Remediation Statement
Appendix K

CHP Investigation, former Albright and Wilson Works, Whitehaven Cumbria

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EXECUTIVE SUMMARY

URS Corporation Limited (URS) was commissioned by Rhodia UK Limited (Rhodia) to carry out minor remedial works and further intrusive investigation, followed by a controlled waters risk assessment in the area of the former combined heat and power (CHP) plant on the former Albright & Wilson site (now owned by Rhodia) in Whitehaven, Cumbria.

In January 2008, an area of surface staining was identified on a concrete slab in the CHP plant area, which is understood to have been caused by a minor oil spill during the dismantling and demolition of the CHP plant in 2007.

The objectives of the work completed by URS were to investigate the oil staining in the CHP area, remove as much as possible from the concrete slab and to assess the associated risks to controlled waters from any remaining contamination associated with the CHP oil spill.

A site walkover was completed in January 2008 and in June 2008 stained material was removed from the top of the concrete slab and the slab was inspected. The concrete was found to be in good condition and there was no evidence to suggest that the oil spill had extended beyond the edge of the slab.

The second stage of site works was conducted in November 2008 and involved excavating four trial pits in the vicinity of the concrete slab to retrieve soil samples for laboratory testing. Evidence of hydrocarbon contamination was encountered in two trial pits and it cannot be ruled out that this is associated with the 2007 oil spill.

A controlled waters risk assessment was completed to assess the potential risks to the Irish Sea from the hydrocarbon impact that was encountered in the trial pits; however, no significant potential risks were identified. It is considered that further remedial action is not required in the CHP area to deal with the impact from the oil spill in 2007.

1. INTRODUCTION

1.1. General Introduction

URS Corporation Limited (URS) was commissioned by Rhodia UK Limited (Rhodia) to investigate the potential impacts of an oil spill that occurred in 2007 in the area of the former combined heat and power (CHP) plant on the former Albright & Wilson site (now owned by Rhodia) in Whitehaven, Cumbria. The location of the Rhodia/former Albright and Wilson site is presented in Figure 1.

This report details the works carried out, which were completed in accordance with the Site Remediation Statement, which has been approved by the Environment Agency. The report will act as Appendix K of the Remediation Statement.

1.2. Project Background

The Rhodia site was designated by Copeland Borough Council as statutory "Contaminated Land" under Part 2A of the Environmental Protection Act 1990. The entire site was subsequently declared a "Special Site" and is now regulated by the Environment Agency.

URS has undertaken a variety of investigations on the site dating back to 1995. The site was divided into "Plots" and each plot was subject to intrusive investigation to identify potential contamination issues. The CHP area was not designated as a "plot", as per the draft remediation statement produced in 2006. Prior to the CHP plant operations in this area, it formed part of the cement production area. The main process areas associated with cement production were investigated as part of the Plot G investigations and no significant risks were identified.

Since 1995, Rhodia's operations at the site have ceased and URS understands that decommissioning of above ground structures is now complete. URS understands that after remediation and minimal site preparation is complete the site is proposed for use as public open space.

The CHP plant area is located in the south west of the Rhodia Site (see Figure 2). The plant operated between 2000 and 2004, after which it remained non-operational until it was decommissioned and demolished by Cogen in 2007.

During a site walkover undertaken by the Environment Agency and Copeland Borough Council in January 2008, an area of surface staining was identified on a concrete slab in the CHP plant area. URS understands that the staining was caused by a minor oil spill that occurred during the dismantling and demolition of the CHP plant. The Environment Agency subsequently requested that the extent and environmental significance of this staining be investigated in order to address the environmental risk as part of the Remediation Statement for the site.

The presently reported investigation within the CHP plant area is different to the previous investigations within the "plots" since it was designed to assess the extent of contamination caused by a spillage that had occurred after site operations had ceased.

1.3. Project Objectives

The objectives of the works in the CHP area were to investigate the oil staining, remove as much as physically possible from the concrete slab and to assess potential risks to controlled waters from any remaining contamination associated with the CHP oil spill.

2. SITE WORK AND FINDINGS

2.1. Preliminary Investigation

A preliminary walkover was undertaken by URS on 23 January 2008 to assess the scope of work for an investigation in the former CHP plant area. Free phase oil product was not observed although there was some minor surface staining and a sheen on puddles present on the concrete slab. The stained materials were restricted to a small amount of demolition-related debris and soil on top of the concrete hardstanding. A photograph from this visit is presented in Appendix A.

Given that the materials affected by the spill were easily identifiable due to obvious staining, it was proposed that the impacted material be removed and the area validated by visual inspection, photographic record, and, if appropriate the collection of soils samples for total petroleum hydrocarbon (TPH) analysis if the spill were found to extend beyond the edge of the concrete hardstanding.

2.2. Minor Remedial Works – June 2008

Following the preliminary investigation URS attended the site in June 2008 to perform minor remedial works in the CHP area.

The concrete slab underlying the area of the former CHP plant was covered in places by a thin layer of soil (no more than 50mm thick) comprising light brown sandy silt and gravel of red brick and concrete. Staining of the soil was identified in two separate areas on the concrete slab, each approximately $2m^2$. Evidence of staining did not extend to soils beyond the edge of the concrete slab.

Soil samples from each stained area (CHP1 and CHP2) were collected and sent to a URS-approved subcontract laboratory (Alcontrol Geochem, Chester) for analyses for waste disposal purposes. The results of the analyses are presented in Appendix B.

Following sampling, the stained materials were removed from the concrete slab using an excavator with toothless ditching bucket and transferred to an on-site skip for disposal to a suitably licensed waste disposal facility. The volume removed was estimated at approximately $0.5m^3$.

The scraped concrete was inspected for cracks or other damage that may provide a pathway for contaminants to migrate to the underlying soils. The slab was found to be in good condition.

Photographs of the concrete slab from before and after removal of the stained soils are presented in Appendix A.

2.3. Soil Sampling – November 2008

2.3.1. Site Works

An additional phase of verification works was completed to assess the source-pathway-receptor linkages in the event that hydrocarbon contamination had migrated from the slab to the surrounding soils. Visual evidence from the site visits indicated that this had probably not occurred.

Four trial pits (TP1, TP2, TP4 and TP6) were advanced to depths of between 0.4m and 3.0m below ground level (bgl) around the edge of the concrete slab. Trial pit TP1 was located next to the concrete slab at a point where the spill appeared to have extended closest to the edge of the slab.

Soil samples were collected from the trial pits along with two surface samples (SS1 and SS2) from the top of the concrete slab. Trial pit and sample locations are shown on Figure 2 and the trial pit logs are provided in Appendix C.

The soil samples were submitted to a URS-approved laboratory (Alcontrol Geochem of Chester) for TPH (total petroleum hydrocarbon), BTEX (benzene, toluene, ethyl benzene and xylene) and one sample (TP2, 2mbgl) for VOC (volatile organic compound) analysis. The analytical results from the June and November investigations are presented in Appendix B.

2.3.2. Ground Conditions

Made ground (comprising gravelly clay, silt, gravel and cobbles) was encountered to depths of up to 2.3mbgl. The base of the made ground was not proven in two locations (TP2 and TP4) to depths of up to 2.0mbgl. In each case the trial pit was terminated within a low-permeability horizon.

Natural soils comprising firm to stiff clay were encountered in two locations (TP1 and TP6) from depths of 2.3mbgl and 1.2mbgl respectively. A deep borehole (BH101) drilled approximately 30m from the CHP area in a previous investigation, determined this low permeability horizon of clay to be over 2.5m thick, underlain by low permeability dolomitic limestone of the St. Bees Evaporites.

There was no visual or olfactory evidence of hydrocarbon contamination in trial pits TP4 or TP6. Evidence of contamination encountered in trial pits TP1 and TP2 is as follows:

- Hydrocarbon odour within clay made ground at TP1, 0.4mbgl. A sample of this material was submitted for laboratory chemical analysis.
- Strong hydrocarbon odour within cobbles at TP2 in places between depths of 0.4mbgl and 2.0mbgl. A sample of clay from beneath the impacted cobbles was submitted for laboratory chemical analysis. It was not possible to sample the cobbles.

2.3.3. Analysis Results

The chemical analysis results are given in the laboratory certificates provided in Appendix B. No samples contained BTEX or MTBE concentrations above the detection limit of the analysis method. The VOC concentrations in the one sample tested (TP2, 2mbgl) were all below the method detection limit.

The TPH results from both the June and November investigations and percentage composition are tabulated in Appendix B and summarised in the table below.

Table 1 - Summary of TPH Results

Date	June 08	June 08	Nov 08	Nov 08	Nov 08	Nov 08	Nov 08	Nov 08
Sample	CHP1	CHP2	SS1	SS2	TP1	TP1	TP2	TP6
Sample Origin	From top of concrete slab				From trial pits around edge			
Depth (m)	GL	GL	GL	GL	0.4	3.0	2.0	0.2
TOTAL ALIPHATICS	18000	18000	290	5000	550	1.3	98	31
TOTAL AROMATICS	5500	5700	88	1400	180	ND	5.1	3.1
TOTAL TPH	23000	24000	380	6400	730	1.3	100	34
Total aliphatics (%)*	75	74	75	79	74	98	99	91
Total aromatics (%)*	24	24	23	22	25	0	5	9

Table Notes: ND Not detected (i.e. below detection limit of analytical method)
* Not all percentage calculations add up to exactly 100%

The highest total TPH concentration (24,000mg/kg) was recorded in surface sample CHP2 removed from the concrete slab in June 08. The majority (>75%) of this TPH was due to the aliphatic component with approximately 40% of the total due to the C16 to C21 aliphatic fraction alone.

The second highest total TPH concentration (6400mg/kg) was recorded in surface sample SS2, taken from the concrete slab in November 2008. The majority (>78%) of this TPH was also due to aliphatic fractions with more than 43% of the total TPH concentration due to the C16 to C21 aliphatic fraction.

For below surface soil samples, the highest total TPH concentration (730mg/kg) was recorded in trial pit TP1 at a depth of 0.4mbgl. The percentage speciation of the TPH detected in this sample bore close similarity to surface sample SS2. A deeper sample from trial pit TP1 (3mbgl) contained a significantly lower TPH concentration of 1.3mg/kg and all the recorded TPH was due to aliphatic fractions.

The second highest TPH concentration in the trial pit samples was 100mg/kg in a clay sample from TP2 (2.0mbgl), taken from beneath a layer of cobbles containing a hydrocarbon odour (it was not possible to sample the cobbles). The sample comprised 98% aliphatics, with 53% of the total due to aliphatic fraction C16 to C21.

Whilst unsupported by visual evidence on site, there is still a possibility that the spillage during decommissioning and demolition works in 2007 was not restricted to the surface of the concrete slab in the CHP area. A further risk assessment has therefore been undertaken for controlled waters under the Part 2A determination for this site. This is discussed further in Section 3.

3. CONTROLLED WATERS RISK ASSESSMENT

3.1. Introduction

The risks to the Irish Sea from TPH contamination identified in the soils around the concrete slab have been assessed in a controlled waters risk assessment using the URS 3A/3B detailed modelling process that has been used elsewhere on the site in previous investigations.

This risk assessment adopts the methodology utilised in the Plot D Controlled Waters Risk Assessment as detailed in the report entitled Additional Site Investigation: Plot D, Plot F and Plot G (REF: 49308127/MARP0003).

3.2. Potential Sources

The hydrocarbon residue remaining on the concrete slab is not of significant volume and isolated from the surrounding ground. This material is therefore not considered to be a potential source.

Whilst unlikely, it is possible that the TPH identified within trial pits around the edge of the slab could be derived from the 2007 spillage. Therefore the TPH encountered in TP1 and TP2 is considered as the source for this risk assessment.

3.3. Potential Receptors

It should be noted that there is no statutory requirement to investigate pollutant linkages to human health under Part 2A as the determination relates to controlled waters receptors only.

A route to Sandwith Beck via overland flow or shallow groundwater is not considered likely given the distance to the receptor, the lack of a continuous shallow groundwater table, and the low permeability of the shallow soils.

The potential controlled waters receptor considered in this assessment is therefore the Irish Sea.

3.4. Potential Pathways

As for the site specific risk assessments previously undertaken by URS, the risk-driving pathway has been determined as leaching of contaminated soil horizons into pore water, followed by the vertical migration through low permeability drift, and then low permeability dolomitic limestone (the uppermost horizons of the St. Bees Evaporite sequence). This is followed by the entry of contamination into the underlying void network within the St. Bees Evaporite sequence. There is no evidence of voids being present in this area; however, in order to be conservative, it has been assumed that these voids are present beneath the CHP plant. Once in the void network, the contamination has been assumed to be incorporated into a stream network, and follow a rapid pathway towards the Irish Sea.

3.5. Screening Criteria

There are currently no published screening criteria for TPH in coastal waters; therefore, as a highly conservative approach, the UK Drinking Water Standard for TPH of 10µg/l has been used as the screening value to assess potential risks at the receptor.

3.6. Source Concentration

From concentrations of each hydrocarbon fraction in soil, simulated pore water concentrations have been calculated using published or site-derived values of bulk density, porosity (water and air filled), fraction of organic carbon, H (Henry's Law constant), and K_{OC} (partition coefficient).

In Section 3.2, the impacted material remaining on top of the concrete slab has been discounted as a potential source; however, as a conservative approach to the risk assessment we have considered the potential risks from this material rather than the impacted soils encountered in the trial pits. Consequently the highest TPH concentrations from the surface samples taken in November 2008 (results for sample SS2) have been used to simulate pore water concentrations. The soil concentrations for the surface and trial pit samples are compared in the table below.

Table 2 - Soil Concentrations used to generate Pore water Concentrations

Hydrocarbon Fraction	Soil Concentration (mg/kg)	
	SS2	**TP1, 0.4m**
C5-C6 ALIPHATIC	ND	ND
>C6-C8 ALIPHATIC	ND	ND
>C8-C10 ALIPHATIC	0.41	0.8
>C10-C12 ALIPHATIC	0.96	1.8
>C12-C16 ALIPHATIC	960	110
>C16-C21 ALIPHATIC	2800	300
>C21-C35 ALIPHATIC	1300	130
C6-C7 AROMATIC	ND	ND
>C7-C8 AROMATIC	ND	ND
>C8-EC10 AROMATIC	0.62	1.2
>C10-EC12 AROMATIC	1.4	2.8
>C12-EC16 AROMATIC	130	25
>C16-EC21 AROMATIC	610	88
>C21-EC35 AROMATIC	650	64

Table Notes:
ND Concentration not detected above the method detection limit of the method

The simulated pore water concentrations generated using concentrations from SS2 are given in the table below.

Table 3 - Simulated Pore Water Concentrations

Hydrocarbon Fraction	Soil Concentration in SS2 (mg/kg)	Koc	H'	UK DWS for TPH (µg/l)	Simulated Pore water Concentration (µg/l)
C5-C6 ALIPHATIC	ND	794	33	10	
>C6-C8 ALIPHATIC	ND	3981	50	10	
>C8-C10 ALIPHATIC	0.41	31623	80	10	1.9
>C10-C12 ALIPHATIC	0.96	251189	120	10	0.6
>C12-C16 ALIPHATIC	960	5011872	520	10	29
>C16-C21 ALIPHATIC	2800	6.3.E+08	4.9.E+03	10	0.7
>C21-C35 ALIPHATIC	1300	7.6.E+09	2.0.E+04	10	0.03
C6-C7 AROMATIC	ND	1000	0.230	10	
>C7-C8 AROMATIC	ND	1259	0.270	10	
>C8-EC10 AROMATIC	0.62	1585	0.480	10	57
>C10-EC12 AROMATIC	1.4	2512	0.140	10	82
>C12-EC16 AROMATIC	130	5012	0.053	10	3852
>C16-EC21 AROMATIC	610	1.58E+04	1.30E-02	10	**5736**
>C21-EC35 AROMATIC	650	1.26E+05	6.70E-04	10	770

Table Notes:
ND Concentration not detected above the method detection limit of the method

The highest calculated pore water concentration is 5736µg/l and is for the C16-C21 aromatic TPH fraction. This value was taken forward into the risk assessment model, described below.

3.7. Source Area

The concrete slab covers an area of approximately 20m by 15m, which results in a source area of approximately 160m^2 (see Figure 2). URS has assumed that the source area is the area from the edge of the concrete slab to 2m beyond it on all sides. Taking into account the visual observations on site, the distance any surface spill would have been likely to travel and the actual source concentration encountered in the trial pits, it is considered that a distance of 2m from the edge of the slab is extremely conservative.

3.8. Source Migration to the Irish Sea

Since pore water migrates vertically from the made ground into the underlying drift and consolidated horizons, the rate at which it migrates is controlled by the permeability of the strata. The presence of low permeability silt and dolomitic limestone is likely to be the reason for the existence of water in shallow horizons.

The hydraulic conductivity values for dolomitic limestone were used to determine a typical discharge rate through the limestone out of the source zone (and subsequently into the presumed void area), using Darcy's Law. Once in the evaporite voids, the "contaminant flux" of the C16 to C21 Aromatic TPH fraction (source zone discharge x source zone concentration) was determined.

The 3B model (dilution from infilitrating clean rainwater on the St.Bees Sandstone) was then applied to generate a concentration at the coastline.

The modelling calculations are presented in the table below.

Table 4 - Modelling Calculation

Stage	Description	Value	Units
1	**Discharge out of Dolomitic Evaporites**		
	Hydraulic Conductivity of dolomite, Kh*	1.00E-09	m/s
	Vertical Hydraulic Conductivity of dolomite, Kv	1.00E-10	m/s
	Hydraulic gradient, I **	1.41	no units
	Size of Source Area	**160**	m^2
	Discharge, Q	2.26E-08	m^3/sec
	Discharge, Q	2	litres/day
2	**Contaminant Flux passing out of source zone**		
	Concentration of TPH adopted in model***	**5736**	µg/litre
	Discharge, Q	2	litres/day
	Flux	28290	µg/day
3	**Effective Rainfall**		
	Rainfall	0.003	m/day
	Infiltration	7.5	%
	Effective Rainfall	2.20E-04	m/day
4	**Discharge Contribution from St. Bees Sandstone**		
	Length of catchment	300	m
	Width of catchment	12.6	m
	Effective Rainfall	2.20E-04	m/day
	Discharge	1	m^3/day
	Discharge	834	litres/day
5	**Total discharge (sum of both areas)**		
	Source Discharge	2	litres/day
	St. Bees Discharge	834	litres/day
	Discharge	836	litres/day
6	**Concentration of TPH C16-C21 AROMATIC at coast**		
	Flux from Source Area	28288	µg/day
	Total Discharge	836	litres/day
	Concentration	13.4	µg/litre

Table Notes

* Environment Agency R&D Publication 120 (Landsim manual).

** Hydraulic Gradient determined from measured "shallow" water level in the drift horizon, and "deep" water level in the evaporites, and the thickness of the dry low permeability dolomitic evaporites.

*** TPH fraction aromatic C16 to C21 in the surface sample SS2

3.9. Risk Assessment Results

Using the maximum TPH concentrations encountered in surface sample SS2 and an area equivalent to the area reaching 2m beyond the concrete slab, the concentration of TPH fraction aromatic C16 to C21 at the coastline is calculated as 13.4µg/l, which is slightly above the screening criteria for TPH of 10µg/l (UK DWS).

The risk assessment described above is considered to be extremely conservative for the following reasons:

- The source concentration used is an order of magnitude above that measured in the soils around the edge of the concrete slab. This concentration is assumed to be present consistently over the whole of the assumed source area. It is considered unlikely that the concentration is this high and distributed consistently over such a large area.
- The assumed source area extends 2m from the edge of the concrete slab along all sides. Staining was not observed to extend beyond the edge of the slab. If oil from the 2007 spill had extended beyond the edge of the slab it is considered very unlikely to have reached 2m beyond the edge of the slab along all sides.
- The presence of a rapid pathway to the Irish Sea through voids beneath the CHP area is a conservative approach since there is no evidence of voids beneath the CHP area.
- The screening value is a Drinking Water Standard, which is applicable to potable water. The Irish Sea is not used for drinking and this standard is therefore highly conservative when considering risks to coastal waters.

When the risk modelling was repeated using the concentration found in TP1 of 88mg/kg for the C16 to C21 aromatic fraction, the simulated pore water concentration was calculated to be 827µg/l. The resultant concentration of TPH fraction aromatic C16 to C21 modelled at the coastline is 1.9µg/l, which is below the UK DWS of 10µg/l for TPH.

Considering the results of the modelling and the conservatism of the model, URS concludes that there are not likely to be potential risks to the Irish Sea from the residual TPH associated with the CHP oil spill in 2007. URS therefore considers that the spillage on the concrete slab in the CHP area that occurred during decommissioning and demolition in 2007 does not represent a significant risk to controlled waters.

4. CONCLUSIONS AND REMEDIATION ACTIONS

4.1. Summary of remediation actions required due to the CHP oil spill

The material on the concrete slab that was contaminated by the oil spill in 2007 was removed in June 2008. An insignificant volume of residue remained on the concrete which was too small to be removed with the plant and equipment used.

TPH concentrations above site background were identified in one trial pit on the northern side of the concrete slab and it cannot be discounted that this TPH is associated with the 2007 oil spill.

A risk assessment was performed using analysis results from a surface sample (a conservative approach), which did not identify any theoretical potential risks to the Irish Sea. It is therefore considered that remediation actions will not be necessary in the CHP area as a result of the 2007 oil spill.

4.2. Summary of remediation actions required due to Part 2A pollutant linkages identified for the overall site area

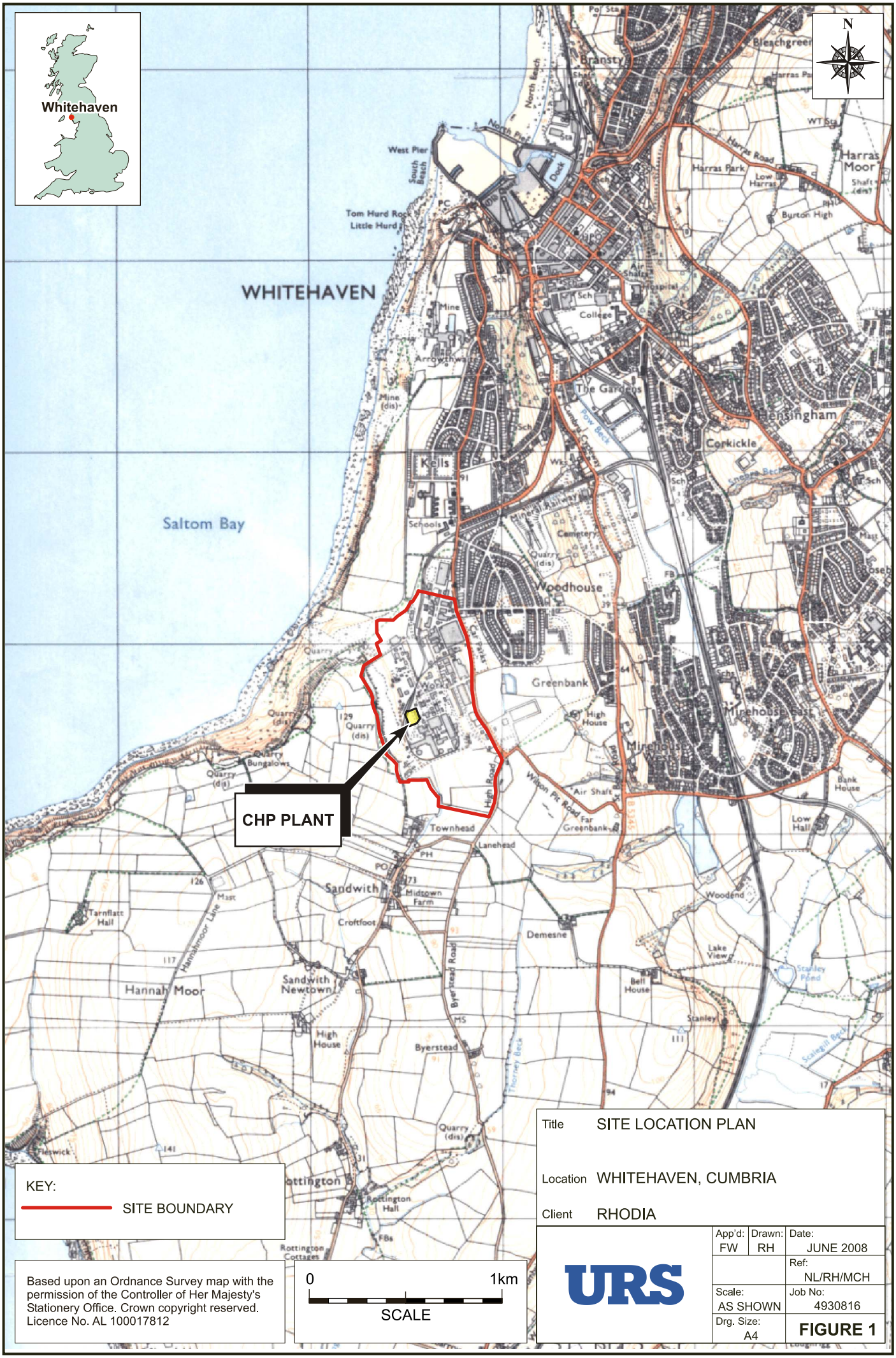
For regulatory purposes, Table 6 is presented to summarise the findings of the investigation and to demonstrate how each pollutant linkage listed by Copeland Borough Council in their determination of the site as statutory Contaminated Land has been dealt with in the CHP plant area, specifically in relation to contamination from the oil spill in 2007.

Table 6 – Summary of Remedial Actions

Copeland Borough Council Pollutant Linkage	Findings and Remediation Actions for CHP Oil Spill
Petroleum Hydrocarbons in soil, migrating from soil to groundwater (and through drains) impacting identified controlled waters receptor.	Materials affected by the oil spill have been removed. Residual hydrocarbons in the shallow soils surrounding the concrete slab possibly related to the CHP oil spill. A controlled waters risk assessment indicates that there is no significant pollutant linkage (no source).
Polycyclic Aromatic Hydrocarbons in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no significant source).
Surfactants in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no source).
Phosphates in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no source).

Copeland Borough Council Pollutant Linkage	Findings and Remediation Actions for CHP Oil Spill
Arsenic in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no source).
Boron in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no source).
Cadmium in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no source).
Chromium in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no source).
Copper in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no source).
Lead in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no source).
Mercury in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no source).
Nickel in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no source).
Selenium in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no source).
Zinc in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no significant source).
VOCs/ SVOCs in soil, migrating from soil to groundwater and through drains impacting undefined controlled waters receptor.	No significant pollutant linkage (no source).

Figures



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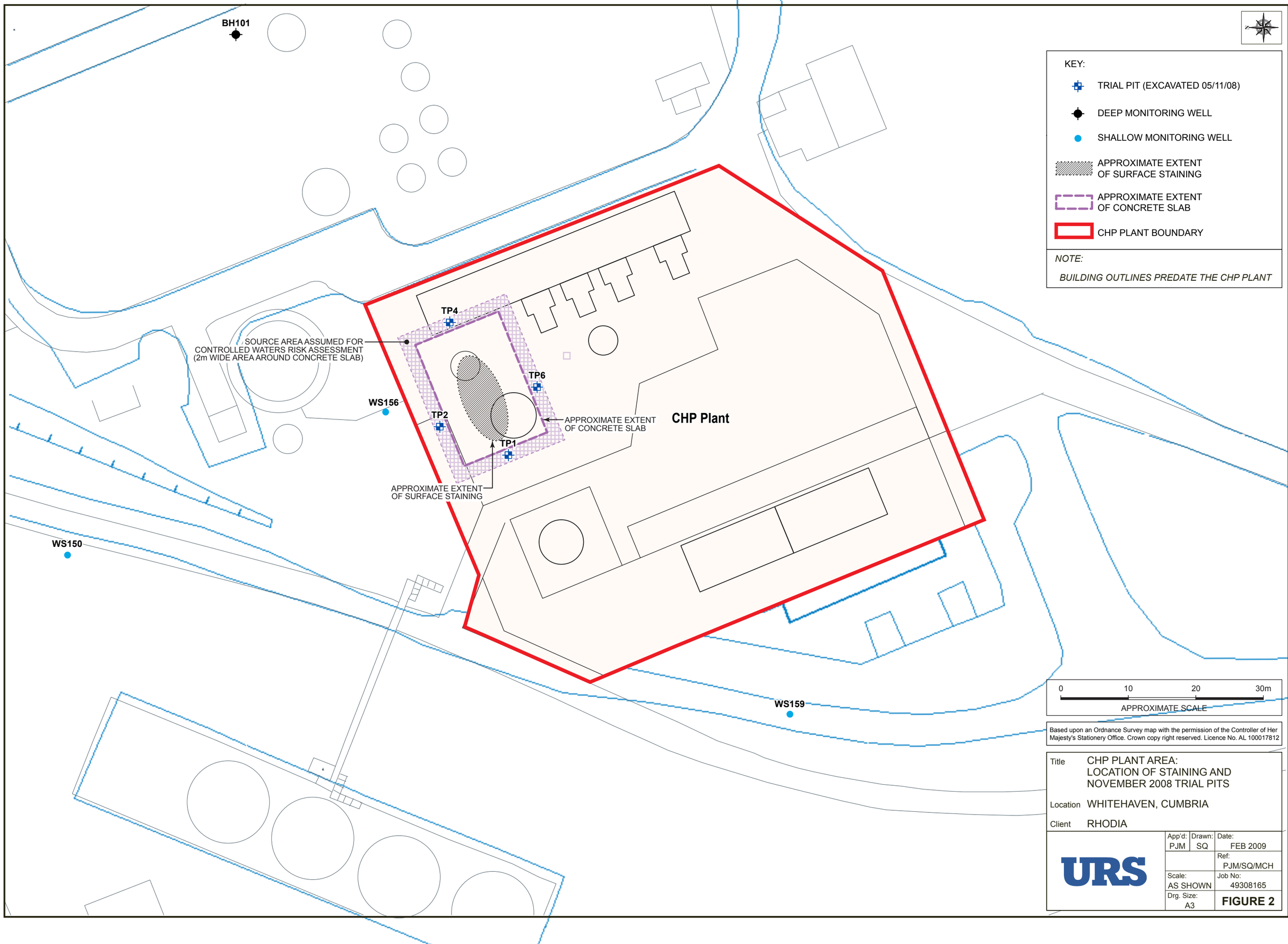
Title	SITE LOCATION PLAN
Location	WHITEHAVEN, CUMBRIA
Client	RHODIA

URS

App'd:	Drawn:	Date:
FW	RH	JUNE 2008
		Ref: NL/RH/MCH
Scale: AS SHOWN		Job No: 4930816
Drg. Size: A4		**FIGURE 1**



Title	CHP PLANT AREA: LOCATION OF STAINING AND NOVEMBER 2008 TRIAL PITS
Location	WHITEHAVEN, CUMBRIA
Client	RHODIA

URS

App'd:	Drawn:	Date:
PJM	SQ	FEB 2009
		Ref: PJM/SQ/MCH
Scale: AS SHOWN		Job No: 49308165
Drg. Size: A3		**FIGURE 2**

Appendix A - Photographic Record

Appendix B - Analytical Results

Rhodia Whitehaven
CHP Investigation - Appendix K of Remediation Statement
Appendix B1 - TPH Testing Results from June and November 2008 Investigations

TPH Fraction	MDL	Sample	Analytical Results										
			CHP1	CHP2	SS1	SS2	TP1	TP1	TP2	TP3	TP5	TP6	TP7
		Depth (m)	0.1	GL	GL	GL	0.4	3.0	2.0	1.5	0.4	0.2	0.5
		Units	*Surface Samples*				*Soil samples*						
>C8-C10 ALIPHATIC	0.01	mg/kg	ND	ND	ND	0.41	0.8	ND	ND	ND	ND	ND	ND
>C10-C12 ALIPHATIC	0.01	mg/kg	ND	0.18	ND	0.96	1.8	ND	ND	ND	ND	ND	ND
>C12-C16 ALIPHATIC	0.1	mg/kg	1700	3100	2.1	960	110	0.32	13	1.6	3.6	2.1	8
>C16-C21 ALIPHATIC	0.1	mg/kg	10000	10000	83	2800	300	0.95	53	5.5	3.7	10	41
>C21-C35 ALIPHATIC	0.1	mg/kg	5500	4700	200	1300	130	ND	33	1.4	17	19	140
TOTAL ALIPHATICS (C5-C35)	0.1	mg/kg	18000	18000	290	5000	550	1.3	98	8.5	24	31	190
>EC8-EC10 AROMATIC	0.01	mg/kg	ND	ND	ND	0.62	1.2	ND	ND	ND	ND	ND	0.032
>EC10-EC12 AROMATIC	0.01	mg/kg	ND	0.27	ND	1.4	2.8	ND	ND	ND	ND	ND	ND
>EC12-EC16 AROMATIC	0.1	mg/kg	520	800	0.23	130	25	ND	0.26	ND	0.95	0.41	0.33
>EC16-EC21 AROMATIC	0.1	mg/kg	2600	3000	8.3	610	88	ND	3.5	ND	1.2	0.47	1.3
>EC21-EC35 AROMATIC	0.1	mg/kg	2400	1900	80	650	64	ND	1.3	ND	3.1	2.2	9.1
TOTAL AROMATICS (C6-C35)	0.1	mg/kg	5500	5700	88	1400	180	ND	5.1	ND	5.2	3.1	11
TPH (SUM ALIPHATICS&AROMATICS C5 C35)	0.1	mg/kg	23000	24000	380	6400	730	1.3	100	8.5	29	34	200

Fractions not shown recorded less than detection limit in all samples
GL - Ground level
MDL - Method dection limit
ND - Not detected above the MDL
* Result for aliphatic aromatic mix

TPH Fraction	Sample	Percentage of TPH Concentration										
		CHP1	CHP2	SS1	SS2	TP1	TP1	TP2	TP3	TP5	TP6	TP7
	Depth (m)	0.1	GL	GL	GL	0.4	3.0	2.0	1.5	0.4	0.2	0.5
	Units	*Surface Samples*				*Soil samples*						
>C8-C10 ALIPHATIC	%				0.0	0.1						
>C10-C12 ALIPHATIC	%		0.0		0.0	0.2						
>C12-C16 ALIPHATIC	%	7.4	12.9	0.6	15.0	15.1	24.6	13.0	18.8	12.4	6.2	4.0
>C16-C21 ALIPHATIC	%	43.5	41.7	21.8	43.8	41.1	73.1	53.0	64.7	12.8	29.4	20.5
>C21-C35 ALIPHATIC	%	23.9	19.6	52.6	20.3	17.8		33.0	16.5	58.6	55.9	70.0
TOTAL ALIPHATICS (C5-C35)	%	78.3	75.0	76.3	78.1	75.3	100.0	98.0	100.0	82.8	91.2	95.0
>EC8-EC10 AROMATIC	%				0.0	0.2						0.0
>EC10-EC12 AROMATIC	%		0.0		0.0	0.4						
>EC12-EC16 AROMATIC	%	2.3	3.3	0.1	2.0	3.4		0.3		3.3	1.2	0.2
>EC16-EC21 AROMATIC	%	11.3	12.5	2.2	9.5	12.1		3.5		4.1	1.4	0.7
>EC21-EC35 AROMATIC	%	10.4	7.9	21.1	10.2	8.8		1.3		10.7	6.5	4.6
TOTAL AROMATICS (C6-C35)	%	23.9	23.8	23.2	21.9	24.7		5.1		17.9	9.1	5.5
TPH (SUM ALIPHATICS&AROMATICS C5 C35)	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

ALcontrol Laboratories Analytical Services
Sample Descriptions

Job Number: 08/09940/02/01
Client: URS Corporation Limited
Client Ref : 49308165

Grain sizes

<0.063mm	Very Fine
0.1mm - 0.063mm	Fine
0.1mm - 2mm	Medium
2mm - 10mm	Coarse
>10mm	Very Coarse

Sample Identity	Depth (m)	Colour	Grain Size	Description	Batch
CHP1	0.1	Brown	0.1mm - 0.063mm	Silt with some Stones	1
CHP2	0.0	Dark Brown	0.1mm - 2mm	Sand with some Stones	1
TP601Z	1.0	Red	0.1mm - 0.063mm	Silty Clay with some Stones	1
TP602Z	0.7	Red	<0.063mm	Clay with some Stones	1

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

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

Validated ☑
Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

[#] ISO 17025 accredited
[M] MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/09940/02/01 **Matrix:** SOLID
Client: URS Corporation Limited **Location:** Not Specified
Client Ref. No.: 49308165 **Client Contact:** Paula Marshall

Sample Identity	CHP1	CHP2	TP601Z	TP602Z						Method Code	LoD/Units
Depth (m)	0.1	0.0	1.0	0.7							
Sample Type	SOLID	SOLID	SOLID	SOLID							
Sampled Date	02.06.08	02.06.08	02.06.08	02.06.08							
Sample Received Date	03.06.08	03.06.08	03.06.08	03.06.08							
Batch	1	1	1	1							
Sample Number(s)	**1-2**	**3-4**	**5**	**6**							
Total Organic Carbon	1.0	0.9	-	-						TM132[#M]	<0.2 %
pH Value	8.24	7.90	-	-						TM133[#M]	<1.00 pH Units

All results expressed on a dry weight basis.

Date 17.06.2008

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Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

[#] ISO 17025 accredited
[M] MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/09940/02/01 **Matrix:** SOLID
Client: URS Corporation Limited **Location:** Not Specified
Client Ref. No.: 49308165 **Client Contact:** Paula Marshall

Sample Identity	CHP1	CHP2	TP601Z	TP602Z						Method Code	LoD/Units
Depth (m)	0.1	0.0	1.0	0.7							
Sample Type	SOLID	SOLID	SOLID	SOLID							
Sampled Date	02.06.08	02.06.08	02.06.08	02.06.08							
Sample Received Date	03.06.08	03.06.08	03.06.08	03.06.08							
Batch	1	1	1	1							
Sample Number(s)	**1-2**	**3-4**	**5**	**6**							
GRO (C4-C12)	<10	450	-	-						TM089	<10 ug/kg
MTBE	<10	<10	-	-						TM089#	<10 ug/kg
Benzene	<10	<10	-	-						TM089#M	<10 ug/kg
Toluene	<10	<10	-	-						TM089#M	<10 ug/kg
Ethyl benzene	<10	<10	-	-						TM089#M	<10 ug/kg
m & p Xylene	<10	<10	-	-						TM089#M	<10 ug/kg
o Xylene	<10	<10	-	-						TM089#M	<10 ug/kg
Aliphatics C5-C6	<10	<10	-	-						TM089	<10 ug/kg
Aliphatics >C6-C8	<10	<10	-	-						TM089	<10 ug/kg
Aliphatics >C8-C10	<10	<10	-	-						TM089	<10 ug/kg
Aliphatics >C10-C12	<10	180	-	-						TM089	<10 ug/kg
Aliphatics >C12-C16	1700000	3100000	-	-						TM173#	<100 ug/kg
Aliphatics >C16-C21	10000000	10000000	-	-						TM173#	<100 ug/kg
Aliphatics >C21-C35	5500000	4700000	-	-						TM173#	<100 ug/kg
Total Aliphatics C5-C35	18000000	18000000	-	-						TM61/89	<100 ug/kg
Aromatics C6-C7	<10	<10	-	-						TM089	<10 ug/kg
Aromatics >C7-C8	<10	<10	-	-						TM089	<10 ug/kg
Aromatics >EC8-EC10	<10	<10	-	-						TM089	<10 ug/kg
Aromatics >EC10-EC12	<10	270	-	-						TM089	<10 ug/kg
Aromatics >EC12-EC16	520000	800000	-	-						TM173#	<100 ug/kg
Aromatics >EC16-EC21	2600000	3000000	-	-						TM173#	<100 ug/kg
Aromatics >EC21-EC35	2400000	1900000	-	-						TM173#	<100 ug/kg
Total Aromatics C6-C35	5500000	5700000	-	-						TM61/89	<100 ug/kg
TPH (Aliphatics and Aromatics C5-C35)	23000000	24000000	-	-						TM61/89	<100 ug/kg

All results expressed on a dry weight basis.

Date 17.06.2008

Validated ☑
Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

[#] ISO 17025 accredited
[M] MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/09940/02/01 **Matrix:** SOLID
Client: URS Corporation Limited **Location:** Not Specified
Client Ref. No.: 49308165 **Client Contact:** Paula Marshall

Sample Identity	CHP1	CHP2	TP601Z	TP602Z						Method Code	LoD/Units
Depth (m)	0.1	0.0	1.0	0.7							
Sample Type	SOLID	SOLID	SOLID	SOLID							
Sampled Date	02.06.08	02.06.08	02.06.08	02.06.08							
Sample Received Date	03.06.08	03.06.08	03.06.08	03.06.08							
Batch	1	1	1	1							
Sample Number(s)	**1-2**	**3-4**	**5**	**6**							
TPH C6-40	-	-	<10	<10						TM154[#]	<10 mg/kg

All results expressed on a dry weight basis.

Date 17.06.2008

Validated ✓
Preliminary

ALcontrol Laboratories Analytical Services
Table Of Results

[#] ISO 17025 accredited
[M] MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/09940/02/01 **Matrix:** SOLID
Client: URS Corporation Limited **Location:** Not Specified
Client Ref. No.: 49308165 **Client Contact:** Paula Marshall

Sample Identity	CHP1	CHP2	TP601Z	TP602Z						Method Code	LoD/Units
Depth (m)	0.1	0.0	1.0	0.7							
Sample Type	SOLID	SOLID	SOLID	SOLID							
Sampled Date	02.06.08	02.06.08	02.06.08	02.06.08							
Sample Received Date	03.06.08	03.06.08	03.06.08	03.06.08							
Batch	1	1	1	1							
Sample Number(s)	**1-2**	**3-4**	**5**	**6**							
PAH by GCMS											
Naphthalene	120	120	-	-						TM074[#M]	<10 ug/kg
Acenaphthylene	870	1000	-	-						TM074[#M]	<5 ug/kg
Acenaphthene	3000	3100	-	-						TM074[#M]	<14 ug/kg
Fluorene	1400	3700	-	-						TM074[#M]	<12 ug/kg
Phenanthrene	2200	3000	-	-						TM074[#M]	<21 ug/kg
Anthracene	1200	5500	-	-						TM074[#M]	<9 ug/kg
Fluoranthene	2900	2800	-	-						TM074[#M]	<25 ug/kg
Pyrene	4600	5500	-	-						TM074[#M]	<22 ug/kg
Benz(a)anthracene	120	380	-	-						TM074[#M]	<12 ug/kg
Chrysene	1300	1600	-	-						TM074[#M]	<10 ug/kg
Benzo(b)fluoranthene	130	440	-	-						TM074[#M]	<16 ug/kg
Benzo(k)fluoranthene	<125	230	-	-						TM074[#M]	<25 ug/kg
Benzo(a)pyrene	79	210	-	-						TM074[#M]	<12 ug/kg
Indeno(123cd)pyrene	<55	210	-	-						TM074[#M]	<11 ug/kg
Dibenzo(ah)anthracene	<40	160	-	-						TM074[#M]	<8 ug/kg
Benzo(ghi)perylene	74	270	-	-						TM074[#M]	<10 ug/kg
PAH 16 Total	18000	28000	-	-						TM074[#M]	<25 ug/kg

All results expressed on a dry weight basis.

Date 17.06.2008

Validated ☑
Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

[#] ISO 17025 accredited
[M] MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/09940/02/01 **Matrix:** SOLID
Client: URS Corporation Limited **Location:** Not Specified
Client Ref. No.: 49308165 **Client Contact:** Paula Marshall

Sample Identity	CHP1	CHP2	TP601Z	TP602Z						Method Code	LoD/Units
Depth (m)	0.1	0.0	1.0	0.7							
Sample Type	SOLID	SOLID	SOLID	SOLID							
Sampled Date	02.06.08	02.06.08	02.06.08	02.06.08							
Sample Received Date	03.06.08	03.06.08	03.06.08	03.06.08							
Batch	1	1	1	1							
Sample Number(s)	**1-2**	**3-4**	**5**	**6**							
PCBs (vs Aroclor 1254)	-	-	<35	<35						TM070[#]	<35 ug/kg

All results expressed on a dry weight basis.

Date 17.06.2008

ALcontrol Laboratories Analytical Services
Table Of Results - Appendix

Job Number: 08/09940/02/01
Client: URS Corporation Limited
Client Ref. No.: 49308165

Report Key :

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03×10^{-7}

NDP	No Determination Possible	*	Subcontracted test
NFD	No Fibres Detected	»	Result previously reported (Incremental reports only)
#	ISO 17025 accredited	M	MCERTS Accredited
PFD	Possible Fibres Detected	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control.

Summary of Method Codes contained within report :

Method No.	Reference	Description	ISO 17025 Accredited	MCERTS Accredited	Wet/Dry Sample [1]	Surrogate Corrected
TM070	Modified: US EPA Method 8250 & 625	Determination of Total Polychlorinated Biphenyls (PCB's) as Aroclor 1254 by GC-MS in Soils	✓		DRY	
TM074	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS. MCERTS Accreditation on Soils for Naphthalene except when Kerosene present.	✓		DRY	
TM074	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS. MCERTS Accreditation on Soils for Naphthalene except when Kerosene present.	✓	✓	DRY	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)			WET	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)	✓		WET	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)	✓	✓	WET	
TM132	In - house Method	ELTRA CS800 Operators Guide	✓	✓	DRY	
TM133	BS 1377: Part 3 1990	Determination of pH in Soil and Water using the GLpH pH Meter	✓	✓	WET	
TM154	In - house Method	Determination of Petroleum Hydrocarbons by EZ Flash GC-FID in the Carbon range C6- C40	✓		WET	
TM173		Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID	✓		DRY	
TM61/89		see TM061 and TM089 for details			WET	

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

ALcontrol Laboratories Analytical Services
Table Of Results - Appendix

Job Number: 08/09940/02/01
Client: URS Corporation Limited
Client Ref. No.: 49308165

Summary of Coolbox temperatures

Batch No.	Coolbox Temperature (°C)
1	7*C

Validated ☑
Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/17414/02/01 **Matrix:** SOLID
Client: URS Corporation Limited **Location:** RHODIA
Client Ref. No.: **Client Contact:** Niklas Lehto

Sample Identity	SS1	SS2	TP1	TP1	TP2	TP6				Method Code	LoD/Units
Depth (m)	0M	0M	0.4	3.0	2M	0.2					
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID					
Sampled Date	05.11.08	05.11.08	05.11.08	05.11.08	05.11.08	05.11.08					
Sample Received Date	07.11.08	07.11.08	07.11.08	07.11.08	07.11.08	07.11.08					
Batch	2	2	2	2	2	2					
Sample Number(s)	7-9	10-12	13-15	16-18	19-21	28-30					
GRO (C4-C12)	<10	3400	6600	<10	<10	<10				TM089	<10 ug/kg
MTBE	<10	<10	<10	<10	<10	<10				TM089#	<10 ug/kg
Benzene	<10	<10	<10	<10	<10	<10				TM089#M	<10 ug/kg
Toluene	<10	<10	<10	<10	<10	<10				TM089#M	<10 ug/kg
Ethyl benzene	<10	<10	<10	<10	<10	<10				TM089#M	<10 ug/kg
m & p Xylene	<10	<10	<10	<10	<10	<10				TM089#M	<10 ug/kg
o Xylene	<10	<10	<10	<10	<10	<10				TM089#M	<10 ug/kg
Aliphatics C5-C6	<10	<10	<10	<10	<10	<10				TM089	<10 ug/kg
Aliphatics >C6-C8	<10	<10	<10	<10	<10	<10				TM089	<10 ug/kg
Aliphatics >C8-C10	<10	410	800	<10	<10	<10				TM089	<10 ug/kg
Aliphatics >C10-C12	<10	960	1800	<10	<10	<10				TM089	<10 ug/kg
Aliphatics >C12-C16	2100	960000	110000	320	13000	2100				TM173#	<100 ug/kg
Aliphatics >C16-C21	83000	2800000	300000	950	53000	10000				TM173#	<100 ug/kg
Aliphatics >C21-C35	200000	1300000	130000	<100	33000	19000				TM173#	<100 ug/kg
Total Aliphatics C5-C35	290000	5000000	550000	1300	98000	31000				TM61/89	<100 ug/kg
Aromatics C6-C7	<10	<10	<10	<10	<10	<10				TM089	<10 ug/kg
Aromatics >C7-C8	<10	<10	<10	<10	<10	<10				TM089	<10 ug/kg
Aromatics >EC8-EC10	<10	620	1200	<10	<10	<10				TM089	<10 ug/kg
Aromatics >EC10-EC12	<10	1400	2800	<10	<10	<10				TM089	<10 ug/kg
Aromatics >EC12-EC16	230	130000	25000	<100	260	410				TM173#	<100 ug/kg
Aromatics >EC16-EC21	8300	610000	88000	<100	3500	470				TM173#	<100 ug/kg
Aromatics >EC21-EC35	80000	650000	64000	<100	1300	2200				TM173#	<100 ug/kg
Total Aromatics C6-C35	88000	1400000	180000	<100	5100	3100				TM61/89	<100 ug/kg
TPH (Aliphatics and Aromatics C5-C35)	380000	6400000	730000	1300	100000	34000				TM61/89	<100 ug/kg

All results expressed on a dry weight basis.

Date 11.02.2009

Validated ☑
Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/17414/02/01 **Matrix:** SOLID
Client: URS Corporation Limited **Location:** RHODIA
Client Ref. No.: **Client Contact:** Niklas Lehto

Sample Identity	SS1	SS2	TP1	TP1	TP2	TP6				Method Code	LoD/Units
Depth (m)	0M	0M	0.4	3.0	2M	0.2					
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID					
Sampled Date	05.11.08	05.11.08	05.11.08	05.11.08	05.11.08	05.11.08					
Sample Received Date	07.11.08	07.11.08	07.11.08	07.11.08	07.11.08	07.11.08					
Batch	2	2	2	2	2	2					
Sample Number(s)	7-9	10-12	13-15	16-18	19-21	28-30					
Volatile Organic Compounds											
Dichlorodifluoromethane	-	-	-	-	<4	-				TM116#	<4 ug/kg
Chloromethane	-	-	-	-	<7	-				TM116#	<7 ug/kg
Vinyl Chloride	-	-	-	-	<10	-				TM116#M	<10 ug/kg
Bromomethane	-	-	-	-	<13	-				TM116	<13 ug/kg
Chloroethane	-	-	-	-	<14	-				TM116#	<14 ug/kg
Trichlorofluoromethane	-	-	-	-	<6	-				TM116#M	<6 ug/kg
trans-1-2-Dichloroethene	-	-	-	-	<11	-				TM116#	<11 ug/kg
Dichloromethane	-	-	-	-	<10	-				TM116#	<10 ug/kg
Carbon Disulphide	-	-	-	-	<7	-				TM116#M	<7 ug/kg
1.1-Dichloroethene	-	-	-	-	<10	-				TM116#M	<10 ug/kg
1.1-Dichloroethane	-	-	-	-	<8	-				TM116#M	<8 ug/kg
Methyl Tertiary Butyl Ether	-	-	-	-	<11	-				TM116	<11 ug/kg
cis-1-2-Dichloroethene	-	-	-	-	<5	-				TM116#M	<5 ug/kg
Bromochloromethane	-	-	-	-	<14	-				TM116#	<14 ug/kg
Chloroform	-	-	-	-	<8	-				TM116#M	<8 ug/kg
2.2-Dichloropropane	-	-	-	-	<12	-				TM116	<12 ug/kg
1.2-Dichloroethane	-	-	-	-	<5	-				TM116#	<5 ug/kg
1.1.1-Trichloroethane	-	-	-	-	<7	-				TM116#M	<7 ug/kg
1.1-Dichloropropene	-	-	-	-	<11	-				TM116#M	<11 ug/kg
Benzene	-	-	-	-	<9	-				TM116#M	<9 ug/kg
Carbontetrachloride	-	-	-	-	<14	-				TM116#M	<14 ug/kg
Dibromomethane	-	-	-	-	<9	-				TM116#	<9 ug/kg
1.2-Dichloropropane	-	-	-	-	<12	-				TM116#M	<12 ug/kg
Bromodichloromethane	-	-	-	-	<7	-				TM116#M	<7 ug/kg
Trichloroethene	-	-	-	-	<9	-				TM116#M	<9 ug/kg
cis-1-3-Dichloropropene	-	-	-	-	<14	-				TM116#M	<14 ug/kg
trans-1-3-Dichloropropene	-	-	-	-	<14	-				TM116#M	<14 ug/kg
1.1.2-Trichloroethane	-	-	-	-	<10	-				TM116#	<10 ug/kg
Toluene	-	-	-	-	<5	-				TM116#M	<5 ug/kg
1.3-Dichloropropane	-	-	-	-	<7	-				TM116#	<7 ug/kg

All results expressed on a dry weight basis.

Date 11.02.2009

Validated ☑
Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/17414/02/01 **Matrix:** SOLID
Client: URS Corporation Limited **Location:** RHODIA
Client Ref. No.: **Client Contact:** Niklas Lehto

Sample Identity	SS1	SS2	TP1	TP1	TP2	TP6				Method Code	LoD/Units
Depth (m)	0M	0M	0.4	3.0	2M	0.2					
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID					
Sampled Date	05.11.08	05.11.08	05.11.08	05.11.08	05.11.08	05.11.08					
Sample Received Date	07.11.08	07.11.08	07.11.08	07.11.08	07.11.08	07.11.08					
Batch	2	2	2	2	2	2					
Sample Number(s)	7-9	10-12	13-15	16-18	19-21	28-30					
Volatile Organic Compounds (cont)											
Dibromochloromethane	-	-	-	-	<13	-				TM116#	<13 ug/kg
1.2-Dibromoethane	-	-	-	-	<12	-				TM116#	<12 ug/kg
Tetrachloroethene	-	-	-	-	<5	-				TM116#	<5 ug/kg
1.1.1.2-Tetrachloroethane	-	-	-	-	<10	-				TM116#M	<10 ug/kg
Chlorobenzene	-	-	-	-	<5	-				TM116#M	<5 ug/kg
Ethylbenzene	-	-	-	-	<4	-				TM116#	<4 ug/kg
p/m-Xylene	-	-	-	-	<14	-				TM116#	<14 ug/kg
Bromoform	-	-	-	-	<10	-				TM116#	<10 ug/kg
Styrene	-	-	-	-	<10	-				TM116#	<10 ug/kg
1.1.2.2-Tetrachloroethane	-	-	-	-	<10	-				TM116#	<10 ug/kg
o-Xylene	-	-	-	-	<10	-				TM116#	<10 ug/kg
1.2.3-Trichloropropane	-	-	-	-	<17	-				TM116#	<17 ug/kg
Isopropylbenzene	-	-	-	-	<5	-				TM116#	<5 ug/kg
Bromobenzene	-	-	-	-	<10	-				TM116#M	<10 ug/kg
2-Chlorotoluene	-	-	-	-	<9	-				TM116#	<9 ug/kg
Propylbenzene	-	-	-	-	<11	-				TM116#	<11 ug/kg
4-Chlorotoluene	-	-	-	-	<12	-				TM116#	<12 ug/kg
1.2.4-Trimethylbenzene	-	-	-	-	<9	-				TM116#	<9 ug/kg
4-Isopropyltoluene	-	-	-	-	<11	-				TM116#	<11 ug/kg
1.3.5-Trimethylbenzene	-	-	-	-	<8	-				TM116#	<8 ug/kg
1.2-Dichlorobenzene	-	-	-	-	<12	-				TM116#M	<12 ug/kg
1.4-Dichlorobenzene	-	-	-	-	<5	-				TM116#M	<5 ug/kg
sec-Butylbenzene	-	-	-	-	<10	-				TM116#	<10 ug/kg
tert-Butylbenzene	-	-	-	-	<12	-				TM116#	<12 ug/kg
1.3-Dichlorobenzene	-	-	-	-	<6	-				TM116#	<6 ug/kg
n-Butylbenzene	-	-	-	-	<10	-				TM116#	<10 ug/kg
1.2-Dibromo-3-chloropropane	-	-	-	-	<14	-				TM116#	<14 ug/kg
1.2.4-Trichlorobenzene	-	-	-	-	<6	-				TM116#	<6 ug/kg
Naphthalene	-	-	-	-	<13	-				TM116#	<13 ug/kg
1.2.3-Trichlorobenzene	-	-	-	-	<11	-				TM116#	<11 ug/kg

All results expressed on a dry weight basis.

Date 11.02.2009

Validated ☑
Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/17414/02/01 **Matrix:** SOLID
Client: URS Corporation Limited **Location:** RHODIA
Client Ref. No.: **Client Contact:** Niklas Lehto

Sample Identity	SS1	SS2	TP1	TP1	TP2	TP6				Method Code	LoD/Units
Depth (m)	0M	0M	0.4	3.0	2M	0.2					
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID					
Sampled Date	05.11.08	05.11.08	05.11.08	05.11.08	05.11.08	05.11.08					
Sample Received Date	07.11.08	07.11.08	07.11.08	07.11.08	07.11.08	07.11.08					
Batch	2	2	2	2	2	2					
Sample Number(s)	7-9	10-12	13-15	16-18	19-21	28-30					
Volatile Organic Compounds (cont)											
Hexachlorobutadiene	-	-	-	-	<12	-				TM116#	<12 ug/kg

All results expressed on a dry weight basis.

Date 11.02.2009

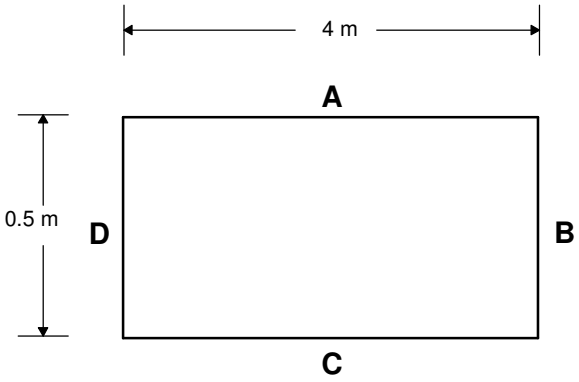
Appendix C - Trial Pit Logs

Logged By : NJL

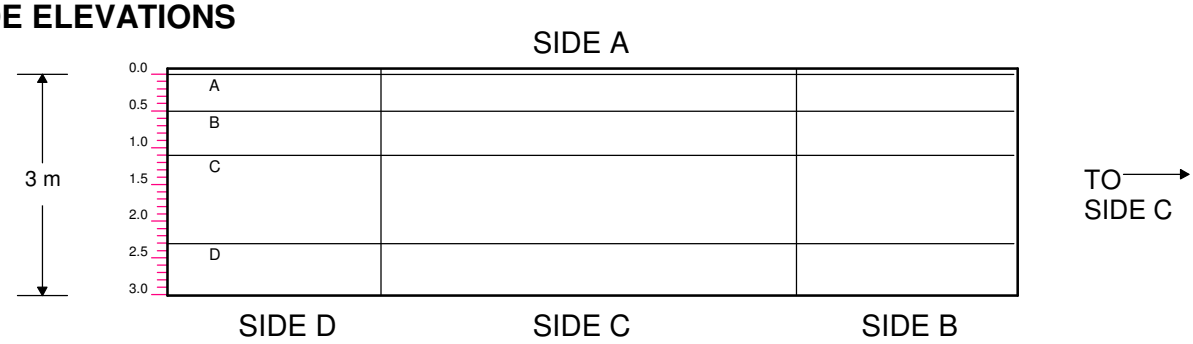
Checked By: PJM

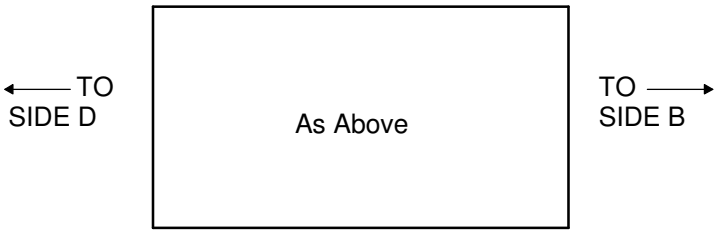
TRIAL PIT NUMBER: TP 1
PIT LOCATION: CHP, Rhodia Whitehaven
DATE OF EXCAVATION: 5/11/2008
GROUND ELEVATION:
WATER LEVEL:

PLAN



SIDE ELEVATIONS





STRATA DESCRIPTION	COMMENTS	SAMPLE
A: MADE GROUND: Brown, soft, gravelly sandy clay. Gravel is angular to subangular and medium to coarse.	Dry, NVO Turns wet at 0.4m, HC Odour	0.4m:TPH; VOC
B:MADE GROUND: Brown, soft to firm sandy clay with much subrounded to angular medium gravel and rare boulders of concrete.	Dry, NVO	
C: MADE GROUND: Dark brown, soft sandy silt with much rootlets and occasional angular fine gravel	Dry, NVO	
D: Brown, firm to stiff clay with much angular fine gravel and occasional layer of fine yellow sand	Dry, NVO	3.0m: TPH; VOC

KEY

BGL	Below ground level
*	Sample location
SO	Soil sample
WA	Water sample
†	Soil vapour analysis

TRIAL PIT LOG

Job Title: CHP Investigation
Location: Rhodia Whitehaven
Client: Rhodia UK Ltd

URS

App'd: PJM	Date: November 2008
Drawn : NJL	Ref: 49308165
Scale: NTS	Job No: 49308165
Drg. Size:	TRIAL PIT LOG

Logged By : NJL

Checked By: PJM

TRIAL PIT NUMBER: TP 2

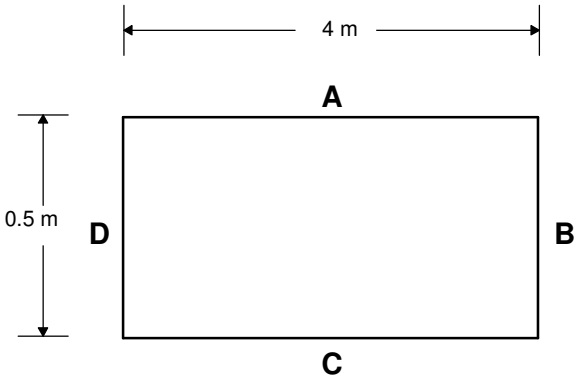
PIT LOCATION: CHP, Rhodia Whitehaven

DATE OF EXCAVATION: 5/11/2008

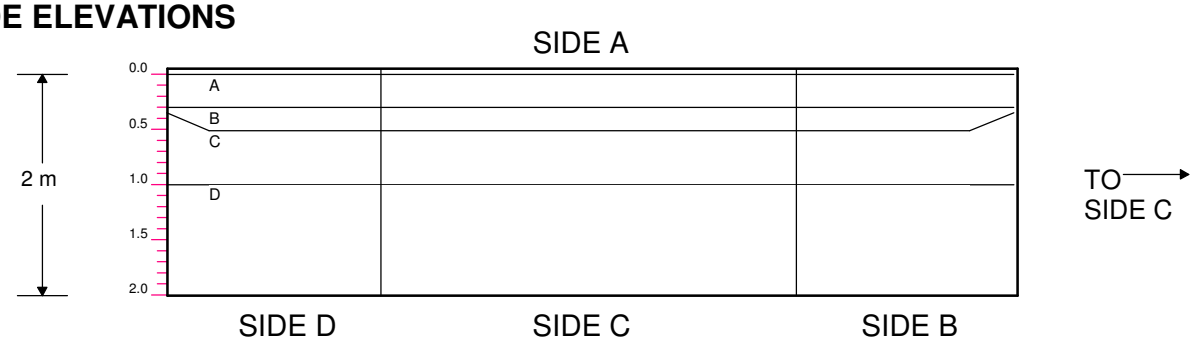
GROUND ELEVATION:

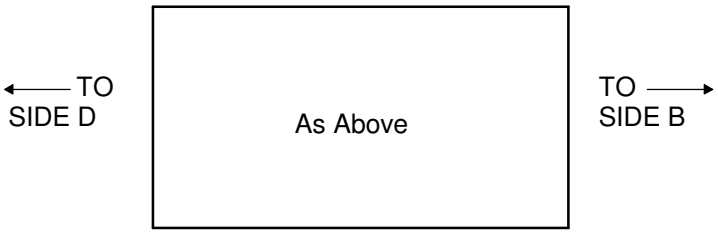
WATER LEVEL: 1.0 mBGL

PLAN



SIDE ELEVATIONS





STRATA DESCRIPTION	COMMENTS	SAMPLE
A: MADE GROUND: Brown, soft, sandy silt with much medium to coarse gravel of red brick and concrete	Dry, NVO	
B:MADE GROUND: Black, soft silt with much fine to medium gravel of coal.	Dry, NVO	
C: MADE GROUND: Brown, soft sandy and clayey silt with much angular to subangular medium to coarse grave and cobbles of red brick.	Wet, HC Odour	
D: MADE GROUND: Black cobbles with rare pockets of grey clay.	Wet, Strong HC Odour	Grey clay at 2.0m: TPH; VOC

KEY

BGL Below ground level
* Sample location
SO Soil sample
WA Water sample
† Soil vapour analysis

TRIAL PIT LOG

Job Title: CHP Investigation

Location: Rhodia Whitehaven

Client: Rhodia UK Ltd

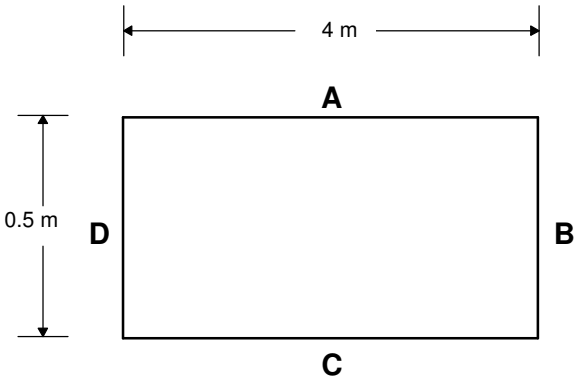
URS

App'd: PJM	Date: November 2008
Drawn : NJL	Ref: 49308165
Scale: NTS	Job No: 49308165
Drg. Size:	TRIAL PIT LOG

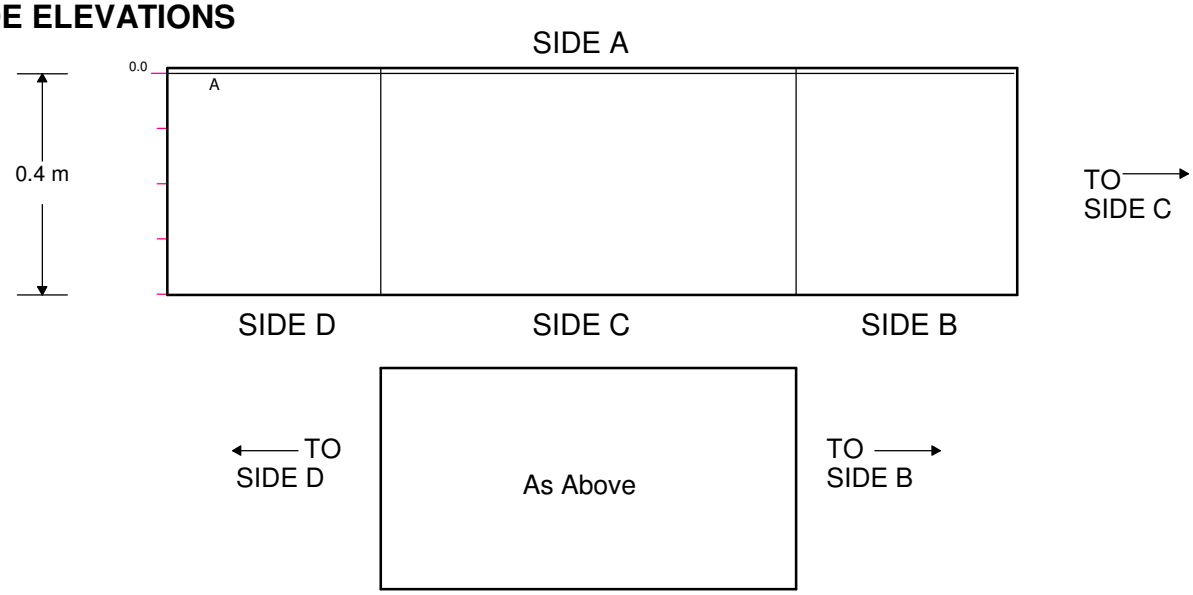
Logged By : NJL	
Checked By: PJM	

TRIAL PIT NUMBER: TP 4
PIT LOCATION: CHP, Rhodia Whitehaven
DATE OF EXCAVATION: 5/11/2008
GROUND ELEVATION:
WATER LEVEL:

PLAN



SIDE ELEVATIONS



STRATA DESCRIPTION	COMMENTS	SAMPLE
A: MADE GROUND: Brown, sandy silt with much medium to coarse gravel of red brick and concrete.	Dry, NVO	

KEY

BGL Below ground level
* Sample location
SO Soil sample
WA Water sample
† Soil vapour analysis

TRIAL PIT LOG

Job Title: CHP Investigation
Location: Rhodia Whitehaven
Client: Rhodia UK Ltd

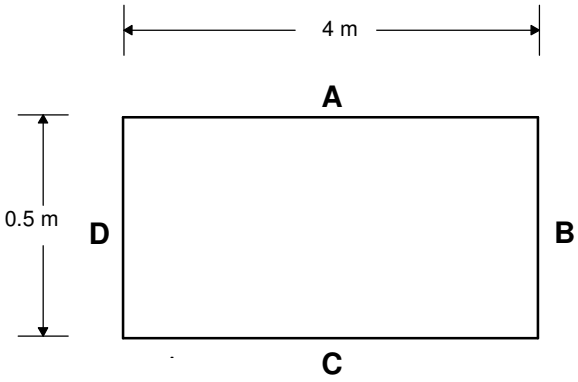
URS

App'd: PJM	Date: November 2008
Drawn : NJL	Ref: 49308165
Scale: NTS	Job No: 49308165
Drg. Size:	TRIAL PIT LOG

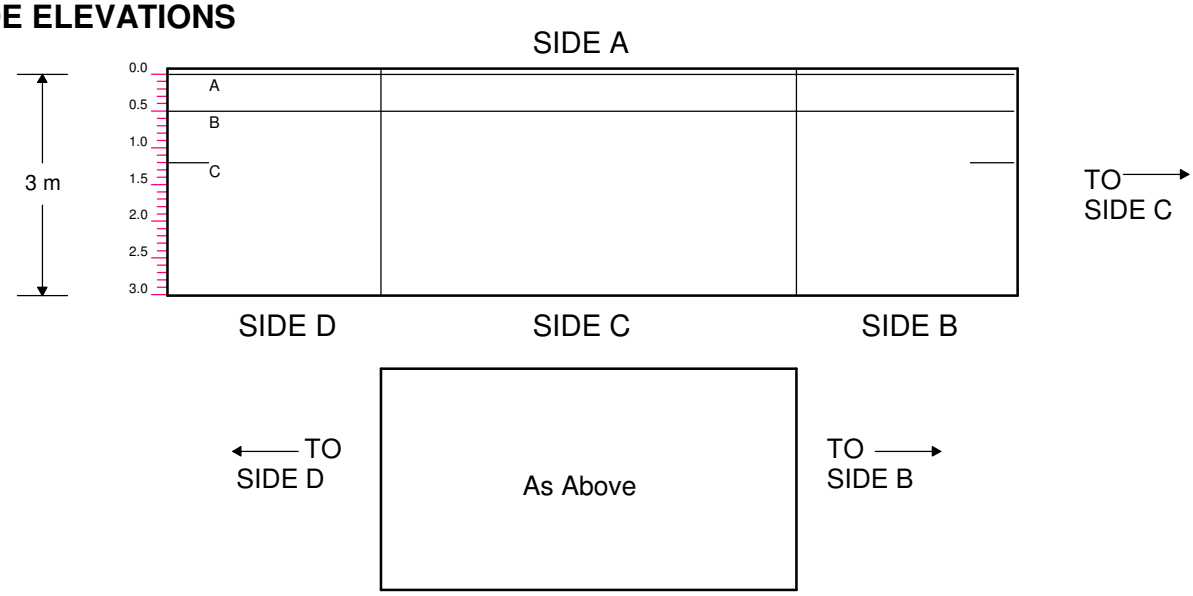
Logged By : NJL	
Checked By: PJM	

TRIAL PIT NUMBER: TP 6
PIT LOCATION: CHP, Rhodia Whitehaven
DATE OF EXCAVATION: 5/11/2008
GROUND ELEVATION:
WATER LEVEL:

PLAN



SIDE ELEVATIONS



STRATA DESCRIPTION	COMMENTS	SAMPLE
A: MADE GROUND: Dark brown, sandy clayey gravel. Gravel is subrounded to angular and fine to coarse. **B**:MADE GROUND: Black sandy gravel. Gravel is angular fine gravel with much angular to subrounded coarse gravel and much cobbles. **C**: Brown stiff clay with much angular to subrounded fine gravel, much pockets of grey and light brown sand, and rare boulder.	Dry, NVO Wet, NVO Ingress of water at 1.2m Dry, NVO	0.2m: TPH; VOC

KEY

BGL	Below ground level
*	Sample location
SO	Soil sample
WA	Water sample
†	Soil vapour analysis

TRIAL PIT LOG

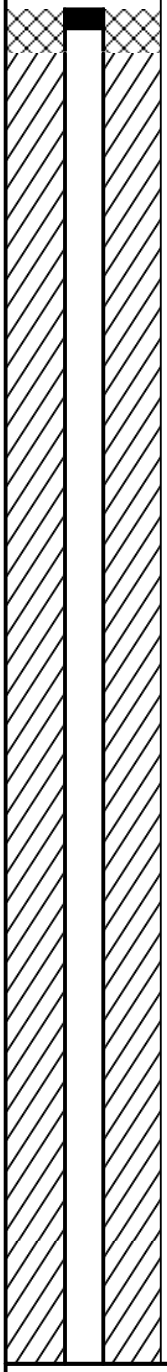
Job Title: CHP Investigation
Location: Rhodia Whitehaven
Client: Rhodia UK Ltd

URS

App'd: PJM	Date: November 2008
Drawn : NJL	Ref: 49308165
Scale: NTS	Job No: 49308165
Drg. Size:	TRIAL PIT LOG

BOREHOLE NUMBER: BH101

DRILLING DATES: 28.11.01-5.12.01	DRILLING METHODS : Core
DRILLER : Norwest Holst	BOREHOLE DIAMETER : 100mm
LOGGED BY : SNL	SCREEN TYPE & DIAM: HDPE, 50mm
CHECKED BY : JM	SCREEN SLOT SIZE: 3mm



TCR (%)	SCR AND RQD	SAMPLE	DEPTH (m)	GEOLOGY	DESCRIPTION	COMMENTS
			0.0		NO RECOVERY	
19%			0.5			
			1.0		MADE GROUND Cobbles of subangular red brick over concrete.	
91%			1.5			
			2.0		Soft, brown slightly silty CLAY.	Top Boulder Clay
			2.5			
			3.0			
			3.5			
			4.0			
			4.5			
91%	FI-10.2 RQD-58%		5.0			Top Magnesian Limestone
			5.5			NVO
			6.0			NVO

LOCATION / NOTES:

NVO - No visual or olfactory evidence of contamination
TCR-Total Core Recovery (%)
FI-Fracture index
RQD-Rock Quality Determinand (%)

LEGEND

- Disturbed Sample
- Undisturbed Sample
- Headspace Analysis
- Down Borehole Analysis
- Groundwater Table
- Perched Water Table

BOREHOLE LOG

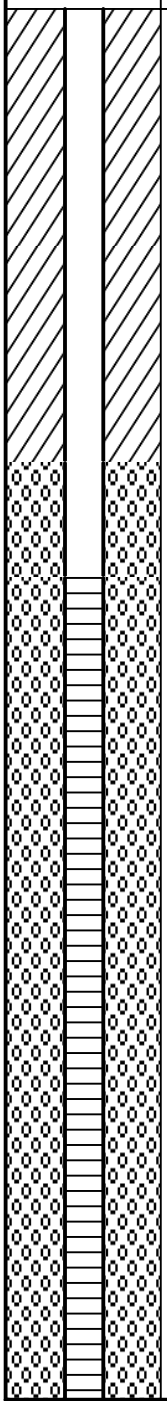
Job Title: Deep Borehole
Location: Whitehaven
Client: Rhodia

URS

App'd: JM	Date: 11.12.01
Drawn : SNL	Ref:
Scale: As shown	Job No: 44557-021-787
Drg. Size: A4	BOREHOLE LOG

BOREHOLE NUMBER: BH101

DRILLING DATES: 28.11.01-5.12.01	DRILLING METHODS : Core
DRILLER : Norwest Holst	BOREHOLE DIAMETER : 100mm
LOGGED BY : SNL	SCREEN TYPE & DIAM: HDPE, 50mm
CHECKED BY : JM	SCREEN SLOT SIZE: 3mm



TCR (%)	SCR AND RQD	DEPTH (m)	GEOLOGY	COMMENTS
		6.5		Brown, moderately strong, slightly weathered fine-medium silty DOLOMITE. Small veins and voids (5-50mm) make up some 5%. These rarely interconnect, and are partially mineralised with calcite. Weak-very weak and friable within 2-4cm of fractures, and in some cases void density is markedly increased near fractures. Fractures sub-horizontal.
98%	FI-6.4 RQD-84%	7.0		
		7.5		Pale brown, strong, fresh fine DOLOMITE. Some 10% made up of 2-12mm voids which do not interconnect. These contain some 10% calcite mineralisation.
		8.0		NVO
		8.5		Occasional 10-25mm bands of soft red clay (e.g. at 8.34m and 8.79m) appear to be a result of infilling of fractures from above. Fractures sub-horizontal.
		9.0		Some fractures show minor calcite mineralisation. Some have a sheen of micrite on each surface.
		9.5		
100%	FI-18.0 RQD-0%	10.0		NVO
95%	FI-4.24 RQD-89%	10.5		Pinkish cream, moderately strong, fresh fine micritic LIMESTONE. Thinly laminated with bands of grey. Fractures are sub-horizontal, with no sign of dissolution or secondary mineralisation.
		11.0		Pale brown, strong, fresh fine DOLOMITE. 5-10% voids, 2-12mm in size. Pronounced discolouration to pale cream within 2-6cm of fractures. Fractures sub-horizontal, with no sign of dissolution or mineralisation.
		11.5		
		12.0		NVO

LOCATION / NOTES:

NVO - No visual or olfactory evidence of contamination
TCR-Total Core Recovery (%)
FI-Fracture index
RQD-Rock Quality Determinand (%)

LEGEND

- Disturbed Sample
- Undisturbed Sample
- Headspace Analysis
- Down Borehole Analysis
- Groundwater Table
- Perched Water Table

BOREHOLE LOG

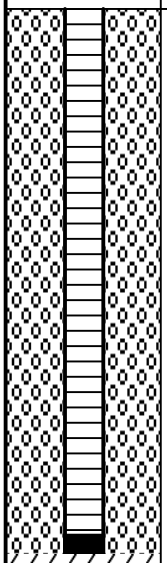
Job Title: Deep Borehole
Location: Whitehaven
Client: Rhodia

URS

App'd: JM	Date: 11.12.01
Drawn : SNL	Ref:
Scale: As shown	Job No: 44557-021-787
Drg. Size: A4	BOREHOLE LOG

BOREHOLE NUMBER: BH101

DRILLING DATES: 28.11.01-5.12.01	DRILLING METHODS : Core
DRILLER : Norwest Holst	BOREHOLE DIAMETER : 100mm
LOGGED BY : SNL	SCREEN TYPE & DIAM: HDPE, 50mm
CHECKED BY : JM	SCREEN SLOT SIZE: 3mm



TCR (%)	SCR AND RQD	DEPTH (m)	GEOLOGY	COMMENTS
100%	FI-3.2 RQD-56%	12.5	Dark reddish-brown, strong, fresh silty DOLOMITE with some 2% voids which only occasionally show signs of limited calcite mineralisation. Most fractures sub-horizontal. Very weak and very silty from 12.7m-13.7m.	
		13.0		
		13.5	One vertical fracture noted from 13.7-13.9m.	
		14.0		NVO
		14.5	Becoming yellowish brown from 14.7m.	
100%	FI-4.5 RQD-98%	15.0	Purple/reddish brown, very hard, fresh BRECCIA. Clasts (50%): 2-40mm, pinkish purple fine sandstone (20%), pale cream sandstone (40%) and purplish brown mudstone (40%). Clasts angular-subrounded, equant-oblate. Matrix (50%): Purple, fine-coarse well-cemented sandstone. Fractures sub-horizontal, with no sign of mineralisation or dissolution.	Top Brockram
		15.5		NVO
100%	FI-4.4 RQD-93%	16.0	UNCONFORMABLE UPON... Pinkish-purple, very strong, fresh, fine SANDSTONE. Well-cemented, and thinly laminated, with dune foresets picked out by dark purple laminations. Truncation relationships indicate no inversion. Occasional tabular clast of dark purple mudstone. No bioturbation. Fractures sub-horizontal. 9mm layer of firm red-brown silty clay at 16.91m.	Top Whitehaven Sandstone
		16.5		
		17.0		
		17.5		NVO
		18.0		

LOCATION / NOTES:

NVO - No visual or olfactory evidence of contamination
TCR-Total Core Recovery (%)
FI-Fracture index
RQD-Rock Quality Determinand (%)

LEGEND

- Disturbed Sample
- Undisturbed Sample
- Headspace Analysis
- Down Borehole Analysis
- Groundwater Table
- Perched Water Table

BOREHOLE LOG

Job Title: Deep Borehole
Location: Whitehaven
Client: Rhodia

URS

App'd: JM	Date: 11.12.01
Drawn : SNL	Ref:
Scale: As shown	Job No: 44557-021-787
Drg. Size: A4	BOREHOLE LOG

BOREHOLE NUMBER: BH101

DRILLING DATES: 28.11.01-5.12.01	DRILLING METHODS : Core
DRILLER : Norwest Holst	BOREHOLE DIAMETER : 100mm
LOGGED BY : SNL	SCREEN TYPE & DIAM: HDPE, 50mm
CHECKED BY : JM	SCREEN SLOT SIZE: 3mm

BOREHOLE CONSTRUCTION	TCR (%)	SCR AND RQD	SAMPLE	DEPTH (m)	GEOLOGY		COMMENTS
				18.5			
	100%	FI-0.0 RQD-100%		19.0		Purple-brown, very hard fresh CONGLOMERATE. Clasts (40%): Sub-rounded to rounded, tabular brown mudstone, 10-40mm, often imbricated. Matrix (60%): Cream-mottled purple, medium- coarse, well-cemented quartzite.	
	100%	FI-4.3 RQD-86%					Top Coal Measures
				19.5		UNCONFORMABLE UPON... Pinkish-purple, very strong, fresh, massive medium SANDSTONE. Foresets picked out by thin, dark purple laminations. Truncations indicate no inversion. No bioturbation. Occasional 1-4cm bands of pale greenish cream sandstone from 20.0m. Joints mostly sub-horizontal. One sub-vertical joint noted.	
				20.0			NVO
				20.5			
	95%	FI-0 RQD-100%		21.0		Dark reddish-brown, moderately strong, fresh CONGLOMERATE. Clasts (30%): Dark red mudstone, rounded, tabular, 10-15mm. Matrix (70%): Purple-mottled cream, medium-coarse, well-cemented sandstone.	
	98%	FI-8.2 RQD-71%					
				21.5			
				22.0		Pinkish-purple, very strong, fresh, medium SANDSTONE. Becoming cream from 21.6-22.0m. Becoming coarse and dark purple from 22.0. Thin-medium bedded, with bedding defined by grainsize variations. Joints mostly sub-horizontal, occasionally at 45 degrees.	NVO
				22.5			
	80%	FI-4.7 RQD-36%		23.0		Red/cream, very strong, fresh CONGLOMERATE. Clasts (40%): Dark reddish-brown mudstone. 2-40mm, rounded-subangular, equant-tabular. Matrix (60%): Pale cream, mottled purple medium-coarse well cemented sandstone.	
				23.5			
	83%	FI-10.6 RQD-26%		24.0			NVO

LOCATION / NOTES:

NVO - No visual or olfactory evidence of contamination
TCR-Total Core Recovery (%)
FI-Fracture index
RQD-Rock Quality Determinand (%)

LEGEND

- Disturbed Sample
- Undisturbed Sample
- Headspace Analysis
- Down Borehole Analysis
- Groundwater Table
- Perched Water Table

BOREHOLE LOG

Job Title: Deep Borehole
Location: Whitehaven
Client: Rhodia

URS

App'd: JM	Date: 11.12.01
Drawn : SNL	Ref:
Scale: As shown	Job No: 44557-021-787
Drg. Size: A4	BOREHOLE LOG

BOREHOLE NUMBER: BH101

DRILLING DATES: 28.11.01-5.12.01	DRILLING METHODS : Core
DRILLER : Norwest Holst	BOREHOLE DIAMETER : 100mm
LOGGED BY : SNL	SCREEN TYPE & DIAM: HDPE, 50mm
CHECKED BY : JM	SCREEN SLOT SIZE: 3mm

BOREHOLE CONSTRUCTION	TCR (%)	SCR AND RQD	SAMPLE	DEPTH (m)	GEOLOGY		COMMENTS
				24.5		Brownish purple, very hard, fresh MUDSTONE. Occasional thin laminations of pale green mudstone.	
				25.0		Becoming moderately hard with a greasy texture from 25.2m.	
				25.5		Becoming fissile, breaking into 10-20mm slabs from 25.7m.	
				26.0		Majority of fractures sub-horizontal. One sub-vertical. Occasional fractures 30 degrees from horizontal.	
						No bioturbation.	NVO
	99%	FI-14.2 RQD-23%		26.5		Pale greenish-grey mottled purple, moderately weak, fresh thinly laminated MUDSTONE.	
				27.0		Very weak from 26.8-27.0m.	
				27.5		Becoming moderately strong from 27.0m.	
						Majority of fractures sub-horizontal. One vertical fracture from 27.0-27.4m.	
						No bioturbation.	
	100%	FI-12.5 RQD-46%		28.0			NVO
						Dark brownish-grey, very strong, fresh MUDSTONE. Thinly laminated, with dislocations indicating soft sediment deformation.	
				28.5		No bioturbation.	
				29.0		Fractures mostly sub-horizontal. Occasionally 30 degrees from horizontal.	
				29.5			
				30.0			NVO

LOCATION / NOTES:

NVO - No visual or olfactory evidence of contamination
TCR-Total Core Recovery (%)
FI-Fracture index
RQD-Rock Quality Determinand (%)

LEGEND

- Disturbed Sample
- Undisturbed Sample
- Headspace Analysis
- Down Borehole Analysis
- Groundwater Table
- Perched Water Table

BOREHOLE LOG

Job Title: Deep Borehole
Location: Whitehaven
Client: Rhodia

URS

App'd: JM	Date: 11.12.01
Drawn : SNL	Ref:
Scale: As shown	Job No: 44557-021-787
Drg. Size: A4	BOREHOLE LOG

BOREHOLE NUMBER: BH101

DRILLING DATES: 28.11.01-5.12.01	DRILLING METHODS : Core
DRILLER : Norwest Holst	BOREHOLE DIAMETER : 100mm
LOGGED BY : SNL	SCREEN TYPE & DIAM: HDPE, 50mm
CHECKED BY : JM	SCREEN SLOT SIZE: 3mm

BOREHOLE CONSTRUCTION | TCR (%) | SCR AND RQD | SAMPLE | DEPTH (m) | GEOLOGY | COMMENTS

15mm bank of soft, dark grey clay at 30.29m.

30mm band of soft, reddish brown silty clay at 30.37m.

NVO

NVO

End of Borehole

30.5 31.0 31.5 32.0 32.5 33.0 33.5 34.0 34.5 35.0 35.5 36.0

LOCATION / NOTES:

NVO - No visual or olfactory evidence of contamination
TCR-Total Core Recovery (%)
FI-Fracture index
RQD-Rock Quality Determinand (%)

LEGEND

- Disturbed Sample
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BOREHOLE LOG

Job Title: Deep Borehole
Location: Whitehaven
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URS

App'd: JM	Date: 11.12.01
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Scale: As shown	Job No: 44557-021-787
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