicate Result

Next, compare the RPD to the Reporting Limit, which should be provided on the laboratory certificate. As a guideline:

- If the sample concentration is less than 10 times the reporting limit, the RPD is not overly critical.
- If the sample concentration is between 10 times and 20 times the reporting limit, the RPD should be less than 50%.
- If the sample concentration is greater than 20 times the reporting limit, the RPD should be less than 20%.
- If the RPD falls outside these criteria, then professional judgement should be used to evaluate the acceptability of the data using the following criteria as guidance:
 - If the sample is soil there is a strong possibility that the elevated RPD relates to a matrix effect, particularly with highly heterogeneous media, or where textural characteristics make homogenisation difficult (e.g. a stiff clay). Refer to borehole logs and field notes.
 - If the sample is an aqueous sample check that the well has been adequately purged or whether only a limited volume of water was recoverable – e.g. with discontinuous perched groundwater, in this case some variation between samples may be expected.
 - If the sample has entrained free product – this could relate to small globules, not a distinct layer – then small differences in the amount present could result in significant variation in concentrations measured, the latter not being truly reflective of 'dissolved phase' concentrations.
- If none of these are applicable and there is no additional reason to suppose that lesser or greater losses of the compound in question took place from the sample compared to its duplicate, as a result of handling issues, then an explanation should be sought from the laboratory, with the lab QA coordinator being copied on all correspondence.

PM Comments

Project Manager:

Date:

Blank Detections

Sample Type: WATER $\mu\text{g/l}$

EQUIPMENT BLANK Fontwell January 2013

Sample ID	Depth (m)	Analyte	Lab Sample	Sample Date	Amount	MDL
10018991 EQUIP BLANK	W	LEAD	6793421	16/01/2013	0.366	0.02
10018991 EQUIP BLANK	W	BORON	6793421	16/01/2013	18.6	9.4
10018991 EQUIP BLANK	W	ZINC	6793421	16/01/2013	1.63	0.41
10018991 EQUIP BLANK	W	SELENIUM	6793421	16/01/2013	0.501	0.39
10018991 EQUIP BLANK	W	MOLYBDENUM	6793421	16/01/2013	2.5	0.24
10018991 EQUIP BLANK	W	CHROMIUM	6793421	16/01/2013	1.33	0.22
10018991 EQUIP BLANK	W	NICKEL	6793421	16/01/2013	0.623	0.15
10018991 EQUIP BLANK	W	ARSENIC	6793421	16/01/2013	0.535	0.12
10018991 EQUIP BLANK	W	TOTAL COBALT	6793421	16/01/2013	0.062	0.06
10018991 EQUIPMENT	W	BORON	2677324	11/01/2011	18.6	9.4
10018991 EQUIPMENT	W	COPPER	2677324	11/01/2011	18.6	0.85
10018991 EQUIPMENT	W	LEAD	2677324	11/01/2011	0.311	0.02
10018991 EQUIPMENT	W	ZINC	2677324	11/01/2011	3.77	0.41
10018991 EQUIPMENT	W	SELENIUM	2677324	11/01/2011	3.33	0.39
10018991 EQUIPMENT	W	MOLYBDENUM	2677324	11/01/2011	3.64	0.24
10018991 EQUIPMENT	W	CHROMIUM	2677324	11/01/2011	18.3	0.22
10018991 EQUIPMENT	W	NICKEL	2677324	11/01/2011	3.72	0.15
10018991 EQUIPMENT	W	COBALT	2677324	11/01/2011	0.285	0.06
10018991 EQUIPMENT	W	PHENANTHRENE	2677324	11/01/2011	0.0215	0.022
10018991 EQUIPMENT	W	ARSENIC	2677324	11/01/2011	0.373	0.12
10018991 EQUIPMENT BLANK	W	LEAD	4465027	06/10/2011	0.30	0.02
10018991 EQUIPMENT BLANK	W	MOLYBDENUM	4465027	06/10/2011	0.516	0.24

Blank Detections

Sample Type: WATER $\mu\text{g/l}$

EQUIPMENT BLANK Fontwell January 2013

Sample ID	Depth (m)	Analyte	Lab Sample	Sample Date	Amount	MDL
10018991 EQUIPMENT BLANK	W	PHENANTHRENE	4465027	06/10/2011	0.022	0.022
10018991 EQUIPMENT BLANK	W	TOTAL COBALT	4465027	06/10/2011	0.06	0.06
10018991 EQUIPMENT BLANK	W	ARSENIC	4465027	06/10/2011	0.12	0.12
10018991 EQUIPMENT BLANK	W	CHROMIUM	4465027	06/10/2011	0.22	0.22
10018991 EQUIPMENT BLANK	W	BENZENE	9979821	10/09/2014	1	1
10018991 EQUIPMENT BLANK	W	TIN	4465027	06/10/2011	0.36	0.36
10018991 EQUIPMENT BLANK	W	SELENIUM	4465027	06/10/2011	0.39	0.39
10018991 EQUIPMENT BLANK	W	ZINC	4465027	06/10/2011	0.41	0.41
10018991 EQUIPMENT BLANK	W	COPPER	4465027	06/10/2011	0.85	0.85
10018991 EQUIPMENT BLANK	W	BORON	4465027	06/10/2011	9.4	9.4
10018991 EQUIPMENT BLANK	W	Naphthalene	9979821	10/09/2014	0.1	0.1
10018991 EQUIPMENT BLANK	W	NICKEL	4465027	06/10/2011	0.15	0.15

The procedure for evaluating blanks should be as follows:

Confirm that blank data have been provided at the appropriate frequency as above:

- Identify whether there are any target or non-target compounds in the blank, noting that the following compounds are common laboratory contaminants:
 - Methylene chloride (Dichloromethane)
 - Chloroform (Trichloromethane)
 - Acetone
 - Cyclohexane
 - 2-butanone
 - Phthalates
- If there is a contaminant in the blank that does not occur in any of the samples, no action is required.
- If any of the above common laboratory contaminants is present in the laboratory blank, then any result that falls within 10 times the value reported in the laboratory blank should be treated as suspect and ideally reported as 'less than' this value. So for example, if 5 µg/l of dichloromethane has been detected in the laboratory blank, a concentration of 45 µg/l dichloromethane identified in a particular sample should be reported as <45 µg/l.
- For any other compound that is present in the laboratory blank, then any result that falls within 5 times the value reported in the laboratory blank should be treated as suspect and ideally reported as 'less than' this value. So for example, if 0.5 mg/l of nitrate has been detected in the laboratory blank, a concentration of 1 mg/l nitrate identified in a particular sample should be reported as <2.5 mg/l.

The tabulation of the data should therefore either report these values as <10x or <5x the blank value or, if it is preferred, indicate this as a footnote to the relevant tables:

Due to the occurrence of dichloromethane within the blank sample at a concentration of 5 µg/l, then based on USEPA CLP Functional Guidelines, concentrations below 50 µg/l are not considered to represent positive identification of this compound

There may however be instances where the elevated reporting limit falls above the initial screening criterion for a specific compound, but the actual value present in the sample falls below the latter, in such cases it is permissible in the report to refer to the reported value, in order that it may be eliminated from subsequent risk considerations, although reference should still be made to its occurrence in the blank.

A similar procedure should be adopted with regards to the trip blank, (taking the highest concentration in each of the blanks as the basis for comparison)

However in the case of the field blank, professional judgement should be used to evaluate the significance of any positive identifications and the effect on the usability and reporting of the sample data.

PM Notes

Project Manager:

Date:

Holding Times >7 Days from Sample to Extraction

Sample Type: WATER
Site: Fontwell

Sample ID	Depth (m)	Analyte	Lab Sample	Sample Date	Extraction Date	Holding Time (Days)
10018981_MW2	W	DIPE	4465023	06/10/2011	17/10/2011	11
10018981_MW7	W	DIPE	4465025	06/10/2011	17/10/2011	11
10018981_MW4	W	DIPE	4465024	08/10/2011	17/10/2011	11
10018981_MW7	W	TBA	4465025	06/10/2011	14/10/2011	8
10018981_MW7	W	ETHANOL	4465025	06/10/2011	14/10/2011	8
10018981_MW7	W	ETBE	4465025	06/10/2011	14/10/2011	8
10018981_MW4	W	ETHANOL	4465024	08/10/2011	14/10/2011	8
10018981_MW4	W	TBA	4465024	06/10/2011	14/10/2011	8
10018981_MW4	W	ETBE	4465024	06/10/2011	14/10/2011	8
10018981_MW2	W	ETHANOL	4465023	08/10/2011	14/10/2011	8
10018981_MW2	W	TBA	4465023	06/10/2011	14/10/2011	8
10018981_MW2	W	ETBE	4465023	06/10/2011	14/10/2011	8

Sample Type: WATER
Site: Fontwell

Sample ID	Depth (m)	Analyte	Lab Sample	Sample Date	Extraction Date	Holding Time (Days)
10018981_MW1	W	PH	6793412	16/01/2013	26/01/2013	12
10018981_MW2	W	SPECIFIC CONDUCTIVITY	6793413	16/01/2013	26/01/2013	12
10018981_MW1	W	PYRENE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	BENZO_B_FLUORANTHENE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	ACENAPHTHYLENE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	CHRYSENE	6793412	16/01/2013	24/01/2013	8
10018981_MW7	W	ETHANOL	6793416	16/01/2013	24/01/2013	8
10018981_MW1	W	FLUORENE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	INDENO_1_2_3_CD_PYRENE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	ANTHRACENE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	BENZO_G_H_I_PERYLENE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	DIBENZ_A_H_ANTHRACENE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	BENZO_A_ANTHRACENE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	FLUORANTHENE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	Phenanthrene	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	BENZO_A_PYRENE	6793412	16/01/2013	24/01/2013	8
10018981_MW2	W	TBA	6793413	16/01/2013	24/01/2013	8
10018981_MW5	W	ETHANOL	6793415	16/01/2013	24/01/2013	8
10018981_MW4	W	ETHANOL	6793414	16/01/2013	24/01/2013	8
10018981_MW2	W	ETHANOL	6793413	16/01/2013	24/01/2013	8
10018981_MW1	W	ETHANOL	6793412	16/01/2013	24/01/2013	8
10018981_MW7	W	TBA	6793416	16/01/2013	24/01/2013	8
10018981_MW1	W	ACENAPHTHENE	6793412	16/01/2013	24/01/2013	8
10018981_MW4	W	TBA	6793414	16/01/2013	24/01/2013	8
10018981_MW1	W	BENZO_K_FLUORANTHENE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	TBA	6793412	16/01/2013	24/01/2013	8
10018981_MW7	W	ETBE	6793416	16/01/2013	24/01/2013	8
10018981_MW7	W	DIPE	6793416	16/01/2013	24/01/2013	8
10018981_MW5	W	ETBE	6793415	16/01/2013	24/01/2013	8

Sample Type: WATER
Site: Fontwell

Sample ID	Depth (m)	Analyte	Lab Sample	Sample Date	Extraction Date	Holding Time (Days)
10018981_MW6	W	DIPE	6793415	16/01/2013	24/01/2013	8
10018981_MW4	W	ETBE	6793414	16/01/2013	24/01/2013	8
10018981_MW7	W	HEXAVALENT_CHROMIUM	6793416	16/01/2013	24/01/2013	8
10018981_MW8	W	TBA	6793415	16/01/2013	24/01/2013	8
10018981_MW4	W	DIPE	6793414	16/01/2013	24/01/2013	8
10018981_MW2	W	HEXAVALENT_CHROMIUM	6793413	16/01/2013	24/01/2013	8
10018981_MW8	W	HEXAVALENT_CHROMIUM	6793415	16/01/2013	24/01/2013	8
10018981_MW1	W	HEXAVALENT_CHROMIUM	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	NAPHTHALENE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	TOTAL_PAH	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	DIPE	6793412	16/01/2013	24/01/2013	8
10018981_MW1	W	ETBE	6793412	16/01/2013	24/01/2013	8
10018981_MW2	W	DIPE	6793413	16/01/2013	24/01/2013	8
10018981_MW2	W	ETBE	6793413	16/01/2013	24/01/2013	8
10018981_MW4	W	HEXAVALENT_CHROMIUM	6793414	16/01/2013	24/01/2013	8

Sample Type: SOIL
Site: Fontwell

Sample ID	Depth (m)	Analyte	Lab Sample	Sample Date	Extraction Date	Holding Time (Days)
10018981_MW1	4	ETHYLBENZENE	5072592	24/01/2012	01/02/2012	S
10018981_MW1	4	ETBE	5072592	24/01/2012	01/02/2012	S
10018981_MW1	4	M_P_XYLENE	5072592	24/01/2012	01/02/2012	S
10018981_MW1	4	TOLUENE	5072592	24/01/2012	01/02/2012	S
10018981_MW1	4	BENZENE	5072592	24/01/2012	01/02/2012	S
10018981_MW1	4	O_XYLENE	5072592	24/01/2012	01/02/2012	S
10018981_MW1	4	TBA	5072592	24/01/2012	01/02/2012	S
10018981_MW1	4	MTBE	5072592	24/01/2012	01/02/2012	S
10018981_MW1	4	TAME	5072592	24/01/2012	01/02/2012	S
10018981_MW1	4	ETHANOL	5072592	24/01/2012	01/02/2012	S
10018981_MW5	3.4	DIPE	5072586	24/01/2012	01/02/2012	S
10018981_MW5	3.4	ETBE	5072586	24/01/2012	01/02/2012	S
10018981_MW5	3.4	ETHANOL	5072586	24/01/2012	01/02/2012	S
10018981_MW1	4	TOLUENE-D8 (SUR)	5072592	24/01/2012	01/02/2012	S
10018981_MW1	4	DIPE	5072592	24/01/2012	01/02/2012	S
10018981_MW5	3.4	TBA	5072586	24/01/2012	01/02/2012	S
10018981_MW1	W	RISK_TPH_C16_C21_AROM	5114873	01/02/2012	09/02/2012	S
10018981_MW5	W	RISK_TPH_C16_C21_AROM	5114874	01/02/2012	09/02/2012	S
10018981_MW1	W	RISK_TPH_C21_C35_ALI	5114873	01/02/2012	09/02/2012	S
10018981_MW1	W	RISK_TPH_C12_C16_ALI	5114873	01/02/2012	09/02/2012	S
10018981_MW5	W	RISK_TPH_C21_C35_AROM	5114874	01/02/2012	09/02/2012	S
10018981_MW5	W	RISK_TPH_C12_C16_AROM	5114874	01/02/2012	09/02/2012	S
10018981_MW5	W	RISK_TPH_C21_C35_ALI	5114874	01/02/2012	09/02/2012	S
10018981_MW5	W	RISK_TPH_C16_C21_ALI	5114874	01/02/2012	09/02/2012	S
10018981_MW5	W	RISK_TPH_C12_C16_ALI	5114874	01/02/2012	09/02/2012	S
10018981_MW1	W	RISK_TPH_C21_C35_AROM	5114873	01/02/2012	09/02/2012	S
10018981_MW1	W	RISK_TPH_C12_C16_AROM	5114873	01/02/2012	09/02/2012	S
10018981_MW1	W	RISK_TPH_C16_C21_ALI	5114873	01/02/2012	09/02/2012	S

Sample Type: WATER
Site: Fontwell

Sample ID	Depth (m)	Analyte	Lab Sample	Sample Date	Extraction Date	Holding Time (Days)
10018981_MW7	W	DIPE	9979819	10/09/2014	18/09/2014	8
10018981_MW1	W	ETBE	9979810	10/09/2014	18/09/2014	8
10018981_MW1	W	ETHANOL	9979810	10/09/2014	18/09/2014	8
10018981_MW2	W	ETHANOL	9979812	10/09/2014	18/09/2014	8
10018981_MW5	W	TBA	9979817	10/09/2014	18/09/2014	8
10018981_MW4	W	ETHANOL	9979814	10/09/2014	18/09/2014	8
10018981_MW6	W	ETHANOL	9979817	10/09/2014	18/09/2014	8
10018981_MW7	W	ETHANOL	9979819	10/09/2014	18/09/2014	8
10018981_MW1	W	DIPE	9979810	10/09/2014	18/09/2014	8
10018981_MW7	W	TBA	9979819	10/09/2014	18/09/2014	8
10018981_MW2	W	DIPE	9979812	10/09/2014	18/09/2014	8
10018981_MW2	W	ETBE	9979812	10/09/2014	18/09/2014	8
10018981_MW4	W	DIPE	9979814	10/09/2014	18/09/2014	8
10018981_MW4	W	ETBE	9979814	10/09/2014	18/09/2014	8
10018981_MW5	W	ETBE	9979817	10/09/2014	18/09/2014	8
10018981_MW7	W	ETBE	9979819	10/09/2014	18/09/2014	8
10018981_MW1	W	TBA	9979810	10/09/2014	18/09/2014	8
10018981_MW2	W	TBA	9979812	10/09/2014	18/09/2014	8
10018981_MW4	W	TBA	9979814	10/09/2014	18/09/2014	8
10018981_MW6	W	DIPE	9979817	10/09/2014	18/09/2014	8

Project Manager:

Date:

Appendix D - Stage 2 Tables

TABLE 10
GROUNDWATER ANALYTICAL DATA

Exceeds Human Health	Human Health CPU
Exceeds Controlled Waters	Minimum
Sample Radius	Fortwell September 2014
Site	Fortwell

Contaminant	CAS#	HH	GAC	MDF	Units	MW1	MW2	MW4	MW5	MW7
						10/09/2014	10/09/2014	10/09/2014	10/09/2014	10/09/2014
BTEX	BENZENE	23800	1	1	µg/l	ND	ND	ND	ND	ND
	TOLUENE	>Sat	50	1	µg/l	ND	ND	ND	ND	ND
	ETHYLBENZENE	>Sat	20	1	µg/l	ND	ND	ND	ND	ND
	M,P XYLENE	>Sat	30	1	µg/l	ND	ND	ND	ND	ND
	O XYLENE	>Sat	30	1	µg/l	ND	ND	ND	ND	ND
PAH	Acenaphthene	>Sat	2200	0.015	µg/l	ND	ND	ND	ND	ND
	Acenaphthylene	>Sat	90	0.011	µg/l	ND	ND	ND	ND	ND
	Anthracene	>Sat	0.1	0.015	µg/l	ND	ND	ND	ND	ND
	BENZO_A_ ANTHRACENE	>Sat	0.029	0.017	µg/l	ND	ND	ND	ND	ND
	BENZO_A_ PYRENE	>Sat	0.01	0.009	µg/l	ND	ND	ND	ND	ND
	BENZO_B_ FLUORANTHENE	>Sat	0.025	0.023	µg/l	ND	ND	ND	ND	ND
	BENZO_G_H_I_ PERYLENE	>Sat	0.025	0.016	µg/l	ND	ND	ND	ND	ND
	BENZO_K_ FLUORANTHENE	>Sat	0.025	0.027	µg/l	ND	ND	ND	ND	ND
	Chrysene	>Sat	2.9	0.013	µg/l	ND	ND	ND	ND	ND
	DIBENZ_A_H_ ANTHRACENE	>Sat	0.0029	0.016	µg/l	ND	ND	ND	ND	ND
	Fluoranthene	>Sat	0.1	0.017	µg/l	ND	ND	ND	ND	ND
	Fluorene	>Sat	1500	0.014	µg/l	ND	ND	ND	ND	ND
	INDENO_1_2_3_CD_ PYRENE	>Sat	0.025	0.014	µg/l	ND	ND	ND	ND	ND
	Naphthalene	16700	2.4	0.1	µg/l	ND	ND	ND	ND	ND
	Phenanthrene	>Sat	90	0.022	µg/l	ND	ND	ND	ND	ND
	Pyrene	>Sat	1100	0.015	µg/l	ND	ND	ND	ND	ND
	TOTAL_PAH	(blank)	(blank)	0.344	µg/l	ND	0.382	ND	ND	ND
VOC	DIPE	635000	120	1	µg/l	ND	ND	ND	ND	ND
	ETBE	733000	40	1	µg/l	ND	ND	ND	ND	ND
	ETHANOL	(blank)	1100000	50	µg/l	ND	ND	ND	ND	ND
	MTBE	7240000	20	1	µg/l	ND	ND	ND	ND	ND
	TAME	248000	140	1	µg/l	ND	ND	ND	ND	ND
	TBA	17400000	40	10	µg/l	ND	ND	ND	ND	ND
	N-HEXANE	17600	360	2	µg/l	ND	ND	ND	ND	ND
RISKTPH	RISK TPH C6 C7 AROM	>Sat	1	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C7 C8 AROM	>Sat	50	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C8 C10 AROM	>Sat	300	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C10 C12 AROM	>Sat	90	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C12 C16 AROM	>Sat	90	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C16 C21 AROM	>Sat	90	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C21 C35 AROM	>Sat	90	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C6 C8 ALI	>Sat	15000	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C8 C9 ALI	>Sat	15000	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C9 C10 ALI	>Sat	300	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C10 C12 ALI	>Sat	300	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C12 C16 ALI	>Sat	300	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C16 C21 ALI	>Sat	300	10	µg/l	ND	ND	ND	ND	ND
	RISK TPH C21 C35 ALI	>Sat	300	10	µg/l	ND	ND	ND	ND	ND
	TPH STAGE2 HI	1	(blank)	10	ratio	0.0046085	0.0046085	0.0046102	0.0046085	0.0046085
SVOC	A_2_ METHYLNAPHTHALENE	>Sat	24	1	µg/l	ND	ND	ND	ND	ND

XX	Exceeds Human Health & Controlled Waters
XX	Exceeds Human Health Criteria
XX	Exceeds Controlled Waters Criteria

CSM / Assumptions:
 Soil 1% SOM (0.59% TOC)
 Soil properties for "sand"
 Commercial site area 0.5ha
 Soil gas ingress rates calculated by model
 Infinite groundwater source at 1m.bgl for groundwater GAC
 High density residential assume vapour exposure pathways only
 CPU scenario modified from modelled commercial scenario by:
 Building dimensions (l x w x h): 14m x 5.5m x 2.4m
 Differential pressure: 2.6 pascals
 Only vapour exposure pathways considered viable
 Derived November 2010 using Human7.1 issue8, MTF.

ND: Not detected above MDL
 HH: Human Health
 GAC: Generic Assessment Criteria
 (blank): No criteria
 NP: No pathway
 >Sat: Unacceptable risk not achieved due to calculated saturation of vapour pathway
 NT: Not tested

TABLE 10
GROUNDWATER ANALYTICAL DATA

[illegible]