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REPORT ON THE UNDERTAKING OF AN ENVIRONMENTAL SITE ASSESSMENT FOR THE DECOMMISSIONED FORMER CASTROL ISLAND VIEW TERMINAL FACILITY – DURBAN HARBOUR – ETHEKWINI MUNICIPALITY

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

EXECUTIVE SUMMARY

Geomeasure Group (Pty) Ltd was appointed by BP Remediation Management to undertake an Environmental Site Assessment (ESA) at the former decommissioned Castrol Island View Terminal Facility (hereafter referred to as 'the site'), located at the Durban Harbour, which included the collection and analyses of selected soil samples as well as the installation and sampling of groundwater monitoring wells.

The objective of the investigation was to document groundwater quality on site subsequent to the demolition of the facility and undertaking of extensive remediation by means of bulk source removal, as well as to assess the nature of any potential compounds of concern either entering or leaving the site via the groundwater flow pathway.

The site is currently being leased by BP Southern Africa (Pty) Ltd from the Transnet National Ports Authority (TNPA) and is located at 54 Hainan Road, Durban, within the Cutler / Island View Complex at the Durban Harbour.

Our contaminated land specialist and appointed drilling contractor undertook the installation and sampling of groundwater monitoring wells from the 27th February to the 7th March 2013. Due to the high volumes of building rubble encountered in the subsoil environment, the proposed drilling locations could not be advanced by hand or by means of utilising direct push drilling, therefore a Tractor Loader Backhoe (TLB) was utilised for excavation and the collection of soil samples. Soil samples were collected at varying depths at selected monitoring well locations, which are located along the eastern site boundary, in the vicinity of the historic lube blending plant, metalworking facility and solvent storage areas.

The laboratory analyses for these samples indicated that they contained reportable concentrations of a number of the targeted hydrocarbon determinants analysed for. However, the concentration of benzo(a)pyrene in soil sample PNMW 8, which was collected alongside the eastern boundary of the site, was the only determinant value to exceed the adopted US EPA Regional Screening Levels for Industrial Soil.

Groundwater and free phase product level monitoring revealed that a measured thickness of 0.684 m of free phase product was present in monitoring well SB27MW7, which is located along the eastern boundary fence of the site which borders the SAPREF facility. A smaller measured thickness of free phase product (0.037 m) was found in monitoring well CAST 31, which is located on the north-western portion of the site. Samples of free phase product were also collected from monitoring wells SB27MW7 and CAST 31 and were submitted for whole oil analysis. The laboratory analyses showed that both samples consisted of highly degraded diesel and lube oil.

The collection of groundwater parameter data from each of the existing and newly installed monitoring wells indicated that the elevated electrical conductivity values found in the monitoring wells along the eastern site boundary most likely originated from a source other than the Durban Harbour (either on-site or from a neighbouring property). The results of the dissolved oxygen (DO) and oxygen reduction potential (ORP) monitoring indicated that aerobic to marginally reducing conditions were present in the shallow groundwater underlying the site, which are conducive to the on-going biodegradation of petroleum hydrocarbon compounds.

Groundwater samples were collected from all of the monitoring wells located on site (with the exception of those wells that contained free phase product). Laboratory analyses results for the groundwater samples indicated that, although detectable concentrations were detected in the majority of the samples, none of these values exceeded the adopted Risc - Tier I Risk-Based Screening Levels for Industrial Soil, based on the inhalation of indoor air exposure pathway.

The results of this investigation were used to run a quantitative human health risk assessment, utilising the proprietary Risc 5 software, which indicated that the potential risk posed to an onsite worker by the residual levels of benzo(a)Pyrene, which was the only compound that exceed the Tier 1 screening levels adopted for this site, were extremely low, thereby indicating that the dissolved phase impacts in the groundwater as well as in the soils underlying the site, as identified in prior investigations conducted for this site have been successfully remediated.

REPORT ON THE UNDERTAKING OF AN ENVIRONMENTAL SITE ASSESSMENT FOR THE DECOMMISSIONED FORMER CASTROL ISLAND VIEW TERMINAL FACILITY – DURBAN HARBOUR – ETHEKWINI MUNICIPALITY

1. INTRODUCTION AND SCOPE OF WORK

Geomeasure Group (Pty) Ltd was contracted by BP Remediation Management to undertake an Environmental Site Assessment (ESA) at the decommissioned Castrol Island View Terminal Facility (hereafter referred to as 'the site'), located at the Durban Harbour, which included the collection and analyses of selected soil samples as well as the installation and sampling of groundwater monitoring wells.

The objective of the investigation was to document groundwater quality on site subsequent to the demolition of the facility and undertaking of extensive remediation by means of bulk source removal, as well as to assess the nature of any potential compounds of concern either entering or leaving the site via the groundwater flow pathway.

The scope of work for this ESA included the following;

- The installation of ten (10) new groundwater monitoring wells (PNMW 1 – PNMW 10) in different areas across the site by means of a direct push Geoprobe drill rig.

- The re-installation of three existing groundwater monitoring wells (CAST 30, CAST 31 and SB27MW7), which had been destroyed by demolition activities during the site decommissioning, utilising the same drilling method.

- The collection of soil samples from the saturated zone of the subsoil environment at three of the monitoring well locations (PNMW 6, PNMW 8 and SB27MW7). The collection of additional soil samples from this zone at monitoring well PNMW 6 during the installation of the monitoring wells where the soils were found to contain detectable concentrations of Volatile Organic Compounds (VOCs). The VOC levels were determined through on site screening utilising a Photo Ionisation Detector (PID).

- Purging of the new and existing monitoring wells to remove any silt and possible contaminants introduced during the drilling and monitoring well installation operations.

- Checking of the new and existing monitoring wells with an interface probe for the presence of free phase hydrocarbon compounds as well as recording of the static water levels. The field pH, Electrical Conductivity, Redox Potential and Dissolved Oxygen content of the groundwater present in the monitoring wells were also measured.

- The collection of groundwater samples from both the existing and the newly installed monitoring wells (PNMW 1 – PNMW 10, MW 1, MW 4, MW 5, CAST 30, CAST 31 and SB27MW7). In those monitoring wells where free phase product was encountered and groundwater samples could not be collected, samples of the free phase product were collected instead.

- Surveying of the existing and completed monitoring well locations and elevations to facilitate the accurate plotting of reduced groundwater levels underlying the site.

- Submission of the collected soil and groundwater samples to a SANAS-accredited laboratory for screening for gasoline range organics (GROs), diesel range organics (DROs) and polycyclic aromatic hydrocarbons (PAHs), as well as the internationally accredited ALcontrol laboratory for Volatile Organic Compounds (VOCs) and Semi-Volatile Organic (SVOCs) analyses.

- Submission of additional water samples collected from monitoring wells MW 5, PNMW 1 and PNMW 7 to a SANAS-accredited laboratory for arsenic analysis.

- Submission of the collected free phase oil samples to the ALcontrol laboratory for whole oil analysis.

Our findings and conclusions based on the results of this investigation are contained in this report.

2. SITE DESCRIPTION

2.1 Locality

The former Castrol Island View Terminal Facility, which is currently being leased by BP Southern Africa (Pty) Ltd from the Transnet National Ports Authority (TNPA), is located at 54 Hainan Road, Durban, within the Cutler / Island View Complex at the Durban Harbour. The site has been decommissioned and remediated by BP, and no Castrol / BP infrastructure remain on site. The site is bounded by Industrial properties and the Durban Harbour, including the Engen C bulk Storage facility to the east across Hainan Road and the South African Petroleum Refineries (SAPREF) Site 3 bulk storage facility to the immediate west. The Durban Harbour is located to the north, across Wharfside Road, whilst Formosa Road and a railway line are located to the south of the site. The Bluff residential area is located up-gradient to the south of the site. The co-ordinates for the site are 29° 53' 26.13" S and 31° 01' 57.41" E (see Figure 1 – Locality Plan overleaf).

2.2 Topography and Drainage

The site is situated at an elevation of 4 m above mean sea level (AMSL) and is relatively planar. Site drainage is variable due to the tidal influence from the Durban Harbour, which is located approximately 25 m away from the northern site boundary. Our in-house database, as well as the Department of Water Affairs (DWA) Groundwater Resource Information Project (GRIP) database, was used to conduct a limited hydrocensus. The results of the hydrocensus indicated that no water supply boreholes were present within a 1 km radius of the site (see Figure 2 – Area Plan overleaf).

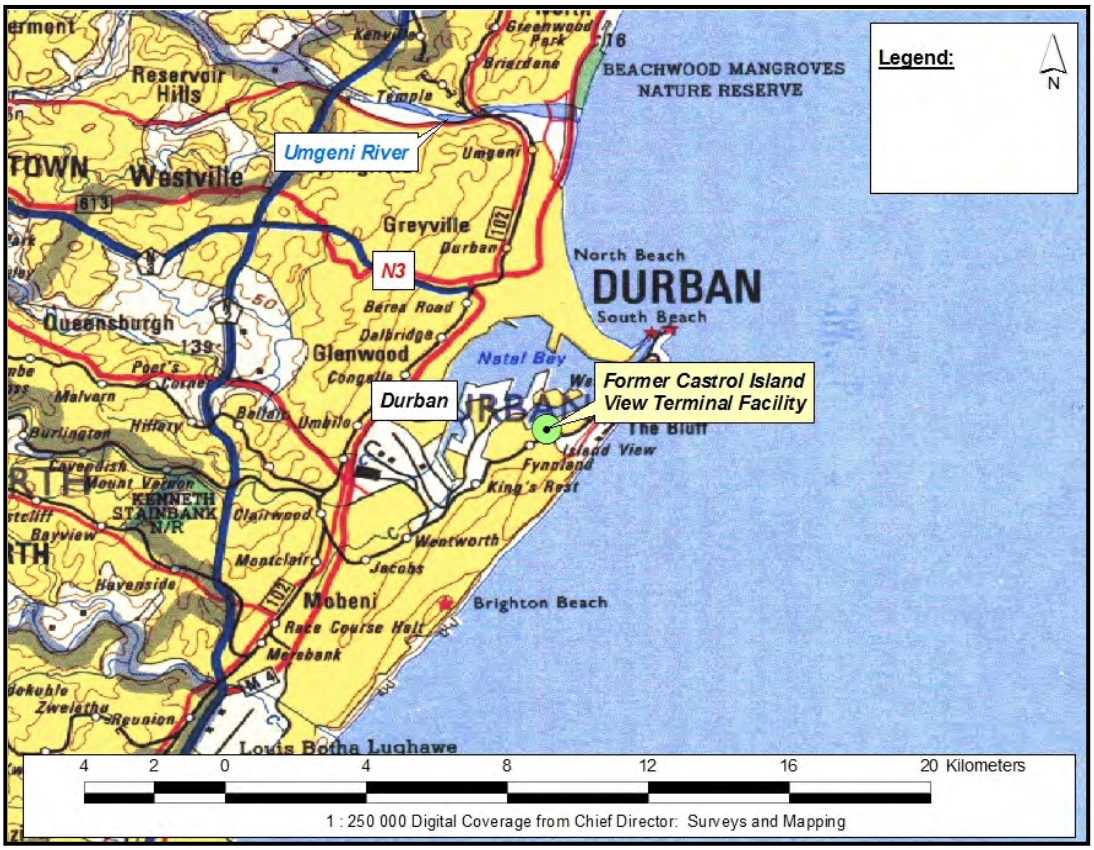


Figure 1 – Locality Plan

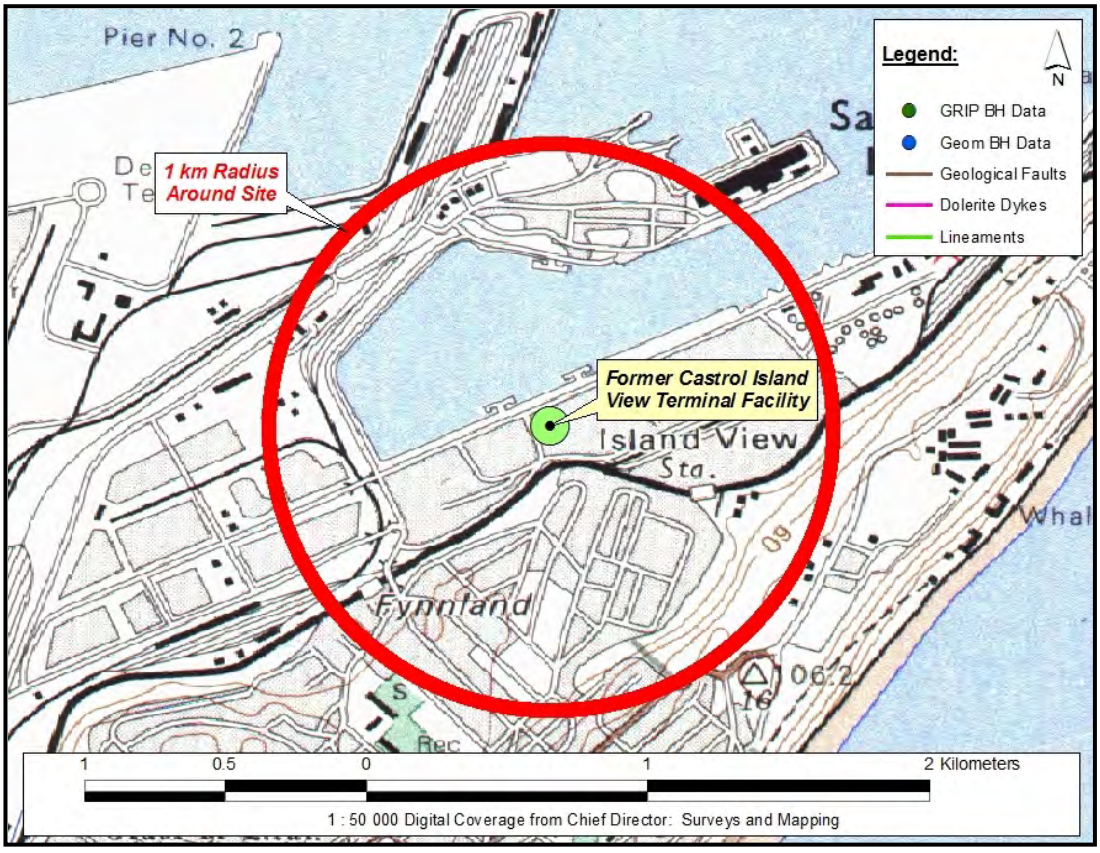


Figure 2 – Area Plan

2.3 Geology

The 1 : 250 000 Durban Geological sheet shows that the site and the surrounding areas are underlain by various Quaternary-age unconsolidated deposits, primarily alluvium in the form of beach deposits of the Maputaland Group. Berea sands, considered to be weathering products of Pliocene and Pleistocene calcareous deposits, and Bluff calcrete, are seen to the west of the site. Units of the Dwyka Group, which comprises an ancient glacial deposit consisting of tillite, minor shale, varved shale and subordinate sandstone bands, are seen to outcrop further to the west, and likely underlie the site at depth (see Figure 3 – Geological Plan below).

This lithified unit has been subjected to faulting and fracturing associated with the breakup of the ancient Gondwana super-continent, as illustrated by the coast-parallel faults situated away to the west of the site. These are attributed to the extraction of the Falkland Plateau past the Natal Valley during the mid-Cretaceous breakup of Gondwana, when during the coast-parallel shearing, right-lateral strike-slip movement occurred. As a result of this tectonic activity, the sandstone formations have also been intruded by much younger Jurassic-age, sub-horizontal dolerite sills and sub-vertical dolerite dykes, which are located to the northwest of the site.

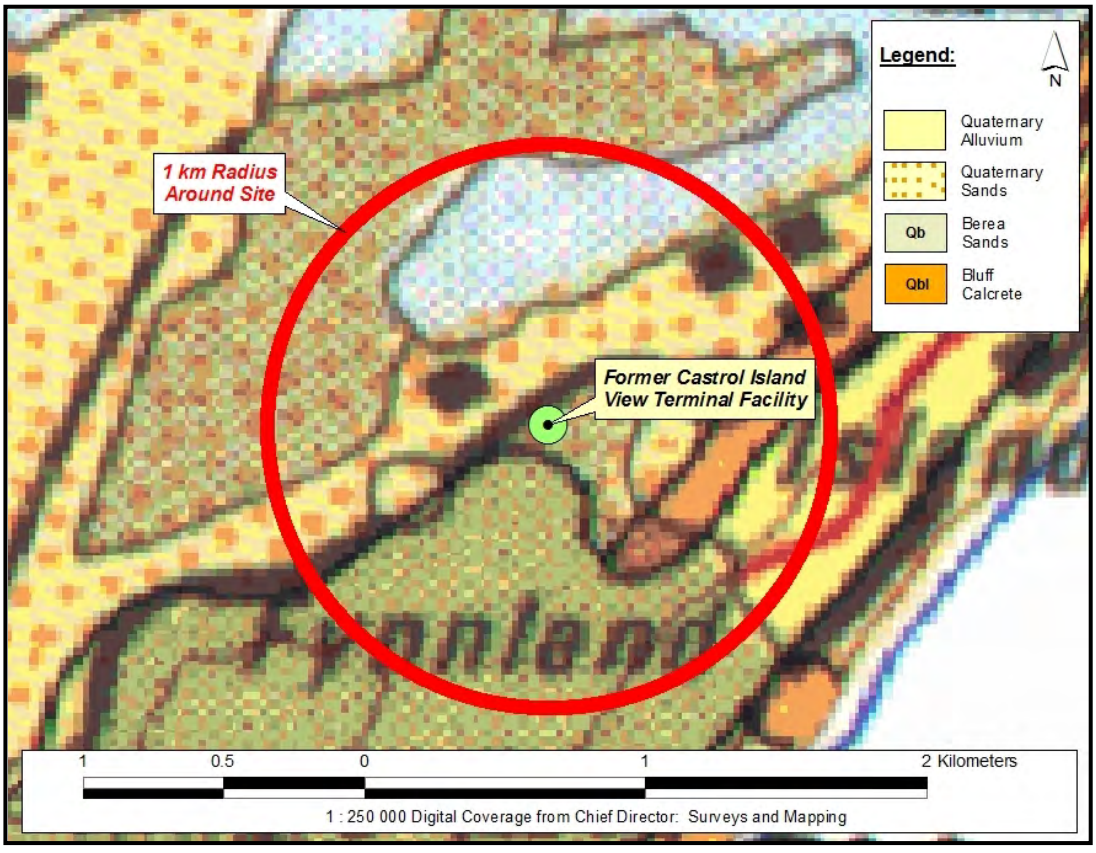


Figure 3 – Geological Plan

2.4 Geohydrology

The unconsolidated sediments which comprise the Quaternary units are considered inter-granular aquifers, with groundwater storage and movement occurring within the interconnected pore spaces between the sand grains. The consolidated sediments of the Dwyka Group are essentially secondary or fractured rock aquifers with negligible primary storage and permeability. Groundwater storage and movement is generally confined to fractures, joints and bedding planes within the rock mass.

Typical borehole yields, which are to be expected in this area in the unconsolidated and sedimentary units, are considered to be moderate, in the range of > 0.5 – 3.0 l/s according to *"Characterisation and Mapping of the Groundwater Resources of KwaZulu-Natal Province Mapping Unit 6"* July 1995, prepared by Groundwater Development Services (GDS) for the former Department of Water Affairs and Forestry.

The unconsolidated Berea sands in the region typically form a poor potential aquifer with limited development potential due to their generally elevated clay content. The Dwyka tillite is generally considered to be a poor aquifer due to its massive nature and elevated electrical conductivity values (EC) of groundwater intersected in this formation. This is attributable to high concentrations of dissolved solids, mainly sodium and chloride, which frequently renders the water "brackish" according to *"Characterisation and Mapping of the Groundwater Resources of KwaZulu-Natal Province Mapping Unit 2"* April 1995. The hydrochemical facies of groundwater in this unit is typically Na-Cl. Often groundwater from the Dwyka Group is unsuitable for long term potable water supply without the use of sophisticated water treatment, which can include reverse osmosis.

3. SITE HISTORY AND PREVIOUS REPORTS

This investigation references two investigation reports, which had previously been undertaken as part of the decommissioning, demolition and remediation processes undertaken at the site. The following two reports were made available to us;

- *'Soil and Groundwater Investigation, BP Hainan Rd, Island View, Durban, Kwazulu-Natal'*, compiled by Environmental Resources Management (ERM) and dated August 2009.

- *'Summary Report – Demolition and Restoration of the Former Castrol Island View Terminal Facility, Hainan Road, Durban, South Africa'*, compiled by the Inogen BP Joint Venture (c/o HPC Antea Group) and dated August 2012.

According to information contained in the environmental investigation report compiled by ERM, the site was previously used as a bulk storage and lube oil blending facility, predominantly for the storage of base oils and additives. It was reported that around 90% of the products manufactured and stored at the facility were automotive and industrial lubricants, whilst the remainder consisted of speciality lubricants such as solvent degreasers and metal-working fluids. In addition the site also stocked and packaged raw materials, some of which were hazardous.

All site activities were ceased in 2006 and prior to the hand-back of the site, ERM was commissioned to investigate and determine the status of the underlying groundwater and subsoil environment. The investigation involved the advancement of thirty-eight (38) soil bores across the site for the purpose of collecting soil samples, and included the conversion of nine (9) of the soil bores into groundwater monitoring wells.

The laboratory analyses results for the soil samples, which had been collected at varying depths from the soil bore locations adjacent to the eastern site boundary, contained detectable concentrations of Extracted Petroleum Hydrocarbons (EPHs), which were in excess of the screening levels which had been adopted for the study. In addition, the soil samples which had been collected from the metal surface treatment plant area contained a detectable concentration of 4-Chloro-3-Methylphenol, whilst one of the soil samples collected from the tank farm area contained a detectable concentration of benzene. Both of these determinant concentrations exceeded the adopted screening levels as well.

The interpretation of the results of the soil sampling exercise concluded that the site had three main areas of impact to the subsoil environment, namely the northern and eastern site boundary, the area where the metal surface treatment plant was located, and the tank farm area to the north of the site.

The results of the groundwater level monitoring undertaken as part of the study showed that free phase product was detected in two of the groundwater monitoring wells, both of which were located adjacent to the eastern site boundary. The results of the laboratory analyses for the groundwater samples collected from the monitoring wells indicated that the groundwater environment beneath the site had been potentially impacted by arsenic and vinyl chloride. In addition, detectable concentrations at trace levels of trichloroethene (TCE) and tetracholoroethene (PCE) were found separately in two of the monitoring wells installed on site. The groundwater samples taken from the metal surface treatment plant area also contained elevated anion and cation concentrations, which most likely originated from an on-site source.

The Inogen BP Joint Venture (JV) was contracted by BP Southern Africa to undertake the final decommissioning and removal of the remaining infrastructure at the site, as well as the remediation of the site by means of bulk source removal. The summary report compiled by the Inogen BP JV detailed the infrastructure that was demolished or removed from the site, and included a description of the remediation activities and verification sampling that were undertaken at the same time.

Pertinent information taken from the summary report indicated that during the demolition of the infrastructure and remediation of the site, any soils which were determined visually, by olfactory means and through the use of a Photo-Ionisation Detector (PID) to have been impacted by hydrocarbons were excavated until impacts were no longer observed, or to the depth of groundwater. Further to this a limited soil assessment was also undertaken during the demolition and remediation phases, which included the collection of forty-nine (49) soil samples across the site, all of which were submitted for laboratory analyses, to confirm that wherever feasible the impacted soils identified during the prior investigation had been removed.

The summary report also indicated that three of the groundwater monitoring wells which had been installed at the site (MW 1, MW 4 and MW 5), as well as a one-inch diameter piezometer (SB27), were left in place due to their close proximity to the site boundary wall. The locations of these monitoring wells are shown on Figure 4 – Site Plan overleaf.

4. SITE INVESTIGATION

Our contaminated land specialist and our appointed drilling contractor undertook the installation and sampling of the groundwater monitoring wells from the 27th February to the 7th March 2013, at the locations which had been determined during previous discussions with BP Remediation Management. The locations of the monitoring wells are shown on Figure 4 – Site Plan below, whilst an image showing the location of previous site infrastructure in relation to the monitoring wells is included as Figure 5 – Site Plan Showing Previous Infrastructure overleaf.

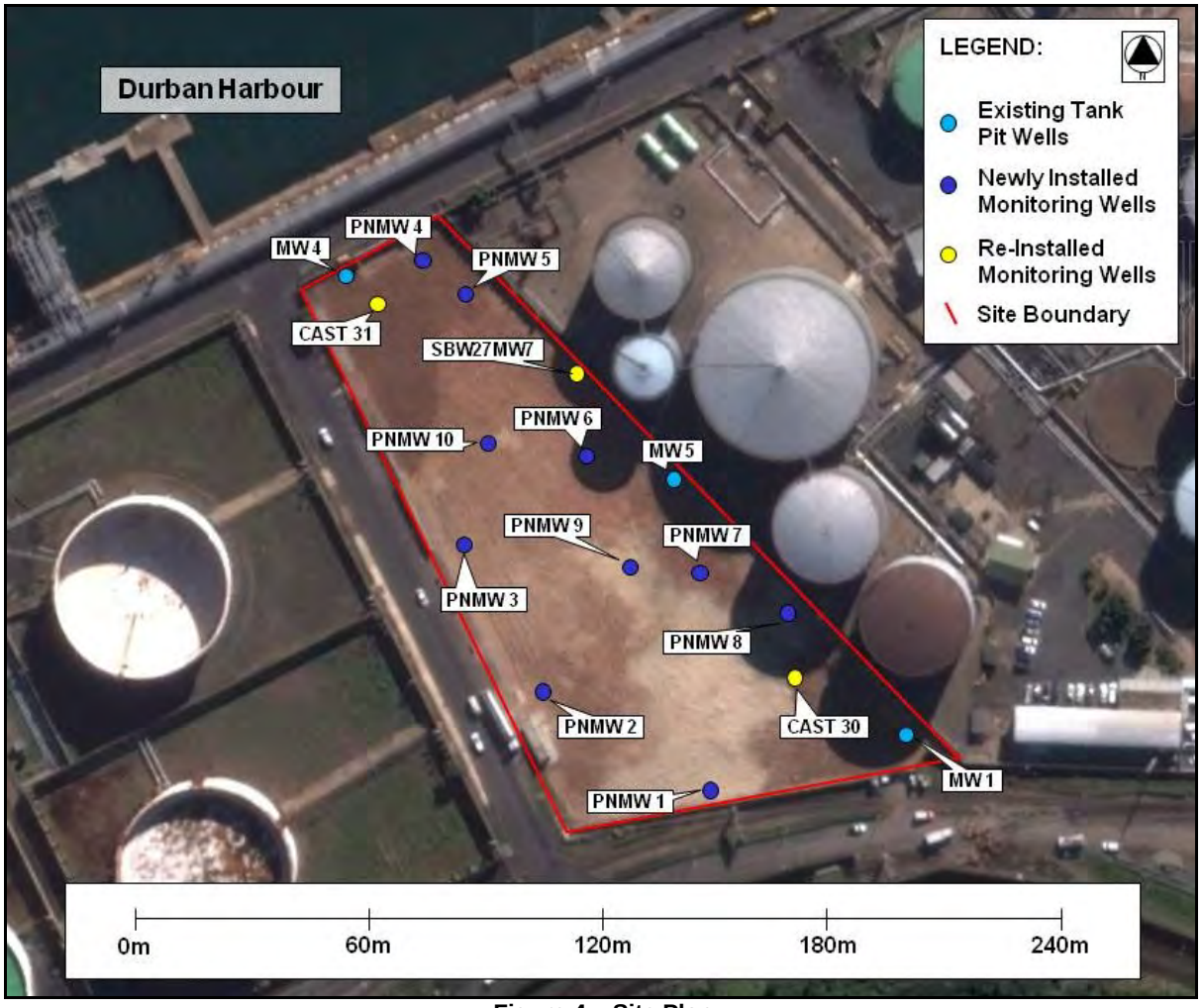


Figure 4 – Site Plan

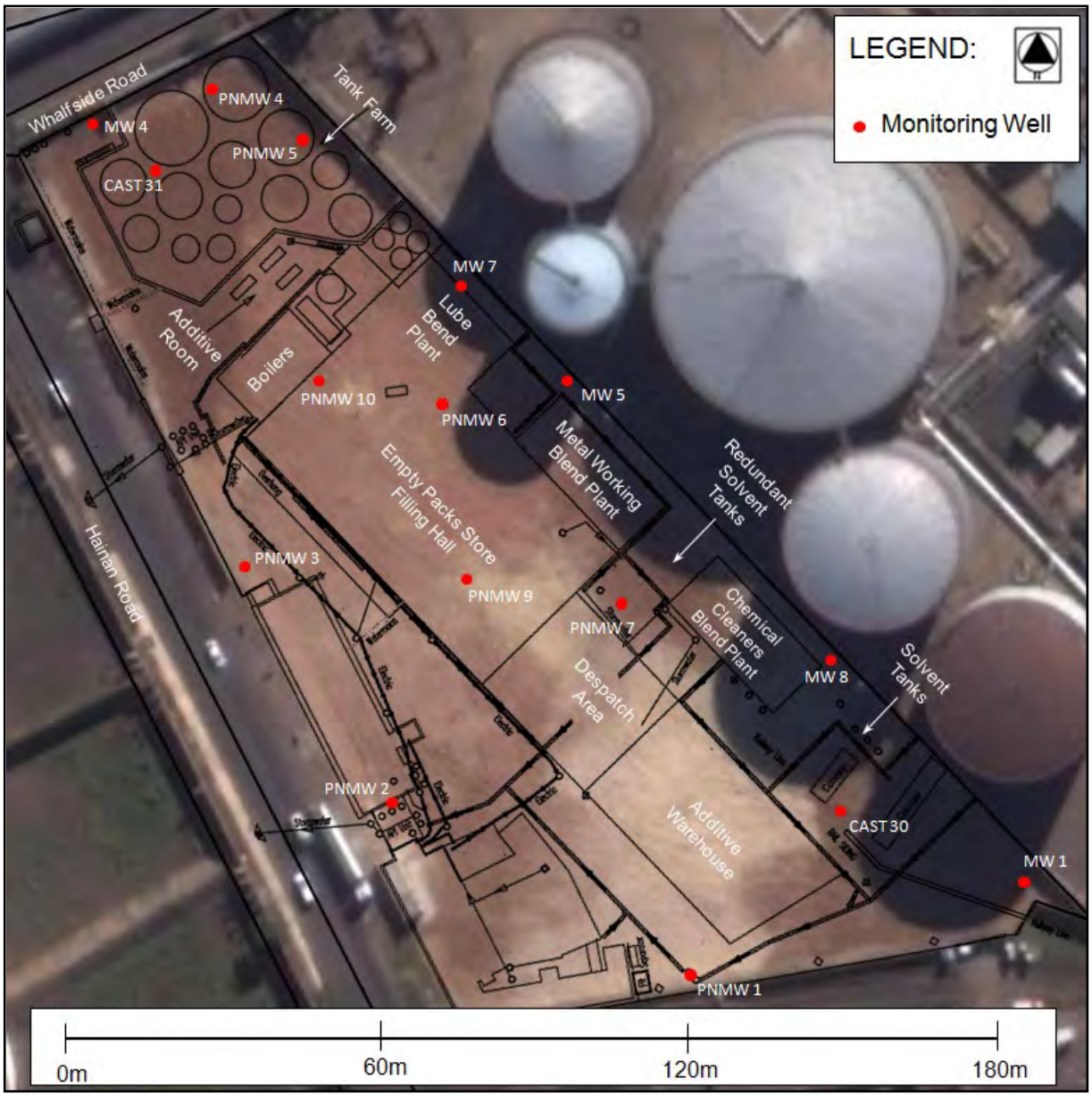


Figure 5 – Site Plan Showing Previous Infrastructure

4.1 Soil Sampling – Tier I Screening

Upon attempts to advance a hand auger at the proposed monitoring well locations, it was discovered that there were high volumes of building rubble in the subsoil environment that prevented the collection of soil samples from the saturated zone. A Tractor Loader Backhoe (TLB) was used to clear the proposed monitoring well locations to a depth of approximately 2 m to allow for the collection of soil samples prior to backfilling the holes with sand.

Soil samples were collected from the saturated zone at monitoring well locations PNMW 6, PNMW 8 and SB27MW7. As per the scope of work for this investigation, a soil sample was also collected from the saturated zone at monitoring well location PNMW 7 due to the elevated levels of VOCs (in excess of 100 ppm) which were recorded at this sampling point during on site screening utilising a Photo-Ionisation Detector (PID).

All of the collected soil samples were submitted to the SANAS-accredited UIS Organic Laboratory for screening for Gasoline Range Organics (GROs), Diesel Range Organics (DROs) and Polycyclic Aromatic Hydrocarbons (PAHs). Soil samples were also submitted to the United Kingdom-based and internationally-accredited ALcontrol laboratory for Volatile Organic Compounds (VOCs) and Semi Volatile Organic Compounds (SVOCs) analyses.

The laboratory analyses results have been summarised in Tables 1 – 3, where they have been compared to the adopted Region 9 (November 2012) United States Environmental Protection Agency (US EPA) Regional Screening Levels (RSLs) for Industrial Soil in the current absence of promulgated South African standards. The results have also been compared to the proposed RSA Department of Environment Affairs (DEA) Soil Screening Values (SSVs) for All Land Uses for the Protection of the Water Resource, as contemplated in the Framework for the Management of Contaminated Land, which are yet to be promulgated.

These screening levels were utilised based on the fact that the site is in close proximity to the Durban Harbour, although it is in an industrial area and no groundwater receptors are present.

Only those determinants with concentrations that exceeded laboratory detection limits, as well as BTEX-N, MTBE and TAME, have been presented in the tables that follow. The complete set of tabulated results, as well as all the laboratory certificates of analyses, is contained in Appendix B.

Table 1: GRO, DRO & PAH Results for BP Hainan Road – Soil Samples

Sample Date	***28/02/2013***			***04/03/2013***	**US EPA Screening Levels[1]**	**SA DEA SSVs[2]**
Determinant	**PNMW 7 @ 1.9m** *(ppm)*	**PNMW 8 @ 2.0m** *(ppm)*	**SB27MW7 @ 2.1m** *(ppm)*	**PNMW 6 @ 2.0m** *(ppm)*	*(ppm)*	*(ppm)*
Benzene	<0.040	<0.040	<0.040	<0.040	***5.4***	***0.03***
Toluene	<0.200	<0.200	<0.200	<0.200	***45 000***	***25***
Ethyl Benzene	<0.040	<0.040	**0.236**	<0.040	***27***	***26***
m+p-Xylene	<0.040	<0.040	**0.966**	<0.040	***2 600***	***45***
o-Xylene	<0.040	<0.040	**0.640**	**0.074**	***3 000***	***45***
1,3,5 Trimethyl Benzene	**0.858**	<0.040	**1.765**	**0.103**	***10 000***	***N/A***
1,2,4 Trimethyl Benzene	**0.453**	<0.040	**7.937**	<0.040	***260***	***N/A***
MTBE	<0.100	<0.100	<0.100	<0.100	***220***	***0.0036***
TAME	<0.100	<0.100	<0.100	<0.100	***N/A***	***N/A***
Naphthalene	<0.040	<0.040	**2.715**	<0.040	***18***	***28***
Alkanes C10 – C14	**210.843**	<0.020	**156.923**	**1.251**	***N/A***	***440***
Estimated Total VPHs[3]	**1 056.952**	<0.200	**1 130.215**	**73.931**	***N/A***	***N/A***

[1]US EPA Regional Screening Levels for Industrial Soil
[2]RSA DEA Soil Screening Values for All Land Uses for the Protection of the Water Resource
[3]VPHs – Volatile Petroleum Hydrocarbons
Concentrations in bold indicate reported results in excess of the laboratory detection limits

The following can be inferred from the results presented in Table 1:

- None of the collected soil samples contained any of the targeted determinants in concentrations exceeding the adopted screening levels.

- Soil samples PNMW 7 and SB27MW7 were collected from the areas where the metalworking blend plant and lube blend plant were located previously; therefore it is most likely that the determinant concentrations found in these samples originated from prior site activities.

Table 2: VOC Results for BP Hainan Road – Soil Samples

Sample Date	*28/02/2013*			*03/04/2013*	US EPA Screening Levels[1] *(ppm)*	SA DEA Limits[2] *(ppm)*
Determinant	PNMW 7 @ 1.9m *(ppm)*	PNMW 8 @ 2.0m *(ppm)*	SB27MW7 @ 2.1m *(ppm)*	PNMW 6 @ 2.0m *(ppm)*		
Carbon Disulphide	**0.0189**	<0.007	<0.140	**0.138**	*3 700*	*N/A*
cis-1,2-Dichloroethene	**0.232**	<0.005	<0.100	**0.0672**	*2 000*	*N/A*
Trichloroethene	**0.266**	<0.009	<0.180	<0.018	*6.4*	*N/A*
Toluene	**0.0181**	<0.005	**0.376**	<0.010	*45 000*	*N/A*
Tetrachloroethene	**4.510**	<0.005	<0.100	<0.010	*110*	*N/A*
Ethylbenzene	**0.109**	<0.004	**0.609**	**0.0427**	*27*	*26*
m+p-Xylene	**0.372**	<0.014	**2.430**	<0.028	*2 600*	*45*
o-Xylene	**0.581**	<0.010	**1.720**	**0.0952**	*3 000*	*45*
Isopropylbenzene	**0.198**	<0.005	**0.633**	**0.111**	*11 000*	*N/A*
Propylbenzene	**0.534**	<0.011	**2.090**	**0.320**	*21 000*	*N/A*
1,3,5-Trimethylbenzene	**1.220**	<0.008	**3.870**	**0.115**	*10 000*	*N/A*
1,2,4-Trimethylbenzene	**3.640**	<0.009	**27.400**	**1.040**	*260*	*N/A*
sec-Butylbenzene	**0.526**	<0.010	**3.810**	**0.455**	*N/A*	*N/A*
4-Isopropyltoluene	**0.403**	<0.011	**2.870**	**0.152**	*N/A*	*N/A*
n-Butylbenzene	**0.352**	<0.010	**10.800**	**0.272**	*51 000*	*N/A*
Naphthalene	**0.479**	<0.013	**9.220**	**0.461**	*18*	*28*

[1]US EPA Regional Screening Levels for Industrial Soil
[2]RSA DEA Soil Screening Values for All Land Uses for the Protection of the Water Resource
Concentrations in bold indicate reported results in excess of the laboratory detection limits

The following can be inferred from the results presented in Table 2:

- None of the collected soil samples contained any of the targeted determinants at concentrations exceeding the adopted screening levels.

- The soil sample collected from the saturated zone at monitoring well location PNMW 7 contained detectable concentrations of tetrachloroethene (PCE) and some of its degradation products (trichloroethene (TCE) and cis-1,2-diclhoroethene (DCE)) as well as ethylbenzene, m+p-xylene, o-xylene, 1,2,4 trimethyl benzene and naphthalene, although all of these determinant concentrations fall well within the adopted screening levels.

- The soil sample collected from the saturated zone at monitoring well location SB27MW7 also contained detectable concentrations of a number of the determinants analysed for. These are however more consistent with fuel products and may have been associated with impacts arising from the former tank farm.

Table 3: SVOC Results for BP Hainan Road – Soil Samples

Sample Date	*28/02/2013*			*03/04/2013*	US EPA Screening Levels[1] *(ppm)*	SA DEA Limits[2] *(ppm)*
Determinant	PNMW 7 @ 1.9m *(ppm)*	PNMW 8 @ 2.0m *(ppm)*	SB27MW7 @ 2.1m *(ppm)*	PNMW 6 @ 2.0m *(ppm)*		
Butylbenzyl phthalate	<0.100	<0.100	**1.100**	<0.100	*910*	*N/A*
bis(2-Ethylhexyl)phthalate	<0.500	<0.500	<3.000	**0.213**	*120*	*N/A*
2-Methylnaphthalene	<0.100	<0.100	**4.620**	<0.100	*2 200*	*N/A*
Benzo(a)anthracene	<0.100	**0.143**	<0.100	<0.100	*2.1*	*N/A*
Benzo(b)fluoranthene	<0.100	**0.452**	**0.471**	<0.100	*2.1*	*N/A*
Benzo(k)fluoranthene	<0.100	**0.290**	**0.167**	<0.100	*21*	*N/A*
Benzo(a)pyrene	<0.100	*0.288*	<0.100	<0.100	*0.21*	*0.34*
Benzo(g,h,i)perylene	<0.100	**0.123**	**0.139**	<0.100	*N/A*	*N/A*
Chrysene	<0.100	<0.100	**0.276**	<0.100	*210*	*N/A*
Fluoranthene	<0.100	<0.100	<0.100	**0.221**	*22 000*	*N/A*
Fluorene	<0.100	<0.100	**0.337**	<0.100	*22 000*	*N/A*
Indeno(1,2,3-cd)pyrene	<0.100	**0.120**	**0.133**	<0.100	*2.1*	*N/A*
Phenanthrene	<0.100	<0.100	<0.100	**0.224**	*N/A*	*N/A*
Pyrene	<0.100	<0.100	<0.100	**0.170**	*17 000*	*5.3*
Naphthalene	<0.100	<0.100	**5.500**	**0.148**	*18*	*28*
Dibenzo(a,h)anthracene	<0.100	<0.100	**0.138**	<0.100	*0.21*	*N/A*

[1]US EPA Regional Screening Levels for Industrial Soil
[2]RSA DEA Soil Screening Values for All Land Uses for the Protection of the Water Resource
Concentrations in bold indicate reported results in excess of the laboratory detection limits

The following can be inferred from the results presented in Table 3:

- The soil sample collected from monitoring well location PNMW 8 contained a detectable concentration of benzo(a)pyrene which slightly exceeded the adopted screening levels.

- None of the other targeted determinant concentrations, across any of the collected soil samples, exceeded the adopted screening levels.

4.2 Monitoring Well Installation and Groundwater Level Monitoring

Once the soil samples had been collected and the TLB excavations had been backfilled with rubble-free sand from the site, a Geoprobe direct push drill rig was used to finish the well locations to their completions depths, which were variable due to the presence of building rubble. The completion depths of each monitoring well are presented in Table 4 below.

Table 4: Monitoring Well Completion Depths

Monitoring Well No.	Completion Depth (m bgl[1])
PNMW 1	4.0
PNMW 2	3.6
PNMW 3	3.7
PNMW 4	3.4
PNMW 5	3.8
PNMW 6	2.5
PNMW 7	2.8
PNMW 8	4.0
PNMW 9	3.1
PNMW 10	3.9
CAST 30	2.9
CAST 31	3.3
SB27MW7	4.0

[1]bgl – below ground level

The completed shallow bores were converted into monitoring wells to allow the collection of groundwater samples by means of installing plain and factory slotted 63 mm uPVC casing. The annulus between the casing and the borehole sides at each new monitoring well location was gravel packed with 1 to 3 mm 98% silica pure sand and sealed with bentonite, prior to the installation of galvanised steel stand pipes to ensure that the wells are clearly visible and not destroyed during future site activities to ensure their availability for on-going collection of groundwater samples.

Due to the use of the TLB, none of the boreholes could be logged for this site; however a diagram detailing the construction of a monitoring well is attached in Appendix A.

On completion of their installation, the monitoring wells were allowed to stand for a period of at least one day to allow for the groundwater to sufficiently recharge. A monitoring event was conducted on the 7th March 2013, during which time an interface probe was utilised to determine whether free phase hydrocarbon product was present, as well as to record the static water levels of the newly installed monitoring wells and the three existing monitoring wells on site which had not been destroyed by demolition activities (MW 1, MW 4 and MW 5).

The results of this exercise are presented in Table 5 below.

Table 5: Monitoring Well Free Product & Static Water Levels

Date	07/03/2013		
Monitoring Well No.	FPL[2] (m bgl[1])	SWL[3] (m bgl)	MFPT[4] (m)
PNMW 1	-	2.140	-
PNMW 2	-	1.926	-
PNMW 3	-	2.301	-
PNMW 4	-	2.385	-
PNMW 5	-	2.546	-
PNMW 6	-	1.936	-
PNMW 7	-	1.793	-
PNMW 8	-	2.280	-
PNMW 9	-	1.555	-
PNMW 10	-	2.187	-
CAST 30	-	1.907	-
CAST 31	2.387	2.424	**0.037**
SB27MW7	2.688	3.372	**0.684**
MW 1	-	1.936	-
MW 4	-	2.718	-
MW 5		2.178	

[1]bgl – below ground level
[2]FPL – free product level
[3]SWL – static water level
[4]MFPT – measured free product thickness

The results presented in Table 5 indicate that a measurable thickness of free phase product was encountered in monitoring well SB27MW7, which is located along the eastern site boundary fence which borders the SAPREF facility. In addition to this, a measurable thickness of free phase product was found in monitoring well CAST 31, which is located towards the north-western corner of the site. No measurable thickness of free phase product was found in any of the other monitoring wells at the time of the sampling event.

In addition, the well head parameters (pH, Electrical Conductivity (EC), Oxidation Reduction Potential (RP), Dissolved Oxygen (DO) content and temperature (Temp) for each of the monitoring wells that did not contain a measurable thickness of free phase product were recorded utilising a hand held Hannah multi parameter probe. The results of this exercise are presented in Table 6 below.

Table 6: Additional Groundwater Level Monitoring Measurements

Date	07/03/2013				
Monitoring Well No.	**pH** (pH Units)	**EC[1]** (mS/m)	**ORP[2]** (mV)	**DO[3]** (ppm)	**Temp** (°C)
PNMW 1	6.12	588.00	-116.70	2.11	27.43
PNMW 2	6.43	449.00	-114.70	1.87	26.94
PNMW 3	6.39	364.00	-111.40	2.26	27.24
PNMW 4	6.37	633.00	-111.00	1.83	27.14
PNMW 5	6.39	710.00	-108.30	2.02	27.38
PNMW 6	6.33	1028.00	-109.30	1.97	27.62
PNMW 7	6.32	1204.00	-116.50	1.67	27.68
PNMW 8	6.22	560.00	-113.70	1.91	27.67
PNMW 9	6.47	296.00	-115.20	2.48	27.48
PNMW 10	6.89	427.00	-114.60	2.87	26.78
CAST 30	6.33	516.00	-113.10	2.23	28.44
MW 1	6.25	400.00	-117.00	4.25	27.00
MW 4	6.51	648.00	-112.90	2.08	27.06
MW 5	6.72	1229.00	-112.80	1.77	26.98

[1]EC – Electrical Conductivity
[2]ORP – Oxygen Reduction Potential
[3]DO – Dissolved Oxygen

The results presented in Table 6 indicate that the groundwater underlying the site showed relatively high levels of conductivity, especially along the eastern boundary of the site. The lower conductivity levels found in the monitoring wells located along the northern site boundary (i.e. MW 4, PNMW 4 and PNMW 5) suggest that the elevated conductivity levels found along the eastern site boundary are not a result of sea water encroachment from the harbour, but rather may have originated from an alternative source (either on-site or from neighbouring properties).

The dissolved oxygen (DO) levels recorded for the shallow groundwater underlying the site are indicative of aerobic conditions (≥2.0mg/l) to a marginally reducing environment, whilst the oxygen reduction potential (ORP) results of -100 millivolts suggest a reducing environment, where iron may serve as an electron acceptor. Some of the measurements do not appear entirely consistent (high DO with low ORP), suggesting that these results may have to be treated with some caution. Under iron reducing conditions, the natural bio-degradation of the residual petroleum hydrocarbons and chlorinated volatile organic compounds can be expected to occur although at lower rates than in the optimum environments for these processes (which would be aerobic for petroleum compound biodegradation and anaerobic for chlorinated solvents).

Once the well head parameters had been collected, the monitoring wells were surveyed by a qualified land surveyor utilising mean average sea level elevation as a benchmark. The data were then compared against the recorded SWL measurements and the resultant reduced groundwater levels were used to create a contour model of depths to groundwater underlying the site, which is included as Figure 6 – Contoured Depth to Groundwater overleaf.

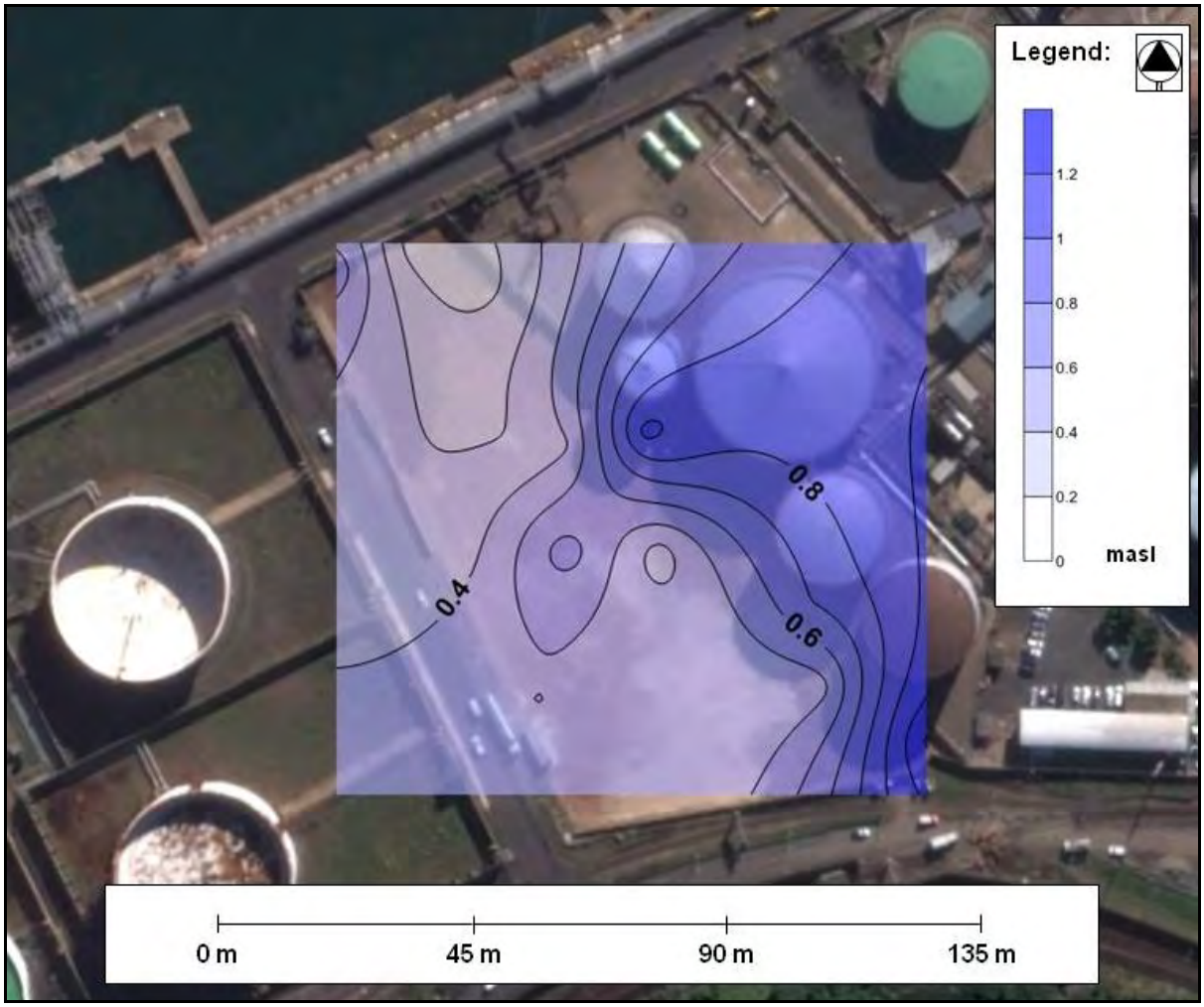


Figure 6 – Contoured Depth to Groundwater

The above figure indicates the depths to groundwater at the time of this investigation. It is important to note that the site is close to planar, and is influenced by the tidal action due to its proximity to the Durban harbour and the Indian Ocean to the south east of the facility. Further to this, long term investigations still being undertaken within the Island View complex by SAPREF have indicated that the groundwater remains "trapped" in the complex as a result of the quay walls bounding the facility and typically does not move laterally but vertically. This is attributed to being as a result of the tidal influence exerted on the groundwater underlying the Bluff paleo-dune, which borders the site to the south by the adjacent Indian Ocean, resulting in little migration of free phase or dissolved phase impacts from the point of origin.

4.3 Water Quality Sampling – Tier I Screening

Groundwater samples were collected from all of the newly installed and existing monitoring wells that did not contain free phase product. The samples were submitted to the UIS Organic Laboratory for screening for GROs, DROs and PAHs, as well as to the ALcontrol Laboratory for VOC and SVOC analyses.

The laboratory analyses results are summarised in Tables 7 – 9 where they have been compared to the Tier I - RISC Risk-Based Screening Levels for Industrial Soil, based on the inhalation of indoor air exposure pathway, with the exception of the SVOC results, as appropriate screening levels are not available for these specific determinants. These screening levels were chosen based on the industrial nature of the areas surrounding the site, as well as the lack of on- and off-site human receptors that could be expected to be impacted by ingestion of groundwater impacted by the activities historically conducted on this site.

Additional groundwater samples were collected from monitoring wells MW 5, PNMW 1 and PNMW 7. These samples were submitted to the SANAS-accredited Talbot and Talbot laboratory for arsenic analysis. These laboratory analyses results have been presented in Tables 10.

All the complete laboratory certificates of analyses are contained in Appendix B.

Table 7: GRO, DRO & PAH Results for BP Hainan Road – Groundwater Samples

Sample Date	*07/03/2013*							RISC RBSLs[1] *(ppm)*
Determinant	PNMW 1 *(ppm)*	PNMW 2 *(ppm)*	PNMW 3 *(ppm)*	PNMW 4 *(ppm)*	PNMW 5 *(ppm)*	PNMW 6 *(ppm)*	PNMW 7 *(ppm)*	
Benzene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	***4.8****
Toluene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	***450***
Ethyl Benzene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	***N/A***
m+p-Xylene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	***130***
o-Xylene	<0.002	<0.002	<0.002	<0.002	<0.002	**0.002**	**0.011**	***130***
1,3,5 Trimethyl Benzene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	***N/A***
1,2,4 Trimethyl Benzene	<0.002	<0.002	<0.002	<0.002	<0.002	**0.004**	<0.002	***N/A***
MTBE	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	***39 000***
TAME	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	***N/A***
Naphthalene	<0.002	<0.002	<0.002	<0.002	<0.002	**0.002**	<0.002	***N/A***
Estimated Total VPHs[2]	<0.010	<0.010	<0.010	<0.010	0.059	**0.252**	**0.693**	***N/A***

[1] – RISC Tier 1 – Risk-Based Screening Levels – For Worker Via Indoor Air Exposure Pathway
[2] – Volatile Petroleum Hydrocarbons
*** - Carcinogenic Risk**
Concentrations in bold indicate reported results in excess of the laboratory detection limits

Table 7 (cont.): GRO, DRO & PAH Results for BP Hainan Road – Groundwater Samples

Sample Date	*07/03/2013*							RISC RBSLs[1]
Determinant	PNMW 8 *(ppm)*	PNMW 9 *(ppm)*	PNMW 10 *(ppm)*	MW 1 *(ppm)*	MW 4 *(ppm)*	MW 5 *(ppm)*	CAST 30 *(ppm)*	
Benzene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	***4.8****
Toluene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	***450***
Ethyl Benzene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	***N/A***
m+p-Xylene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	***130***
o-Xylene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	***130***
1,3,5 Trimethyl Benzene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	***N/A***
1,2,4 Trimethyl Benzene	<0.002	<0.002	<0.002	<0.002	<0.002	**0.002**	<0.002	***N/A***
MTBE	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.020**	***39 000***
TAME	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	***N/A***
Naphthalene	<0.002	<0.002	<0.002	<0.002	<0.002	**0.005**	<0.002	***N/A***
Estimated Total VPHs[2]	<0.010	<0.010	<0.010	<0.010	<0.010	**0.435**	**0.087**	***N/A***

[1] – RISC Tier 1 – Risk-Based Screening Levels – For Worker Via Indoor Air Exposure Pathway
[2] – Volatile Petroleum Hydrocarbons
*** - Carcinogenic Risk**
Concentrations in bold indicate reported results in excess of the laboratory detection limits

From the results presented in Table 7 the following can be inferred:

- Detectable concentrations of a number of the targeted hydrocarbon compounds were reported in the groundwater samples collected from monitoring wells PNMW 6, PNMW 7 and PNMW 5, which are located along the eastern boundary of the site. However, the chosen screening levels do not contain levels for any of the determinants which were present.

- The groundwater sample collected from CAST 30, which is located in the north-western portion of the site, contained detectable concentrations of MTBE and estimated total VPHs.

Table 8: VOC Results for BP Hainan Road – Groundwater Samples

Sample Date	*07/03/2013*							RISC RBSLs[1]
Determinant	PNMW 1 *(ppm)*	PNMW 2 *(ppm)*	PNMW 3 *(ppm)*	PNMW 4 *(ppm)*	PNMW 5 *(ppm)*	PNMW 6 *(ppm)*	PNMW 7 *(ppm)*	*(ppm)*
Vinyl Chloride	<0.001	<0.001	<0.001	<0.001	<0.001	**0.035**	**0.00199**	***0.88****
Dichloromethane	**0.00604**	<0.001	<0.001	**0.00446**	<0.001	<0.001	**0.00555**	***N/A***
trans-1,2-Dichloroethene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.00313**	<0.001	***N/A***
1,1-Dichloroethane	<0.001	<0.001	<0.001	<0.001	**0.00113**	**0.00298**	<0.001	***N/A***
cis-1,2-Dichloroethene	<0.001	<0.001	**0.00191**	**0.00553**	**0.0705**	**0.729**	**0.275**	***68***
Trichloroethene	<0.001	<0.001	**0.00336**	<0.001	<0.001	<0.001	**0.00248**	***0.21****
Toluene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.00144**	<0.001	***450***
Tetrachloroethene	<0.001	<0.001	**0.00165**	<0.001	<0.001	<0.001	**0.00275**	***N/A***
Ethylbenzene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.002**	<0.001	***N/A***
o-Xylene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.00855**	<0.001	***130***
1,3,5-Trimethylbenzene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.00169**	<0.001	***N/A***
1,2,4-Trimethylbenzene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.00483**	<0.001	***N/A***
Naphthalene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.00549**	<0.001	***N/A***

[1] – RISC Tier 1 – Risk-Based Screening Levels – For Worker Via Indoor Air Exposure Pathway

*** - Carcinogenic Risk**

Concentrations in bold indicate reported results in excess of the laboratory detection limits

Table 8 (cont.): VOC Results for BP Hainan Road – Groundwater Samples (cont.)

Sample Date	*07/03/2013*							RISC RBSLs[1]
Determinant	PNMW 8 *(ppm)*	PNMW 9 *(ppm)*	PNMW 10 *(ppm)*	MW 1 *(ppm)*	MW 4 *(ppm)*	MW 5 *(ppm)*	CAST 30 *(ppm)*	*(ppm)*
Vinyl Chloride	<0.001	<0.001	**0.00177**	<0.001	<0.001	<0.001	<0.001	***0.88****
Carbon Disulphide	<0.001	<0.001	<0.001	<0.001	<0.001	**0.00191**	<0.001	***340***
Dichloromethane	<0.001	**0.00569**	<0.001	**0.00516**	<0.003	<0.001	**0.00309**	***N/A***
MTBE	<0.001	<0.001	<0.001	<0.001	**0.00129**	<0.001	**0.0143**	***39 000***
cis-1,2-Dichloroethene	<0.001	<0.001	**0.0033**	<0.001	**0.0123**	**0.1220**	<0.001	***68***
Benzene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.0019**	<0.001	***4.8****
Toluene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.0135**	<0.001	***450***
Ethylbenzene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.00142**	<0.001	***N/A***
m+p-Xylene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.00687**	<0.001	***130***
o-Xylene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.00618**	<0.001	***130***
1,3,5-Trimethylbenzene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.00152**	<0.001	***N/A***
1,2,4-Trimethylbenzene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.0106**	<0.001	***N/A***
Naphthalene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.0158**	<0.001	***N/A***

[1] – RISC Tier 1 – Risk-Based Screening Levels – For Worker Via Indoor Air Exposure Pathway

*** - Carcinogenic Risk**

Concentrations in bold indicate reported results in excess of the laboratory detection limits

The following can be inferred from the results presented in Table 8:

- None of the determinant concentrations across any of the collected groundwater samples exceeded the adopted screening levels.

- The groundwater samples collected from the monitoring wells located in close proximity to the metal working facility and old solvent storage infrastructure (PNMW 6, PNMW 7 and MW 5) contained detectable concentrations of a number of the targeted determinants. These included vinyl chloride, DCE, TCE, 1,1 dichloroethane, benzene, ethyl benzene and naphthalene.

- The groundwater samples collected from monitoring wells PNMW 6, PNMW 7 and PNMW 5 contained detectable concentrations of TCE, DCE and vinyl chloride. It is possible that that these determinants may have resulted from the natural breakdown of PCE.

- The groundwater sample collected from monitoring well PNMW 3 also contained detectable concentrations of PCE, TCE and DCE.

Table 9: SVOC Results for BP Hainan Road – Groundwater Samples

Sample Date	***07/03/2013***						
Determinant	**PNMW 1** *(ppm)*	**PNMW 2** *(ppm)*	**PNMW 3** *(ppm)*	**PNMW 4** *(ppm)*	**PNMW 5** *(ppm)*	**PNMW 6** *(ppm)*	**PNMW 7** *(ppm)*
2,4-Dimethylphenol	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**0.0145**
2-Methylphenol	<0.001	<0.001	<0.001	<0.001	<0.001	**0.00151**	**0.00779**
2-Nitroaniline	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**0.0311**
4-Chloro-3-methylphenol	<0.001	**0.00104**	<0.001	<0.001	<0.001	**0.00297**	**0.0947**
4-Methylphenol	<0.001	<0.001	<0.001	<0.001	<0.001	**0.0597**	**0.0387**
bis(2-Ethylhexyl) phthalate	**0.00512**	<0.002	<0.002	<0.002	<0.002	**0.00341**	<0.004
n-Dibutyl phthalate	**0.00108**	<0.001	<0.001	<0.001	<0.001	**0.00198**	**0.00623**
Phenol	<0.001	<0.001	<0.001	<0.001	<0.001	**0.0365**	**0.00547**
Naphthalene	<0.001	<0.001	<0.001	<0.001	<0.001	**0.0089**	**0.0531**

Concentrations in bold indicate reported results in excess of the laboratory detection limits

Table 9 (cont.): SVOC Results for BP Hainan Road – Groundwater Samples (cont.)

Sample Date	***07/03/2013***						
Determinant	**PNMW 8** *(ppm)*	**PNMW 9** *(ppm)*	**PNMW 10** *(ppm)*	**MW 1** *(ppm)*	**MW 4** *(ppm)*	**MW 5** *(ppm)*	**CAST 30** *(ppm)*
4-Chloro-3-methylphenol	<0.001	<0.001	<0.001	<0.001	<0.001	**3.960**	<0.005
bis(2-Ethylhexyl) phthalate	<0.002	<0.002	<0.002	**0.00742**	**0.00424**	<0.100	<0.010
n-Dibutyl phthalate	<0.001	<0.001	<0.001	<0.001	**0.00128**	<0.050	<0.005

Concentrations in bold indicate reported results in excess of the laboratory detection limits

The following can be inferred from the results presented in Table 9:

- Trace levels of several SVOCs were detected, however, as they are classified as “semi-volatiles” (low volatility), they are not expected to impact indoor air quality. It is also noted for information purposes, that none of these concentrations exceeds drinking water screening levels, indicating that these compounds are not a concern at this site. Further to this phthalates were also detected in up-gradient well, suggesting that these compounds may not be related to the former site activities.

Table 10: Arsenic Results for BP Hainan Road – Groundwater Samples

Sample Date	*07/03/2013*			**RISC RBSLs[1]** *(ppm)*
Determinant	**PNMW 1** *(ppm)*	**PNMW 7** *(ppm)*	**MW 5** *(ppm)*	
Arsenic	**0.0039**	**0.107**	**0.109**	***N/A***

[1] – RISC Tier 1 – Risk-Based Screening Levels – For Worker Via Indoor Air Exposure Pathway
Concentrations in bold indicate reported results in excess of the laboratory detection limits

The following can be inferred from the results presented in Table 10:

- There are detectable concentrations of arsenic present in the groundwater samples collected from monitoring wells PNMW 7 and MW 5, which could possibly have originated from the old metal working plant. However, it should also be noted that the presence of naturally elevated concentrations of arsenic in groundwater in the KwaZulu-Natal region is commonplace, as evident by the presence of arsenic in the groundwater sample collected from the up-gradient monitoring well PNMW 1.

4.4 Whole Oil Analysis

A total of two oil samples were collected from the free phase product present in monitoring wells SB7MW27, which is located on the eastern site boundary fence, and CAST 3, which is located on the north-western portion of the site (refer to Figure 4 – Site Plan).

Both of these samples were submitted to the ALcontrol Laboratory for whole oil analysis in order to ascertain the composition of the free phase product. The chemical oil fingerprints for both samples indicated that the free phase product was highly degraded and fell into the diesel product and lube oil range.

The presence of lube oil in the groundwater environment suggests that it is possible that the free phase product may have originated from previous on-site sources such as the lube oil blend plant.

The laboratory certificates of analyses are presented in Appendix B.

5. UPDATED CONCEPTUAL SITE MODEL & QUANTITATIVE HUMAN HEALTH RISK ASSESSMENT – TIER II SCREENING

5.1 Updated Conceptual Site Model

The results of the site investigations and soil and groundwater sampling have been utilised to compile a conceptual site model (CSM), showing the depth of the groundwater table in the immediate vicinity of the site, locations of previous site infrastructure and areas of inferred impact (see Figure 7 – Conceptual Site Model overleaf).

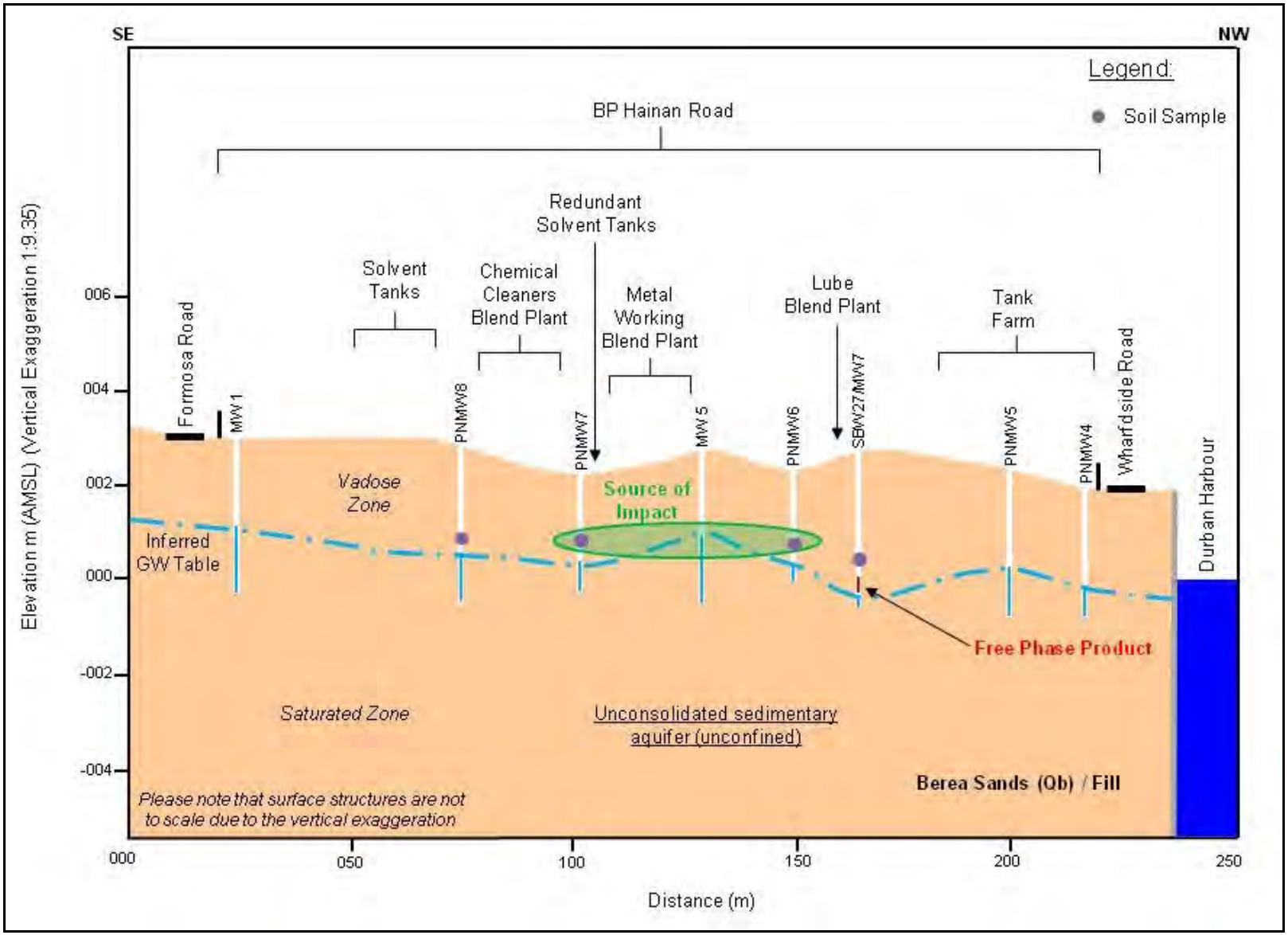


Figure 7 – Conceptual Site Model (NW to SE)

The CSM for the site shows the inferred impact to groundwater from the previous solvent storage, metal working and chemical cleaning facility areas. The free phase product present in monitoring well SB27MW7 has also been modelled, and likely resulted from activities at the previous lube oil blend plant, as supported by the whole oil analysis results.

5.2 Quantitative Human Health Risk Assessment – Tier II Screening

The findings of this investigation, as well as the available laboratory analyses results, were used to conduct a quantitative human health risk assessment utilising the proprietary Risc5 software. Based on the results of the Tier I screening exercise for both the soil and groundwater samples, the only compound that exceeded the adopted screening levels was benzo(a)pyrene in the soil sample collected during the installation of monitoring well PNMW 8 @ 2.0m.

The risk assessment for this compound was run based on possible impacts to an on-site worker via the following pathways; ingestion of impacted soil, dermal contact with impacted soil, inhalation of outdoor and indoor air as well as inhalation of impacted particulates. The results of this assessment, which are contained in Appendix C, are summarised in Table 11 below.

Table 11: Quantitative Human Health Risk Assessment Summary For On-Site Worker

Chemical	Ingestion of Soil	Dermal Contact with Soil	Inhalation of Outdoor Air	Inhalation of Indoor Air	Inhalation of Particulates	TOTAL
Benzo(a)pyrene	5.1E-08	2.9E-08	5.6E-13	4.9E-08	9.7E-20	**8.1E-08**
TOTAL	**5.1E-08**	**2.9E-08**	**5.6E-13**	**4.9E-08**	**9.7E-20**	**8.1E-08**

From the results of the quantitative human health risk assessment it can be seen that the levels identified were extremely low (<$10E^{-6}$), and it therefore was determined that the residual levels of benzo(a)pyrene do not pose a risk to potential on-site workers via any of the pathways modelled.

6. CONCLUSIONS

- Geomeasure Group Geomeasure Group (Pty) Ltd was appointed by BP Remediation Management to undertake an Environmental Site Assessment (ESA) at the former decommissioned Castrol Island View Terminal Facility to determine whether subsequent to the demolition of the facility, and undertaking of remediation of the site by means of bulk source removal, residual impacts remain on this site as a result of historic site operations.

- Thirteen (13) monitoring wells were installed at previously selected locations across the former Castrol Island View Terminal Facilities through the combined use of a TLB (to remove the building rubble located in the shallow subsoil environment) and a Geoprobe direct push drill rig.

- Soil samples were collected from sampling locations PNMW 6, PNMW 7, PNMW 8 and SB27MW7. The laboratory analyses of these samples indicated that they contained detectable concentrations of a number of the targeted determinants. However, the concentration of benzo(a)pyrene in soil sample PNMW 8 was the only determinant concentration to exceed the adopted US EPA Regional Screening Levels for Industrial soil.

- Groundwater and free phase product level monitoring revealed that a measured thickness of 0.684 m of free phase product was present in monitoring well SB27MW7, which is located along the eastern boundary fence of the site which borders the SAPREF facility. A smaller measured thickness of free phase product (0.037 m) was found in monitoring well CAST 31, which is located within the north-western portion of the portion of the site. The whole oil analysis for the two samples of free phase product collected from monitoring wells SB27MW7 and CAST 31 indicated that both samples consisted of highly degraded product which fell within the diesel product and lube oil range.

- Long term groundwater level monitoring data for the Island View facility indicates that the groundwater levels within the facility is significantly impacted by tidal action, which results in vertical rather than lateral groundwater movement. This results in little migration of free phase or dissolved phase impacts from the point of origin.

- The collection of groundwater parameter data from each of the existing and newly installed monitoring wells indicated that the elevated electrical conductivity values found in the monitoring wells along the eastern site boundary most likely originated from a source other than the Durban Harbour (either on-site or from a neighbouring property). The results of the DO and ORP monitoring indicated that aerobic to marginally reducing conditions were present in the shallow groundwater underlying the site, which are conducive to the on-going biodegradation of petroleum hydrocarbon compounds.

- The laboratory analyses results for the groundwater samples collected from the existing and newly-installed monitoring wells indicated that, although detectable concentrations were present in the majority of the samples collected, none of these values exceed the adopted Risc - Tier I Risk-Based Screening Levels for Industrial Soil, based on the inhalation of indoor air exposure pathway. No other exposure pathway is considered pertinent at the site given the absence of drinking water wells and the lack of significant groundwater migration.

  The whole oil analysis for the two samples of free phase product collected from monitoring wells SB27MW7 and CAST 31 indicated that both were highly degraded and fell within the diesel product and lube oil range. Groundwater data also show that this free phase product is not the source of plumes of dissolved petroleum compounds, likely due to favourable conditions for biodegradation and the lack of significant groundwater migration.

- The results of the quantitative human health risk assessment, which was undertaken utilising the proprietary Risc 5 software, indicate that the potential risk posed to an onsite worker by the residual levels of benzo(a)pyrene, which was the only compound that exceeded the Tier 1 screening levels for this site were extremely low ($<10E^{-6}$), and it therefore determined that the residual levels of this compound do not pose a risk to potential on-site workers via the pathways modelled.

- This investigation indicates that the residual dissolved phase impacts in the groundwater as well as in the soils underlying the site, as identified in prior investigations conducted for this site, have been successfully remediated by means of demolition of the infrastructure and bulk source removal, as illustrated by the results of the Tier I screening exercise and the quantitative risk assessment.

We trust that this report serves to update you on the current status of this site and we will be pleased to discuss any queries which may arise from this submission.

Yours sincerely,

Jonathan Thompson
Environmentalist

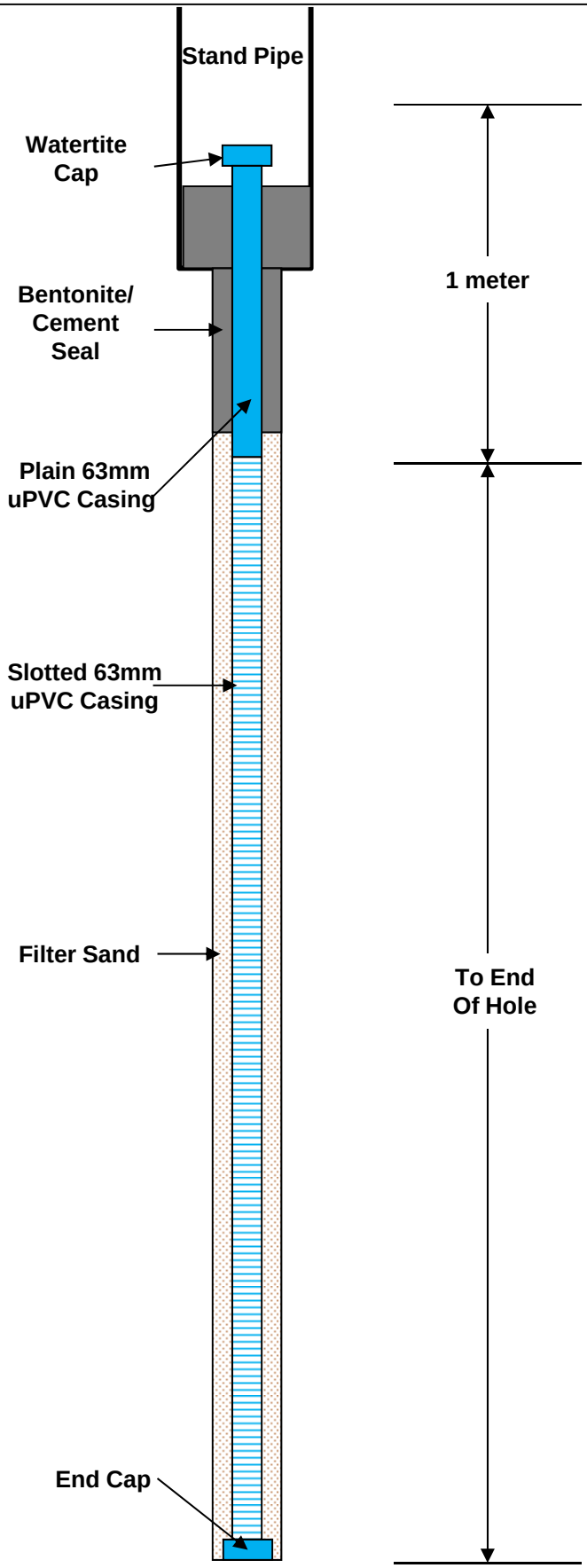
Rupert Sebire
Project Geohydrologist

GEOMEASURE GROUP (Pty) Ltd

APPENDIX A

EXAMPLE OF MONITORING WELL CONSTRUCTION

GEOMEASURE GROUP
Groundwater & Environmental Consultants



Monitoring Well Detail

GEOMEASURE GROUP
Groundwater & Environmental Consultants
Unit 3 Burnside Office Park
1 Builders Way, Hillcrest (3610)
Tel: (031) 765 1900
Fax: (031) 765 1935

FORMER CASTROL ISLAND VIEW TERMINAL FACILITY

MONITORING WELL CONSTRUCTION DETAIL

SCALE: Not to Scale

APPENDIX B

LABORATORY CERTIFICATES OF ANALYSIS

GEOMEASURE GROUP
Groundwater & Environmental Consultants

UIS Organic Laboratory (Pty) Ltd • Reg. No. 2007/001896/07
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willieh@uisol.co.za • http://www.uisol.co.za

CLIENT INFORMATION

GeoMeasure Group
Rupert Sebire
Box 1194
Hillcrest

TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **CAST 30** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	20 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	<2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	<2 µg/liter
Naphthalene	<2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	<1 µg/liter
C17 *	3 µg/liter
C18 *	<1 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	#Error

Total VPHs Identified	23 µg/liter
Estimated VPHs Unidentified	64 µg/liter
Estimated TOTAL VPHs	87 µg/liter

Authorised Signatory that approved this report

Reinardt Cromhout

SANAS Testing Laboratory T0419

Parameters marked " * " in this Report are not included in the SANAS Schedule of Accreditation for this laboratory".

Results marked "A" - Concentration outside calibration range, estimate only

3/19/2013

UIS ORGANIC LABORATORY

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ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **MW 1** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	<2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	<2 µg/liter
Naphthalene	<2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	<1 µg/liter
C17 *	<1 µg/liter
C18 *	<1 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	#Error

Total VPHs Identified	<10 µg/liter
Estimated VPHs Unidentified	<10 µg/liter
Estimated TOTAL VPHs	<10 µg/liter

Authorised Signatory that approved this report

Reinardt Cromhout

sanas Testing Laboratory T0419

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Hillcrest

TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **MW 4** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	<2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	<2 µg/liter
Naphthalene	<2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	<1 µg/liter
C17 *	<1 µg/liter
C18 *	<1 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	#Error

Total VPHs Identified	<10 µg/liter
Estimated VPHs Unidentified	<10 µg/liter
Estimated TOTAL VPHs	<10 µg/liter

Authorised Signatory that approved this report

Reinardt Cromhout

sanas Testing Laboratory T0419

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Hillcrest

TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **MW 5** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	<2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	2 µg/liter
Naphthalene	5 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	3 µg/liter
C17 *	15 µg/liter
C18 *	4 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	0.00
(B+T)/(E+X)	#Error

Total VPHs Identified	29 µg/liter
Estimated VPHs Unidentified	406 µg/liter
Estimated TOTAL VPHs	435 µg/liter

Authorised Signatory that approved this report
-

Reinardt Cromhout

sanas Testing Laboratory T0419

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TEST REPORT

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ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **PNMW 1** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	<2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	<2 µg/liter
Naphthalene	<2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	<1 µg/liter
C17 *	<1 µg/liter
C18 *	<1 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	#Error

Total VPHs Identified	<10 µg/liter
Estimated VPHs Unidentified	<10 µg/liter
Estimated TOTAL VPHs	<10 µg/liter

Authorised Signatory that approved this report

Reinardt Cromhout

sanas Testing Laboratory T0419

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Results marked "A" - Concentration outside calibration range, estimate only

3/19/2013

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CLIENT INFORMATION

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Box 1194
Hillcrest

TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **PNMW 10** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	<2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	<2 µg/liter
Naphthalene	<2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	<1 µg/liter
C17 *	<1 µg/liter
C18 *	<1 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	#Error

Total VPHs Identified	<10 µg/liter
Estimated VPHs Unidentified	<10 µg/liter
Estimated TOTAL VPHs	<10 µg/liter

Authorised Signatory that approved this report

Reinardt Cromhout

sanas Testing Laboratory T0419

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Results marked "A" - Concentration outside calibration range, estimate only

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CLIENT INFORMATION

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TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **PNMW 2** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	<2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	<2 µg/liter
Naphthalene	<2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	<1 µg/liter
C17 *	<1 µg/liter
C18 *	<1 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	#Error

Total VPHs Identified	<10 µg/liter
Estimated VPHs Unidentified	<10 µg/liter
Estimated TOTAL VPHs	<10 µg/liter

Authorised Signatory that approved this report

Reinardt Cromhout

sanas Testing Laboratory T0419

Parameters marked " * " in this Report are not included in the SANAS Schedule of Accreditation for this laboratory".

Results marked "A" - Concentration outside calibration range, estimate only

3/19/2013

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TEST REPORT

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ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **PNMW 3** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	<2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	<2 µg/liter
Naphthalene	<2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	<1 µg/liter
C17 *	<1 µg/liter
C18 *	<1 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	#Error

Total VPHs Identified	<10 µg/liter
Estimated VPHs Unidentified	<10 µg/liter
Estimated TOTAL VPHs	<10 µg/liter

Authorised Signatory that approved this report

Reinardt Cromhout

sanas Testing Laboratory T0419

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Results marked "A" - Concentration outside calibration range, estimate only

3/19/2013

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CLIENT INFORMATION

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TEST REPORT

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ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **PNMW 4** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	<2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	<2 µg/liter
Naphthalene	<2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	<1 µg/liter
C17 *	<1 µg/liter
C18 *	<1 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	#Error

Total VPHs Identified	<10 µg/liter
Estimated VPHs Unidentified	<10 µg/liter
Estimated TOTAL VPHs	<10 µg/liter

Authorised Signatory that approved this report

Reinardt Cromhout

sanas Testing Laboratory T0419

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Results marked "A" - Concentration outside calibration range, estimate only

3/19/2013

UIS ORGANIC LABORATORY

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CLIENT INFORMATION

GeoMeasure Group
Rupert Sebire
Box 1194
Hillcrest

TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **PNMW 5** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	<2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	<2 µg/liter
Naphthalene	<2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	4 µg/liter
C17 *	5 µg/liter
C18 *	5 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	#Error

Total VPHs Identified	14 µg/liter
Estimated VPHs Unidentified	45 µg/liter
Estimated TOTAL VPHs	59 µg/liter

Authorised Signatory that approved this report
-

Reinardt Cromhout

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TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **PNMW 6** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	4 µg/liter
Naphthalene	2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	6 µg/liter
C17 *	1 µg/liter
C18 *	<1 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	0.00
(B+T)/(E+X)	0.00

Total VPHs Identified	15 µg/liter
Estimated VPHs Unidentified	237 µg/liter
Estimated TOTAL VPHs	252 µg/liter

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TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Soil
SAMPLE No **PNMW 6 @ 2.0m** Dilution Factor 20
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<100 µg/kg
TAME*	<100 µg/kg
Benzene	<40 µg/kg
Toluene	<200 µg/kg
Ethyl Benzene	<40 µg/kg
m+p-Xylene	<40 µg/kg
o-Xylene	74 µg/kg
1,3,5 Trimethyl benzene	103 µg/kg
1,2,4 Trimethyl benzene	<40 µg/kg
Naphthalene	<40 µg/kg

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<20 µg/kg
Acenaphthylene *	<20 µg/kg
Flourene *	<20 µg/kg
Phenanthrene *	<20 µg/kg
Anthracene *	<20 µg/kg
Fluoranthene *	<20 µg/kg
Pyrene *	<20 µg/kg

DIESEL RANGE ORGANICS (DROs)

C10 *	107 µg/kg
C11 *	241 µg/kg
C12 *	529 µg/kg
C13 *	374 µg/kg
C14 *	<20 µg/kg
C15 *	<20 µg/kg
C16 *	<20 µg/kg
C17 *	1379 µg/kg
C18 *	590 µg/kg
C19 *	<20 µg/kg
C20 *	<20 µg/kg

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	0.00

Total VPHs Identified	3397 µg/kg
Estimated VPHs Unidentified	70534 µg/kg
Estimated TOTAL VPHs	73931 µg/kg

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TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **PNMW 7** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	11 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	<2 µg/liter
Naphthalene	<2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	<1 µg/liter
C17 *	<1 µg/liter
C18 *	<1 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	0.00

Total VPHs Identified	11 µg/liter
Estimated VPHs Unidentified	682 µg/liter
Estimated TOTAL VPHs	693 µg/liter

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TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Soil
SAMPLE No **PNMW 7 @ 1.9m** Dilution Factor 20
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<100	µg/kg
TAME*	<100	µg/kg
Benzene	<40	µg/kg
Toluene	<200	µg/kg
Ethyl Benzene	<40	µg/kg
m+p-Xylene	<40	µg/kg
o-Xylene	<40	µg/kg
1,3,5 Trimethyl benzene	858	µg/kg
1,2,4 Trimethyl benzene	453	µg/kg
Naphthalene	<40	µg/kg

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<20	µg/kg
Acenaphthylene *	<20	µg/kg
Flourene *	<20	µg/kg
Phenanthrene *	<20	µg/kg
Anthracene *	<20	µg/kg
Fluoranthene *	<20	µg/kg
Pyrene *	<20	µg/kg

DIESEL RANGE ORGANICS (DROs)

C10 *	13354	µg/kg	
C11 *	19300	µg/kg	
C12 *	40252	µg/kg	See Note A
C13 *	77503	µg/kg	See Note A
C14 *	60434	µg/kg	See Note A
C15 *	19164	µg/kg	
C16 *	6176	µg/kg	
C17 *	4213	µg/kg	
C18 *	865	µg/kg	
C19 *	<20	µg/kg	
C20 *	<20	µg/kg	

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	1.89
(B+T)/(E+X)	#Error

Total VPHs Identified	242572	µg/kg
Estimated VPHs Unidentified	814380	µg/kg
Estimated TOTAL VPHs	1056952	µg/kg

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-

Reinardt Cromhout

sanas Testing Laboratory T0419

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CLIENT INFORMATION

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Hillcrest

TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **PNMW 8** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	<2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	<2 µg/liter
Naphthalene	<2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	<1 µg/liter
C17 *	<1 µg/liter
C18 *	<1 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	#Error

Total VPHs Identified	<10 µg/liter
Estimated VPHs Unidentified	<10 µg/liter
Estimated TOTAL VPHs	<10 µg/liter

Authorised Signatory that approved this report

Reinardt Cromhout

sanas Testing Laboratory T0419

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TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Soil
SAMPLE No **PNMW 8 @ 2.0m** Dilution Factor 20
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<100 µg/kg
TAME*	<100 µg/kg
Benzene	<40 µg/kg
Toluene	<200 µg/kg
Ethyl Benzene	<40 µg/kg
m+p-Xylene	<40 µg/kg
o-Xylene	<40 µg/kg
1,3,5 Trimethyl benzene	<40 µg/kg
1,2,4 Trimethyl benzene	<40 µg/kg
Naphthalene	<40 µg/kg

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<20 µg/kg
Acenaphthylene *	<20 µg/kg
Flourene *	<20 µg/kg
Phenanthrene *	<20 µg/kg
Anthracene *	<20 µg/kg
Fluoranthene *	<20 µg/kg
Pyrene *	<20 µg/kg

DIESEL RANGE ORGANICS (DROs)

C10 *	<20 µg/kg
C11 *	<20 µg/kg
C12 *	<20 µg/kg
C13 *	<20 µg/kg
C14 *	<20 µg/kg
C15 *	<20 µg/kg
C16 *	<20 µg/kg
C17 *	<20 µg/kg
C18 *	<20 µg/kg
C19 *	<20 µg/kg
C20 *	<20 µg/kg

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	#Error

Total VPHs Identified	<200 µg/kg
Estimated VPHs Unidentified	<200 µg/kg
Estimated TOTAL VPHs	<200 µg/kg

Authorised Signatory that approved this report
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Reinardt Cromhout

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TEST REPORT

TEST INFORMATION **SCREENING FOR VOLATILE PETROLEUM HYDROCARBONS (VPHs)**
ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Water
SAMPLE No **PNMW 9** Dilution Factor No Dilution
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<5 µg/liter
TAME*	<5 µg/liter
Benzene	<2 µg/liter
Toluene	<10 µg/liter
Ethyl Benzene	<2 µg/liter
m+p-Xylene	<2 µg/liter
o-Xylene	<2 µg/liter
1,3,5 Trimethyl benzene	<2 µg/liter
1,2,4 Trimethyl benzene	<2 µg/liter
Naphthalene	<2 µg/liter

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<1 µg/liter
Acenaphthylene *	<1 µg/liter
Flourene *	<1 µg/liter
Phenanthrene *	<1 µg/liter
Anthracene *	<1 µg/liter
Fluoranthene *	<1 µg/liter
Pyrene *	<1 µg/liter

DIESEL RANGE ORGANICS (DROs)

C10 *	<1 µg/liter
C11 *	<1 µg/liter
C12 *	<1 µg/liter
C13 *	<1 µg/liter
C14 *	<1 µg/liter
C15 *	<1 µg/liter
C16 *	<1 µg/liter
C17 *	<1 µg/liter
C18 *	<1 µg/liter
C19 *	<1 µg/liter
C20 *	<1 µg/liter

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	#Error
(B+T)/(E+X)	#Error

Total VPHs Identified	<10 µg/liter
Estimated VPHs Unidentified	<10 µg/liter
Estimated TOTAL VPHs	<10 µg/liter

Authorised Signatory that approved this report

Reinardt Cromhout

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TEST REPORT

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ANALYTICAL METHOD: SPME Extraction and GC-MS METHOD Number: UISOL-T-012
DATE RECEIVED 3/12/2013 DATE COMPLETED 3/19/2013 DATE ISSUED 3/19/2013

SAMPLE INFORMATION **Lab No : 6258 A** Matrix: Soil
SAMPLE No **SBW27MW7 @ 2.1m** Dilution Factor 20
Project number 2013/043 Project name 2013/043

GASOLINE RANGE ORGANICS (GROs)

MTBE*	<100	µg/kg
TAME*	<100	µg/kg
Benzene	<40	µg/kg
Toluene	<200	µg/kg
Ethyl Benzene	236	µg/kg
m+p-Xylene	966	µg/kg
o-Xylene	640	µg/kg
1,3,5 Trimethyl benzene	1765	µg/kg
1,2,4 Trimethyl benzene	7937	µg/kg
Naphthalene	2715	µg/kg

POLYCYCLIC AROMATIC COMPOUNDS

Acenaphthene *	<20	µg/kg
Acenaphthylene *	<20	µg/kg
Flourene *	<20	µg/kg
Phenanthrene *	<20	µg/kg
Anthracene *	<20	µg/kg
Fluoranthene *	<20	µg/kg
Pyrene *	<20	µg/kg

DIESEL RANGE ORGANICS (DROs)

C10 *	25968	µg/kg	See Note A
C11 *	28580	µg/kg	See Note A
C12 *	42099	µg/kg	See Note A
C13 *	39395	µg/kg	See Note A
C14 *	20881	µg/kg	
C15 *	6602	µg/kg	
C16 *	2987	µg/kg	
C17 *	2946	µg/kg	
C18 *	455	µg/kg	
C19 *	<20	µg/kg	
C20 *	<20	µg/kg	

DIAGNOSTIC RATIOS

1,3,5TMB : 1,2,4TMB	0.22
(B+T)/(E+X)	0.00

Total VPHs Identified	184172	µg/kg
Estimated VPHs Unidentified	946043	µg/kg
Estimated TOTAL VPHs	1130215	µg/kg

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Reinardt Cromhout

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3/19/2013

ALcontrol Laboratories

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Website: www.alcontrol.com

Geomeasure Group Ltd
Unit 3
Burnside Office Park
1 Builders Way
Hillcrest
South Africa 3610

Attention: Nicole Olivier

CERTIFICATE OF ANALYSIS

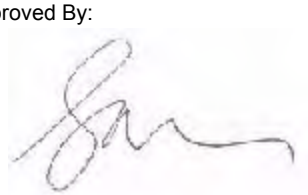
Date:	26 March 2013
Customer:	H_GEOMEAS_HLC
Sample Delivery Group (SDG):	130318-20
Your Reference:	2013/043
Location:	2013/043
Report No:	217302

We received 17 samples on Friday March 15, 2013 and 17 of these samples were scheduled for analysis which was completed on Tuesday March 26, 2013. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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

Approved By:



Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
7088446	CAST 30		0.00	07/03/2013
7088451	CAST31		0.00	07/03/2013
7088447	MW 1		0.00	07/03/2013
7088449	MW 4		0.00	07/03/2013
7088450	MW 5		0.00	07/03/2013
7088436	PNMW 1		0.00	07/03/2013
7088437	PNMW 2		0.00	07/03/2013
7088438	PNMW 3		0.00	07/03/2013
7088439	PNMW 4		0.00	07/03/2013
7088440	PNMW 5		0.00	07/03/2013
7088441	PNMW 6		0.00	07/03/2013
7088442	PNMW 7		0.00	07/03/2013
7088443	PNMW 8		0.00	07/03/2013
7088444	PNMW 9		0.00	07/03/2013
7088445	PNMW 10		0.00	07/03/2013
7088454	PNMW6@2m		2.00	04/03/2013
7088453	SBW27MW7		0.00	07/03/2013

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

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

LIQUID

Results Legend

X Test

N No Determination Possible

		Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container
Character of hydrocarbon samples	All	NDPs: 0 Tests: 2				
SVOC MS (W) - Aqueous	All	NDPs: 0 Tests: 14				
VOC MS (W)	All	NDPs: 0 Tests: 14				

Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Character of hydrocarbon samples	SVOC MS (W) - Aqueous	VOC MS (W)
7088446	CAST 30		0.00	0.5l glass bottle (AL		X	
7088446	CAST 30		0.00	Vial (ALE297)			X
7088451	CAST31		0.00	Vial (ALE297)	X		
7088447	MW 1		0.00	0.5l glass bottle (AL		X	
7088447	MW 1		0.00	Vial (ALE297)			X
7088449	MW 4		0.00	0.5l glass bottle (AL		X	
7088449	MW 4		0.00	Vial (ALE297)			X
7088450	MW 5		0.00	0.5l glass bottle (AL		X	
7088450	MW 5		0.00	Vial (ALE297)			X
7088436	PNMW 1		0.00	0.5l glass bottle (AL		X	
7088436	PNMW 1		0.00	Vial (ALE297)			X
7088437	PNMW 2		0.00	0.5l glass bottle (AL		X	
7088437	PNMW 2		0.00	Vial (ALE297)			X
7088438	PNMW 3		0.00	0.5l glass bottle (AL		X	
7088438	PNMW 3		0.00	Vial (ALE297)			X
7088439	PNMW 4		0.00	0.5l glass bottle (AL		X	
7088439	PNMW 4		0.00	Vial (ALE297)			X
7088440	PNMW 5		0.00	0.5l glass bottle (AL		X	
7088440	PNMW 5		0.00	Vial (ALE297)			X
7088441	PNMW 6		0.00	0.5l glass bottle (AL		X	
7088441	PNMW 6		0.00	Vial (ALE297)			X
7088442	PNMW 7		0.00	0.5l glass bottle (AL		X	
7088442	PNMW 7		0.00	Vial (ALE297)			X
7088443	PNMW 8		0.00	0.5l glass bottle (AL		X	
7088443	PNMW 8		0.00	Vial (ALE297)			X
7088444	PNMW 9		0.00	0.5l glass bottle (AL		X	
7088444	PNMW 9		0.00	Vial (ALE297)			X
7088445	PNMW 10		0.00	0.5l glass bottle (AL		X	
7088445	PNMW 10		0.00	Vial (ALE297)			X
7088453	SBW27MW7		0.00	Vial (ALE297)	X		

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

SOLID

Results Legend

X **Test**

N **No Determination Possible**

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	
			7088454	PNMW6@2m		2.00	250g Glass Jar	Vial (ALE297)
Sample description	All	NDPs: 0 Tests: 1					X	
Semi Volatile Organic Compounds	All	NDPs: 0 Tests: 1					X	
VOC MS (S)	All	NDPs: 0 Tests: 1						X

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	**fine**	0.063mm - 0.1mm	**medium**	0.1mm - 2mm	**coarse**	2mm - 10mm	**very coarse**	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2
7088454	PNMW6@2m	2.00	Dark Brown	Sand	0.1 - 2 mm	Oil/Petroleum	Stones

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

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

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

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

Semi Volatile Organic Compounds

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R					
			PNMW6@2m					
			Depth (m)	2.00				
			Sample Type	Soil/Solid				
			Date Sampled	04/03/2013				
			Sample Time	.				
			Date Received	15/03/2013				
			SDG Ref	130318-20				
			Lab Sample No.(s)	7088454				
			AGS Reference	2013/043				
Phenol	<100 µg/kg	TM157	<100					
Pentachlorophenol	<100 µg/kg	TM157	<100					
n-Nitroso-n-dipropylamine	<100 µg/kg	TM157	<100					
Nitrobenzene	<100 µg/kg	TM157	<100					
Isophorone	<100 µg/kg	TM157	<100					
Hexachloroethane	<100 µg/kg	TM157	<100					
Hexachlorocyclopentadiene	<100 µg/kg	TM157	<100					
Hexachlorobutadiene	<100 µg/kg	TM157	<100					
Hexachlorobenzene	<100 µg/kg	TM157	<100					
n-Dioctyl phthalate	<100 µg/kg	TM157	<100					
Dimethyl phthalate	<100 µg/kg	TM157	<100					
Diethyl phthalate	<100 µg/kg	TM157	<100					
n-Dibutyl phthalate	<100 µg/kg	TM157	<100					
Dibenzofuran	<100 µg/kg	TM157	<100					
Carbazole	<100 µg/kg	TM157	<100					
Butylbenzyl phthalate	<100 µg/kg	TM157	<100					
bis(2-Ethylhexyl) phthalate	<100 µg/kg	TM157	213					
bis(2-Chloroethoxy)methane	<100 µg/kg	TM157	<100					
bis(2-Chloroethyl)ether	<100 µg/kg	TM157	<100					
Azobenzene	<100 µg/kg	TM157	<100					
4-Nitrophenol	<100 µg/kg	TM157	<100					
4-Nitroaniline	<100 µg/kg	TM157	<100					
4-Methylphenol	<100 µg/kg	TM157	<100					
4-Chlorophenylphenylether	<100 µg/kg	TM157	<100					
4-Chloroaniline	<100 µg/kg	TM157	<100					
4-Chloro-3-methylphenol	<100 µg/kg	TM157	<100					
4-Bromophenylphenylether	<100 µg/kg	TM157	<100					
3-Nitroaniline	<100 µg/kg	TM157	<100					
2-Nitrophenol	<100 µg/kg	TM157	<100					
2-Nitroaniline	<100 µg/kg	TM157	<100					
2-Methylphenol	<100 µg/kg	TM157	<100					
1,2,4-Trichlorobenzene	<100 µg/kg	TM157	<100					

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

Semi Volatile Organic Compounds

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Customer Sample R	PNMW6@2m
Depth (m)	2.00
Sample Type	Soil/Solid
Date Sampled	04/03/2013
Sample Time	.
Date Received	15/03/2013
SDG Ref	130318-20
Lab Sample No.(s)	7088454
AGS Reference	2013/043

Component	LOD/Units	Method	
2-Chlorophenol	<100 µg/kg	TM157	<100
2,6-Dinitrotoluene	<100 µg/kg	TM157	<100
2,4-Dinitrotoluene	<100 µg/kg	TM157	<100
2,4-Dimethylphenol	<100 µg/kg	TM157	<100
2,4-Dichlorophenol	<100 µg/kg	TM157	<100
2,4,6-Trichlorophenol	<100 µg/kg	TM157	<100
2,4,5-Trichlorophenol	<100 µg/kg	TM157	<100
1,4-Dichlorobenzene	<100 µg/kg	TM157	<100
1,3-Dichlorobenzene	<100 µg/kg	TM157	<100
1,2-Dichlorobenzene	<100 µg/kg	TM157	<100
2-Chloronaphthalene	<100 µg/kg	TM157	<100
2-Methylnaphthalene	<100 µg/kg	TM157	<100
Acenaphthylene	<100 µg/kg	TM157	<100
Acenaphthene	<100 µg/kg	TM157	<100
Anthracene	<100 µg/kg	TM157	<100
Benzo(a)anthracene	<100 µg/kg	TM157	<100
Benzo(b)fluoranthene	<100 µg/kg	TM157	<100
Benzo(k)fluoranthene	<100 µg/kg	TM157	<100
Benzo(a)pyrene	<100 µg/kg	TM157	<100
Benzo(g,h,i)perylene	<100 µg/kg	TM157	<100
Chrysene	<100 µg/kg	TM157	<100
Fluoranthene	<100 µg/kg	TM157	221
Fluorene	<100 µg/kg	TM157	<100
Indeno(1,2,3-cd)pyrene	<100 µg/kg	TM157	<100
Phenanthrene	<100 µg/kg	TM157	224
Pyrene	<100 µg/kg	TM157	170
Naphthalene	<100 µg/kg	TM157	148
Dibenzo(a,h)anthracene	<100 µg/kg	TM157	<100

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	CAST 30	MW 1	MW 4	MW 5	PNMW 1	PNMW 2
			Depth (m)	0.00	0.00	0.00	0.00	0.00	0.00
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013
			Sample Time	.	.	.	.	.	.
			Date Received	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013
			SDG Ref	130318-20	130318-20	130318-20	130318-20	130318-20	130318-20
			Lab Sample No.(s)	7088446	7088447	7088449	7088450	7088436	7088437
			AGS Reference	2013/043	2013/043	2013/043	2013/043	2013/043	2013/043
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
2,4-Dichlorophenol (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
2,4-Dimethylphenol (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
2-Chloronaphthalene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
2-Chlorophenol (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
2-Methylnaphthalene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
2-Methylphenol (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
2-Nitroaniline (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
2-Nitrophenol (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
3-Nitroaniline (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
4-Bromophenylphenylether (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176		<5	<1	<1	3960	<1	1.04
4-Chloroaniline (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
4-Methylphenol (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
4-Nitrophenol (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
4-Nitroaniline (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Azobenzene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Acenaphthylene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Acenaphthene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Anthracene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176		<10	7.42	4.24	<100	5.12	<2
Benzo(a)anthracene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	CAST 30	MW 1	MW 4	MW 5	PNMW 1	PNMW 2
			Depth (m)	0.00	0.00	0.00	0.00	0.00	0.00
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013
			Sample Time	.	.	.	.	.	.
			Date Received	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013
			SDG Ref	130318-20	130318-20	130318-20	130318-20	130318-20	130318-20
			Lab Sample No.(s)	7088446	7088447	7088449	7088450	7088436	7088437
			AGS Reference	2013/043	2013/043	2013/043	2013/043	2013/043	2013/043
Butylbenzyl phthalate (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Benzo(a)pyrene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Carbazole (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Chrysene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Dibenzofuran (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
n-Dibutyl phthalate (aq)	<1 µg/l	TM176		<5	<1	1.28	<50	1.08	<1
Diethyl phthalate (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Dimethyl phthalate (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
n-Dioctyl phthalate (aq)	<5 µg/l	TM176		<25	<5	<5	<250	<5	<5
Fluoranthene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Fluorene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Hexachlorobenzene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Hexachlorobutadiene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Pentachlorophenol (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Phenol (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Hexachloroethane (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Nitrobenzene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Naphthalene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Isophorone (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Phenanthrene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1
Pyrene (aq)	<1 µg/l	TM176		<5	<1	<1	<50	<1	<1

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	PNMW 3	PNMW 4	PNMW 5	PNMW 6	PNMW 7	PNMW 8
			Depth (m)	0.00	0.00	0.00	0.00	0.00	0.00
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013
			Sample Time	.	.	.	.	.	.
			Date Received	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013
			SDG Ref	130318-20	130318-20	130318-20	130318-20	130318-20	130318-20
			Lab Sample No.(s)	7088438	7088439	7088440	7088441	7088442	7088443
			AGS Reference	2013/043	2013/043	2013/043	2013/043	2013/043	2013/043
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
2,4-Dichlorophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
2,4-Dimethylphenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	14.5	<1
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
2-Chloronaphthalene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
2-Chlorophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
2-Methylnaphthalene (aq)	<1 µg/l	TM176		<1	<1	<1	1.51	7.79	<1
2-Methylphenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	31.1	<1
2-Nitroaniline (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
2-Nitrophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
3-Nitroaniline (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
4-Bromophenylphenylether (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176		<1	<1	<1	2.97	94.7	<1
4-Chloroaniline (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
4-Methylphenol (aq)	<1 µg/l	TM176		<1	<1	<1	59.7	38.7	<1
4-Nitrophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
4-Nitroaniline (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Azobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Acenaphthylene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Acenaphthene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Anthracene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176		<2	<2	<2	3.41	<4	<2
Benzo(a)anthracene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	PNMW 3	PNMW 4	PNMW 5	PNMW 6	PNMW 7	PNMW 8
			Depth (m)	0.00	0.00	0.00	0.00	0.00	0.00
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013
			Sample Time	.	.	.	.	.	.
			Date Received	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013
			SDG Ref	130318-20	130318-20	130318-20	130318-20	130318-20	130318-20
			Lab Sample No.(s)	7088438	7088439	7088440	7088441	7088442	7088443
			AGS Reference	2013/043	2013/043	2013/043	2013/043	2013/043	2013/043
Butylbenzyl phthalate (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Benzo(a)pyrene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Carbazole (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Chrysene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Dibenzofuran (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
n-Dibutyl phthalate (aq)	<1 µg/l	TM176		<1	<1	<1	1.98	6.23	<1
Diethyl phthalate (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Dimethyl phthalate (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
n-Dioctyl phthalate (aq)	<5 µg/l	TM176		<5	<5	<5	<5	<10	<5
Fluoranthene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Fluorene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Hexachlorobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Hexachlorobutadiene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Pentachlorophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Phenol (aq)	<1 µg/l	TM176		<1	<1	<1	36.5	5.47	<1
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Hexachloroethane (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Nitrobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Naphthalene (aq)	<1 µg/l	TM176		<1	<1	<1	8.9	53.1	<1
Isophorone (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Phenanthrene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1
Pyrene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<2	<1

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	PNMW 9	PNMW 10				
			Depth (m)	0.00	0.00				
			Sample Type	Water(GW/SW)	Water(GW/SW)				
			Date Sampled	07/03/2013	07/03/2013				
			Sample Time	.	.				
			Date Received	15/03/2013	15/03/2013				
			SDG Ref	130318-20	130318-20				
			Lab Sample No.(s)	7088444	7088445				
			AGS Reference	2013/043	2013/043				
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176		<1	<1				
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176		<1	<1				
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176		<1	<1				
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176		<1	<1				
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176		<1	<1				
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176		<1	<1				
2,4-Dichlorophenol (aq)	<1 µg/l	TM176		<1	<1				
2,4-Dimethylphenol (aq)	<1 µg/l	TM176		<1	<1				
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176		<1	<1				
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176		<1	<1				
2-Chloronaphthalene (aq)	<1 µg/l	TM176		<1	<1				
2-Chlorophenol (aq)	<1 µg/l	TM176		<1	<1				
2-Methylnaphthalene (aq)	<1 µg/l	TM176		<1	<1				
2-Methylphenol (aq)	<1 µg/l	TM176		<1	<1				
2-Nitroaniline (aq)	<1 µg/l	TM176		<1	<1				
2-Nitrophenol (aq)	<1 µg/l	TM176		<1	<1				
3-Nitroaniline (aq)	<1 µg/l	TM176		<1	<1				
4-Bromophenylphenylether (aq)	<1 µg/l	TM176		<1	<1				
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176		<1	<1				
4-Chloroaniline (aq)	<1 µg/l	TM176		<1	<1				
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176		<1	<1				
4-Methylphenol (aq)	<1 µg/l	TM176		<1	<1				
4-Nitrophenol (aq)	<1 µg/l	TM176		<1	<1				
4-Nitroaniline (aq)	<1 µg/l	TM176		<1	<1				
Azobenzene (aq)	<1 µg/l	TM176		<1	<1				
Acenaphthylene (aq)	<1 µg/l	TM176		<1	<1				
Acenaphthene (aq)	<1 µg/l	TM176		<1	<1				
Anthracene (aq)	<1 µg/l	TM176		<1	<1				
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176		<1	<1				
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176		<1	<1				
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176		<2	<2				
Benzo(a)anthracene (aq)	<1 µg/l	TM176		<1	<1				

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	PNMW 9	PNMW 10				
			Depth (m)	0.00	0.00				
			Sample Type	Water(GW/SW)	Water(GW/SW)				
			Date Sampled	07/03/2013	07/03/2013				
			Sample Time	.	.				
			Date Received	15/03/2013	15/03/2013				
			SDG Ref	130318-20	130318-20				
			Lab Sample No.(s)	7088444	7088445				
			AGS Reference	2013/043	2013/043				
Butylbenzyl phthalate (aq)	<1 µg/l	TM176		<1	<1				
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176		<1	<1				
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176		<1	<1				
Benzo(a)pyrene (aq)	<1 µg/l	TM176		<1	<1				
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176		<1	<1				
Carbazole (aq)	<1 µg/l	TM176		<1	<1				
Chrysene (aq)	<1 µg/l	TM176		<1	<1				
Dibenzofuran (aq)	<1 µg/l	TM176		<1	<1				
n-Dibutyl phthalate (aq)	<1 µg/l	TM176		<1	<1				
Diethyl phthalate (aq)	<1 µg/l	TM176		<1	<1				
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176		<1	<1				
Dimethyl phthalate (aq)	<1 µg/l	TM176		<1	<1				
n-Dioctyl phthalate (aq)	<5 µg/l	TM176		<5	<5				
Fluoranthene (aq)	<1 µg/l	TM176		<1	<1				
Fluorene (aq)	<1 µg/l	TM176		<1	<1				
Hexachlorobenzene (aq)	<1 µg/l	TM176		<1	<1				
Hexachlorobutadiene (aq)	<1 µg/l	TM176		<1	<1				
Pentachlorophenol (aq)	<1 µg/l	TM176		<1	<1				
Phenol (aq)	<1 µg/l	TM176		<1	<1				
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176		<1	<1				
Hexachloroethane (aq)	<1 µg/l	TM176		<1	<1				
Nitrobenzene (aq)	<1 µg/l	TM176		<1	<1				
Naphthalene (aq)	<1 µg/l	TM176		<1	<1				
Isophorone (aq)	<1 µg/l	TM176		<1	<1				
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176		<1	<1				
Phenanthrene (aq)	<1 µg/l	TM176		<1	<1				
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176		<1	<1				
Pyrene (aq)	<1 µg/l	TM176		<1	<1				

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

VOC MS (S)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

	Customer Sample R
	PNMW6@2m
Depth (m)	2.00
Sample Type	Soil/Solid
Date Sampled	04/03/2013
Sample Time	.
Date Received	15/03/2013
SDG Ref	130318-20
Lab Sample No.(s)	7088454
AGS Reference	2013/043

Component	LOD/Units	Method	
Dibromofluoromethane**	%	TM116	105 @
Toluene-d8**	%	TM116	95.8 @
4-Bromofluorobenzene**	%	TM116	124 @
Dichlorodifluoromethane	<4 µg/kg	TM116	<8 @ M
Chloromethane	<7 µg/kg	TM116	<14 @
Vinyl Chloride	<10 µg/kg	TM116	<20 @
Bromomethane	<13 µg/kg	TM116	<26 @ M
Chloroethane	<14 µg/kg	TM116	<28 @ M
Trichlorofluorormethane	<6 µg/kg	TM116	<12 @ M
1,1-Dichloroethene	<10 µg/kg	TM116	<20 @ #
Carbon Disulphide	<7 µg/kg	TM116	138 @ M
Dichloromethane	<10 µg/kg	TM116	<20 @ #
Methyl Tertiary Butyl Ether	<11 µg/kg	TM116	<22 @ M
trans-1,2-Dichloroethene	<11 µg/kg	TM116	<22 @ M
1,1-Dichloroethane	<8 µg/kg	TM116	<16 @ M
cis-1,2-Dichloroethene	<5 µg/kg	TM116	67.2 @ M
2,2-Dichloropropane	<12 µg/kg	TM116	<24 @ M
Bromochloromethane	<14 µg/kg	TM116	<28 @ M
Chloroform	<8 µg/kg	TM116	<16 @ M
1,1,1-Trichloroethane	<7 µg/kg	TM116	<14 @ M
1,1-Dichloropropene	<11 µg/kg	TM116	<22 @ M
Carbontetrachloride	<14 µg/kg	TM116	<28 @ M
1,2-Dichloroethane	<5 µg/kg	TM116	<10 @ M
Benzene	<9 µg/kg	TM116	<18 @ M
Trichloroethene	<9 µg/kg	TM116	<18 @ M
1,2-Dichloropropane	<12 µg/kg	TM116	<24 @ M
Dibromomethane	<9 µg/kg	TM116	<18 @ M
Bromodichloromethane	<7 µg/kg	TM116	<14 @ M
cis-1,3-Dichloropropene	<14 µg/kg	TM116	<28 @ M
Toluene	<5 µg/kg	TM116	<10 @ M
trans-1,3-Dichloropropene	<14 µg/kg	TM116	<28 @
1,1,2-Trichloroethane	<10 µg/kg	TM116	<20 @ M

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

VOC MS (S)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Customer Sample R	PNMW6@2m
Depth (m)	2.00
Sample Type	Soil/Solid
Date Sampled	04/03/2013
Sample Time	.
Date Received	15/03/2013
SDG Ref	130318-20
Lab Sample No.(s)	7088454
AGS Reference	2013/043

Component	LOD/Units	Method	
1,3-Dichloropropane	<7 µg/kg	TM116	<14 @ #
Tetrachloroethene	<5 µg/kg	TM116	<10 @ M
Dibromochloromethane	<13 µg/kg	TM116	<26 @ M
1,2-Dibromoethane	<12 µg/kg	TM116	<24 @ M
Chlorobenzene	<5 µg/kg	TM116	<10 @ M
1,1,1,2-Tetrachloroethane	<10 µg/kg	TM116	<20 @ M
Ethylbenzene	<4 µg/kg	TM116	42.7 @ M
p/m-Xylene	<14 µg/kg	TM116	<28 @ #
o-Xylene	<10 µg/kg	TM116	95.2 @ M
Styrene	<10 µg/kg	TM116	<20 @ M
Bromoform	<10 µg/kg	TM116	<20 @ M
Isopropylbenzene	<5 µg/kg	TM116	111 @ M
1,1,2,2-Tetrachloroethane	<10 µg/kg	TM116	<20 @ #
1,2,3-Trichloropropane	<17 µg/kg	TM116	<34 @ M
Bromobenzene	<10 µg/kg	TM116	<20 @ M
Propylbenzene	<11 µg/kg	TM116	320 @ M
2-Chlorotoluene	<9 µg/kg	TM116	<18 @ M
1,3,5-Trimethylbenzene	<8 µg/kg	TM116	115 @ #
4-Chlorotoluene	<12 µg/kg	TM116	<24 @ M
tert-Butylbenzene	<12 µg/kg	TM116	<24 @ #
1,2,4-Trimethylbenzene	<9 µg/kg	TM116	1040 @ #
sec-Butylbenzene	<10 µg/kg	TM116	455 @ M
4-Isopropyltoluene	<11 µg/kg	TM116	152 @ M
1,3-Dichlorobenzene	<6 µg/kg	TM116	<12 @ M
1,4-Dichlorobenzene	<5 µg/kg	TM116	<10 @ M
n-Butylbenzene	<10 µg/kg	TM116	272 @ M
1,2-Dichlorobenzene	<12 µg/kg	TM116	<24 @ M
1,2-Dibromo-3-chloropropane	<14 µg/kg	TM116	<28 @ M
Tert-amyl methyl ether	<15 µg/kg	TM116	<30 @
1,2,4-Trichlorobenzene	<6 µg/kg	TM116	<12 @ #
Hexachlorobutadiene	<12 µg/kg	TM116	<24 @
Naphthalene	<13 µg/kg	TM116	461 @ M

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

VOC MS (S)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

	Customer Sample R	LOD/Units	Method
	PNMW6@2m		
Depth (m)	2.00		
Sample Type	Soil/Solid		
Date Sampled	04/03/2013		
Sample Time	.		
Date Received	15/03/2013		
SDG Ref	130318-20		
Lab Sample No.(s)	7088454		
AGS Reference	2013/043		
1,2,3-Trichlorobenzene	<12 @ M	<6 µg/kg	TM116

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	CAST 30	MW 1	MW 4	MW 5	PNMW 1	PNMW 2
			Depth (m)	0.00	0.00	0.00	0.00	0.00	0.00
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013
			Sample Time	.	.	.	.	.	.
			Date Received	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013
			SDG Ref	130318-20	130318-20	130318-20	130318-20	130318-20	130318-20
			Lab Sample No.(s)	7088446	7088447	7088449	7088450	7088436	7088437
			AGS Reference	2013/043	2013/043	2013/043	2013/043	2013/043	2013/043
Dibromofluoromethane**	%	TM208		110	111	108	107	107	105
Toluene-d8**	%	TM208		99.9	101	99.9	98.8	101	99.9
4-Bromofluorobenzene**	%	TM208		96.4	95.4	98.2	92	99.7	98.3
Dichlorodifluoromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Vinyl chloride	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromomethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Trichlorofluoromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Carbon disulphide	<1 µg/l	TM208		<1 #	<1 #	<1 #	1.91 #	<1 #	<1 #
Dichloromethane	<3 µg/l	TM208		3.09 #	5.16 #	<3 #	<3 #	6.04 #	3.93 #
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		14.3 #	<1 #	1.29 #	<1 #	<1 #	<1 #
trans-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
cis-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #	12.3 #	120 #	<1 #	3.29 #
2,2-Dichloropropane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
Bromochloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chloroform	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,1-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Carbontetrachloride	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichloroethane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
Benzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	1.9 #	<1 #	<1 #
Trichloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Dibromomethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromodichloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
cis-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Toluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	13.5 #	<1 #	<1 #
trans-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,2-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	CAST 30	MW 1	MW 4	MW 5	PNMW 1	PNMW 2
			Depth (m)	0.00	0.00	0.00	0.00	0.00	0.00
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013
			Sample Time	.	.	.	.	.	.
			Date Received	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013
			SDG Ref	130318-20	130318-20	130318-20	130318-20	130318-20	130318-20
			Lab Sample No.(s)	7088446	7088447	7088449	7088450	7088436	7088437
			AGS Reference	2013/043	2013/043	2013/043	2013/043	2013/043	2013/043
1,3-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Tetrachloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Dibromochloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dibromoethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	1.42 #	<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #	6.87 #	<1 #	<1 #
o-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #	6.18 #	<1 #	<1 #
Styrene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromoform	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Isopropylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Propylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
2-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	1.52 #	<1 #	<1 #
4-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
tert-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	10.6 #	<1 #	<1 #
sec-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
4-iso-Propyltoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,4-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
n-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichlorobenzene	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Hexachlorobutadiene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Naphthalene	<1 µg/l	TM208		<1 #	<1 #	<1 #	15.8 #	<1 #	<1 #

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	CAST 30	MW 1	MW 4	MW 5	PNMW 1	PNMW 2
			Depth (m)	0.00	0.00	0.00	0.00	0.00	0.00
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013
			Sample Time	.	.	.	.	.	.
			Date Received	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013
			SDG Ref	130318-20	130318-20	130318-20	130318-20	130318-20	130318-20
			Lab Sample No.(s)	7088446	7088447	7088449	7088450	7088436	7088437
			AGS Reference	2013/043	2013/043	2013/043	2013/043	2013/043	2013/043
1,2,3-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3,5-Trichlorobenzene	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	PNMW 3	PNMW 4	PNMW 5	PNMW 6	PNMW 7	PNMW 8
			Depth (m)	0.00	0.00	0.00	0.00	0.00	0.00
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013
			Sample Time	.	.	.	.	.	.
			Date Received	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013
			SDG Ref	130318-20	130318-20	130318-20	130318-20	130318-20	130318-20
			Lab Sample No.(s)	7088438	7088439	7088440	7088441	7088442	7088443
			AGS Reference	2013/043	2013/043	2013/043	2013/043	2013/043	2013/043
Dibromofluoromethane**	%	TM208		110	106	106	107	105	106
Toluene-d8**	%	TM208		99.7	99.8	101	98	100	100
4-Bromofluorobenzene**	%	TM208		95.9	96.4	98.4	97.8	97.1	99.7
Dichlorodifluoromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Vinyl chloride	<1 µg/l	TM208		<1 #	<1 #	<1 #	35 #	1.99 #	<1 #
Bromomethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Trichlorofluoromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Carbon disulphide	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Dichloromethane	<3 µg/l	TM208		<3 #	4.46 #	<3 #	<3 #	5.55 #	<3 #
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
trans-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	3.13 #	<1 #	<1 #
1,1-Dichloroethane	<1 µg/l	TM208		<1 #	<1 #	1.13 #	2.98 #	<1 #	<1 #
cis-1,2-Dichloroethene	<1 µg/l	TM208		1.91 #	5.53 #	70.5 #	729 #	275 #	<1 #
2,2-Dichloropropane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
Bromochloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chloroform	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,1-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Carbontetrachloride	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichloroethane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
Benzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Trichloroethene	<1 µg/l	TM208		3.36 #	<1 #	<1 #	<1 #	2.48 #	<1 #
1,2-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Dibromomethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromodichloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
cis-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Toluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	1.44 #	<1 #	<1 #
trans-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,2-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	PNMW 3	PNMW 4	PNMW 5	PNMW 6	PNMW 7	PNMW 8
			Depth (m)	0.00	0.00	0.00	0.00	0.00	0.00
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013
			Sample Time	.	.	.	.	.	.
			Date Received	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013
			SDG Ref	130318-20	130318-20	130318-20	130318-20	130318-20	130318-20
			Lab Sample No.(s)	7088438	7088439	7088440	7088441	7088442	7088443
			AGS Reference	2013/043	2013/043	2013/043	2013/043	2013/043	2013/043
1,3-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Tetrachloroethene	<1 µg/l	TM208		1.65 #	<1 #	<1 #	<1 #	2.75 #	<1 #
Dibromochloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dibromoethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	2 #	<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
o-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #	8.55 #	<1 #	<1 #
Styrene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromoform	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Isopropylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Propylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
2-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	1.69 #	<1 #	<1 #
4-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
tert-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	4.83 #	<1 #	<1 #
sec-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
4-iso-Propyltoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,4-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
n-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichlorobenzene	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Hexachlorobutadiene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Naphthalene	<1 µg/l	TM208		<1 #	<1 #	<1 #	5.49 #	<1 #	<1 #

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	PNMW 3	PNMW 4	PNMW 5	PNMW 6	PNMW 7	PNMW 8
			Depth (m)	0.00	0.00	0.00	0.00	0.00	0.00
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013	07/03/2013
			Sample Time	.	.	.	.	.	.
			Date Received	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013	15/03/2013
			SDG Ref	130318-20	130318-20	130318-20	130318-20	130318-20	130318-20
			Lab Sample No.(s)	7088438	7088439	7088440	7088441	7088442	7088443
			AGS Reference	2013/043	2013/043	2013/043	2013/043	2013/043	2013/043
1,2,3-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3,5-Trichlorobenzene	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	PNMW 9	PNMW 10				
			Depth (m)	0.00	0.00				
			Sample Type	Water(GW/SW)	Water(GW/SW)				
			Date Sampled	07/03/2013	07/03/2013				
			Sample Time	.	.				
			Date Received	15/03/2013	15/03/2013				
			SDG Ref	130318-20	130318-20				
			Lab Sample No.(s)	7088444	7088445				
			AGS Reference	2013/043	2013/043				
Dibromofluoromethane**	%	TM208		107	107				
Toluene-d8**	%	TM208		101	101				
4-Bromofluorobenzene**	%	TM208		98	96.6				
Dichlorodifluoromethane	<1 µg/l	TM208		<1 #	<1 #				
Chloromethane	<1 µg/l	TM208		<1 #	<1 #				
Vinyl chloride	<1 µg/l	TM208		<1 #	1.77 #				
Bromomethane	<1 µg/l	TM208		<1 #	<1 #				
Chloroethane	<1 µg/l	TM208		<1 #	<1 #				
Trichlorofluoromethane	<1 µg/l	TM208		<1 #	<1 #				
1,1-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #				
Carbon disulphide	<1 µg/l	TM208		<1 #	<1 #				
Dichloromethane	<3 µg/l	TM208		5.69 #	<3 #				
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #				
trans-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #				
1,1-Dichloroethane	<1 µg/l	TM208		<1 #	<1 #				
cis-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	3.3 #				
2,2-Dichloropropane	<1 µg/l	TM208		<1	<1				
Bromochloromethane	<1 µg/l	TM208		<1 #	<1 #				
Chloroform	<1 µg/l	TM208		<1 #	<1 #				
1,1,1-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #				
1,1-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #				
Carbontetrachloride	<1 µg/l	TM208		<1 #	<1 #				
1,2-Dichloroethane	<1 µg/l	TM208		<1	<1				
Benzene	<1 µg/l	TM208		<1 #	<1 #				
Trichloroethene	<1 µg/l	TM208		<1 #	<1 #				
1,2-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #				
Dibromomethane	<1 µg/l	TM208		<1 #	<1 #				
Bromodichloromethane	<1 µg/l	TM208		<1 #	<1 #				
cis-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #				
Toluene	<1 µg/l	TM208		<1 #	<1 #				
trans-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #				
1,1,2-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #				

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

VOC MS (W)

Results Legend		Customer Sample R	PNMW 9	PNMW 10				
#	ISO17025 accredited.							
M	*m*CERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.	Depth (m)	0.00	0.00				
tot.unfilt	Total / unfiltered sample.	Sample Type	Water(GW/SW)	Water(GW/SW)				
*	Subcontracted test.	Date Sampled	07/03/2013	07/03/2013				
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Sample Time	.	.				
		Date Received	15/03/2013	15/03/2013				
		SDG Ref	130318-20	130318-20				
(F)	Trigger breach confirmed	Lab Sample No.(s)	7088444	7088445				
1-4&+§@	Sample deviation (see appendix)	AGS Reference	2013/043	2013/043				

Component	LOD/Units	Method						
1,3-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #				
Tetrachloroethene	<1 µg/l	TM208	<1 #	<1 #				
Dibromochloromethane	<1 µg/l	TM208	<1 #	<1 #				
1,2-Dibromoethane	<1 µg/l	TM208	<1 #	<1 #				
Chlorobenzene	<1 µg/l	TM208	<1 #	<1 #				
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1 #	<1 #				
Ethylbenzene	<1 µg/l	TM208	<1 #	<1 #				
m,p-Xylene	<1 µg/l	TM208	<1 #	<1 #				
o-Xylene	<1 µg/l	TM208	<1 #	<1 #				
Styrene	<1 µg/l	TM208	<1 #	<1 #				
Bromoform	<1 µg/l	TM208	<1 #	<1 #				
Isopropylbenzene	<1 µg/l	TM208	<1 #	<1 #				
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1	<1				
1,2,3-Trichloropropane	<1 µg/l	TM208	<1 #	<1 #				
Bromobenzene	<1 µg/l	TM208	<1 #	<1 #				
Propylbenzene	<1 µg/l	TM208	<1 #	<1 #				
2-Chlorotoluene	<1 µg/l	TM208	<1 #	<1 #				
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1 #	<1 #				
4-Chlorotoluene	<1 µg/l	TM208	<1 #	<1 #				
tert-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #				
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1 #	<1 #				
sec-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #				
4-iso-Propyltoluene	<1 µg/l	TM208	<1 #	<1 #				
1,3-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #				
1,4-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #				
n-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #				
1,2-Dichlorobenzene	<1 µg/l	TM208	<1	<1				
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1	<1				
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1 #	<1 #				
Hexachlorobutadiene	<1 µg/l	TM208	<1 #	<1 #				
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1 #	<1 #				
Naphthalene	<1 µg/l	TM208	<1 #	<1 #				

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	PNMW 9	PNMW 10			
			Depth (m)	0.00	0.00			
			Sample Type	Water(GW/SW)	Water(GW/SW)			
			Date Sampled	07/03/2013	07/03/2013			
			Sample Time	.	.			
			Date Received	15/03/2013	15/03/2013			
			SDG Ref	130318-20	130318-20			
			Lab Sample No.(s)	7088444	7088445			
			AGS Reference	2013/043	2013/043			
1,2,3-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #			
1,3,5-Trichlorobenzene	<1 µg/l	TM208		<1	<1			

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
TM059	In - house Method	Determination of whole oil by gas chromatography (C4-C40)		
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS		
TM157	HP 6890 Gas Chromatograph (GC) system and HP 5973 Mass Selective Detector (MSD).	Determination of SVOC in Soils by GC-MS extracted by sonication in DCM/Acetone		
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS		
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters		

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

CERTIFICATE OF ANALYSIS

SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	7088451	7088446	7088447	7088449	7088450	7088436	7088437	7088438	7088439	7088440
Customer Sample Ref.	CAST31	CAST 30	MW 1	MW 4	MW 5	PNMW 1	PNMW 2	PNMW 3	PNMW 4	PNMW 5
AGS Ref.										
Depth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
Character of hydrocarbon samples	25-Mar-2013									
SVOC MS (W) - Aqueous		26-Mar-2013	25-Mar-2013	25-Mar-2013	26-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013
VOC MS (W)		25-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013

Lab Sample No(s)	7088441	7088442	7088443	7088444	7088445	7088454	7088453
Customer Sample Ref.	PNMW 6	PNMW 7	PNMW 8	PNMW 9	PNMW 10	PNMW6@2m	SBW27MW7
AGS Ref.							
Depth	0.00	0.00	0.00	0.00	0.00	2.00	0.00
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	SOLID	LIQUID
Character of hydrocarbon samples							25-Mar-2013
Sample description						20-Mar-2013	
Semi Volatile Organic Compounds						25-Mar-2013	
SVOC MS (W) - Aqueous	26-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013	26-Mar-2013		
VOC MS (S)						25-Mar-2013	
VOC MS (W)	25-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013	25-Mar-2013		

ALcontrol Laboratories

Chemical Oil Fingerprint

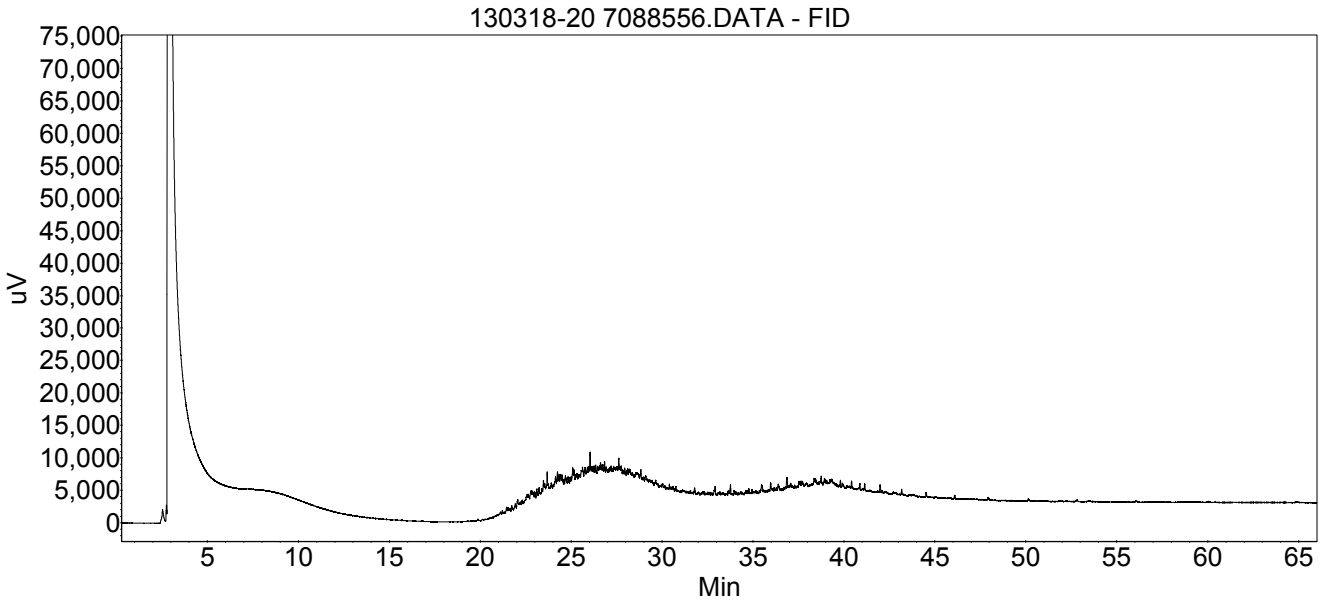
Client: H_GEOMEAS_HLC

Job Number: 130318-20 7088556

Identity: CAST 31

Description: Oil on water

Carbon Range:	C12 - C40
Boiling Point Range:	216 - 525°C
Fingerprint:	Heavily biodegraded Diesel &
Comments:	Lube oil
	Extraction



ALcontrol Laboratories

Chemical Oil Fingerprint

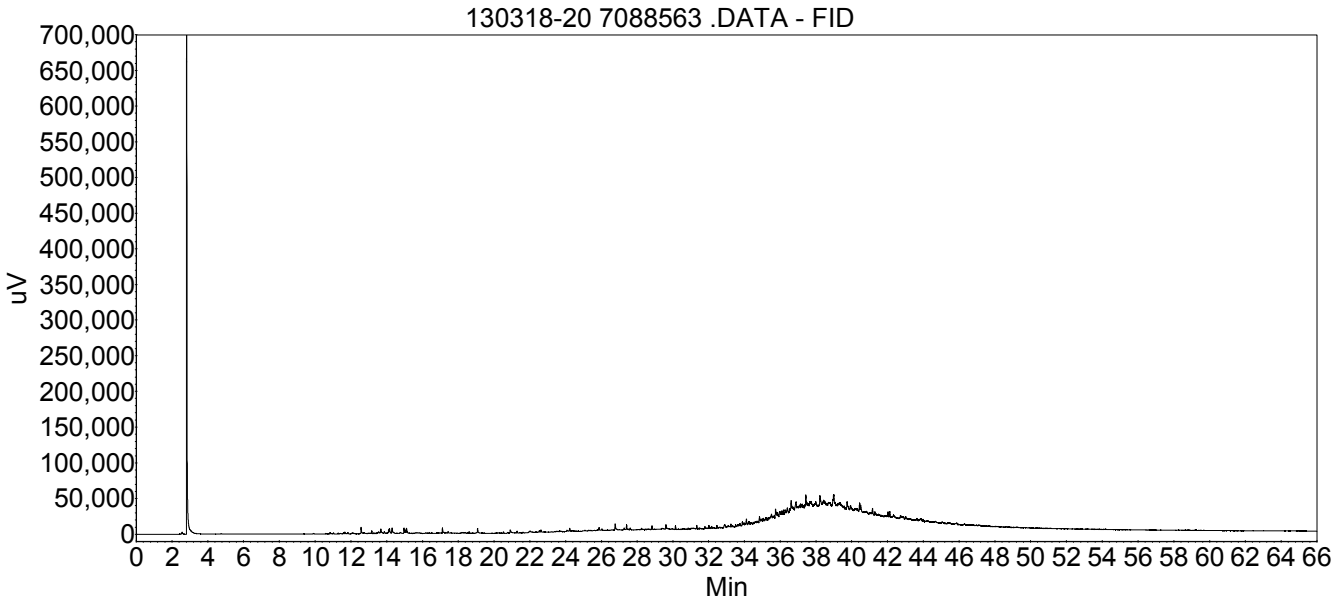
Client: H_GEOMEAS_HLC

Job Number: 130318-20 7088563

Identity: SBW27MW7

Description: Black product

Carbon Range:	C10 - C38
Boiling Point Range:	174 - 512°C
Fingerprint:	Degraded material in the
Comments:	Diesel range & Lube oil range
	N/A



SDG:	130318-20	**Location:**	2013/043	**Order Number:**	
Job:	H_GEOMEAS_HLC-22	**Customer:**	Geomeasure Group Ltd	**Report Number:**	217302
Client Reference:	2013/043	**Attention:**	Nicole Olivier	**Superseded Report:**	

Appendix
General

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

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

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 2 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

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

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

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

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

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

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

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

11. Results relate only to the items tested.

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

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

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

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

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

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

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

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

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

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

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

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

Sample Deviations

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

Asbestos

Identification of Asbestos in Bulk Materials & Soils

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

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

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

Visual Estimation Of Fibre Content

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

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

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

Talbot & Talbot

Talbot LABORATORIES

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2013/03/22

ANALYTICAL REPORT

OUR REF: **GEOMEASURE GROUP 4411/13**
COMPANY NAME: **GEOMEASURE GROUP**
CONTACT ADDRESS: **P O BOX 1194, HILLCREST, 3650**
CONTACT PERSON: **NICOLE**
SAMPLE TYPE: **WATER SAMPLES**
DATE SUBMITTED: **2013/03/08**

Determinand	Units	Method No	Results		
			4411/13	4412/13	4413/13
			PNMW 1 08.03.13 2013/043	PNMW 7 08.03.13 2013/043	MW 5 08.03.13 2013/043
Dissolved arsenic*	µg As/l	-	3.90**	107**	109**

Technical Signatory: Chemistry_____ Bacteriology_____

- This report relates only to the samples tested. This report shall not be reproduced, except in full, without the written approval of **TALBOT LABORATORIES**
- Test marked * in this report are not SANAS accredited and are not included in the SANAS accreditation schedule for our laboratory.
- Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.
- Figures reported in () were analysed after preservation according to the laboratory's preservation procedure.
- Note: results marked ** have been sub-contracted to a peer laboratory.
- Note: Estimates of Uncertainty of Measurement may be obtained from the laboratory.

APPENDIX C

RISC5 ASSESSMENT RESULTS

GEOMEASURE GROUP
Groundwater & Environmental Consultants

SUMMARY OF CARCINOGENIC RISK

Receptor 1:

Worker - Mean

Chemical	Ingestion of Soil	Dermal Contact with Soil	Inhalation of Outdoor Air	Inhalation of Particulates	TOTAL
Benzo(a)pyrene	5.1E-08	2.9E-08	5.6E-13	9.7E-20	**8.1E-08**
TOTAL	**5.1E-08**	**2.9E-08**	**5.6E-13**	**9.7E-20**	**8.1E-08**

Summary of Input Data for Risk Calculation

Description:

Date: **05-15-2013 10:21:20**

Receptors:
Worker - Mean

Routes:
Ingestion of Soil
Dermal Contact with Soil
Inhalation of Outdoor Air
Inhalation of Particulates

Chemicals:
Benzo(a)pyrene

Exposure Parameters

Exposure Pathway	**Units**	**Worker - Mean**
Body weight	kg	71.8
Averaging time for carcinogens	yr	70
Exposure duration	yr	4.2

Ingestion of Soil	**Units**	**Worker - Mean**
Exposure frequency for soil	events/yr	219
Ingestion rate for soil	mg/d	50

Dermal Contact with Soil	**Units**	**Worker - Mean**
Exposure frequency for soil	events/yr	219
Skin surface area exposed to soil	cm2	3.12E+03
Soil/skin adherence factor	mg/cm2	7.00E-02

Inhalation of Outdoor Air	**Units**	**Worker - Mean**
Exposure frequency for outdoor air	events/yr	219
Time outdoors	hr/d	4
Inhalation rate outdoors	m3/hr	1

Inhalation of Particulates	**Units**	**Worker - Mean**
Exposure frequency for outdoor air	events/yr	219
Time outdoors	hr/d	4
Inhalation rate outdoors	m3/hr	1

Absorption Adjustment Factors	**Ingestion of Soil**
	-
Benzo(a)pyrene	1

Slope Factors and Reference Doses

Chemical	**Units**	**Benzo(a)pyrene**
Ingestion Slope Factor	1/(mg/kg-day)	7.3
Ingestion Reference Dose	mg/kg-day	ND
Inhalation Slope Factor	1/(mg/kg-day)	3.85
Reference Concentration	mg/m3	ND

Exposure Point Concentrations for Modeled Media

Obtained from Fate and Transport Output

For carcinogenic risk, concentrations are averaged over the exposure duration (ED).
For non-carcinogenic risk, concentrations are averaged over the minimum of 7 years or the ED.

Modeled Concentrations for Surface Soil **Exposure Point Concentration for Carcinogens** **Receptor Description**	**Exposure Duration yr**	**Benzo(a)pyrene mg/kg**
Carcinogens		
Worker - Mean	4.20E+00	2.81E-01

Modeled Concentrations for Surface Soil **Exposure Point Concentration for Non-Carcinogens** **Receptor Description**	**Exposure Duration yr**	**Benzo(a)pyrene mg/kg**
Non-Carcinogens		
Worker - Mean	4.20E+00	2.81E-01

Exposure Point Concentrations for Modeled Media
Obtained from Fate and Transport Output

For carcinogenic risk, concentrations are averaged over the exposure duration (ED).
For non-carcinogenic risk, concentrations are averaged over the minimum of 7 years or the ED.

Modeled Concentrations for Outdoor Air **Exposure Point Concentration for Carcinogens** **Receptor Description**	**Exposure Duration yr**	**Benzo(a)pyrene mg/m3**
Carcinogens		
Worker - Mean	4.20E+00	7.22E-11

Modeled Concentrations for Outdoor Air **Exposure Point Concentration for Non-Carcinogens** **Receptor Description**	**Exposure Duration yr**	**Benzo(a)pyrene mg/m3**
Non-Carcinogens		
Worker - Mean	4.20E+00	7.22E-11

Exposure Point Concentrations for Modeled Media
Obtained from Fate and Transport Output

For carcinogenic risk, concentrations are averaged over the exposure duration (ED).
For non-carcinogenic risk, concentrations are averaged over the minimum of 7 years or the ED.

Modeled Concentrations for Particulates in Ai **Exposure Point Concentration for Carcinogens** **Receptor Description**	**Exposure Duration yr**	**Benzo(a)pyrene mg/m3**
Carcinogens		
Worker - Mean	4.20E+00	1.26E-17

Modeled Concentrations for Particulates in Ai **Exposure Point Concentration for Non-Carcinogens** **Receptor Description**	**Exposure Duration yr**	**Benzo(a)pyrene mg/m3**
Non-Carcinogens		
Worker - Mean	4.20E+00	1.26E-17

SUMMARY OF HAZARD QUOTIENTS

Receptor 1:
Worker - Mean

Chemical	Ingestion of Soil	Dermal Contact with Soil	Inhalation of Outdoor Air	Inhalation of Particulates	TOTAL
Benzo(a)pyrene	ND	ND	ND	ND	**ND**
TOTAL	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**

Summary of Daily Doses (Intake) for Risk Calculation

Description:

Date: **05-15-2013 10:21:20**

Daily Dose and Risk for: Benzo(a)pyrene **Ingestion of Soil**	**Worker - Mean**
CADD (mg/kd-d)	1.2E-07
LADD (mg/kd-d)	7.0E-09
Cancer Risk (-)	5.1E-08
Hazard Index (-)	ND

Daily Dose and Risk for: Benzo(a)pyrene **Dermal Contact with Soil**	**Worker - Mean**
CADD (mg/kd-d)	6.7E-08
LADD (mg/kd-d)	4.0E-09
Cancer Risk (-)	2.9E-08
Hazard Index (-)	ND

Daily Dose and Risk for: Benzo(a)pyrene **Inhalation of Outdoor Air**	**Worker - Mean**
CADD (mg/kd-d)	2.4E-12
LADD (mg/kd-d)	1.5E-13
Cancer Risk (-)	5.6E-13
Hazard Index (-)	ND

Daily Dose and Risk for: Benzo(a)pyrene **Inhalation of Particulates**	**Worker - Mean**
CADD (mg/kd-d)	4.2E-19
LADD (mg/kd-d)	2.5E-20
Cancer Risk (-)	9.7E-20
Hazard Index (-)	ND

SUMMARY OF CARCINOGENIC RISK

Receptor 1:
Worker - Mean

Chemical	Inhalation of Outdoor Air	TOTAL
Bis(2ethylhexyl)phthalate	5.0E-15	**5.0E-15**
Carbon Disulfide	ND	**ND**
Dichloroethane (1,1)	0.0E+00	**ND**
Dichloroethene (trans 1,2)	ND	**ND**
Ethylbenzene	1.4E-10	**1.4E-10**
Naphthalene	4.3E-10	**4.3E-10**
Phenol	ND	**ND**
Toluene	ND	**ND**
Trimethylbenzene (1,2,4)	ND	**ND**
Vinyl Chloride	4.2E-08	**4.2E-08**
Xylenes (o-)	ND	**ND**
TOTAL	**4.2E-08**	**4.2E-08**

Summary of Input Data for Risk Calculation

Description:

Date: **05-15-2013 11:25:21**

Receptors:
Worker - Mean

Routes:
Inhalation of Outdoor Air

Chemicals:
Bis(2ethylhexyl)phthalate
Carbon Disulfide
Dichloroethane (1,1)
Dichloroethene (trans 1,2)
Ethylbenzene
Naphthalene
Phenol
Toluene
Trimethylbenzene (1,2,4)
Vinyl Chloride
Xylenes (o-)

Exposure Parameters

Exposure Pathway	**Units**	**Worker - Mean**
Body weight	kg	71.8
Averaging time for carcinogens	yr	70
Exposure duration	yr	4.2

Inhalation of Outdoor Air	**Units**	**Worker - Mean**
Exposure frequency for outdoor air	events/yr	219
Time outdoors	hr/d	4
Inhalation rate outdoors	m3/hr	1

Slope Factors and Reference Doses

Chemical	**Units**	**Bis(2ethylhexyl)phthalate**	**Carbon Disulfide**	**Dichloroethane (1,1)**	**Dichloroethene (trans 1,2)**	**Ethylbenzene**	**Naphthalene**	**Phenol**	**Toluene**	**Trimethylbenzene (1,2,4)**	**Vinyl Chloride**	**Xylenes (o-)**
Inhalation Slope Factor	1/(mg/kg-day)	8.40E-03	ND	5.60E-03	ND	8.75E-03	0.119	ND	ND	ND	3.08E-02	ND
Reference Concentration	mg/m3	ND	0.7	ND	6.00E-02	1	3.00E-03	0.2	5	7.00E-03	0.1	0.1

Exposure Point Concentrations for Modeled Media

Obtained from Fate and Transport Output

For carcinogenic risk, concentrations are averaged over the exposure duration (ED).
For non-carcinogenic risk, concentrations are averaged over the minimum of 7 years or the ED.

Modeled Concentrations for Outdoor Air
Exposure Point Concentration for Carcinogens

Receptor Description	**Exposure Duration yr**	**Bis(2ethylhexyl)phthalate mg/m3**	**Carbon Disulfide mg/m3**	**Dichloroethane (1,1) mg/m3**	**Dichloroethene (trans 1,2) mg/m3**	**Ethylbenzene mg/m3**	**Naphthalene mg/m3**	**Phenol mg/m3**	**Toluene mg/m3**	**Trimethylbenzene (1,2,4) mg/m3**	**Vinyl Chloride mg/m3**	**Xylenes (o-) mg/m3**
Carcinogens												
Worker - Mean	4.20E+00	2.95E-10	0.00E+00	0.00E+00	1.40E-05	7.98E-06	1.79E-06	2.69E-08	5.61E-06	2.07E-06	6.76E-04	6.11E-06

Modeled Concentrations for Outdoor Air
Exposure Point Concentration for Non-Carcinogens

Receptor Description	Exposure Duration yr	Bis(2ethylhexyl)phthalate mg/m3	Carbon Disulfide mg/m3	Dichloroethane (1,1) mg/m3	Dichloroethene (trans 1,2) mg/m3	Ethylbenzene mg/m3	Naphthalene mg/m3	Phenol mg/m3	Toluene mg/m3	Trimethylbenzene (1,2,4) mg/m3	Vinyl Chloride mg/m3	Xylenes (o-) mg/m3
Non-Carcinogens												
Worker - Mean	4.20E+00	2.95E-10	0.00E+00	0.00E+00	1.40E-05	7.98E-06	1.79E-06	2.69E-08	5.61E-06	2.07E-06	6.76E-04	6.11E-06

SUMMARY OF HAZARD QUOTIENTS

Receptor 1:
Worker - Mean

Chemical	Inhalation of Outdoor Air	TOTAL
Bis(2ethylhexyl)phthalate	ND	**ND**
Carbon Disulfide	0.0E+00	**ND**
Dichloroethane (1,1)	ND	**ND**
Dichloroethene (trans 1,2)	2.3E-05	**2.3E-05**
Ethylbenzene	8.0E-07	**8.0E-07**
Naphthalene	6.0E-05	**6.0E-05**
Phenol	1.4E-08	**1.4E-08**
Toluene	1.1E-07	**1.1E-07**
Trimethylbenzene (1,2,4)	3.0E-05	**3.0E-05**
Vinyl Chloride	6.8E-04	**6.8E-04**
Xylenes (o-)	6.1E-06	**6.1E-06**
TOTAL	**8.0E-04**	**8.0E-04**

Summary of Daily Doses (Intake) for Risk Calculation

Description:

Date: 05-15-2013 11:25:21

Daily Dose and Risk for: Bis(2ethylhexyl)phthalate	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	9.9E-12
LADD (mg/kd-d)	5.9E-13
Cancer Risk (-)	5.0E-15
Hazard Index (-)	ND

Daily Dose and Risk for: Carbon Disulfide	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	0.0E+00
LADD (mg/kd-d)	0.0E+00
Cancer Risk (-)	ND
Hazard Index (-)	0.0E+00

Daily Dose and Risk for: Dichloroethane (1,1)	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	0.0E+00
LADD (mg/kd-d)	0.0E+00
Cancer Risk (-)	0.0E+00
Hazard Index (-)	ND

Daily Dose and Risk for: Dichloroethene (trans 1,2)	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	4.7E-07
LADD (mg/kd-d)	2.8E-08
Cancer Risk (-)	ND
Hazard Index (-)	2.3E-05

Daily Dose and Risk for: Ethylbenzene	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	2.7E-07
LADD (mg/kd-d)	1.6E-08
Cancer Risk (-)	1.4E-10
Hazard Index (-)	8.0E-07

Daily Dose and Risk for: Naphthalene	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	6.0E-08
LADD (mg/kd-d)	3.6E-09
Cancer Risk (-)	4.3E-10
Hazard Index (-)	6.0E-05

Daily Dose and Risk for: Phenol	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	9.0E-10
LADD (mg/kd-d)	5.4E-11
Cancer Risk (-)	ND
Hazard Index (-)	1.4E-08

Daily Dose and Risk for: Toluene	
Inhalation of Outdoor Air	**Worker - Mean**

CADD (mg/kd-d)	1.9E-07
LADD (mg/kd-d)	1.1E-08
Cancer Risk (-)	ND
Hazard Index (-)	1.1E-07

Daily Dose and Risk for: Trimethylbenzene (1,2,4)	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	6.9E-08
LADD (mg/kd-d)	4.2E-09
Cancer Risk (-)	ND
Hazard Index (-)	3.0E-05

Daily Dose and Risk for: Vinyl Chloride	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	2.3E-05
LADD (mg/kd-d)	1.4E-06
Cancer Risk (-)	4.2E-08
Hazard Index (-)	6.8E-04

Daily Dose and Risk for: Xylenes (o-)	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	2.0E-07
LADD (mg/kd-d)	1.2E-08
Cancer Risk (-)	ND
Hazard Index (-)	6.1E-06

SUMMARY OF CARCINOGENIC RISK

Receptor 1:
Worker - Mean

Chemical	Inhalation of Outdoor Air	TOTAL
Arsenic	0.0E+00	**ND**
Carbon Disulfide	ND	**ND**
Dichloroethene (trans 1,2)	ND	**ND**
Dimethylphenol (2,4)	ND	**ND**
Naphthalene	4.3E-10	**4.3E-10**
Phenol	ND	**ND**
Toluene	ND	**ND**
Vinyl Chloride	4.2E-08	**4.2E-08**
Xylenes (o-)	ND	**ND**
TOTAL	**4.2E-08**	**4.2E-08**

Summary of Input Data for Risk Calculation

Description:

Date: **05-15-2013 11:25:21**

Receptors:
Worker - Mean

Routes:
Inhalation of Outdoor Air

Chemicals:
Arsenic
Carbon Disulfide
Dichloroethene (trans 1,2)
Dimethylphenol (2,4)
Naphthalene
Phenol
Toluene
Vinyl Chloride
Xylenes (o-)

Exposure Parameters

Exposure Pathway	**Units**	**Worker - Mean**
Body weight	kg	71.8
Averaging time for carcinogens	yr	70
Exposure duration	yr	4.2

Inhalation of Outdoor Air	**Units**	**Worker - Mean**
Exposure frequency for outdoor air	events/yr	219
Time outdoors	hr/d	4
Inhalation rate outdoors	m3/hr	1

Slope Factors and Reference Doses

Chemical	**Units**	**Arsenic**	**Carbon Disulfide**	**Dichloroethene (trans 1,2)**	**Dimethylphenol (2,4)**	**Naphthalene**	**Phenol**	**Toluene**	**Vinyl Chloride**	**Xylenes (o-)**
Inhalation Slope Factor	1/(mg/kg-day)	15.1	ND	ND	ND	0.119	ND	ND	3.08E-02	ND
Reference Concentration	mg/m3	1.50E-05	0.7	6.00E-02	ND	3.00E-03	0.2	5	0.1	0.1

Exposure Point Concentrations for Modeled Media
Obtained from Fate and Transport Output

For carcinogenic risk, concentrations are averaged over the exposure duration (ED).
For non-carcinogenic risk, concentrations are averaged over the minimum of 7 years or the ED.

Modeled Concentrations for Outdoor Air **Exposure Point Concentration for Carcinogens** **Receptor Description**	**Exposure Duration** **yr**	**Arsenic** **mg/m3**	**Carbon Disulfide** **mg/m3**	**Dichloroethene (trans 1,2)** **mg/m3**	**Dimethylphenol (2,4)** **mg/m3**	**Naphthalene** **mg/m3**	**Phenol** **mg/m3**	**Toluene** **mg/m3**	**Vinyl Chloride** **mg/m3**	**Xylenes (o-)** **mg/m3**

Carcinogens										
Worker - Mean	4.20E+00	0.00E+00	0.00E+00	0.00E+00	3.51E-08	1.79E-06	4.03E-09	5.61E-06	6.76E-04	6.11E-06

Modeled Concentrations for Outdoor Air **Exposure Point Concentration for Non-Carcinogens**										
Receptor Description	**Exposure Duration** **yr**	**Arsenic** **mg/m3**	**Carbon Disulfide** **mg/m3**	**Dichloroethene (trans 1,2)** **mg/m3**	**Dimethylphenol (2,4)** **mg/m3**	**Naphthalene** **mg/m3**	**Phenol** **mg/m3**	**Toluene** **mg/m3**	**Vinyl Chloride** **mg/m3**	**Xylenes (o-)** **mg/m3**
Non-Carcinogens										
Worker - Mean	4.20E+00	0.00E+00	0.00E+00	0.00E+00	3.51E-08	1.79E-06	4.03E-09	5.61E-06	6.76E-04	6.11E-06

SUMMARY OF HAZARD QUOTIENTS

Receptor 1:
Worker - Mean

Chemical	Inhalation of Outdoor Air	TOTAL
Arsenic	0.0E+00	**ND**
Carbon Disulfide	0.0E+00	**ND**
Dichloroethene (trans 1,2)	0.0E+00	**ND**
Dimethylphenol (2,4)	ND	**ND**
Naphthalene	6.0E-05	**6.0E-05**
Phenol	2.0E-09	**2.0E-09**
Toluene	1.1E-07	**1.1E-07**
Vinyl Chloride	6.8E-04	**6.8E-04**
Xylenes (o-)	6.1E-06	**6.1E-06**
TOTAL	**7.4E-04**	**7.4E-04**

Summary of Daily Doses (Intake) for Risk Calculation

Description:

Date: 05-15-2013 11:25:21

Daily Dose and Risk for: Arsenic	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	0.0E+00
LADD (mg/kd-d)	0.0E+00
Cancer Risk (-)	0.0E+00
Hazard Index (-)	0.0E+00

Daily Dose and Risk for: Carbon Disulfide	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	0.0E+00
LADD (mg/kd-d)	0.0E+00
Cancer Risk (-)	ND
Hazard Index (-)	0.0E+00

Daily Dose and Risk for: Dichloroethene (trans 1,2)	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	0.0E+00
LADD (mg/kd-d)	0.0E+00
Cancer Risk (-)	ND
Hazard Index (-)	0.0E+00

Daily Dose and Risk for: Dimethylphenol (2,4)	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	1.2E-09
LADD (mg/kd-d)	7.0E-11
Cancer Risk (-)	ND
Hazard Index (-)	ND

Daily Dose and Risk for: Naphthalene	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	6.0E-08
LADD (mg/kd-d)	3.6E-09
Cancer Risk (-)	4.3E-10
Hazard Index (-)	6.0E-05

Daily Dose and Risk for: Phenol	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	1.4E-10
LADD (mg/kd-d)	8.1E-12
Cancer Risk (-)	ND
Hazard Index (-)	2.0E-09

Daily Dose and Risk for: Toluene	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	1.9E-07
LADD (mg/kd-d)	1.1E-08
Cancer Risk (-)	ND
Hazard Index (-)	1.1E-07

Daily Dose and Risk for: Vinyl Chloride	
Inhalation of Outdoor Air	**Worker - Mean**

CADD (mg/kd-d)	2.3E-05
LADD (mg/kd-d)	1.4E-06
Cancer Risk (-)	4.2E-08
Hazard Index (-)	6.8E-04

Daily Dose and Risk for: Xylenes (o-)	
Inhalation of Outdoor Air	**Worker - Mean**
CADD (mg/kd-d)	2.0E-07
LADD (mg/kd-d)	1.2E-08
Cancer Risk (-)	ND
Hazard Index (-)	6.1E-06