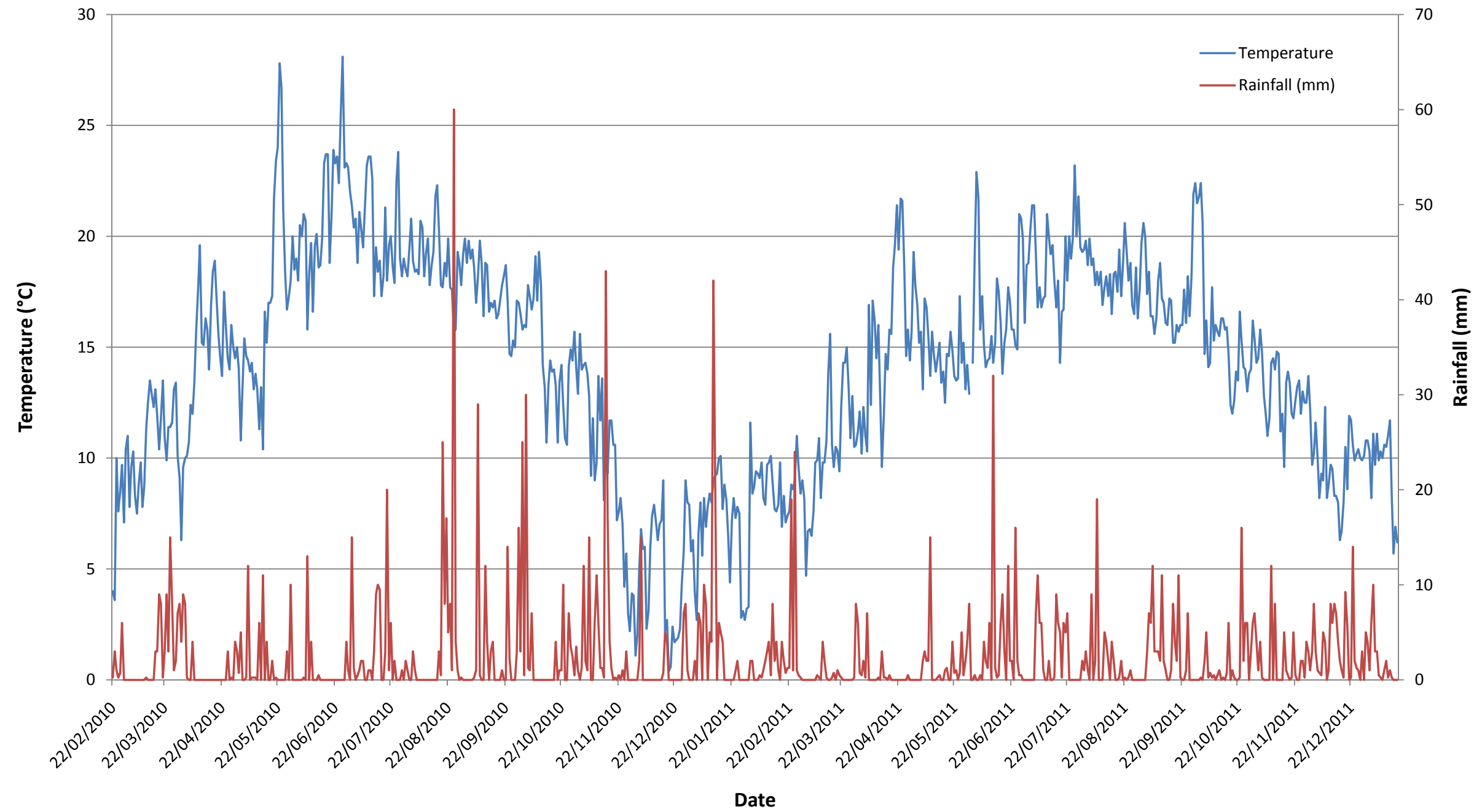


Coed Darcy Weather Summary



Product Recovery Features - Oil Thickness

Date of Monitoring		RAP 2 - Product in Monitoring Pits																WM17	WM18	Railhead Trench		
		WM1	WM2	WM3	WM4	WM5	WM6	WM7	WM8	WM9	WM10	WM11	WM12	WM13	WM14	WM15	WM16					
25 February 2010	Product Dip	PS 0.74	PS 0.55	PS 0.9	PS 1.5	OC 1.3	PS 1.1	0 0.7	1 1.7	DRY	0 2.2	PD 0.3	0 1.2	PD 3.3	PS 2.5	OC 0.8	0 0.4				AM	
04 March 2010	Product Dip	0 1.1	PS 0.9	PS 1.3	PS 1.9	OC 2.1	OC 1.8	0 0.8	0 2.3	DRY	0 2.8	PD 1	PS 1.9	PD 3.2	PS 3.2	PS 1.2	0 1.5				AM	
12 March 2010	Product Dip	0 1.2	PS 0.8	OC 1.1	OC 2	OC 1.9	PD 1.7	0 0.9	PS 2.3	DRY	0 3	PD 0.6	0 1.8	PS 3.2	PS 3.4	0 1.4	0 1.1				AM	
18 March 2010	Product Dip	0 0.88	PS 0.49	SS 0.95	SS 1.83	OC 1.8	SS 1.45	PD 0.91	OC 2.18	DRY	0 2.62	0 0.84	0 2.16	0 3.67	0 3.23	0 2.31	SS 1.74				RW	
24 March 2010	Product Dip	0 0.6	PS 0.4	0 0.7	SS 1.3	SS 1.65	PD 1.25	0 0.5	NP 2.1	DRY	0 2.6	PD 0.5	OC 2.1	OC 3.4	0 2.7	PS 1.6	PS 1.6				AM	
31 March 2010	Product Dip	0 0.9	PS 0.61	0 0.82	0 1.52	0 2.2	0 1.8	0 1	0 2.6	DRY	0 2.4	SS 0.3	0 2.9	0 3.5	0 1.4	0 0.6	0 1.1				AM	
07 April 2010	Product Dip	SS 0.9	SS 0.7	OC 1.4	0 2	0 2.3	SS 1.6	SS 1.1	SS 2.3	DRY	0 1.7	PD 0.4	NP 2.1	PD 3.2	SS 3.3	SS 0.2	0 0.5				AM	
14 April 2010	Product Dip	0 1.2	PS 0.6	PS 0.8	0 1.7	PS 2.1	0 1.4	PS 1.2	PS 1.8	DRY	0 2.1	0 0.6	0 2.4	0 3.2	PS 3.4	PS 0.7	0 1.1				AM	
20 April 2010	Product Dip	0 1.1	PS 0.6	PS 1.3	SS 1.8	SS 1.6	0 1.7	PS 0.7	PS 1.9	DRY	0 2.2	0 0.8	0 1.9	0 3.1	PS 3.4	PS 1.4	0 1.1				AM	
26 April 2010	Product Dip	0 1.3	PS 0.6	PS 1.1	SS 1.9	SS 2.2	0 2	0 1.2	0 2.6	DRY	0 2.4	0 0.5	0 2.2	SS 3.4	PS 3.6	PS 1.8	0 1.5				AM	
05 May 2010	Product Dip	0 1.3	PS 0.6	PS 1.4	SS 1.8	SS 2.2	0 2	0 1.2	0 2	DRY	0 2.3	0 0.5	0 2	SS 3.2	PS 3.5	PS 1.8	0 1.4				RW	
12 May 2010	Product Dip	NP 1.4	PS 0.7	NP 1.5	PS 2	SS 2.2	NP 2.3	NP 1.7	DRY	DRY	NP 0.9	SS 2.2	NP 3.5	NP 3.2	NP 2.4	NP 2.2				AM		
19 May 2010	Product Dip	NP 1.4	PS 1.1	NP 1.6	SS 2.1	NP 2.4	NP 2.3	NP 1.8	DRY	DRY	NP 0.8	NP 2.3	NP 3.6	NP 3.3	NP 2.9					AM		
14 July 2010	Product Dip	NP 2.2	P 1cm 2.21	NP DRY	NP DRY	P 1cm 3.95	NP 2.45	NP 2.73	DRY	DRY	NP 2.34	NP 2.1	NP DRY	NP DRY	NP DRY	NP DRY	NP DRY	installed 21/07/2010			AM	
18 August 2010	Product Dip	NP 1.96	P 5cm 1.68	NP 1.94	NP 2.74	NP 2.04	NP 2.63	NP 1.87	DRY	DRY	NP 2.77	NP 2.45	NP 3.11	NP 4.58	NP 2.82	NP 2.92		installed 21/07/2010			RW	
07 September 2010	Product Dip	NP 1.4	P 2cm 0.42	PS 1.3	SS 1.8	NP 1.92	NP 1.72	NP 0.9	DRY	DRY	NP 2.3	NP 0.5	NP 1.9	NP 3.4	NP 2.7	NP 0.4	NP 1.7	NP 2.4	NP 1.8		AM	
19 October 2010	Product Dip	NP 1.1	P 2cm 1.2	PS 1.3	PS 1.8	NP 2.2	NP 2	NP 1.3	DRY	DRY	NP 2.5	NP 0.5	NP 2.4	NP 3.4	NP 3.2	NP 1.2	NP 1.8	NP 2.4	NP 2.1		AM	
23 November 2010	Product Dip	NP 1.1	P 1cm 1.4	PS 1.5	PS 1.9	NP 2.4	NP 2.2	NP 1.5	REMOVED	REMOVED	NP 2.5	NP 0.5	NP 2.5	NP 3.5	NP 3.6	NP 1.3	NP 1.9	NP 2.5	NP 2.2	Installed	RW	
24 January 2011	Product Dip	NP 1.2	P 1cm 0.6	PS 1.1	SS 1.4	NP 1.4	NP 1.2	NP 1.5	REMOVED	REMOVED	NP 1.7	NP 0.5	NP 2.4	NP 2.9	NP GL	NP 1.2	NP 2.4	NP 2.2		OC	AM	
17 February 2011	Product Dip	NP 0.9	P 0.5cm 0.6	NP 0.9	NP 1.3	NP 1.7	NP 1.1	NP 0.9	REMOVED	REMOVED	not measured	not measured	NP 0.2	NP 3.1	NP 0.8	NP 0.8	NP 1.3	NP 2.4	NP 1.2		RW	
11 March 2011	Product Dip	NP 0.94	PS 0.58	SS 0.96	SS 1.42	NP 1.69	NP 1.345	NP 0.815	REMOVED	REMOVED	NP 2.075	NP 0.63	NP 2.085	NP 3.145	NP 2.87	NP 0.61	NP 1.21	NP 2.04	NP 1.08		ST	
27 April 2011	Product Dip	NP 1.28	PS 0.84	SS 1.42	SS 2.11	NP 2	NP 1.78	NP 1.03	REMOVED	REMOVED	NP DRY	NP 1.2	NP 2.01	NP DRY	NP 3.5	NP 2.63	NP 1.89	NP 3.16	NP 3.23		ST	
29 November 2011	Product Dip	NP 1.46	Thick Film 1.36	NP 1.4	NP 1.89	NP 2.14	NP 1.64	NP 1.45	REMOVED	REMOVED	NP 3.53	NP 1.39	NP 2.9	NP 3.88	NP 1.39	NP 1.45	NP 2.78	NP 4.17	NP 3.35		OC	JKF
04 January 2012	Product Dip	NP 1.47	P 1cm 1.32	NP 1.37	NP 1.73	NP 1.85	NP 1.23	NP 1.39	REMOVED	REMOVED	NP 2.26	NP 1.48	NP 2.27	NP 2.44	NP 1.41	NP 1.21	NP 2.22	NP 2.63	NP 1.85		OC	JKF
26 January 2012	Product Dip	NP 1.5	P 0.5cm 1.38	NP 1.49	NP 2	NP 1.95	NP 1.5	NP 1.46	REMOVED	REMOVED	NP 3	NP 1.6	NP 2.93	NP 3.49	NP 1.34	NP 1.45	NP 2.64	NP 3.2	NP 2.41		OC	JKF
	Product Dip																					
	Product Dip																					
	Product Dip																					
	Product Dip																					
	Product range	top	0.74	0.4	0.8	1.3	1.3	1.1	0.5	1.8	2.6	0.3	1.9	3.1	2.5	0.8	1.6	1.6	1.6			
		bottom	0.9	1.1	1.4	2.1	2.2	1.8	1.8	2.2	2.6	1	2.16	3.4	3.6	1.8	1.74	1.74	1.74			
	Water range	top	0.6	0.8	0.7	1.52	2.2	1.4	0.7	1.7	1.7	0.5	1.2	3.1	1.4	0.6	0.5	0.5	0.5			
		bottom	1.4	1.4	1.6	2	2.4	2.3	1.2	2.6	3	0.9	2.9	3.67	3.23	3.3	2.9	2.9	2.9			
	Strata where product evident in gw during monitoring	MG	GD	GD	MG	GD	MG	MG	MG	MG	GD	GD	GD	GD	GD	GD	GD	GD	GD			
	Strata where product evident from logs from pits MP201-512	GD	GD				GD?	GD?	GD?	GD?	N/a	N/a			GD	GD	GD	MG	GD			

WM - Western Margin Key
 Product Thickness 2
 Product Sheen PS
 No Free Product 0
 Ochre OC
 Slight sheen SS

All mbgl

All mbgl

Appendix B – Borehole Monitoring Data

Exploratory Holes with Historical Evidence of Free Product		
Free Product (Recoverable)	Sheen/Droplets	
MP208	RHRW024	
WSTP069	RHRW006	
MP403	MSMW113D1	
MSTP221	WSMW047	
RHRW006A	MP207	
RHRW006B	MP209	
RHRW007A	MSMW49D	
RHRW007B	WSTP067	
RHRW009	MSMW098D	
RHRW010	MSTP183	
RHRW011	RHRW044	
RHRW012	WSMW083	
RHRW013	MP401	
RHRW013A	WSTP047	
RHRW013B	WSTP089	
RHRW014	MP506	
RHRW014A	MSTP260	
RHRW014B	RHRW001C	
RHRW015A	RHRW002	
RHRW015B	RHRW003	
RHRW016	RHRW008	
RHRW028	RHRW040	
RHRW029	RHRW041	
RHRW035	RHRW044	
RHRW042	RHRW046	
RHRW043	RHRW047	
RHRW045	RHRW048A	
WSMW005	RHRW048B	
WSTP071	RHRW049	
WSTP102	RHRW049d	
MSMW099s	RHRW049s	
MSMW105d	WSMW006	
MSMW109s	WSTP010	
MSMW109d	MSMW49S	
MSMW119	MSMW49D	
MSMW119	MSMW122D	
WSMW005	WSMW002	
	WSMW005	
	WSMW006	
	WSMW006	
	WSMW006	

Exploratory Holes Currently with Evidence of Free Product			
Free Product (Recoverable)	Sheen/Droplets		Groundwater RTC Faiiure
RHRW024B	WM2		WM2
	WM3		WM13
	WM7		WM15
	WM13		WSMW003
	WM14		WSMW005
	WM15		WSMW006
	RHRW002		
	RHRW003		
	RHRW008		
	RHRW009		
	RHRW011		
	RHRW013B		
	RHRW035		
	WSMW005		

Appendix C – URS Exploratory Hole Logs

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW216S		PAGE 1 of 1		
	NUMBER	TYPE					START DATE: 01/4/99		DRILLING METHOD: CABLE PERCUSSION		
							FINISH DATE: 01/4/99		BOREHOLE DIAMETER: 200 mm		
							DRILLER: CP2		SCREEN TYPE & DIAMETER: N/A		
							LOGGED BY: DB/JC APPR'D BY:		SCREEN SLOT SIZE: N/A		
						DESCRIPTION		COMMENTS			
					0	Coarse GRAVEL (ballast) (MADE GROUND)	No odour	0			
					1.0	Loose black ASH (MADE GROUND)	No odour	1.0			
			*0.0		2.0	Soft orange-brown sandy CLAY with frequent fine to coarse gravel (MADE GROUND)	Strong hydrocarbon odour at 1.85m	2.0			
			*0.0		3.0	Black ASH (MADE GROUND)		3.0			
			*0.0		4.0	Borehole terminated at 3.85 mbgl on refusal		4.0			
		*0.0		5.0			5.0				
		*0.0		6.0				6.0			
		*0.0		7.0				7.0			
		*0.0		8.0				8.0			
		*0.0		9.0				9.0			
		*0.0		10.0				10.0			
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 App'd DRAFT Ref. CR/MC/BRS Date MAY 99 Job No. 39991-004-401			



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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW216D		PAGE 1 of 2	
	NUMBER	TYPE					START DATE: 06/4/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 06/4/99		BOREHOLE DIAMETER: 165/115 mm	
							DRILLER: R1		SCREEN TYPE & DIAMETER: 50 mm ID UPVC	
							LOGGED BY: DB APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm	
						DESCRIPTION		COMMENTS		
						0		Coarse GRAVEL (ballast) (MADE GROUND)	No odour	0
						1.0		Loose black ASH (MADE GROUND)	No odour	1.0
						2.0		Soft orange-brown sandy CLAY with frequent fine to coarse gravel (MADE GROUND)	Strong hydrocarbon odour at 1.85m	2.0
						3.0		Black ASH (MADE GROUND)		
						4.0			Strong hydrocarbon odour	4.0
						5.0				
						6.0				6.0
						7.0				
						8.0		ROCKHEAD: Hard light grey crystalline SANDSTONE (BEDROCK)		8.0
						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. Rotary with ODEX throughout		■ Undisturbed Sample		Location LLANDARCY REFINERY	
		★ Headspace Analysis		Client BP LLANDARCY LTD	
		† Down Borehole Analysis		App'd DRAFT	
		▼ Groundwater Table		Ref. CR/MC/BRS	
		▽ Perched Water Table		Date MAY 99	
				Job No. 39991-004-401	
				 DAMES & MOORE	

[illegible]

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW122S		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 16/3/99	DRILLING METHOD: CABLE PERCUSSION	FINISH DATE: 16/3/99	BOREHOLE DIAMETER: 150 mm
							DESCRIPTION	COMMENTS		
	MSMW122 0.2m	✗			0		Medium dense grey-brown gravelly SILT with some clinker and ballast (MADE GROUND)	No odour		0
			*0.0							
			*0.0		1.0		Soft orange-brown gravelly and silty CLAY (MADE GROUND)	Very faint hydrocarbon odour. Damp at 1.5m		1.0
			*0.0				Soft brown slightly gravelly silty CLAY (MADE GROUND) becoming very soft at 1.6m with some black streaking and frequent cobbles. Concrete at 1.7m	Dry - Slight hydrocarbon odour		2.0
			*8.1		2.0		Loose brown gravelly SILT with some clay becoming grey at 2.1m with frequent cobbles	Moderate hydrocarbon odour at 2m		
	MSMW122 2.6m	✗	*112		3.0		Soft dark grey gravelly SILT with some sand and occasional cobbles			3.0
			*112				Sandstone fragments at 2.6m			
					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 LTD App'd DRAFT Ref. CR/MC/BRS Date MAY 99 Job No. 39991-004-401	 DAMES & MOORE GROUP
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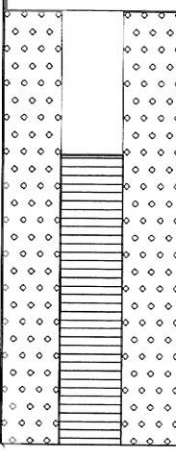
BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW122D		PAGE 1 of 1		
	NUMBER	TYPE					START DATE: 23/3/99		DRILLING METHOD: ROTARY AIR FLUSH		
							FINISH DATE: 23/3/99		BOREHOLE DIAMETER: 150/115 mm		
							DRILLER: R4		SCREEN TYPE & DIAMETER: 50 mm ID UPVC		
				LOGGED BY: SG/PW APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm					
							DESCRIPTION	COMMENTS			
							Medium dense grey-brown gravelly SILT with some clinker and ballast (MADE GROUND)	No odour			
							Soft orange-brown gravelly and silty CLAY (MADE GROUND)	Very faint hydrocarbon odour. Damp at 1.5m			
							Soft brown slightly gravelly silty CLAY (MADE GROUND) becoming very soft at 1.6m with some black streaking and frequent cobbles. Concrete at 1.7m	Dry - Slight hydrocarbon odour			
							Loose brown gravelly SILT with some clay becoming grey at 2.1m with frequent cobbles	Moderate hydrocarbon odour at 2m			
							Soft dark grey gravelly SILT with some sand and occasional cobbles	Slight hydrocarbon odour			
							Sandstone fragments at 2.6m				
							ROCKHEAD - Hard blue-grey SANDSTONE				
								Water strike at 4.5m			
								Productive water strike at 7.2m.			
								Borehole terminated at 7.8 mbgl	Moderately strong hydrocarbon odour and sheen on water surface		
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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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW121		PAGE 1 of 2	
	NUMBER	TYPE					START DATE: 1/4/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 1/4/99	BOREHOLE DIAMETER: 165/115 mm
							DESCRIPTION	COMMENTS		
					0.0		Grey-brown GRAVEL with silt and sand (MADE GROUND)		0.0	
					1.0				1.0	
					2.0		Brown silty and sandy CLAY with frequent boulders (BOULDER CLAY)	Dry	2.0	
					3.0				3.0	
					4.0				4.0	
					5.0				5.0	
					6.0				6.0	
					7.0		sandstone boulders at 7m	Moist	7.0	
					8.0				8.0	
					9.0		ROCKHEAD - SANDSTONE		9.0	
					10.0				10.0	

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	<table border="1"> <tr> <th colspan="2">BOREHOLE LOG</th> </tr> <tr> <td>Job Title</td> <td>SOIL & GROUNDWATER INVESTIGATION</td> </tr> <tr> <td>Location</td> <td>LLANDARCY REFINERY</td> </tr> <tr> <td>Client</td> <td>BP LLANDARCY LTD</td> </tr> <tr> <td>App'd</td> <td>DRAFT</td> </tr> <tr> <td>Ref.</td> <td>CR/MC/BRS</td> </tr> <tr> <td>Date</td> <td>MAY 99</td> </tr> <tr> <td>Job No.</td> <td>39991-004-401</td> </tr> </table> DAMES & MOORE	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
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																		

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW121		PAGE 2 of 2										
	NUMBER	TYPE					START DATE: 1/4/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 1/4/99	BOREHOLE DIAMETER: 165/115 mm	DRILLER: R4	SCREEN TYPE & DIAMETER: 50 mm ID UPVC	LOGGED BY: JC APPR'D BY:	SCREEN SLOT SIZE: 0.5 mm					
							DESCRIPTION		COMMENTS										
							SANDSTONE (BEDROCK)												
							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: MSMW120		PAGE 1 of 2	
	NUMBER	TYPE					START DATE: 9/3/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 9/3/99		BOREHOLE DIAMETER: 165 mm	
						DRILLER: R1		SCREEN TYPE & DIAMETER: 50 mm ID UPVC		
						LOGGED BY: DB APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm		
							DESCRIPTION	COMMENTS		
							Dark brown GRAVEL with sand and silt (MADE GROUND)		0	
									1.0	
									2.0	
									3.0	
									4.0	
									5.0	
									6.0	
									7.0	
									8.0	
									9.0	
		10								
							Dark brown silty GRAVEL with sand (MADE GROUND) Some boulders present	Moderate hydrocarbon odour	3.0	
							Light grey sandy GRAVEL with silt (MADE GROUND) Some sandstone boulders present	Moderate hydrocarbon odour	4.0	
							Sandstone boulder content increasing		5.0	
									6.0	
									7.0	
									8.0	
									9.0	
							Large sandstone BOULDERS (MADE GROUND)		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**

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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW120		PAGE 2 of 2	
	NUMBER	TYPE					START DATE: 9/3/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 9/3/99	BOREHOLE DIAMETER: 165 mm
							DESCRIPTION		COMMENTS	
					10		Large sandstone BOULDERS (MADE GROUND)			
							Borehole terminated at 10.2 mbgl			
					11					
					12					
					13					
					14					
					15					
					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 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: MSMW119		PAGE 1 of 1		
	NUMBER	TYPE					START DATE: 1/4/99	DRILLING METHOD: ROTARY AIR FLUSH			
							FINISH DATE: 1/4/99	BOREHOLE DIAMETER: 165 mm			
						DRILLER: R3	SCREEN TYPE & DIAMETER: 50 mm ID UPVC				
						LOGGED BY: JC APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm			
						DESCRIPTION	COMMENTS				
						Light brown-grey sandy, silty and gravelly CLAY	Strong hydrocarbon odour				
						Light brown sandy, gravelly CLAY	Heavy hydrocarbon contamination				
							Damp to 4.5m				
						Dark grey sandy silty gravelly CLAY	Heavy hydrocarbon contamination				
						ROCKHEAD - Light grey-medium grey crystalline SANDSTONE (BEDROCK)	Dry				
						SANDSTONE / SILTSTONE interbedded with traces of coal					
						Light grey-medium grey crystalline SANDSTONE					
							Water strike at 9m				
						Borehole terminated at 10.0 mbgl					

LOCATION / NOTES:

- All measurements in m below ground level (mbgl)
- ODEX to 6m, Rotary to 10m
- Shallow well flowing artesian at completion

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: MSMW113D2,D3,D4		PAGE 1 of 4	
		NUMBER	TYPE					START DATE: 31/3/99	DRILLING METHOD: ROTARY AIR FLUSH		
								FINISH DATE: 4/4/99	BOREHOLE DIAMETER: 165/115 mm		
								DRILLER: RD1	SCREEN TYPE & DIAMETER: 19 mm ID HDPE		
								LOGGED BY: DB	APPR'D BY:	SCREEN SLOT SIZE: 0.5 mm	
D2	D3	D4						DESCRIPTION		COMMENTS	
						0		Soft loose black clayey GRAVEL with ash (MADE GROUND)		0	
						1.0				Very strong hydrocarbon odour	
						2.0		Soft light brown-grey CLAY with some large sub-angular cobbles		2.0	
						3.0		cobble content increasing from 3m		Strong hydrocarbon odour to 6m	
						4.0		Dense sandy gravelly CLAY			
						5.0		Grey clayey sandy GRAVEL with some cobbles			
						6.0		Dense dark brown-grey sandy gravelly CLAY (BOULDER CLAY)		Water cased out at 6m	
						7.0					
						8.0		ROCKHEAD - Hard grey crystalline medium grained SANDSTONE			
						9.0				No odour	
						10				10	

LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. ODEX to 8.0m Rotary to 39 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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DAMES & MOORE
GROUP

BOREHOLE CONSTRUCTION		SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW113D2,D3,D4		PAGE 3 of 4	
		NUMBER	TYPE					START DATE: 31/3/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 4/4/99	BOREHOLE DIAMETER: 165/115 mm
D2	D3	D4						DESCRIPTION	COMMENTS		
						20		Soft light grey-brown MUDSTONE	No odour		20
						21					21
						22					22
						23					23
						24		COAL measures			24
						25		Brown MUDSTONE with bands of and shale			25
						26					26
						27		Soft grey MUDSTONE (BEDROCK)	becoming more productive with depth		27
						28		Hard light grey-grey crystalline SANDSTONE			28
						29			No odour		29
						30			No odour		30

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	
2. ODEX to 8.0m Rotary to 39 mbgl				DCM GROUP DAMES & MOORE	

BOREHOLE CONSTRUCTION		SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW113D2,D3,D4		PAGE 2 of 4	
		NUMBER	TYPE					START DATE: 31/3/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 1/4/99	BOREHOLE DIAMETER: 165/115 mm
D2	D3	D4						DESCRIPTION		COMMENTS	
						10		Soft light grey-brown MUDSTONE (BEDROCK)		No odour	
						11					
						12					
						13					
						14					
						15				Damp at 15m	
						16				Water strike at 16.2m	
						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	
2. ODEX to 8.0m Rotary to 39 mbgl				DCM GROUP DAMES & MOORE	

BOREHOLE CONSTRUCTION		SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW113D2,D3,D4		PAGE 4 of 4	
		NUMBER	TYPE					START DATE: 31/3/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 4/4/99	BOREHOLE DIAMETER: 165/115 mm
D2	D3	D4						DESCRIPTION		COMMENTS	
						30		COAL measures		No odour	30
						Hard light grey-grey crystalline SANDSTONE		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) 2. ODEX to 8.0m Rotary to 39 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
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW113D1		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 29/3/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 29/3/99		BOREHOLE DIAMETER: 165 mm	
						DRILLER: R1		SCREEN TYPE & DIAMETER: 50 mm ID UPVC		
						LOGGED BY: MC APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm		
						DESCRIPTION	COMMENTS			
						0	Soft loose blavk clayey GRAVEL with ash (MADE GROUND)	Strong hydrocarbon odour Wet Free product on cuttings	0	
						1.0				1.0
						2.0	Soft light brown-grey CLAY with some large sub-angular cobbles			2.0
						3.0	cobble content increasing from 3m		3.0	
						4.0	Dense sandy gravelly CLAY	Dry	4.0	
						4.0	Grey clayey sandy GRAVEL with some cobbles		Moderate hydrocarbon odour	
						5.0			5.0	
						6.0			6.0	
						6.0	Dense dark brown-grey sandy gravelly CLAY (BOULDER CLAY)	Dry	6.0	
						7.0				7.0
8.0	ROCKHEAD - Hard grey crystalline medium grained SANDSTONE	No hydrocarbon odour Water at 7.2m	8.0							
9.0				9.0						
									10	

LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. Located next to MSMW042 3. ODEX with rotary to 9m		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
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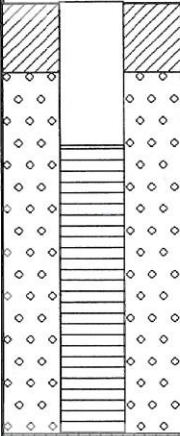
BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW111		PAGE 3 of 4	
	NUMBER	TYPE					START DATE: 29/3/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 30/3/99	BOREHOLE DIAMETER: 115 mm
D4 D3 D2 D1							DESCRIPTION		COMMENTS	
					20		Hard grey medium grained crystalline SANDSTONE			
					21					
					22					
					23					
					24					
					25		(Slight increases / decreases in drilling rate indicate harder and softer lithologies)			
					26					
					27		Traces of coal at 27.2 m			
					28					
					29					
					30					

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
1. All measurements in m below ground level (mbgl)	☒ Disturbed Sample	Job Title SOIL & GROUNDWATER INVESTIGATION	
2. ODEX to 7.0m Rotary to 40 mbgl	☐ Undisturbed Sample	Location LLANDARCY REFINERY	
	* Headspace Analysis	Client BP LLANDARCY LTD	
	† Down Borehole Analysis	App'd DRAFT	 DAMES & MOORE
	▽ Groundwater Table	Ref. CR/MC/BRS	
	▽ Perched Water Table	Date MAY 99	
		Job No. 39991-004-401	

BOREHOLE CONSTRUCTION		SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW111		PAGE 2 of 4	
		NUMBER	TYPE					START DATE: 29/3/99	DRILLING METHOD: ROTARY AIR FLUSH	FINISH DATE: 30/3/99	BOREHOLE DIAMETER: 115 mm
D4	D3	D2	D1					DESCRIPTION		COMMENTS	
						10		Grey MUDSTONE		10	
								Hard grey medium grained crystalline SANDSTONE		Wet	
						11				11	
						12				12	
						13				Very fast water ingress	
						14				14	
						15		(Returns difficult to log due to extremely high rate of water production from well)		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	
2. ODEX to 7.0m Rotary to 40 mbgl				Location LLANDARCY REFINERY	
				Client BP LLANDARCY LTD	
				App'd Ref. CR/MC/BR5 Date MAY 99 Job No. 39991-004-401	
				DAMES & MOORE GROUP	

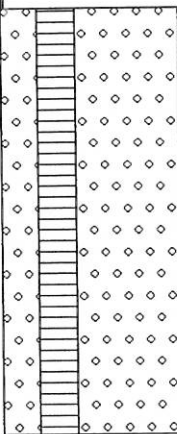
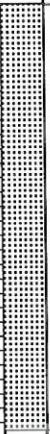
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW099S		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 17/3/99		DRILLING METHOD: CABLE PERCUSSION	
							FINISH DATE: 17/3/99		BOREHOLE DIAMETER: 150 mm	
							DRILLER: CP1		SCREEN TYPE & DIAMETER: N/A	
						LOGGED BY: JC APPR'D BY:		SCREEN SLOT SIZE: N/A		
						DESCRIPTION		COMMENTS		
						Loose black fine to medium GRAVEL (MADE GROUND)		Dry	0	
						Loose brown coarse SAND with fine gravel and black ash(MADE GROUND)		No hydrocarbon odour		
						Loose brown sandy SILT with frequent gravel			1.0	
						Soft orange-brown clayey SILT with frequent gravel				
						Loose dark grey sandy SILT with frequent gravel		Hydrocarbon	2.0	
						Borehole terminated at 3.0 mbgl on refusal				3.0
										4.0
										5.0
										6.0
										7.0
										8.0
										9.0
										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 GROUP	
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW099S2&D		PAGE 1 of 2	
	NUMBER	TYPE					START DATE: 6/4/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 6/4/99		BOREHOLE DIAMETER: 165/115 mm	
						DRILLER: R4		SCREEN TYPE & DIAMETER: 50 mm UPVC 19 mm HDPE		
						LOGGED BY: PW APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm		
D	S2						DESCRIPTION		COMMENTS	
					0		Very soft brown silty SAND		Poor returns Strong hydrocarbon odour	
					1.0					
					2.0		Loose dark grey-brown silty SAND with frequent gravel		Strong hydrocarbon odour Poor returns	
					3.0					
					4.0		becoming lighter in colour and increasingly silty		Very strong hydrocarbon odour	
					5.0		Loose, light grey-brown sandy SILT with frequent cobbles		Strong hydrocarbon odour	
					6.0		Dark grey sandy SILT with sub-rounded cobbles		Slight to moderate hydrocarbon odour	
					7.0		Light brown silty SAND with frequent sandstone cobbles		Moderate hydrocarbon odour	
					8.0		Alternating light grey and light brown layers of loose fine SAND with gravel and cobbles		Faint odour Drilling not constant - very fine returns	
					9.0				No hydrocarbon odour	
					10					

LOCATION / NOTES:		LEGEND		BOREHOLE LOG	
1. All measurements in m below ground level (mbgl)			Disturbed Sample	Job Title SOIL & GROUNDWATER INVESTIGATION	
			Undisturbed Sample	Location LLANDARCY REFINERY	
			Headspace Analysis	Client BP LLANDARCY LTD	
			Down Borehole Analysis	App'd DRAFT	
			Groundwater Table	Ref. CR/MC/BRS	
			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: MSMW099S2&D		PAGE 2 of 2	
	NUMBER	TYPE					START DATE: 6/4/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 6/4/99		BOREHOLE DIAMETER: 165/115 mm	
							DRILLER: R1		SCREEN TYPE & DIAMETER: 50 mm UPVC 19 mm HDPE	
LOGGED BY: PW		APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm						
							DESCRIPTION		COMMENTS	
					10		Light grey crystalline SANDSTONE (BEDROCK)		No odour	
					11					
					12					
					13					
					14					
					15					
					16					
					17					
					18					
					19					
					20					
LOCATION / NOTES:							LEGEND		BOREHOLE LOG	
1. All measurements in m below ground level (mbgl)							 Disturbed Sample		Job Title SOIL & GROUNDWATER INVESTIGATION	
							 Undisturbed Sample		Location LLANDARCY REFINERY	
							 Headspace Analysis		Client BP LLANDARCY LTD	
							 Down Borehole Analysis		App'd DRAFT	
							 Groundwater Table		Ref. CR/MC/BRS	
							 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: MSMW51		PAGE 1 of 3		
	NUMBER	TYPE					START DATE: 17/06/98		DRILLING METHOD: Cable Percussion/Rotary		
							FINISH DATE: 17/06/98		BOREHOLE DIAMETER: 200/165/115mm		
						DRILLER: CP1/R3		SCREEN TYPE & DIAMETER: UPVC 50mm			
						LOGGED BY: SG		APPRD BY:		SCREEN SLOT SIZE: 0.5mm	
						DESCRIPTION	COMMENTS				
						0.0	Loose grey angular medium GRAVEL (MADE GROUND)	Some brown staining on surface - no odour	0.0		
						0.1	Loose grey-black and brown sandy and silty fine to medium GRAVEL with some clinker (MADE GROUND)	No odour	0.1		
						0.3	Loose black and brown slightly silty and gravelly medium SAND with ash and clinker (MADE GROUND)	No odour	0.3		
						0.3	Loose black very sandy fine SILT	No odour	0.3		
						0.0		Timber obstruction at 1.4m	2.0		
						4.5	Soft grey to yellow-brown gravelly CLAY with some black mottling and occasional cobbles	Dry Clay warm to touch - very strong hydrocarbon odour	3.0		
						120		pungent odour	3.0		
						62.8	becoming more gravelly at 3.5m	bitumen odour	4.0		
						84.2	Firm to stiff grey gravelly CLAY with occasional cobbles	Wet at 3.5m	4.0		
						76.4		Water ingress at 4m (warm)	5.0		
6.6		Moderate bitumen odour	5.0								
0.0			6.0								
0.0			6.0								
0.0	Firm yellow-orange to yellow-brown slightly silty and sandy gravelly CLAY with frequent cobbles	Dry - no odour	7.0								
0.0	Dense yellow-brown silty sandy and very clayey medium to coarse sub-rounded GRAVEL with cobbles	Dry - no odour	7.0								
	Rotary drilling from 7.1 mbgl		8.0								
			9.0								
	large sandstone boulder at 9-9.5m		9.0								
			10.0								

LOCATION / NOTES:

- All measurements in m below ground level (mbgl)
- Water strike at 3.5 mbgl, cased out at 5.8 mbgl
- Water strike at 5.5 mbgl and 7.0 mbgl
- Cable percussion to 7.1mbgl, Rotary to 22 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

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW51		PAGE 2 of 3	
	NUMBER	TYPE					START DATE: 17/06/98		DRILLING METHOD: Cable Percussion/Rotary	
							FINISH DATE: 17/06/98		BOREHOLE DIAMETER: 200/165/115mm	
							DRILLER: CP1/R3		SCREEN TYPE & DIAMETER: UPVC 50mm	
LOGGED BY: SG APPRD BY:						SCREEN SLOT SIZE: 0.5mm				
						DESCRIPTION		COMMENTS		
						10		10		
						11		11		
						12		12		
						13		13		
						14		14		
						15		15		
						16		16		
						17		17		
						18		18		
						19		19		
						Dense yellow-brown silty sandy and very clayey medium to coarse sub-rounded GRAVEL with cobbles Rotary drilling from 7.1 mbgl				
						frequent boulders between 13.6m and 15.5m				
						Brown silty sandy CLAY with cobbles and boulders				
						ROCKHEAD: Hard blue-grey fine to medium grained SANDSTONE (BEDROCK)				
						20		20		

LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. Cable percussion to 7.1mbgl, Rotary to 22 mbgl with odex to 14 mbgl 3. Borehole backfilled with bentonite to 18.0 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 Appd DRAFT Ref. MC/CR/BRS Date JUL 98 Job No. 39991-001-401	
				DAMES & MOORE GROUP	