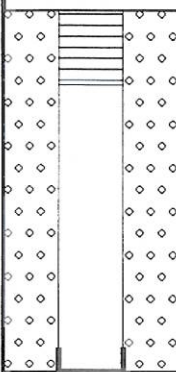


BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW2		PAGE 2 of 2	
	NUMBER	TYPE					START DATE: 27/05/98		DRILLING METHOD: Cable Percussion/ Rotary	
							FINISH DATE: 28/05/98		BOREHOLE DIAMETER: 200mm / 120mm	
							DRILLER: CP1 / R2		SCREEN TYPE & DIAMETER: UPVC 50mm	
							LOGGED BY: SG/MC APPR'D BY:		SCREEN SLOT SIZE: 0.5mm	
						DESCRIPTION		COMMENTS		
 cap						10		10		
						11		11		
						12		12		
						13		13		
						14		14		
						15		15		
						16		16		
						17		17		
						18		18		
						19		19		
						20		20		
						Light grey hard sandstone BEDROCK				
						Borehole terminated at 12.5 mbgl				

LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. Cable Percussion to 1.7mbgl, Rotary to 12.5 mbgl with odex to 4.5 mbgl 3. Water strike at 8 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 App'd DRAFT Ref. MC/CR/BR5 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: MSMW3		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 28/05/98		DRILLING METHOD: Cable Percussion/ Rotary	
							FINISH DATE: 01/06/98		BOREHOLE DIAMETER: 200mm / 115mm	
						DRILLER: CP2 / R2		SCREEN TYPE & DIAMETER: UPVC 50mm		
						LOGGED BY: SG/MC APPR'D BY:		SCREEN SLOT SIZE: 0.5mm		
						DESCRIPTION	COMMENTS			
						Soft brown-grey slightly sandy gravelly CLAY with angular sandstone cobbles	Hydrocarbon odour 0.8-1.9m	0		
						Soft grey-brown very sandy silty gravelly CLAY with angular sandstone cobbles		1.0		
						Moderately strong blue-grey medium grained SANDSTONE Rotary drilling from 2 mbgl	Productive from 2.5m	2.0		
						Coarse blue/blue-grey sandstone angular GRAVEL with some rounded gravel and cobbles		3.0		
						ROCKHEAD: Light grey medium grained hard sandstone BEDROCK	Drilling very hard	5.0		
Borehole terminated at 5.5 mbgl on refusal	6.0									
								7.0		
								8.0		
								9.0		
								10		

LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. Cable Percussion to 2 mbgl, Rotary with odex to 5.5 mbgl 3. Water strike at 1.9 mbgl rising to 1.4 mbgl after 20 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 App'd 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: MSMW13		PAGE 1 of 3	
	NUMBER	TYPE					START DATE: 29/05/98		DRILLING METHOD: Cable Percussion / Rotary	
							FINISH DATE: 04/06/98		BOREHOLE DIAMETER: 200/165/115mm	
							DRILLER: CP1/R2		SCREEN TYPE & DIAMETER: UPVC 50mm	
							LOGGED BY: SG/MC APPR'D BY:		SCREEN SLOT SIZE: 0.5mm	
▽ (artesian) 0							DESCRIPTION COMMENTS 0 10			
*0.2 0							Loose dark brown slightly silty SAND with some gravel and occasional rootlets and red staining No odour			
*0 0.2							Soft black silty CLAY with fine coal fragments and rootlets and occasional sand - becoming peaty at 0.7m Ground vibrating on impact			
*0.3 1.0							Spongy, fibrous, dark brown-red to black PEAT No odour			
*0 2.0							Soft dark brown slightly silty CLAY with some sand becoming dark brown spongy peat with rootlets and occasional coal fragments Slight organic odour			
*0 3.0							Very soft brown silty CLAY No odour			
*0 4.0							 Slight organic odour			
*0 5.0							 Damp			
*0 6.0							 Wet			
*0 7.0										
*0 8.0										
*0 9.0										
*0 10										

LOCATION / NOTES:

- All measurements in m below ground level (mbgl)
- Cable Percussion to 13.0 mbgl, Rotary to 21.0 mbgl with odex to 19.0 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**

App'd **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: MSMW13		PAGE 2 of 3	
		NUMBER	TYPE					START DATE: 29/05/98	DRILLING METHOD: Cable Percussion / Rotary	FINISH DATE: 04/06/98	BOREHOLE DIAMETER: 200/165/115mm
								DESCRIPTION		COMMENTS	
								Very soft brown-grey silty CLAY			
								Dense to very dense strong blue-grey medium grained sandstone medium GRAVEL with cobbles			
								Rotary drilling from 13 mbgl			
								Moderately weak blue-grey silty sandstone GRAVEL (WEATHERED BEDROCK)			
								ROCKHEAD: Moderately strong blue-grey medium grained SANDSTONE (BEDROCK)			

LOCATION / NOTES:

- All measurements in m below ground level (mbgl)
- Cable Percussion to 13.0 mbgl, Rotary to 21.0 mbgl with odex to 19.0 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**

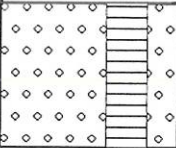
App'd **DRAFT**

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: MSMW13		PAGE 3 of 3		
	NUMBER	TYPE					START DATE: 29/05/98		DRILLING METHOD: Cable Percussion / Rotary		
							FINISH DATE: 04/06/98		BOREHOLE DIAMETER: 200/165/115mm		
							DRILLER: CP1/R2		SCREEN TYPE & DIAMETER: UPVC 50mm		
							LOGGED BY: SG/MC APPR'D BY:		SCREEN SLOT SIZE: 0.5mm		
						DESCRIPTION		COMMENTS			
						20		Moderately strong blue-grey medium grained SANDSTONE (BEDROCK)		20	
						21		Borehole terminated at 21 mbgl		21	
						22				22	
						23				23	
						24				24	
						25				25	
						26				26	
						27				27	
						28				28	
						29				29	
						30				30	

LOCATION / NOTES:

- All measurements in m below ground level (mbgl)
- Cable Percussion to 13.0 mbgl, Rotary to 21.0 mbgl with odex to 19.0 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	
App'd	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: MSMW224A		PAGE 1 of 4	
	NUMBER	TYPE					START DATE: 12/5/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 13/5/99		BOREHOLE DIAMETER: 250/165 mm	
							DRILLER: R4		SCREEN TYPE & DIAMETER: 50 mm polypropylene	
							LOGGED BY: PW APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm	
					DESCRIPTION		COMMENTS			
S1	D2				0	CONCRETE (MADE GROUND)			0	
					1.0	Loose black coarse angular GRAVEL (MADE GROUND)	Strong hydrocarbon odour Damp		1.0	
					2.0				2.0	
					3.0	Loose black SAND with minor gravel	Wet		3.0	
					4.0	Loose black sandy GRAVEL	Strong hydrocarbon odour		4.0	
					5.0		Wet - Sheen on returns		5.0	
					6.0				6.0	
					7.0	Stiff brown sandy CLAY (BOULDER CLAY)	Drying out		7.0	
					8.0		Damp		8.0	
					9.0	Stiff light brown very sandy silty CLAY (BOULDER CLAY)	Dry following rod connection at 7.0m Moderate hydrocarbon odour		9.0	
					10.0		Dry		10.0	
							Slight to moderate hydrocarbon			

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

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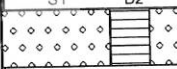
GROUP

DAMES & MOORE

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW224B		PAGE 3 of 3		
	NUMBER	TYPE					START DATE: 14/5/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 14/5/99	BOREHOLE DIAMETER: 250/200/165 mm	DRILLER: R4
						DESCRIPTION		COMMENTS			
S2 D1						20 Grey-brown fine to medium grained crystalline SANDSTONE (BEDROCK) 21 22 traces of coal from 22m 23 24 25 26 27 28 29 30		20 Wet Wet following rod connection at 20.3m 21 22 Wet 23 24 25 26 27 28 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 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: MSMW224B		PAGE 1 of 3	
	NUMBER	TYPE					START DATE: 14/5/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 14/5/99		BOREHOLE DIAMETER: 250/200/165 mm	
							DRILLER: R4		SCREEN TYPE & DIAMETER: 50 mm polypropylene	
				LOGGED BY: PW APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm				
S2	D1						DESCRIPTION		COMMENTS	
					0		CONCRETE (MADE GROUND)			
					1.0		Loose black coarse angular sandy GRAVEL		Heavy contamination noted Damp	
					2.0				Dry following rod connection at 1m	
					3.0				Wet	
					4.0		sand becoming very fine		Dry following rod connection at 4m	
					5.0				Damp Strong hydrocarbon odour	
					6.0					
					7.0				Damp Slight hydrocarbon odour	
					8.0					
					9.0					
					10				Dry following rod connection at	

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 GROUP	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW224A		PAGE 4 of 4	
	NUMBER	TYPE					START DATE: 12/5/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 13/5/99		BOREHOLE DIAMETER: 250/200/165 mm	
							DRILLER: R4		SCREEN TYPE & DIAMETER: 50 mm polypropylene	
						LOGGED BY: PW APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm		
						DESCRIPTION		COMMENTS		
S1 D2 						Light brown-grey fine to medium grained crystalline SANDSTONE (BEDROCK)		Very productive		30
						Borehole terminated at 30.4 mbgl				30.4
										31
										32
										33
										34
										35
										36
										37
										38
										39
										40

LOCATION / NOTES:

- All measurements in m below ground level (mbgl)
- ODEX to 20.5m, Rotary to 30.4m

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: MSMW224B		PAGE 2 of 3	
	NUMBER	TYPE					START DATE: 14/5/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 14/5/99	BOREHOLE DIAMETER: 250/200/165 mm
S2	D1						DESCRIPTION	COMMENTS		
					10		Stiff brown sandy CLAY (BOULDER CLAY)			10
							becoming grey-brown			
					11		Stiff grey silty, sandy CLAY (BOULDER CLAY)	Damp No odour		11
							Stiff grey fine SAND with minor gravel	Damp to wet No odour		
					12		Firm grey silty CALY	Damp, no odour		12
							Loose grey SAND with minor silt and clay			
					13		Stiff brown very sandy CLAY (BOULDER CLAY)	Dry following rod connection at 13m		13
							Loose orange-brown very sandy CLAY (BOULDER CLAY)	Damp		
					14					14
					15			Damp No odour		15
					16					16
					17		Stiff light brown very sandy CLAY (BOULDER CLAY)	Dry to slightly damp No odour Dry following rod connection at 17.2m		17
							with boulders from 17.2m			
					18		Grey sandy CLAY with sandstone boulders (BOULDER CLAY)			18
					19		Weathered sandstone BOULDERS (WEATHERED BEDROCK)	Wet		19
					20		ROCKHEAD: Grey-brown fine to medium grained Crystalline SANDSTONE (BEDROCK)			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/BR5 Date MAY 99 Job No. 39991-004-401	
2. Rotary with ODEX throughout				DAMES & MOORE GROUP	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW52d		PAGE 1 of 3							
	NUMBER	TYPE					START DATE: 23/06/98		DRILLING METHOD: Rotary							
							FINISH DATE: 23/06/98		BOREHOLE DIAMETER: 165/115mm							
							DRILLER: R3		SCREEN TYPE & DIAMETER: UPVC 50mm							
		LOGGED BY: SG		APPRD BY:		SCREEN SLOT SIZE: 0.5mm										
							DESCRIPTION	COMMENTS								
							0.05m of loose grey medium angular gravel on loose pink and grey fine to medium angular GRAVEL - becoming dense at 0.3m									
							Medium dense blue-grey coarse GRAVEL with cobbles									
							Loose grey silty SAND									
							Firm orange-brown slightly gravelly silty CLAY									
							Soft grey very sandy SILT with occasional lenses of orange-brown clay									
							clay content increasing at 6m with frequent angular to sub-rounded medium gravel									
							Dense to very dense blue-grey and red rounded COBBLES									
							Dense brown sandy, gravelly CLAY with frequent cobbles and boulders									

LOCATION / NOTES:

- All measurements in m below ground level (mbgl)
- Rotary to 20.6 mbgl with odex to 10.45 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**

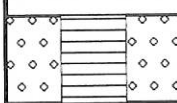
Ref. **MC/CR/BR5**

Date **JUL 98**

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

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW52d		PAGE 2 of 3	
	NUMBER	TYPE					START DATE: 23/06/98		DRILLING METHOD: Rotary/odex	
							FINISH DATE: 23/06/98		BOREHOLE DIAMETER: 165/115mm	
							DRILLER: R3		SCREEN TYPE & DIAMETER: UPVC 50mm	
LOGGED BY: SG		APPRD BY:		SCREEN SLOT SIZE: 0.5mm						
						DESCRIPTION		COMMENTS		
								Dense brown sandy, gravelly CLAY with frequent cobbles and boulders		10
								Dry		11
								Damp at 14.5m		12
										13
						Dense grey-brown sandy gravelly CLAY with boulders and cobbles				14
						ROCKHEAD: Hard blue-grey fine to medium grained SANDSTONE (BEDROCK)				15
										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 LLLANDARCY	
2. Rotary to 20.6 mbgl with odex to 10.45 mbgl				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: MSMW52d		PAGE 3 of 3	
	NUMBER	TYPE					START DATE: 23/06/98		DRILLING METHOD: Rotary/odex	
							FINISH DATE: 23/06/98		BOREHOLE DIAMETER: 165/115mm	
							DRILLER: R3		SCREEN TYPE & DIAMETER: UPVC 50mm	
							LOGGED BY: SG APPD BY:		SCREEN SLOT SIZE: 0.5mm	
						DESCRIPTION	COMMENTS			
						20	Hard blue-grey fine to medium grained SANDSTONE (BEDROCK)		20	
							Borehole terminated at 20.6 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) 2. Rotary to 20.6 mbgl with odex to 10.45 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
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW52s		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 17/06/98		DRILLING METHOD: Cable Percussion	
							FINISH DATE: 17/06/98		BOREHOLE DIAMETER: 200mm	
							DRILLER: CP1		SCREEN TYPE & DIAMETER: UPVC 50mm	
							LOGGED BY: SG APPRD BY:		SCREEN SLOT SIZE: 0.5mm	
							DESCRIPTION	COMMENTS		
							0.05m of loose grey medium angular gravel on loose pink and grey fine to medium angular GRAVEL - becoming dense at 0.3m	Hydrocarbon odour and black staining	0	
								Slightly damp at 1.4m	1.0	
									2.0	
									3.0	
									4.0	
									5.0	
									6.0	
									7.0	
									8.0	
									9.0	
		10								

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
		App'd	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: 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	
			*22			Loose clayey sandy GRAVEL with rubble and black staining (MADE GROUND)	black staining			
			*45		1.0	Silty CLAY with black staining (MADE GROUND)	Strong hydrocarbon odour - Wet black oil staining		1.0	
			*16		2.0	Ashy GRAVEL with rubble and black staining (MADE GROUND)	Saturated with oil and water - strong hydrocarbon odour		2.0	
			*21		3.0	Trial Pit terminated at 3.0 mbgl			3.0	
		*14			4.0				4.0	
		*15			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)	Disturbed Sample	Job Title SOIL & GROUNDWATER INVESTIGATION	
2. Casing installed in MSTP210	Undisturbed Sample	Location LLANDARCY REFINERY	
	* 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 GROUP	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW61		PAGE 1 of 1			
	NUMBER	TYPE					START DATE: 10/06/98		DRILLING METHOD: Odex/Rotary			
							FINISH DATE: 10/06/98		BOREHOLE DIAMETER: 150/115mm			
							DRILLER: R3		SCREEN TYPE & DIAMETER: UPVC 50mm			
				LOGGED BY: MC		APPRD BY:		SCREEN SLOT SIZE: 0.5mm				
							DESCRIPTION		COMMENTS			
							0		CONCRETE hard-standing (MADE GROUND)		Strong fuel odour - increasing with depth Moist	
							1.0		Grey to dark grey silty SAND with some gravel and plastic clay			
							2.0		Brown silty sandy GRAVEL with fragments of silty sandstone		Strong fuel odour - Moist	
							4.0		ROCKHEAD: Weathered grey to dark grey silty SANDSTONE		Hydrocarbon odour on rock returns	
							5.0				Sheen on surface of water	
							8.0		becoming dark brown-grey at 8.4 - 8.7m			
							9.0		Borehole terminated at 8.7 mbgl			
							10					

LOCATION / NOTES:

- All measurements in m below ground level (mbgl)
- Odex to 4 mbgl , Rotary to 8.7 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
GROUP

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	
							Brown very sandy and silty gravelly CLAY	No odour - Dry	6.0	
									7.0	
							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	
							Orange-brown silty CLAY with occasional gravel		10	

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**

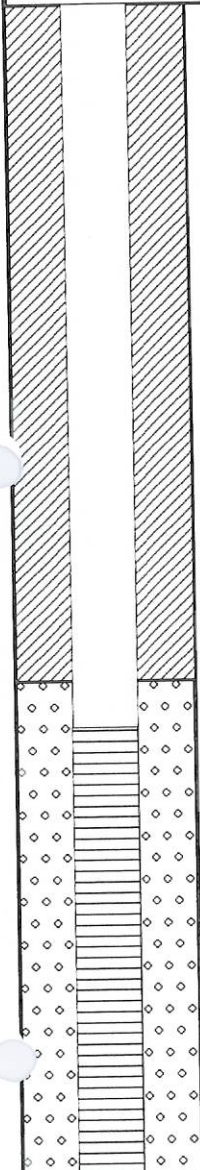
App'd DRAFT

Ref. MC/CR/BRS

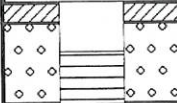
Date JUL 98

Job No. 39991-001-401

DAMES & MOORE
GROUP

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: 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		
							11			
							12			
							13			
							14	ROCKHEAD: Hard grey coarse grained SANDSTONE		
							15			
							16			
							17			
							18	Borehole terminated at 18.2 mbgl		
							19			
							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: MSMW69s		PAGE 1 of 1					
	NUMBER	TYPE					START DATE: 17/06/98		DRILLING METHOD: Cable Percussion					
							FINISH DATE: 17/06/98		BOREHOLE DIAMETER: 200mm					
							DRILLER: CP1		SCREEN TYPE & DIAMETER: UPVC 50mm					
						LOGGED BY: SG		APPROD BY:		SCREEN SLOT SIZE: 0.5mm				
							DESCRIPTION		COMMENTS					
							0		0					
							X-X-X-X		Loose grey angular medium GRAVEL (BALLAST)			No odour		
							X-X-X-X		Soft black-grey silty CLAY			Very strong sweet hydrocarbon odour - black staining		
							X-X-X-X		Borehole terminated at 0.7 mbgl on refusal			Obstruction at 0.7m		
							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					

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 GROUP	
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW71d		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 25/06/98	DRILLING METHOD: Odex/Rotary		
							FINISH DATE: 25/06/98		BOREHOLE DIAMETER: 165/115mm	
							DRILLER: R3		SCREEN TYPE & DIAMETER: UPVC 50mm	
							LOGGED BY: SG APPRD BY:		SCREEN SLOT SIZE: 0.5mm	
							DESCRIPTION		COMMENTS	
					0		Brown-black clayey ASH (MADE GROUND)			
					1.0		Grey-brown very sandy silty gravelly CLAY			
					2.0		Stiff grey sandy silty CLAY			
					3.0					
					4.0		Grey-brown very sandy silty gravelly CLAY			
					5.0		Grey-brown sandy silty GRAVEL		Damp	
					6.0		Grey-brown very sandy and silty gravelly CLAY		Damp	
							Grey-brown sandy and silty gravelly CLAY			
							ROCKHEAD: Hard grey coarse grained SANDSTONE (BEDROCK)			
					7.0					
					8.0					
					9.0					
					10.0		Grey SILTSTONE			
							Borehole terminated at 10.0 mbgl			

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
1. All measurements in m below ground level (mbgl)	Disturbed Sample	Job Title	SOIL & GROUNDWATER INVESTIGATION
2. Air pressure caused water to rise to surface in MSMW71s - and caused bubbles at surface	Undisturbed Sample	Location	LLANDARCY REFINERY
3. Rotary to 10 mbgl with odex to 7 mbgl	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: MSMW71s		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 22/06/98	DRILLING METHOD: Cable Percussion	FINISH DATE: 22/06/98	BOREHOLE DIAMETER: 200mm
					0		Loose brown and dark red sandy GRAVEL with clinker (MADE GROUND)	Slight hydrocarbon odour	0	
					11.1		Firm grey-brown CLAY with orange streaking (MADE GROUND)	No odour		
					6.0		Firm black slightly silty CLAY with some ash (MADE GROUND)	Seepage at 1m	1.0	
					6.7		Firm grey-brown CLAY with orange streaking	Strong hydrocarbon odour		
					17.8				2.0	
					23.2				3.0	
					121			Damp at 3.0m		
					12.6		becoming gravelly at 3.5m		4.0	
							Dense to very dense brown very silty fine to medium GRAVEL with cobbles	Water added	5.0	
							Borehole terminated at 5.0 mbgl on refusal		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**

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: MSMW76		PAGE 1 of 2	
	NUMBER	TYPE					START DATE: 24/06/98		DRILLING METHOD: Cable Percussion/Rotary	
							FINISH DATE: 25/06/98		BOREHOLE DIAMETER: 200/115mm	
							DRILLER: CP3/R1		SCREEN TYPE & DIAMETER: UPVC 50mm	
LOGGED BY: ED		APPR'D BY:		SCREEN SLOT SIZE: 0.5mm						
							DESCRIPTION	COMMENTS		
							Stiff orange-brown CLAY with well rounded gravel and angular sandstone gravel (MADE GROUND)		0	
							Stiff brown CLAY with lenses of fine orange sand and coarse angular sandstone gravel (MADE GROUND)		1.0	
									2.0	
							Firm grey-brown CLAY with angular sandstone gravel	Moist	3.0	
							Rotary drilling from 3.25 mbgl	No perched water encountered	4.0	
							ROCKHEAD: Competent fine to medium grained grey SANDSTONE intercalated with thinly laminated seams of brown siltstone		5.0	
									6.0	
									7.0	
									8.0	
									9.0	
									10	

LOCATION / NOTES:

- All measurements in m below ground level (mbgl)
- Cable Percussion to 3.5 mbgl, Rotary to 12.5 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**

App'd **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: MSMW76		PAGE 2 of 2		
	NUMBER	TYPE					START DATE: 24/06/98		DRILLING METHOD: Cable Percussion/Rotary		
							FINISH DATE: 25/06/98		BOREHOLE DIAMETER: 200/115mm		
							DRILLER: CP3/R1		SCREEN TYPE & DIAMETER: UPVC 50mm		
						LOGGED BY: ED		APPR'D BY:		SCREEN SLOT SIZE: 0.5mm	
						DESCRIPTION				COMMENTS	
						10 Competent fine to medium grained grey SANDSTONE intercalated with thinly laminated seams of brown siltstone and coal					
						11 12 Borehole terminated at 12.5 mbgl					
						13					
						14					
						15					
						16					
						17					
						18					
						19					
						20					

LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. Cable Percussion to 3.5 mbgl, Rotary to 12.5 mbgl 3. Water level rose to 9.5 mbgl 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 App'd 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: MSMW78s&d		PAGE 1 of 2	
	NUMBER	TYPE					START DATE: 15/06/98		DRILLING METHOD: Rotary	
							FINISH DATE: 15/06/98		BOREHOLE DIAMETER: 165/115mm	
							DRILLER: R1		SCREEN TYPE & DIAMETER: UPVC 50mm	
				LOGGED BY: ED		APPR'D BY:		SCREEN SLOT SIZE: 0.5mm		
							DESCRIPTION		COMMENTS	
							CONCRETE		No odour or staining	
							Stiff light brown CLAY with gravel			
							ROCKHEAD: Competent grey SANDSTONE intercalated with grey silt and clay bands			
							Thin bands of COAL intercalated with fine grained sandstone			
LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. Rotary to 18.5 mbgl with Odex to 6 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 App'd DRAFT Ref. MC/CR/BRS Date JUL 98 Job No. 39991-001-401	
									DAMES & MOORE	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW78s&d		PAGE 2 of 2	
	NUMBER	TYPE					START DATE: 15/06/98	DRILLING METHOD: Rotary	FINISH DATE: 15/06/98	BOREHOLE DIAMETER: 165/115mm
							DESCRIPTION		COMMENTS	
						10	Thin bands of COAL intercalated with dark SILTSTONE and grey fine to medium grained SANDSTONE	No odour or staining	10	
						11			11	
						12			12	
						13			13	
						14			14	
						15			15	
						16			16	
						17			17	
						18			18	
						19			19	
						20			20	
						21			21	
						22			22	
						23			23	
						24			24	
						25			25	
						26			26	
						27			27	

LOCATION / NOTES:		LEGEND		BOREHOLE LOG	
1. All measurements in m below ground level (mbgl) 2. Rotary to 18.5 mbgl with odex to 6 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 App'd DRAFT Ref. MC/CR/BR5 Date JUL 98 Job No. 39991-001-401	
				DAMES & MOORE GROUP	