

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW69d		PAGE 1 of 2	
	NUMBER	TYPE					START DATE: 24/06/98		DRILLING METHOD: Rotary	
							FINISH DATE: 24/06/98		BOREHOLE DIAMETER: 165/115mm	
							DRILLER: R3		SCREEN TYPE & DIAMETER: UPVC 50mm	
				LOGGED BY: SG		APPRD BY:		SCREEN SLOT SIZE: 0.5mm		
							DESCRIPTION	COMMENTS		
							Brown sandy silty CLAY	No odour	0	
							Black-grey very sandy silty CLAY	Strong hydrocarbon odour - Damp	1.0	
							Grey-brown very sandy silty gravelly CLAY	Strong hydrocarbon odour in clay	2.0	
									3.0	
									4.0	
									5.0	
									6.0	
									7.0	
									8.0	
									9.0	
							Brown very sandy and silty gravelly CLAY	No odour - Dry	6.0	
							Grey-brown very sandy and silty gravelly CLAY	No odour - Dry	8.0	
							Brown very sandy silty CLAY	No odour	9.0	
							Grey very sandy silty CLAY		10.0	
							Orange-brown silty CLAY with occasional gravel		10.0	

LOCATION / NOTES:

- All measurements in m below ground level (mbgl)
- Water strike at 12m

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**

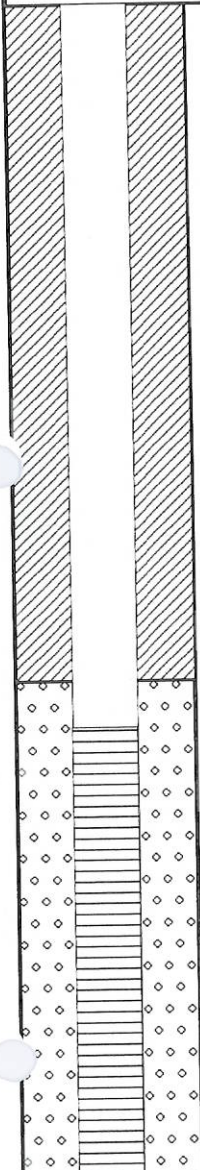
Appd **DRAFT**

Ref. **MC/CR/BR5**

Date **JUL 98**

Job No. **39991-001-401**

DAMES & MOORE

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW69d		PAGE 2 of 2	
	NUMBER	TYPE					START DATE: 24/06/98	DRILLING METHOD: Rotary	FINISH DATE: 24/06/98	BOREHOLE DIAMETER: 165/115mm
							DESCRIPTION		COMMENTS	
							10	Orange-brown silty CLAY with occasional gravel		10
							11			11
							12			12
							13			13
							14	ROCKHEAD: Hard grey coarse grained SANDSTONE		14
							15			15
							16			16
							17			17
							18	Borehole terminated at 18.2 mbgl		18
							19			19
							20			20

LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. Rotary to 18.2 mbgl with odex to 14 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 Appd DRAFT Ref. MC/CR/BRS Date JUL 98 Job No. 39991-001-401	 DAMES & MOORE
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW069S2/D2		PAGE 1 of 4		
	NUMBER	TYPE					START DATE: 27/4/99		DRILLING METHOD: ROTARY AIR FLUSH		
							FINISH DATE: 27/4/99		BOREHOLE DIAMETER: 200/150 mm		
							DRILLER: R4		SCREEN TYPE & DIAMETER: 50 mm Polypropylene		
				LOGGED BY: PW APPRD BY:		SCREEN SLOT SIZE: 0.5 mm					
						DESCRIPTION		COMMENTS			
S2 D2						Loose coarse GRAVEL with black slag (MADE GROUND)		Poor returns		0	
										1.0	
										2.0	
						Light grey very silty CLAY (BOULDER CLAY)		Damp Slight hydrocarbon odour		3.0	
								Wet from 4.5m at rod connection		4.0	
						Soft to medium firm light orange-brown very gravelly CLAY (BOULDER CLAY)		Damp		5.0	
										6.0	
						Hard light grey sandstone BOULDERS with silt		Dry		7.0	
						Loose light brown very silty and gravelly CLAY (BOULDER CLAY)		Dry		8.0	
						Loose brown, very silty fine sandy CLAY with minor gravel (BOULDER CLAY)		Slight 'sweet' odour Very good returns		9.0	
						becoming orange from 8.75m		Dry		10.0	
						Loose, brown, very fine sandy, silty CLAY (BOULDER CLAY) becoming lighter in colour		No odour			

LOCATION / NOTES:		LEGEND		BOREHOLE LOG	
1. All measurements in m below ground level (mbgl)		☒ Disturbed Sample		Job Title SOIL & GROUNDWATER INVESTIGATION	
2. Shallow and deep bedrock addition to		■ Undisturbed Sample		Location LLANDARCY REFINERY	
		* Headspace Analysis		Client BP LLANDARCY LTD	
		† Down Borehole Analysis		App'd DRAFT	
		▽ Groundwater Table		Ref. CR/MC/BR5	
		▽ Perched Water Table		Date MAY 99	
				Job No. 39991-004-401	
				 DAMES & MOORE	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW069S2/D2		PAGE 3 of 4	
	NUMBER	TYPE					START DATE: 27/4/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 27/4/99	BOREHOLE DIAMETER: 200/150 mm
S2	D2						DESCRIPTION		COMMENTS	
					20	Soft grey fine grained SANDSTONE (BEDROCK)	Damp			
						COAL	Damp			
					21	Soft grey SILTSTONE/SANDSTONE (BEDROCK)	Damp			
					22		Damp on rod connection at 22.0m			
					22		Wet from 22.2m			
					23	Hard light grey SANDSTONE (BEDROCK)				
					24					
					24	COAL	Damp			
					25	Consolidated dark grey fine grained crystalline SANDSTONE	Dry			
					25		Wet after rod connection at 25.2m			
				26						
				27						
				27				becoming drier from 27.8m		
				28	Consolidated dark grey SANDSTONE interbedded with siltstone					
				29						
				30						

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**

Appd **DRAFT**

Ref. **CR/MC/BRS**

Date **MAY 99**

Job No. **39991-004-401**

DAMES & MOORE

BOREHOLE CONSTRUCTION		SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW069S2/D2		PAGE 2 of 4	
		NUMBER	TYPE					START DATE: 27/4/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 27/4/99	BOREHOLE DIAMETER: 200/150 mm
S2 D2								DESCRIPTION		COMMENTS	
								10	Loose light brown very silty BOULDER CLAY	Dry No odour	10
								11	Loose pale yellow-brown siltstone BOULDER	Dry	11
									Dark very soft mudstone BOULDER	Dry to 17.4m	
								12	Loose light brown very silty BOULDER CLAY		12
									Consolidated light grey sandstone BOULDER		
									Loose orange-brown silty BOULDER CLAY		
									Light grey weathered sandstone BOULDERS with alternating thin orange-brown bands (WEATHERED BEDROCK)		
								13	ROCKHEAD - Crystalline light grey fine to medium grained SANDSTONE (BEDROCK)		13
									Soft light brown SILTSTONE (BEDROCK)		
									Crystalline light grey fine to medium grained SANDSTONE with thin interbedded bands of siltstone (BEDROCK)		
								14			14
								15			15
								16		Soft drilling	16
								17	Soft brown SILTSTONE (BEDROCK)	Dry	17
									Soft grey fine grained crystalline SANDSTONE with interbedded siltstone (BEDROCK)	Damp after rod connection at 17.8m	
								18			18
								19		becoming dry at 19.5m	19
										Damp after rod connected at 19.8m	
								20			20

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**

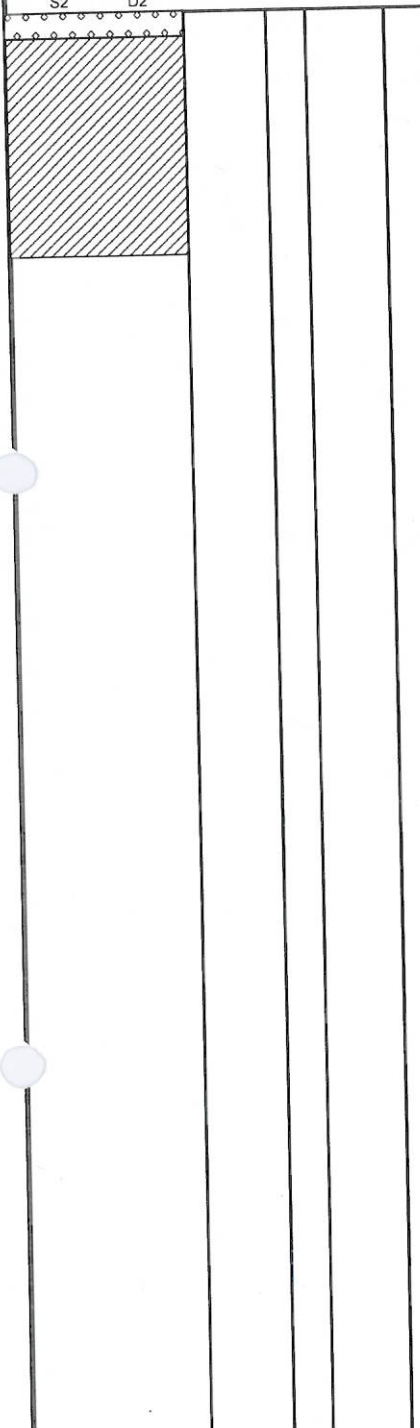
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Date **MAY 99**

Job No. **39991-004-401**

DAMES & MOORE

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW069S2/D2		PAGE 4 of 4	
	NUMBER	TYPE					START DATE: 27/4/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 27/4/99		BOREHOLE DIAMETER: 200/150 mm	
							DRILLER: R4		SCREEN TYPE & DIAMETER: 50 mm Polypropylene	
							LOGGED BY: PW APPRD BY:		SCREEN SLOT SIZE: 0.5 mm	
S2	D2						DESCRIPTION	COMMENTS		
						30	Dark grey crystalline SANDSTONE interbedded with siltstone	Wet	30	
						31				31
						32				32
						33				33
						34				34
						35				35
						36				36
						37				37
						38				38
						39				39
						40				40
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 App'd DRAFT Ref. CR/MC/BRS Date MAY 99 Job No. 39991-004-401	
									 DAMES & MOORE GROUP	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW68s		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 28/06/98		DRILLING METHOD: Cable Percussion	
							FINISH DATE: 28/06/98		BOREHOLE DIAMETER: 200mm	
						DRILLER: CP1		SCREEN TYPE & DIAMETER: UPVC 50mm		
						LOGGED BY: SG		APPRD BY:		
						SCREEN SLOT SIZE: 0.5mm				
						DESCRIPTION		COMMENTS		
						0		0		
						Loose grey angular medium GRAVEL (BALLAST)		No odour		
						CONCRETE (MADE GROUND)				
						CLAY (MADE GROUND)				
						CONCRETE (MADE GROUND)				
						1.0		1.0		
						Soft brown CLAY with boulders and some ash (MADE GROUND)				
						2.0		2.0		
						Loose light grey GRAVEL		Slight hydrocarbon odour at 1.8m		
						Stiff grey-black CLAY		No odour		
3.0		3.0								
Soft to firm green-grey -brown CLAY		No odour								
4.0		4.0								
Dense brown medium GRAVEL with some CLAY		Slight hydrocarbon odour from water								
5.0		5.0								
6.0		6.0								
7.0		7.0								
8.0		8.0								
9.0		9.0								
10		10								
						Borehole terminated at 5.8 mbgl				

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 Appd DRAFT Ref. MC/CR/BRs Date JUL 98 Job No. 39991-001-401 DAMES & MOORE
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW068D2		PAGE 1 of 3	
	NUMBER	TYPE					START DATE: 16/4/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 16/4/99	BOREHOLE DIAMETER: 165/115 mm
							DESCRIPTION	COMMENTS		
						0	Loose grey angular medium GRAVEL (MADE GROUND)			
							CONCRETE (MADE GROUND)			
							CLAY (MADE GROUND)			
							CONCRETE (MADE GROUND)			
						1.0	Soft brown CLAY with boulders and some ash (MADE GROUND)			
						2.0	Loose light grey GRAVEL			
							Stiff grey-black CLAY			
						3.0	Soft to firm green-grey-brown CLAY			
						4.0	Dense brown medium GRAVEL with some CLAY			
						5.0				
						6.0		Water ingress at 4m		
						7.0	becoming very silty and sandy gravelly CLAY with cobbles and occasional boulders			
						8.0		water cased out		
						9.0	ROCKHEAD - Light grey-brown MUDSTONE			
							Brown MUDSTONE			
						10				

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	
App'd	DRAFT		
Ref.	CR/MC/BRS		
Date	MAY 99		
Job No.	39991-004-401		

DAMES & MOORE

GROUP

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW068D2		PAGE 2 of 3	
	NUMBER	TYPE					START DATE: 16/4/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 16/4/99	BOREHOLE DIAMETER: 165/115 mm
							DESCRIPTION	COMMENTS		
						10	Grey MUDSTONE			
							COAL SHALE			
							Grey MUDSTONE			
						11				
						12				
						13				
						14				
						15	Grey crystalline SANDSTONE			
						16				
						17				
						18				
						19				
						20				

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
		App'd	DRAFT
		Ref.	CR/MC/BRS
		Date	MAY 99
		Job No.	39991-004-401
		 DAMES & MOORE	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW068D2		PAGE 3 of 3	
	NUMBER	TYPE					START DATE: 16/4/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 16/4/99		BOREHOLE DIAMETER: 165/115 mm	
							DRILLER: R1		SCREEN TYPE & DIAMETER: 50 mm ID UPVC	
							LOGGED BY: MC APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm	
						DESCRIPTION		COMMENTS		
						20 Grey crystalline SANDSTONE				
						23 Borehole terminated at 23.0 mbgl				
						21		21		
						22		22		
						23		23		
						24		24		
						25		25		
						26		26		
						27		27		
						28		28		
						29		29		
						30		30		
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 App'd DRAFT Ref. CR/MC/BRs Date MAY 99 Job No. 39991-004-401		
								DAMES & MOORE		

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW068D2		PAGE 2 of 3	
	NUMBER	TYPE					START DATE: 16/4/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 16/4/99	BOREHOLE DIAMETER: 165/115 mm
							DESCRIPTION	COMMENTS		
						10	Grey MUDSTONE			
						COAL SHALE				
						11	Grey MUDSTONE			
						12				
						13				
						14				
						15	Grey crystalline SANDSTONE			
						16				
						17				
						18				
						19				
						20				

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**

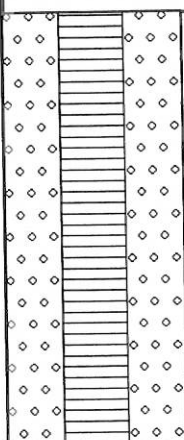
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Ref. **CR/MC/BRS**

Date **MAY 99**

Job No. **39991-004-401**

DAMES & MOORE

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW068D2		PAGE 3 of 3		
	NUMBER	TYPE					START DATE: 16/4/99		DRILLING METHOD: ROTARY AIR FLUSH		
							FINISH DATE: 16/4/99		BOREHOLE DIAMETER: 165/115 mm		
							DRILLER: R1		SCREEN TYPE & DIAMETER: 50 mm ID UPVC		
							LOGGED BY: MC APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm		
						DESCRIPTION		COMMENTS			
						20 Grey crystalline SANDSTONE		20			
						21		21			
						22		22			
						23 Borehole terminated at 23.0 mbgl		23			
						24		24			
						25		25			
						26		26			
						27		27			
						28		28			
						29		29			
						30		30			
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 App'd DRAFT Ref. CR/MC/BR Date MAY 99 Job No. 39991-004-401			
								 DAMES & MOORE			

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW68d		PAGE 1 of 2		
	NUMBER	TYPE					START DATE: 24/06/98		DRILLING METHOD: Rotary		
							FINISH DATE: 24/06/98		BOREHOLE DIAMETER: 115mm		
								SCREEN TYPE & DIAMETER: UPVC 50mm			
								LOGGED BY: SG APPRD BY:		SCREEN SLOT SIZE: 0.5mm	
						DESCRIPTION				COMMENTS	
10/7/98 24/6/98						0				0	
						Loose light grey angular medium GRAVEL (MADE GROUND)				Damp - No odour	
						CONCRETE					
						Black-grey sandy silty CLAY					
						1.0				1.0	
2.0				2.0							
3.0				3.0							
4.0				4.0							
5.0				5.0							
6.0				6.0							
7.0				7.0							
8.0				8.0							
9.0				9.0							
10				10							
						Grey-brown very sandy and silty gravelly CLAY				Damp - No odour	
						Brown very sandy and silty gravelly CLAY with cobbles and occasional boulders					
						Grey-brown sandy and silty gravelly CLAY					

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**

Appd **DRAFT**

Ref. **MC/CR/BR5**

Date **JUL 98**

Job No. **39991-001-401**

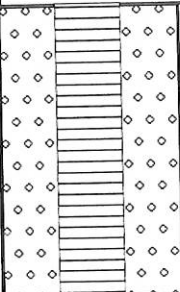
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW68d		PAGE 2 of 2								
	NUMBER	TYPE					START DATE: 24/06/98		DRILLING METHOD: Rotary								
							FINISH DATE: 24/06/98		BOREHOLE DIAMETER: 115mm								
							DRILLER: R3		SCREEN TYPE & DIAMETER: UPVC 50mm								
						LOGGED BY: SG		APPRD BY:		SCREEN SLOT SIZE: 0.5mm							
						DESCRIPTION		COMMENTS									
						10		ROCKHEAD: Hard grey-blue coarse grained SANDSTONE (BEDROCK)				10					
						11						11					
						12						12					
						13						13					
						14						14					
						15						15					
						16						16					
						17						17					
						18						18					
						19						19					
						20						20					
						LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. Water strike at 13.5m rising to 12m after 20 minutes						LEGEND ☒ 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 Appd DRAFT Ref. MC/CR/BR5 Date JUL 98 Job No. 39991-001-401																	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW67s		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 19/06/98		DRILLING METHOD: Cable Percussion	
							FINISH DATE: 19/06/98		BOREHOLE DIAMETER: 200mm	
							DRILLER: CP1		SCREEN TYPE & DIAMETER: UPVC 50mm	
							LOGGED BY: ED APPRD BY:		SCREEN SLOT SIZE: 0.5mm	
							DESCRIPTION	COMMENTS		
			*1838		0		Loose black sandy SILT with occasional fine gravel	No odour	0	
			*1562		1.0				1.0	
					2.0		Obstruction - no returns	No returns	2.0	
					2.0		Borehole terminated at 2.0 mbgl on refusal		2.0	
					3.0				3.0	
					4.0				4.0	
					5.0				5.0	
					6.0				6.0	
					7.0				7.0	
					8.0				8.0	
					9.0				9.0	
					10				10	

LOCATION / NOTES: 1. All measurements in m below ground level (mbgl)	LEGEND		BOREHOLE LOG	
		Disturbed Sample	Job Title SOIL & GROUNDWATER INVESTIGATION	
		Undisturbed Sample	Location LLANDARCY REFINERY	
		Headspace Analysis	Client BP LLANDARCY	
		Down Borehole Analysis	Appd DRAFT	
		Groundwater Table	Ref. MC/CR/BRs	 DAMES & MOORE
		Perched Water Table	Date JUL 98	
			Job No. 39991-001-401	

BOREHOLE CONSTRUCTION		SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW67d		PAGE 1 of 2			
		NUMBER	TYPE					START DATE: 24/06/98	DRILLING METHOD: Rotary	FINISH DATE: 24/06/98	BOREHOLE DIAMETER: 115mm	DRILLER: R2	SCREEN TYPE & DIAMETER: UPVC 50mm
								DESCRIPTION	COMMENTS				
								Loose black sandy SILT with occasional fine gravel					
								Brown-grey very gravelly CLAY with occasional cobbles and boulders	Very strong odour and black staining in patches throughout depth				
								ROCKHEAD: Hard grey medium grained SANDSTONE	Very oily water with moderate to strong light petroleum odour				
LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. Water strike at 7.9 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 Appd DRAFT Ref. MC/CR/BR5 Date JUL 98 Job No. 39991-001-401	
								DAMES & MOORE GROUP					

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW67d		PAGE 2 of 2				
	NUMBER	TYPE					START DATE: 24/06/98		DRILLING METHOD: Rotary				
							FINISH DATE: 24/06/98		BOREHOLE DIAMETER: 115mm				
							DRILLER: R2		SCREEN TYPE & DIAMETER: UPVC 50mm				
						LOGGED BY: SG		APPRD BY:		SCREEN SLOT SIZE: 0.5mm			
						DESCRIPTION		COMMENTS					
						10		Hard grey medium grained SANDSTONE				10	
						11						11	
						12		Borehole terminated at 12 mbgl				12	
						13						13	
						14						14	
						15						15	
						16						16	
						17						17	
						18						18	
						19						19	
						20						20	

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 Appd DRAFT Ref. MC/CR/BRs Date JUL 98 Job No. 39991-001-401	
				 DAMES & MOORE GROUP	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW65s		PAGE 1 of 1		
	NUMBER	TYPE					START DATE: 18/06/98	DRILLING METHOD: Cable Percussion	FINISH DATE: 18/06/98	BOREHOLE DIAMETER: 200mm	DRILLER: CP1
					0		DESCRIPTION	COMMENTS			
							Black ASH and BRICK fragments (MADE GROUND)	No staining or odour	0		
							Brown sandy CLAY (MADE GROUND)		1.0		
									2.0		
							Sandstone COBBLES	Water encountered at 2m	2.0		
							Soft grey-brown CLAY	Moderate hydrocarbon odour - wet	3.0		
							Grey silty CLAY	Moderate hydrocarbon odour	3.0		
							ROCKHEAD: Grey SANDSTONE	Strong hydrocarbon odour	4.0		
							Borehole terminated at 3.75 mbgl on refusal		4.0		
									10		
LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. Water strike at 2m rising to 1.85m after 30 minutes						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 Appd DRAFT Ref. MC/CR/BSR Date JUL 98 Job No. 39991-001-401			

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW65d		PAGE 1 of 2		
	NUMBER	TYPE					START DATE: 24/06/98		DRILLING METHOD: Rotary		
							FINISH DATE: 24/06/98		BOREHOLE DIAMETER: 115mm		
						DRILLER: R2		SCREEN TYPE & DIAMETER: UPVC 50mm			
						LOGGED BY: SG		APPRD BY:		SCREEN SLOT SIZE: 0.5mm	
						DESCRIPTION		COMMENTS			
						0	Black ashy BRICK fragments (MADE GROUND)	No staining or odour	0		
						1.0	Brown sandy CLAY (MADE GROUND)		1.0		
						2.0	Sandstone COBBLES	Water encountered at 2m	2.0		
						3.0	Soft grey-brown CLAY		3.0		
						3.0	Grey silty CLAY	Moderate hydrocarbon odour	3.0		
						4.0	ROCKHEAD: Weathered grey and red medium grained SANDSTONE (WEATHERED BEDROCK)		4.0		
						5.0	Strong grey medium grained SANDSTONE	Strong hydrocarbon odour Weak hydrocarbon odour and black staining	5.0		
						6.0			6.0		
						7.0	7.0				
						8.0	8.0				
9.0	9.0										
10	Weak grey SILTSTONE		10								

LOCATION / NOTES:		LEGEND		BOREHOLE LOG	
1. All measurements in m below ground level (mbgl)		Disturbed Sample		Job Title SOIL & GROUNDWATER INVESTIGATION	
2. Water strike at 4.2m		Undisturbed Sample		Location LLANDARCY REFINERY	
3. Water strike at 9.7m rising to 4m (approx)		* Headspace Analysis		Client BP LLANDARCY	
		† Down Borehole Analysis		Appd DRAFT	
		Groundwater Table		Ref. MC/CR/BR5	
		Perched Water Table		Date JUL 98	
				Job No. 39991-001-401	
				DAMES & MOORE	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW65d		PAGE 2 of 2		
	NUMBER	TYPE					START DATE: 24/06/98	DRILLING METHOD: Rotary	FINISH DATE: 24/06/98	BOREHOLE DIAMETER: 115mm	DRILLER: R2
							DESCRIPTION	COMMENTS			
						10	Weak grey SILTSTONE				
							Strong grey medium grained SANDSTONE				
						11	Borehole terminated at 11.0m				
						12					
						13					
						14					
						15					
						16					
						17					
						18					
						19					
						20					

LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. Water strike at 4.2m 3. Water strike at 9.7m rising to 4m (approx)		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 Appd DRAFT Ref. MC/CR/BRS Date JUL 98 Job No. 39991-001-401	 DAMES & MOORE GROUP
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW64		PAGE 1 of 1		
	NUMBER	TYPE					START DATE: 18/06/98		DRILLING METHOD: Odex/Rotary		
							FINISH DATE: 18/06/98		BOREHOLE DIAMETER: 150/115mm		
							DRILLER: R3		SCREEN TYPE & DIAMETER: UPVC 50mm		
		LOGGED BY: SG/MC APPD BY:		SCREEN SLOT SIZE: 0.5mm							
							DESCRIPTION	COMMENTS			
							CONCRETE with ballast and clinker (MADE GROUND)	Water strike at 3.3m Hard drilling 4-5m Odex casing set at 5m Water strike at 8-8.5m			
							Stiff dark grey CLAY with gravel and cobbles (BOULDER CLAY)				
							gravel and cobble content increasing from 3m with boulders				
							ROCKHEAD: Light grey to grey medium coarse grained SANDSTONE (BEDROCK)				
							Borehole terminated at 10.0 mbgl				

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	
2. Odex to 5.0 mbgl, Rotary to 10 mbgl				Appd DRAFT Ref. MC/CR/BRS Date JUL 98 Job No. 39991-001-401	
3. Water strike at 3.3 mbgl				DAMES & MOORE	
4. Water strike at 8 mbgl					

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW053D1		PAGE 1 of 3		
	NUMBER	TYPE					START DATE: 12/4/99		DRILLING METHOD: ROTARY AIR FLUSH		
							FINISH DATE: 12/4/99		BOREHOLE DIAMETER: 150 mm		
							DRILLER: R4		SCREEN TYPE & DIAMETER: 50 mm Polypropylene		
LOGGED BY: PW		APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm							
							DESCRIPTION	COMMENTS			
							0	Loose black GRAVEL with slag and silt (MADE GROUND)	Damp Slight solvent odour	0	
							1.0				1.0
							2.0				2.0
							3.0				3.0
*57.1				2.0							
				3.0							
*50.2				3.0	Soft dark grey silty CLAY with frequent gravel and slag (MADE GROUND)	Moderate to strong solvent odour	3.0				
*32.8				4.0	Loose grey sandy and silty GRAVEL	Slight to moderate solvent odour	4.0				
				5.0	becoming clayey and brown		5.0				
*24.4				6.0		No solvent odour Dry	6.0				
				7.0		Damp from	7.0				
				8.0			8.0				
				9.0			9.0				
				10			10				

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**

App'd **DRAFT**

Ref. **CR/MC/BR5**

Date **MAY 99**

Job No. **39991-004-401**

DAMES & MOORE

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW053D1		PAGE 2 of 3	
	NUMBER	TYPE					START DATE: 12/4/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 12/4/99		BOREHOLE DIAMETER: 150 mm	
							DRILLER: R4		SCREEN TYPE & DIAMETER: 50 mm Polypropylene	
							LOGGED BY: PW APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm	
						DESCRIPTION	COMMENTS			
 						10	Loose orange-brown GRAVEL		10	
						11	Loose grey gravelly SAND	No odours	11	
						12		Wet returns	12	
						13	Very loose grey sub-rounded silty and sandy GRAVEL	No odours	13	
						14			14	
						15			15	
						16			16	
						17			17	
						18			18	
						19			19	
						20			20	

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 App'd DRAFT Ref. CR/MC/BRS Date MAY 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: MSMW053D1		PAGE 3 of 3				
	NUMBER	TYPE					START DATE: 12/4/99		DRILLING METHOD: ROTARY AIR FLUSH				
							FINISH DATE: 12/4/99		BOREHOLE DIAMETER: 150 mm				
							DRILLER: R4		SCREEN TYPE & DIAMETER: 50 mm Polypropylene				
		LOGGED BY: PW APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm									
						DESCRIPTION		COMMENTS					
						20		Loose dark grey GRAVEL with sand		No hydrocarbon odour		20	
						21						21	
						22		ROCKHEAD - Cblue-grey crystalline SANDSTONE				22	
						23		COAL		Productive No odour Warm water returns		23	
						24				24			
						25		Grey silty MUDSTONE				25	
						26						26	
						27						27	
						28						28	
						29						29	
						30						30	

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 App'd DRAFT Ref. CR/MC/BRS Date MAY 99 Job No. 39991-004-401	
				DAMES & MOORE GROUP	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW53		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 17/06/98		DRILLING METHOD: Trial Pit	
							FINISH DATE: 17/06/98		BOREHOLE DIAMETER: 120mm	
				DRILLER: CP3		SCREEN TYPE & DIAMETER: UPVC 50mm				
				LOGGED BY: ED		APPROD BY:		SCREEN SLOT SIZE: 0.5mm		
						DESCRIPTION	COMMENTS			
						0	Loose clayey sandy GRAVEL with rubble (MADE GROUND)	Moderate hydrocarbon odour	0	
							Loose clayey sandy GRAVEL with rubble and black staining (MADE GROUND)	black staining		
						1.0	Silty CLAY with black staining (MADE GROUND)	Strong hydrocarbon odour - Wet black oil staining	1.0	
						2.0	Ashy GRAVEL with rubble and black staining (MADE GROUND)	Saturated with oil and water - strong hydrocarbon odour	2.0	
						3.0	Trial Pit terminated at 3.0 mbgl		3.0	
						4.0			4.0	
						5.0			5.0	
						6.0			6.0	
						7.0			7.0	
						8.0			8.0	
						9.0			9.0	
						10			10	

LOCATION / NOTES:		LEGEND		BOREHOLE LOG	
1. All measurements in m below ground level (mbgl) 2. Casing installed in MSTP210		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 Appd DRAFT Ref. MC/CR/BR5 Date JUL 98 Job No. 39991-001-401	
				DAMES & MOORE GROUP	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: P1BH020s (+ PIT)		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 7/2/03		DRILLING METHODS : DTH	
							DRILLER : APEX - Terry		BOREHOLE DIAMETER : 100mm	
							LOGGED BY : TRR		SCREEN TYPE & DIAM: 50mm uPVC	
							CHECKED BY : TR		SCREEN SLOT SIZE: 1mm	
	P1BH020s - 0.1 - 0.3m		*0		0.0	Soft to firm, pale grey-brown, clayey silt with grass and roots to 0.05m	NVO, wet Feint H/C odour from 0.2m	0.0		
					0.5	Firm to stiff, pale grey-brown, sandy clay with some sub-angular gravel, bricks and boulders		1.0		
	P1BH020s - 1.0 - 1.2m		*5.4 *5.8		1.0	with a silty, sandy ash lens from 0.9 to 0.95m	Water inflow at 0.8m Black staining 0.9-1.2m	2.1		
			*2.1		1.5	Loose to medium dense, dark grey-black, silty, fine to medium sand with fragments of brick and concrete at 1.5m	Feint H/C odour at 1.0m, saturated from 1.2m	2.2		
	P1BH020 PIT - 1.7m		*0		2.0	becoming clayey from 1.7m with fragments of sub-angular sandstone	Percussion refused at 1.8. Sheen on water			
					2.5	Weak, weathered, pale grey, fine grained sandstone				
					3.0	Terminated at 2.2m (Due to presence of contamination)				
					3.5					
					4.0					
					4.5					
					5.0					

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence H/C = Hydrocarbon 4,2 = Scoring for (odour, visual) contamination	Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	Job Title: Phase 1 Investigation Works Location: BP Llandarcy Refinery, Neath Client: BP/WDA 	
		App'd:	Date: February 2003
		Drawn : ABB	Ref:
		Scale:	Job No: 39991-035-785
		Org. Size:	BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: P1BH020d (+ PIT)		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 7/2/03		DRILLING METHODS: Percussive / AF	
							DRILLER: APEX - Terry		BOREHOLE DIAMETER: 100mm	
							LOGGED BY: TRR		SCREEN TYPE & DIAM: 50mm uPVC	
							CHECKED BY: LT		SCREEN SLOT SIZE: 1mm	
	P1BH020 PIT - 1.7m		*0.0	0.0	Soft to firm, pale grey-brown, clayey silt with grass and roots to 0.05m	NVO, wet Feint H/C odour from 0.2m	0,0			
			*0.0	0.5	Firm to stiff, pale grey-brown, sandy clay with some sub-angular gravel, bricks and boulders		1,0			
			*5.4	1.0	with a silty, sandy ash lens from 0.9 to 0.95m	Water inflow at 0.8m Black staining 0.9-1.2m	2,1			
			*5.8	1.5	Loose to medium dense, dark grey-black, silty, fine to medium sand with fragments of brick and concrete at 1.5m	Feint H/C odour at 1.0m, saturated from 1.2m	2,2			
			*2.1	2.0	becoming clayey from 1.7m with fragments of sub-angular sandstone	Percussion refused at 1.8. Sheen on water AF (and cased) from 1.8m				
			*0.0	2.5	Weak-hard, weathered, pale grey, fine grained sandstone with some sandstone cobbles and silty, clayey sand					
			*10	3.0	Hard, pale grey, fine grained sandstone with frequent fractures and permeable horizons	Water inflow at ~2.4m from fractures				
			*8.0	3.5		Sheen on water and moderate H/C odour				
			*0.0	4.0	Terminated at 4.0m (sst fragments jamming bit)					
					5.0					

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence H/C = Hydrocarbon 4,2 = Scoring for (odour, visual) contamination	Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	Job Title: Phase 1 Investigation Works Location: BP Llandarcy Refinery, Neath Client: BP/WDA 	
		App'd:	Date: February 2003
		Drawn: ABB	Ref:
		Scale:	Job No: 39991-035-785
		Drg. Size:	BOREHOLE LOG