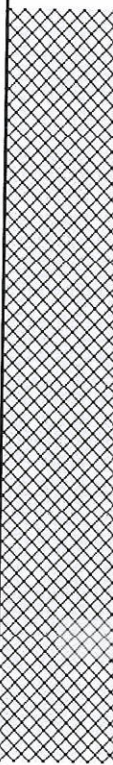


BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSTP019		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 12/11/03		DRILLING METHODS: JCB	
							DRILLER: JCB		BOREHOLE DIAMETER: -	
							LOGGED BY: CM		SCREEN TYPE & DIAM: -	
							CHECKED BY: SG		SCREEN SLOT SIZE: -	
DESCRIPTION		COMMENTS	S,V							
	WSTP019 - 0.3m (S,L)	 *69.7	0.0	Loose to medium dense, dark brown silty fine SAND with abundant angular to subrounded, fine to coarse sandstone gravel with frequent cobbles and boulders.	Wet Free product	2,5				
			0.5	Becoming grey brown from 0.5m.	Damp	1,3				
			1.0		Dry	1,3				
			1.5	With abundant angular to subrounded sandstone from 1.3m.	Dry.	2,3				
	WSTP019 - 1.7m (S,L)	 *75.2	2.0	Weak grey weathered sandstone.						
			2.0	Trial pit terminated at 1.8m due to refusal at bedrock.						
			2.5							
			3.0							
			3.5							
			4.0							
			4.5							
			5.0							

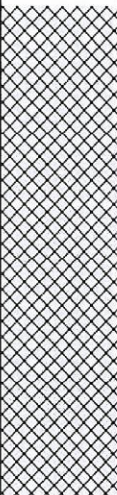
LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)	 Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table	BOREHOLE LOG Job Title: BP Llandarcy Whole Site Investigation Location: BP Llandarcy Refinery Client: BP/WDA	
		App'd:	Date: November 2003
		Drawn: CM	Ref:
		Scale: As scale	Job No: 39991-044-785
		Drg. Size: A4	BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSTP022		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 2/12/03		DRILLING METHODS: JCB	
							DRILLER: JCB - John		BOREHOLE DIAMETER: -	
							LOGGED BY: J.G		SCREEN TYPE & DIAM: -	
							CHECKED BY: LT		SCREEN SLOT SIZE: -	
							DESCRIPTION	COMMENTS	S,V	
	WSTP022		*191		0.0		Soft, brown, sandy silt with moss covering. (MADE GROUND)	Black hydrocarbon staining moderate odour. Fast water ingress with sheen from SE at 0.4m Cables at 0.5m Red-orange, translucent 'product' observed to float to water surface. Very strong acrid odour of detergent /perfume /solvent. Possibly sourced from inside cables/pipes observed, residual product remaining. NB. Metal drum noted nearby labelled as 'liquid colour contains cresol'.	4, 4	
	WSTP022			0.5	Loose to dense demolition rubble of concrete slabs, bricks, paint tins within a sandy matrix. (MADE GROUND)					
	0.5m (S,L) Water sample also of red LNAPL for VOC and SVOC			1.0	Loose to dense, silty, slightly clayey fine sand with gravel and small boulders. (MADE GROUND)					
				1.5	Terminated at 1.0m due to large concrete boulders.					
				2.0						
					2.5					
					3.0					
					3.5					
					4.0					
					4.5					
					5.0					

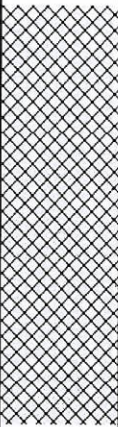
LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)	 Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table	Job Title: BP Llandarcy Whole Site Investigation Location: BP Llandarcy Refinery Client: BP/WDA 	
		App'd:	Date: January 2004
		Drawn: JG	Ref:
		Scale: As scale	Job No: 39991-044-785
		Drg. Size: A4	BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSTP085		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 24/11/03		DRILLING METHODS : JCB	
							DRILLER : JCB		BOREHOLE DIAMETER : -	
							LOGGED BY : HM		SCREEN TYPE & DIAM: -	
		CHECKED BY : SG		SCREEN SLOT SIZE: -						
	WSTP085 - 0.4M (P)		*2.5		0.0		DESCRIPTION		COMMENTS	S,V
	WSTP085 - 0.5m (S,L)				0.5		Loose brown silty sand with abundant rootlets. (MADE GROUND)		nvo, damp-dry.	0,0
							Soft black and brown sandy silt with occasional fine to coarse gravel and occasional subangular cobbles and brick fragments. (MADE GROUND)		Damp-dry. Slight odour and staining.	1,1
							With concrete and bricks from 1.0 - 1.1m.		Dry, nvo.	0,0
							Soft, pale brown sandy silt with occasional black ash, cobbles, bricks and white light cobbles. (MADE GROUND)		Dry, nvo.	0,0
							With frequent subrounded to subangular cobbles from 2.5m.		Dry, nvo.	0,0
	WSTP085 - 2.0m (S,L) DUP HM3 (S,L)		*3.9		2.0		Trail pit terminated at 3.0m due to refusal.			0,0
			*3.2		2.5					0,0
			*3.2		3.0					0,0
					3.5					
					4.0					
					4.5					
					5.0					

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)	 Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table	Job Title: BP Llandarcy Whole Site Investigation Location: BP Llandarcy Refinery Client: BPWDA 	
		App'd:	Date: February 2004
		Drawn : HM	Ref:
		Scale: As scale	Job No: 39991-044-785
		Drg. Size: A4	BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSTP086		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 02/12/03		DRILLING METHODS: JCB	
							DRILLER: JCB - JOHN		BOREHOLE DIAMETER: -	
							LOGGED BY: J.G		SCREEN TYPE & DIAM: -	
							CHECKED BY: SG		SCREEN SLOT SIZE: -	
							DESCRIPTION	COMMENTS	S,V	
	WSTP086 - 0.5m (S,L)		*1.4		0.0		Light brown silty fine sand with frequent rounded to angular gravel to boulders including occasional brick fragments. (MADE GROUND)	NVO	0, 0	
			*1.8		0.5			NVO	0, 0	
			*2.7		1.0			Black tar in small patches.	0, 3	
					1.5					
	WSTP086 - 2.0m (S,L)		*3.3		2.0		Trial pit terminated at 2.0m due to refusal on bedrock.		0, 3	
					2.5					
					3.0					
					3.5					
					4.0					
					4.5					
					5.0					

LOCATION / NOTES: NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)	LEGEND  Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table	BOREHOLE LOG Job Title: BP Llandarcy Whole Site Investigation Location: BP Llandarcy Refinery Client: BPWDA  <table border="1"> <tr> <td>App'd:</td> <td>Date: January 2004</td> </tr> <tr> <td>Drawn: JG</td> <td>Ref:</td> </tr> <tr> <td>Scale: As scale</td> <td>Job No: 39991-044-785</td> </tr> <tr> <td>Drg. Size: A4</td> <td>BOREHOLE LOG</td> </tr> </table>	App'd:	Date: January 2004	Drawn: JG	Ref:	Scale: As scale	Job No: 39991-044-785	Drg. Size: A4	BOREHOLE LOG
App'd:	Date: January 2004									
Drawn: JG	Ref:									
Scale: As scale	Job No: 39991-044-785									
Drg. Size: A4	BOREHOLE LOG									

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSTP146		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 10/11/03		DRILLING METHODS : JCB	
							DRILLER : JCB		BOREHOLE DIAMETER : -	
							LOGGED BY : SS		SCREEN TYPE & DIAM: -	
CHECKED BY : SG		SCREEN SLOT SIZE: -								
	WSTP146 - 0.5m (S,L,P)		*2.7		0.0		DESCRIPTION		COMMENTS	S,V
					0.5		Loose, dark brown, sandy silt with abundant rootlets (MADE GROUND)	Damp. NVO		
					1.0		Loose, yellow brown, fine to medium sand with occasional rootlets and rare, coarse gravel. (MADE GROUND)	Damp. NVO	0,0	
					1.5		With some boulders of sandstone and brick wall fragments from 0.7m.	Damp. NVO	0,0	
	WSTP146 - 1.2m (S,L)		*3.9				With frequent subrounded, coarse gravel. (Reinforcing bar observed in pit walls from 0.8m).			
	WSTP146 - 1.7m (S,L)		*6.8				Trial pit terminated at 1.7m due to refusal on bedrock.	Damp. Slight, light hydrocarbon odour and faint grey staining	1,1	
					2.0					
					2.5					
					3.0					
					3.5					
					4.0					
					4.5					
					5.0					

LOCATION / NOTES:

NVO = No visual or olfactory evidence of contamination

S,V = Contamination Observations

S - Odour score (0-5)

V - Visual score (0-5)

LEGEND

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

BOREHOLE LOG

Job Title: BP Llandarcy Whole Site Investigation

Location: BP Llandarcy Refinery

Client: BP/WDA



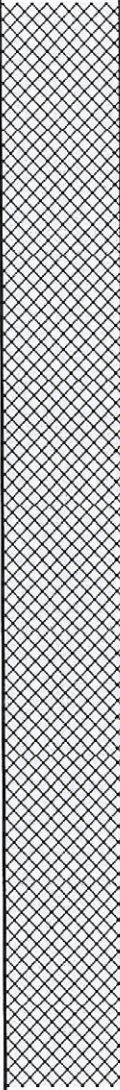
App'd:	Date: November 2003
Drawn : SS	Ref:
Scale: As scale	Job No: 39991-044-785
Org. Size: A4	BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSTP163		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 12/11/03		DRILLING METHODS: JCB	
							DRILLER: JCB		BOREHOLE DIAMETER: -	
							LOGGED BY: JW		SCREEN TYPE & DIAM: -	
							CHECKED BY: SG		SCREEN SLOT SIZE: -	
							DESCRIPTION	COMMENTS	S,V	
	WSTP163 - 0.5m (S,L)		*64.3		0.0		Loose brown silty sand with frequent rootlets. (TOPSOIL)	NVO	0,0	
					0.5		Loose brown grey fine to medium sandy SILT with occasional fine to coarse subrounded and subangular gravel and occasional cobbles.	Slight heavy hydrocarbon odour and patches of black staining	2,2	
					1.0					
					1.5		With frequent cobbles from 1.3m.	Moderate hydrocarbon odour to base.	3,2	
			2.0		With occasional subrounded to rounded sandstone cobbles and boulders from 2.0m.		3,2			
	WSTP163 - 3.5m (S,L)		*501		3.0		With frequent subangular cobbles and boulders from 2.8m		3,2	
				3.5		Trial pit terminated at 3.0m due to refusal.				
					4.0					
					4.5					
					5.0					

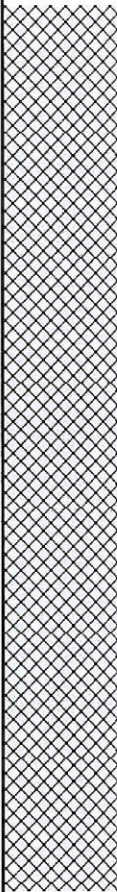
LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)	 Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table	Job Title: BP Llandarcy Whole Site Investigation Location: BP Llandarcy Refinery Client: BP/WDA 	
		App'd:	Date: December 2003
		Drawn: JW	Ref:
		Scale: As Shown	Job No: 39991-044-785
		Drg. Size: A4	BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSTP269		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 11/12/03		DRILLING METHODS : JCB	
							DRILLER : JCB - Viv		BOREHOLE DIAMETER : -	
							LOGGED BY : EM		SCREEN TYPE & DIAM: -	
							CHECKED BY : SG		SCREEN SLOT SIZE: -	
DESCRIPTION							COMMENTS	S,V		
	WSTP269 - 0.5m. (S,L,2xP)		*1.7		0.0		Loose, dark brown to black ash with frequent gravel to cobble sized particles of clinker and slag, occasional brick fragments and entire bricks. (MADE GROUND)	Damp. NVO	0,0	
							0.5			
							1.0	Soft to firm, grey to dark grey silty CLAY with rare fine to coarse gravels, cobbles and boulders.	Damp. Light hydrocarbon odour.	3,3
							1.5	With frequent yellow mottling from 1.5m.	Damp. Faint hydrocarbon odour and staining	1,2
							2.0	With occasional tabular sandstone cobbles and boulders from 1.9m.	Damp. Faint hydrocarbon odour and staining	1,2
	WSTP269 - 1.3m. (S,L)		*10.9 *11.8		2.5		3.0	Firm to stiff, grey brown sandy CLAY with frequent fine to coarse gravels, subangular to subrounded, tabular cobbles and boulders.	Damp. Faint hydrocarbon odour and small pockets of staining	1,1
							3.5			
							4.0			
							4.5			
							5.0			
	WSTP269 - 3.3m. (S,L)		*42.1 *13.7 6.4		3.5		Trial pit terminated at 3.5m	Damp. Faint hydrocarbon odour and small pockets of staining	1,1	
							4.0			
							4.5			
							5.0			
							5.5			

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)	Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	Job Title: BP Llandarcy Whole Site Investigation Location: BP Llandarcy Refinery Client: BP/WDA 	
		App'd:	Date: January 2004
		Drawn : EM	Ref:
		Scale: As Scale	Job No: 39991-044-785
		Drg. Size: A4	BOREHOLE LOG

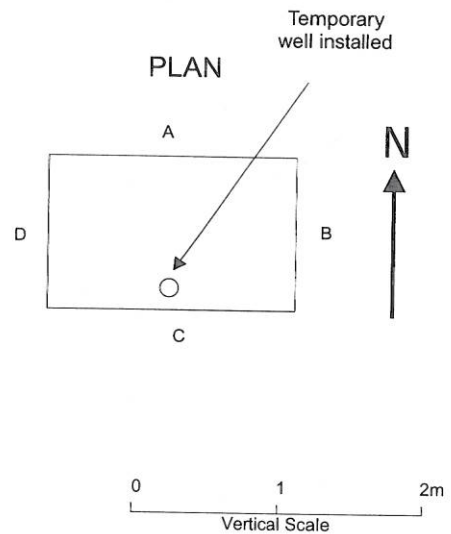
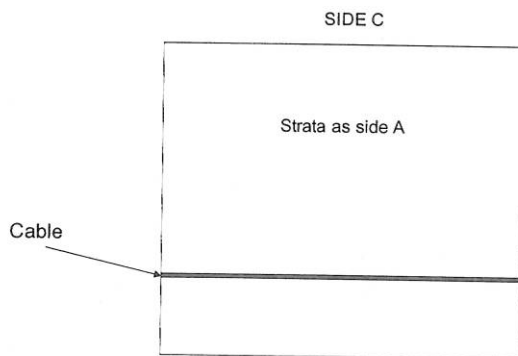
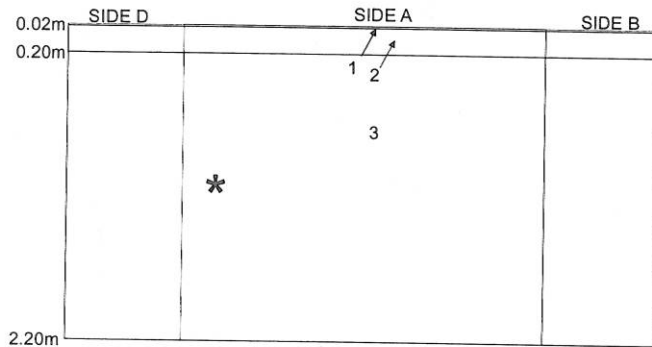
BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSTP270		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 19/11/03		DRILLING METHODS: JCB	
							DRILLER: JCB - Viv		BOREHOLE DIAMETER: -	
							LOGGED BY: EM		SCREEN TYPE & DIAM: -	
							CHECKED BY: SG		SCREEN SLOT SIZE: -	
DESCRIPTION							COMMENTS	S,V		
	WSTP270 - 0.7m (S,L,2xP)		*<0.1	0.0		Loose, dark brown coarse gravel and small cobbles with silt and sand. (MADE GROUND)	Damp. NVO	0,0		
			*<0.1	0.5		Loose, brown, silty fine sand with ash and clinker and frequent fine to coarse gravels and occasional cobbles. (MADE GROUND)	Damp. NVO	0,0		
			*1.0	1.0		Loose, black, ash and clinker material with frequent cobble and boulder sized processed material and brick fragments and occasional patches of soft orange brown silty clay. (MADE GROUND)	Damp. NVO	0,0		
			*<0.1	1.5		Loose, black, ash with abundant fine to coarse gravel of clinker and processed material and frequent cobble and boulder sized processed material. (MADE GROUND)	Damp. NVO	0,0		
			*0.2	2.0			Damp. NVO	0,0		
				2.5		Loose, black ash and clinker. (MADE GROUND)	Dry-damp. NVO	0,0		
			*0.7	3.0			Dry. NVO	0,0		
				3.5						
			*0.4	4.0			Dry. NVO	0,0		
			*<0.1	4.5			Trial pit terminated at 4.4m due to refusal.			
			5.0							

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)	 Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table	Job Title: BP Llandarcy Whole Site Investigation Location: BP Llandarcy Refinery Client: BP/WDA  App'd: _____ Date: December 2003 Drawn: EM Ref: _____ Scale: As Scale Job No: 39991-044-785 Drg. Size: A4 BOREHOLE LOG	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSTP271		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 20/11/03		DRILLING METHODS : JCB	
							DRILLER : JCB - Lee		BOREHOLE DIAMETER : -	
							LOGGED BY : EM		SCREEN TYPE & DIAM: -	
							CHECKED BY : SG		SCREEN SLOT SIZE: -	
							DESCRIPTION	COMMENTS	S,V	
	WSTP271 - 0.4m (S,L)		*0.1		0.0		Loose, dark grey brown coarse gravels with small cobbles, concrete fragments, wire and metal. (MADE GROUND)	Damp. NVO	0,0	
					0.5		Dense, light orange brown sandy clayey silt with frequent fine to coarse gravels, subangular cobbles and boulders. (MADE GROUND)	Damp. NVO. Slight seepage from surface Damp. NVO	0,0	
					1.0		Loose, dark brown, silty clayey fine sand with frequent fine to coarse gravels, subangular and tabular cobbles, boulders, frequent brick and reinforced concrete fragments. (MADE GROUND)	Damp. NVO	0,0	
					1.5		With significant white, grey and black ash content and frequent brick fragments from 0.95m.		0,0	
					2.0		With abundant black ash with gravel and cobble sized processed material from 1.7m.	Damp to dry. NVO	0,0	
	WSTP271 - 3.5m (S,L)		*0.8		2.5		Loose black gravel and cobbles (slag and processed material.) (MADE GROUND)		0,0	
					3.0			Dry. NVO	0,0	
					3.5			Dry. NVO	0,0	
					4.0		Trial pit terminated at 3.6m due to collapse.			
					4.5					
					5.0					
LOCATION / NOTES:						LEGEND		BOREHOLE LOG		
NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)						 Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table		Job Title: BP Llandarcy Whole Site Investigation		
								Location: BP Llandarcy Refinery		
								Client: BP/WDA		
										
								App'd: _____ Date: December 2003		
						Drawn : EM		Ref: _____		
						Scale: As Scale		Job No: 39991-044-785		
						Drg. Size: A4		BOREHOLE LOG		

TRIAL PIT NUMBER: MSTP116
 GROUND ELEVATION: -
 DATE OF EXCAVATION: 2/6/98
 WATER LEVEL: 1.50 mbgl
 LOGGED BY: RC
 APPROVED BY:

SIDE ELEVATIONS



Key:

- * Soil Sample location
- WA Water Sample
- HS Headspace Analysis
- Water Ingress

Job Title: **SOIL & GROUNDWATER INVESTIGATION**

Location: **LLANDARCY REFINERY**

Client: **BP LLANDARCY**

Job No: **39991-001-401** **DRAFT**

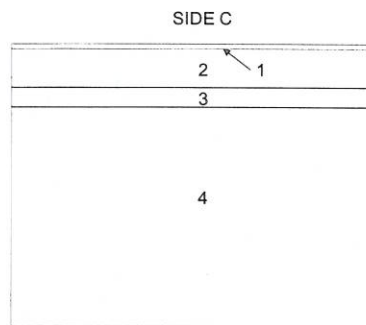
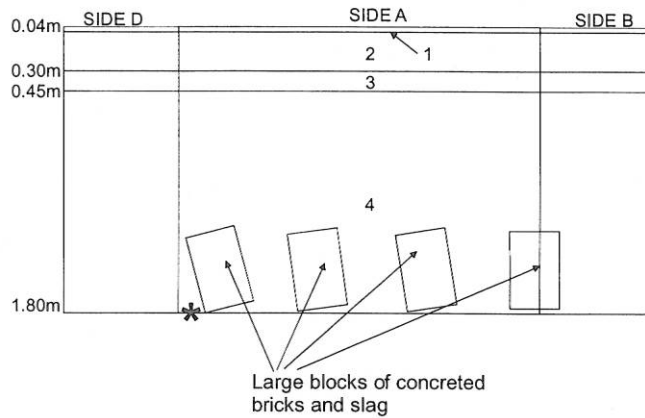


DAMES & MOORE

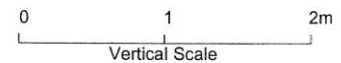
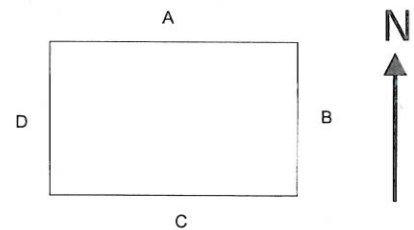
STRATA DESCRIPTIONS	COMMENTS	SAMPLES
- Coarse angular GRAVEL with some vegetation (MADE GROUND) - Loose black ashy GRAVEL (MADE GROUND) - BUILDING RUBBLE including: brick fragments and large pieces of concrete at 1.25m Trial pit terminated at 2.2 mbgl	- Slightly damp and slight diesel odour at 1.5m - Temporary well installed to 2.2m	<u>PID RESULTS</u> 0.5m - 5.6 ppm 1.0m - 20.7 ppm 1.5m - 19.4 ppm 2.0m - 15.6 ppm <u>SOIL SAMPLES</u> MSTP116-1.0m

TRIAL PIT NUMBER: MSTP124
GROUND ELEVATION: -
DATE OF EXCAVATION: 2/6/98
WATER LEVEL: DRY
LOGGED BY: RCAPPROVED BY:

SIDE ELEVATIONS



PLAN



Key:

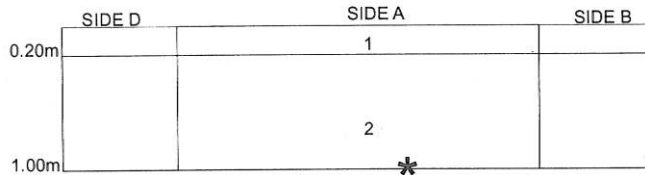
- * Soil Sample location
- WA Water Sample
- HS Headspace Analysis
- Water Ingress

STRATA DESCRIPTIONS	COMMENTS	SAMPLES
1. GRAVEL (MADE GROUND) 2. Red-brown ASH (MADE GROUND) 3. White and yellow FIRE BRICKS 4. BUILDING RUBBLE with ash and bricks (MADE GROUND) Large blocks of concreted bricks and slags at 1.75m Trial pit terminated at 1.8 mbgl		<u>PID RESULTS</u> 0.5m - 11.4 ppm 1.0m - 16.2 ppm 1.5m - 11.6 ppm 1.8m - 16.7 ppm <u>SOIL SAMPLES</u> MSTP124-1.8m

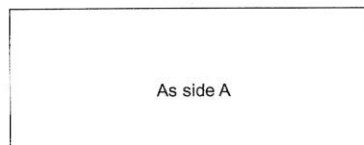
Job Title:	SOIL & GROUNDWATER INVESTIGATION	
Location:	LLANDARCY REFINERY	
Client:	BP LLANDARCY	
Job No:	39991-001-401	DRAFT
 DAMES & MOORE		

TRIAL PIT NUMBER: MSTP143
 GROUND ELEVATION: -
 DATE OF EXCAVATION: 3/6/98
 WATER LEVEL: DRY
 LOGGED BY: RC
 APPROVED BY:

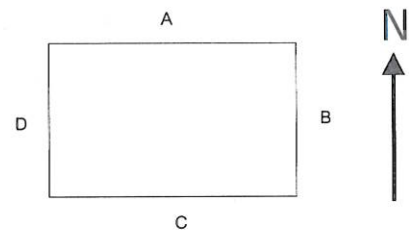
SIDE ELEVATIONS



SIDE C



PLAN



Key:

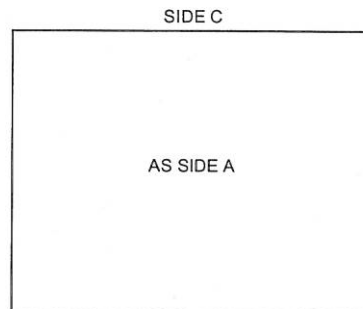
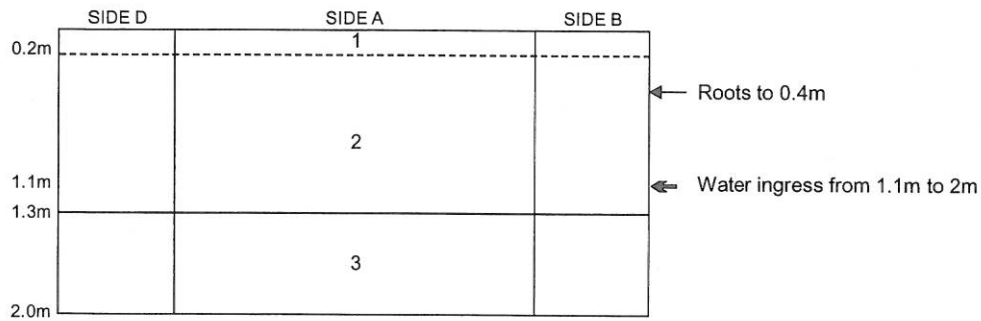
- * Soil Sample location
- WA Water Sample
- HS Headspace Analysis
- ➡ Water Ingress

STRATA DESCRIPTIONS	COMMENTS	SAMPLES
1. Dark brown silty clayey SAND with vegetation at surface (TOPSOIL) 2. Loose brown very sandy GRAVEL with some clayey lenses (MADE GROUND) Trial pit terminated at 1.00 mbgl	a. Slightly damp at 1.0m	<u>PID RESULTS</u> 0.5m - 0.4 ppm 1.0m - 0.7 ppm <u>SOIL SAMPLES</u>

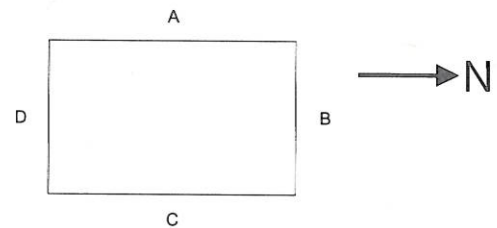
Job Title: SOIL & GROUNDWATER INVESTIGATION	
Location: LLANDARCY REFINERY	
Client: BP LLANDARCY	
Job No: 39991-001-401	DRAFT
 DAMES & MOORE	

TRIAL PIT NUMBER: MSTP273
GROUND ELEVATION: -
DATE OF EXCAVATION: 25/02/99
WATER LEVEL: 1.3m
LOGGED BY: JC
APPROVED BY:

SIDE ELEVATIONS



PLAN



Key:

- BGL Below Ground Level
- Sample location
- SO Soil Sample
- WA Water Sample
- * Headspace Analysis (ND = Not Detected)
- Water Ingress

STRATA DESCRIPTIONS	COMMENTS	SAMPLES
1. Dry, loose, brown-black sandy PEAT with frequent rootlets.	1 No odour	<u>PID Results</u>
2. Loose orange brown clayey SILT with frequent fine gravel and occasional medium coarse gravel.	2 Damp Hydrocarbon odour	0.1m - 0 ppm 1.2m - 205 ppm 2.0m - 635 ppm
3. Loose grey-black clayey SILT with frequent coarse gravel and cobbles and occasional boulders	3 Damp Strong hydrocarbon odour	<u>Soil Samples</u> MSTP273 - 2.0m
Trial Pit terminated at 2.0 mbgl on refusal		

Job Title: SOIL AND GROUNDWATER INVESTIGATION

Location: BP LLANDARCY REFINERY

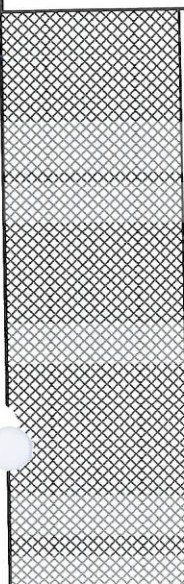
Client: BP LLANDARCY LTD

Job No: 39991-004-401

DRAFT



DAMES & MOORE

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSTP307		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 3/03/99		DRILLING METHOD: Window Sampling	
							FINISH DATE: 3/03/99		BOREHOLE DIAMETER: 100 mm	
							DRILLER: THYSSENS		SCREEN TYPE & DIAMETER: N/A	
							LOGGED BY: DB/ MC		APPR'D BY:	
									SCREEN SLOT SIZE: N/A	
							DESCRIPTION	COMMENTS		
					0		Loose brown PEAT.	No odour	0	
					0.5		Soft orange brown silty CLAY.	Slight hydrocarbon odour	0.5	
			*0.0					Moderate hydrocarbon odour		
			*1425		1.0		Soft orange brown sandy silty CLAY	Hydrocarbon sheen on water	1.0	
			*232		1.5		Soft orange-brown silty very sandy CLAY.	Moderate odour	1.5	
		*332		2.0		Borehole terminated at 2.0 mbgl		2.0		
					2.5				2.5	
					3.0				3.0	
					3.5				3.5	
					4.0				4.0	
					4.5				4.5	
					5.0				5.0	

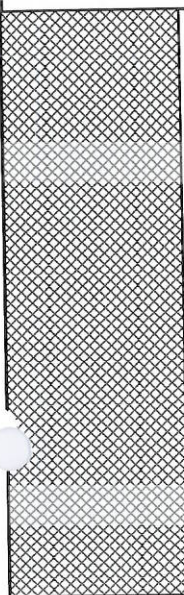
LOCATION / NOTES:		LEGEND		BOREHOLE LOG	
1. All measurements in m below ground level (mbgl)		☐ Disturbed Sample ☒ Undisturbed Sample * Headspace Analysis † Down Borehole Analysis  Groundwater Table  Perched Water Table		Job Title SOIL & GROUNDWATER INVESTIGATION Location LLANDARCY REFINERY Client BP LLANDARCY LTD TI App'd DRAFT Ref. CR/RH/MCH Date APRIL 99 Job No. 39991-004-401	
				 DAMES & MOORE	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSTP308		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 3/03/99		DRILLING METHOD: Window Sampling	
							FINISH DATE: 3/03/99		BOREHOLE DIAMETER: 100 mm	
							DRILLER: THYSSENS		SCREEN TYPE & DIAMETER: N/A	
				LOGGED BY: DB/MC		APPR'D BY:		SCREEN SLOT SIZE: N/A		
							DESCRIPTION	COMMENTS		
					0		Loose brown PEAT.	No odour.		0
					0.5		Soft light grey brown silty CLAY	Moderate rancid odour		0.5
			*0.0		0.5			Moderate to strong rancid odour.		
					1.0		Plastic grey brown sandy gravelly CLAY.	Sheen on water ingress from 1 - 2m.		1.0
			*516		1.0			1-2mm product observed		
					1.5		Plastic grey-brown sandy CLAY with frequent rounded gravel	Odour becoming stronger with depth (1.5 - 2m)		1.5
			*283		1.5					
					2.0					2.0
			*286		2.0					
					2.5					2.5
			*123		2.5				Moderate to strong odour at 2.5m	
					3.0					3.0
			*86.4		3.0					
					3.5		Borehole terminated at 3.5 mbgl			3.5
					4.0					4.0
					4.5					4.5
					5.0					5.0

LOCATION / NOTES: 1. All measurements in m below ground level		LEGEND Disturbed Sample Undisturbed Sample * Headspace Analysis † Down Borehole Analysis ▽ Groundwater Table ▽ Perched Water Table		BOREHOLE LOG Job Title: SOIL & GROUNDWATER INVESTIGATION Location: LLANDARCY REFINERY Client: BP LLANDARCY LTD TI App'd: DRAFT Ref: CR/RH/MCH Date: APRIL 99 Job No. 39991-004-401  DAMES & MOORE	
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSTP309		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 3/03/99		DRILLING METHOD: Window Sampling	
							FINISH DATE: 3/03/99		BOREHOLE DIAMETER: 100 mm	
							DRILLER: THYSSENS		SCREEN TYPE & DIAMETER: N/A	
							LOGGED BY: DB/ MC		APPR'D BY:	
				SCREEN SLOT SIZE: N/A						
							DESCRIPTION	COMMENTS		
							Loose medium brown silty PEAT.	No odour	0	
							Very soft grey to orange brown silty very sandy CLAY.	Very slight odour	0.5	
							Very soft grey to orange brown silty very sandy CLAY with frequent gravel and cobbles.	Very slight odour	1.0	
							Very soft orange brown silty clayey SAND with frequent	Very slight odour	2.5	
							Borehole terminated at 3.0 mbgl		3.0	
									5.0	

LOCATION / NOTES: 1. All measurements in m below ground level		LEGEND Disturbed Sample Undisturbed Sample * Headspace Analysis + Down Borehole Analysis ▽ Groundwater Table ▽ Perched Water Table		BOREHOLE LOG Job Title SOIL & GROUNDWATER INVESTIGATION Location LLANDARCY REFINERY Client BP LLANDARCY LTD TI App'd DRAFT Ref. CR/RH/MCH Date APRIL 99 Job No. 39991-004-401		DAMES & MOORE GROUP	
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSTP310		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 3/03/99		DRILLING METHOD: Window Sampling	
							FINISH DATE: 3/03/99		BOREHOLE DIAMETER: 100 mm	
				DRILLER: THYSSENS		SCREEN TYPE & DIAMETER: N/A				
				LOGGED BY: DB/ MC		APPR'D BY:		SCREEN SLOT SIZE: N/A		
						DESCRIPTION	COMMENTS			
						0	Loose black ASH (MADE GROUND)	Moderate hydrocarbon odour	0	
						0.5		Sheen visible on surface	0.5	
						1.0	Loose, dark brown to black clayey PEAT.	Strong hydrocarbon odour.	1.0	
						1.5	Soft dark grey silty CLAY.	Moderate odour.	1.5	
						2.0	Soft brown to orange-brown sandy CLAY.	No hydrocarbon odour.	2.0	
						Borehole terminated at 2.0 mbgl				
						2.5			2.5	
						3.0			3.0	
						3.5			3.5	
						4.0			4.0	
						4.5			4.5	
						5.0			5.0	

LOCATION / NOTES: 1. All measurements in m below ground level (mbgl)		LEGEND Disturbed Sample Undisturbed Sample * Headspace Analysis † Down Borehole Analysis ▽ Groundwater Table ▽ Perched Water Table		BOREHOLE LOG Job Title SOIL & GROUNDWATER INVESTIGATION Location LLANDARCY REFINERY Client BP LLANDARCY LTD TI App'd DRAFT Ref. CR/RH/MCH Date APRIL 99 Job No. 39991-004-401		 DAMES & MOORE GROUP	
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSMW008		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 11/12/2003		DRILLING METHODS : Beretta - Various	
							DRILLER : APEX - Rhymal		BOREHOLE DIAMETER : 100-115mm	
							LOGGED BY : SS		SCREEN TYPE & DIAM: 50mm HDPE	
				CHECKED BY : SG		SCREEN SLOT SIZE: 1mm				
						DESCRIPTION		COMMENTS	S,V	
					0.0		Loose to medium dense, dark brown, sandy silt with brick, concrete and sandstone gravel. (MADE GROUND)	Damp-wet NVO	0,0	
					0.5		Concrete. (MADE GROUND)			
							No recovery			
					1.0		Very soft, brown, slightly clayey, sandy SILT.	Wet		
					2.5					
					3.5		Weathered, fine to medium SANDSTONE. (very poor recovery)			
					5.2		Borehole terminated at 5.2m.			

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)	Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	Job Title: BP Llandarcy Whole Site Investigation Location: BP Llandarcy Refinery Client: BP/WDA	
			App'd: _____ Date: December 2003 Drawn : SS Ref: _____ Scale: As scale Job No: 39991-044-785 Drg. Size: A4 BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSMW009		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 12/12/2003		DRILLING METHODS : Beretta - Various	
							DRILLER : APEX - Rhymal		BOREHOLE DIAMETER : 100-115mm	
							LOGGED BY : SS / HM		SCREEN TYPE & DIAM: 50mm HDPE	
							CHECKED BY : SG		SCREEN SLOT SIZE: 1mm	
							DESCRIPTION	COMMENTS	S,V	
					0.0		Soft, golden brown, slightly fine sandy clayey silt with occasional subangular to subrounded gravel and occasional to rare fine sandy ash bands (<5%) (MADE GROUND)	Damp, nvo.		
					0.5					
			1.5		1.0		Soft, golden brown grey, fine sandy clayey SILT with occasional subangular to subrounded gravel and cobbles.	Damp, nvo.		
			163		1.5					
			525		2.0				With uniform grey staining and moderate to strong light hydrocarbon odour.	
				2.5						
				3.0						
				3.5			With boulders			
				4.0			Borehole terminated at 4.0m.			
				4.5						
				5.0						

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)	Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	Job Title: BP Llandarcy Whole Site Investigation Location: BP Llandarcy Refinery Client: BP/WDA	
			App'd: _____ Date: December 2003 Drawn: HM Ref: _____ Scale: As scale Job No: 39991-044-785 Drg. Size: A4 BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSMW010		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 12/12/2003		DRILLING METHODS: Beretta - Various	
							DRILLER: APEX		BOREHOLE DIAMETER: 100-115mm	
							LOGGED BY: HM		SCREEN TYPE & DIAM: 50mm HDPE	
				CHECKED BY: SG		SCREEN SLOT SIZE: 1mm				
					0.0		Soft, brown slightly silty CLAY with rootlets.		COMMENTS	S,V
					0.5		Soft to firm, beige/brown clayey SILT with occasional fine to coarse gravel and cobbles.		nvo, wet.	0,0
					1.0				Damp - wet.	0,0
					1.5				Mid range hydrocarbon odour.	3,4
					2.0		SANDSTONE			
					3.0		Borehole terminated at 3.0m			
					3.5					
					4.0					
					4.5					
					5.0					

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence of contamination	Disturbed Sample	Job Title: BP Llandarcy Whole Site Investigation	
S,V = Contamination Observations	Undisturbed Sample	Location: BP Llandarcy Refinery	
S - Odour score (0-5)	Headspace Analysis	Client: BP/WDA	
V - Visual score (0-5)	Down Borehole Analysis		App'd:
	Groundwater Table		Date: December 2003
	Perched Water Table		Drawn: HM
			Scale: As scale
		Drg. Size: A4	Ref:
			Job No: 39991-044-785
			BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSMW011		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 12/12/2003		DRILLING METHODS: Beretta - Various	
							DRILLER: APEX		BOREHOLE DIAMETER: 100-115mm	
							LOGGED BY: HM		SCREEN TYPE & DIAM: 50mm HDPE	
							CHECKED BY: SG		SCREEN SLOT SIZE: 1mm	
					0.0		DESCRIPTION		COMMENTS	S,V
					0.5		See trial pit log for details.			
					1.0		Probable SANDSTONE, grey chippings.			
					1.5					
					2.0				Wet	
				2.5						
				3.0						
				3.5		Borehole terminated at 3.5m				
				4.0						
				4.5						
				5.0						

LOCATION / NOTES: NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)	LEGEND Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	BOREHOLE LOG Job Title: BP Llandarcy Whole Site Investigation Location: BP Llandarcy Refinery Client: BP/WDA	
			App'd: _____ Date: December 2003 Drawn: HM Ref: _____ Scale: As scale Job No: 39991-044-785 Drg. Size: A4 BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSMW031		PAGE 1 of 2	
	NUMBER	TYPE					DRILLING DATES: 08/12/2003		DRILLING METHODS : Beretta - Various	
							DRILLER : APEX - Rhymal		BOREHOLE DIAMETER : 100-115mm	
							LOGGED BY : SS		SCREEN TYPE & DIAM: 50mm HDPE	
							CHECKED BY : SG		SCREEN SLOT SIZE: 1mm	
							DESCRIPTION	COMMENTS	S,V	
					0.0		Medium dense, dark brown, slightly silty SAND with abundant weathered sandstone cobbles.	Slight hydrocarbon odour. No staining	1,0	
					0.5		Strong to very strong, moderately closely fractured, grey, fine to medium SANDSTONE with sub-horizontal, rough planar fractures with red-brown staining.	Rock coring from 0.5m		
					1.0					
					1.5					
					2.0					
					2.5					
					3.0					
					3.5					
					4.0					
					4.5					
					5.0					

LOCATION / NOTES:

NVO = No visual or olfactory evidence of contamination
S,V = Contamination Observations
S - Odour score (0-5)
V - Visual score (0-5)

LEGEND

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

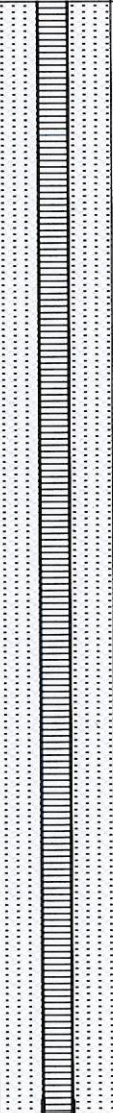
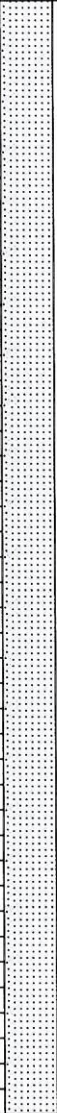
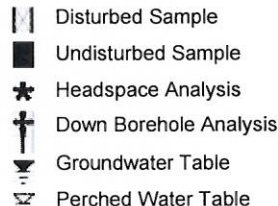
BOREHOLE LOG

Job Title: BP Llandarcy Whole Site Investigation

Location: BP Llandarcy Refinery

Client: BP/WDA

App'd:	Date: December 2003
Drawn : SS	Ref:
Scale: As scale	Job No: 39991-044-785
Drg. Size: A4	BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSMW031		PAGE 2 of 2				
	NUMBER	TYPE					DRILLING DATES: 08/12/2003		DRILLING METHODS : Beretta - Various				
							DRILLER : APEX - Rhymal		BOREHOLE DIAMETER : 100-115mm				
							LOGGED BY : SS		SCREEN TYPE & DIAM: 50mm HDPE				
						CHECKED BY : SG		SCREEN SLOT SIZE: 1mm					
					5.5				COMMENTS	S,V			
					6.0								
					6.5								
					7.0								
					7.5								
					8.0								
					8.5								
					9.0								
					9.5								
					10.0								
LOCATION / NOTES:								LEGEND			BOREHOLE LOG		
NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)								Job Title: BP Llandarcy Whole Site Investigation Location: BP Llandarcy Refinery Client: BP/WDA			App'd: Date: December 2003		
											Drawn : SS Ref:		
											Scale: As scale Job No: 39991-044-785		
											Drg. Size: A4 BOREHOLE LOG		

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSMW045		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 11/12/2003		DRILLING METHODS : Beretta - Various	
							DRILLER : APEX - Rhymal		BOREHOLE DIAMETER : 100-115mm	
							LOGGED BY : SS		SCREEN TYPE & DIAM: 50mm HDPE	
		CHECKED BY : SG		SCREEN SLOT SIZE: 1mm						
					0.0		DESCRIPTION	COMMENTS	S,V	
							Soft, dark brown, sandy silt with occasional gravel and abundant rootlets. (MADE GROUND)	Wet. NVO.	0,0	
			*5.3		0.5		Loose, dark red-brown, fine gravel of ash and clinker. (Ash 50-60%). (MADE GROUND)	Damp. NVO.	0,0	
							Loose to medium dense, dark brown, slightly silty sand with ash (Ash 10%). (MADE GROUND)	Slight hydrocarbon odour, no staining.	1,0	
			*2.3		1.0		Soft, golden brown, sandy SILT with occasional sandstone gravel.	Damp. NVO.	0,0	
			*1.4		1.5			Damp. NVO.	0,0	
			*73.2		2.0			Wet. Patchy black staining and hydrocarbon odour.	3,3	
			*144		2.5			Wet.	3,3	
					2.5		Grey, fine to medium SANDSTONE.			
					3.5		Borehole terminated at 3.5m.			
				4.0						
				4.5						
				5.0						

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence of contamination	Disturbed Sample	Job Title: BP Llandarcy Whole Site Investigation	
S,V = Contamination Observations	Undisturbed Sample	Location: BP Llandarcy Refinery	
S - Odour score (0-5)	Headspace Analysis	Client: BP/WDA	
V - Visual score (0-5)	Down Borehole Analysis		App'd: _____
	Groundwater Table		Date: December 2003
	Perched Water Table		Drawn: SS
			Ref: _____
		Scale: As scale	Job No: 39991-044-785
		Drg. Size: A4	BOREHOLE LOG

Shallow Borehole Construction	Deep Borehole Construction	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSMW145		PAGE 1 of 2	
		NUMBER	TYPE					DRILLING DATES: 18/12/2003	DRILLING METHODS: Beretta - Various	DRILLER: APEX - Rhymal	BOREHOLE DIAMETER: 100-115mm
								DESCRIPTION	COMMENTS	S,V	
						0.0		Black ash and brick fragments. (MADE GROUND)			
						0.5					
						1.0		Concrete fragments. (MADE GROUND)	Open hole from 1.0m.		
						1.5		Brown silty fine to coarse sand with frequent subangular gravel and occasional process waste. (MADE GROUND)	Damp.		
						2.0		As above with rare subangular cobbles. Becoming black ash with occasional coarse gravel size slag. (MADE GROUND)	Percussive from 2.0m. Dry - damp.		
						2.5					
						3.0					
						3.5		Becoming loose brown silt to coarse sand with 70% black ash and frequent coarse subangular gravel. (MADE GROUND)	Damp		
						4.0			Collapsing, ODEX used. Damp.		
						4.5					
						5.0					

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence of contamination	Disturbed Sample	Job Title: BP Llandarcy Whole Site Investigation	
S,V = Contamination Observations	Undisturbed Sample	Location: BP Llandarcy Refinery	
S - Odour score (0-5)	Headspace Analysis	Client: BPWDA	
V - Visual score (0-5)	Down Borehole Analysis		App'd: _____
	Groundwater Table		Date: December 2003
	Perched Water Table		Drawn: HM
			Ref: _____
		Scale: As scale	Job No: 39991-044-785
		Drg. Size: A4	BOREHOLE LOG

Shallow Borehole Construction	Deep Borehole Construction	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: WSMW145		PAGE 2 of 2	
		NUMBER	TYPE					DRILLING DATES: 18/12/2003	DRILLING METHODS: Beretta - Various	DRILLER: APEX - Rhymal	BOREHOLE DIAMETER: 100-115mm
						5.5				COMMENTS	S,V
						6.0					
						6.5					
						7.0	Soft silty fine to coarse black sandy CLAY.			Damp	
						7.5					
						8.0					
						8.5	Becoming dark yellow in colour.			Very damp.	
							Borehole terminated at 8.5m				
						9.0					
						9.5					
						10.0					

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence of contamination S,V = Contamination Observations S - Odour score (0-5) V - Visual score (0-5)	Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	Job Title: BP Llandarcy Whole Site Investigation Location: BP Llandarcy Refinery Client: BP/WDA 	
		App'd:	Date: December 2003
		Drawn: HM	Ref:
		Scale: As scale	Job No: 39991-044-785
		Drg. Size: A4	BOREHOLE LOG