Method of Excavation	JCB 3CX	Plan	**TRIAL PIT No. TP0933**
Surface Dimensions	0.80m x 2.40m		
Date Excavated Start	02/06/2004		Coordinates 459956.470 E
End	02/06/2004	90°	(National Grid) 164419.698 N
Logged by EDHC 02/06/2004	Compiled by edhc 08/06/2004	Checked by DBH 19/6/04	Ground Level 97.30 m OD
			Location
			Co ords - E 2813.665, N 1416.842

In-situ Testing			Samples			Description of Strata	Depth (Thickness) (m)	Level	Legend
Depth (m)	Type	Result	Depth (m)	Type	No.				
						TOPSOIL (SILCHESTER GRAVEL)	(0.10)		
0.10	PID	0	0.10	V			0.10	97.20	
			0.10	CD	1	Grey brown slightly sandy clayey GRAVEL. Sand is fine to coarse. Gravel is subangular to rounded, fine to coarse flint. (SILCHESTER GRAVEL)	(0.10)		
			0.10	K	1		0.20	97.10	
0.30-0.31	CBR	3.7%	0.10	VL	1				
			0.30	D	2				
			0.30	B	3				
0.50	VN	70/76/62	0.30	B	3	Firm laminated orange and light grey sandy CLAY with laminae and lenses of yellow brown, orange and light grey sand. Sand is fine to coarse. With occasional rootlets and rare black organic fragments. (BAGSHOT FORMATION)			
	VR	32/36/22							
							(1.50)		
1.00	PID	0	1.00	V					
			1.00	CD	4				
			1.00	K	4				
			1.00	VL	4				
1.40	VN	32/22/32							
	VR	16/14/18	1.50	D	5				
			1.50	B	6				
							1.70	95.60	
						Firm thinly laminated grey CLAY with thin laminae and lenses of grey, yellow brown and dark orange brown sand. Sand is fine to coarse. (TRANSITIONAL ZONE)	(0.30)		
			1.90	D	7				
2.00	PID	0	2.00	V			2.00	95.30	
			2.00	CD	8				
			2.00	K	8				
			2.00	VL	8				
						End of Trial Pit			

Remarks (See notes & keysheets)

1. The walls of the pit were stable during excavation.
2. Groundwater was not apparent during excavation.
3. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out.
4. Hand Vane tests (VN/R) were carried out on pieces of material brought to the surface using a 19mm hand vane. Direct readings of undrained shear strength given in kPa.
5. On completion of the trial pit, the arisings were backfilled and compacted in layers with the bucket of the JCB.
6. California Bearing Ratio (CBR) performed at 0.30m. See Appendix D for details.

Scale 1:25

FUGRO

Project	AWE ALDERMASTON NEW HR FACILITY GI
Contract No.	BAS040081
Figure No.	TP0933 (1 of 1)

302/03

Method of Excavation	JCB 3CX	Plan	**TRIAL PIT No. TP0934**
Surface Dimensions	0.60m x 2.00m		
Date Excavated Start	28/05/2004		Coordinates 459886.734 E
End	28/05/2004	→ 90 °	(National Grid) 164512.284 N
			Ground Level 99.35 m OD
Logged by	Compiled by	Checked by	Location
EDHC	pb	DOM 17-11-04	Co ords - E 2819.055, N 1532.627
28/05/2004	07/06/2004		

In-situ Testing			Samples			Description of Strata	Depth (Thickness) (m)	Level	Legend
Depth (m)	Type	Result	Depth (m)	Type	No.				
0.10	PID	0	0.10	CD	1	TOPSOIL	(0.15)		
			0.10	K	1		0.15	99.20	
			0.10	VL	1	MADE GROUND: Grey brown slightly clayey, slightly sandy gravel with occasional cobbles and rare boulders. Sand is fine to coarse. Gravel is subangular to rounded, fine to coarse flint and tarmacadam. With occasional rootlets. With occasional fragments of tarmacadam up to 300mm (SILCHESTER GRAVEL)	(0.35)		
			0.30	B	2		0.50	98.85	
			0.80	B	3	Orange brown slightly clayey slightly sandy GRAVEL with occasional cobbles. Sand is fine to coarse. Gravel is subangular and rounded fine to coarse flint. Cobbles are subangular flint. (SILCHESTER GRAVEL)	(0.60)		
			0.80	B	3				
1.00	PID	0	1.00	CD	4				
			1.00	K	4				
			1.00	K	4	Below 1.00m: Locally clayey.	1.10	98.25	
			1.20	B	5	Orange and light grey mottled slightly sandy clayey GRAVEL with occasional cobbles. Sand is fine to coarse. Gravel is subrounded to rounded, fine to coarse flint. Cobbles of subangular flint. (SILCHESTER GRAVEL)	(0.40)		
							1.50	97.85	
			1.70	D	6	Firm orange and light grey slightly gravelly and CLAY. Sand is fine to coarse. Gravel is subrounded and rounded, fine to coarse flint. With occasional black organic fragments. (BAGSHOT FORMATION)	(0.50)		
			1.70	B	7				
2.00	PID	0	2.00	CD	8		2.00	97.35	
			2.00	K	8				
			2.00	VL	8	Below 1.70m: Gravel and sand absent.			
						End of Trial Pit			

Remarks (See notes & keysheets)

1 Minor spalling of the walls of the pit noted between 0.50m and 1.50m
2 Groundwater was encountered as a seepage at 1.70m.
3 On completion the trial pit was backfilled with compacted arisings.
4 Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out.
5 On completion of the trial pit, the arisings were backfilled and compacted in layers with the bucket of the JCB.
6 Soakaway test performed in trial pit at 1.00m depth. See Appendix D for details.

Scale 1:25

FUGRO

Project
AWE ALDERMASTON
NEW HR FACILITY GI

Contract No. BAS040081

Figure No. TP0934 (1 of 1)

302/03

Method of Excavation	JCB 3CX	Plan	**TRIAL PIT No. TP0935**
Surface Dimensions	0.60m x 2.40m		
Date Excavated Start	02/06/2004		Coordinates 459930.551 E
End	02/06/2004	90°	(National Grid) 164522.586 N
			Ground Level 99.55 m OD
Logged by	Compiled by	Checked by	Location
EDHC	edhc		Co ords - N 2859.365, E 1512.598
02/06/2004	08/06/2004	19/10/04	

In-situ Testing			Samples			Description of Strata	Depth (Thickness) (m)	Level	Legend
Depth (m)	Type	Result	Depth (m)	Type	No.				
						TOPSOIL	(0.15)		
0.10	PID	0	0.10	V			0.15	99.40	
			0.10	CD	1	Prabably MADE GROUND: Grey brown slightly clayey slightly sandy gravel with rare cobbles. Sand is fine to coarse. Gravel is subangular to rounded, fine to coarse flint. With common rootlets. (SILCHESTER GRAVEL)	(0.30)		
			0.10	K	1				
			0.10	VL	1				
			0.30	B	2		0.45	99.10	
			0.60	B	3	Light grey brown, white and dark grey locally slightly silty sandy GRAVEL with occasional cobbles. Sand is fine to coarse. Gravel is subangular to rounded, fine to coarse flint. Cobbles are subrounded flint. (SILCHESTER GRAVEL)	(0.45)		
			0.60	B	3				
			0.60	B	3				
			0.60	B	3		0.90	98.65	
1.00	PID	0	1.00	V					
			1.00	CD	4	Orange and light grey mottled slightly sandy clayey GRAVEL. Sand is fine to coarse. Gravel is subangular to rounded, fine to coarse flint. (SILCHESTER GRAVEL)	(0.65)		
			1.00	K	4				
			1.00	VL	4				
			1.30	D	5				
			1.30	B	6				
			1.60	D	7		1.55	98.00	
			1.70	B	8	Dark orange brown, light grey and yellow brown mottled slightly clayey SAND with thin laminae and lenses of light grey clay. Sand is fine to coarse. (BAGSHOT FORMATION) Below 1.75m; With lenses and thin beds of firm dark orange brown and light grey mottled clay. With rare rootlets.	(0.45)		
1.80	VN	74/54/60							
	VR	17/11/10							
2.00	PID	0	2.00	V			2.00	97.55	
			2.00	CD	9				
			2.00	K	9				
			2.00	VL	9	End of Trial Pit			

Remarks (See notes & keysheets)

1. The walls of the pit were unstable between 0.15m and 0.90m during excavation.
2. Groundwater was not apparent during excavation.
3. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out.
4. Hand Vane tests (VN/R) were carried out on pieces of material brought to the surface using a 19mm hand vane. Direct readings of undrained shear strength given in kPa.
5. On completion of the trial pit, the arisings were backfilled and compacted in layers with the bucket of the JCB.
6. Soakaway test performed in trial pit TP0934 at 1.00m depth. See Appendix D for details.

Scale 1:25

FUGRO

Project: AWE ALDERMASTON NEW HR FACILITY GI

Contract No. BAS040081

Figure No. TP0935 (1 of 1)

302/03

Golder Associates

Project:
Soil, Chemical, Radiological and Toxin Survey Phase 2

Borehole ID:
BH0330

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods:
Dando 500 shell and Auger

Drilled by: FES
Date started: 01/10/2003 Completed: 02/10/2003
Logged by: SA

Ground Level: 100.39
Co-ordinates:
2597.02 1522.72

WATER	INSTALLATION/ BACKFILL	HOLE DEPTH (m)	HOLE PROGRESS	SAMPLES Depth (m)	No.	Type	SPT 'N'	STRATA RECORD Level (m aOD)	Legend	Depth *Thickness* (m)	Description
				0.00	1	D	0				Soft, medium, brown sandy CLAY with angular gravels and roots. (MG).
				0.75	2	D		99.64		0.75	Dense, light grey, sandy GRAVEL. Gravel is coarse and angular. Sand is fine to medium and angular. (SG).
				1.20	3	D					At 1.2m: Water added.
				2.00	4	D					
								97.09		3.30	Soft, orange/grey mottled, sandy CLAY. Sand is fine to medium. (BB).
				4.00	5	D		96.39		4.00	*End of Borehole at 4.00 m*

Remarks:

Scale: 1:50

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0330**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 shell and Auger

Drilled by: FES

Date started: 01/10/2003 Completed: 02/10/2003

Logged by: SA

Ground Level: 100.39 (m aOD)

Co-ordinates: 2597.02 1522.72

SAMPLE INFORMATION

Depth (m)		Type	Headspace Result (ppm)	Sample Remarks
0.00	0.10	D	1.30	BG 0.0 - 0.1 RA (Top of IP)
0.75	0.80	D	0.50	BG 0.0 - 0.1 (Middle of IP)
1.20	1.30	D	0.50	BG 0.0 - 0.5 (Base of IP)
2.00	2.10	D	0.00	BG 0.0 - 0.5 RA
4.00	4.10	D	0.00	BG 0.0 - 0.5 RA

Remarks:

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0331**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 shell and Auger

Drilled by: FES

Date started: 02/10/2003 Completed: 02/10/2003

Logged by: SA

Ground Level: 100.15

Co-ordinates: 2692.39 1529.67

WATER	INSTALLATION/ BACKFILL	HOLE DEPTH (m)	HOLE PROGRESS	SAMPLES Depth (m)	No.	Type	SPT 'N'	STRATA RECORD Level (m aOD)	Legend	Depth *Thickness* (m)	Description
				0.00	1	D	0				Loose, light grey, sandy GRAVEL. Gravel is coarse. Sand is medium to coarse and angular. (SG).
				0.75	2	D		99.40		0.75	Loose, light grey/orange, dry, sandy coarse GRAVEL. (SG).
				1.20	3	D		98.95		1.20	Loose, orange, dry, sandy coarse GRAVEL. (SG). At 1.3m: water added.
				2.00	4	D					
								97.65		2.50	Firm to stiff, orange/brown, mottled grey, slightly sandy CLAY. (BB). By 3.1m: Stiff, laminated, grey, very slightly sandy CLAY.
								97.05		3.10	*End of Borehole at 3.10 m*

Remarks:

Scale: 1:50

AWE SCRT 2 V1
February 2005

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0331**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 shell and Auger

Drilled by: FES

Date started: 02/10/2003 Completed: 02/10/2003

Logged by: SA

Ground Level: 100.15 (m aOD)

Co-ordinates: 2692.39 1529.67

SAMPLE INFORMATION

Depth (m)		Type	Headspace Result (ppm)	Sample Remarks
0.00	0.10	D	0.03	BG 0.0 - 0.01 RA
0.75	0.80	D	0.00	BG 0.0
1.20	1.30	D	0.00	BG 0.0
2.00	2.10	D	0.03	BG 0.1 - 0.03 RA

Remarks:

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0332**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 shell and Auger

Drilled by: FES

Date started: 02/10/2003 Completed: 03/10/2003

Logged by: SA

Ground Level: 100.11

Co-ordinates: 2740.63 1519.09

WATER	INSTALLATION/ BACKFILL	HOLE DEPTH (m)	HOLE PROGRESS	SAMPLES Depth (m)	No.	Type	SPT 'N'	STRATA RECORD Level (m aOD)	Legend	Depth *Thickness* (m)	Description
				0.00	1	D	0				Medium to dense, light grey, sandy GRAVEL with roots. Sand is fine to medium and angular.
								99.51		0.60	
				0.75	2	D					Dense, orange/grey, dry, sandy GRAVEL. Sand is fine to medium and angular. (SG).
		1		1.20	3	D					At 1.3m: Water added.
								98.31		1.80	
		2		2.00	4	D					Stiff, orange/brown, grey mottled, slightly sandy CLAY. Sand is fine to medium and angular. (BB).
		3									
								96.31		3.80	
		4		4.00	5	D					Firm to stiff, grey sandy CLAY. Sand is fine to medium and rounded. (BB).
		5						94.91		5.20	Stiff, dry, grey CLAY. (LC)
		6		6.00	6	D					
								93.61		6.50	*End of Borehole at 6.50 m*
		7									
		8									
		9									
		10									

Remarks:

Scale: 1:50

AWE SCRT 2 V1
February 2005

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0332**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 shell and Auger

Drilled by: FES

Date started: 02/10/2003 Completed: 03/10/2003

Logged by: SA

Ground Level: 100.11 (m aOD)

Co-ordinates: 2740.63 1519.09

SAMPLE INFORMATION

Depth (m)		Type	Headspace Result (ppm)	Sample Remarks
0.00	0.10	D	0.50	BG 0.0 - 0.5 RA
0.75	0.80	D	0.50	BG 0.0 - 0.5
1.20	1.30	D	0.10	BG 0.0 - 0.1
2.00	2.10	D	0.10	BG 0.0 - 0.1 RA
4.00	4.10	D	0.10	BG 0.0 - 0.1 RA
6.00	6.10	D	0.50	BG 0.0 - 0.5

Remarks:

Golder Associates

Project:
Soil, Chemical, Radiological and Toxin Survey Phase 2

Borehole ID:
BH0333

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods:
Dando 500 shell and Auger

Drilled by: FES
Date started: 21/10/2003 Completed: 21/10/2003
Logged by: SA

Ground Level: 99.38
Co-ordinates:
2835.66 1541.13

WATER	INSTALLATION/ BACKFILL	HOLE DEPTH (m)	HOLE PROGRESS	SAMPLES Depth (m)	No.	Type	SPT 'N'	STRATA RECORD Level (m aOD)	Legend	Depth *Thickness* (m)	Description
				0.00	1	D	0				Dense, dry, orange/brown, sandy, fine to medium GRAVEL with roots. (SG).
				0.75	2	D					
				1.20	3	D					
				2.00	4	D					
								96.88		2.50	Firm, moist, orange/brown/grey, very sandy CLAY. (BB).
				2.90	5	D					
								96.38		3.00	*End of Borehole at 3.00 m*

Remarks:

Scale: 1:50

AWE SCRT 2 V1
February 2005

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0333**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 shell and Auger

Drilled by: FES

Date started: 21/10/2003 Completed: 21/10/2003

Logged by: SA

Ground Level: 99.38 (m aOD)

Co-ordinates: 2835.66 1541.13

SAMPLE INFORMATION

Depth (m)		Type	Headspace Result (ppm)	Sample Remarks
0.00	0.10	D	0.40	BG 0.4 - 0.9 RA
0.75	0.80	D	0.30	BG 0.4
1.20	1.30	D	0.30	BG 0.4
2.00	2.10	D	0.10	BG 0.4 RA
2.90	3.00	D	0.10	BG 0.4 RA

Remarks:

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0364**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 shell and Auger

Drilled by: FES

Date started: 21/10/2003 Completed: 21/10/2003

Logged by: SA

Ground Level: 92.48

Co-ordinates: 2956.27 1435.49

WATER	INSTALLATION/ BACKFILL	HOLE DEPTH (m)	HOLE PROGRESS	SAMPLES Depth (m)	No.	Type	SPT 'N'	STRATA RECORD Level (m aOD)	Legend	Depth *Thickness* (m)	Description
				0.00	1	D	0	92.28		0.20	Dense, dry, black/grey, sandy gravelly brick fill. TARMAC.
								91.98		0.50	Dense, dry, orange/brown, grey sandy GRAVEL with brick FILL.
				0.75	2	D					Firm, dry, orange/brown, mottled sandy CLAY. (BB).
		1		1.20	3	D					
		2		2.00	4	D		90.48		2.00	Firm, moist, orange/brown, mottled, sandy gravelly CLAY. (BB).
		3									At 3m: Becomes less gravelly.
		4		4.00	5	D		88.48		4.00	Soft, moist, orange/brown, very sandy CLAY. (BB).
		5									After 4.5m: Becoming less sandy.
								86.68		5.80	
		6		6.00	6	D					Firm, moist, grey, sandy CLAY. (BB). After 12 m: Becoming soft.
		7									
		8		8.00	7	D					
		9									
		10		10.00	8	D					

Continued on next sheet

Remarks:
RA samples: 0.0, 2.00, 10.00, 20.00 ?

Scale: 1:50

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0364**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 shell and Auger

Drilled by: FES

Date started: 21/10/2003 Completed: 21/10/2003

Logged by: SA

Ground Level: 92.48

Co-ordinates: 2956.27 1435.49

WATER	INSTALLATION/ BACKFILL	HOLE DEPTH (m)	HOLE PROGRESS	SAMPLES Depth (m)	No.	Type	SPT 'N'	STRATA RECORD Level (m aOD)	Legend	Depth *Thickness* (m)	Description
		11									Firm, moist, grey, sandy CLAY. (BB). After 12 m: Becoming soft.
		12		12.00	9	D					
		13									
		14		14.00	10	D					
		15									
		16		16.00	11	D		76.48		16.00	Becoming firmer and less sandy. (BB/TZ)
		17									
		18		18.00	12	D					
		19									
		20		20.00	13	D		72.48		20.00	*End of Borehole at 20.00 m*

Remarks:
RA samples: 0.0, 2.00, 10.00, 20.00 ?

Scale: 1:50

AWE SCRT 2 V1
February 2005

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0364**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 shell and Auger

Drilled by: FES

Date started: 21/10/2003 Completed: 21/10/2003

Logged by: SA

Ground Level: 92.48 (m aOD)

Co-ordinates: 2956.27 1435.49

SAMPLE INFORMATION

Depth (m)		Type	Headspace Result (ppm)	Sample Remarks
0.00	0.10	D	0.40	BG 0.0 - 0.4 RA
0.75	0.80	D	0.40	BG 0.2
1.20	1.30	D	0.40	BG 0.2
2.00	2.10	D	0.20	BG 0.2 RA
4.00	4.10	D	0.20	BG 0.2 RA
6.00	6.10	D	0.10	BG 0.1 RA
8.00	8.10	D	0.10	BG 0.1 RA
10.00	10.10	D	0.10	BG 0.1 RA
12.00	12.10	D	0.10	BG 0.1 RA
14.00	14.10	D	0.10	BG 0.1 RA
16.00	16.10	D	0.10	BG 0.1 RA
18.00	18.10	D	0.10	BG 0.1 RA
20.00	20.10	D	0.10	BG 0.1 RA

Remarks:

RA samples: 0.0, 2.00, 10.00, 20.00 ?

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0396**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 Shell &Auger

Drilled by: FES

Date started: 09/10/2003 Completed: 09/10/2003

Logged by: TS

Ground Level: 99.59

Co-ordinates: 2684.87 1313.32

WATER	INSTALLATION/ BACKFILL	HOLE DEPTH (m)	HOLE PROGRESS	SAMPLES Depth (m)	No.	Type	SPT 'N'	STRATA RECORD Level (m aOD)	Legend	Depth *Thickness* (m)	Description
				0.00	1	D	0	99.29		0.30	Turf over loose to medium density, dry, grey sand and gravel. Sand is fine to coarse, gravel is fine to coarse, with chert clasts.
				0.70	2	D					1A. TOPSOIL.
		1		1.00	3	D		98.69		0.90	Medium to dense, dry, light brown/orange SAND and GRAVEL with occasional chert cobbles. Sand is fine to coarse, gravel is fine to coarse with chert. 1A. (SG)
		2		2.00	4	D					Soft to firm, dry/damp, grey/orange/brown, thinly laminated, sandy CLAY. Occasional bands of clayey brown SAND. (BB)
		3		3.00	5	D		96.19		3.40	Firm to stiff, grey, moist, sandy CLAY. Rare thin laminations. (BB/TZ)
		4		4.00	6	D		95.09		4.50	Becomes stiff, grey, moist, slightly sandy CLAY. (BB/TZ).
		5									
		6		6.00	7 8	D		93.09		6.50	Very stiff, damp, grey CLAY. (LC).
		7		7.00	8	D		92.49		7.10	*End of Borehole at 7.10 m*
		8									
		9									
		10									

Remarks:
Was a shallow hole, but changed to BB/TZ. as the SG thinned. No useful contaminated land information.

Scale: 1:50

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0396**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 Shell &Auger

Drilled by: FES

Date started: 09/10/2003 Completed: 09/10/2003

Logged by: TS

Ground Level: 99.59 (m aOD)

Co-ordinates: 2684.87 1313.32

SAMPLE INFORMATION

Depth (m)		Type	Headspace Result (ppm)	Sample Remarks
0.00	0.10	D	0.00	(MG) Topsoil
0.70	0.70	D	0.00	(SG)
1.00	1.20	D	0.80	BB
2.00	-	D		BB
3.00	3.20	D	0.20	TZ
4.00	4.20	D	0.20	TZ/LC
6.00	-	D		(TZ)/(LC)
6.00	-			
7.00	7.10	D	0.20	

Remarks:

Was a shallow hole, but changed to BB/TZ. as the SG thinned. No useful contaminated land information.

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0397**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 shell and Auger

Drilled by: FES

Date started: 15/10/2003 Completed: 16/10/2003

Logged by: JA

Ground Level: 100.35

Co-ordinates: 2574.93 1386.98

WATER	INSTALLATION/ BACKFILL	HOLE DEPTH (m)	HOLE PROGRESS	SAMPLES Depth (m)	No.	Type	SPT 'N'	STRATA RECORD Level (m aOD)	Legend	Depth *Thickness* (m)	Description
				0.00	1	D	0	100.15		0.20	Dry, brown, loose (more dense at depth), sandy gravelly SILT. Gravel is fine - coarse, angular - subrounded. Flint and lots of rootlets. (1A) (MG)
				0.50	2	D					Dry, dense, brown, very clayey sandy GRAVEL. Gravel is flint, fine to coarse and angular. Some organic matter. (1A) (MG)
		1		1.10	3	D					At 1m: Brick and asphalt.
								99.05		1.30	Damp, soft, light brown/brown, mottled orange/grey, sandy CLAY. Becomes gravelly at depth. (1A) (MG)
				1.80	4	D					At 1.5m: Fine to coarse angular flint. Water added.
		2						98.45		1.90	Damp, brown/orange, mottled grey, very sandy, very clayey, fine to coarse, angular to subrounded, GRAVEL. (1A). (BB/TZ).
		3		3.00	5	D		97.25		3.10	Damp, soft - firm, brown/orange, mottled grey, laminated sandy CLAY. (1A). (BB/TZ).
		4		4.00	6	D		96.45		3.90	Damp, firm to stiff, grey, slightly sandy CLAY. (1A). (BB/TZ).
		5									
		6		5.90	7	D		94.35		6.00	*End of Borehole at 6.00 m*
		7									
		8									
		9									
		10									

Remarks:

Scale: 1:50

AWE SCRT 2 V1
February 2005

Golder Associates

Project:
Soil, Chemical, Radiological and Toxin Survey Phase 2

Borehole ID:
BH0397

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods:
Dando 500 shell and Auger

Drilled by: FES
Date started: 15/10/2003 Completed: 16/10/2003
Logged by: JA

Ground Level: 100.35 (m aOD)
Co-ordinates:
2574.93 1386.98

SAMPLE INFORMATION

Depth (m)		Type	Headspace Result (ppm)	Sample Remarks
0.00	0.10	D	0.00	RA
0.50	0.60	D	0.00	N/A
1.10	1.20	D	0.00	N/A
1.80	1.90	D	0.00	RA
3.00	3.10	D	0.90	N/A
4.00	4.10	D	0.00	N/A
5.90	6.00	D	0.30	RA

Remarks:

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0398**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 shell and Auger

Drilled by: FES

Date started: 13/10/2003 Completed: 13/10/2003

Logged by: SA

Ground Level: 99.64

Co-ordinates: 2611.05 1378.01

WATER	INSTALLATION/ BACKFILL	HOLE DEPTH (m)	HOLE PROGRESS	SAMPLES Depth (m)	No.	Type	SPT 'N'	STRATA RECORD Level (m aOD)	Legend	Depth *Thickness* (m)	Description
				0.00	1	D	0				Medium to dense, dry, brown/grey, sandty clayey GRAVEL. (MG)
				0.75	2	D					
				1.60	3	D		98.04		1.60	Soft to firm, moist, brown/greyish, sandy gravelly CLAY with roots, leaves and relic wood. (BB/TZ) From 2m: Wet, no water added.
				2.60	4	D		97.04		2.60	Firm, wet, medium, dark grey, orange mottled, sandy CLAY with some roots. (BB/TZ)
				4.00	5	D					
				5.00	6	D		94.64		5.00	Stiff, moist, dark grey CLAY. (LC)
				6.00	7	D		93.64		6.00	*End of Borehole at 6.00 m*

Remarks:
Wet from 2m. No water added.

Scale: 1:50

AWE SCRT 2 V1
February 2005

Golder Associates

Project: **Soil, Chemical, Radiological and Toxin Survey Phase 2**

Borehole ID: **BH0398**

Site: AWE Aldermaston

Client: AWE

Project No. 02525412

Equipment & Methods: Dando 500 shell and Auger

Drilled by: FES

Date started: 13/10/2003 Completed: 13/10/2003

Logged by: SA

Ground Level: 99.64 (m aOD)

Co-ordinates: 2611.05 1378.01

SAMPLE INFORMATION

Depth (m)		Type	Headspace Result (ppm)	Sample Remarks
0.00	0.10	D	0.60	BG 0.2 - 0.6 RA
0.75	0.80	D	0.20	BG 0.2
1.60	1.80	D	0.20	BG 0.2
2.60	2.80	D	0.20	BG 0.2 RA
4.00	4.10	D	0.20	BG 0.2 RA
5.00	5.10	D	0.20	BG 0.2
6.00	6.10	D	0.20	BG 0.2 RA

Remarks:

Wet from 2m. No water added.

Appendix C

Groundwater Levels for Hydrus Application Site

02/06/2004

Hole ID	X	Y	Z	GW Depth	GW Level
BH0900	459775.74	164376.25	100.44	7.9	92.54
BH0901	459829.12	164404.61	99.96	1.2	98.76
BH0902	459879.06	164422.89	100.23	7.54	92.69
BH0909	459866.20	164353.53	98.81	5.51	93.30
BH0911	459838.88	164307.97	99.25	5	94.25
BH0912	459895.39	164323.80	96.12	1.47	94.65
BH0926	459753.02	164390.11	100.21	2.12	98.09
BH0927	459869.85	164483.35	99.66	7.51	92.15
BH0928	459786.56	164460.03	99.98	7.56	92.42
BH0929	459685.08	164331.59	100.50	2.57	97.93

29/07/2004

Hole ID	X	Y	Z	GW Depth	GW Level
BH0900	459775.74	164376.25	100.44	7.51	92.93
BH0901	459829.12	164404.61	99.96	1.3	98.66
BH0902	459879.06	164422.89	100.23	7.76	92.47
BH0907	459805.94	164311.09	100.24	1.94	98.30
BH0909	459866.20	164353.53	98.81	5.64	93.17
BH0911	459838.88	164307.97	99.25	5.56	93.69
BH0912	459895.39	164323.80	96.12	1.02	95.10
BH0926	459753.02	164390.11	100.21	2.08	98.13
BH0928	459786.56	164460.03	99.98	7.74	92.24
BH0929	459685.08	164331.59	100.50	2.62	97.88

10/06/2009

Hole ID	X	Y	Z	GW Depth	GW Level
BH0333	459894.41	164528.87	99.38	1.33	98.05
BHHYD-02	459816.07	164483.46	99.89	1.74	98.15
WSHYD-06	459877.29	164426.87	99.76	2.01	97.75
BAEBH3	459887.59	164373.55	98.89	2.28	96.61
EBH8A	459693.22	164282.29	100.78	2.38	98.40
WSHYD-05	459833.10	164408.20	100.10	2.49	97.61
WSHYD-04	459785.02	164382.80	100.34	2.60	97.74
BAEBH2	459834.30	164342.33	99.98	2.97	97.01
BAEBH1	459791.62	164352.20	100.54	3.25	97.29
BH0909	459866.20	164353.53	98.81	6.32	92.49
BHHYD-03	459906.30	164400.36	99.11	6.48	92.63
EBH8	459694.77	164279.00	100.64	7.44	93.20
BHHYD-01	459810.89	164481.78	99.90	7.76	92.14

31/03/2009

Hole ID	X	Y	Z	GW Depth	GW Level
BH0333	459894.41	164528.87	99.38	1.38	98.00
BHHYD-02	459816.07	164483.46	99.89	1.61	98.29
BH0398	459825.56	164258.20	99.63	1.77	97.86
BH0907	459805.94	164311.09	100.24	1.96	98.29
BAEBH3	459887.59	164373.55	98.89	2.14	96.76
WSHYD-05	459833.10	164408.20	100.10	2.17	97.93
EBH8	459694.77	164279.00	100.64	2.33	98.31
WSHYD-04	459785.02	164382.80	100.34	2.36	97.98
WSHYD-06	459877.29	164426.87	99.76	2.45	97.32
BAEBH1	459791.62	164352.20	100.54	2.68	97.86
BAEBH2	459834.30	164342.33	99.98	2.89	97.09
BH0909	459866.20	164353.53	98.81	5.33	93.48
BHHYD-03	459906.30	164400.36	99.11	6.34	92.78
EBH8A	459693.22	164282.29	100.78	6.95	93.83
BHHYD-01	459810.89	164481.78	99.90	7.24	92.67

28/05/09 (Shallow)

Hole ID	X	Y	Z	GW Depth	GW Level
BAEBH3	459887.59	164373.55	98.89	2.33	96.56
BAEBH2	459834.30	164342.33	99.98	3.11	96.87
WSHYD-06	459877.29	164426.87	99.76	2.45	97.32
BH0398	459825.56	164258.20	99.63	1.79	97.84
BAEBH1	459791.62	164352.20	100.54	2.67	97.87
BH0333	459894.41	164528.87	99.38	1.40	97.98
WSHYD-04	459785.02	164382.80	100.34	2.29	98.05
WSHYD-05	459833.10	164408.20	100.10	2.01	98.09
EBH8	459694.77	164279.00	100.64	2.39	98.25
BHHYD-02	459816.07	164483.46	99.89	1.57	98.32
BH0907	459805.94	164311.09	100.24	1.87	98.37

28/05/09 (Deep)

Hole ID	X	Y	Z	GW Depth	GW Level
BH0909	459866.20	164353.53	98.81	5.54	93.27
BHHYD-03	459906.30	164400.36	99.11	6.10	93.01
EBH8A	459693.22	164282.29	100.78	6.77	94.01
BHHYD-01	459810.89	164481.78	99.90	7.53	92.37

29/06/09 (Shallow)

Hole ID	X	Y	Z	GW Depth	GW Level
BH0398	459825.56	164258.20	99.63	1.87	97.76
BH0333	459894.41	164528.87	99.38	1.94	97.44
BHHYD-02	459816.07	164483.46	99.89	2.03	97.86
BH0397	459790.73	164243.58	100.32	2.05	98.27
BAEBH3	459887.59	164373.55	98.89	2.26	96.63
EBH8	459694.77	164279.00	100.64	2.51	98.13
WSHYD-06	459877.29	164426.87	99.76	2.61	97.15
WSHYD-05	459833.10	164408.20	100.10	2.67	97.43
WSHYD-04	459785.02	164382.80	100.34	2.83	97.51
BAEBH2	459834.30	164342.33	99.98	2.97	97.01
BH0907	459805.94	164311.09	100.24	3.00	97.24
BAEBH1	459791.62	164352.20	100.54	3.04	97.50

29/06/09 (Deep)

Hole ID	X	Y	Z	GW Depth	GW Level
BH0909	459866.20	164353.53	98.81	6.00	92.81
BHHYD-03	459906.30	164400.36	99.11	6.78	92.33
EBH8A	459693.22	164282.29	100.78	7.72	93.06
BHHYD-01	459810.89	164481.78	99.90	7.89	92.01

Appendix D

Groundwater Abstractions

Table of Groundwater Abstractions in the Vicinity of AWE Aldermaston

Borehole Ref.	Name	Location	NGR	Purpose	Authorised Quantity (m^3/annum)
1	AWE	Aldermaston	460200 164600	Crown & Government, drinking, cooking, sanitary, washing	Not Supplied
2	Mrs J Rayner	Circus farm, Aldermaston	460100 163000	General Farming & Domestic	1659
3	Environment Agency	Groundwater Scheme Borehole	460100 162800	Environmental: Non-remedial river/wetland support: transfer between sources	-
4	Lafarge	Aldermaston Court	459430 164660	Mineral products	Not Supplied
5	Mr W J Magill	Chapel House, Baghurst	457800 161300	General farming and domestic	1659
6	Hanson Quarry Products Europe Ltd	Burnt Common Pit Borehole	462780 166450	Mineral products: make-up or top up water	Not Supplied
7	Mr RJ Arlott	Old Mill Hotel, Aldermaston	459100 166200	Hotel: Drinking, cooking, sanitary and washing	909
8	Mr C N Page	Church Farm, Baughurst, Point D	458900 160800	General farming and domestic	Not Supplied
9	Padworth Trout Farm	R kennet at Padworth Fish Farm 'B'	460500 166600	Aquaculture: Fish farm/ cress pond throughflow	Not Supplied
10	Padworth Trout Farm	R Kennet at Padworth Fish Farm 'A'	460600 166600	Aquaculture: Fish farm/ cress pond throughflow	2564
11	-	Porkers Cottage	460120 163030	Private Water Supply	Not Known
12	-	Strawberry Farm	459560 162780	Private Water Supply	Not Known

Appendix E

Electronic Dataset for Hydrus Application Site
(Groundwater, Soil, Radiological and Explosive Data)

Provided Electronically on Attached CD

Appendix F

Processed & Screened Groundwater Quality Data

Organic Parameters
Tier 1 Data Screening

ANALYTE	TYPE	TYPE	Total Nr Analyses	Nr Analyses >MDL	% Analyses >MDL	Concentration Range (ug/l)	Average Concentration (ug/l)	Assessment Criteria (AC) (ug/l)	AC Type	Nr Analyses > AC	Average Concentration > AC	Notes
Total PRO (Combined)	Organic	TPH	56	7	12.5%	11-132	38.1	10	DWS	7	Yes	DWS for Oils / Hydrocarbons
Total Petrol Range Organics	Organic	TPH	11	1	9.1%	66	-	10	DWS	1	Single analysis	DWS for Oils / Hydrocarbons
PRO C4-C10	Organic	TPH	45	6	13.3%	11 - 132	33.5	10	DWS	6	Yes	DWS for Oils / Hydrocarbons
GRO (C10-C12)	Organic	TPH	44	1	2.3%	360 - 727	-	10	DWS	1	Yes	DWS for Oils / Hydrocarbons
EPH (DRO) (C10-C40) Combined	Organic	TPH	85	13	15.3%	74 - 864	297	10	DWS	13	Yes	DWS for Oils / Hydrocarbons
EPH (DRO) (C10-C40) Aqueous	Organic	TPH	44	9	20.5%	74 - 350	208	10	DWS	9	Yes	DWS for Oils / Hydrocarbons
EPH (DRO) (C10-C40)	Organic	TPH	26	3	11.5%	184 - 595	376	10	DWS	3	Yes	DWS for Oils / Hydrocarbons
Diesel Range Organics (DRO)	Organic	TPH	15	1	6.7%	864	-	10	DWS	1	Single analysis	DWS for Oils / Hydrocarbons
>EC21-EC35 Aromatics	Organic	TPH	32	7	21.9%	10 - 52	23.4	10	DWS	6	Yes	DWS for Oils / Hydrocarbons
>C21-C35 Aliphatics	Organic	TPH	32	20	62.5%	15 - 728	171	10	DWS	20	Yes	DWS for Oils / Hydrocarbons
>C16-C21 Aliphatics	Organic	TPH	32	10	31.3%	10 - 71	30.1	10	DWS	8	Yes	DWS for Oils / Hydrocarbons
>C12-C16 Aliphatics (EC=14)	Organic	TPH	32	1	3.1%	28	-	10	DWS	1	Single analysis	DWS for Oils / Hydrocarbons
>C10-C12 Aliphatics (EC=11)	Organic	TPH	32	0								
>C6-C8 Aliphatics	Organic	TPH	4	0								
>C7-C8 Aromatics	Organic	TPH	4	0								
>C8-C10 Aliphatics (EC=9)	Organic	TPH	32	0								
>EC10-EC12 Aromatics	Organic	TPH	32	0								
>EC12-EC16 Aromatics	Organic	TPH	32	0								
>EC16-EC21 Aromatics	Organic	TPH	32	0								
>EC8-EC10 Aromatics	Organic	TPH	32	0								
C5-C35 Aliphatics	Organic	TPH	4	0								
C5-C35 Aliphatics/Aromatics	Organic	TPH	4	0								
C5-C6 Aliphatics (EC=5.5)	Organic	TPH	4	0								
C6-C35 Aromatics	Organic	TPH	4	0								
C6-C7 Aromatics	Organic	TPH	4	0								
GRO (C4-C10)	Organic	TPH	44	0								
GRO (C4-C12)	Organic	TPH	3	0								
PRO C10-C12	Organic	TPH	12	0								
Total GRO (C4-C10)	Organic	TPH	2	0								
Toluene	Organic	BTEX	199	1	0.5%	39	-	10	DWS	1	Single analysis	EQS is 50ug/l but DWS for Oils / HCs used
o-Xylene	Organic	BTEX	170	3	1.8%	14 - 27	19	10	DWS	3	Yes	DWS for Oils / Hydrocarbons
Sum Of BTEX	Organic	BTEX	46	0								
Benzene	Organic	BTEX	199	0								
Ethyl Benzene	Organic	BTEX	198	0								
p/m-Xylene	Organic	BTEX	170	0								
Xylenes	Organic	BTEX	75	0								
Total Polyaromatic Hydrocarbons	Organic	PAH	49	27	55.1%	0.066 - 2000	102	0.1	DWS	26	Yes	BH330 Anomalous high of 2 mg/l: Pos unit issue
						0.066 - 250	28			26	Yes	If use 2 ug/l not 2 mg/l
Naphthalene	Organic	PAH	196	13	6.6%	0.03 - 17	1.54	10	EQS	1	No	EQS of 10 ug/l used
Phenanthrene	Organic	PAH	104	12	11.5%	0.02 - 2.275	0.252	0.1	DWS	4	Yes	PAHs sum of 5???? (EQS Naphth = 10)
Acenaphthene	Organic	PAH	104	11	10.6%	0.02 - 0.063	0.0349	0.1	DWS	0	No	Sum of 5????
Di-sec-octyl phthalate	Organic	PAH	56	11	19.6%	1 - 4	2.09	0.1	DWS	11	Yes	PAHs sum of 5????
Fluorene	Organic	PAH	104	11	10.6%	0.01 - 0.061	0.028	0.1	DWS	0	No	PAHs sum of 5????
Anthracene	Organic	PAH	104	10	9.6%	0.016 - 0.501	0.0788	0.1	DWS	1	No	PAHs sum of 5????
Pyrene	Organic	PAH	104	10	9.6%	0.01 - 0.238	0.0746	0.1	DWS	3	No	PAHs sum of 5???? (EQS Naphth = 10)
Fluoranthene	Organic	PAH	104	8	7.7%	0.01 - 0.25	0.101	0.1	DWS	4	Yes	PAHs sum of 5????
Chrysene	Organic	PAH	104	5	4.8%	0.019 - 0.149	0.0492	0.1	DWS	1	No	PAHs sum of 5????
Benzo(a)anthracene	Organic	PAH	104	4	3.8%	0.044 - 0.142	0.0773	0.1	DWS	1	No	PAHs sum of 5????
Diethyl phthalate	Organic	PAH	59	4	6.8%	1 - 2	1.50	0.1	DWS	4	Yes	PAHs sum of 5????
Acenaphthylene	Organic	PAH	104	3	2.9%	0.01 - 0.048	0.0230	0.1	DWS	0	No	Sum of 5????
Di-n-butylphthalate	Organic	PAH	59	3	5.1%	1 - 3	1.67	0.1	DWS	3	Yes	PAHs sum of 5????
Benzo(a)pyrene	Organic	PAH	104	1	1.0%	0.247	-	0.1	DWS	1	Single analysis	PAHs sum of 5????
Benzo(b)fluoranthene	Organic	PAH	104	1	1.0%	0.268	-	0.1	DWS	1	Single analysis	PAHs sum of 5????
Benzo(ghi)perylene	Organic	PAH	104	1	1.0%	0.292	-	0.1	DWS	1	Single analysis	PAHs sum of 5????
Benzo(k)fluoranthene	Organic	PAH	104	1	1.0%	0.196	-	0.1	DWS	1	Single analysis	PAHs sum of 5????

Organic Parameters
Tier 1 Data Screening

ANALYTE	TYPE	TYPE	Total Nr Analyses	Nr Analyses >MDL	% Analyses >MDL	Concentration Range (ug/l)	Average Concentration (ug/l)	Assessment Criteria (AC) (ug/l)	AC Type	Nr Analyses > AC	Average Concentration > AC	Notes
Dibenzo(ah)anthracene	Organic	PAH	104	1	1.0%	0.048	-	0.1	DWS	0	Single analysis	PAHs sum of 5????
Indeno(1,2,3,cd)pyrene	Organic	PAH	104	1	1.0%	0.161	-	0.1	DWS	1	Single analysis	PAHs sum of 5????
Anthanthrene	Organic	PAH	8	0								
Benzo(e)pyrene	Organic	PAH	8	0								
Cumene	Organic	PAH	3	0								
Cyclopenta(cd)pyrene	Organic	PAH	8	0								
Dimethyl phthalate	Organic	PAH	59	0								
Di-n-octylphthalate	Organic	PAH	59	0								
Total PAHs (16)	Organic	PAH	26	0								
Total Phenol	Organic	Phenols	17	4	23.5%	10 - 10	10	0.5	DWS	4	Yes	DWS for phenol (EQS 30 ug/l)
Monohydric Phenols	Organic	Phenols	3	0								
Phenol	Organic	Phenols	92	0								
Thiocyanate	Organic		36	1	2.8%	60	-	50	DWS	1	Single analysis	DWS for Cyanide
Complex Cyanide	Organic		26	0								
Cyanide	Organic		90	0								
Cyanide - Free	Organic		33	0								
Trichloroethene	Organic	VOC	93	3	3.2%	3 - 4	3.33	10	DWS	0	No	with PCE (tetrachloroethene)
1,1,1-Trichloroethane	Organic	VOC	90	1	1.1%	1500	-	100	EQS	1	Single analysis	
1,2-Dichlorobenzene	Organic	VOC	151	1	0.7%	3	-	1000	WHO	0	Single analysis	
Tetrachloroethene	Organic	VOC	89	1	1.1%	3	-	10	DWS	0	Single analysis	With TCE
1,1,1,2-Tetrachloroethane	Organic	VOC	92	0								
1,1,2,2-Tetrachloroethane	Organic	VOC	92	0								
1,1,2-Trichloroethane	Organic	VOC	92	0								
1,1-Dichloroethane	Organic	VOC	92	0								
1,1-Dichloroethene	Organic	VOC	92	0								
1,1-Dichloropropene	Organic	VOC	92	0								
1,2,3-Trichlorobenzene	Organic	VOC	92	0								
1,2,3-Trichloropropane	Organic	VOC	92	0								
1,2,4-Trichlorobenzene	Organic	VOC	151	0								
1,2,4-Trimethylbenzene	Organic	VOC	92	0								
1,2-Dibromo-3-chloropropane	Organic	VOC	92	0								
1,2-Dibromoethane	Organic	VOC	92	0								
1,2-Dichloroethane	Organic	VOC	92	0								
1,2-Dichloropropane	Organic	VOC	92	0								
1,3,5-Trimethylbenzene	Organic	VOC	92	0								
1,3-Dichlorobenzene	Organic	VOC	151	0								
1,3-Dichloropropane	Organic	VOC	92	0								
1,4-Dichlorobenzene	Organic	VOC	151	0								
2,2-Dichloropropane	Organic	VOC	92	0								
2,4,5-Trichlorophenol	Organic	VOC	59	0								
2,4,6-Trichlorophenol	Organic	VOC	66	0								
2,4-Dichlorophenol	Organic	VOC	66	0								
2,4-Dimethylphenol	Organic	VOC	66	0								
2,4-Dinitrotoluene	Organic	VOC	59	0								
2,6-Dinitrotoluene	Organic	VOC	59	0								
2-Chloronaphthalene	Organic	VOC	59	0								
2-Chlorophenol	Organic	VOC	66	0								
2-Chlorotoluene	Organic	VOC	92	0								
2-Methylnaphthalene	Organic	VOC	59	0								
2-Methylphenol	Organic	VOC	59	0								
2-Nitroaniline	Organic	VOC	59	0								

Organic Parameters
Tier 1 Data Screening

ANALYTE	TYPE	TYPE	Total Nr Analyses	Nr Analyses >MDL	% Analyses >MDL	Concentration Range (ug/l)	Average Concentration (ug/l)	Assessment Criteria (AC) (ug/l)	AC Type	Nr Analyses > AC	Average Concentration > AC	Notes
2-Nitrophenol	Organic	VOC	66	0								
3-Nitroaniline	Organic	VOC	59	0								
4-Bromophenyl phenylether	Organic	VOC	59	0								
4-Chloro-3-methylphenol	Organic	VOC	66	0								
4-Chloroaniline	Organic	VOC	59	0								
4-Chlorophenyl phenylether	Organic	VOC	59	0								
4-Chlorotoluene	Organic	VOC	92	0								
4-Isopropyltoluene	Organic	VOC	92	0								
4-Methylphenol	Organic	VOC	59	0								
4-Nitroaniline	Organic	VOC	59	0								
4-Nitrophenol	Organic	VOC	66	0								
Carbon Tetrachloride	Organic	VOC	92	0								
Chlorobenzene	Organic	VOC	92	0								
Chlorodibromomethane	Organic	VOC	63	0								
Chloroethane	Organic	VOC	92	0								
Chloroform	Organic	VOC	32	0								
Chloromethane	Organic	VOC	92	0								
cis-1,2-Dichloroethene	Organic	VOC	92	0								
cis-1,3-Dichloropropene	Organic	VOC	92	0								
Dibromochloromethane	Organic	VOC	29	0								
Dibromomethane	Organic	VOC	92	0								
Dichlorodifluoromethane	Organic	VOC	92	0								
Dichloromethane	Organic	VOC	92	0								
Methyl chloroform	Organic	VOC	3	0								
MTBE	Organic	VOC	29	0								
Styrene	Organic	VOC	92	0								
Tecnazene	Organic	VOC ?	7	0								
Tetrachloroethylene	Organic	VOC	3	0								
trans-1,2-Dichloroethene	Organic	VOC	92	0								
trans-1,3-Dichloropropene	Organic	VOC	92	0								
Trichlorofluoromethane	Organic	VOC	92	0								
Trichloromethane	Organic	VOC	60	0								
Vinyl Chloride	Organic	VOC	92	0								
Volatiles Screen	Organic	VOC	20	0								
PCB Total	Organic	PCB	4	0								
PCB 105	Organic	PCB	44	0								
PCB 114	Organic	PCB	44	0								
PCB 118	Organic	PCB	44	0								
PCB 123	Organic	PCB	44	0								
PCB 126	Organic	PCB	44	0								
PCB 156	Organic	PCB	44	0								
PCB 157	Organic	PCB	44	0								
PCB 167	Organic	PCB	44	0								
PCB 169	Organic	PCB	44	0								
PCB 189	Organic	PCB	44	0								
PCB 77	Organic	PCB	44	0								
PCB 81	Organic	PCB	44	0								
Carbophenothion	Organic	Pest / Herb?	7	0								
Endosulfan I	Organic	Pest / Herb ?	7	0								

Organic Parameters
Tier 1 Data Screening

ANALYTE	TYPE	TYPE	Total Nr Analyses	Nr Analyses >MDL	% Analyses >MDL	Concentration Range (ug/l)	Average Concentration (ug/l)	Assessment Criteria (AC) (ug/l)	AC Type	Nr Analyses > AC	Average Concentration > AC	Notes
Endosulfan II	Organic	Pest / Herb ?	7	0								
Endosulfan Sulphate	Organic	Pest / Herb ?	7	0								
Endrin	Organic	Pest / Herb ?	7	0								
Ethion	Organic	Pest / Herb ?	7	0								
Etrimphos	Organic	Pest / Herb ?	7	0								
Fenitrothion	Organic	Pest / Herb ?	7	0								
Fenthion	Organic	Pest / Herb ?	7	0								
Heptachlor	Organic	Pest / Herb ?	7	0								
Methyl Parathion	Organic	Pest / Herb ?	7	0								
Mevinphos	Organic	Pest / Herb ?	7	0								
o,p'-DDE	Organic	Pest / Herb ?	7	0								
o,p'-DDT	Organic	Pest / Herb ?	7	0								
o,p'-Methoxychlor	Organic	Pest / Herb ?	7	0								
o,p'-TDE	Organic	Pest / Herb ?	7	0								
p,p'-DDE	Organic	Pest / Herb ?	7	0								
p,p'-DDT	Organic	Pest / Herb ?	7	0								
p,p'-TDE	Organic	Pest / Herb ?	7	0								
Parathion	Organic	Pest / Herb ?	7	0								
Pendimethalin	Organic	Pest / Herb ?	7	0								
Pirimiphos methyl	Organic	Pest / Herb ?	7	0								
Propazine	Organic	Pest / Herb ?	4	0								
Propetamphos	Organic	Pest / Herb ?	7	0								
Trietazine	Organic	Pest / Herb ?	4	0								
Trifluralin	Organic	Pest / Herb ?	7	0								
Aldrin	Organic	Pest / Herb	7	0								
alpha-HCH	Organic	Pest / Herb	7	0								
Atrazine	Organic	Pest / Herb	4	0								
Azinphos ethyl	Organic	Pest / Herb	7	0								
Azinphos methyl	Organic	Pest / Herb	7	0								
Azobenzene	Organic	Pest / Herb	59	0								
beta-HCH	Organic	Pest / Herb	7	0								
Chlorfenvinphos	Organic	Pest / Herb	7	0								
Diazinon	Organic	Pest / Herb	7	0								
Dibenzofuran	Organic	Pest / Herb	59	0								
Dichlorvos	Organic	Pest / Herb	7	0								
Dieldrin	Organic	Pest / Herb	7	0								
Lindane	Organic	Pest / Herb	7	0								
Malathion	Organic	Pest / Herb	7	0								
Simazine	Organic	Pest / Herb	4	0								
Total Organochlorine Pesticides	Organic	Pest / Herb	8	0								
Triazophos	Organic	Pest / Herb	7	0								
Carbon Disulphide	Organic	?	92	0								
bis (2-chloroethoxy) ether	Organic	?	3	0								
bis (2-chloroethoxy) methane	Organic	?	59	0								
bis (2-ethylhexyl) phthalate	Organic	?	3	0								
Bromobenzene	Organic	?	92	0								
Bromochloromethane	Organic	?	92	0								
Bromodichloromethane	Organic	?	92	0								
Bromoform	Organic	?	92	0								

Organic Parameters
Tier 1 Data Screening

ANALYTE	TYPE	TYPE	Total Nr Analyses	Nr Analyses >MDL	% Analyses >MDL	Concentration Range (ug/l)	Average Concentration (ug/l)	Assessment Criteria (AC) (ug/l)	AC Type	Nr Analyses > AC	Average Concentration > AC	Notes
Bromomethane	Organic	?	92	0								
Butyl benzyl phthalate	Organic	?	59	0								
Carbazole	Organic	?	59	0								
Chlorothalonil	Organic	?	7	0								
Chlorpyriphos	Organic	?	7	0								
Chlorpyriphos-methyl	Organic	?	7	0								
Dichloroethyl ether	Organic	?	56	0								
Dimethoate	Organic	?	7	0								
Heptachlor Epoxide	Organic	?	7	0								
Hexachlorobenzene	Organic	?	66	0								
Hexachlorobutadiene	Organic	?	151	0								
Hexachlorocyclopentadiene	Organic	?	59	0								
Hexachloroethane	Organic	?	59	0								
Isophorone	Organic	?	59	0								
Isopropylbenzene	Organic	?	89	0								
Methoxychlor	Organic	?	7	0								
n-Butylbenzene	Organic	?	92	0								
Nitrobenzene	Organic	?	59	0								
N-nitrosodi-n-propylamine	Organic	?	9	0								
N-nitrosodi-n-propylamine	Organic	?	50	0								
n-Propylbenzene	Organic	?	63	0								
Pentachlorophenol	Organic	?	66	0								
Permethrin	Organic	?	7	0								
Phosalone	Organic	?	7	0								
Prometryn	Organic	?	4	0								
Propylbenzene	Organic	?	29	0								
Quintozene (PCNB)	Organic	?	7	0								
sec-Butylbenzene	Organic	?	92	0								
Terbutryn	Organic	?	4	0								
Terbutylazine	Organic	?	4	0								
tert-Butlybenzene	Organic	?	26	0								
tert-Butyl methyl ether	Organic	?	150	0								
tert-Butylbenzene	Organic	?	66	0								
Triadimefon	Organic	?	7	0								
Triallate	Organic	?	6	0								
Triallite	Organic	?	1	0								
Tributyltin	Organic	?	7	0								
Triphenyltin	Organic	?	7	0								

Inorganic Parameters
Tier 1 Data Screening

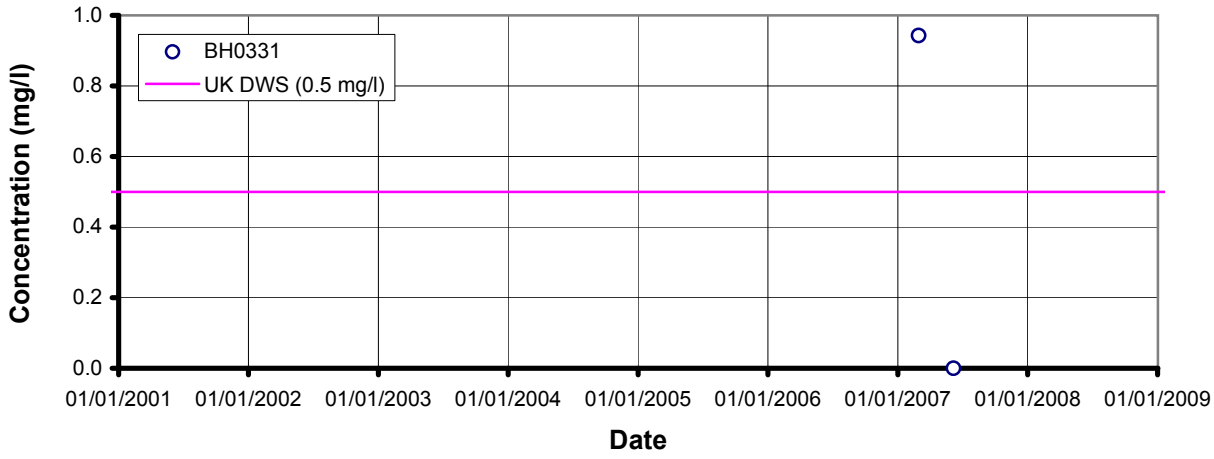
ANALYTE	TYPE	TYPE	Total Nr Analyses	Nr Analyses >MDL	% Analyses >MDL	Concentration Range (ug/l)	Average Concentration (ug/l)	Assessment Criteria (AC) (ug/l)	AC Type	Nr Analyses > AC	Average Concentration > AC
Cadmium	Inorganic	I Metal / Metalloids	129	10	7.8%	0.1 - 8.4	1.60	5	DWS	2	No
Mercury	Inorganic	I Metal / Metalloids	121	9	7.4%	0.05 - 0.1	0.063	1	DWS / EQS	0	No
Mercury Low Dutch Target AA	Inorganic	I Metal / Metalloids	8	0							
Arsenic	Inorganic	II Metal / Metalloids	129	35	27.1%	1 - 27	3.17	10	DWS	2	No
Barium	Inorganic	II Metal / Metalloids	69	68	98.6%	10 - 60	29.1	1000	DWS	0	No
Boron	Inorganic	II Metal / Metalloids	129	52	40.3%	10 - 181	44.3	1000	DWS	0	No
Chromium	Inorganic	II Metal / Metalloids	129	85	65.9%	1 - 121	4.32	50	DWS	1	No
Copper	Inorganic	II Metal / Metalloids	129	65	50.4%	1 - 2800	46.8	2000	DWS	1	No
Coper (corrected for Max)						1 - 34	3.7			0	No
Lead	Inorganic	II Metal / Metalloids	129	6	4.7%	1 - 3	1.50	25	DWS	0	No
Nickel	Inorganic	II Metal / Metalloids	129	120	93.0%	1 - 25000	217	20	DWS	8	Yes
Nickel (Correction for Max)						1-160	9			8	No
Selenium	Inorganic	II Metal / Metalloids	117	40	34.2%	1 - 12	2.38	10	DWS	1	No
Vanadium	Inorganic	II Metal / Metalloids	44	26	59.1%	1 - 5	2.54	20	EQS	0	No
Zinc	Inorganic	II Metal / Metalloids	128	102	79.7%	3 - 180	22.7	5000	DWS	0	No
Hexavalent Chromium	Inorganic	II Metal / Metalloids	26	0							
Antimony	Inorganic	II Metal / Metalloids	3	0							
Beryllium	Inorganic	II Metal / Metalloids	99	0							
Chromium VI	Inorganic	II Metal / Metalloids	5	0							
Molybdenum	Inorganic	II Metal / Metalloids	3	0							
Selenium Low Level by AA	Inorganic	II Metal / Metalloids	8	0							
Alkalinity Total as CaCO3	Inorganic	Misc	8	8	100.0%	10000 - 150000	80250	No Ac		0	
Ammoniacal Nitrogen as N	Inorganic	Misc	44	9	20.5%	200 - 1900	778	500	DWS	4	Yes
Ammoniacal Nitrogen as NH4-N	Inorganic	Misc	56	31	55.4%	200 - 7900	968	500	DWS	16	Yes
Biochemical Oxygen Demand	Inorganic	Misc	32	25	78.1%	1000 - 48000	10640	No AC			
Calcium	Inorganic	Misc	7	7	100.0%	12970 - 38410	27053	250000	DWS	0	No
Chemical Oxygen Demand	Inorganic	Misc	54	42	77.8%	11000 - 2455000	289714	No AC			
Chloride	Inorganic	Misc	55	55	100.0%	12000 - 71000	29345	250000	DWS	0	No
Dissolved Oxygen	Inorganic	Misc	10	10	100.0%	3100 - 8400	6910	No AC			
Electrical Conductivity	Inorganic	Misc	29	29	100.0%	0.199 - 0.353	0.288	No AC			
Iron	Inorganic	Metal	20	17	85.0%	10 - 787	147	200	DWS	2	No
Magnesium	Inorganic	Metal	8	8	100.0%	1740 - 7740	5318	50000	DWS	0	No
Manganese	Inorganic	Metal	8	8	100.0%	4 - 124	42.3	50	DWS	2	No
Nitrate	Inorganic	Misc	26	19	73.1%	300 - 1700	558	11300	DWS	0	No
pH	Inorganic	Misc	106	106	100.0%	4.6 - 8.59	7.28	No AC			
pH	Inorganic	Misc	26	26	100.0%	5.99 - 8.2	7.26				
Potassium	Inorganic	Metal	7	7	100.0%	1600 - 3600	2514	12000	DWS	0	No
Sodium	Inorganic	Metal	7	7	100.0%	16500 - 47500	31429	200000	DWS	0	No
Solvent Extractable Matter	Inorganic	Misc	9	7	77.8%	1000 - 3000	1571	No AC			
Sulphate	Inorganic	Misc	88	87	98.9%	4000 - 4696000	78931	250000	DWS	1	No
Sulphate (corrected for above)						4000 - 97000	25008			0	No
Sulphide	Inorganic	Misc	7	7	100.0%	30 - 140	57.1	0.25	DWS	7	Yes
Total Dissolved Solids	Inorganic	Misc	7	7	100.0%	101000 - 175000	146286	No AC			
Total Organic Carbon	Inorganic	Misc	34	34	100.0%	1000 - 53000	5500	No AC			
Total Oxidised Nitrogen	Inorganic	Misc	7	4	57.1%	1300 - 5900	3600	11500	DWS	0	No
Total Sulphur as SO4 (Dissolved)	Inorganic	Misc	25	25	100.0%	4000 - 165000	29880	No AC			
Total Suspended Solids	Inorganic	Misc	7	7	100.0%	20000 - 517000	143429	No AC			
Sulphur	Inorganic	Misc	43	0							

Appendix G

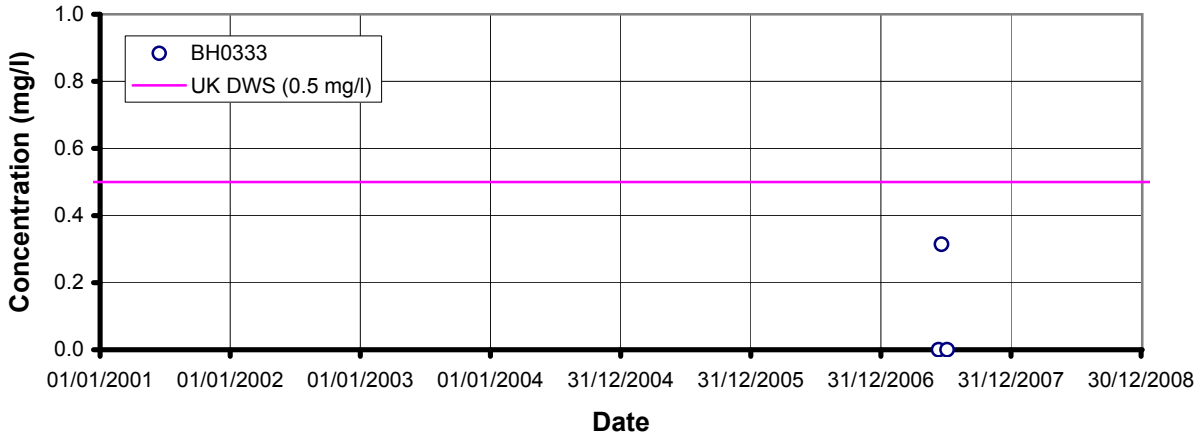
Time Series Concentration Plots for Groundwater

AWE Project Hydrus
Ammoniacal Nitrogen Concentration in Groundwater

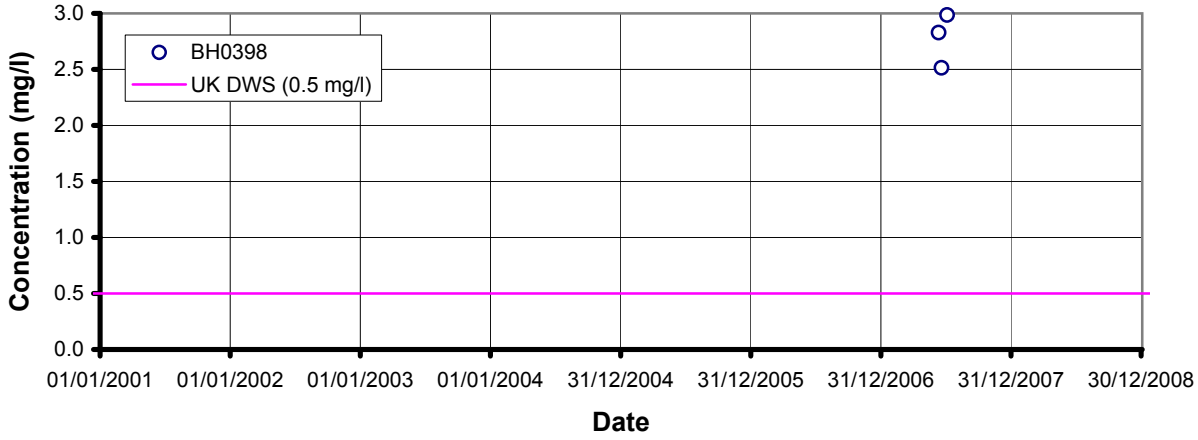
Borehole BH0331



Borehole BH0333



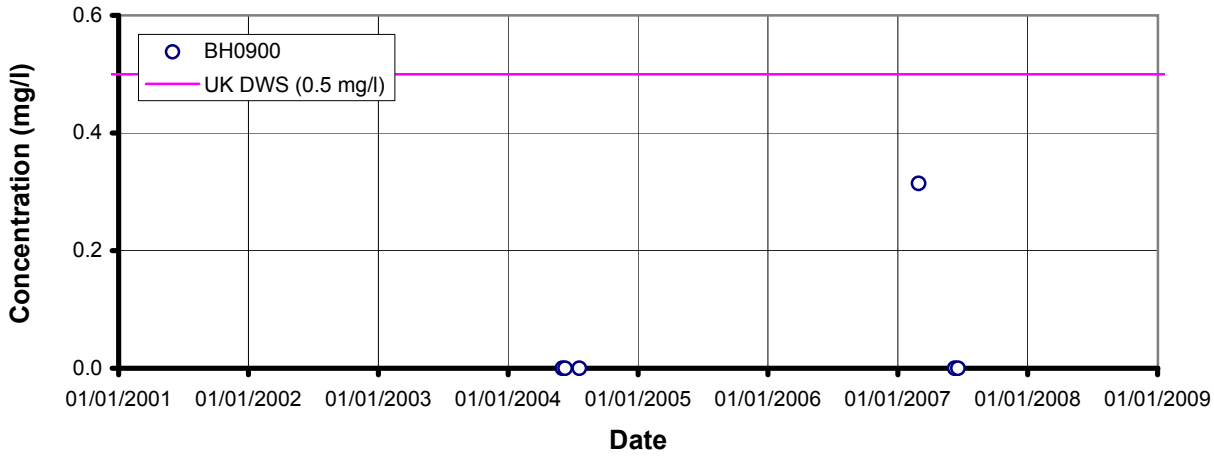
Borehole BH0398



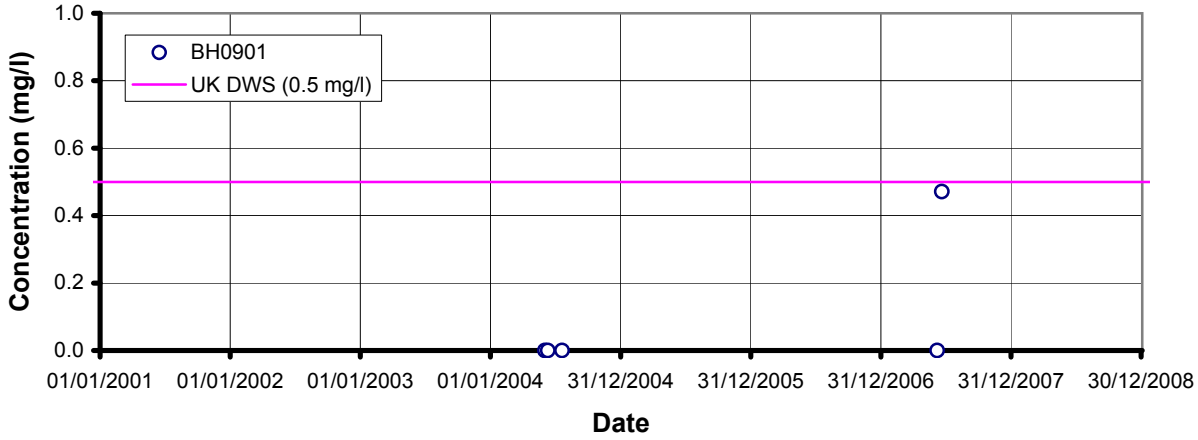
Note: Concentration of 0 mg/l represents measurment below the Method Detection Limit.

AWE Project Hydrus
Ammoniacal Nitrogen Concentration in Groundwater

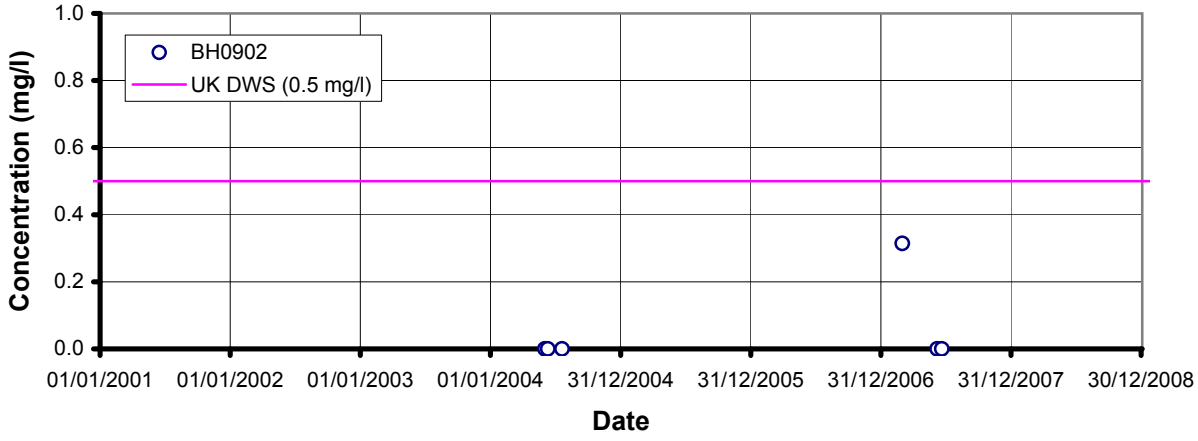
Borehole BH0900



Borehole BH0901



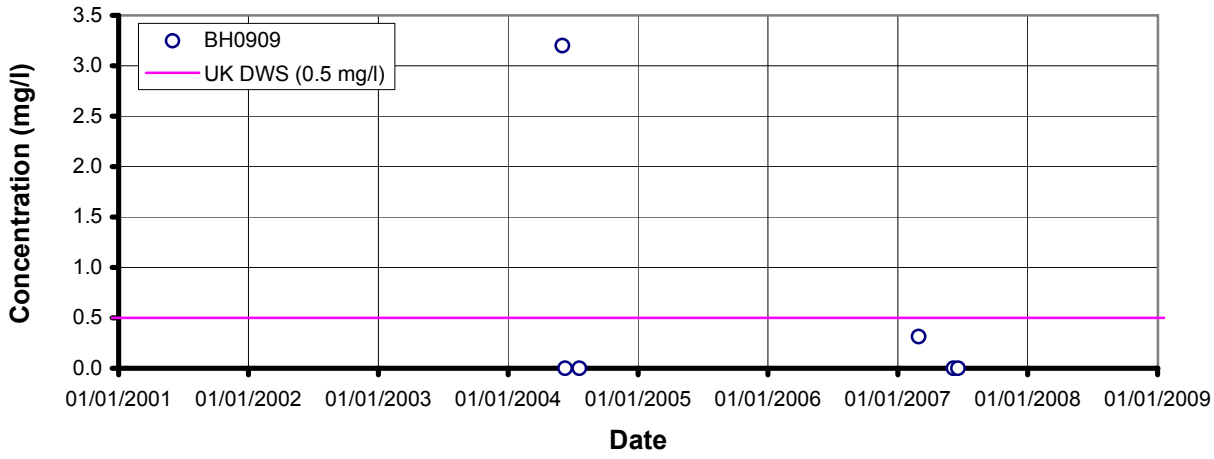
Borehole BH0902



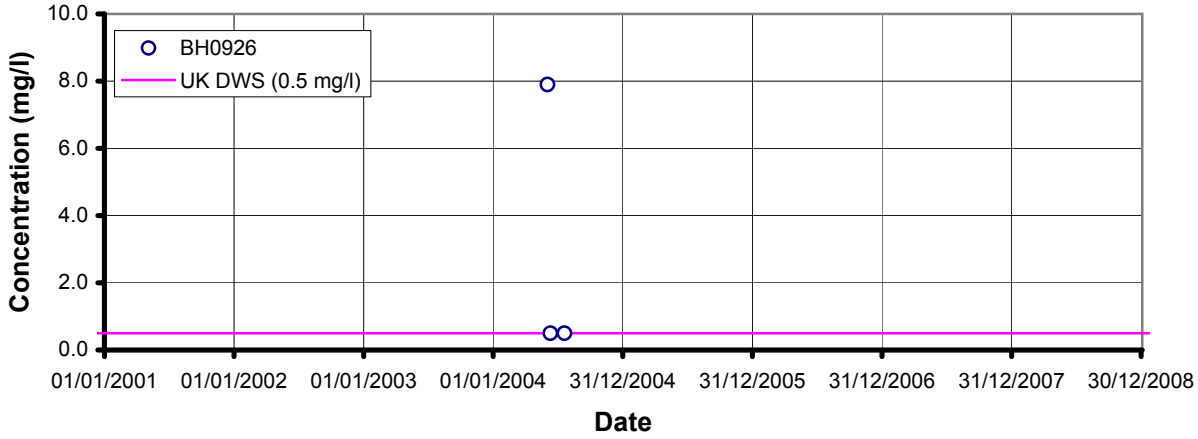
Note: Concentration of 0 mg/l represents measurment below the Method Detection Limit.

AWE Project Hydrus
Ammoniacal Nitrogen Concentration in Groundwater

Borehole BH0909



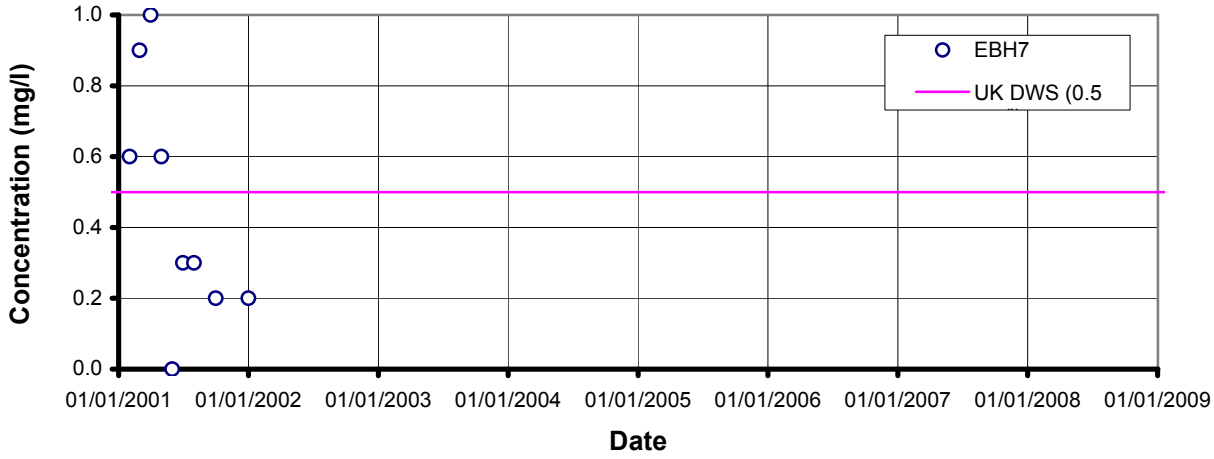
Borehole BH0926



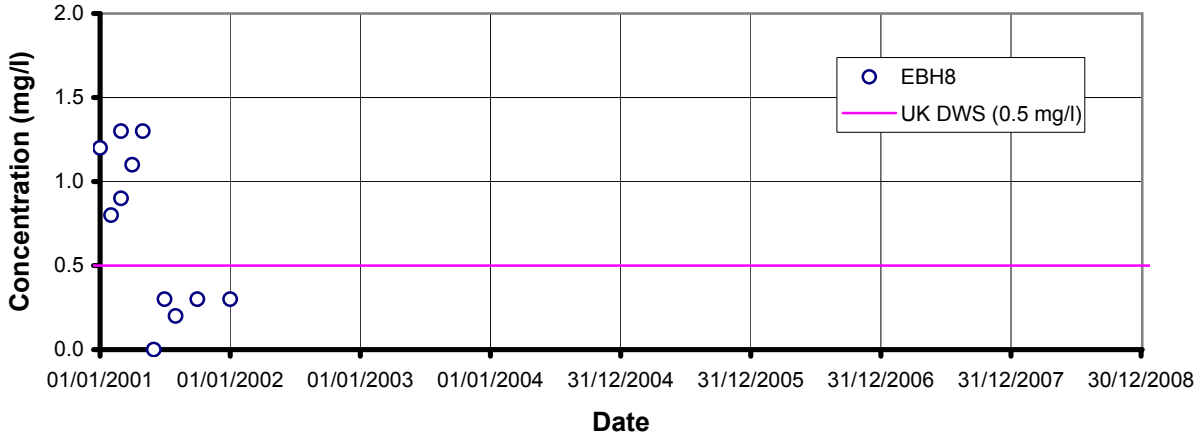
Note: Concentration of 0 mg/l represents measurment below the Method Detection Limit.

AWE Project Hydrus
Ammoniacal Nitrogen Concentration in Groundwater

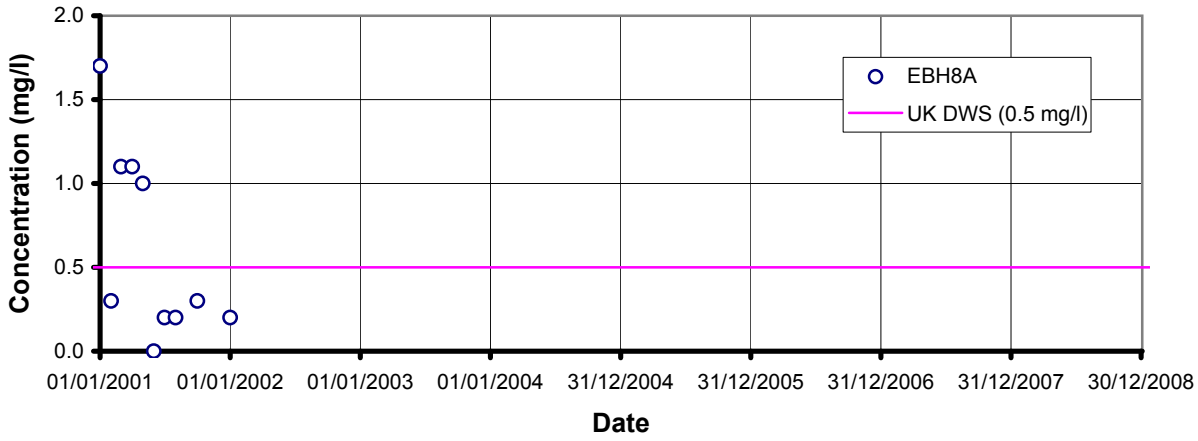
Borehole EBH7



Borehole EBH8



Borehole EBH8A



Note: Concentration of 0 mg/l represents measurment below the Method Detection Limit.

Appendix H

Controlled Water Risk Assessment

Remedial Targets Work Sheet Files

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.1

Date of Workbook Issue: October 2006

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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The calculation of equations in this worksheet has been independently checked by Entec (UK) Ltd on behalf of the Environment Agency.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Application Site - Hydrus			
Site Address:	AWE Aldermaston			
Completed by:	L Willmott			
Date:	14-Aug-09		Version:	1.1
Contaminant	Aliphatic C21-C35			
Target Concentration (C_T)	0.01	mg/l	Origin of C_T:	DWS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.1

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Aliphatic C21-C35		from Level 1
Target Concentration	C_T	1.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	3.35E-01	mg/l	*Concentration in borehole WSHYD-06*
Half life for degradation of contaminant in water	$t_{1/2}$	9.00E+99	days	*No biodegradation assumed*
Calculated decay rate	λ	7.70E-101	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	5.00E+00	m	*Local area around borehole*
Plume thickness at source	Sy	4.00E-01	m	*Part of saturated aquifer thickness*
Saturated aquifer thickness	da	5.50E-01	m	*Depth of water in WSHYD-06 (May 2009)*
Bulk density of aquifer materials	ρ	1.36E+00	g/cm^3	*Minimum value for a gravel*
Effective porosity of aquifer	n	1.00E-01	fraction	*Minimum value for a coarse gravel*
Hydraulic gradient	i	1.33E-02	fraction	*Calculated gradient across the site*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Minimum value measured in AWE(A)*
Distance to compliance point	x	8.50E+01	m	*Distance to eastern site boundary*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	*Recommended*
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	*Recommended*
Time since pollutant entered groundwater	t	9.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.98E+04	l/kg	*see options*
Longitudinal dispersivity	ax	8.50E+00	m	*see options*
Transverse dispersivity	az	8.50E-01	m	*see options*
Vertical dispersivity	ay	8.50E-02	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.15E-02	m/d
Retardation factor	Rf	5.41E+05	fraction
Decay rate used	λ	1.42E-106	d^{-1}
Rate of contaminant flow due to retardation	u	2.13E-08	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{EC}	4.63E-03	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**7.24E+01**	

Remedial Targets

Remedial Target	**7.24E-01**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks			
Distance to compliance point	**85**	**m**	
Concentration of contaminant at compliance point C_{EC}/C_0	**4.63E-03**	**mg/l**	Ogata Banks
after	**9.0E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	1.00E-04	fraction
Organic carbon partition coefficient	Koc	3.98E+08	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	3.98E+04	l/kg

Define dispersivity (click brown cell and use pull down list)

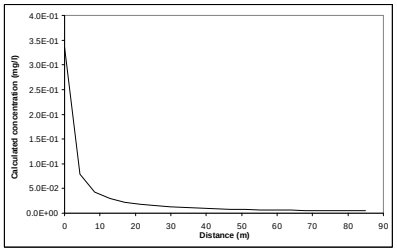
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	8.50E+00	4.06E+00	m
Transverse dispersivity	**az**	0.00E+00	8.50E-01	4.06E-01	m
Vertical dispersivity	**ay**	0.00E+00	8.50E-02	4.06E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Application Site - Hydrus
Completed by:	L Willmott
Date:	########
Version:	1.1

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	3.4E-01
4.3	7.86E-02
8.5	4.27E-02
12.8	2.93E-02
17.0	2.23E-02
21.3	1.80E-02
25.5	1.51E-02
29.8	1.30E-02
34.0	1.14E-02
38.3	1.02E-02
42.5	9.17E-03
46.8	8.35E-03
51.0	7.66E-03
55.3	7.08E-03
59.5	6.58E-03
63.8	6.15E-03
68.0	5.77E-03
72.3	5.43E-03
76.5	5.13E-03
80.8	4.87E-03
85.0	4.63E-03

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.1

Date of Workbook Issue: October 2006

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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The calculation of equations in this worksheet has been independently checked by Entec (UK) Ltd on behalf of the Environment Agency.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Application Site - Hydrus			
Site Address:	AWE Aldermaston			
Completed by:	L Willmott			
Date:	18-Aug-09		Version:	1.1
Contaminant	Aromatic C21-C35			
Target Concentration (C_T)	0.01	mg/l	Origin of C_T:	DWS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Remedial Targets Worksheet , Release 3.1

Level 1 - Soil

Select the method of calculating the soil water Partition Co-efficient by using the pull down menu below

Calculate for non-polar organic chemicals

Contaminant		**Aromatic C21-C35**		
Target concentration	C_T	**0.01**	**mg/l**	

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**
Standard entry				
Water filled soil porosity	θ_W	1.00E-02	fraction	Unsaturated zone - some residual water present
Air filled soil porosity	θa	1.90E-01	fraction	Minimum porosity value for gravelly sand
Bulk density of soil zone material	ρ	1.37E+00	g/cm^3	Minimum value for a gravelly sand
Henry's Law constant	H	8.20E-05	dimensionless	*Value from TPH Working Group for Aro 21-35*
Entry if specify partition coefficient (option)				
Soil water partition coefficient	Kd		l/kg	
Entry for non-polar organic chemicals (option)				
Fraction of organic carbon (in soil)	foc	2.00E-04	fraction	Minimum value for Made Ground
Organic carbon partition coefficient	Koc	1.26E+05	l/kg	*Value from TPH Working Group for Aro 21-35*
Entry for ionic organic chemicals (option)				
Sorption coefficient for neutral species	$K_{oc,n}$		l/kg	
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg	
pH value	pH		pH units	
Acid dissociation constant	pKa			
Fraction of organic carbon (in soil)	foc		fraction	
Soil water partition coefficient used in Level Assessment	**Kd**	**2.52E+01**	**l/kg**	*Calculated value*

This sheet calculates the Level 1 remedial target for soils(mg/kg) based on a selected target concentration and theoretical calculation of soil water partitioning. Three options are included for determining the partition coefficient.

The measured soil concentration as mg/kg should be compared with the Level 1 remedial target to determine the need for further action.

Level 1 Remedial Target

Level 1 Remedial Target	**2.52E-01**	**mg/kg**	**(for comparison with soil analyses)**
	or		
	0.01	**mg/l**	**(for comparison with leachate test results)**

Site being assessed:	Application Site - Hydrus
Completed by:	L Willmott
Date:	18-Aug-09
Version:	1.1

Remedial Targets Worksheet , Release 3.1

Level 2 - Soil

Contaminant		**Aromatic C21-C35**		from Level 1	This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).
Target concentration	C_T	**0.01**	**mg/l**	from Level 1	

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters

	Variable	Value	Unit	Source of parameter value	
Standard entry					
Infiltration	Inf	1.64E-03	m/d	**Maximum value**	
Area of contaminant source	A	4.00E+02	m^2	**10 x 40 m (area around TP1016 and TP 1014)**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	1.00E+01	m	**Horizontal distance from TP1014 and TP1016**	
Saturated aquifer thickness	da	1.20E+00	m	**Depth of groundwater in BH0333 (closest BH)**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	8.64E-02	m/d	**Minimum value measured on AWE(A)**	
Hydraulic gradient of water table	i	1.33E-02	fraction	**Hydraulic gradient measured across the site**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+01	m	**Distance between TP1014 and TP1016**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	0.00E+00	mg/l	**None assumed**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	1.20E+00	m		

Calculated Parameters

Dilution Factor	**DF**	**1.08E+00**		
Level 2 Remedial Target		**1.08E-02**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentra**
		or		
		2.73E-01	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc		mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Application Site - Hydrus
Completed by:	L Willmott
Date:	18-Aug-09
Version:	1.1

Remedial Targets Worksheet , Release 3.1

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Aromatic C21-C35		from Level 1
Target Concentration	C_T	0.01	mg/l	from Level 1
Dilution Factor	DF	1.08E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to pollutants in all phases (e.g. field derived value,**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration		900	mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	9.00E+99	days	*No biodegradation assumed*
Calculated decay rate	λ	7.70E-101	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	1.20E+00	m	from Level 2
Bulk density of aquifer materials	ρ	1.36E+00	g/cm^3	*Minimum value for a gravel*
Effective porosity of aquifer	n	1.00E-01	fraction	*Minimum value for a coarse gravel*
Hydraulic gradient	i	1.72E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	8.64E-02	m/d	from Level 2
Distance to compliance point	x	2.70E+01	m	*Distance to eastern site boundary*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.26E+01	l/kg	*see options*
Longitudinal dispersivity	ax	2.700	m	*see options*
Transverse dispersivity	az	0.270	m	*see options*
Vertical dispersivity	ay	0.027	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	1.48E-01	m/d
Retardation factor	Rf	1.72E+02	fraction
Decay rate used	λ	7.70E-101	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	1.72E-01	fraction
Rate of contaminant flow due to retardation	u	8.60E-04	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	6.80E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.47E+00**	**fraction**
Calculated soil leachate concentration	Co	3.57E+01	mg/l

Remedial Targets

Level 3 Remedial Target	**1.60E-02**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks	**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
	4.02E-01	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point	**27**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration C_{ED}/C_0	**6.80E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	1.00E-04	fraction
Organic carbon partition coefficient	Koc	1.26E+05	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.26E+01	l/kg

Define dispersivity (click brown cell and use pull down list)

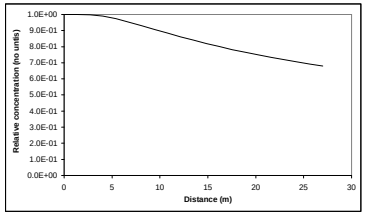
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.70E+00	1.97E+00	m
Transverse dispersivity	**az**	0.00E+00	2.70E-01	1.97E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.70E-02	1.97E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by Q, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Application Site - Hydrus
Completed by:	L Willmott
Date:	########
version:	1.1

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	1.0E+00	3.29E+01
1.4	1.00E+00	3.29E+01
2.7	9.98E-01	3.29E+01
4.1	9.90E-01	3.26E+01
5.4	9.74E-01	3.21E+01
6.8	9.53E-01	3.14E+01
8.1	9.30E-01	3.06E+01
9.5	9.07E-01	2.99E+01
10.8	8.84E-01	2.91E+01
12.2	8.62E-01	2.84E+01
13.5	8.40E-01	2.77E+01
14.9	8.20E-01	2.70E+01
16.2	8.01E-01	2.64E+01
17.6	7.82E-01	2.58E+01
18.9	7.65E-01	2.52E+01
20.3	7.49E-01	2.47E+01
21.6	7.33E-01	2.42E+01
23.0	7.19E-01	2.37E+01
24.3	7.05E-01	2.32E+01
25.7	6.92E-01	2.28E+01
27.0	6.80E-01	2.24E+01

Appendix I

Gas Report for Hydrus Development Area (RPS, 2009)

Ground Gas Interpretative Report

Project Hydrus, AWE Aldermaston, Berkshire

AWE plc

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JER4173/HYDRUS/GAS/I
Revision: 1
July 2009

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Planning & Development

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JER4173-002 Gas and Groundwater Monitoring Locations

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Appendix A **Recent Gas Monitoring Data**

Appendix B **Previous Gas Monitoring Data (supplied by AWE)**

Executive Summary

A programme of gas monitoring has been undertaken within the Hydrus development area to provide a more robust dataset for the assessment of risk posed by the presence of potentially harmful ground gases. Previous gas monitoring within the Hydrus development area has indicated elevated levels of methane and carbon dioxide to be present.

In total, 6 fortnightly rounds of gas monitoring were undertaken on the 6 new wells installed by RPS as part of the groundwater monitoring works (*Ref. 3*). A total of 3 rounds of gas monitoring were undertaken on up to 10 existing installations within the general Hydrus development area, as requested by AWE. The gas monitoring was undertaken in general accordance with CIRIA C665 (*Ref. 1*).

The data from the additional monitoring was combined with the previous monitoring data to form the basis of a ground gas risk assessment.

Carbon dioxide was recorded in the majority of borehole installations, with a maximum concentration of 4.6%. Methane was recorded on a number of occasions during the previous monitoring and twice during the recent monitoring programme, with a maximum concentration of 19.9% recorded. Flow rates were predominantly negative during the monitoring programmes, but a maximum flow of 3.2 l/hr was recorded in Borehole BHHYD-003, but did not coincide with detections of carbon dioxide or methane. The maximum flow rate from the previous rounds of gas monitoring (2.6 l/hr in Borehole CP1002 coincided with a maximum methane concentration of 0.2% and a maximum carbon dioxide concentration of 3.3%.

The presence of carbon monoxide was detected on a number of occasions during the previous rounds of monitoring with a maximum concentration of 26ppm, but was not recorded during the recent monitoring programme.

The gas risk assessment, undertaken in line with CIRIA C665 and BS8485 (*Ref. 2*) has given the following classifications:

- Characteristic Situation 2 (CS2), ‘Low Risk’ for carbon dioxide; and

- Characteristic Situation 1 (CS1), 'Very Low Risk' for methane. It is recommended however that the risk level for methane be increased to CS2, 'Low Risk', based upon the maximum concentrations recorded and the potential permeability of the shallow soils.

The repeated detection of carbon monoxide during the previous rounds of gas monitoring is considered to pose a low risk to the development.

On the basis of this risk assessment, gas protection measures are considered to be required to be installed in new buildings.

1 Introduction

1.1 Background

RPS Planning and Development (RPS) have been requested by AWE plc (Order ref. 30090214/0 dated 30th January 2009) to undertake an intrusive ground investigation and associated gas and groundwater monitoring to support the AWE Project Hydrus Development at AWE Aldermaston (AWE (A)). This report provides a summary of the gas monitoring programme and an assessment of the risks associated with the potential presence of ground gas.

Previous gas monitoring undertaken by AWE in April - June 2007 and August/September 2008 has identified the presence of elevated levels of Hydrogen Sulphide and Carbon Monoxide in the shallow soils (typically Made Ground, Silchester Gravel and Bagshot Beds), with maximum concentrations of 2ppm (Borehole CP1001) and 26ppm (Borehole CP1002) respectively. Elevated methane levels have also been recorded with a maximum concentration of 12.4% recorded within Borehole BH0398. A maximum carbon dioxide concentration of 4.6% was recorded within Borehole CP1001 during the previous rounds of gas monitoring.

An additional gas monitoring programme has therefore been undertaken to provide a more robust dataset to allow a better understanding of the ground gas regime. This dataset would therefore be used to determine the requirement for gas protection measures within the proposed structures, in line with CIRIA C665 (*Ref. 1*) and BS8485 (*Ref. 2*). Locations of monitoring wells are provided on *Drawing JER4173-002*.

Prior to the commencement of the gas monitoring programme, RPS was instructed by AWE to install 4 new shallow and 2 new deep monitoring wells within the Hydrus development area to provide installations for the gas and groundwater monitoring programme. During the monitoring period, AWE requested that the existing monitoring wells were incorporated into the programme, therefore the last 2 rounds of monitoring included up to 9 additional installations within the Hydrus development area.

1.2 Key Objectives

The key objectives of this report are:

- To assess risks associated with the presence of ground gas in line with CIRIA C665 (*Ref. 1*) and BS8485 (*Ref. 2*); and
- Provide recommendations on the requirements for gas protection measures within structures, if required.

1.3 Report Structure

The remainder of the report is structured as follows:

Section 2: *Site Setting Summary;*

Section 3: *Monitoring Methodology and Results;*

Section 4: *Ground Gas Risk Assessment;* and

Section 6: *Recommendations and Conclusions.*

2 Site Setting Summary

2.1 Introduction

This section of the report summarises the site setting of the Hydrus development area at AWE Aldermaston, which includes a description of the site and its surroundings, the regional geology, hydrogeology and hydrology where relevant.

2.2 Site Location and Description

2.2.1 General

AWE Aldermaston lies south of the Kennet Valley in Berkshire on a flat, wooded, broad east-west gravel plateau at approximately 100mAOD. It is approximately 15km south-west of Reading and 13km south-east of Newbury, just south of Aldermaston village. AWE Aldermaston forms part of Aldermaston Parish and is contained and bounded by the A340 to the west and south, Reading Road to the south, Red Lane to the east, and the grounds associated with Portland House and Aldermaston Court to the north.

2.2.2 General Description of Gas Monitoring Area

The Project Hydrus Development covers approximately 5.5 hectares and lies on the northern boundary of AWE Aldermaston. The Hydrus site is not within the nuclear licensed area.

The land at the Hydrus site is rough grassland with occasional mature trees and some areas of demolition rubble and is surrounded by chain link fencing. To the south the land slopes downwards to a ditch.

3 boreholes (Boreholes BH0907, BH0397 and BH0398) which were included within the previous gas monitoring programme are located within the explosives ‘B Area’ located to the south of the site.

2.3 Geology

The published geology of the area is indicated in the following British Geological Survey (BGS) map sheets:

1:50,000, Sheet 268, Reading, Solid and Drift, 2000 and associated Geological Memoir;

1:10,000, Sheet 44NW, Berkshire, 1938;

1:10,000, Sheet 44SW, Berkshire, 1938.

A summary of the geological sequence is presented in *Table 2.1*below.

Table 2.1 General Geological Sequence

Soil Type	Description	Likely Thickness
Silchester Gravel	Dense, orange-brown sand and gravel with variable sand, silt and clay matrix	4-6 m
Bagshot Formation	Sand, fine to medium grained with silt and clay laminae	20-25 m
London Clay	Clay, variably silty, with beds of sand and silt and flint pebble seams; variably glauconitic and shelly	55-100 m
Lambeth Group	Comprises Harwich, Reading and Upnor Formations – Typically Sand and Clay	22-39 m
Upper Chalk	Soft white nodular chalk with flint seams.	90-130 m

Previous investigations undertaken within the Hydrus development area have typically recorded a thin (<0.5m) band of Made Ground overlying the Silchester Gravel to a depth of approximately 2.5mbGL (metres below ground level). The Silchester Gravel is directly underlain by the Bagshot Formation to a depth of 4.5mbGL with the London Clay situated beneath this.

3 Monitoring Methodology and Results

3.1 Introduction

The gas monitoring programme was designed in accordance with CIRIA C665 (*Ref. 1*) and BS8485 (*Ref. 2*) to allow a more robust assessment of risk posed by the presence of ground gases located within or close to the Hydrus Development. The monitoring programme comprised a total of 6 visits undertaken on a fortnightly basis, as specified within CIRIA C665 (*Ref. 1*) for a low risk commercial development.

Initially the monitoring programme comprised the monitoring of the 6 new installations only (Boreholes BHHYD-001 – 003 and Windowless Samples WSHYD-004 – 006), but at the request of AWE the last 2 monitoring rounds included an additional 9 existing boreholes (BAEBH1, BAEBH2, BAEBH3, EBH8, EBH8A, BH0333, BH0398, BH0907 and BH0909). The first monitoring round also included each of the 15 wells, and was undertaken in relation to the first round of groundwater monitoring within the Hydrus development area (*Ref. 3).* A sixteenth monitoring well, Borehole BH0397 (located within 'B Area'), could not be accessed due to damage to the metal cover so therefore was not included within the monitoring programme.

It should be noted that the boreholes within 'B Area' (Boreholes BH0907 and BH0398) were not monitored during the final monitoring round as permissions were not provided for access into the explosives area.

The locations of all gas monitoring installations are shown within *Drawing JER4173-002.*

3.2 Gas Monitoring Results

3.2.1 Introduction

The gas monitoring rounds were undertaken between the 31st March and 10th June 2009, the results of which are included within *Appendix A.* The results of the previous rounds of monitoring, as supplied by AWE, are included in *Appendix B*.

3.2.2 Atmospheric Pressure

During the recent rounds of monitoring, the atmospheric pressure ranged between 997 and 1015Mb, with the highest pressure recorded during the first monitoring round on 31/03/09.

The atmospheric pressure recorded during the previous monitoring rounds undertaken on up to 24No. existing installations varied between 987 (03/09/08) and 1012mb (24/05/07).

3.2.3 Flow Rates

The soil gas flow rate data recorded included peak and average soil gas concentration readings per monitoring visit. The peak soil gas concentrations identified have been utilised in calculation of 'worst case' scenarios on site.

Peak flow rates during the recent gas monitoring ranged between -3.0 litres per hour (l/hr) and +3.2 l/hr in Boreholes BH0909 and BHHYD-03 respectively. The lowest reading of -3.0 l/hr was taken during the fifth round of monitoring on 28/05/09 where an atmospheric pressure of 1003 Mb was recorded. The highest reading of +3.2 l/hr was taken during the sixth monitoring round on 10/06/09, where atmospheric pressure was at its lowest with a minimum of 997 Mb.

The peak flow rate of 3.2 l/hr from Borehole BHHYD-03 on 10/06/09 was in fact the only positive flow rate recorded during the recent gas monitoring programme, with flow rates varying between -1.4 and 3.2 l/hr at this location.

Peak flow rates recorded during previous monitoring rounds varied between -6.0 and +2.6 l/hr. The minimum peak flow rate of -6.0 l/hr was recorded in Borehole EBH8 on the 03/09/08. The maximum peak flow rate of 2.6 l/hr was recorded in Borehole CP1002 also on 24/05/07.

3.2.4 Methane

Methane was recorded on two occasions during the recent programme of gas monitoring. Peak concentrations of 19.9% and 2.1% were recorded both within Borehole BH0398, located within B Area, during the fifth round of gas monitoring on 28/05/09 and the first round on 31/03/09 respectively.

Methane was recorded at a number of locations across the Hydrus development area during the previous monitoring rounds, with concentrations generally between 0.1 and 0.5%. However, a maximum concentration of 12.4% was detected within Borehole BH0398 on 19/06/07.

3.2.5 Carbon Dioxide

Carbon dioxide was recorded in each of the boreholes installations during the recent gas monitoring programme, with the exception of Boreholes EBH8A and BH0907. A maximum peak concentration of 4.6% recorded in Borehole BH0398 on 31/03/09, during the first monitoring round.

During the previous monitoring rounds, a maximum carbon dioxide concentration of 4.6% was recorded in Borehole CP1001 on the 10/05/07. Within Borehole BH0398, a maximum carbon dioxide concentration of 4.4% was recorded on 19/06/07.

3.2.6 VOCs

The measured concentrations of Volatile Organic Compounds (VOCs) vapours within the borehole installations during the recent gas monitoring programme were generally low. A peak concentration of 14.7ppm was recorded within Borehole BHHYD-01 during the sixth monitoring round on 10/06/09.

The previous gas monitoring data recorded VOC's within several of the installations with a maximum peak concentration of 1.8ppm detected within Borehole BAEBH2 on the 06/08/08.

The generally low levels of VOCs recorded are not considered to be indicative of hydrocarbon contamination within the soil.

3.2.7 Oxygen

With respect to oxygen concentrations, 'peak' levels of oxygen recorded during the recent gas monitoring programme ranged between 21.4% (Borehole BHHYD-03 on 29/04/09) and depleted down to 12.1% (Borehole BH0398 on 28/05/09).

During the previous monitoring rounds, the 'peak' concentrations of oxygen were recorded to vary between 3.6% and 21.3%. The minimum oxygen concentration of 3.6% was recorded in Borehole CP1001 on the 10/05/07.

3.2.8 Hydrogen Sulphide

No hydrogen sulphide was recorded in any of the installations during the recent monitoring programme.

During the previous monitoring rounds only very low levels of hydrogen sulphide were recorded in 3 of the borehole installations with a maximum concentration of 2ppm recorded within Borehole CP1002 on the 24/05/07.

3.2.9 Carbon Monoxide

No carbon monoxide was recorded in any of the installations during the recent monitoring programme.

Carbon monoxide was recorded within a total of 16 installations during the previous monitoring rounds with a peak concentration of 26ppm recorded within Borehole CP1001 on 26/04/07.

4 Ground Gas Risk Assessment

4.1 Ground Gas Assessment Criteria

In the UK, current guidance on the assessment of hazardous ground gases is derived primarily from the recently updated British Standard, BS 8485 2007 (*Ref. 2*) and the CIRIA Report C665 (*Ref. 1*). Previous guidance has also been referred to in the assessment of ground gas risks to the development including *Waste Management Paper 27* (*Ref. 4*) which is updated by *Guidance on the Management of Landfill Gas* (*Ref. 5*). Section C1 of the *Building Regulations 2000* also sets out assessment and mitigation requirements for new buildings. The Building Regulations require that a risk assessment approach is adopted to determine whether gas protective measures are required to protect development from ground gases.

The *Guidance on the Management of Landfill Gas (Ref. 5)* identifies environmental benchmarks for methane and carbon dioxide concentrations above background levels that require a qualitative or semi-qualitative assessment.

For the purposes of this report in order to identify the potential risk posed by ground gases, the criteria of 1% methane and 1.5% carbon dioxide have been adopted to allow an initial assessment of the collected data. Where concentrations exceed these 'threshold' levels, a qualitative risk assessment is undertaken as detailed in the following sections.

4.2 Methane Initial Screening Assessment

During the recent gas monitoring, methane was recorded on two occasions only, both within Borehole BH0398, during the fifth and first monitoring rounds respectively. The observed concentrations of 19.9% and 2.1% lie above the environmental benchmark of 1.0%.

Methane was recorded in 26 instances during the previous gas monitoring rounds. However, the environmental benchmark of 1% methane was only exceeded in one instance with a concentration of 12.4% detected again within Borehole BH0398 on 19/06/07.

The corresponding borehole log for Borehole BH0398 shows the installation response zone to be located within the Made Ground, Bagshot Beds and London Clay. Relic wood and roots are recorded to be present within the response zone and are considered to be the most likely source of the methane due to the natural degradation of organic material.

4.3 Carbon Dioxide Initial Screening Assessment

During the recent gas monitoring programme, carbon dioxide was recorded above the 1.5% environmental benchmark within a total of 6 boreholes:

- BHHYD-02 – 5 detections above the environmental benchmark, with a maximum concentration of 4.0%;
- WSHYD-04 – 4 detections above the environmental benchmark with a maximum concentrations of 3.0%;
- WSHYD-05 – 3 detections above the environmental benchmark with a maximum concentration of 2.3%
- WS-HYD-06 – 2 detections above the environmental benchmark with a maximum concentration of 4.5%;
- BAEBH2 – 2 detections above the environmental benchmark with a maximum concentration of 1.9%; and
- BH0398 – 2 detections above the environmental benchmark with a maximum concentration of 4.6%.

The corresponding logs for the above boreholes suggest the presence of organic material within the shallow strata and the natural degradation of this material is considered to be the most likely source of carbon dioxide. There is no log available for Borehole BAEBH2, but a shallow dip depth recorded during the monitoring suggests the response zone to be located within the Silchester Gravels.

In total, the 1.5% environmental benchmark for carbon dioxide has been exceeded on 22 occasions during the previous monitoring rounds, with a maximum concentration of 4.6% recorded in Borehole CP1001 on 10/05/07. The corresponding borehole log for this location does not indicate an obvious

source of carbon dioxide but this may also be due to the natural degradation of organic material within the Bagshot Beds / London Clay.

4.4 Summary of Risk to On Site Receptors from Ground Gases

The gas monitoring dataset has generally recorded low levels of ground gas within the Hydrus development area. However, maximum concentrations of 19.9% methane and 4.6% carbon dioxide have been recorded, and in the absence of any obvious sources this is likely attributable to the natural degradation of organic material within the underlying natural soils.

Gas Screening Values (GSVs) have been derived in accordance with CIRIA C665 *(Ref. 1)* to assess the risk posed by the presence of elevated levels of methane and carbon dioxide. The derivation of the GSVs are summarised in *Table 4.1*, and have been calculated using the following equation:

Gas Concentration % / 100 x Gas Flow (l/hr) = Gas Screening Value (l/hr)

The GSV is synonymous with the Hazardous Gas Flow rate as outlined in BS8485 *(Ref. 2).*

In accordance with BS8485, it is appropriate to consider borehole gas flow rates and concentrations on a location by location basis where there is a comprehensive dataset. Both the historical and recent gas monitoring data sets together do provide a robust dataset for the Hydrus development area and have been used in combination for this risk assessment.

Table 4.1 Gas Screening Value Summary

Monitoring well ID	Gas Type	Peak Concentration (%)	Peak Flow Rate (l/hr)	Gas Screening Value (l/hr)	CIRIA C665 Characteristic Situation
BH0398	Methane	19.9 (28/05/09)	0.0 (taken as 0.1 for purpose of risk assessment)	0.0199	CS1 – Very Low Risk
BH0398 & CP1001	Carbon Dioxide	4.6 (BH0398 – 31/03/09, CP1001 – 10/05/07)	0.0 (taken as 0.1 for purpose of risk assessment)	0.0046	CS1 – Very Low Risk
BHHYD-03	Methane	0.0 (taken as 0.1 for purpose of this risk assessment)	3.2 (10/06/09)	0.0032	CS1 – Very Low Risk
BHHYD-03	Carbon	0.3 (17/04/09 &	3.2 (10/06/09)	0.0096	CS1 – Very Low

Monitoring well ID	Gas Type	Peak Concentration (%)	Peak Flow Rate (l/hr)	Gas Screening Value (l/hr)	CIRIA C665 Characteristic Situation
	Dioxide	29/04/09)			Risk
CP1002	Methane	0.2 (26/04/07 & 24/05/07)	2.6 (24/05/07 – max during previous rounds)	0.0012	CS1 – Very Low Risk
CP1002	Carbon Dioxide	3.3 (10/05/07)	2.6 (24/05/07 – max during previous rounds)	0.0858	CS2 – Low Risk

The risk assessment has indicated that for methane a CIRIA C665 *(Ref. 1)* Characteristic Situation CS1 (Very Low Risk) is applicable. However, CIRIA C665 states that for a Characteristic Situation CS1, concentrations of methane are typically <1.0%, otherwise an increase to CS2 (Low Risk) should be considered. Levels of methane have been recorded on three occasions as being >1.0%, all within Borehole BH0398, with a maximum concentration of 19.9% lying well above the 1.0% threshold. Although this monitoring well is not located directly underneath the footprint of the proposed building, the likely permeable nature of the Silchester Gravels may permit the migration of ground gas toward the development area. On this basis, it is considered prudent that the characteristic situation be increased to CS2 (Low Risk) for methane, where protective measures are required for proposed structures.

The risk assessment indicates that for carbon dioxide a CS2 Characteristic Situation (Low Risk) is applicable, based upon three rounds of gas monitoring undertaken within Borehole CP1002 in 2007. Protective measures are therefore required for proposed structures to mitigate the risk posed by carbon dioxide.

The risk assessment process above is only applicable to methane and carbon dioxide and does not cover VOCs, carbon monoxide and hydrogen sulphide. Given that carbon monoxide in particular was consistently recorded within the previous rounds of monitoring within the shallow soils (although not within the recent gas monitoring programme), the presence of these gases may be considered to pose a risk to the proposed development. The potential risk posed by the presence of ground gases can be mitigated by the installation of protective measures in line with characteristic situation CS2, as outlined in *Section 5.2*.

Based on the soil gas monitoring results overall and this risk assessment, the following risks have been identified to the Hydrus development:

- Carbon Dioxide: **Low Risk**;
- Methane: **Low Risk**;
- Hydrogen Sulphide: **Negligible Risk**;
- Carbon Monoxide: **Low Risk**; and,
- VOCs: **Negligible Risk**.

4.5 Summary of Risk to Off Site Receptors from Ground Gases

As outlined in *Section 4.4* the risks presented from all potentially hazardous ground gases (methane, carbon monoxide, hydrogen sulphide, VOCs and carbon dioxide) have been demonstrated to be low to negligible.

Flow rates have been generally low with a maximum recorded rate of +3.2 l/hr. The majority of the flow rates have been either negative or 0 l/hr, during the previous and recent rounds of monitoring.

It is considered that the shallow Silchester Gravels will have a degree of permeability to enable the potential migration of ground gases. Given the proximity of the Hydrus development area in relation to other buildings, it is not considered that is there is likely receptor for any ground gases, should they migrate and the predominantly negative flow rates recorded suggest a limited potential for gas migration. In addition, much of the surrounding land is softstanding, thereby allowing gases to naturally dissipate into the atmosphere. The risk to off site buildings or receptors from ground gas is therefore considered negligible.

5 Recommendations and Conclusions

5.1 Conclusions

A programme of gas monitoring has been undertaken within the Hydrus development area to provide a robust dataset on which a detailed assessment could be based, to determine the requirement for gas protection measures for the proposed development.

The gas monitoring and assessment has identified the following key findings:

- Over the entire monitoring period, a maximum carbon dioxide concentration of 4.6% was recorded;
- Over the entire monitoring period, a maximum methane concentration of 19.9% was recorded;
- Flow rates have been recorded to be predominantly negative over a range of atmospheric pressures. A maximum flow rate of 3.2 l/hr was recorded during the recent monitoring, but did not coincide was any detections of methane or carbon dioxide. During the previous monitoring, a maximum flow rate of 2.6 l/hr coincided with detections of 0.2% methane and 3.3% carbon dioxide;
- Generally low concentrations of VOCs were encountered, with a maximum concentration of 14.7ppm;
- No hydrogen sulphide or carbon monoxide was detected during the recent monitoring programmes. However, previous rounds of monitoring have recorded maximum hydrogen sulphide and carbon monoxide concentrations of 2ppm and 26ppm respectively;
- Although the risk assessments indicate that for methane a CIRIA Characteristic Situation CS1 (Very Low Risk) is applicable to the development, it is considered prudent that a Characteristic Situation CS2 (Low Risk) be adopted, based upon the presence of methane (recorded up to 19.9%) at a monitoring location on the periphery of the

Hydrus development area and the potential for gas migration within permeable shallow soils;

- The risk assessment has indicated a CIRIA Characteristic Situation CS2 (Low Risk) for carbon dioxide, based upon previous monitoring data from Borehole CP1002;

- Carbon monoxide was consistently detected during the previous monitoring rounds (although not during the recent monitoring programme), and is therefore considered to pose a low risk to the development;

- The risk to the Hydrus development from VOCs and hydrogen sulphide considered to be negligible;

- The risk to off-site receptors from ground gas considered to be negligible, given the low gas flow rates and the proximity of the development area to other buildings.

5.2 Recommendations for Gas Protection Measures

The ground gas risk assessment undertaken in *Section 4* has concluded that the presence of methane and carbon dioxide poses a Low Risk to the Hydrus development, as per CIRIA C665 *(Ref. 1),* based on a Characteristic Situation CS2 for carbon dioxide and a recommended increase to Characteristic Situation CS2 for methane. The presence of carbon monoxide within the soils is also considered to pose a low risk to the development.

The scope of protection measures to address the risk posed by the presence of methane and carbon monoxide, in line with *Table 8.6* of CIRIA C665, may comprise one or more of the following for an Office / Commercial / Industrial development:

- Reinforced concrete cast *in situ* floor slab (suspended, non-suspended or raft) with at least 1200g DPM; or

- Beam and block or pre cast concrete slab and minimum 2000 g DPM / reinforced gas membrane; or

- Possibly underfloor venting or pressurisation in combination with either option above, depending on use.

- All joints and penetrations are to be sealed.

The scope and design of the gas protection measures can be fully refined following final foundation design details for the development.

6 References

1 CIRIA Report C665. Assessing risks posed by hazardous ground gases to buildings. 2007.

2 British Standards Institution BS 8485: Code of Practice for the characterization and remediation from ground gas in affected developments.

3 RPS, Ground Investigation Interim Factual Report, Project Hydrus, JER4173/Hydrus/GI/IF, Rev 0, May 2009.

4 HMSO Waste Management Paper 27. The Control of Landfill Gas, 1995.

5 Environment Agency, Guidance on the Management of Landfill Gas (2004).

Drawings

BH0333
BH-HYD-02
BH-HYD-01
CP1002
WS-HYD-06
WS-HYD-05
CP1001
BH-HYD-03
WS-HYD-04
BAEBH3
BAEBH1
BH0909
BAEBH2
BH0907
EBH8A
EBH8
BH0398
BH0397

LEGEND

AWE Aldermaston Fence Line

New Sampling Locations

- Deep Borehole
- Shallow Borehole
- Window Sample Borehole

Existing Sampling Locations

- Borehole with Monitoring Well

Other Locations

- Borehole Believed to have been Lost

Rev:	Date:	Amendment:	Name:	Checked:

Data Source: RPS 2008, AWE 2009

Status: PRELIMINARY

RPS
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T 02920 668662 F 02920 668622 E rpsca@rpsgroup.com W www.rpsplc.co.uk

Client: AWE Plc

Project: Hydrus

Title: Gas & Groundwater Monitoring Locations

Scale: A3 @ 1:1,250

0 0.0125 0.025km

N

Date: 27/10/2008 Datum: OSGB36 Projection: BNG

Drawn: RJ Checked: GM Job Ref: JER4173

Figure No: **JER4173-002** Revision: -

Project Ref: J:\Drawings\JER4173

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Appendices

Appendix A

Recent Gas Monitoring Data

Gas and Groundwater Monitoring Round 1

Job Name: Hydrus

Job Number: JER4173

Date: 31/03/09 - 02/04/09

Staff Name: LKS / LW

Hole ID	Time of reading	Atmospheric Pressure (Mb)	DP Pa	Flow (l/hr)		VOCs (ppm)		CH4 (%/vol)		Peak LEL (%)	CO2 (%/vol)		O2 (%/vol)		Peak H2S (%)	Peak CO (%)	Groundwater Level (mbTIC)	Well Base (mbTIC)	Correction to Ground Level (m)	Notes on Gas Concentration/flow durations, average gas concentrations etc
				Peak	Average	Peak	Average	Peak	Average		Peak	Average	Peak	Average						
BHHYD-01	16:30	1011	-1.7	-0.4	-0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.1	20.5	20.7	0.0	0.0	7.24	14.44	0.10	
BHHYD-02	16:00	1011	-1.7	-0.3	-0.3	0.2	0.2	0.0	0.0	0.0	3.8	3.8	15.9	16	0.0	0.0	1.61	6.02	0.16	
BHHYD-03	12:10	1011	-6.1	-1.4	-1.2	0.4	0.0	0.0	0.0	0.0	0.2	0.1	20.9	21.3	0.0	0.0	6.34	14.92	0.16	
WSHYD-04	09:00	1015	-3	-0.7	-0.6	0.1	0.6	0.0	0.0	0.0	0.2	0.0	19.2	21.6	0.0	0.0	2.36	3.00	0.10	
WSHYD-05	09:58	1013	-3.7	-0.7	-0.7	5.7	2.1	0.0	0.0	0.0	1.9	1.4	20.1	20.2	0.0	0.0	2.17	2.96	0.12	
WSHYD-06	11:40	1012	-3.4	-1.7	-1	2	1.4	0.0	0.0	0.0	0.6	0.5	20.6	20.6	0.0	0.0	2.45	3.02	0.10	
BAEBH1	15:45	1010	-3	-1.4	-1	1.3	0.1	0.0	0.0	0.0	0.5	0.2	19.5	21.2	0.0	0.0	2.68	3.34	0.09	
BAEBH2	15:15	1011	-2.4	-0.4	-0.3	1.1	0.1	0.0	0.0	0.0	1.9	1.8	20.2	20.2	0.0	0.0	2.89	3.47	0.06	50mm borehole
BAEBH3	14:20	1011	-1.7	-0.3	-0.2	0.3	0.0	0.0	0.0	0.0	0.2	0.2	20.9	21.3	0.0	0.0	2.14	3.19	0.00	50mm borehole
EBH8	10:30	1012	-3.4	-0.7	-0.6	0.1	0.0	0.0	0.0	0.0	0.1	0.0	19.9	21.6	0.0	0.0	2.33	2.94	0.10	
EBH8A	10:45	1012	-3.4	-0.7	-0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	20.6	21.6	0.0	0.0	6.95	12.75	0.00	
BH0333	14:00	1012	-3.4	-0.7	-0.7	0.2	0.0	0.0	0.0	0.0	0.6	0.6	19.6	20.8	0.0	0.0	1.38	2.58	0.00	
BH0397																				Unable to remove cover
BH0398	15:00	1013	0	0	0	0	0.0	2.1	1.1	0.0	4.6	2.5	13.7	15.6	0.0	0.0	1.77	5.76		50mm borehole
BH0907	14:45	1014	-2.4	-0.6	-0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	20.4	21.3	0.0	0.0	1.96	2.03		Dry
BH0909	08:45	1013	-3.7	-0.7	-0.7	0.3	0.1	0.0	0.0	0.0	0.1	0.1	19.5	21.6	0.0	0.0	5.33	12.20	0.05	

Gas Monitoring Round 2

Job Name: Hydrus
Job Number: JER4173

Date: 17/04/2009

Staff Name: BC

Hole ID	Time of reading	Atmospheric Pressure (Mb)	DP Pa	Flow (l/hr)		VOCs (ppm)		CH4 (%/vol)		Peak LEL (%)	CO2 (%/vol)		O2 (%/vol)		Peak H2S (%)	Peak CO (%)	Groundwater Level (mbTIC)	Well Base (mbTIC)	Correction to Ground Level (m)	Notes on Gas Concentration/flow durations, average gas concentrations etc
				Peak	Average	Peak	Average	Peak	Average		Peak	Average	Peak	Average						
BHHYD-01	08:30	998	-2	-0.6	-0.4	0	0.0	0.0	0.0	0.0	0.2	0.2	21.3	21.3	0.0	0.0	7.52	14.63	0.10	
BHHYD-02	08:45	998	-1.7	-0.3	-0.3	0	0.0	0.0	0.0	0.0	4.0	4.0	21	17.8	0.0	0.0	1.73	5.11	0.16	
BHHYD-03	09:00	999	-2.4	-0.5	-0.4	0	0.0	0.0	0.0	0.3	0.3	0.1	21.3	21.3	0.0	0.0	6.34	14.72	0.16	
WSHYD-04	09:45	999	-2	-0.3	-0.3	0	0.0	0.0	0.0	0.0	2.8	2.8	19	19	0.0	0.0	2.27	3.00	0.10	
WSHYD-05	09:30	999	-1	-0.5	-0.2	0	0.0	0.0	0.0	0.0	1.6	1.6	20	19.7	0.0	0.0	2.55	2.96	0.12	
WSHYD-06	09:15	999	-2.4	-0.9	-0.7	0	0.0	0.0	0.0	0.0	0.6	0.6	21.2	20.8	0.0	0.0	1.83	3.02	0.10	

Gas Monitoring Round 3

Job Name: Hydrus
Job Number: JER4173

Date: 29/04/2009

Staff Name: BC

Hole ID	Time of reading	Atmospheric Pressure (Mb)	DP Pa	Flow (l/hr)		VOCs (ppm)		CH4 (%/vol)		Peak LEL (%)	CO2 (%/vol)		O2 (%/vol)		Peak H2S (%)	Peak CO (%)	Groundwater Level (mbTIC)	Well Base (mbTIC)	Correction to Ground Level (m)	Notes on Gas Concentration/flow durations, average gas concentrations etc
				Peak	Average	Peak	Average	Peak	Average		Peak	Average	Peak	Average						
BHHYD-01	13:10	999	-2	-0.5	-0.4	0	0.0	0.0	0.0	0.0	0.5	0.5	20.7	20.4	0.0	0.0	7.45	14.63	0.10	
BHHYD-02	13:00	998	-1.4	-0.3	-0.3	0	0.0	0.0	0.0	0.0	2.8	2.8	19	19	0.0	0.0	1.87	5.11	0.16	
BHHYD-03	12:50	999	-2	-0.3	-0.3	0	0.0	0.0	0.0	0.3	0.3	0.3	21.4	21.4	0.0	0.0	6.66	14.72	0.16	
WSHYD-04	12:15	999	-2	-0.3	-0.3	0	0.0	0.0	0.0	0.0	3.0	3.0	18.2	18.2	0.0	0.0	2.15	2.96	0.10	
WSHYD-05	12:30	998	-1	-0.2	-0.2	0	0.0	0.0	0.0	0.0	2.3	2.3	18.7	18.6	0.0	0.0	2.37	2.96	0.12	
WSHYD-06	12:45	998	-3	-0.8	-0.9	0	0.0	0.0	0.0	0.0	0.5	0.5	20.7	20.6	0.0	0.0	1.91	2.96	0.10	

Gas Monitoring Round 4

Job Name: Hydrus
Job Number: JER4173

Date: 13/05/09

Staff Name: BC

Hole ID	Time of reading	Atmospheric Pressure (Mb)	DP Pa	Flow (l/hr)		VOCs (ppm)		CH4 (%/vol)		Peak LEL (%)	CO2 (%/vol)		O2 (%/vol)		Peak H2S (%)	Peak CO (%)	Groundwater Level (mbTIC)	Well Base (mbTIC)	Correction to Ground Level (m)	Notes on Gas Concentration/flow durations, average gas concentrations etc
				Peak	Average	Peak	Average	Peak	Average		Peak	Average	Peak	Average						
BHHYD-01	11:35	999	-1	-0.1	-0.1	0.7	0.7	0.0	0.0	0.0	0.6	0.6	20.6	20.6	0.0	0.0				
BHHYD-02	11:45	999	-1	-0.1	-0.1	0.4	0.4	0.0	0.0	0.0	2.0	2.0	18.8	18.8	0.0	0.0				
BHHYD-03	11:54	1001	-2	-0.4	-0.1	0	0.0	0.0	0.0	0.0	0.0	0.0	19.9	19.9	0.0	0.0				
WSHYD-04	12:08	1001	-2	-0.3	-0.3	0	0.0	0.0	0.0	0.0	2.1	2.1	18.8	18.8	0.0	0.0				
WSHYD-05	12:17	1000	-1	-0.4	-0.2	0	0.0	0.0	0.0	0.0	0.2	0.2	20.2	19.7	0.0	0.0				
WSHYD-06	12:25	1000	-1	-0.1	-0.1	0	0.0	0.0	0.0	0.0	4.5	4.5	18.4	18.4	0.0	0.0				

Gas Monitoring Round 5

Job Name: Hydrus

Job Number: JER4173

Date: 28/05/09

Staff Name: LKS

Hole ID	Time of reading	Atmospheric Pressure (Mb)	DP Pa	Flow (l/hr)		VOCs (ppm)		CH4 (%/vol)		Peak LEL (%)	CO2 (%/vol)		O2 (%/vol)		Peak H2S (%)	Peak CO (%)	Groundwater Level (mbTIC)	Well Base (mbTIC)	Correction to Ground Level (m)	Notes on Gas Concentration/flow durations, average gas concentrations etc
				Peak	Average	Peak	Average	Peak	Average		Peak	Average	Low	Average						
BHHYD-01	08:45	1002	-1.1	-0.3	-0.1	0.2	0.0	0.0	0.0	0.0	0.2	0.1	20.1	20.5	0.0	0.0	7.53	14.44	0.10	
BHHYD-02	08:50	1002	-1.9	-0.1	0.0	0.7	0.1	0.0	0.0	0.0	2.9	2.8	15.7	17.1	0.0	0.0	1.57	6.02	0.16	
BHHYD-03	09:00	1002	-2.1	-0.9	-0.9	0	0.0	0.0	0.0	0.0	0.3	0.1	20.8	21.1	0.0	0.0	6.10	14.92	0.16	
WSHYD-04	09:05	1002	-3	-0.2	-0.2	0.1	0.1	0.0	0.0	0.0	1.3	1.3	19.8	20	0.0	0.0	2.29	2.96	0.10	
WSHYD-05	09:10	1002	-4.1	-1	-1	3.4	2.0	0.0	0.0	0.0	0.2	0.2	20.7	20.7	0.0	0.0	2.01	2.96	0.12	
WSHYD-06	09:15	1002	-5.1	-1.1	-1.1	0.7	0.2	0.0	0.0	0.0	0.0	0.0	20.1	20.7	0.0	0.0	2.45	2.96	0.10	
BAEBH1	09:20	1002	-1.1	-0.9	-0.9	1.7	0.9	0.0	0.0	0.0	0.1	0.1	19.7	19.8	0.0	0.0	2.67	3.34	0.09	
BAEBH2	09:25	1002	-1.9	-0.4	-0.4	0.8	0.1	0.0	0.0	0.0	1.4	1.0	19.6	19.6	0.0	0.0	3.11	3.47	0.06	
BAEBH3	09:30	1002	-0.8	-0.5	-0.3	0.3	0.0	0.0	0.0	0.0	0.1	0.0	20.9	21.2	0.0	0.0	2.33	3.19	0.00	
EBH8	09:35	1002	-2.9	-0.6	-0.4	0.7	0.2	0.0	0.0	0.0	0.0	0.0	21.7	21.7	0.0	0.0	2.39	2.94	0.10	
EBH8A	09:40	1003	-2.7	-0.7	-0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	20.7	20.8	0.0	0.0	6.77	12.75	0.00	
BH0333	09:55	`003	-2.1	-0.9	-0.6	0.1	0.0	0.1	0.0	0.0	0.7	0.7	19.6	20.2	0.0	0.0	1.40	2.58	0.00	
BH0397																				Unable to remove cover
BH0398	09:59	1003	-0.1	-0.1	-0.1	0.1	0.1	19.9	18.6	0.0	4.1	3.8	12.1	12.9	0.0	0.0	1.79	5.76	0.05	
BH0907	10:10	1003	-3.1	-2.9	-2	0.7	0.1	0.0	0.0	0.0	0.0	0.0	19.4	20.1	0.0	0.0	1.87	2.03	0.07	
BH0909	10:15	1003	-3.5	-3	-2.1	0.3	0.0	0.0	0.0	0.0	0.3	0.3	19.9	20.3	0.0	0.0	5.54	12.20	0.05	

Gas and Groundwater Monitoring Round 6

Job Name: Hydrus

Job Number: JER4173

10/06/2009

Staff Name: BC

Hole ID	Time of reading	Atmospheric Pressure (Mb)	DP Pa	Flow (l/hr)		VOCs (ppm)		CH4 (%/vol)		Peak LEL (%)	CO2 (%/vol)		O2 (%/vol)		Peak H2S (%)	Peak CO (%)	Groundwater Level (mbTIC)	Well Base (mbTIC)	Correction to Ground Level (m)	Notes on Gas Concentration/flow durations, average gas concentrations etc
				Peak	Average	Peak	Average	Peak	Average		Peak	Average	Peak	Average						
BHHYD-01	10:20	998	0	0	0	14.7	14.5	0.0	0.0	0.0	0.0	0.0	19.7	19.7	0.0	0.0	7.76	14.37	0.10	
BHHYD-02	10:30	998	0	0	0	12.1	10.6	0.0	0.0	0.0	1.2	0.9	19.5	19	0.0	0.0	1.74	5.76	0.16	
BHHYD-03	10:00	999	3.0(peak) / 0 (Av)	3.2	0	6.3	6.2	0.0	0.0	0.0	0.0	0.0	20.8	19.9	0.0	0.0	6.48	14.67	0.16	
WSHYD-04	09:10	999	0	0	0	0	0.0	0.0	0.0	0.0	1.7	1.6	19.6	18.6	0.0	0.0	2.60	2.96	0.10	
WSHYD-05	09:20	999	0	0	0	0.5	0.0	0.0	0.0	0.0	1.4	0.8	18.8	18.6	0.0	0.0	2.49	2.96	0.12	
WSHYD-06	10:10	999	0	0	0	0	0.0	0.0	0.0	0.0	1.6	0.7	20.8	20.4	0.0	0.0	2.01	2.96	0.10	
BAEBH1	09:03	999	0	0	0	5.8	4.3	0.0	0.0	0.0	0.2	0.0	21.2	20.2	0.0	0.0	3.25	3.75	0.09	
BAEBH2	09:25	999	0	0	0	6.7	2.9	0.0	0.0	0.0	1.8	0.0	20.4	19.3	0.0	0.0	2.97	3.45	0.06	
BAEBH3	09:47	999	0	0	0	5.5	4.1	0.0	0.0	0.0	0.0	0.0	20.7	19.8	0.0	0.0	2.28	3.21	0.00	
EBH8A	11:10	998	0	-0.2	0	7.6	6.5	0.0	0.0	0.0	0.0	0.0	20.7	19.8	0.0	0.0	7.44	12.70	0.10	
EBH8	11:00	997	1	-1.1	0	5.1	3.1	0.0	0.0	0.0	0.0	0.0	20.8	19.8	0.0	0.0	2.38	2.92	0.00	
BH0333	11:22	999	0	0	0	7.2	6.8	0.0	0.0	0.0	0.6	0.4	19.8	19.4	0.0	0.0	1.33	2.52	0.00	
BH0397																				No Access to 'B Area'
BH0398																				
BH0907																				
BH0909	09:42	999	0	0	0	9.5	9.0	0.0	0.0	0.0	0.6	0.0	20.9	19.9	0.0	0.0	6.32	13.00	0.05	

Appendix B

Previous Gas Monitoring Data (supplied by AWE)

GOLDERS ASSOCIATES (UK) LIMITED
AWE ALDERMASTON HYDRUS

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	CP1001
Date Installed	14/03/2007
Depth of Installation (mbgl)	15.00

Date		26/04/2007	10/05/2007	24/05/2007			
Time of Day		14:58:00	14:40:00	13:42:00			
Instrument Type		GA 2000, Flow Pod	GA 2000, Flow Pod	GA 2000, Flow Pod			
Instrument Number		7835	7834	7834			
Atmospheric Pressure (millibars)		1009	994	1010			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		3.76	6.95	6.79			
Flow Rate (l/hr)		0.0	-0.70 to 0.0	0.0			
Insitu Differential Pressure (Pa)		NR	0	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	4	4	4			
	% VOL	0.2	0.2	0.2			
Oxygen (O_2)	% VOL	9.2	3.6	20.1			
Carbon Dioxide (CO_2)	% VOL	3.3	4.6	0.1			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	<1			
Carbon Monoxide (CO)	ppm	26	<1	1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC			
Weather / Surface Conditions		Sunny.	Overcast, raining	Blue sky, sunny			
Remarks			PID = 0.4 ppm	PID = 0 ppm			

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Input By	CH	Date	05/06/2007	Checked By	RMM	Date	06/06/07

GOLDERS ASSOCIATES (UK) LIMITED
AWE ALDERMASTON HYDRUS

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	CP1002
Date Installed	17/04/2007
Depth of Installation (mbgl)	15.00

Date		26/04/2007	10/05/2007	24/05/2007			
Time of Day		12:41:00	13:35:00	11:04:00			
Instrument Type		GA 2000, Flow Pod	GA 2000, Flow Pod	GA 2000, Flow Pod			
Instrument Number		7835	7834	7834			
Atmospheric Pressure (millibars)		1009	997	1012			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		5.80	7.19	7.60			
Flow Rate (l/hr)		0.0	NR	2.6 to -2.7			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	4	<2	4			
	% VOL	0.2	<0.1	0.2			
Oxygen (O_2)	% VOL	4.4	4.8	14.2			
Carbon Dioxide (CO_2)	% VOL	3.0	3.3	2.1			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	2			
Carbon Monoxide (CO)	ppm	14	1	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC			
Weather / Surface Conditions		Sunny.	Overcast, raining	Blue sky, sunny			
Remarks			PID = 1.0 ppm	PID = 0 ppm			

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Input By	CH	Date	05/06/2007	Checked By	AMM	Date	06/06/07

GOLDERS ASSOCIATES (UK) LIMITED
AWE ALDERMASTON HYDRUS

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	CP1003
Date Installed	08/03/2007
Depth of Installation (mbgl)	15.00

Date		26/04/2007	10/05/2007	24/05/2007			
Time of Day		09:15:00	08:50:00	08:48:00			
Instrument Type		GA 2000, Flow Pod	GA 2000, Flow Pod	GA 2000, Flow Pod			
Instrument Number		7835	7834	7834			
Atmospheric Pressure (millibars)		1005	995	1007			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		7.74	8.63	7.63			
Flow Rate (l/hr)		0.0	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	0	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	2	2	4			
	% VOL	0.1	0.1	0.2			
Oxygen (O_2)	% VOL	12.1	14.2	15.1			
Carbon Dioxide (CO_2)	% VOL	1.9	1.3	1.1			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	<1			
Carbon Monoxide (CO)	ppm	<1	<1	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC			
Weather / Surface Conditions		Sunny.	Overcast, raining	Blue sky, sunny			
Remarks			PID = 0.3 ppm	PID = 0 ppm			

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Input By	CH	Date	05/06/2007	Checked By	[illegible]	Date	06/06/07

GOLDERS ASSOCIATES (UK) LIMITED
AWE ALDERMASTON HYDRUS

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	R1002
Date Installed	12/04/2007
Depth of Installation (mbgl)	15.00

Date		26/04/2007	10/05/2007	24/05/2007			
Time of Day		12:04:00	10:10:00	09:48:00			
Instrument Type		GA 2000, Flow Pod	GA 2000, Flow Pod	GA 2000, Flow Pod			
Instrument Number		7835	7834	7834			
Atmospheric Pressure (millibars)		1008	996	1009			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		5.75	6.46	7.22			
Flow Rate (l/hr)		0.0	0.0	1.3 to -3.0			
Insitu Differential Pressure (Pa)		NR	0	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	2	<2	2			
	% VOL	0.1	<0.1	0.1			
Oxygen (O_2)	% VOL	11.6	10.1	10.9			
Carbon Dioxide (CO_2)	% VOL	2.2	2.6	2.9			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	1			
Carbon Monoxide (CO)	ppm	6	<1	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC			
Weather / Surface Conditions		Sunny.	Overcast, raining	Blue sky, sunny			
Remarks			PID = 0.2 ppm	PID = 0 ppm			

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Input By	CH	Date	05/06/2007	Checked By	RWH	Date	06/06/07

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	R1003
Date Installed	23/03/2007
Depth of Installation (mbgl)	15.00

Date		26/04/2007	10/05/2007				
Time of Day		10:30:00	NR				
Instrument Type		GA 2000, Flow Pod	NR				
Instrument Number		7835	NR				
Atmospheric Pressure (millibars)		1007	NR				
Depth to Sampling Point (m)		Surface Valve	NR				
Depth to Water (m)		3.00	NR				
Flow Rate (l/hr)		0.0	NR				
Insitu Differential Pressure (Pa)		NR	NR				
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	2	NR				
	% VOL	0.1	NR				
Oxygen (O_2)	% VOL	21.1	NR				
Carbon Dioxide (CO_2)	% VOL	<0.1	NR				
Hydrogen Sulphide (H_2S)	% VOL	<1	NR				
Carbon Monoxide (CO)	ppm	<1	NR				
Gas Sample Taken		No	NR				
Operator		CC	CC				
Weather / Surface Conditions		Sunny.	Overcast, raining				
Remarks			No access to borehole due to mound of rubble.				

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Input By	CH	Date	11/05/2007	Checked By		Date	

GOLDER ASSOCIATES (UK) LTD
AWE ALDERMASTON HYDRUS

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH0156
Date Installed	NR
Depth of Installation (mbgl)	1.75

Date		25/05/2007	07/06/2007	20/06/2007			
Time of Day		11:09	13:41	11:35			
Instrument Type		GA2000, Flow Pod	GA2000, Flow Pod	GA2000, Flow Pod			
Instrument Number		7834	7834	7834			
Atmospheric Pressure (millibars)		995	1007	998			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		Dry	Dry	Dry			
Flow Rate (l/hr)		0.0	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	<2	2	<2			
	% VOL	<0.1	0.1	<0.1			
Oxygen (O_2)	% VOL	20.3	19.5	20.2			
Carbon Dioxide (CO_2)	% VOL	0.9	1.4	0.1			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	<1			
Carbon Monoxide (CO)	ppm	<1	7	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC/MS			
Weather / Surface Conditions		Dry, clear	Overcast, dry	Fair, dry			
Remarks		PID = 0ppm	PID = 0.1ppm	PID = 0ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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GOLDER ASSOCIATES (UK) LTD
AWE ALDERMASTON HYDRUS

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH330
Date Installed	NR
Depth of Installation (mbgl)	3.25

Date		25/05/2007	07/06/2007	20/06/2007			
Time of Day		08:09	09:00	08:18			
Instrument Type		GA 2000, Flow Pod	GA 2000, Flow Pod	GA 2000, Flow Pod			
Instrument Number		7834	7834	7834			
Atmospheric Pressure (millibars)		996	1007	995			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		2.86	2.75	2.89			
Flow Rate (l/hr)		0.0	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	<2	<2	<2			
	% VOL	<0.1	<0.1	<0.1			
Oxygen (O_2)	% VOL	18.7	16.8	18.8			
Carbon Dioxide (CO_2)	% VOL	1.9	3.1	1.9			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	<1			
Carbon Monoxide (CO)	ppm	<1	7	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC/MS			
Weather / Surface Conditions		Clear, dry	Overcast, dry	Fair, dry			
Remarks		PID = 0.3ppm	PID = 0 ppm	PID = 0.1ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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GOLDER ASSOCIATES (UK) LTD
AWE ALDERMASTON HYDRUS

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH331
Date Installed	NR
Depth of Installation (mbgl)	2.30

Date		25/05/2007	07/06/2007	20/06/2007			
Time of Day		08:42	09:18	08:26			
Instrument Type		GA2000, Flow Pod	GA2000, Flow Pod	GA2000, Flow Pod			
Instrument Number		7834	7834	7834			
Atmospheric Pressure (millibars)		996	1007	995			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		1.77	1.50	1.73			
Flow Rate (l/hr)		0.0	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	<2	<2	<3			
	% VOL	<0.1	<0.1	<0.1			
Oxygen (O_2)	% VOL	18.3	17.5	18.8			
Carbon Dioxide (CO_2)	% VOL	3.2	4.0	1.9			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	<1			
Carbon Monoxide (CO)	ppm	<1	4	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC			
Weather / Surface Conditions		Clear, dry	Overcast, dry	Fair, dry			
Remarks		PID = 0.1ppm	PID = 0 ppm	PID = 0 ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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GOLDER ASSOCIATES (UK) LTD
AWE ALDERMASTON HYDRUS

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH332
Date Installed	NR
Depth of Installation (mbgl)	6.20

Date		25/05/2007	07/06/2007	20/06/2007			
Time of Day		09:56	11:10	09:42			
Instrument Type		GA2000, Flow Pod	GA2000, Flow Pod	GA2000, Flow Pod			
Instrument Number		7834	7834	7834			
Atmospheric Pressure (millibars)		996	1007	996			
Depth to Sampling Point (m)		Surface valve	Surface valve	Surface valve			
Depth to Water (m)		5.85	2.25	2.14			
Flow Rate (l/hr)		0.0	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	<2	2	<2			
	% VOL	<0.1	0.1	<0.1			
Oxygen (O_2)	% VOL	21.1	20.8	20.6			
Carbon Dioxide (CO_2)	% VOL	0.4	<0.1	0.1			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	<1			
Carbon Monoxide (CO)	ppm	<1	6	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC/MS			
Weather / Surface Conditions		Dry, clear	Overcast, dry	Fair, dry			
Remarks		PID = 0ppm	PID = 0ppm	PID = 0.1ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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GOLDER ASSOCIATES (UK) LTD
AWE ALDERMASTON (HYDRUS)

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH0333
Date Installed	NR
Depth of Installation (mbgl)	2.60

Date		11/06/2007	19/06/2007				
Time of Day		NR	15:50				
Instrument Type		NR	GA 2000				
Instrument Number		NR	7834				
Atmospheric Pressure (millibars)		NR	997				
Depth to Sampling Point (m)		NR	2.4				
Depth to Water (m)		NR	1.28				
Flow Rate (l/hr)		NR	0.0				
Insitu Differential Pressure (Pa)		NR	NR				
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	NR	<2				
	% VOL	NR	<0.1				
Oxygen (O_2)	% VOL	NR	19.8				
Carbon Dioxide (CO_2)	% VOL	NR	0.5				
Hydrogen Sulphide (H_2S)	ppm	NR	<1				
Carbon Monoxide (CO)	ppm	NR	<1				
Gas Sample Taken		No	No				
Operator		CC	CC				
Weather / Surface Conditions		Overcast, dry	Fair, dry				
Remarks		No reading taken as borehole cap not closed fully	PID = 0ppm				

Input By	RL	Date	22/06/2007	Checked By		Date	

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GOLDER ASSOCIATES (UK) LTD
AWE ALDERMASTON (HYDRUS)

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH0398
Date Installed	NR
Depth of Installation (mbgl)	5.75

Date		25/05/2007	11/06/2007	19/06/2007			
Time of Day		NR	12:02	14:35			
Instrument Type		NR	GA2000	GA2001			
Instrument Number		NR	7834	7834			
Atmospheric Pressure (millibars)		NR	1003	996			
Depth to Sampling Point (m)		NR	Surface Valve	Surface Valve			
Depth to Water (m)		NR	1.62	1.62			
Flow Rate (l/hr)		NR	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	NR	2.0	>77			
	% VOL	NR	0.1	12.4			
Oxygen (O_2)	% VOL	NR	20.3	12.4			
Carbon Dioxide (CO_2)	% VOL	NR	0.3	4.4			
Hydrogen Sulphide (H_2S)	ppm	NR	<1	<1			
Carbon Monoxide (CO)	ppm	NR	4.0	<1			
Gas Sample Taken		NR	No	No			
Operator		NR	CC	CC			
Weather / Surface Conditions		NR	Overcast, dry	Fair, dry			
Remarks		Not found	PID = 0.1ppm	PID = 0.1ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH0900
Date Installed	NR
Depth of Installation (mbgl)	14.60

Date		25/05/2007	11/06/2007	20/06/2007			
Time of Day		15:52	10:30	12:35			
Instrument Type		GA2000	GA2000	GA2001			
Instrument Number		7834	7834	7834			
Atmospheric Pressure (millibars)		1010	1003	998			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		7.55	7.50	7.5			
Flow Rate (l/hr)		0.0	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	2	<2	<2			
	% VOL	0.1	<0.1	<0.1			
Oxygen (O_2)	% VOL	20.3	20.3	19.2			
Carbon Dioxide (CO_2)	% VOL	0.1	0.1	0.2			
Hydrogen Sulphide (H_2S)	ppm	1	<1	<1			
Carbon Monoxide (CO)	ppm	2	6	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC/MS			
Weather / Surface Conditions		Dry, clear	Overcast, dry	Fair, dry			
Remarks		PID = 0ppm	PID = 0ppm	PID = 0.2ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH0901
Date Installed	NR
Depth of Installation (mbgl)	2.34

Date		24/05/2007	07/06/2007	20/06/2007			
Time of Day		13:35	12:25	10:08			
Instrument Type		GA2000, Flow Pod	GA2000, Flow Pod	GA2000, Flow Pod			
Instrument Number		7834	7834	7834			
Atmospheric Pressure (millibars)		1009	1007	997			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		1.90	1.50	1.74			
Flow Rate (l/hr)		0.0	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	<2	2	<2			
	% VOL	<0.1	0.1	<0.1			
Oxygen (O_2)	% VOL	20.1	20.4	20.6			
Carbon Dioxide (CO_2)	% VOL	0.4	0.1	<0.1			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	<1			
Carbon Monoxide (CO)	ppm	<1	4	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC/MS			
Weather / Surface Conditions		Blue sky, sunny	Overcast, dry	Fair, dry			
Remarks		PID = 0 ppm	PID = 0 ppm	PID = 0 ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH0902
Date Installed	NR
Depth of Installation (mbgl)	16.75

Date		24/05/2007	07/06/2007	20/06/2007			
Time of Day		14:28	13:11	11:15			
Instrument Type		GA2000, Flow Pod	GA2000, Flow Pod	GA2000, Flow Pod			
Instrument Number		7834	7834	7834			
Atmospheric Pressure (millibars)		1010	1007	997			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		7.73	7.65	7.7			
Flow Rate (l/hr)		0.0	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	<2	2	<2			
	% VOL	0.1	0.1	<0.1			
Oxygen (O_2)	% VOL	20.0	20.2	20.3			
Carbon Dioxide (CO_2)	% VOL	0.7	0.5	0.2			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	<1			
Carbon Monoxide (CO)	ppm	<1	7	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC/MS			
Weather / Surface Conditions		Blue sky, sunny	Overcast, dry	Fair, dry			
Remarks		PID = 0 ppm	PID = 0 ppm	PID = 0 ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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GOLDER ASSOCIATES (UK) LTD
AWE ALDERMASTON (HYDRUS)

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH0907
Date Installed	NR
Depth of Installation (mbgl)	2.05

Date		25/05/2007	11/06/2007	19/06/2007			
Time of Day		NR	11:50	14:30			
Instrument Type		NR	GA2000	GA2001			
Instrument Number		NR	7834	7834			
Atmospheric Pressure (millibars)		NR	1003	996			
Depth to Sampling Point (m)		NR	Surface Valve	Surface Valve			
Depth to Water (m)		NR	Dry	Dry			
Flow Rate (l/hr)		NR	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	NR	<2	<2			
	% VOL	NR	0.1	<0.1			
Oxygen (O_2)	% VOL	NR	19.8	19.8			
Carbon Dioxide (CO_2)	% VOL	NR	1.1	0.7			
Hydrogen Sulphide (H_2S)	ppm	NR	<1	<1			
Carbon Monoxide (CO)	ppm	NR	4.0	<1			
Gas Sample Taken		NR	No	No			
Operator		NR	CC	CC			
Weather / Surface Conditions		NR	Overcast, dry	Fair, dry			
Remarks		Not found	PID = 0ppm	PID = 0ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH909
Date Installed	NR
Depth of Installation (mbgl)	14.20

Date		24/05/2007	07/06/2007	20/06/2007			
Time of Day		15:12	NR	11:40			
Instrument Type		GA2000, Flow Pod	GA2000, Flow Pod	GA2000, Flow Pod			
Instrument Number		7834	7834	7834			
Atmospheric Pressure (millibars)		1009	1007	998			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		5.63	5.62	5.6			
Flow Rate (l/hr)		0.0	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	<2	2	<2			
	% VOL	<0.1	0.1	<0.1			
Oxygen (O_2)	% VOL	20.7	20.6	20.2			
Carbon Dioxide (CO_2)	% VOL	<0.1	<0.1	0.1			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	<1			
Carbon Monoxide (CO)	ppm	2	7	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC/MS			
Weather / Surface Conditions		Blue sky, sunny	Overcast, dry	Fair, dry			
Remarks		PID = 0ppm	PID = 0.1ppm	PID = 0.1ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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GOLDER ASSOCIATES (UK) LTD
AWE ALDERMASTON HYDRUS

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH0911
Date Installed	NR
Depth of Installation (mbgl)	16.85

Date		25/05/2007	07/06/2007	20/06/2007			
Time of Day		11:27	14:53	12:15			
Instrument Type		GA2000, Flow Pod	GA2000, Flow Pod	GA2000, Flow Pod			
Instrument Number		7834	7834	7834			
Atmospheric Pressure (millibars)		995	1007	998			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		5.65	5.61	5.58			
Flow Rate (l/hr)		0.0	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	<2	2	<2			
	% VOL	<0.1	0.1	<0.1			
Oxygen (O_2)	% VOL	13.4	20.1	18.8			
Carbon Dioxide (CO_2)	% VOL	1.9	0.5	1.8			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	<1			
Carbon Monoxide (CO)	ppm	<1	6	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC/MS			
Weather / Surface Conditions		Dry, clear	Overcast, dry	Fair, dry			
Remarks		PID = 0ppm	PID = 0ppm	PID = 0ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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AWE ALDERMASTON HYDRUS

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH927
Date Installed	NR
Depth of Installation (mbgl)	9.85

Date		25/05/2007	07/06/2007	20/06/2007			
Time of Day		10:20	11:42	09:04			
Instrument Type		GA2000, Flow Pod	GA2000, Flow Pod	GA2000, Flow Pod			
Instrument Number		7834	7834	7834			
Atmospheric Pressure (millibars)		996	1007	996			
Depth to Sampling Point (m)		Surface valve	Surface valve	Surface valve			
Depth to Water (m)		7.58	7.57	7.6			
Flow Rate (l/hr)		0.0	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	<2	<2	<2			
	% VOL	<0.1	0.1	<0.1			
Oxygen (O_2)	% VOL	17.2	18.4	20.4			
Carbon Dioxide (CO_2)	% VOL	1.1	0.8	0.1			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	<1			
Carbon Monoxide (CO)	ppm	<1	7	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC/MS			
Weather / Surface Conditions		Dry, clear	Overcast, clear	Fair, dry			
Remarks		PID = 0 ppm	PID = 0.2ppm	PID = 0.2ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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AWE ALDERMASTON HYDRUS

RESULTS OF IN-SITU TESTS ON SAMPLES OF GAS WITHDRAWN FROM GAS MONITORING STANDPIPES

Hole Number	BH928
Date Installed	NR
Depth of Installation (mbgl)	9.50

Date		25/05/2007	07/06/2007	20/06/2007			
Time of Day		09:17	09:48	08:37			
Instrument Type		GA2000, Flow Pod	GA2000, Flow Pod	GA2000, Flow Pod			
Instrument Number		7834	7834	7834			
Atmospheric Pressure (millibars)		995	1007	996			
Depth to Sampling Point (m)		Surface Valve	Surface Valve	Surface Valve			
Depth to Water (m)		7.62	7.60	7.6			
Flow Rate (l/hr)		0.0	0.0	0.0			
Insitu Differential Pressure (Pa)		NR	NR	NR			
Flammable Gas as Methane (CH_4) - LEL-Lower Explosive Limit	% LEL	<2	2	<2			
	% VOL	<1	0.1	<1			
Oxygen (O_2)	% VOL	15.8	20.8	17.7			
Carbon Dioxide (CO_2)	% VOL	2.3	0.1	1.6			
Hydrogen Sulphide (H_2S)	ppm	<1	<1	<1			
Carbon Monoxide (CO)	ppm	<1	6	<1			
Gas Sample Taken		No	No	No			
Operator		CC	CC	CC/MS			
Weather / Surface Conditions		Dry, clear	Overcast, dry	Fair, dry			
Remarks		PID = 0ppm	PID = 0.1ppm	PID = 0.1ppm			

Input By	RL	Date	22/06/2007	Checked By		Date	

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GOLDERS ASSOCIATES (UK) LIMITED
AWE ALDERMASTON HYDRUS

WATER SAMPLING DATA SHEET

BOREHOLE DETAILS			
Borehole No:	CP1001	Operator:	CC
Standing water level (mbgl):	3.76	Time:	15:06
Borehole diameter (mm):	150	Date:	26/04/2007
Standpipe diameter (mm):	50	Volume to be removed (litres)	
Standpipe depth (mbgl):	15.00	(based on 3 times volume of water in borehole):	199

PURGING DETAILS			
Equipment/method:		Depth of purging point (mbgl):	12.00
		Flow rate (litres/minute):	NR
		Time:	15:16
Waterra foot valve		Water level after purging (mbgl):	11.12
		Volume purged (litres):	130

SAMPLING DETAILS			
Equipment/method:		Depth of sampling point (mbgl):	12.00
		Flow rate (litres/minute):	NR
		Time:	NR
Waterra foot valve		Water level after sampling (mbgl):	NR
		Volume sampled (litres):	5

Description of sample: Grey brown in colour, some sediment.

Sample container used: 2 x 1 litre glass bottle, 3 x 1 litre plastic bottle, 1 x vial.

Sample preservation/filtration method: None

Sample Transportation: Overnight courier

Sample Storage: Cool box

Other remarks: 0.1 ppm on PID. No oil detected with interface meter.

Input By: TMR	Date: 03/05/2007	Checked By: RMM	Date: 03/05/07	

Gas Monitoring

Job Name:	**Hydrus**	**Date:**	06.08.08
Job Number:	**Jer3745**	**Staff Name:**	Rachel Beck

Hole ID	Time of reading	Hole Diameter	Atmospheric Pressure	Peak VOCs (ppm)	Monitoring period (seconds)	Peak Flow (l/hr)	Average Flow (l/hr)	Peak CH4 (%vol)	Average CH4 (%vol)	Peak CO2 (%vol)	Average CO2 (%vol)	Differential Pressure (mb)	Peak LEL (%)	Peak H2S (%)	AverageO2	Hole ID	Orientation of measurement Point*	Dip metres Below IC	Dip metres Below OC	Dip metres Below GL	Plunge metres Below IC	Plunge metres Below OC	Plunge metres Below GL	Notes
					0-5	0.4	0.3	0.0	0.0	0.2	0.1	0.8	0	0	21.1									
					5-10	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0	0	21.1									
					10-40	0.1	0	0.0	0.0	0.0	0.0	0.0	0	0	21.1									
					40-70	0.1	0	0.0	0.0	0.0	0.0	0.0	0	0	21.1									
				0.2 ppm peak (Av over 60 seconds =	70-100	0.1	0	0.0	0.0	0.0	0.0	0.0	0	0	21.1									
BH907	9.45	50	999	0ppm)	100-130	0.1	0	0.0	0.0	0.0	0.0	0.0	0	0	21.1	BH907		1.81	1.95	1.95	1.89	2.03	2.03	
					0-5	-0.4	-0.2	0.0	0.0	0.3	0.3	-2.7	0	0	20.7									
					5-10	-0.2	-0.2	0.0	0.0	0.4	0.3	-1.0	0	0	20.9									
					10-40	-0.2	-0.2	0.0	0.0	0.3	0.3	-1.0	0	0	20.9									
					40-70	-0.2	-0.2	0.0	0.0	0.2	0.2	-1.0	0	0	21.0									
					70-100	-0.2	-0.2	0.0	0.0	0.2	0.2	-1.0	0	0	21.0									
BAE BH1	10.15	50	1000	0.0	100-130	-0.2	-0.2	0.0	0.0	0.1	0.1	-1.0	0	0	21.0	BAE BH1		3.07	3.18	3.18	3.42	3.53	3.53	
					0-5	-0.1	0	0.0	0.0	0.0	0.0	-0.6	0	0	20.9									
					5-10	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.9									
					10-40	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.9									
					40-70	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.8									
				1.8 ppm peak (av over 60 seconds = 0.1	70-100	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.8									
BAE BH2	10.25	50	1000	ppm)	100-130	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.8	BAE BH2		2.8	2.91	2.91	3.47	3.58	3.58	
					0-5	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.4									
					5-10	0	0	0.0	0.0	0.1	0.1	0.0	0	0	20.4									
					10-40	0	0	0.0	0.0	0.1	0.1	0.0	0	0	20.4									
					40-70	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.5									
					70-100	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.6									
BAE BH3	10.55	50	1000	0.0	100-130	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.6	BAE BH3		2.1	2.31	2.31	2.98	3.19	3.19	

Gas Monitoring

Job Name:	**Hydrus**	**Date:**	06.08.08
Job Number:	**Jer3745**	**Staff Name:**	Rachel Beck

Hole ID	Time of reading	Hole Diameter	Atmospheric Pressure	Peak VOCs (ppm)	Monitoring period (seconds)	Peak Flow (l/hr)	Average Flow (l/hr)	Peak CH4 (%vol)	Average CH4 (%vol)	Peak CO2 (%vol)	Average CO2 (%vol)	Differential Pressure (mb)	Peak LEL (%)	Peak H2S (%)	AverageO2	Hole ID	Orientation of measurement Point*	Dip metres Below IC	Dip metres Below OC	Dip metres Below GL	Plunge metres Below IC	Plunge metres Below OC	Plunge metres Below GL	Notes
					0-5	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.6									
					5-10	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.7									
					10-40	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.7									
					40-70	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.7									
					70-100	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.7									
BH909	10.4	50	1000	0.0	100-130	0	0	0.0	0.0	0.0	0.0	0.0	0	0	20.7	BH909		5.48	5.56	5.56	12.53	12.61	12.61	
					0-5	-0.3	-0.1	0.0	0.0	0.0	0.0	-1.0	0	0	20.8									
					5-10	-0.1	-0.1	0.0	0.0	0.0	0.0	-1.0	0	0	20.9									
					10-40	-0.1	-0.1	0.0	0.0	0.0	0.0	-1.0	0	0	21.0									
					40-70	-0.1	-0.1	0.0	0.0	0.0	0.0	-1.0	0	0	21.0									
					70-100	-0.1	-0.1	0.0	0.0	0.0	0.0	-1.0	0	0	21.0									
EBH8	11.1	50	1000	0.0	100-130	-0.1	-0.1	0.0	0.0	0.0	0.0	-1.0	0	0	21.0	EBH8		2.17	2.345	2.235	3	3.175	3.065	
					0-5	-0.2	-0.2	0.0	0.0	0.0	0.0	-0.6	0	0	20.8									
					5-10	-0.2	-0.2	0.0	0.0	0.0	0.0	-0.6	0	0	20.8									
					10-40	-0.2	-0.2	0.0	0.0	0.0	0.0	-0.6	0	0	20.8									
					40-70	-0.2	-0.2	0.0	0.0	0.0	0.0	-0.6	0	0	20.8									
					70-100	-0.4	-0.2	0.0	0.0	0.0	0.0	-1.7	0	0	20.8									
EBH8A	11.2	50	1000	0.0	100-130	-0.2	-0.2	0.0	0.0	0.0	0.0	-0.6	0	0	20.9	EBH8A		7.22	7.34	7.24	12.6	12.72	12.62	
					0-5	-0.2	-0.2	0.0	0.0	0.0	0.0	-2.0	0	0	20.8									
					5-10	0	0	0.0	0.0	0.0	0.0	-0.3	0	0	20.7									
					10-40	0	0	0.0	0.0	0.2	0.1	-0.3	0	0	20.7									
					40-70	0	0	0.0	0.0	0.2	0.2	-0.3	0	0	20.7									
					70-100	0	0	0.0	0.0	0.2	0.2	-0.3	0	0	20.7									
BH0333	11.4	50	1000	0.0	100-130	0	0	0.0	0.0	0.2	0.2	-0.3	0	0	20.7	BH0333		1.2	1.27	1.27	2.47	2.54	2.54	

Notes: Always measure VOCs first for a short period. If no VOCs are recorded then an instantaneous reading will be sufficient. Then always measure flow first (0-5 seconds) followed by concentrations (5-10 seconds), repeat for detailed time scales alternating between flow and concentrations.
Wherever possible always measure the flows and concentrations until they have stabilised. If stabilisation is not achieved within the desired period or elevated concentrations and/or flows are still present then leave the gas tap open and return at the end of the gas monitoring round to remonitor.
A peak in CH4 followed by a fall and corresponding raise in CO2 indicates stratification of gas within the borehole. This should be noted as it indicates low levels of gas generation
Always measure dips to lowest point

* It is important that dip and plunge measurements are taken from a consistent point on each borehole. It is recommended that where possible the measurement should be taken from the northern edge of the borehole. Where possible the northern side of the borehole should be marked with a notch

Gas Monitoring

Job Name:	**Hydrus**	**Date:**	03.09.08
Job Number:	**Jer3745**	**Staff Name:**	RB

Hole ID	Time of reading	Hole Diameter	Atmospheric Pressure	Peak VOCs (ppm)	Monitoring period (seconds)	Peak Flow (l/hr)	Average Flow (l/hr)	Peak CH4 (%vol)	Average CH4 (%vol)	Peak CO2 (%vol)	Average CO2 (%vol)	Differential Pressure (mb)	Peak LEL (%)	Peak H2S (%)	AverageO2	AverageN2	Hole ID	Orientation of measurement Point*	Dip metres Below IC	Dip metres Below OC	Dip metres Below GL	Plunge metres Below IC	Plunge metres Below OC	Plunge metres Below GL	Notes
					0-5	0	0	0.0	0.0	0.3	0.1	0	0	0	21.3	78.6									
					5-10	0	0	0.0	0.0	0.1	0.1	0	0	0	21.3	78.6									
					10-40	0	0	0.0	0.0	0.1	0.0	0	0	0	21.3	78.6									
					40-70	0	0	0.0	0.0	0.0	0.0	0	0	0	21.3	78.6									
					70-100	0	0	0.0	0.0	0.0	0.0	0	0	0	21.3	78.6									
BAE BH1	10.00	50mm	991	0.0	100-130	0	0	0.0	0.0	0.0	0.0	0	0	0	21.3	78.6	BAE BH1		3.09			3.26			Very silty and sandy at base (orange brown)
					0-5	0.2	0	0.0	0.0	1.0	0.5	0	0	0	20.7	78.4									
					5-10	0	0	0.0	0.0	1.2	1.2	0	0	0	20.4	78.4									
					10-40	0	0	0.0	0.0	1.3	1.3	0	0	0	20.4	78.4									
					40-70	0	0	0.1	0.0	1.3	1.3	0	4.3	0	20.2	78.4									
					70-100	0	0	0.1	0.0	1.4	1.4	0	4.5	0	20.1	78.3									
					100-130	0	0	0.2	0.2	1.4	1.4	0	5.6	0	20.1	78.1									
					130-150	0	0	0.3	0.3	1.4	1.4	0	6.8	0	20.0	78.2									
					150-180	0	0	0.4	0.4	1.4	1.4	0	10.4	0	19.9	78.1									
					180-240	0	0	0.6	0.6	1.5	1.5	0	13.1	0	19.7	78.0									
					240-300	0	0	0.7	0.7	1.6	1.6	0	13.4	0	19.7	78.0									
					300-350	0	0	0.8	0.7	1.5	1.5	0	15.5	0	19.6	78.0									
BAEBH2	10.15	50mm	991	0.0	350-400	0	0	0.7	0.6	1.4	1.4	0	11.7	0	19.6	78.3	BAEBH2		2.88			3.47			
					0-5	0	0	0.2	0.0	0.1	0.0	0	1.0	0	20.9	78.0									
					5-10	0	0	0.3	0.2	0.0	0.0	0	2.1	0	20.9	79.0									
					10-40	0	0	0.4	0.4	0.0	0.0	0	2.2	0	20.9	79.0									
					40-70	0	0	0.2	0.2	0.0	0.0	0	6.5	0	20.9	79.0									
					70-100	0	0	0.0	0.0	0.0	0.0	0	0.0	0	20.9	79.0									
BH909	10.30	50mm	991	0.0	100-130	0	0	0.0	0.0	0.0	0.0	0	0.0	0	20.9	79.0	BH909		5.58			12.13			silty at base (grey)

Gas Monitoring

Job Name:	**Hydrus**	**Date:**	03.09.08
Job Number:	**Jer3745**	**Staff Name:**	RB

Hole ID	Time of reading	Hole Diameter	Atmospheric Pressure	Peak VOCs (ppm)	Monitoring period (seconds)	Peak Flow (l/hr)	Average Flow (l/hr)	Peak CH4 (%vol)	Average CH4 (%vol)	Peak CO2 (%vol)	Average CO2 (%vol)	Differential Pressure (mb)	Peak LEL (%)	Peak H2S (%)	AverageO2	AverageN2	Hole ID	Orientation of measurement Point*	Dip metres Below IC	Dip metres Below OC	Dip metres Below GL	Plunge metres Below IC	Plunge metres Below OC	Plunge metres Below GL	Notes
					0-5	0	0	0.0	0.0	0.1	0.0	0	0	0	20.8	79.0									
					5-10	0	0	0.0	0.0	0.2	0.1	0	0	0	20.8	79.0									
					10-40	0	0	0.0	0.0	0.1	0.1	0	0	0	20.8	79.0									
					40-70	0	0	0.0	0.0	0.0	0.0	0	0	0	20.8	79.0									
					70-100	0	0	0.0	0.0	0.0	0.0	0	0	0	20.9	79.1									
BAE BH3	10.40	50mm	991	0.0	100-130	0	0	0.0	0.0	0.0	0.0	0	0	0	20.9	79.1	BAE BH3		2.1			2.99			
					0-5	-0.4	-0.4	0.0	0.0	0.0	0.0	0	0	0	20.8	79.1									
					5-10	-0.6	-0.6	0.0	0.0	0.0	0.0	0	0	0	20.8	79.1									
					10-40	-0.7	-0.7	0.0	0.0	0.0	0.0	0	0	0	20.8	79.1									
					40-70	-1	-1	0.0	0.0	0.0	0.0	0	0	0	20.8	79.1									
					70-100	-3	-3	0.0	0.0	0.0	0.0	0	0	0	20.8	79.1									
EBH8	10.55	50mm	990	0.0	100-130	-6	-6	0.0	0.0	0.0	0.0	0	0	0	20.8	79.1	EBH8		2.17			2.93			
					0-5	0	0	0.0	0.0	0.0	0.0	0	0	0	20.8	79.1									
					5-10	0	0	0.0	0.0	0.0	0.0	0	0	0	20.8	79.1									
					10-40	0	0	0.0	0.0	0.0	0.0	0	0	0	20.7	79.2									
					40-70	0	0	0.0	0.0	0.0	0.0	0	0	0	20.7	79.2									
					70-100	0	0	0.0	0.0	0.0	0.0	0	0	0	20.7	79.2									
EBH8A	11.05	50mm	990	0.0	100-130	0	0	0.0	0.0	0.0	0.0	0	0	0	20.7	79.2	EBH8A		7.34			12.6			
					0-5	0.7	0.2	0.0	0.0	0.1	0.1	8	0	0	20.4	79.1									
					5-10	0.3	0.1	0.0	0.0	0.2	0.2	3	0	0	20.4	79.1									
					10-40	0.1	0	0.0	0.0	0.4	0.4	1	0	0	20.4	79.1									
					40-70	0	0	0.0	0.0	0.4	0.4	0	0	0	20.3	79.3									
					70-100	0	0	0.0	0.0	0.5	0.4	0	0	0	20.2	79.2									
					100-130	0	0	0.0	0.0	0.4	0.4	0	0	0	20.2	79.3									
BH0333	11.25	50mm	988	0.0	130-150	0	0	0.0	0.0	0.4	0.4	0	0	0	20.2	79.3	BH0333		1.31			2.49			

Gas Monitoring

Job Name:	**Hydrus**	**Date:**	03.09.08
Job Number:	**Jer3745**	**Staff Name:**	RB

Hole ID	Time of reading	Hole Diameter	Atmospheric Pressure	Peak VOCs (ppm)	Monitoring period (seconds)	Peak Flow (l/hr)	Average Flow (l/hr)	Peak CH4 (%vol)	Average CH4 (%vol)	Peak CO2 (%vol)	Average CO2 (%vol)	Differential Pressure (mb)	Peak LEL (%)	Peak H2S (%)	AverageO2	AverageN2	Hole ID	Orientation of measurement Point*	Dip metres Below IC	Dip metres Below OC	Dip metres Below GL	Plunge metres Below IC	Plunge metres Below OC	Plunge metres Below GL	Notes
					0-5	0.1	0	0.0	0.0	0.5	0.4	0	0	0	20.3	78.9									
					5-10	0	0	0.0	0.0	0.8	0.8	0	0	0	20.1	78.9									
					10-40	0	0	0.0	0.0	0.9	0.9	0	0	0	20.1	78.9									
					40-70	0	0	0.0	0.0	0.9	0.9	0	0.0	0	20.1	78.9									
					70-100	0	0	0.0	0.0	1.1	1.1	0	0.0	0	19.8	79.0									
					100-130	0	0	0.0	0.0	1.3	1.2	0	0.0	0	19.7	78.9									
					130-150	0	0	0.0	0.0	1.4	1.3	0	0.0	0	19.5	79.0									
					150-180	0	0	0.0	0.0	1.6	1.6	0	0.0	0	19.3	79.0									
					180-240	0	0	0.0	0.0	1.6	1.6	0	0.0	0	19.2	79.1									
					240-300	0	0	0.0	0.0	1.7	1.7	0	0.0	0	19.2	79.1									
					300-350	0	0	0.0	0.0	1.7	1.7	0	0.0	0	19.2	79.1									
BH907	12.30	50mm	987	0.0	350-400	0	0	0.0	0.0	1.7	1.7	0	0.0	0	19.1	79.1	BH907		2.88			3.47			

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