REGIONAL GASWORKS REMEDIATION STUDY

FINAL DRAFT REPORT

on

SITE INVESTIGATION

at

LIMERICK GASWORKS SITE

for

BORD GAIS EIREANN

VOLUME 2
FACTUAL SITE INVESTIGATION DATA

D 1078/3

April 1996

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(Note: Volume 2 is bound in a separate volume)

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TABLES

Table 1: Penetration Test Results

Sample No. (m bls)	Blow Counts	SPT N-Value	Strength	Colour	Main Constituent	Lesser Constituent
BH-7 (1.0m)	2 per 45cm	2	soft	grey	sandy clay	gravel
BH-7 (2.0m)	2,2,6,3,2,2	13	medium dense	red/brown	red brick	clinker fill
BH-7 (3.0m)	2,2,3,2,2,2	9	loose	red/brown	red brick	clinker fill
BH-7 (4.0m)	3,5,3,7,6,3	19	medium dense	red/brown	red brick	clinker fill
BH-7 (5.0m)	8,18,13,7,7,9	36	dense	red/brown	red brick	boulders
BH-8 (1.6m)	7,3,1,2,1,1	5	soft	brown/grey	silty clay	sand
BH-9 (0.8m)	0,1,2,2,3,1	8	loose	grey/brown	sand	gravel
BH-9 (1.5m)	2,3,18,29	20	medium dense	dark grey	sandy silt	gravel
BH-10 (0.65m)	23,23	>50*	very dense	light brown	sandy silt	boulders
BH-10 (1.65m)	3,4,3,2,0,1	6	loose	brown/black	gravel	bricks
BH-10 (2.65m)	3,4,9,4,3,2	18	medium dense	brown/black	cobbles	gravel
BH-10 (3.65m)	2,2,2,3,2,2	9	loose	grey	silty clay	sand
BH-10 (4.65m)	2,2,4,2,2,3	11	medium dense	dark grey	sand	silt
BH-11 (0.75m)	3,5,23,5,3,3	34	dense	brown	sandy silt	cobbles
BH-11 (1.75m)	1,1,0,1,1,1	3	soft	grey	silty clay	sand
BH-11 (2.75m)	1,1,0,0,0,1	1	very loose	dark grey	sand	gravel
BH-11 (3.75m)	0,0,0,0,0,1	1	very soft	dark grey	silty clay	organics
BH-11 (4.75m)	0,0,0,0,0,1	1	very soft	grey	sandy clay	gravel
BH-11 (5.75m)	0,0,0,0,0,1	1	very soft	grey	sandy clay	gravel
BH-11 (6.75m)	0,0,0,0,0,1	1	very soft	grey	sandy clay	gravel
BH-11 (7.75m)	1,0,1,2,2,3	8	loose	dark grey	sand	silt
BH-12 (0.7m)	8,8,4,2,3,1	10	loose	light grey	sandy silt	gravel
BH-12 (1.7m)	1,3,5,5,3,3	16	soft to firm	brown	silty clay	sand
BH-12 (3.4m)	0,1,2,3,2,2	9	soft	dark grey	silty clay	sand

LEGEND

* Test stopped as greater than 50 blows were recorded per 75mm

m bls - metres below land surface

Table 2: Surface Sampling Location Descriptions

Surface Sample No.	Description	Analysis Requested
F1	Collected from 3m from the base of existing site boundary - Limestone wall which lies to the southwest of the former location of Gasholder 3 Wet sticky black CLAY. Heavily stained with strong phenolic odours.	S1, S2, S1y, S3, S4, S5
F2	Collected from the surface of the wall at the derelict booster house. Dry/hardened sticky tar deposits. Heavy contamination with strong odour	S1, S1x, S1z
F3	Collected from the inner side of the wall enclosing the compound area (c. 5m from TP19) Dry and hardened with tar stained material. No odour.	S1, S2, S1y, S3, S4, S5
F4	Collected from the surface of the compound (adjoining compound perimeter wall). Dry and hardened with tar stained material. No odour.	S1
F5	Collected from the site boundary wall adjoining the Dock Road (c. 8m from TP 17). Dry and hardened with tar stained material. No odour.	S1, S2, S1y, S3, S4, S5

Legend

S1 - pH, Total Cyanide, Sulphate, Toluene Extractable Matter, Total Phenols
S2 - pH, Arsenic, Lead, Cadmium, Chromium, Mercury, Nickel, Zinc, Copper, Cyanide, Sulphur, Sulphide
S1x - Free Cyanide, Complex Cyanide, Thiocyanate
S1y - Water Soluble Sulphate
S1z - 16 Priority PAHs, BTEX
S3 - Mineral Oils
S4 - Mineral Oil Speciation by GCMS
S5 - Total VOCs

Table 3: Recorded Water Levels on 11/8/95 and 25/9/95.

Date	BH-7 (m bls)	BH-8 (m bls)	BH-9 (m bls)	BH-10 (m bls)	BH-11 (m bls)	BH-12(D) (m bls)	BH-12(S) (m bls)
11/8/95	1.22	2.83	0.92	1.55	1.74	2.31	2.36
25/9/95	NA	0.8	0.95	NA	1.72	2.26	NA

LEGEND

m bls - metres below land surface

NA - water level not recorded due to extent of groundwater contamination

Table 4: Recorded Gas Concentrations.

Borehole No.	Date	CH4 (%)	CO2%	O2%	mb	Hydrogen (ppm)	H2S(ppm)	LEL (%)
BH-7 (B/R)	11/8/95	3.0	0.0	20.8	1014.0	0.0	0.0	60.0
BH-7 (B/R)	25/9/95	74.0	1.8	0.0	1021.0	0.0	0.0	-
BH-8 (O/B)	11/8/95	0.1	0.1	20.1	1016.0	0.0	0.0	18.0
BH-8 (O/B)	25/9/95	17.1	1.7	11.5	1021.0	0.0	0.0	27.0
BH-9 (B/R)	11/8/95	0.4	0.0	21.3	1015.0	0.0	0.0	10.0
BH-9 (B/R)	25/9/95	0.4	0.5	18.1	1019.0	0.0	0.0	8.0
BH-10 (O/B)	11/8/95	0.4	0.0	21.3	1015.0	0.0	0.0	8.0
BH-10 (O/B)	25/9/95	34.0	3.2	8.0	1021.0	0.0	0.0	30.4
BH-11 (O/B)	11/8/95	0.1	0.0	21.3	1016.0	0.0	0.0	4.0
BH-11 (O/B)	25/9/95	0.0	2.0	18.1	1021.0	0.0	0.0	0.0
BH-12 (S) (O/B)	11/8/95	2.1	0.4	18.6	1016.0	0.0	0.0	42.0
BH-12 (S) (O/B)	25/9/95	-	-	-	-	0.0	-	-
BH-12 (D) (B/R)	11/8/95	0.2	0.0	21.3	1016.0	0.0	0.0	4.0
BH-12 (D) (B/R)	25/9/95	86.6	2.5	0.0	1022.0	0.0	0.0	-

Legend

CH4 - Methane
CO2 - Carbon Dioxide
O2 - Oxygen
mb - millibars
H2S - Hydrogen Sulphide
LEL - Lower Explosive Limit
B/R - Screen in Bedrock O/B - Screen in Overburden

Table 5 (page 1 of 3): Soil Analytical Results - pH, Total Cyanide and Phenols, TEM, Sulphate and Physical Descriptions

Sample No.	pH	Water Soluble Sulphate g/l	Acid Soluble Sulphate (mg/kg)	Total Cyanide (mg/kg)	Total Phenols (mg/kg)	TEM (mg/kg)	Evidence of Physical Contamination
TP-11 (0.3-1.3m)	9.48	-	1600	38	<0.1	2475	No odour and no soil staining
TP-11 (2.4-3.2m)	8.53	-	1800	<5	<0.1	239	No odour and no soil staining
TP-11 (3.3-3.7m)	8.58	-	2300	<5	1.3	6811	Moderately contaminated ash-type layer
TP-12 (0.9-1.4m)	7.65	1.125	7000	220	0.3	5959	Heavily stained with tar and oil, strong hydrocarbon odour
TP-12 (1.4-1.9m)	8.65	-	11000	430	<0.1	3514	Visable evidence of contamination, moderate phenol odour
TP-12 (2.5-3.5m)	8.41	0.157	9200	<5	0.7	2046	Moderate contamination with mild phenolic odour
TP-13 (0.4-0.8m)	7.06	-	66000	10000	0.6	18888	Moderate contamination with a mild phenolic odour
TP-13 (1.0-1.7m)	8.29	0.695	10400	112	<0.1	441	Moderate contamination with a mild phenolic odour
TP-13 (2.0-3.0m)	7.03	-	81500	390	3.9	16994	Moderate contamination with a mild phenolic odour
TP-14 (0.0-0.5m)	8.22	-	1300	23	<0.1	4474	No evidence of contamination
TP-14 (1.4-2.7m)	8.21	-	3100	<5	0.1	7177	Moderately contaminated with slight phenolic odour
TP-14 (2.7-3.5m)	8.26	0.219	5500	108	2.4	3294	Heavily stained with strong phenolic odour
TP-15 (0.0-0.75m)	9.16	-	4900	420	426.1	22360	Uncontaminated, no odour present
TP-15 (0.75-1.5m)	7.87	-	8600	90	41.8	17556	Heavily stained with tar and oil, strong hydrocarbon odour
TP-15 (1.5-3.0m)	8.6	-	11500	380	265.5	23148	Visable evidence of staining, moderate phenolic odour
TP-16 (0.0-0.9m)	10.36	-	<0.01	5	0.5	1970	No odour and no soil staining
TP-16 (1.1-1.8m)	8.03	-	1800	57	4.6	921	Heavily stained with strong phenolic odour
TP-16 (1.5-1.8m)	9.16	-	<0.01	72	1	68	Heavily stained with strong phenolic odour
TP-17 (0.0-0.75m)	7.56	-	59600	<5	1.8	1484	No odour and no soil staining
TP-17 (0.75-1.5m)	8.96	-	<0.01	<5	0.1	116	No odour and no soil staining
TP-17 (1.5-3.0m)	8.62	-	<0.01	<5	0.2	365	Heavily stained with strong phenolic odour
TP-18 (0.0-0.75m)	9.02	-	<0.01	<5	0.2	70	No odour and no soil staining
TP-18 (0.75-1.5m)	9.01	-	<0.01	<5	0.1	90	No odour and no soil staining
TP-18 (1.5-3.0m)	8.56	-	<0.05	<14	2	1464	Heavily stained with moderate phenolic odour
DUTCH MACs (1/10/94)							
Intervention Value	-	-	-	20	2000	-	
ICRCL							
Threshold	5		2,000	25	-	-	
Action	3		10,000	500	-	-	

LEGEND

Date of Sample Collection: July 18th - July 22nd, 1995

MACs - Maximum Admissible Concentration

ICRCL - Interdepartmental Committee on the redevelopment of contaminated land (domestic gardens, allotments, landscaped areas)

mg/kg - milligrams per kilogramme

TEM - Total Extractable Matter

Table 5 (page 2 of 3): Soil Analytical Results - pH, Total Cyanide and Phenols, Sulphate,TEM and Physical Description

Sample No.	pH	Water Soluble Sulphate g/l	Acid Soluble Sulphate (mg/kg)	Total Cyanide (mg/kg)	Total Phenols (mg/kg)	TEM (mg/kg)	Evidence of Physical Contamination
TP-19 (0.0-0.5m)	8.88	-	<0.01	<5	0.4	268	No odour and no soil staining
TP-19 (0.5-0.9m)	8.66	-	<0.01	42	1.4	4768	No odour and no soil staining
TP-19 (0.9-1.2m)	9.38	-	0.03	<5	0.2	959	Heavily stained with tar and oil, strong hydrocarbon odour
TP-20 (0.0-0.64m)	8.35	-	0.83	13	0.4	33016	Slightly contaminated with a mild phenolic odour
TP-21 (0.0-0.5m)	9.13	-	<0.01	<5	0.4	2443	No odour and no soil staining
TP-22 (0.0-0.6m)	8.47	-	0.12	55	0.7	2438	Slightly contamination with a mild phenolic odour
TP-22 (1.0-1.5m)	7.39	-	8.18	10000	15.6	111957	Heavily contaminated with strong phenolic odour
TP-22 (1.5-2.5m)	7.99	-	3.52	650	8.7	34309	Moderately stained with mild phenolic odour
TP-23 (0.0-0.5m)	8.52	0.124	0.32	14	3.5	5182	Slight evidence of contamination within the ash material
TP-23 (0.5-1.7m)	8.15	-	0.57	97	14.1	38996	Heavily contaminated with strong phenolic odour
TP-23 (2.0-2.4m)	8.41	-	0.52	103	1.9	9709	Heavily stained with strong tar odour
TP-24 (0.0-0.75m)	7.87	-	0.93	570	13.3	7261	Slightly contamination with a mild phenolic odour
TP-24 (0.9-1.2m)	8.18	-	0.93	1300	403.6	161290	Heavily contaminated with strong phenolic odour
TP-24 (1.5-2.3m)	7.98	-	2.18	740	76.5	140625	Heavily contaminated with strong phenolic odour
TP-25 (0.4-0.8m)	10.86	-	0.25	8	341.9	34817	Heavily contaminated with strong phenolic odour
TP-25 (0.8-1.1m)	8.07	-	0.22	<5	38.1	1698	Heavily stained with moderate tar odour
TP-26a (0.0-0.2m)	8	-	0.02	32	6.9	8596	No odour and no soil staining
TP-26b (0.0-0.15m)	7.49	-	<0.01	<5	0.2	1063	No odour and no soil staining
TP-27 (0.2-0.5m)	10.72	0.916	0.36	22	1.8	3669	No odour and no soil staining
TP-27 (0.5-1.9m)	8.19	0.54	0.76	124	0.2	20483	Unontaminated, no evidence of staining
TP-27 (3.2-3.4m)	7.51	-	1.28	1200	1.9	6315	Unontaminated, no evidence of staining
DUTCH MACSs (1/10/94)							
Intervention Value	-		-	20	2000	-	
ICRCL							
Threshold	5		2,000	25	-	-	
Action	3		10,000	500	-	-	

LEGEND

Date of Sample Collection: July 18th - July 22nd, 1995

MACs - Maximum Admissible Concentration

ICRCL - Interdepartmental Committee on the redevelopment of contaminated land (domestic gardens, allotments, landscaped areas)

mg/kg - milligrams per kilogramme

TEM - Total Extractable Matter

Table 5 (page 3 of 3): Soil Analytical Results - pH, Sulphate, Total Cyanide, Total Phenols,TEM and Physical Description

Sample No.	pH	Water Soluble Sulphate g/l	Acid Soluble Sulphate (mg/kg)	Total Cyanide (mg/kg)	Total Phenols (mg/Kg)	TEM (mg/kg)	Evidence of Physical Contamination
F1	8.07	0.578	4600	295	36.3	2237	Heavily stained with strong phenolic odour
F2	7.65	-	<0.01	76	634	632577	Heavily stained with strong phenolic odour
F3	7.02	0.087	4200	53	51.5	246885	Dry, hardened tar-stained material
F4	NDP	-	NDP	NDP	NDP	NDP	Dry, hardened tar-stained material
F5	7.16	1.059	4500	19	205	270463	Dry, hardened tar-stained material
BH-7 (5-5.2m)	9.47	-	1500	40	15.3	2178	No evidence of contamination
BH-11 (7-7.3m)	8.4	0.302	3900	4	0.1	642	No evidence of contamination
DUTCH MACSs (1/10/94)							
Intervention Value			-	20	2000	-	
ICRCL							
Threshold	5		2,000	25	-	-	
Action	3		10,000	500	-	-	

LEGEND

Date of Sample Collection: July 18th - July 22nd, 1995

MACs - Maximum Admissible Concentration

ICRCL - Interdepartmental Committee on the redevelopment of contaminated land (domestic gardens, allotments, landscaped areas)

mg/kg - milligrams per kilogramme

TEM - Total Extractable Matter

NDP - No Detection Possible

Table 6
Soil Analytical Results - Complex Cyanide, Free Cyanide Thiocyanate.

Sample No.	Complex Cyanides mg/kg	Free Cyanide mg/kg	Thiocyanate mg/kg
TP-12 (1.4-1.9m)	377	23	85
TP-13 (0.4-0.9m)	9988	12	20
TP-13 (2.0-3.0m)	388	2	30
TP-15 (0.0-0.75m)	418	2	47
TP-15 (1.5-3.0m)	374	6	125
TP-16 (1.1-1.8m)	57	<1	<10
TP-22 (0.0-0.6m)	10000	<1	210
TP-23 (2.0-2.4m)	101	2	50
TP-24 (0.9-1.2m)	1300	<1	<10
TP-27 (3.2-3.4m)	1179	31	20
F2	75	1	10
DUTCH MACs (1/10/94)			
Intervention Value	50	20	20
ICRCL			
Threshold	250	25	50
Action	5,000	500	-

LEGEND
Date of sample collection: July 18th - August 10th, 1995
MACs - Maximum Admissible Concentration
ICRCL - Inter-Departmental Committee on the Redevelopment of Contaminated Land

Table 7: Soil Analytical Results - Metals, Total Sulphur and Sulphide

Sample No.	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Mercury mg/kg	Nickel mg/kg	Lead mg/kg	Zinc mg/kg	Sulphur mg/kg	Sulphide mg/kg
TP-15 (0.0-0.75m)	12	<1	12	16	<1	16	109	52	4000	6
TP-15 (1.5-3.0m)	29	<1	20	27	<1	24	175	73	6500	3
TP-16 (1.1-1.8m)	65	2	29	244	<1	146	464	840	8300	<1
TP-18 (0.75-1.5m)	2	<1	2	4	<1	8	5	20	<0.01	<1
TP-19 (0.5-0.9m)	10	<1	6	15	<1	12	16	32	400	1
TP-19 (0.9-1.2m)	4	<1	3	4	<1	6	7	15	400	1
TP-22 (1.0-1.5m)	26	2	34	4	<1	6	67	94	151000	19
TP-25 (0.4-0.8m)	18	<1	14	30	<1	18	73	133	2300	18
TP-26a (0.0-0.2m)	31	<1	16	37	<1	21	168	101	4100	5
TP-27 (0.2-0.5m)	21	<1	23	59	<1	27	332	147	1800	<1
TP-27 (3.2-3.4m)	88	1	32	218	<1	44	1625	448	8200	11
F1	18	1	14	37	<1	21	46	39	4200	3
F3	28	<1	8	120	<1	14	156	158	17400	<1
F5	9	<1	3	6	<1	3	22	79	12800	<1
BH-7 (5.0-5.2m)	18	<1	22	27	<1	35	77	57	1500	8
BH-11 (7.0-7.3)	7	<1	68	44	<1	71	54	72	11300	34
Dutch MACs (1/10/94)										
Intervention value	-	12	380	190	10	210	530	720	-	200
ICRCL										
Trigger Conc.	-	15	1,000	130	20	70	2000	300	5000	250

LEGEND

Date of Sample Collection: July 18th - August 11th, 1995

MACs - Maximum Admissible Concentration

ICRCL - Interdepartmental Committee on the redevelopment of contaminated land (gardens, allotments, landscaped areas)

mg/kg - milligrams per kilogram

NA - Analysis not requested

Table 8: Soil Analytical Results - BTEX

Sample No.	Benzene µg/kg	Toluene µg/kg	Ethyl Benzene µg/kg	Total Xylene µg/kg
TP-13 (2.5-2.7m)	145	53	33	46
TP-15 (0.6-0.9m)	25390	26990	3282	21973
TP-15 (2.5-2.8 m)	8231	8853	1070	7461
TP-16 east (1.5-1.8m)	31	42	73	433
TP-16 south (1.5-1.8m)	<10	<10	<10	19
TP-18 (0.75-1.5m)	<10	<10	<10	11
TP-19 (0.0-0.5m)	<10	<10	<10	15
TP-19 (0.9-1.2m)	1426	3456	789	6145
TP-22 (1.0-1.5m)	4531	2994	2037	12942
TP-23 (1.1-1.4m)	11649	16839	7640	37550
TP-24 (0.9-1.2m)	25221	31629	4067	20482
F1	38204	36816	4751	28359
F3	53	181	53	337
F5	10	12	11	62
BH-7	519	764	143	638
BH-11	98	38	32	89

Dutch MACs 1/10/94				
Intervention (µg/kg)	1000	130000	50000	25000

Legend

Date of Sample Collection: July 18th - August 11th, 1995

MACs - Maximum Admissable Concentration

µg/kg - micrograms per kilogram

Table 9 (page 1 of 2): Soil Analytical Results - Polycyclic Aromatic Hydrocarbons

Polynuclear Aromatic Hydrocarbons	Units	TP-11 0.3-1.3m	TP-11 3.3-3.7m	TP-12 1.4-1.9m	TP-13 0.4-0.9m	TP-13 2.0-3.0	TP-14 1.4-2.7m	TP-15 0.0-0.75m	TP-15 1.5-3.0m	TP-17 0.0-0.75m	TP-20 0.0-0.64m	Dutch MACs Intervention
Naphthalene	mg/kg	<1	3	6	54	8	25	9	185	47	44	-
Acenaphthylene	mg/kg	<1	12	2	10	15	5	10	286	2	2	-
Acenaphthene	mg/kg	<1	21	3	6	17	8	9	50	2	3	-
Fluorene	mg/kg	<1	35	5	5	42	16	20	271	7	2	-
Phenanthrene	mg/kg	6	141	14	32	160	39	55	691	42	2	-
Anthracene	mg/kg	<1	28	3	10	53	8	21	390	10	2	-
Fluoranthene	mg/kg	6	72	22	50	217	16	47	708	48	17	-
Pyrene	mg/kg	7	101	22	39	177	11	31	523	37	18	-
Benzo(a)anthracene	mg/kg	1	31	18	49	99	3	43	2,845	95	19	-
Chrysene	mg/kg	1	21	18	60	73	4	19	968	51	12	
Benzo(b)fluoranthene and Benzo(k)fluoranthene	mg/kg	<1	10	34	94	68	4	26	1,450	72	16	-
Benzo (a)pyrene	mg/kg	<1	17	47	55	83	4	13	1,600	37	9	-
Benzo(g,h,i)perylene	mg/kg	<1	13	148	253	188	10	57	9,241	236	63	-
Dibenz(a,h)Anthracene	mg/kg	<1	2	15	41	26	1	5	1,244	27	13	-
Indeno(1,2,3-cd)Pyrene	mg/kg	<1	9	91	124	99	9	52	4,084	136	50	-
Total PAH	mg/kg	21	516	447	882	1,326	164	418	24,518	851	274	40

LEGEND

Date of sample collection: 18th July - 11 August, 1995
Dutch MACs - Maximum Admissible Concentrations (1/10/94)
mg/kg - milligram per kilogram

Table 9 (page 2 of 2): Soil Analytical Results - Polycyclic Aromatic Hydrocarbons

Polynuclear Aromatic Hydrocarbons	Units	TP-21 0.0-0.5m	TP-22 1.0-1.5m	TP-23 0.0-0.5m	TP-23 2.0-2.4m	TP-25 0.4-0.8	TP-26a 0.0-0.2m	TP-27 0.2-0.5m	TP-27 3.2-3.4m	F2	Dutch MACs Intervention
Naphthalene	mg/kg	27	281	25	21	55	9	<1	2	687	-
Acenaphthylene	mg/kg	4	123	18	31	153	25	1	22	895	-
Acenaphthene	mg/kg	1	57	17	17	45	6	<1	8	346	-
Fluorene	mg/kg	3	434	41	84	196	31	3	40	1065	-
Phenanthrene	mg/kg	4	1258	183	289	430	103	19	77	1669	-
Anthracene	mg/kg	<1	638	41	85	273	40	5	20	83	-
Fluoranthene	mg/kg	3	1434	253	273	444	126	27	31	1689	-
Pyrene	mg/kg	2	1147	204	241	359	103	20	22	1452	-
Benzo(a)anthracene	mg/kg	3	6011	147	169	307	88	9	14	976	-
Chrysene	mg/kg	2	2102	107	99	186	56	9	15	799	-
Benzo(b)fluoranthene and Benzo(k)fluoranthene	mg/kg	3	1973	123	110	190	72	9	32	1051	-
Benzo (a)pyrene	mg/kg	1	1808	210	183	321	121	12	32	2468	-
Benzo(g,h,i)perylene	mg/kg	10	8813	536	356	808	349	24	133	28326	-
Dibenz(a,h)Anthracene	mg/kg	<1	1564	78	46	107	48	2	8	589	-
Indeno(1,2,3-cd)Pyrene	mg/kg	8	4260	296	185	368	160	14	76	10351	-
Total PAH	mg/kg	71	31903	2278	2190	4241	1338	154	533	52447	40

LEGEND

Date of sample collection: 18th July - 11 August, 1995

Dutch MACs - Maximum Admissible Concentrations (1/10/94)

mg/kg - milligram per kilogram

Table 10: Soil Analytical Analysis - Mineral Oils, Total Extract and Saturate Quantification by G.C.

Sample No.	Minerial Oils mg/kg	Total Extract mg/kg	Isoprenoid mg/kg	Paraffins mg/kg	Others mg/kg
TP-15 (0.0-0.75m)	10062	22360	368.94	1439.98	20551.08
TP-15 (1.5-3.0m)	10567	23148	180.55	689.81	22277.64
TP-16 (1.1-1.8m)	448	921	24.59	179.69	716.82
TP-18 (0.0-0.75m)	32	90	2.03	9.09	78.88
TP-19 (0.5-0.9m)	1445	4768	20.98	119.68	4627.34
TP-19 (0.9-1.2m)	412	959	8.15	103.28	847.57
TP-22 (1.0-1.5m)	47582	111957	4153.6	12046.57	95756.83
TP-25 (0.4-0.8m)	19115	34817	1483.3	3203.16	30134.11
TP-26a (0.0-0.2m)	3241	8596	44.56	658.45	7893.71
TP-27 (0.2-0.5m)	1339	4162	68.9	962.25	3130.25
TP-27 (3.2-3.4m)	467	6315	46.1	589.82	5679.71
F1	767	2237	19.91	52.57	2164.3
F3	88879	246885	345.64	3431.7	234713.57
F5	116029	270463	3029.19	10304.64	257129.17
BH-7 (5.0-5.2m)	564	642	13.8	166.41	461.79
BH-11 (7.0-7.3m)	128	2178	4.356	194.5	1977.19
Dutch MAC 1/10/95					
Intervention	-	-	-	-	-
ICRCL					
Threshold	-	-	-	-	-
Action	5000	5000	-	-	-

LEGEND

Date of Sample Collection: July18th - August 11th, 1995
MACs - Maximum Admissible Concentration
mg/kg - milligrams per kilogram

Table 11: Soil Analytical Results - Total Volatiles by Gas Chromotograph

Sample No.	Units	Total Volatiles
TP-13 (2.5-2.7m)	µg/kg	3084
TP-15 (0.6-0.9m)	µg/kg	223355
TP-15 (2.5-2.8m)	µg/kg	76342
TP-16 (1.1-1.8m)	µg/kg	4916
TP-16 (1.5-1.8m)	µg/kg	308
TP-18 (0.75-1.5m)	µg/kg	165
TP-19 (0.0-0.5m)	µg/kg	7046
TP-19 (0.9-1.2m)	µg/kg	46254
TP-22 (1.0-1.5m)	µg/kg	74858
TP-24 (0.9-1.2m)	µg/kg	250914
TP-24 (1.1-1.4m)	µg/kg	211983
F1	µg/kg	346343
F3	µg/kg	4885
F5	µg/kg	875
BH-7 (5.0-5.2m)	µg/kg	4547
BH-11 (7.0-7.3m)	µg/kg	685

Legend
Date of sample collection: July18th - August 11th, 1995
µg/kg - micrograms per kilogram

Table 12: Soil Analytical Results (Page 1 of 2) - Results for Soil Leachate Tests

Analytical Parameter	Units DIN Leachate	TP15 (1.5-3.0m)	TP22 (1.0-1.5m)
Total Cyanide in Leachate	mg/l	<0.05	0.06
Sulphide on Leachate	mg/l	0.04	0.03
Phenol Leachate	mg/l	7.4	0.03
Ammonical Nitrogen in Leachate	mg/l	4.5	210

Legend
Date of Sample Collection - July 18th - August 11th, 1995
mg/l - milligrams per litre of DIN Leachate

Table 12 (Page 2 of 2) - Polynulear Aromatic Hydrocarbon Leachate Results

Polynuclear Aromatic Hydroarbons	TP15 (1.5-3.0m) ng/l DIN Leachate	TP22 (1.0-1.5m) ng/l DIN Leachate
Naphthalene	211236	507518
Acenaphthylene	216195	162801
Acenaphthene	46131	20545
Fluorene	146309	85399
Phenanthrene	218887	206391
Anthracene	82412	50115
Fluoranthene	102429	77117
Pyrene	69152	50256
Benzo(a)anthracene	16838	13193
Chrysene	16475	13642
Benzo(b)fluoranthene and Benzo(k)fluoranthene	18679	14310
Benzo (a)pyrene	7239	4512
Benzo(g,h,i)perylene	399	2927
Dibenz(a,h)Anthracene	1168	984
Indeno(1,2,3-cd)Pyrene	1815	1768
Total PAH	1158874	11211479

Legend

Date of Sample Collection - July 18th - August 11th, 1995

ng/l - nanograms per litre of DIN Leachate

Table 13: Groundwater Analysis Results - pH, Conductivity and Temperature

Sample No.	pH		Conductivity (µS)		Temperature (c)	
	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95
TP - 11	NA	NS	NA	NS	NA	NS
TP - 12	8.43	NS	662	NS	12	NS
TP - 13	7.41	NS	1633	NS	13	NS
TP - 14	7.2	NS	1845	NS	14	NS
TP - 15	NA	NS	NA	NS	NA	NS
TP - 16	7.19	NS	1021	NS	NA	NS
TP - 17	NA	NS	NA	NS	NA	NS
TP - 18	7.47	NS	NA	NS	12.4	NS
TP - 19	8.5	NS	487	NS	14	NS
TP - 20	6.9	NS	1472	NS	12	NS
TP - 21	7.1	NS	868	NS	12	NS
TP - 22	NA	NS	NA	NS	NA	NS
TP - 23	7.8	NS	949	NS	13	NS
TP - 24	NA	NS	NA	NS	NA	NS
TP - 25	NA	NS	NA	NS	NA	NS
TP - 26 (A)	NA	NS	NA	NS	NA	NS
TP - 26 (B)	NA	NS	NA	NS	NA	NS
TP - 27	7.77	NS	968	NS	12	NS
BH-7	NA	NA	NA	NA	NA	NA
BH-8	7.07	6.85	2189	2280	17.05	13.5
BH-9	7.9	7.65	1767	1737	14.9	14
BH-10	NA	NA	NA	NA	NA	NA
BH-11	7.74	7.48	1508	1544	14.1	13.5
BH-12(S)	7.12	NS	1539	NS	14.4	NS
BH-12(D)	7.52	7.5	1487	1730	15	14

LEGEND

Date of sample collection: August 10th/ September 26th, 1995.

° C = degrees celcius

µS/cm = micro siemens per centimetre.

NA - Field analysis not available due to heavy contamination

NS - Not sampled, trial pit backfilled after excavation

Table 14: Groundwater Analytial Results - Total Phenols, Amm. Nitrogen, Sulphide, and Cyanide

Sample No.	Total Phenols		Sulphide		Amm. Nitrogen		Total Cyanide	
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95
BH-7	NDP	NDP	NDP	0.04	58.3	NDP	NDP	NDP
BH-8	137	595.6	0.25	0.25	99.3	97.5	0.46	0.6
BH-9	97.5	80.8	0.12	0.08	108.8	142.5	0.38	0.13
BH-10	NS	NDP	0.19	1.02	410.8	540	NDP	NDP
BH-11	2.33	3.15	0.07	0.44	71.5	80	0.05	<0.05
BH-12 (S)	0.42	NS	0.05	NS	35.8	NS	<0.05	NS
BH-12 (D)	1.57	1.45	0.05	0.08	75.9	72.5	0.05	<0.05
TP-11	NS	NS	NS	NS	NS	NS	NS	NS
TP-12	0.02	NS	<0.01	NS	6	NS	9.6	NS
TP-13	0.53	NS	<0.01	NS	4.3	NS	2.4	NS
TP-14	10.23	NS	<0.01	NS	18.9	NS	0.9	NS
TP-15	828	NS	<0.01	NS	297	NS	0.07	NS
TP-16	1.99	NS	<0.01	NS	13.2	NS	0.07	NS
TP-17	4.13	NS	<0.01	NS	37	NS	0.01	NS
TP-18	22.73	NS	<0.01	NS	75	NS	0.04	NS
TP-18(RS)	23.1	NS	0.07	NS	76.1	NS	0.24	NS
TP-19	1.91	NS	<0.01	NS	6.2	NS	0.05	NS
TP-20	3	NS	<0.01	NS	8.9	NS	0.02	NS
TP-21	0.06	NS	<0.01	NS	4.1	NS	0.02	NS
TP-22	4.85	NS	1.13	NS	53.5	NS	0.22	NS
TP-23	0.95	NS	<0.01	NS	16.4	NS	2.9	NS
TP-24	55.45	NS	1.73	NS	49	NS	43.2	NS
TP-25	NS	NS	NS	NS	NS	NS	NS	NS
TP-26 (a)	NS	NS	NS	NS	NS	NS	NS	NS
TP-26 (b)	NS	NS	NS	NS	NS	NS	NS	NS
TP-27	0.02	NS	<0.01	NS	2.7	NS	7.3	NS

Legend

Date of Sample Collection: 10th August, 26th September, 1995
Amm. Nitrogen - Ammoniacal Nitrogen
NDP - No detection possible
NS - No sample taken
RS - Resample

Water?

Table 15 (Page 1 of 3): Soil Analytical Results - Polycyclic Aromatic Hydrocarbons

PAH	TP-12 µg/l	TP-13 µg/l	TP-14 µg/l	TP-15 µg/l	TP-16 µg/l	TP-16 µg/l	TP-19 µg/l	TP-23 µg/l	TP-27 µg/l	Dutch MACs Intervention
Naphthalene	0.34	0.339	39.742	9982	954	7265	<50	3.297	<0.05	70
Acenaphthylene	0.09	27.007	21.204	3172	617	1641	125	153.122	1087	-
Acenaphthene	0.104	24.603	607.123	725	106	1183	60	66.516	<0.05	-
Fluorene	0.088	63.8	343.658	2508	246	1703	179	123.104	0.089	-
Phenanthrene	0.221	45.918	103.277	3937	171	2388	359	134.891	0.153	5
Anthracene	0.058	16.213	48.484	2437	69	1037	92	34.391	0.161	5
Fluoranthene	0.157	21.136	63.425	3329	26	2575	138	29.375	0.572	1
Pyrene	0.162	29.816	35.338	282	18	2181	90	17.361	0.868	-
Benzo(a)anthracene	<0.05	0.484	2.899	2410	<10	1564	<50	6.192	0.177	0.5
Chrysene	<0.05	0.672	2.444	1778	<10	1043	<50	3.953	0.352	0.05
Benzo(b)fluoranthene and Benzo(k)fluoranthene	<0.05	<0.05	0.257	4787	<10	2927	<50	1.194	<0.05	-
Benzo (a)pyrene	<0.05	0.11	0.43	7355	<10	4581	<50	1.891	<0.05	0.05
Benzo(g,h,l)perylene	<0.05	<0.05	<0.05	17925	<10	7058	<50	<0.05	<0.05	0.05
Dibenz(a,h)Anthracene	<0.05	<0.05	<0.05	4382	<10	1627	<50	<0.05	<0.05	-
Indeno(1,2,3-cd)Pyrene	<0.05	<0.05	<0.05	9309	<10	4221	<50	<0.05	<0.05	0.05
Total PAH	1.218	230.096	1,268	74317	2206	42998	1042	575.288	3.46	-

LEGEND

Date of sample collection: July 18th - August 11th, 1995

Dutch MACs - Maximum Admissible Concentrations (1/10/94): Intervention values in µg/l

µg/l = microgram per litre

Table 15 (Page 2 of 3): Groundwater Analytical Results - Polycyclic Aromatic Hydrocarbons

	Units	BH-7 10/8/95	BH-7 26/9/95	BH-8 10/8/95	BH-8 26/9/95	BH-9 10/8/95	BH-9 26/9/95	BH-10 10/8/95	BH-10 26/9/95	Dutch MACs Intervention
Naphthalene	µg/l	14373	12109	5102	3535	1554	3851	11020	23174	70
Acenaphthylene	µg/l	10180	4834	1417	362	442	453	6564	10006	-
Acenaphthene	µg/l	3054	1718	186	<50	44	<50	1357	1700	-
Fluorene	µg/l	11635	6466	644	65	120	101	6489	6599	-
Phenanthrene	µg/l	12284	6715	1368	61	116	84	6661	9235	5
Anthracene	µg/l	7264	4177	491	<50	33	<50	5715	5988	5
Fluoranthene	µg/l	9420	5274	863	<50	18	<50	7132	8917	1
Pyrene	µg/l	7819	3864	556	<50	11	<50	6190	7196	-
Benzo(a)anthracene	µg/l	9851	7078	295	<50	<10	<50	4076	7172	0.5
Chrysene	µg/l	5646	2893	149	<50	<10	<50	1863	3281	0.05
Benzo(b)fluoranthene and Benzo(k)fluoranthene	µg/l	5331	4336	206	<50	<10	<50	<10	4432	-
Benzo (a)pyrene	µg/l	4244	6166	157	<50	<10	<50	<10	6624	0.05
Benzo(g,h,i)perylene	µg/l	18880	3995	592	<50	<10	<50	<10	3824	0.05
Dibenz(a,h)Anthracene	µg/l	991	1653	31	<50	<10	<50	<10	1347	-
Indeno(1,2,3-cd)Pyrene	µg/l	2777	11291	80	<50	<10	<50	<10	11393	0.05
Total PAH	µg/l	123749	82540	12137	4023	2337	4489	72289	110889	-

LEGEND

Date of sample collection: 25/8/95,and 26/9/95

Dutch MACs - Maximum Admissible Concentrations (1/10/94): Intervention values in µg/l

* For BH-7 Sample analysed as "oil", units are milligrams per Kilogram

µg/l - microgram per litre

Table 15 (Page 3 of 3): Groundwater Analytical Results - Polycyclic Aromatic Hydrocarbons

	Units	BH-11 10/8/95	BH-11 26/9/95	BH-12(S) 10/8/95	BH-12(S) 26/9/95	BH-12(D) 10/8/95	BH-12(D) 26/9/95	Dutch MACs Intervention
Naphthalene	µg/l	27	100	15	NS	<10	<50	70
Acenaphthylene	µg/l	160	78	<10	NS	24	<50	-
Acenaphthene	µg/l	107	51	<10	NS	43	<50	-
Fluorene	µg/l	133	57	<10	NS	29	<50	-
Phenanthrene	µg/l	123	99	13	NS	<10	<50	5
Anthracene	µg/l	21	<50	<10	NS	<10	<50	5
Fluoranthene	µg/l	19	<50	12	NS	22	<50	1
Pyrene	µg/l	11	<50	15	NS	12	<50	-
Benzo(a)anthracene	µg/l	<10	<50	<10	NS	<10	<50	0.5
Chrysene	µg/l	<10	<50	<10	NS	<10	<50	0.05
Benzo(b)fluoranthene and Benzo(k)fluoranthene	µg/l	<10	<50	<10	NS	<10	<50	-
Benzo (a)pyrene	µg/l	<10	<50	<10	NS	<10	<50	0.05
Benzo(g,h,l)perylene	µg/l	<10	<50	<10	NS	<10	<50	0.05
Dibenz(a,h)Anthracene	µg/l	<10	<50	<10	NS	<10	<50	-
Indeno(1,2,3-cd)Pyrene	µg/l	<10	<50	<10	NS	<10	<50	0.05
Total PAH	µg/l	602	386	55	-	131	0	-

LEGEND

Date of sample collection: 25/8/95,and 26/9/95

Dutch MACs - Maximum Admissible Concentrations (1/10/94): Intervention values in µg/l

* For BH-7 Sample analysed as "oil", units are milligrams per Kilogram

µg/l - microgram per litre

Table 16: Groundwater Analytical Results - BOD and COD, Sulphide and Sulphate

Sample No.	BOD		COD		Sulphide		Sulphate	
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95
BH-7	9141	10249	1126168	168440	-	0.04	NDP	1339
BH-8	177	169	4000	4260	0.25	0.25	469	356
BH-9	89	349	988	1332	0.12	0.08	187	324
BH-10	1412	1164	617648	424065	0.19	1.02	292	452
BH-11	105	91	3104	556	0.07	0.44	249	393
BH-12 (S)	127	NS	1476	NS	0.05	NS	394	NS
BH-12 (D)	47	386	300	728	0.05	0.08	169	346
TP-13	18	NS	31	NS	<0.01	NS	NA	NS
TP-15	1330	NS	16320	NS	<0.01	NS	900	NS
TP-16	560	NS	2120	NS	<0.01	NS	250	NS
TP-18	NS	NS	NS	NS	0.07	NS	252	NS
TP-19	50	NS	105	NS	<0.01	NS	138	NS
Dutch MACs (1/10/94)								
Intervention Value	-	-		-	0.3	0.3	-	

LEGEND

Date of Sample collection: 10/8/95, 26/9/95
mg/l - milligrams oxygen per litre
NS - Not Sampled

Table 17: Groundwater Analytical Results-
Metals: Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Selenium, Zinc

Sample	Units	Arsenic		Cadmium		Chromium		Copper		Mercury		Nickel		Lead		Selenium		Zinc	
		10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95
TP-15	mg/l	0.4	NS	0.06	NS	<0.05	NS	0.15	NS	<0.05	NS	0.07	NS	0.11	NS	<0.1	NS	0.09	NS
TP-16	mg/l	0.08	NS	<0.05	NS	<0.05	NS	<0.05	NS	<0.05	NS	<0.05	NS	0.23	NS	<0.1	NS	0.09	NS
TP-18	mg/l	0.13	NS	<0.05	NS	<0.05	NS	<0.05	NS	<0.05	NS	0.05	NS	<0.05	NS	<0.1	NS	<0.05	NS
TP-19	mg/l	<0.05	NS	<0.05	NS	<0.05	NS	<0.05	NS	<0.05	NS	<0.05	NS	<0.05	NS	<0.1	NS	<0.05	NS
BH-7	mg/l	<1	0.1	<1	<0.05	1	<0.05	<1	<0.05	<1	<0.05	<1	0.09	<1	<0.05	<1	<0.1	3	0.65
BH-8	mg/l	1.54	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.05	<0.05
BH-9	mg/l	0.18	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.05	<0.05
BH-10	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	<0.05	0.08	<0.05	<0.05	<0.05	0.12	<0.05	0.46	<0.1	<0.1	<0.05	0.36
BH-11	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	NS	<0.05	0.05
BH-12(D)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.05	0.05
BH-12(S)	mg/l	<0.05	NS	<0.05	NS	<0.05	NS	<0.05	NS	<0.05	NS	<0.05	NS	<0.05	NS	<0.1	NS	<0.05	NS
Dutch MACs (1/10/94)																			
Intervention Value	-	0.06	0.06	0.008	0.008	0.03	0.03	0.075	0.075	0.0003	0.0003	0.075	0.075	0.075	0.075	-	-	0.8	0.8

LEGEND

Date of sample Collection:, 18th July - 11th August 1995
MACs - Maximum Admissible Concentration
mg/l - milligrams per litre
NS - Not Sampled

Table 18: Groundwater Analytical Results - Inorganics

Parameter	Unit	BH-7		BH-8		BH-9		BH-10		BH-11		BH-12(S)		BH-12(D)		TP-15	TP-16	TP-18	TP-19
		10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95	10/8/95	26/9/95				
Aluminium	mg/l as Al	2	0.14	0.14	0.5	0.08	0.9	0.17	10.4	0.06	<0.05	<0.05	NS	<0.05	<0.05	1.65	0.47	0.19	0.66
Calcium	mg/l as Ca	127	2955	1037	520	133	83.1	46.6	159	264	222	605	NS	473	127	1127	218.1	251	109.2
Iron	mg/l as Fe	53	25.6	1.97	1.89	0.39	1.53	2.22	51.1	0.9	0.57	0.47	NS	3.18	0.38	17.25	3.74	0.58	1.19
Magnesium	mg/l as Mg	6	1.14	20.9	22.5	15.3	14.7	5.88	12.3	28.5	31.7	28.4	NS	25.2	25.9	5.05	10.76	20.3	7.99
Manganese	mg/l as Mn	<1	<0.05	5.17	12	0.07	0.11	<0.05	2.27	1.24	0.74	0.79	NS	0.16	0.23	0.3	0.65	1.22	0.31
Colour (True)	Hazen Units	-	NDP	430	138	89	85	870	NDP	42	35	31	NS	28	28	1180	49	84	47
Total Hardness	mg/l as CaCO3	NDP	1953	731	886	214	258	48	119	370	541	540	NS	268	351	2705.6	2705.6	331	284.8
Turbidity	N.T.U.	-	NDP	6000	800	750	725	4250	NDP	1650	700	2850	NS	3250	1075	1100	280	-	75
Non-Carbonate Hardness	mg/l as CaCO3	NDP	NDP	77.1	99.6	57	55.4	19.8	NDP	122	123	123	NS	96	96.8	NDP	36.1	-	25.3
Potassium	mg/l as K	-	75.4	17.2	16.5	14.6	13.9	8.6	19.4	9.4	9.8	10.7	NS	20.7	14.1	33.5	8.7	-	5.2
Sodium	mg/l as Na	-	258	87	131	44	41	88	207	44	46	52	NS	68	189	185.6	17.3	-	12
Organic Carbon	mg/l as C	-	57.3	-	777	-	212	-	868	-	46	-	NS	-	189	-	-	-	-
Chloride	mg/l as Cl	NDP	1268	383	282	250	172	168	187	61	62	56	NS	65	77	900	17	-	16
Nitrite	mg/l as NO2	NDP	0.19	0.18	0.04	0.19	0.02	2.8	0.17	0.08	0.02	0.1	NS	0.1	0.02	<0.01	<0.01	-	<0.01
Nitrate	mg/l as NO3	NDP	1.2	2.1	5.1	2.4	10.1	6	1.9	2	10.9	2.4	NS	2	6.9	2	2	-	8
Total Alkalinity	mg/l as CaCO3	NDP	NDP	NDP	1390	NDP	1180	NDP	NDP	NDP	1130	NDP	NS	NDP	3270	2415	2415	-	280

Legend
Date of Sample Collection - 10/8/95, 26/9/95, 1995
mg/l - milligrammes per litre
NS - Not Sampled

Table 19: Soil Analytical Results - Soil Moisture Content

Sample No.	Moisture Content (%)
TP-11 (0.3-1.3m)	11.14
TP-11 (2.4-3.2m)	14.57
TP-11 (3.3-3.7m)	14.08
TP-12 (0.9-1.4m)	12.15
TP-12 (1.4-1.9m)	25.57
TP-12 (2.5-3.5m)	28.72
TP-13 (0.4-0.8m)	24.12
TP-13 (1.0-1.7m)	28.3
TP-13 (2.0-3.0m)	32.17
TP-14 (0.0-0.5m)	11.25
TP-14 (1.4-2.7m)	17.5
TP-14 (2.7-3.5m)	27.11
TP-15 (0.0-0.75m)	7.24
TP-15 (0.75-1.5m)	11.68
TP-15 (1.5-3.0m)	20.69
TP-16 (0.0-0.9m)	7.02
TP-16 (1.1-1.8m)	27.58
TP-16 (1.5-1.8m)	21.69
TP-17 (0.0-0.75m)	3.75
TP-17 (0.75-1.5m)	4.18
TP-17 (1.5-3.0m)	6.21
TP-18 (0.0-0.75m)	4.53
TP-18 (0.75-1.5m)	4.82
TP-18 (1.5-3.0m)	9.47
TP-19 (0.0-0.5m)	5.6
TP-19 (0.5-0.9m)	9.79
TP-19 (0.9-1.2m)	9.99
TP-20 (0.0-0.64m)	9.39
TP-21 (0.0-0.5m)	8.78
TP-22 (0.0-0.6m)	21.17
TP-22 (1.0-1.5m)	22.04
TP-22 (1.5-2.5m)	25.6

Sample No.	Moisture Content (%)
TP-23 (0.0-0.5m)	19.93
TP-23 (0.5-1.7m)	27.92
TP-23 (2.0-2.4m)	19.75
TP-24 (0.0-0.75m)	21.31
TP-24 (0.9-1.2m)	28.39
TP-24 (1.5-2.3m)	23.56
TP-25 (0.4-0.8m)	18.44
TP-25 (0.8-1.1m)	27.31
TP-26a (0.0-0.2m)	9.77
TP-26b (0.0-0.15m)	16.97
TP-27 (0.2-0.5m)	11.43
TP-27 (0.5-1.9m)	24.57
TP-27 (3.2-3.4m)	25.56
F1	29.55
F2	0.76
F3	8.76
F4	NDP
F5	5.84
BH-7 (5.0-5.2m)	2.51
BH-11 (7.0-7.3m)	19.57

Legend

Date of Sample Collection: 18th July - 10th August, 1995

Table 12 (Page 2 of 2) - Polynulear Aromatic Hydrocarbon Leachate Results

Polynuclear Aromatic Hydroarbons	TP15 ng/l	TP22 ng/l
Naphthalene	211236	507518
Acenaphthylene	216195	162801
Acenaphthene	46131	20545
Fluorene	146309	85399
Phenanthrene	218887	206391
Anthracene	82412	50115
Fluoranthene	102429	77117
Pyrene	69152	50256
Benzo(a)anthracene	16838	13193
Chrysene	16475	13642
Benzo(b)fluoranthene and Benzo(k)fluoranthene	18679	14310
Benzo (a)pyrene	7239	4512
Benzo(g,h,i)perylene	399	2927
Dibenz(a,h)Anthracene	1168	984
Indeno(1,2,3-cd)Pyrene	1815	1768
Total PAH	1158874	11211479

Legend

Date of Sample Collection - July 18th - August 11th, 1995

ng/l - nanograms per litre

APPENDICES

Appendix A	Trial Pit Records
Appendix B	Borehole Logs
Appendix C	Core Drilling Logs
Appendix D	Monitoring Well Sampling Logs
Appendix E	Geotechnical Results
Appendix F	Geochem Test Results
Appendix G	BOD and COD Analytical Results
Appendix H	Falling Head and Packer Test Results

APPENDIX A

Trial Pit Records

Project No. : 809 **Location :** Bord Gais, Limerick **Date :** 21/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 11

Geology :	0 - 1.3 m	Fill material consisting of sandy GRAVEL, rubble and dark silty clay.
	1.3 - 1.6 m	Reinforced CONCRETE
	1.6 - 2.4 m	Medium dense, light brown silty SAND with gravel and occassional cobbles. Some ash material present also.
	2.4 - 3.2 m	Loose, light brown/grey sandy GRAVEL with occassional limestone cobbles.
	3.2 - 3.3 m	Compact white/grey chalk-like CONCRETE layer
	3.3 - 3.7 m	Medium dense dark brown silty CLAY with gravels and occassional large boulders. Moderately contaminated ash-type layer at 3.5m. Seepage noted at 3.3m.

Depth to Rock : Not encountered

Rock Type : Expected to be limestone

Water Entry : Seepage at 3.3m

Static Water : N/A

Total Depth : 3.7m

Comments : *Soil samples collected at 0.3-1.3m, 2.4-3.2m, 3.3-3.7m.
Water samples not taken

Elevation : 5.41 mOD

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Trial Pit Records

Project No. : 809 **Location :** Bord Gais, Dock Road, Limerick **Date :** 21/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 12

Geology :	0 - 0.3m	CONCRETE
	0.3 - 0.7m	Medium dense dark brown silty CLAY with some gravel and occassional cobbles. Uncontaminated, no odour present.
	0.7 - 0.9m	Loose light brown/ grey silty sand with GRAVEL (rounded /sub angular). Uncontaminated.
	0.9 - 1.4m	Firm black sandy CLAY with some gravels. Heavily stained with tar and oil, strong hydrocarbon odour.
	1.4 - 1.9m	Loose white/grey silty CLAY, ash-like material ("blue billy"). Visible evidence of contamination, moderate phenol odour
	1.9 - 2.5m	Firm brown/orange sandy CLAY with bricks and rubble material, some cobbles.
	2.5 - 3.5m	Firm black silty CLAY with gravels. Moderate contamination with mild phenolic odour.

Depth to Rock : Not encountered

Rock Type : Expected to be limestone

Water Entry : 2.3 m

Static Water : 3.4 m

Total Depth : 3.6 m

Comments : Soil samples taken 0.9-1.4m, 1.4-1.9m, 2.5-3.5m
Water samples taken at 3.4m

Elevation : 7.67 mOD

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Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 20/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 13

Geology :	0 - 0.2 m	HARDCORE, Blindings
	0.2 - 0.4 m	CONCRETE - Base of existing structure
	0.4 - 1.7 m	Loose light brown grey and white silty CLAY (Ash material) Spent oxide. Moderate contamination with a mild phenolic odour
	1.7 - 3.0 m	Soft to firm black silty CLAY with angular gravel. Slightly contaminated with mild phenolic odour
		Note: 0-2.5 To the north, base of existing building, old foundation.

Depth to Rock : Not encountered

Rock Type : Expected to be limestone

Water Entry : Seepage at 2.8 m

Static Water : 2.9 m

Total Depth : 3.1 m

Comments : Soil samples taken at 0.4-0.8m, 1.0-1.7m, 2.0-3.0m
Water samples taken at 2.9m

Elevation : 7.49 mOD

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Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 18/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 14

Geology :	0 - 0.3 m	Soft to firm grey silty CLAY with gravel and occasional boulders. No evidence of contamination
	0.3 - 0.9 m	Loose orange/brown/red silty SAND with angular gravel and some cobbles and bricks (Fill material)
	0.9 - 1.4 m	Reinforced CONCRETE layer
	1.4 - 2.3 m	Fill material containing brown, black silty SAND with some orange silty clays mixed throughout (Spent material). Moderately contaminated with slight odour
	2.3 - 2.7 m	Ash material containing loose brown/red/grey silty SAND with occasional boulders
	2.7 - 3.2 m	Loose grey sandy angular GRAVEL with occasional boulders. Heavy staining with strong phenolic odour

Depth to Rock :	Not encountered
Rock Type :	Expeted ot be limestone
Water Entry :	Seepage at 3.2 m
Static Water :	3.2 m
Total Depth :	3.6 m
Comments :	Soil samples taken at 0-0.5m, 1.4-2.7m, 2.7-3.5m Water samples taken at 3.2m
Elevation :	8.0 mOD

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Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 20/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 16

Geology :	0-0.9 m	Fill material containing soft dark brown sandy CLAY with angular gravel. Uncontaminated backfill layer
	0.9-1.2 m	CONCRETE. Former foundations of the gasometer
	1.2-2.1 m	Loose dark brown/black silty SAND (ash) containing many cobbles. Heavily stained with strong phenolic odour. East side of pit contains less cobbles than the west and the ash material is more consolidated

Depth to Rock : Rock encountered at 2.6 m

Rock Type : Expected to be limestone

Water Entry : Seepage at 2.0 m

Static Water : 2.1 m

Total Depth : 2.6 m

Comments : Soil samples taken at 0-0.9m. 1.1-1.8m. 1.5-1.8m
Water samples taken at 2.1m

Elevation : 5.88 mOD

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Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 20/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 17

Geology :	0-0.1 m	CONCRETE, concrete
	0.1-2.0 m	Loose light brown sandy SILT with angular gravel and cobbles (fill material). Uncontaminated
	2.0-2.6 m	Loose black sandy SILT with angular gravels and cobbles (fill). Heavily stained layer with strong phenolic odour
	2.6-3.2 m	Fill material containing loose black sandy SILT with angular gravel and cobbles. Mildly contaminated layer with strong phenolic odour. Some red brick material also present

Depth to Rock : Rock encountered at 3.3m

Rock Type : Expected to be limestone

Water Entry : Seepage at 2.2 m

Static Water : 2.4 m

Total Depth : 3.3 m

Comments : Soil samples taken at 0-0.75, 0.75-1.5m, 1.5-3.0m
Water samples taken at 2.4m

Elevation : 6.01 mOD

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Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 19/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 18

Geology :	0-0.1 m	TARMAC layer
	0.1-1.95 m	Loose light brown sandy SILT with angular gravel and occasional cobbles (fill material). No apparent contamination
	1.95-2.65 m	Fill material containing loose balck sandy SILT with angular gravel and cobbles present. Evidence of heavy staining with moderate phenolic odour.

Depth to Rock : Rock encountered at 2.65 m

Rock Type : Expected to be limestone

Water Entry : Seepage at 2.0 m

Static Water : 2.5 m

Total Depth : 2.65 m

Comments : Soil samples taken at 0-0.75m. 0.75-1.5m. 1.5-3.0m
Water samples taken at 2.5m

Elevation : 5.85 mOD

2.65

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Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 19/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 19

Geology :	0-0.9 m	Fill material containing soft to firm light brown silty CLAY with angular gravels and cobbles. No visible evidence of contamination, no odour present.
	0.9-1.2 m	Dense firm black silty SAND (fill) containing angular gravels and occasional boulders. Heavily stained with tars and a strong tarry odour.

Depth to Rock : Rock encountered at 1.2 m

Rock Type : Fractured limestone bedrock

Water Entry : Seepage at 0.9 m

Static Water : 1.1 m

Total Depth : 1.6 m

Comments : Soil samples taken at 0.0-0.5m, 0.5-0.9m, 0.9-1.2m
Water samples taken at 1.1m

Rockbreaker used from 1.2-1.6m to establish presence of bedrock - confirmed
The heavily contaminated layer described above appears to lie to the southern edge of the trial pit. Profile to the north of the trial pit appears clean

Elevation : 5.58 mOD

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Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 18/795

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 20

Geology :	0-0.1 m	HARDCORE, Blindings
	0.1-0.3 m	Soft to firm silty brown silty CLAY with angular gravel and occasional cobbles. Slightly contaminated with a mild phenolic odour
	0.3-0.64 m	Heavily weathered LIMESTONE bedrock

Depth to Rock : 0.64 m

Rock Type : Limestone

Water Entry : Seepage at 0.43 m

Static Water : 0.43 m

Total Depth : 0.64 m

Comments : Soil samples taken at 0-0.64m
Water samples taken at 0.43m

Elevation : 7.11 mOD

Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 21/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 21

Geology :	0-0.4 m	Soft to firm light brown silty CLAY with pockets of sandy gravel and some cobbles (fill). No evidence of contamination
	0.4-0.5 m	Loose grey brown silty CLAY with sandy gravel and fragments of weathered rock, presumed bedrock. Uncontaminated.

Depth to Rock : 0.5 m

Rock Type : Limestone

Water Entry : Seepage at 0.3 m

Static Water : 0.4 m

Total Depth : 0.5 m

Comments : Soil samples taken at 0-0.5m
Water samples taken at 0.5m

Elevation : 7.59 mOD

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Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 19/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 22

Geology :	0-0.1 m	HARDCORE, Blindings
	0.1-0.5 m	Backfill material containing red bricks and loose angular GRAVEL. Mildly contaminated
	0.5-0.8 m	Medium dense black silty CLAY (fill). Heavily contaminated with a strong phenolic odour
	0.8-1.4 m	Fill material containing loose black sandy GRAVEL with red bricks present. Heavily contaminated with strong odour
	1.4-2.5 m	Loose black sandy GRAVEL (ash material). Moderately stained with mild phenolic odour

Depth to Rock : Not encountered. Excavation ceased due to heavy tars staining the car park

Rock Type : Expected to be limestone

Water Entry : Seepage at 1.0 m

Static Water : 1.4 m

Total Depth : 2.3 m

Comments : Soil samples taken at 0-0.75m, 0.75-1.5m, 1.5-2.5m
Water samples taken at 1.4m

Elevation : 5.82 mOD

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Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 18/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 23

Geology :	0-0.1 m	HARDCORE, Blindings
	0.1-0.3 m	CONCRETE layer
	0.3-0.8 m	Fill material containing loose grey silty fine to coarse angular GRAVEL with pockets of firm brown silty clay (Ash). Slight evidence of contamination.
	0.8-1.2 m	Soft to firm grey/brown silty CLAY. Slight contamination
	1.2-1.7 m	Loose brown/black silty angular GRAVEL with red bricks and cobbles with some boulders. Heavy tars and oil present, very contaminated.
	1.7-1.8 m	Dense black ash fill material containing heavily stained sandy CLAY.
	1.8-2.2 m	Loose black silty angular GRAVEL with cobbles and occasional boulders. Heavily stained with a strong tar odour.

Depth to Rock : Rock encountered at 2.6m

Rock Type : Limestone bedrock

Water Entry : Seepage at 1.7m

Static Water : 2.2m

Total Depth : 2.6m

Comments : Soil samples taken at 0.0-0.5, 0.5-1.7m, 2.0-2.4m
Water samples taken at 2.2m

Elevation : 5.25 mOD

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Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 21/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 26 A

Geology :	0-0.05 m	ORGANIC layer, grass rootlets with some brown silty CLAY
	0.05-0.2 m	HARDCORE fill material containing some brown silty CLAY

Depth to Rock : Expected to be limestone

Rock Type : Unknown

Water Entry : None

Static Water : -

Total Depth : 0.2m

Comments : Soil sample taken at 0-0.2m

Elevation : Not available

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Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 21/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 26 B

Geology :	0-0.05m	ORGANIC layer, grass rootlets with brown silty CLAY
	0.05-0.15m	HARDCORE fill material with brown silty CLAY

Depth to Rock : Unknown

Rock Type : Expeted to be limestone

Water Entry : None

Static Water : -

Total Depth : 0.15m

Comments : Soil sample taken at 0-0.15m

Elevation : Not available

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Trial Pit Records

Project No. : 809 **Location :** Limerick Gas Works, Dock Road, Limerick **Date :** 21/7/95

Drilling Method : Hymac **Supervisor :** Conor Wall

TRIAL PIT NO. 27

Geology :	0-0.2 m	CONCRETE
	0.2-0.5 m	Fill material containing loose light brown/grey silty SAND with angular coarse gravels. Uncontaminated, no odour present
	0.4-1.9 m	Loose, dark brown/black silty CLAY with angular finr to coarse gravel and occasional cobbles (Fill material). Also containing glass fragments, bricks and metal objects. Uncontaminated.
	1.9-3.7 m	Fill material containing loose black silty CLAY with some fine to coarse sub angular gravel. Red brick wall exposed at c.3.2m remaining intact after excavation.
	3.2-3.4 m	Soft to firm orange/red silty CLAY lying to the east of the trial pit

Depth to Rock : Not encountered

Rock Type : Expected to be limestone

Water Entry : 3.4m

Static Water : 3.5m

Total Depth : 3.7m

Comments : Soil samples collected at 0.2-0.5m,0.5-1.9m, 3.2-3.4m
Water samples collected at 3.5m

Elevation : 7.33 mOD

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APPENDIX B

BOREHOLE LOG

Borehole No. 7G

Client : Ove Arup & Partners
Project : Limerick Gasworks
Location : Dock Road
County : Limerick
Date : September, 1995
Driller : Glovers
Aquifer : Limestone
Well Elevation : 5.81 m O.D.
Specific Capacity : m^3/day/m
National Grid Co - ordinates : 157600 East, 157200 North

Remarks

Static Water Level (11/8/95)

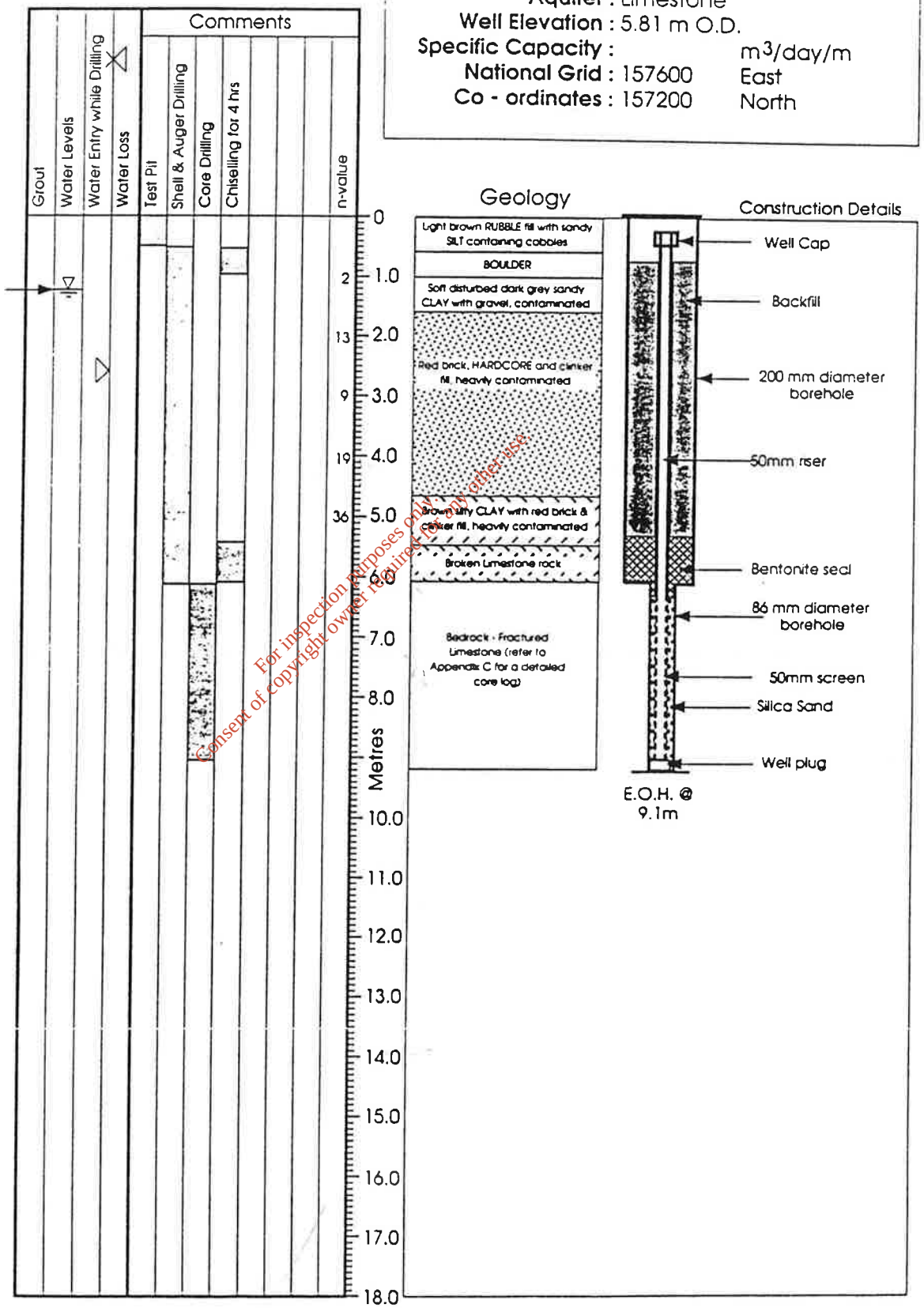

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Figure No.

BOREHOLE LOG

Borehole No. 8G

Client : Ove Arup & Partners
Project : Limerick Gasworks
Location : Dock Road
County : Limerick
Date : July, 1995
Driller : Glovers
Aquifer : Limestone
Well Elevation : 8.24 m O.D.
Specific Capacity : $m^3/day/m$
National Grid : 157600 East
Co - ordinates : 157200 North

Remarks

Static Water Level (11/8/95)

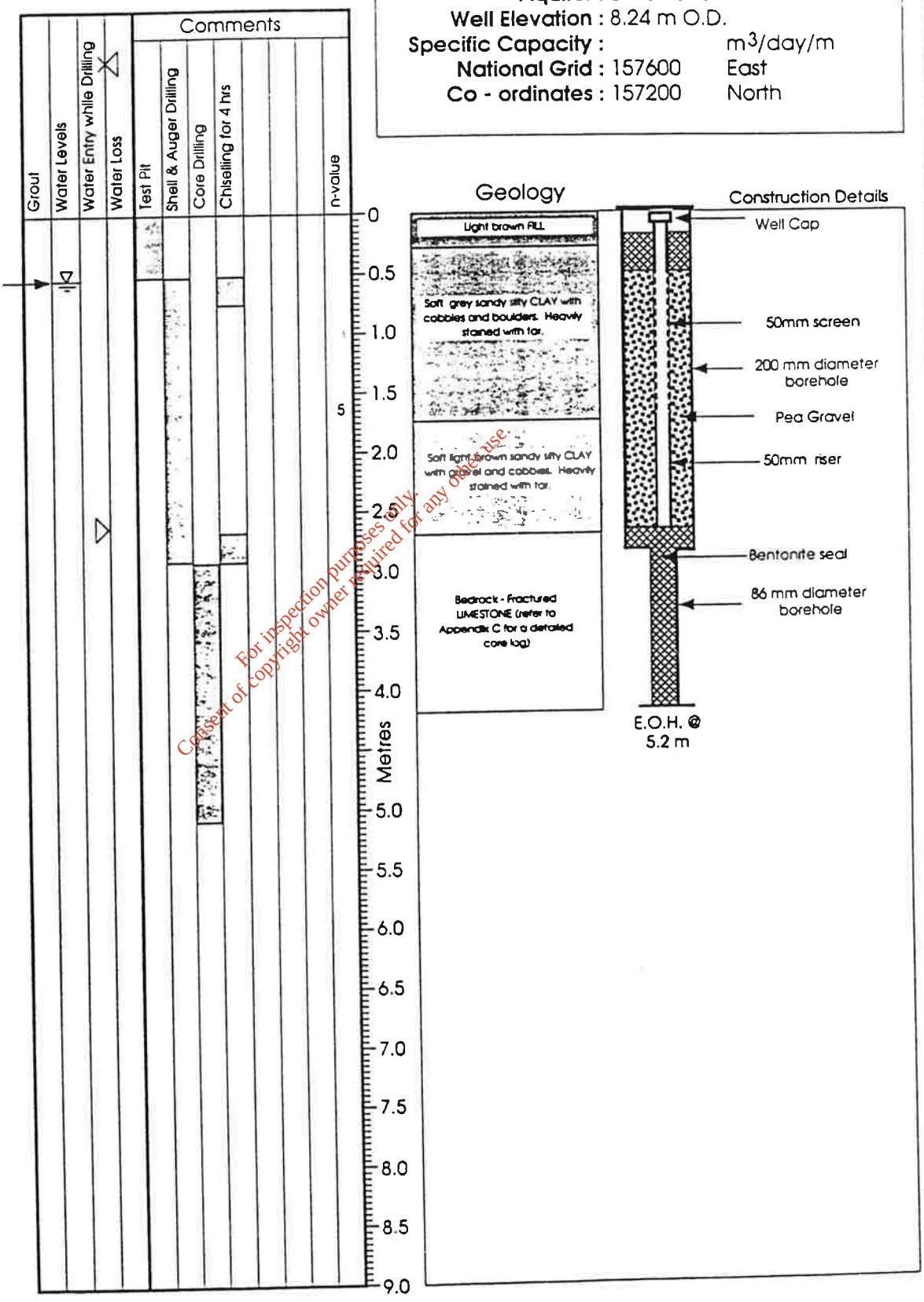

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Figure No.

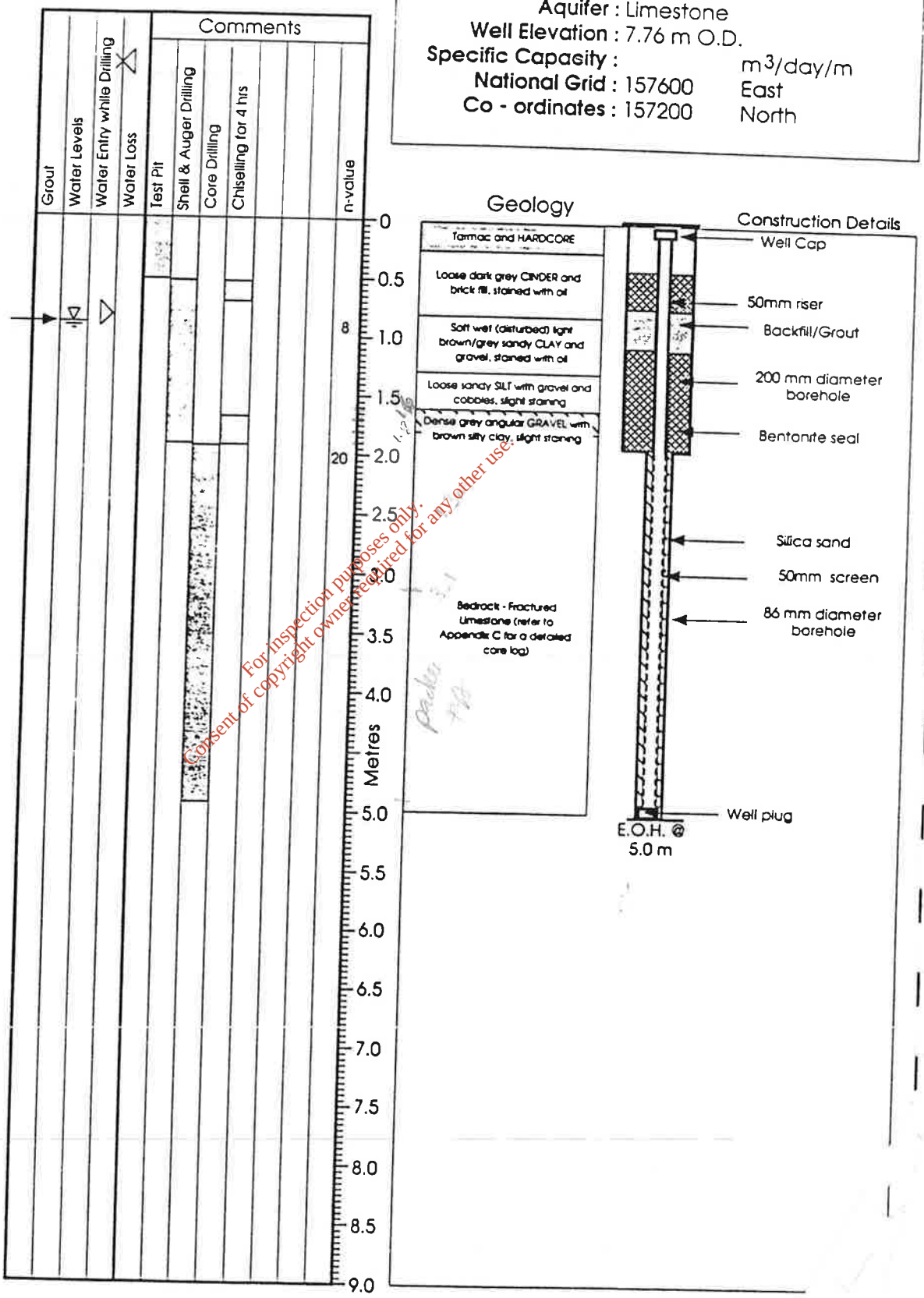
BOREHOLE LOG

Borehole No. 9

Client : Ove Arup & Partners
Project : Limerick Gasworks
Location : Dock Road
County : Limerick
Date : July, 1995
Driller : Glovers
Aquifer : Limestone
Well Elevation : 7.76 m O.D.
Specific Capasity : m3/day/m
National Grid : 157600 East
Co - ordinates : 157200 North

Remarks

Static Water Level (11/8/95)



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Figur , N

BOREHOLE LOG

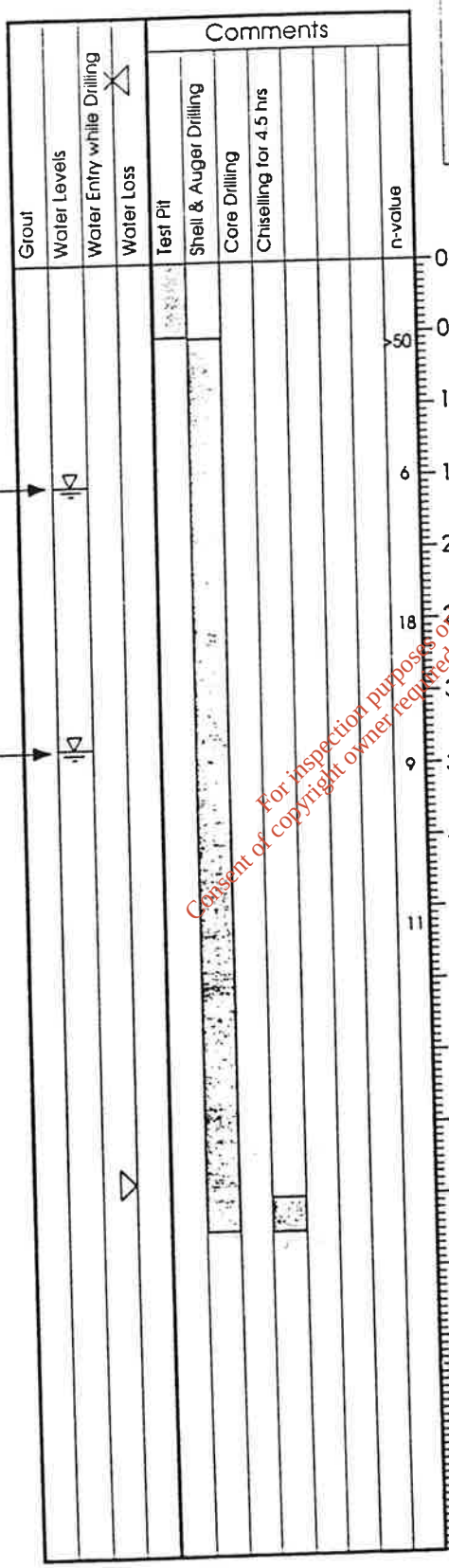
Borehole No. 10

Client : Ove Arup & Partners
Project : Limerick Gasworks
Location : Dock Road
County : Limerick
Date : July, 1995
Driller : Glovers
Aquifer : Limestone
Well Elevation : 6.23 m O.D.
Specific Capacity : m^3/day/m
National Grid : 157600 East
Co - ordinates : 157200 North

Remarks

Static Water Level (11/8/95)

Water level after 30 minutes (2/8/95)



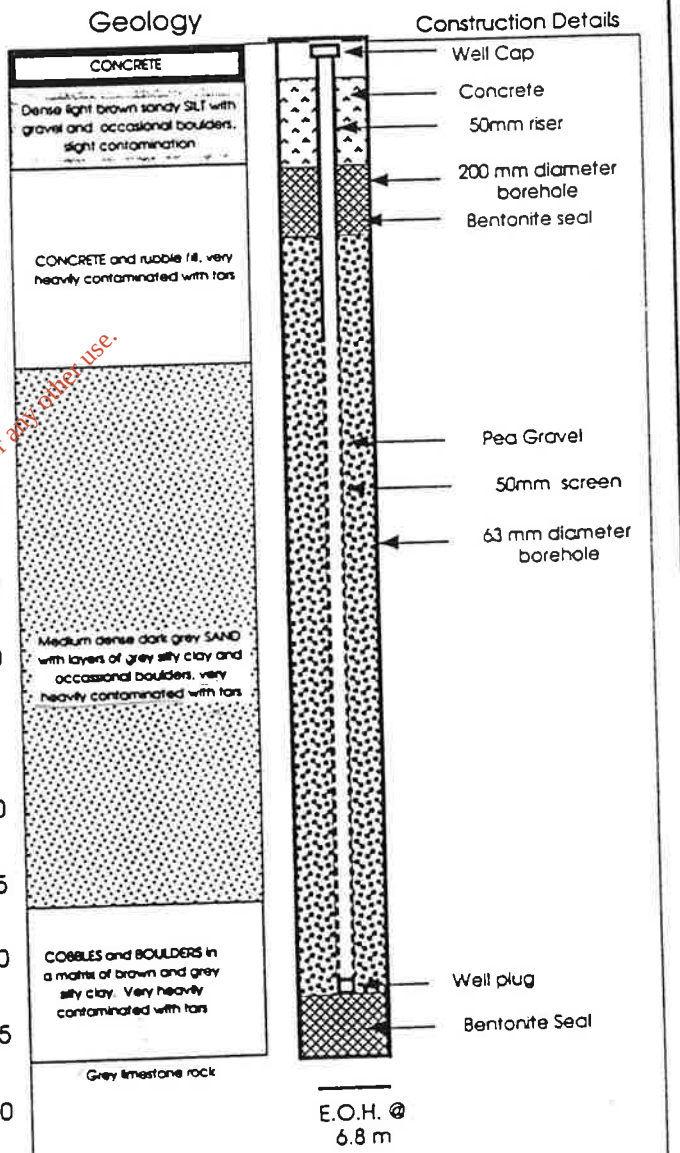


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Figure No.

BOREHOLE LOG

Borehole No. 11

Client : Ove Arup & Partners
Project : Limerick Gasworks
Location : Dock Road
County : Limerick
Date : July, 1995
Driller : Glovers
Aquifer : Limestone
Well Elevation : 6.96 m O.D.
Specific Capacity : m^3/day/m
National Grid Co - ordinates : 157600 East, 157200 North

Remarks

Static Water Level (11/8/95)

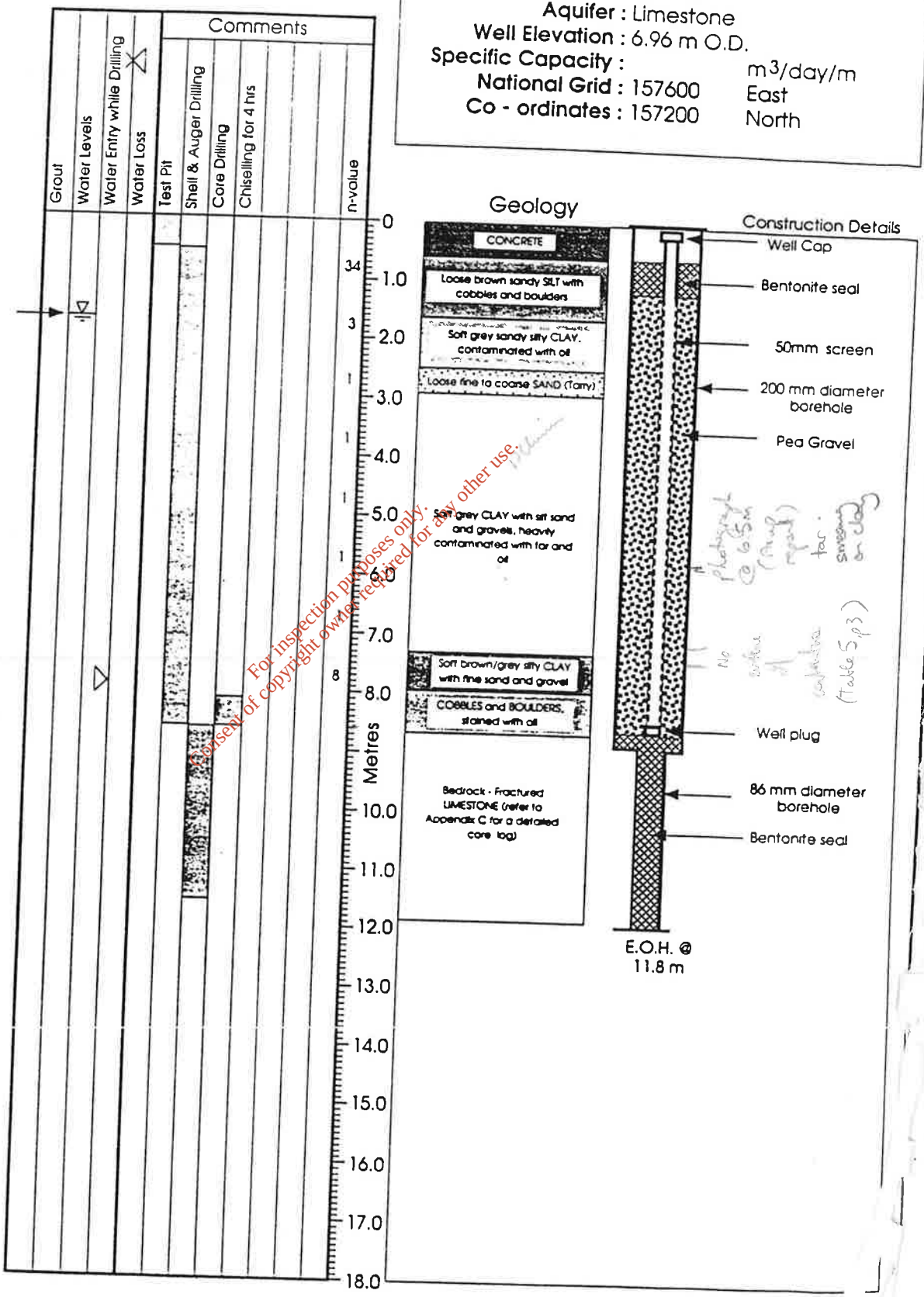

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Figure No.

BOREHOLE LOG

Borehole No. 12S & 12D

Client : Ove Arup & Partners
Project : Limerick Gasworks
Location : Dock Road
County : Limerick
Date : July, 1995
Driller : Glovers
Aquifer : Limestone
Well Elevation : 7.51 mOD
Specific Capacity : m^3/day/m
National Grid : 157600 East
Co - ordinates : 157200 North

Remarks

Static Water Level (7/8/95)

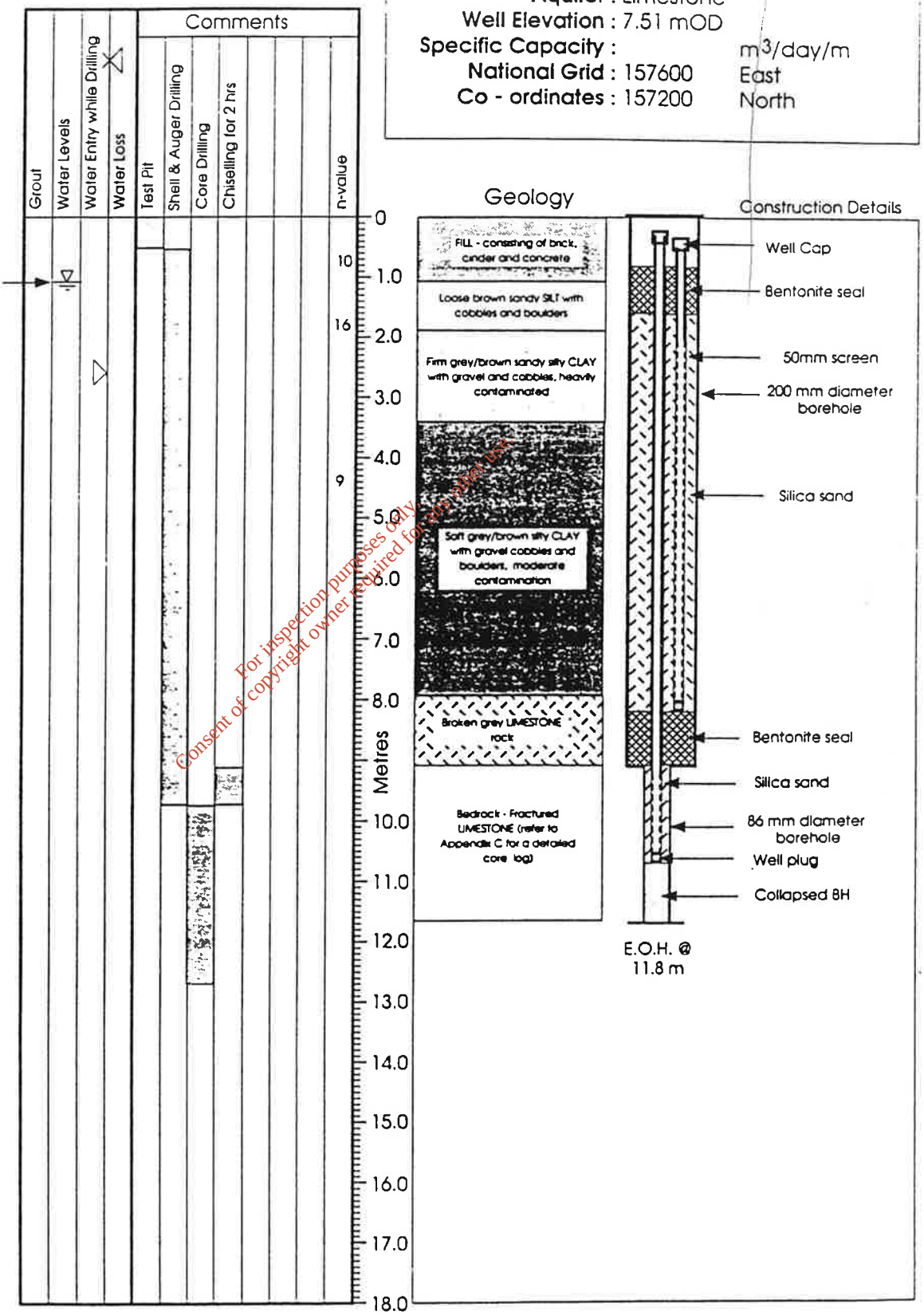

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Figure No.

GEOLOGICAL / GEOTECHNICAL LOG

Job No.	809	**B.H. Ref.**	BH 7
Client	Bord Gais, Eireann	**Date**	August, 1995
Project	Gas Works Site Investigation	**Driller**	Glovers
Location	Limerick City	**B.H. Diameter**	86mm
County	Limerick	**Casing Diameter**	None
Elevation	5.81 mOD	**Logged By**	Conor Walsh

Depth (m)		Geological Description	TCR	SCR	Joints / Discontinuities				FSI	RQD
From	To		%	%	Depth	Dip	Smoothness	Staining		%
6.10	9.10	Med. Grey Coarse grained, fresh, bedded Limestone, strong, containing abundant fossils, predominantly crinoids (stained with black tar)	100	100	6.20	5°	Irregular, undulating	None	0.17	89
					6.22	5°	Irregular, undulating	None		
					6.26	10°	Irregular, undulating	None		
					6.54	5°	Irregular, undulating	None		
					6.61	5°	Irregular, undulating	None		
					7.04	10°	Irregular, undulating	None		
					7.44	30°	Irregular, undulating	Black Tar		
					7.48	35°	Irregular, undulating	Black Tar		
7.60	9.10		86	80	7.60	10°	Irregular, undulating	Black Tar	0.17	71
					7.77	10°	Irregular, Planar	None		
					7.91	10°	Irregular, undulating	Black Tar		
					8.17	5°	Irregular, undulating	Black Tar		
					8.30	0°	Irregular, Planar	Black Tar		
					8.34	0°	Irregular, Planar	None		
					8.71	25°	Irregular, undulating	None		
					8.71 - 9.06		Irregular, undulating	Fractured with core loss	<0.04	
					9.06	5°	Irregular, undulating	Black Tar		

APPENDIX C

GEOLOGICAL / GEOTECHNICAL LOG

Job No.	809	**B.H. Ref.**	BH 7
Client	Bord Gais, Eireann	**Date**	August, 1995
Project	Gas Works Site Investigation	**Driller**	Glovers
Location	Limerick City	**B.H. Diameter**	86mm
County	Limerick	**Casing Diameter**	None
Elevation	5.81 mOD	**Logged By**	Conor Walsh

Depth (m) From	Depth (m) To	Geological Description	TCR %	SCR %	Joints / Discontinuities: Depth	Dip	Smoothness	Staining	FSI	RQD %
6.10	9.10	Med. Grey Coarse grained, fresh, bedded Limestone, strong, containing abundant fossils, predominantly crinoids (stained with black tar)	100	100	6.20	5°	Irregular, undulating	None	0.17	89
					6.22	5°	Irregular, undulating	None		
					6.26	10°	Irregular, undulating	None		
					6.54	5°	Irregular, undulating	None		
					6.61	5°	Irregular, undulating	None		
					7.04	10°	Irregular, undulating	None		
					7.44	30°	Irregular, undulating	Black Tar		
					7.48	35°	Irregular, undulating	Black Tar		
7.60	9.10		86	80	7.60	10°	Irregular, undulating	Black Tar	0.17	71
					7.77	10°	Irregular, Planar	None		
					7.91	10°	Irregular, undulating	Black Tar		
					8.17	5°	Irregular, undulating	Black Tar		
					8.30	0°	Irregular, Planar	Black Tar		
					8.34	0°	Irregular, Planar	None		
					8.71	25°	Irregular, undulating	None		
					8.71 - 9.06		Irregular, undulating	Fractured with core loss	<0.04	
					9.06	5°	Irregular, undulating	Black Tar		

GEOLOGICAL / GEOTECHNICAL LOG

Job No.	809	**B.H. Ref.**	BH - 8
Client	Bord Gais	**Date**	26-Jul-95
Project	Gas Works Site Investigation	**Driller**	Glovers Site Investigation
Location	Limerick City	**B.H. Diameter**	86mm
County	Limerick	**Casing Diameter**	None
Elevation	8.24 mOD	**Logged By**	Conor Walsh

Depth (m)		Geological Description	TCR	SCR	Joints / Discontinuities				FSI	RQD
From	To				Depth	Dip	Smoothness	Staining		
2.80	3.50	Med. Grey Coarse grained, fresh, bedded Limestone, strong, containing abundant fossils, mainly brachipods and crinoids (stained with Tar)	100%	100%	3.10	5°	Irregular, Planar	Calcite	0.12	69%
					3.15	70°	Irregular, Planar	light brown		
					3.19	10°	Irregular, undulating	none		
					3.38	75°	Irregular, undulating	none		
					3.39	10°	Irregular, Planar	calcite		
					3.44	10°	Irregular, Planar	calcite		
3.50	4.20	Med. Grey, coarser to Med. grained, fresh, bedded Limestone, strong containing fossils mainly brachipods and crinoids.	53%	53%	3.5 - 3.83		Core loss	black tar		40%
					3.83	40°	Irregular, undulating	black tar		
					3.83 - 3.98		Cement Filled Fractures		0.05	
					3.98	20°	Irregular, undulating	brown clay	0.11	
					4.07	40°	Irregular, Planar	none		
4.20	5.20	Med. grey, coarse grained, fresh bedded limestone strong, containing abundant fossils, mainly brachiapods and crinoids	14%	14%	4.34	55°	Irregular, Planar	slight brown	0.14	14%

GEOLOGICAL / GEOTECHNICAL LOG

Job No.	809	**B.H. Ref.**	BH 9
Client	Bord Gais	**Date**	August, 1995
Project	Gas Works Site Investigation	**Driller**	Glovers Site Investigation
Location	Limerick City	**B.H. Diameter**	86mm
County	Limerick	**Casing Diameter**	None
Elevation	7.76 mOD	**Logged By**	Conor Walsh

Depth (m) From	To	Geological Description	TCR	SCR	Joints / Discontinuities Depth	Dip	Smoothness	Staining	FSI	RQD
1.90	2.90	Dark to medium grey coarse grained, bedded Limestone, strong, containing fossils, predominantly crinerols	94%	85%	1.98	20°	Irregular, undulating	brown clay	0.08	30%
					2.15	20°	Irregular, undulating	brown clay		
					2.15 - 2.90	90°	Irregular, undulating	brown clay		
					2.31	5°	Irregular, undulating	brown clay		
					2.36	5°	Irregular, undulating	brown clay		
					2.44	45°	Irregular, undulating	brown clay		
					2.52	55°	Irregular, undulating	none		
					2.55	5°	Irregular, undulating	none		
					2.61	65°	Irregular, undulating	none		
					2.65	10°	Irregular, undulating	none		
					2.80	20°	Irregular, undulating	none		
					2.85	10	Irregular, undulating	none		
2.90	3.60	Dark to med. grey coarse grained, bedded Limestone, strong, containing fossils, predominantly crinoids.	94%	89%	2.90 - 2.98		Irregular, Planar	Fractured and Core loss	<0.04	87%
					2.98	5°	Irregular, undulating	none	0.16	
					3.06	30°	Irregular, Planar	black clay		
					3.20	5°	Irregular, undulating	none		
					3.24	5°	Irregular, Planar	none		
					3.50	35°	Irregular, undulating	black clay		
3.60	5.00	Dark to med. grey coarse, grained, bedded Limestone, strong, containing fossils, predominantly crinoids	10%	100%	3.70	5°	Irregular, undulating	none	0.28	100%
					3.91	2°	Irregular, Planar	calcite vein		
					4.08	5°	Irregular, undulating			
					4.73	20°	Irregular, undulating	brown clay		
					7.95	70°	Irregular, undulating	brown clay		

GEOLOGICAL / GEOTECHNICAL LOG

Job No.	809	**B.H. Ref.**	BH-11
Client	Bord Gais	**Date**	July, 1995
Project	Gas Works Site Investigation	**Driller**	Glovers Site Investigation
Location	Limerick	**B.H. Diameter**	86mm
County	Limerick	**Casing Diameter**	None
Elevation	6.96 mOD	**Logged By**	Conor Walsh

Depth (m)		Geological Description	TCR	SCR	Joints / Discontinuities				FSI	RQD
From	To		%	%	Depth	Dip	Smoothness	Staining		%
8.80	10.30	Med. Grey Coarse grained, fresh, bedded Limestone, strong, containing abundant fossils, mainly brachipods and crinoids(stained with Tar)	100	100	8.99	5°	Irregular, undulating	Black tar	0.3	100
					9.23	5°	Irregular, undulating	Black tar		
					9.41	5°	Irregular, undulating	Black tar		
					9.72	5°	Irregular, undulating	Black tar		
					10.10	2°	Irregular, Planar	Black tar		
10.30	11.80	Med. Grey Coarse grained, fresh, bedded Limestone, strong, containing abundant fossils, mainly brachipods and crinoids (stained with tar)	94	94	10.51	5°	Irregular, undulating	Black tar	0.2	87
					10.57	20°	Irregular, undulating	Black tar		
					10.73	10°	Irregular, undulating	Black tar		
					10.96	2°	Irregular, Planar	Black tar		
					11.20	5°	Irregular, undulating	Black tar		
					11.38	5°	Irregular, undulating	Black tar		
					11.42	5°	Irregular, undulating	Black tar		

GEOLOGICAL / GEOTECHNICAL LOG

Job No.	809	**B.H. Ref.**	BH 12
Client	Bord Gais	**Date**	August, 1995
Project	Gas Works Site Investigation	**Driller**	Glovers Site Investigation
Location	Limerick	**B.H. Diameter**	86mm
County	Limerick	**Casing Diameter**	None
Elevation	7.67 mOD	**Logged By**	Conor Walsh

Depth (m) From	Depth (m) To	Geological Description	TCR	SCR	Joints / Discontinuities: Depth	Dip	Smoothness	Staining	FSI	RQD
9.70	10.95	Dark grey coarse grained, fresh bedded Limestone, strong, containing fossils, mainly brachipols and crineroids	86%	71%	9.75	30°	Irregular, Planar	none	0.18	
					9.88	20°	Irregular, undulating	none		60%
					9.95	55°	Irregular, undulating	none		
					Fractured (10cm) core loss			none	0.04	
					10.30	75°	Irregular, undulating	none		
					10.34	5°	Irregular, Planar	none		
					10.49	5°	Irregular, Planar	none		
					10.60	5°	Irregular, Planar	none		
10.95	11.65	Dark to med. grey coarse grained, bedded Limestone, strong, containing fossils, mainly brachipols and crineroids	80%	63%	Fractured from 10.95 to 11.30				5%	39%
					11.38	5°	Smooth, Planar		0.15	
					11.54	5°	Smooth, Planar			
11.65	12.70	Dark to med. grey interbedded coarse and fine grained fresh Limestone, strong, containing abundant fossils, mainly brachiopoids	71%	56%	1.65 - 12.0	5°	Fractured with core less			
					12.00	5°	Irregular, Planar	none	0.04	48%
					12.11	5°	Irregular, Planar	none	0.12	
					12.29	5°	Irregular, Planar	none		
					12.42	5°	Irregular, undulating	none		
					12.50	5°	Irregular, Planar	none		
					12.60	35°	Irregular, undulating	none		

APPENDIX D

Monitoring Well Sampling Log

Site Location :	Bord Gais , Dock Road, Limerick.		
Project No. :	809	**Well No. :**	BH - 7
Date :	11/8/95	**Sampler :**	Ronan Doyle
TOC Elevation (msl) :	7.11 mOD	**Stickup :**	0.0m (flush mount)
Water Level (BTOC) :	1.22 m	**Well Depth :**	8.90 m
Head :	7.68 m	**Well ID :**	2 inch (5 cm)
Volume in Well :	15.1 Litres	**Volume Purged :**	Unpurgeable
Rope Type :	Polyproylene	**Bailer Type :**	pvc

Decon. Procedure : Washed with Decon 90 followed by double-rinse with De-Ionised water

FIELD PARAMETERS

Colour : ..... **Odour :** .....

Temperature : ..... **Conductivity :** ..... **pH :** .....

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments : Very thick black tar - Highly viscous.

K.T.Cullen & Co. Ltd.
Hydrogeological & Environmental Consultants

NOTE : 5cm ID = 1.962 litres/m

Monitoring Well Sampling Log

Site Location :	Bord Gais , Dock Road, Limerick.		
Project No. :	809	**Well No. :**	BH - 8
Date :	11/8/95	**Sampler :**	Ronan Doyle
TOC Elevation (msl) :	8.24 mOD	**Stickup :**	0.0m (flush mount)
Water Level (BTOC) :	0.52 m	**Well Depth :**	3.35 m
Head :	2.83 m	**Well ID :**	2 inch (5 cm)
Volume in Well :	5.6 Litres	**Volume Purged :**	20 Litres
Rope Type :	Polyproylene	**Bailer Type :**	pvc
Decon. Procedure :	Washed with Decon 90 followed by double-rinse with De-Ionised water		

FIELD PARAMETERS

Colour :	Milky brown	**Odour :**	Strong Phenol odour		
Temperature :	17.5 ° C	**Conductivity :**	2.189 mS	**pH :**	7.07

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments :

K.T.Cullen & Co. Ltd.
Hydrogeological & Environmental Consultants

NOTE : 5cm ID = 1.962 litres/m

Monitoring Well Sampling Log

Site Location :	Bord Gais , Dock Road, Limerick.		
Project No. :	809	**Well No. :**	BH 9
Date :	11/8/95	**Sampler :**	Ronan Doyle
TOC Elevation (msl) :	6.76 mOD	**Stickup :**	0.0m (flush mount)
Water Level (BTOC) :	0.92 m	**Well Depth :**	4.64 m
Head :	3.72 m	**Well ID :**	2 inch (5 cm)
Volume in Well :	7.3 litres	**Volume Purged :**	Bailed dry
Rope Type :	Polyproylene	**Bailer Type :**	pvc
Decon. Procedure :	Washed with Decon 90 followed by double-rinse with De-Ionised water		

FIELD PARAMETERS

Colour : light milky brown **Odour :** moderate phenol odour

Temperature : 14.9 ° C **Conductivity :** 1767 µS **pH :** 7.9

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments : Well sampled after recovery.

K.T.Cullen & Co. Ltd.
Hydrogeological & Environmental Consultants

NOTE : 5cm ID = 1.962 litres/m

Monitoring Well Sampling Log

Site Location :	Bord Gais , Dock Road, Limerick.		
Project No. :	809	**Well No. :**	BH 10
Date :	11/8/95	**Sampler :**	Ronan Doyle
TOC Elevation (msl) :	6.23 mOD	**Stickup :**	0.0 m (flush mount)
Water Level (BTOC) :	1.55 m	**Well Depth :**	6.67 m
Head :	5.12 m	**Well ID :**	2 inch (5 cm)
Volume in Well :	10 Litres	**Volume Purged :**	Unpurgeable
Rope Type :	Polyproylene	**Bailer Type :**	pvc
Decon. Procedure :	Washed with Decon 90 followed by double-rinse with De-Ionised water		

FIELD PARAMETERS

Colour :	Black tar	**Odour :**	Strong phenol and tar		
Temperature :	not avaiable	**Conductivity :**	n/a	**pH :**	n/a

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments : Thick heavy black tarry water.

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NOTE : 5cm ID = 1.962 litres/m

Monitoring Well Sampling Log

Site Location : Bord Gais , Dock Road, Limerick.

Project No. : 809 Well No. : BH 11

Date : 11/8/95 Sampler : Ronan Doyle

TOC Elevation (msl) : 6.96 mOD Stickup : 0.0m (flush mount)

Water Level (BTOC) : 1.74 m Well Depth : 9.1 m

Head : 7.36 m Well ID : 2 inch (5 cm)

Volume in Well : 14.44 Litres Volume Purged : 45 Litres

Rope Type : Polyproylene Bailer Type : pvc

Decon. Procedure : Washed with Decon 90 followed by double-rinse with De-Ionised water

FIELD PARAMETERS

Colour : Black tint Odour : Strong phenol odour

Temperature : 14.1° C Conductivity : 1508µS pH : 7.74

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments : Redox potential 32 mV

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NOTE : 5cm ID = 1.962 litres/m

Monitoring Well Sampling Log

Site Location :	Bord Gais , Dock Road, Limerick.		
Project No. :	809	**Well No. :**	BH 12-D
Date :	11/8/95	**Sampler :**	Ronan Doyle
TOC Elevation (msl) :	7.51 mOD	**Stickup :**	0.0m (flush mount)
Water Level (BTOC) :	2.31 m	**Well Depth :**	11.19 m
Head :	8.88 m	**Well ID :**	2 inch (5 cm)
Volume in Well :	17.4 Litres	**Volume Purged :**	15 Litres
Rope Type :	Polyproylene	**Bailer Type :**	pvc
Decon. Procedure :	Washed with Decon 90 followed by double-rinse with De-Ionised water		

FIELD PARAMETERS

Colour :	dark grey cloudy	**Odour :**	phenol		
Temperature :	15 ° C	**Conductivity :**	1487 µS	**pH :**	7.52

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments : Redox potential 24 mV

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NOTE : 5cm ID = 1.962 litres/m

Monitoring Well Sampling Log

Site Location :	Bord Gais , Dock Road, Limerick.		
Project No. :	809	**Well No. :**	BH 12-S
Date :	11/8/95	**Sampler :**	Ronan Doyle
TOC Elevation (msl) :	7.51 mOD	**Stickup :**	0.0m (flush mount)
Water Level (BTOC) :	2.36 m	**Well Depth :**	7.85 m
Head :	5.49 m	**Well ID :**	2 inch (5 cm)
Volume in Well :	10.8 Litres	**Volume Purged :**	30 Litres
Rope Type :	Polyproylene	**Bailer Type :**	pvc
Decon. Procedure :	Washed with Decon 90 followed by double-rinse with De-Ionised water		

FIELD PARAMETERS

Colour :	milky brown	**Odour :**	Phenol type		
Temperature :	14.4 ° C	**Conductivity :**	1539µS	**pH :**	7.12

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments : Redox potential 7 mV

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NOTE : 5cm ID = 1.962 litres/m

Monitoring Well Sampling Log

Site Location : Bord Gais , Dock Road, Limerick.

Project No. : 809 **Well No. :** BH - 7

Date : 25/9/95 **Sampler :** Ronan Doyle

TOC Elevation (msl) : **Stickup :**

Water Level (BTOC) : **Well Depth :**

Head : **Well ID :** 2 inch (5 cm)

Volume in Well : **Volume Purged :**

Rope Type : Polyproylene **Bailer Type :** pvc

Decon. Procedure : Washed with Decon 90 followed by double-rinse with De-Ionised water

FIELD PARAMETERS

Colour : **Odour :**

Temperature : ° C **Conductivity :** µS **pH :**

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments :

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Hydrogeological & Environmental Consultants

NOTE : 5cm ID = 1.962 litres/m

Monitoring Well Sampling Log

Site Location :	Bord Gais , Dock Road, Limerick.		
Project No. :	809	**Well No. :**	BH-8
Date :	25/9/95	**Sampler :**	Ronan Doyle
TOC Elevation (msl) :	8.24 mOD	**Stickup :**	0.0m (flush mount)
Water Level (BTOC) :	0.8 m	**Well Depth :**	3.35 m
Head :	2.55 m	**Well ID :**	2 inch (5 cm)
Volume in Well :	5 Litres	**Volume Purged :**	15 Litres
Rope Type :	Polyproylene	**Bailer Type :**	pvc

Decon. Procedure : Washed with Decon 90 followed by double-rinse with De-Ionised water

FIELD PARAMETERS

Colour : Blackish colour **Odour :** strong Phenol odour

Temperature : 13.5° C **Conductivity :** 2.28mS **pH :** 6.85

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments : Floating tar on sample.

K.T.Cullen & Co. Ltd.
Hydrogeological & Environmental Consultants

NOTE : 5cm ID = 1.962 litres/m

Monitoring Well Sampling Log

Site Location :	Bord Gais , Dock Road, Limerick.		
Project No. :	809	**Well No. :**	BH 9
Date :	25/9/95	**Sampler :**	Ronan Doyle
TOC Elevation (msl) :	6.76 mOD	**Stickup :**	0.0 m (flush mount)
Water Level (BTOC) :	0.95	**Well Depth :**	4.64 m
Head :	3.69 m	**Well ID :**	2 inch (5 cm)
Volume in Well :	7.3 Litres	**Volume Purged :**	21 litres
Rope Type :	Polyproylene	**Bailer Type :**	pvc
Decon. Procedure :	Washed with Decon 90 followed by double-rinse with De-Ionised water		

FIELD PARAMETERS

Colour :	milky brown	**Odour :**	phenol odour		
Temperature :	14° C	**Conductivity :**	1737µS	**pH :**	7.65

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments : floating tar on sample.

K.T.Cullen & Co. Ltd.
Hydrogeological & Environmental Consultants

NOTE : 5cm ID = 1.962 litres/m

Monitoring Well Sampling Log

Site Location : Bord Gais , Dock Road, Limerick.

Project No. : 809 Well No. : BH - 10

Date : 25/9/95 Sampler : Ronan Doyle

TOC Elevation (msl) : Stickup :

Water Level (BTOC) : Well Depth :

Head : Well ID : 2 inch (5 cm)

Volume in Well : Volume Purged :

Rope Type : Polyproylene Bailer Type : pvc

Decon. Procedure : Washed with Decon 90 followed by double-rinse with De-Ionised water

FIELD PARAMETERS

Colour : Odour :

Temperature : °C Conductivity : µS pH :

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments :

K.T.Cullen & Co. Ltd.
Hydrogeological & Environmental Consultants

NOTE : 5cm ID = 1.962 litres/m

Monitoring Well Sampling Log

Site Location :	Bord Gais , Dock Road, Limerick.		
Project No. :	809	**Well No. :**	BH-11
Date :	25/9/95	**Sampler :**	Ronan Doyle
TOC Elevation (msl) :	6.96 mOD	**Stickup :**	0.0m (flush mount)
Water Level (BTOC) :	1.72 m	**Well Depth :**	9m
Head :	7.28 m	**Well ID :**	2 inch (5 cm)
Volume in Well :	14.3 Litres	**Volume Purged :**	42 Litres
Rope Type :	Polyproylene	**Bailer Type :**	pvc

Decon. Procedure : Washed with Decon 90 followed by double-rinse with De-Ionised water

FIELD PARAMETERS

Colour : Blackish colour **Odour :** Phenol odour

Temperature : 13.5 ° C **Conductivity :** 1544 µS **pH :** 7.48

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments : Irridescence on surface.

K.T.Cullen & Co. Ltd.
Hydrogeological & Environmental Consultants

NOTE : 5cm ID = 1.962 litres/m

Monitoring Well Sampling Log

Site Location :	Bord Gais , Dock Road, Limerick.		
Project No. :	809	**Well No. :**	BH 12-D
Date :	25/9/95	**Sampler :**	Ronan Doyle
TOC Elevation (msl) :	7.51 mOD	**Stickup :**	0.0m (flush mount)
Water Level (BTOC) :	2.26 m	**Well Depth :**	10.15 m
Head :	7.89 m	**Well ID :**	2 inch (5 cm)
Volume in Well :	15.5 Litres	**Volume Purged :**	45 Litres
Rope Type :	Polyproylene	**Bailer Type :**	pvc
Decon. Procedure :	Washed with Decon 90 followed by double-rinse with De-Ionised water		

FIELD PARAMETERS

Colour :	Milky grey	**Odour :**	phenol odour		
Temperature :	14° C	**Conductivity :**	1730µS	**pH :**	7.5

ANALYSIS REQUESTED	CONTAINER TYPE/VOL.	PRESERVED
W1, W2 and W3 Analytical Suites	2 (No) 1 L Amber Glass	< 4 ° C
Analysis as requested by Ove Arup	250 ml PET	H2SO4
and Partners : see Chemical testing	250 ml PET	ZnAc
list.	250 ml PET	NaOH
BOD and COD analysis:	2.5 L Plastic.	< 4 ° C

Comments :

K.T.Cullen & Co. Ltd.
Hydrogeological & Environmental Consultants

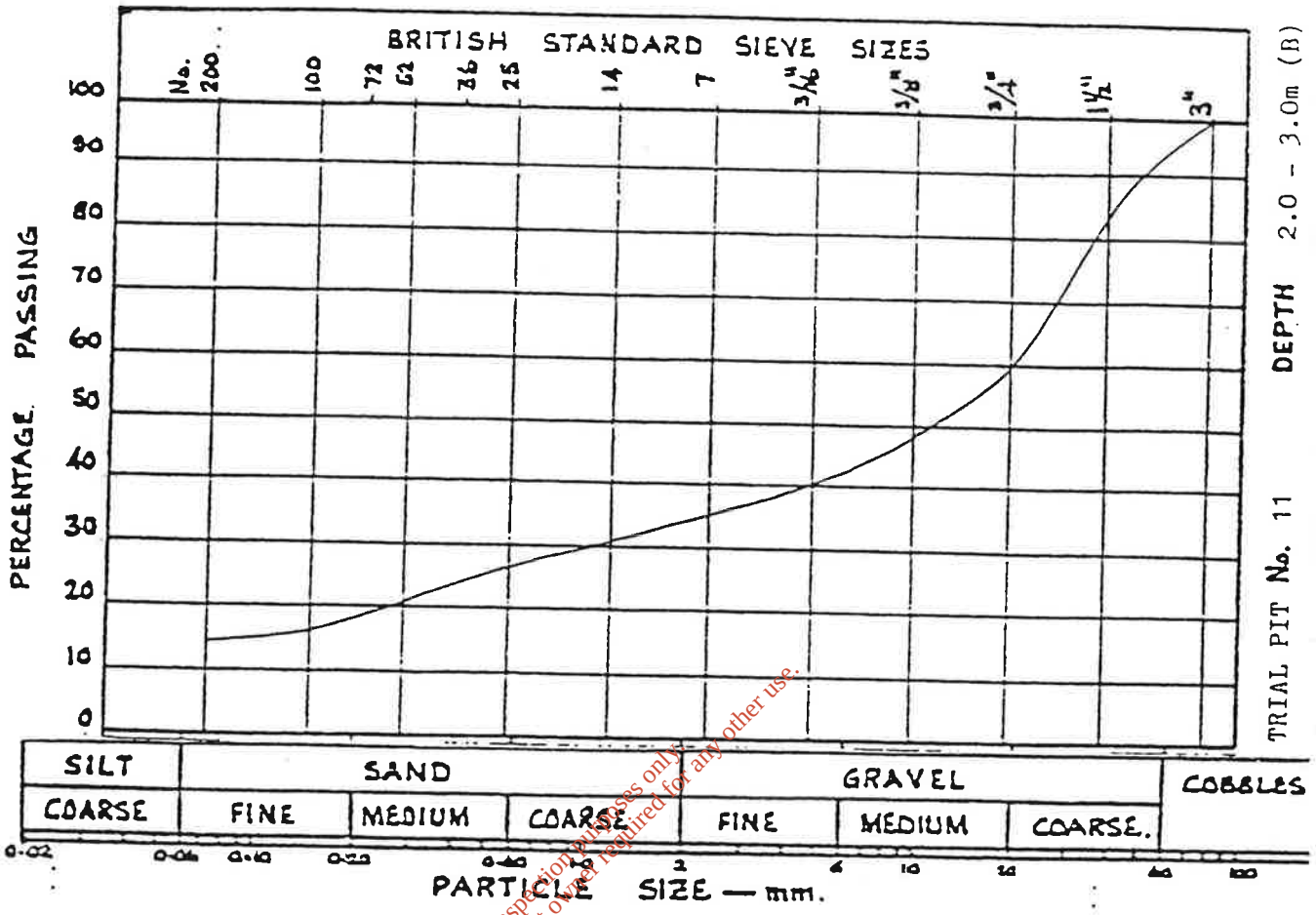
NOTE : 5cm ID = 1.962 litres/m

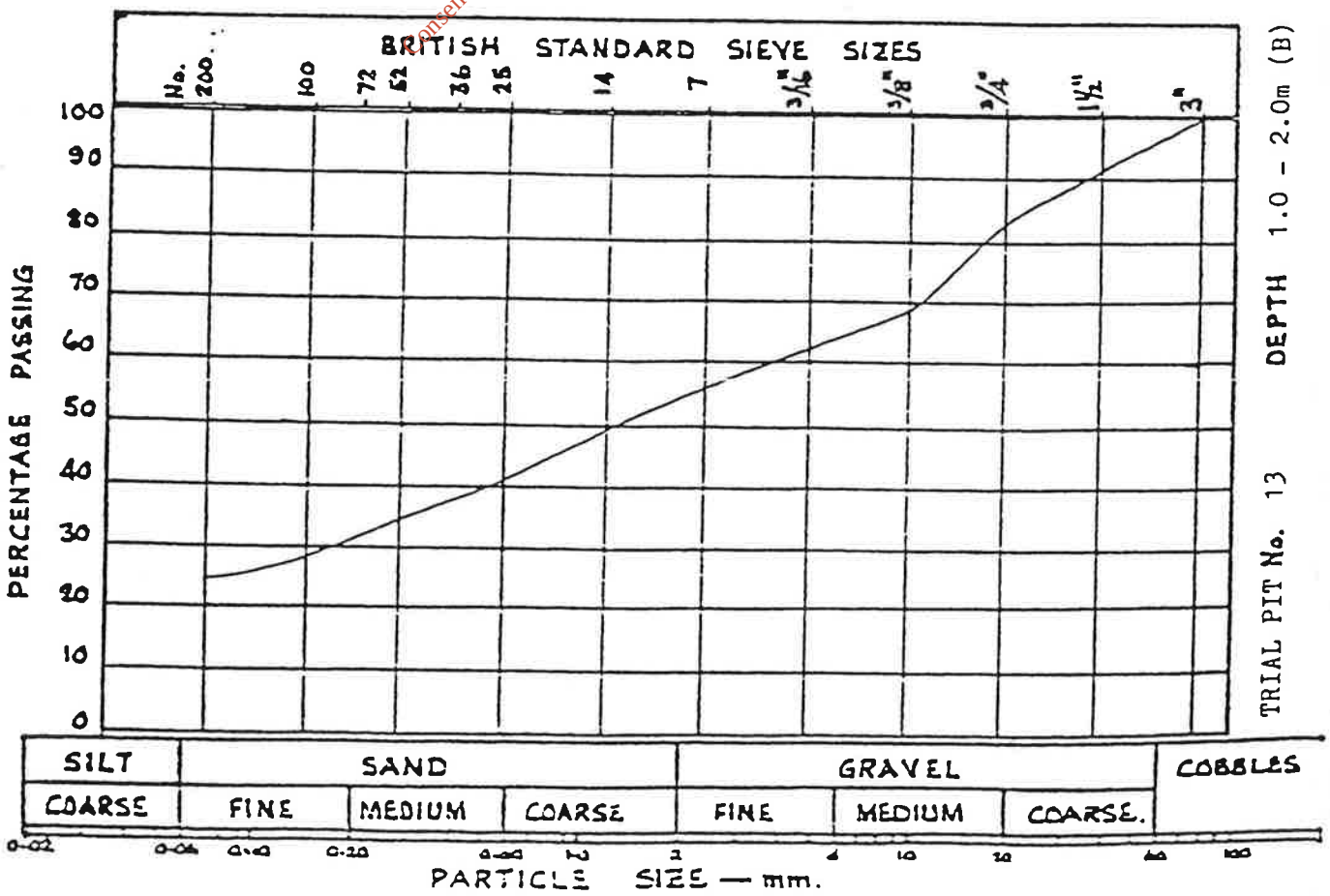
APPENDIX E

SIEVING ANALYSIS

CONTRACT: Bord Gais, Limerick

SITE:

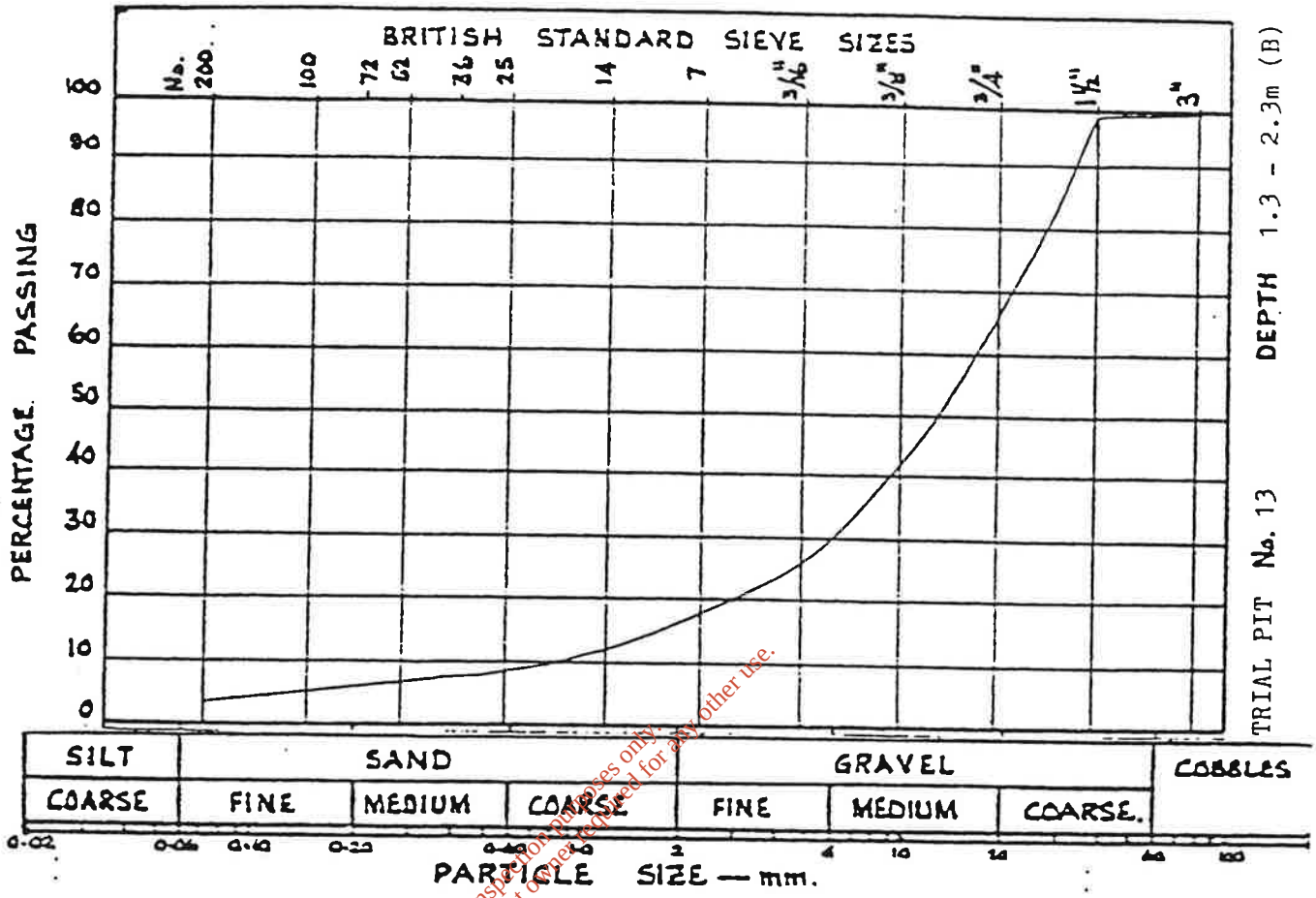


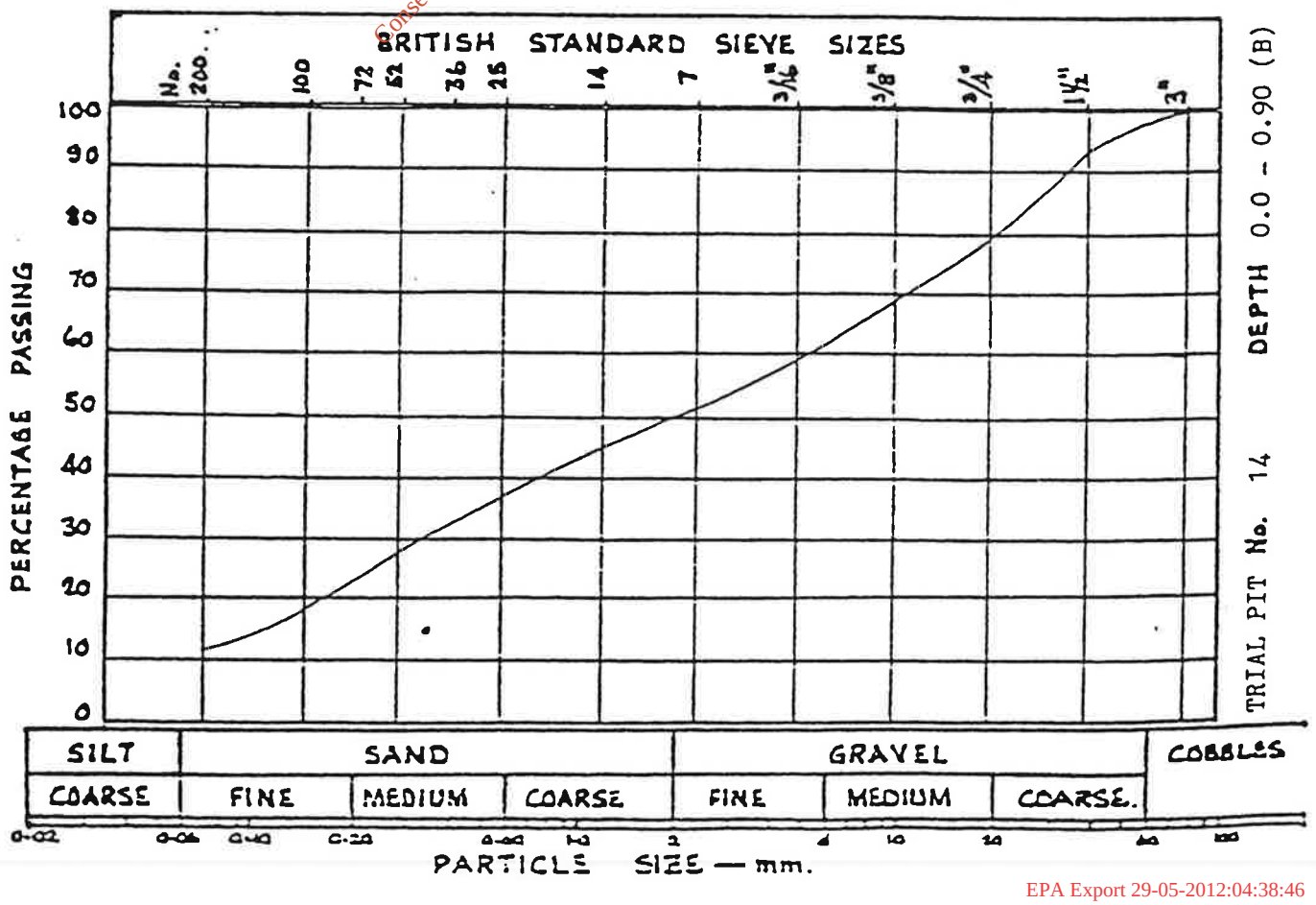


SIEVING ANALYSIS

CONTRACT: Bord Gais, Limerick

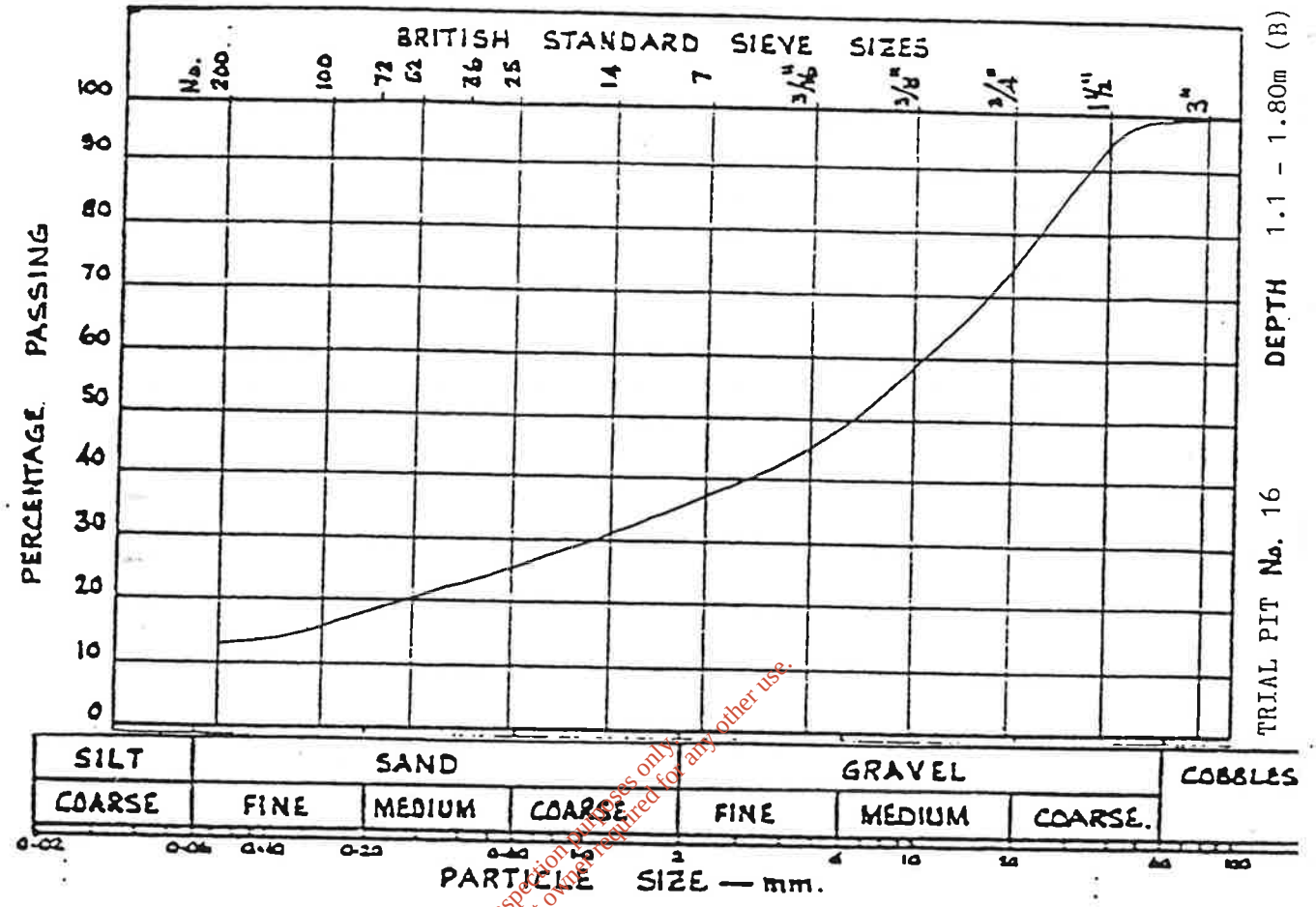
SITE:

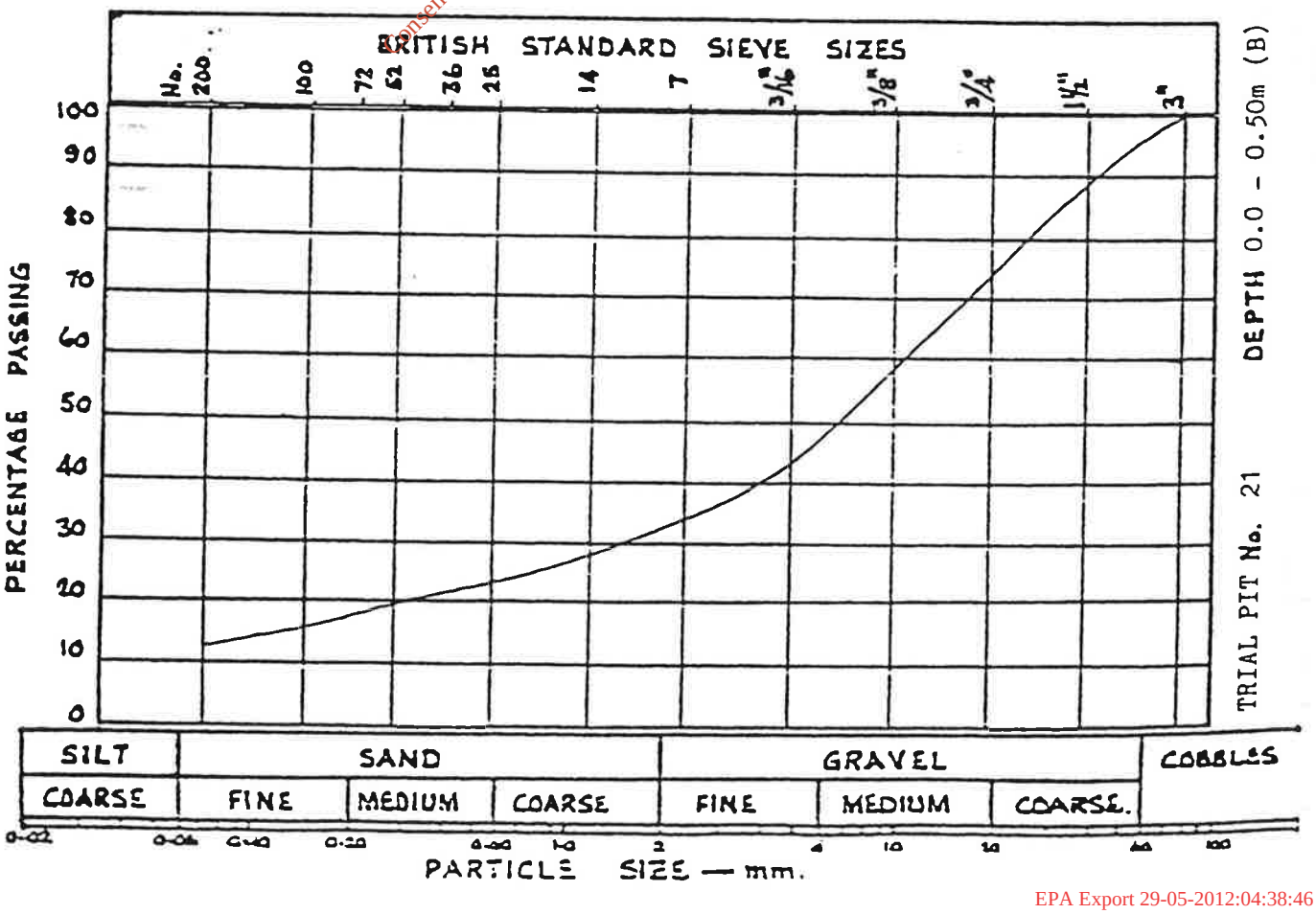




SIEVING ANALYSIS

CONTRACT: Bord Gais, Limerick SITE:

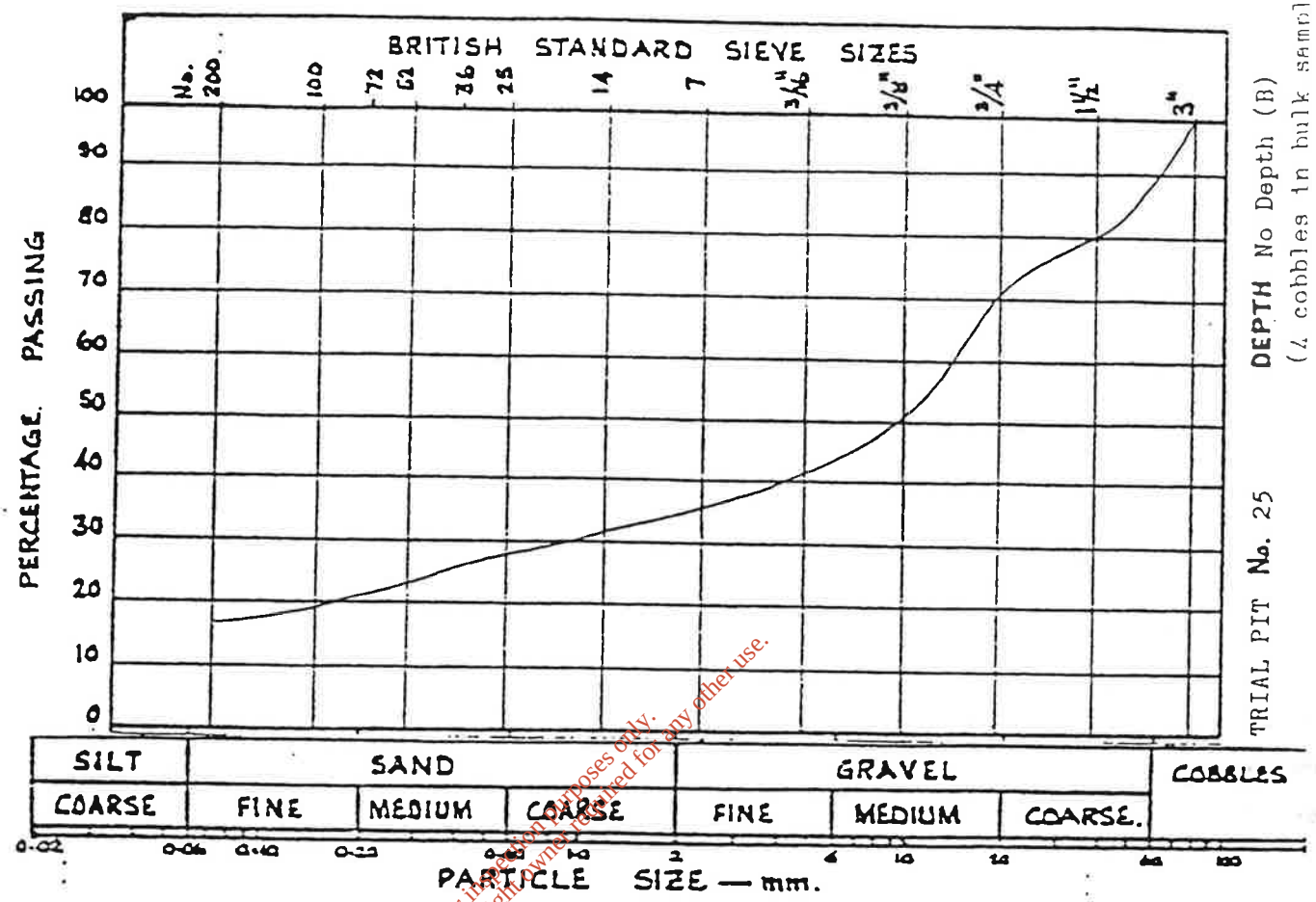


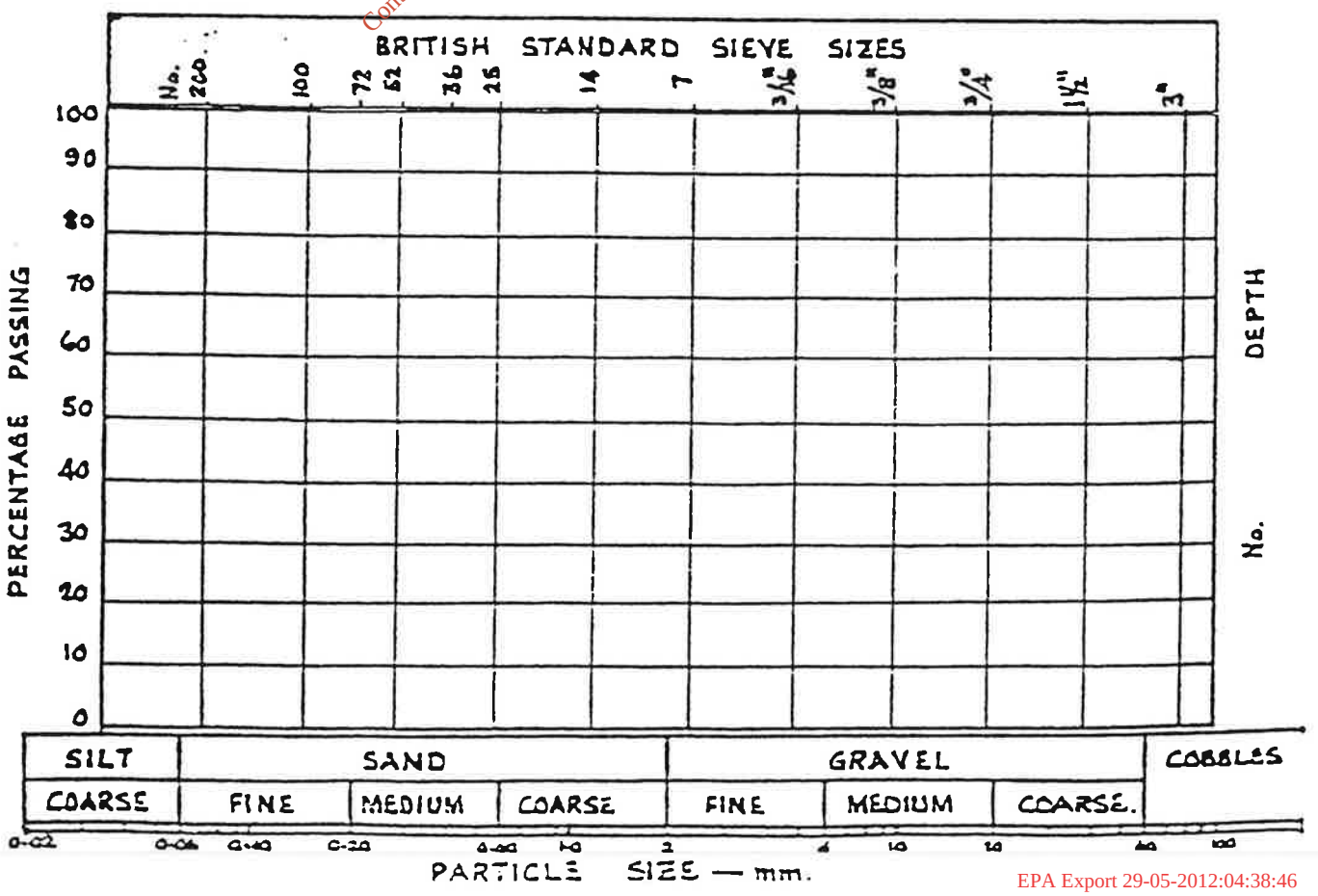


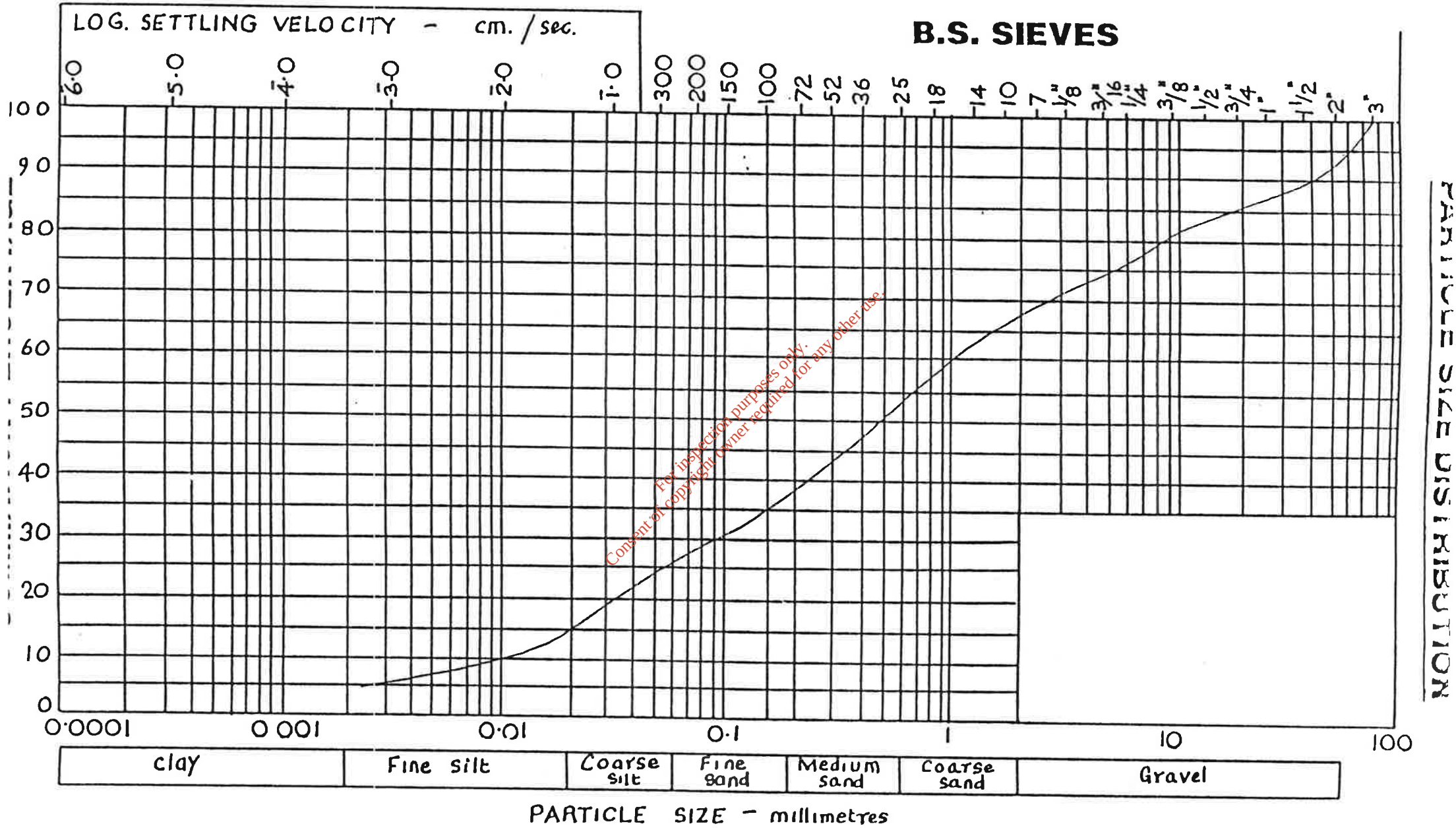
SIEVING ANALYSIS

CONTRACT: Bord Gais, Limerick

SITE:







JOB : Bord Gais, Limerick

TRIAL PIT No : 27

SAMPLE No : DEPTH :) / -1.

APPENDIX F

GEOCHEM

GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No. 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	1
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	21/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Solv. Ext. Matter	Total sulphate	Phenol (soil)	pH (soil)	Total cyanide	Arsenic	Lead	Cadmium	Chromium	Mercury	Nickel	Zinc	Copper	Total sulphur	Ac.Sol.Sulphide	Thin-layer chro.	Sat Quant (GC)	Tot Vol by GC	BTEX by GC	DIN leach	Thiocyanate *	Free cyanide
1	TP 15		0-0.75	SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				2	2
2	TP 15		0.75-1.5	SOIL	✓	✓	✓	✓	✓																	
3	TP 15		1.5-3.0	SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				2	2
4	TP 16		0-0.9	SOIL	✓	✓	✓	✓	✓																	
5	TP 16		1.1-1.8	SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				2	2
6	TP 16		1.5-1.8	SOIL	✓	✓	✓	✓	✓																	
7	TP 17		0.-0.75	SOIL	✓	✓	✓	✓	✓																	
8	TP 17		0.75-1.5	SOIL	✓	✓	✓	✓	✓																	
9	TP 17		1.5-3.0	SOIL	✓	✓	✓	✓	✓																	
10	TP 18		0-0.75	SOIL	✓	✓	✓	✓	✓																	
11	TP 18		0.75-1.5	SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
12	TP 18		1.5-3.0	SOIL	✓	✓	✓	✓	✓																	
13	TP19		0-0.5	SOIL	✓	✓	✓	✓	✓																	
14	TP19		0.5-0.9	SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
15	TP19		0.9-1.2	SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
16	TP20		0.64	SOIL	✓	✓	✓	✓	✓																	
17	TP21		0-0.5	SOIL	✓	✓	✓	✓	✓																	
18	TP22		0-0.6	SOIL	✓	✓	✓	✓	✓																	
19	TP22		1.0-1.5	SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
20	TP22		1.5-2.5	SOIL	✓	✓	✓	✓	✓																2	2

Checked by ..... Print Name JANE ACCOCK

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GEOCHEM

GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	1
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	21/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type . . . . . .

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Complex cyan.	Soluble SO4	PAH by GAS	O2 Dissolved	Phenol (water)	Amm. N2 (W)	Total CN Water	PAH by MS	Sulphide (H2O)	Sulphate Kone	Arsenic	Cadmium	Chromium	Lead	Mercury	Selenium	Copper	Nickel	Zinc	Colour	Turbidity Test	Hardness
1	TP 15		0-0.75	SOIL	2		2																			
2	TP 15		0.75-1.5	SOIL	2																					
3	TP 15		1.5-3.0	SOIL	2		2																			
4	TP 16		0-0.9	SOIL																						
5	TP 16		1.1-1.8	SOIL	2																					
6	TP 16		1.5-1.8	SOIL																						
7	TP 17		0.-0.75	SOIL			2																			
8	TP 17		0.75-1.5	SOIL																						
9	TP 17		1.5-3.0	SOIL																						
10	TP 18		0-0.75	SOIL																						
11	TP 18		0.75-1.5	SOIL																						
12	TP 18		1.5-3.0	SOIL																						
13	TP19		0-0.5	SOIL																						
14	TP19		0.5-0.9	SOIL																						
15	TP19		0.9-1.2	SOIL																						
16	TP20		0.64	SOIL		2	2																			
17	TP21		0-0.5	SOIL			2																			
18	TP22		0-0.6	SOIL																						
19	TP22		1.0-1.5	SOIL	2		2																			
20	TP22		1.5-2.5	SOIL		2																				

Checked by JA Print Name JANE ALCOCK

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GEOCHEM

GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No. 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	1
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	21/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type .....

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Alkalinity Total	Mg Hardness	Chloride Kone	T.O.C. in water	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Aluminium	Nitrate Kone	Nitrite Kone										
1	TP 15		0-0.75	SOIL																							
2	TP 15		0.75-1.5	SOIL																							
3	TP 15		1.5-3.0	SOIL																							
4	TP 16		0-0.9	SOIL																							
5	TP 16		1.1-1.8	SOIL																							
6	TP 16		1.5-1.8	SOIL																							
7	TP 17		0.-0.75	SOIL																							
8	TP 17		0.75-1.5	SOIL																							
9	TP 17		1.5-3.0	SOIL																							
10	TP 18		0-0.75	SOIL																							
11	TP 18		0.75-1.5	SOIL																							
12	TP 18		1.5-3.0	SOIL																							
13	TP19		0-0.5	SOIL																							
14	TP19		0.5-0.9	SOIL																							
15	TP19		0.9-1.2	SOIL																							
16	TP20		0.64	SOIL																							
17	TP21		0-0.5	SOIL																							
18	TP22		0-0.6	SOIL																							
19	TP22		1.0-1.5	SOIL																							
20	TP22		1.5-2.5	SOIL																							

Checked by ..... DA ..... Print Name .. DANE ... ALCOCK

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GEOCHEM

GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	1
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	21/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type .....

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Solv. Ext. Matter	Total sulphate	Phenol (soil)	pH (soil)	Total cyanide	Arsenic	Lead	Cadmium	Chromium	Mercury	Nickel	Zinc	Copper	Total sulphur	Ac.Sol.Sulphide	Thin-layer chro.	Sat Quant (GC)	Tot Vol by GC	BTEX by GC	DIN leach	Thiocyanate *	Free cyanide
21	TP24		0-0.75	SOIL	✓	✓	✓	✓	✓																	
22	TP24		0.9-1.2	SOIL		✓	✓	✓	✓																	
23	TP24		1.5-2.3	SOIL		✓	✓	✓	✓																2	2
24	TP15	1L gl	3.10	WATER																						
25	TP15	H2SO4	3.10	WATER																						
26	TP15	NaOH	3.10	WATER																						
27	TP15	ZnAc	3.10	WATER																						
28	TP16	1L gl		WATER																						
29	TP16	H2SO4		WATER																						
30	TP16	NaOH		WATER																						
31	TP16	ZnAc		WATER																						
32	TP17	H2SO4	2.40	WATER																						
33	TP17	NaOH	2.40	WATER																						
34	TP18	H2SO4	2.50	WATER																						
35	TP18	NaOH	2.50	WATER																						
36	TP19	1L gl		WATER																						
37	TP19	H2SO4		WATER																						
38	TP19	NaOH		WATER																						
39	TP19	ZnAc		WATER																						
40	TP20	H2SO4	0.43	WATER																						

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GEOCHEM

GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	1
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	21/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Complex cyan.	Soluble SO4	PAH by MS	O2 Dissolved	Phenol (water)	Amm. N2 (W)	Total CN Water	PAH by MS	Sulphide (H2O)	Sulphate Kone	Arsenic	Cadmium	Chromium	Lead	Mercury	Selenium	Copper	Nickel	Zinc	Colour	Turbidity Test	Hardness
21	TP24		0-0.75	SOIL																						
22	TP24		0.9-1.2	SOIL	2																					
23	TP24		1.5-2.3	SOIL		2																				
24	TP15	1L gl	3.10	WATER				✓				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
25	TP15	H2SO4	3.10	WATER					✓	✓																
26	TP15	NaOH	3.10	WATER							✓															
27	TP15	ZnAc	3.10	WATER									✓													
28	TP16	1L gl		WATER				✓				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
29	TP16	H2SO4		WATER					✓	✓																
30	TP16	NaOH		WATER							✓															
31	TP16	ZnAc		WATER									✓													
32	TP17	H2SO4	2.40	WATER					✓	✓																
33	TP17	NaOH	2.40	WATER							✓		✓													
34	TP18	H2SO4	2.50	WATER					✓	✓																
35	TP18	NaOH	2.50	WATER							✓		✓													
36	TP19	1L gl		WATER				✓				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
37	TP19	H2SO4		WATER					✓	✓																
38	TP19	NaOH		WATER							✓															
39	TP19	ZnAc		WATER									✓													
40	TP20	H2SO4	0.43	WATER					✓	✓																

Checked by JA Print Name JANE ACCOC /c

☐ NAMAS Accredited

GEOCHEM

GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No. 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	1
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	21/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type .....

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Alkalinity Total	Mg Hardness	Chloride Kone	T.O.C. In Water	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Aluminium	Nitrate Kone	Nitrite Kone									
21	TP24		0-0.75	SOIL																						
22	TP24		0.9-1.2	SOIL																						
23	TP24		1.5-2.3	SOIL																						
24	TP15	1L gl	3.10	WATER	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									
25	TP15	H2SO4	3.10	WATER																						
26	TP15	NaOH	3.10	WATER																						
27	TP15	ZnAc	3.10	WATER																						
28	TP16	1L gl		WATER	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									
29	TP16	H2SO4		WATER																						
30	TP16	NaOH		WATER																						
31	TP16	ZnAc		WATER																						
32	TP17	H2SO4	2.40	WATER																						
33	TP17	NaOH	2.40	WATER																						
34	TP18	H2SO4	2.50	WATER																						
35	TP18	NaOH	2.50	WATER																						
36	TP19	1L gl		WATER	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									
37	TP19	H2SO4		WATER																						
38	TP19	NaOH		WATER																						
39	TP19	ZnAc		WATER																						
40	TP20	H2SO4	0.43	WATER																						

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GEOCHEM

GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	1
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	21/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type .....

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Solv. Ext. Matter	Total sulphate	Phenol (soil)	pH (soil)	Total cyanide	Arsenic	Lead	Cadmium	Chromium	Mercury	Nickel	Zinc	Copper	Total sulphur	Ac.Sol.Sulphide	Thin-layer chro.	Sat Quant (GC)	Tot Vol by GC	BTEX by GC	DIN leach	Thiocyanate *	Free cyanide
41	TP20	NaOH	0.43	WATER																						
42	TP21	H2SO4	0.50	WATER																						
43	TP21	NaOH	0.50	WATER																						
44	TP22	H2SO4	1.40	WATER																						
45	TP22	NaOH	1.40	WATER																						
46	TP24	NaOH		WATER																						
47	TP24	H2SO4		WATER																						
48	TP15	Vial	0.6-0.9	SOIL																						
49	TP15	Vial	2.5-2.8	SOIL																		✓	✓			
50	TP16 EAST	Vial	1.5-1.8	SOIL																		✓	✓			
51	TP16 SOUTH	Vial	1.5-1.8	SOIL																		✓	✓			
52	TP17	Vial	0.6-0.75	SOIL																		✓	✓			
53	TP17	Vial	2.6-2.8	SOIL																						
54	TP18	Vial	0.75-1.5	SOIL																						
55	TP19	Vial	0-0.5	SOIL																		✓	✓			
56	TP19	Vial	0.9-1.2	SOIL																		✓	✓			
57	TP21	Vial	0-0.5	SOIL																		✓	✓			
58	TP22	Vial	1-1.5	SOIL																						
59	TP20	Vial	0.-0.64	SOIL																		✓	✓			
60	TP24	Vial	0.9-1.2	SOIL																						

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No. 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	1
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	21/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Complex cyan.	Soluble SO4	PAH by MS	O2 Dissolved	Phenol (water)	Amm. N2 (W)	Total CN Water	PAH by MS	Sulphide (H2O)	Sulphate Kone	Arsenic	Cadmium	Chromium	Lead	Mercury	Selenium	Copper	Nickel	Zinc	Colour	Turbidity Test	Hardness
41	TP20	NaOH	0.43	WATER							✓		✓													
42	TP21	H2SO4	0.50	WATER					✓	✓																
43	TP21	NaOH	0.50	WATER							✓		✓													
44	TP22	H2SO4	1.40	WATER					✓	✓																
45	TP22	NaOH	1.40	WATER							✓		✓													
46	TP24	NaOH		WATER							✓		✓													
47	TP24	H2SO4		WATER					✓	✓																
48	TP15	Vial	0.6-0.9	SOIL																						
49	TP15	Vial	2.5-2.8	SOIL																						
50	TP16 EAST	Vial	1.5-1.8	SOIL																						
51	TP16 SOUTH	Vial	1.5-1.8	SOIL																						
52	TP17	Vial	0.6-0.75	SOIL																						
53	TP17	Vial	2.6-2.8	SOIL																						
54	TP18	Vial	0.75-1.5	SOIL																						
55	TP19	Vial	0-0.5	SOIL																						
56	TP19	Vial	0.9-1.2	SOIL																						
57	TP21	Vial	0-0.5	SOIL																						
58	TP22	Vial	1-1.5	SOIL																						
59	TP20	Vial	0.-0.64	SOIL																						
60	TP24	Vial	0.9-1.2	SOIL																						

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TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	1
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	21/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type .....

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Alkalinity Total	Mg Hardness	Chloride Kone	T.O.C. in water	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Aluminium	Nitrate Kone	Nitrite Kone									
41	TP20	NaOH	0.43	WATER																					
42	TP21	H2SO4	0.50	WATER																					
43	TP21	NaOH	0.50	WATER																					
44	TP22	H2SO4	1.40	WATER																					
45	TP22	NaOH	1.40	WATER																					
46	TP24	NaOH		WATER																					
47	TP24	H2SO4		WATER																					
48	TP15	Vial	0.6-0.9	SOIL																					
49	TP15	Vial	2.5-2.8	SOIL																					
50	TP16 EAST	Vial	1.5-1.8	SOIL																					
51	TP16 SOUTH	Vial	1.5-1.8	SOIL																					
52	TP17	Vial	0.6-0.75	SOIL																					
53	TP17	Vial	2.6-2.8	SOIL																					
54	TP18	Vial	0.75-1.5	SOIL																					
55	TP19	Vial	0-0.5	SOIL																					
56	TP19	Vial	0.9-1.2	SOIL																					
57	TP21	Vial	0-0.5	SOIL																					
58	TP22	Vial	1-1.5	SOIL																					
59	TP20	Vial	0.-0.64	SOIL																					
60	TP24	Vial	0.9-1.2	SOIL																					

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

JOB NUMBER	95/1035/02/01	BATCH NUMBER	1
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	21/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type ....

NAMAS TESTING No. 1291

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Solv. Ext. Matter	Total sulphate	Phenol (soil)	pH (soil)	Total cyanide	Arsenic	Lead	Cadmium	Chromium	Mercury	Nickel	Zinc	Copper	Total sulphur	Ac.Sol.Sulphide	Thin-layer chro.	Sat Quant (GC)	Tot Vol by GC	BTEX by GC	DIN leach	Thiocyanate *	Free cyanide
61	TP25	Vial	0-0.6	SOIL																						
	Total number of tests				23	23	23	23	23	7	7	7	7	7	7	7	7	7	7	7	7	8	8	0	5	5

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No. 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	1
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	21/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type . .

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Complex cyan.	Soluble SO4	PAH by MS	C2 Dissolved	Phenol (water)	Amm. N2 (W)	Total CN Water	PAH by MS	Sulphide (H2O)	Sulphate Kone	Arsenic	Cadmium	Chromium	Lead	Mercury	Selenium	Copper	Nickel	Zinc	Colour	Turbidity Test	Hardness
61	TP25	Vial	0-0.6	SOIL																						
Total number of tests					5	5	6	3	9	9	9	3	9	3	3	3	3	3	3	3	3	3	3	3	3	3

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

JOB NUMBER	95/1035/02/01	BATCH NUMBER	1
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	21/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type ----------

NAMAS TESTING No. 1291

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Alkalinity Total	Mg Hardness	Chloride Kone	T.O.C. in Water	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Aluminium	Nitrate Kone	Nitrite Kone										
61	TP25	Vial	0-0.6	SOIL																							
Total number of tests					3	3	3	3	3	3	3	3	3	3	3	3	3										

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	2
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	27/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type . . . . .

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Soly. Ext. Matter	Total sulphate	Phenol (soil)	pH (soil)	Total cyanide	Arsenic	Lead	Cadmium	Chromium	Mercury	Nickel	Zinc	Copper	Total sulphur	Ac.Sol.Sulphide	Thin-layer chro.	Sat Quant (GC)	Tot Vol by GC	BTEX by GC	DIN leach	Thiocyanate *	Free cyanide
62	TP11		0.3-1.3	SOIL	✓	✓	✓	✓	✓																	
63	TP11		2.4-3.2	SOIL	✓	✓	✓	✓	✓																	
64	TP11		3.3-3.7	SOIL	✓	✓	✓	✓	✓																	
65	TP11	Vial	2.4-3.2	SOIL																						
66	TP11	Vial	3.3-3.9	SOIL																						
67	TP12		0.9-1.4	SOIL	✓	✓	✓	✓	✓																	
68	TP12		1.4-1.9	SOIL	✓	✓	✓	✓	✓																	
69	TP12		2.5-3.5	SOIL	✓	✓	✓	✓	✓															3	3
70	TP12	Vial	1.1-1.4	SOIL																						
71	TP12	Vial	1.6-1.8	SOIL																						
72	TP13		0.4-0.9	SOIL	✓	✓	✓	✓	✓																	
73	TP13		1-1.7	SOIL	✓	✓	✓	✓	✓															3	3
74	TP13		2.0-3.0	SOIL	✓	✓	✓	✓	✓																	
75	TP13	Vial	1.2-1.4	SOIL																				3	3
76	TP13	Vial	2.5-2.7	SOIL																						
77	TP14		0-0.5	SOIL	✓	✓	✓	✓	✓													2	2			
78	TP14		1.4-2.7	SOIL	✓	✓	✓	✓	✓																	
79	TP14		2.7-3.5	SOIL	✓	✓	✓	✓	✓																	
80	TP14	Vial	3-3.2	SOIL																						
81	TP23		0-0.5	SOIL	✓	✓	✓	✓	✓																	

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	2
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	27/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type . . . .

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Complex cyan.	Soluble SO4	PAH by MS	O2 Dissolved	Phenol(water)	Ammn. N2 (W)	Total CN Water	PAH by MS	Sulphide (H2O)	Sulphate Kone	Arsenic	Cadmium	Chromium	Lead	Mercury	Selenium	Copper	Nickel	Zinc	Colour	Turbidity Test	Hardness
62	TP11		0.3-1.3	SOIL			3																			
63	TP11		2.4-3.2	SOIL																						
64	TP11		3.3-3.7	SOIL			3																			
65	TP11	Vial	2.4-3.2	SOIL																						
66	TP11	Vial	3.3-3.9	SOIL																						
67	TP12		0.9-1.4	SOIL		3																				
68	TP12		1.4-1.9	SOIL	3		3																			
69	TP12		2.5-3.5	SOIL		3																				
70	TP12	Vial	1.1-1.4	SOIL																						
71	TP12	Vial	1.6-1.8	SOIL																						
72	TP13		0.4-0.9	SOIL	3		3																			
73	TP13		1-1.7	SOIL		3																				
74	TP13		2.0-3.0	SOIL	3		3																			
75	TP13	Vial	1.2-1.4	SOIL																						
76	TP13	Vial	2.5-2.7	SOIL																						
77	TP14		0-0.5	SOIL																						
78	TP14		1.4-2.7	SOIL			3																			
79	TP14		2.7-3.5	SOIL		3																				
80	TP14	Vial	3-3.2	SOIL																						
81	TP23		0-0.5	SOIL			3																			

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	2
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	27/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type .....

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Alkalinity Total	Mg Hardness	Chloride Kone	T.O.C. in Water	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Aluminium	Nitrate Kone	Nitrite Kone	pH (water)	Conductivity							
62	TP11		0.3-1.3	SOIL																						
63	TP11		2.4-3.2	SOIL																						
64	TP11		3.3-3.7	SOIL																						
65	TP11	Vial	2.4-3.2	SOIL																						
66	TP11	Vial	3.3-3.9	SOIL																						
67	TP12		0.9-1.4	SOIL																						
68	TP12		1.4-1.9	SOIL																						
69	TP12		2.5-3.5	SOIL																						
70	TP12	Vial	1.1-1.4	SOIL																						
71	TP12	Vial	1.6-1.8	SOIL																						
72	TP13		0.4-0.9	SOIL																						
73	TP13		1-1.7	SOIL																						
74	TP13		2.0-3.0	SOIL																						
75	TP13	Vial	1.2-1.4	SOIL																						
76	TP13	Vial	2.5-2.7	SOIL																						
77	TP14		0-0.5	SOIL																						
78	TP14		1.4-2.7	SOIL																						
79	TP14		2.7-3.5	SOIL																						
80	TP14	Vial	3-3.2	SOIL																						
81	TP23		0-0.5	SOIL																						

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GEOCHEM

GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	2
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	27/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type .....

Numeric values indicate additional scheduling

* *Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Solv. Ext. Matter	Total sulphate	Phenol (soil)	pH (soil)	Total cyanide	Arsenic	Lead	Cadmium	Chromium	Mercury	Nickel	Zinc	Copper	Total sulphur	Ac.Sol.Sulphide	Thin-layer chro.	Sat Quant (GC)	Tot Vol by GC	BTEX by GC	DIN leach	Thiocyanate *	Free cyanide
82	TP23		0.5-1.7	SOIL	✓	✓	✓	✓	✓																	
83	TP23		2-2.4	SOIL	✓	✓	✓	✓	✓																	
84	TP23	Vial	1.1-1.4	SOIL																				3	3
85	TP23	Vial	2-2.4	SOIL																		2	2			
86	TP25		0.4-0.8	SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
87	TP25		0.8-1.1	SOIL	✓	✓	✓	✓	✓																	
88	TP25	Vial	0.8-1.1	SOIL																						
89	TP26A		0-0.2	SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
90	TP26A	Vial	0-0.2	SOIL																						
91	TP26B		0-0.15	SOIL	✓	✓	✓	✓	✓																	
92	TP26B	Vial	0-0.15	SOIL																						
93	TP27		0.2-0.5	SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
94	TP27		0.5-1.9	SOIL	✓	✓	✓	✓	✓																	
95	TP27		3.2-3.4	SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			3	3
96	TP27	Vial	1-1.9	SOIL																						
97	TP27	Vial	3.2-3.4	SOIL																						
98	F1		0.00	SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
99	F1	Vial	0.00	SOIL																		✓	✓			
100	F2		0.00	SOIL	✓	✓	✓	✓	✓															3	3
101	F2	Vial	0.00	SOIL																						

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

JOB NUMBER	95/1035/02/01	BATCH NUMBER	2
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	27/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type . . . . .

NAMAS TESTING No. 1291

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Complex cyan.	Soluble SO4	PAH by MS	O2 Dissolved	Phenol (water)	Amm. N2 (W)	Total CN Water	PAH by MS	Sulphide (H2O)	Sulphate Kone	Arsenic	Cadmium	Chromium	Lead	Mercury	Selenium	Copper	Nickel	Zinc	Colour	Turbidity Test	Hardness
82	TP23		0.5-1.7	SOIL		3																				
83	TP23		2-2.4	SOIL	3		3																			
84	TP23	Vial	1.1-1.4	SOIL																						
85	TP23	Vial	2-2.4	SOIL																						
86	TP25		0.4-0.8	SOIL			3																			
87	TP25		0.8-1.1	SOIL																						
88	TP25	Vial	0.8-1.1	SOIL																						
89	TP26A		0-0.2	SOIL			3																			
90	TP26A	Vial	0-0.2	SOIL																						
91	TP26B		0-0.15	SOIL																						
92	TP26B	Vial	0-0.15	SOIL																						
93	TP27		0.2-0.5	SOIL		3	3																			
94	TP27		0.5-1.9	SOIL		3																				
95	TP27		3.2-3.4	SOIL	3		3																			
96	TP27	Vial	1-1.9	SOIL																						
97	TP27	Vial	3.2-3.4	SOIL																						
98	F1		0.00	SOIL		3																				
99	F1	Vial	0.00	SOIL																						
100	F2		0.00	SOIL	3		3																			
101	F2	Vial	0.00	SOIL																						

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GEOCHEM

GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

JOB NUMBER	95/1035/02/01	BATCH NUMBER	2
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	27/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type ....

NAMAS TESTING No 1291

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Alkalinity Total	Mg Hardness	Chloride Kone	T.O.C in water	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Aluminium	Nitrate Kone	Nitrite Kone	pH (water)	Conductivity
82	TP23		0.5-1.7	SOIL															
83	TP23		2-2.4	SOIL															
84	TP23	Vial	1.1-1.4	SOIL															
85	TP23	Vial	2-2.4	SOIL															
86	TP25		0.4-0.8	SOIL															
87	TP25		0.8-1.1	SOIL															
88	TP25	Vial	0.8-1.1	SOIL															
89	TP26A		0-0.2	SOIL															
90	TP26A	Vial	0-0.2	SOIL															
91	TP26B		0-0.15	SOIL															
92	TP26B	Vial	0-0.15	SOIL															
93	TP27		0.2-0.5	SOIL															
94	TP27		0.5-1.9	SOIL															
95	TP27		3.2-3.4	SOIL															
96	TP27	Vial	1-1.9	SOIL															
97	TP27	Vial	3.2-3.4	SOIL															
98	F1		0.00	SOIL															
99	F1	Vial	0.00	SOIL															
100	F2		0.00	SOIL															
101	F2	Vial	0.00	SOIL															

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GEOCHEM

GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No. 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	2
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	27/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type .....

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Solv. Ext. Matter	Total sulphate	Phenol (soil)	pH (soil)	Total cyanide	Arsenic	Lead	Cadmium	Chromium	Mercury	Nickel	Zinc	Copper	Total sulphur	Ac.Sol.Sulphide	Thin-layer chro.	Sat Quant (GC)	Tot Vol by GC	BTEX by GC	DIN leach	Thiocyanate *	Free cyanide
102	F3			SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
103	F3	Vial		SOIL																		✓	✓			
104	F4			SOIL	✓	✓	✓	✓	✓																	
105	F5			SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
106	F5	Vial		SOIL																		✓	✓			
107	TP12	1L gl	3.40	WATER																						
108	TP12	1L gl	3.40	WATER																						
109	TP12	H2SO4	3.40	WATER																						
110	TP12	NaOH	3.40	WATER																						
111	TP12	ZnAc	3.40	WATER																						
112	TP13	1L gl	2.90	WATER																						
113	TP13	1L gl	2.90	WATER																						
114	TP13	1L gl	2.90	WATER																						
115	TP13	H2SO4	2.90	WATER																						
116	TP13	NaOH	2.90	WATER																						
117	TP13	ZnAc	2.90	WATER																						
118	TP14	1L gl	3.20	WATER																						
119	TP14	1L gl	3.20	WATER																						
120	TP14	H2SO4	3.20	WATER																						
121	TP14	NaOH	3.20	WATER																						

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	2
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	27/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type . . . .

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Complex cyan.	Soluble SO4	PAH by MS	O2 Dissolved	Phenol (water)	Amm. N2 (W)	Total CN Water	PAH by MS	Sulphide (H2O)	Sulphate Kone	Arsenic	Cadmium	Chromium	Lead	Mercury	Selenium	Copper	Nickel	Zinc	Colour	Turbidity Test	Hardness
102	F3			SOIL		3																				
103	F3	Vial		SOIL																						
104	F4			SOIL																						
105	F5			SOIL		3																				
106	F5	Vial		SOIL																						
107	TP12	1L gl	3.40	WATER				✓				✓														
108	TP12	1L gl	3.40	WATER																						
109	TP12	H2SO4	3.40	WATER					✓	✓																
110	TP12	NaOH	3.40	WATER							✓															
111	TP12	ZnAc	3.40	WATER									✓													
112	TP13	1L gl	2.90	WATER				✓				✓														
113	TP13	1L gl	2.90	WATER																						
114	TP13	1L gl	2.90	WATER																						
115	TP13	H2SO4	2.90	WATER					✓	✓																
116	TP13	NaOH	2.90	WATER							✓															
117	TP13	ZnAc	2.90	WATER									✓													
118	TP14	1L gl	3.20	WATER				✓				✓														
119	TP14	1L gl	3.20	WATER																						
120	TP14	H2SO4	3.20	WATER					✓	✓																
121	TP14	NaOH	3.20	WATER							✓															

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

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NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	2
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	27/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type .....

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Alkalinity Total	Mg Hardness	Chloride Kone	T.O.C. in Water	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Aluminium	Nitrate Kone	Nitrite Kone	pH (water)	Conductivity
102	F3			SOIL															
103	F3	Vial		SOIL															
104	F4			SOIL															
105	F5			SOIL															
106	F5	Vial		SOIL															
107	TP12	1L gl	3.40	WATER															
108	TP12	1L gl	3.40	WATER															
109	TP12	H2SO4	3.40	WATER															
110	TP12	NaOH	3.40	WATER															
111	TP12	ZnAc	3.40	WATER															
112	TP13	1L gl	2.90	WATER															
113	TP13	1L gl	2.90	WATER														2	2
114	TP13	1L gl	2.90	WATER															
115	TP13	H2SO4	2.90	WATER															
116	TP13	NaOH	2.90	WATER															
117	TP13	ZnAc	2.90	WATER															
118	TP14	1L gl	3.20	WATER															
119	TP14	1L gl	3.20	WATER															
120	TP14	H2SO4	3.20	WATER															
121	TP14	NaOH	3.20	WATER															

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	2
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	27/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type .....

Numeric values indicate additional scheduling

* *Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Solv. Ext. Matter	Total sulphate	Phenol (soil)	pH (soil)	Total cyanide	Arsenic	Lead	Cadmium	Chromium	Mercury	Nickel	Zinc	Copper	Total sulphur	Ac.Sol.Sulphide	Thin-layer chro.	Sat Quant (GC)	Tot Vol by GC	BTEX by GC	DIN leach	Thiocyanate *	Free cyanide
122	TP14	ZnAc	3.20	WATER																						
123	TP16	1L gl		WATER																						
124	TP23	1L gl	2.20	WATER																						
125	TP23	1L gl	2.20	WATER																						
126	TP23	H2SO4	2.20	WATER																						
127	TP23	NaOH	2.20	WATER																						
128	TP23	ZnAc	2.20	WATER																						
129	TP27	1L gl	3.50	WATER																						
130	TP27	H2SO4	3.50	WATER																						
131	TP27	NaOH	3.50	WATER																						
132	TP27	ZnAc	3.50	WATER																						
Total number of tests					27	27	27	27	27	7	7	7	7	7	7	7	7	7	7	7	7	5	5	0	6	6

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No. 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	2
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	27/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Complex cyan.	Soluble SO4	PAH by MS	O2 Dissolved	Phenol (water)	Amm. N2 (W)	Total CN Water	PAH by MS	Sulphide (H2O)	Sulphate Kone	Arsenic	Cadmium	Chromium	Lead	Mercury	Selenium	Copper	Nickel	Zinc	Colour	Turbidity Test	Hardness
122	TP14	ZnAc	3.20	WATER									✓													
123	TP16	1L gl		WATER																						
124	TP23	1L gl	2.20	WATER				✓				✓														
125	TP23	1L gl	2.20	WATER																						
126	TP23	H2SO4	2.20	WATER					✓	✓																
127	TP23	NaOH	2.20	WATER							✓															
128	TP23	ZnAc	2.20	WATER									✓													
129	TP27	1L gl	3.50	WATER				✓				✓														
130	TP27	H2SO4	3.50	WATER					✓	✓																
131	TP27	NaOH	3.50	WATER							✓															
132	TP27	ZnAc	3.50	WATER									✓													
Total number of tests					6	10	13	5	5	5	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

JOB NUMBER	95/1035/02/01	BATCH NUMBER	2
CLIENT	K T Cullen & Co Ldt	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	27/7/1995	TURNAROUND	Standard
LOCATION	BGE LIMERICK		

Nonhazardous ☐
Hazardous ☐
Type _____

TESTING No. 1291

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Alkalinity Total	Mg Hardness	Chloride Kone	T.O.C. in water	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Aluminium	Nitrate Kone	Nitrite Kone	pH (water)	Conductivity
122	TP14	ZnAc	3.20	WATER															
123	TP16	1L gl		WATER															
124	TP23	1L gl	2.20	WATER															
125	TP23	1L gl	2.20	WATER															
126	TP23	H2SO4	2.20	WATER															
127	TP23	NaOH	2.20	WATER															
128	TP23	ZnAc	2.20	WATER															
129	TP27	1L gl	3.50	WATER															
130	TP27	H2SO4	3.50	WATER															
131	TP27	NaOH	3.50	WATER															
132	TP27	ZnAc	3.50	WATER															
Total number of tests					0	0	0	0	0	0	0	0	0	0	0	0	0	1	1

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No. 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	3
CLIENT	K T Cullen & Co Ltd.	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	12/8/1995	TURNAROUND	Standard
LOCATION	BGE Limerick		

Nonhazardous ☐
Hazardous ☐
Type .....

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Solv. Ext. Matter	Total sulphate	Phenol (soil)	pH (soil)	Total cyanide	Arsenic	Lead	Cadmium	Chromium	Mercury	Nickel	Zinc	Copper	Total sulphur	Ac.Sol.Sulphide	Thin-layer chro.	Sat Quant (GC)	Tot Vol by GC	BTEX by GC	DIN leach	Thiocyanate *	Free cyanide
133	TP18	1lglass		WATER																						
134	TP18	1lglass		WATER																						
135	TP18	H2SO4		WATER																						
136	TP18	NaOH		WATER																						
137	TP18	ZnAc		WATER																						
138	BH7	1lglass		WATER																						
139	BH7	1lglass		OIL																						
140	BH7	H2SO4		OIL																						
141	BH7	NaOH		OIL																						
142	BH7	ZnAc		OIL																						
143	BH8	1lglass		WATER																						
144	BH8	1lglass		WATER																						
145	BH8	H2SO4		WATER																						
146	BH8	NaOH		WATER																						
147	BH8	ZnAc		WATER																						
148	BH9	1lglass		WATER																						
149	BH9	1lglass		WATER																						
150	BH9	H2SO4		WATER																						
151	BH9	NaOH		WATER																						
152	BH9	ZnAc		WATER																						

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	3
CLIENT	K T Cullen & Co Ltd.	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	12/8/1995	TURNAROUND	Standard
LOCATION	BGE Limerick		

Nonhazardous ⌐
Hazardous ⌐
Type

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Complex cyan.	Soluble SO4	PAH by MS	O2 Dissolved	Phenol (water)	Amm. N2 (W)	Total CN Water	PAH by MS	Sulphide (H2O)	Sulphate Kone	Arsenic	Cadmium	Chromium	Lead	Mercury	Selenium	Copper	Nickel	Zinc	Colour	Turbidity Test	Hardness
133	TP18	1Iglass		WATER				✓						✓										✓	✓	✓
134	TP18	1Iglass		WATER								✓			✓	✓	✓	✓	✓	✓	✓	✓	✓			
135	TP18	H2SO4		WATER					✓	✓																
136	TP18	NaOH		WATER							✓															
137	TP18	ZnAc		WATER									✓													
138	BH7	1Iglass		WATER																						
139	BH7	1Iglass		OIL								✓			✓	✓	✓	✓	✓	✓	✓	✓	✓			
140	BH7	H2SO4		OIL					✓	✓																
141	BH7	NaOH		OIL							✓															
142	BH7	ZnAc		OIL									✓													
143	BH8	1Iglass		WATER				✓						✓										✓	✓	✓
144	BH8	1Iglass		WATER								✓			✓	✓	✓	✓	✓	✓	✓	✓	✓			
145	BH8	H2SO4		WATER					✓	✓																
146	BH8	NaOH		WATER							✓															
147	BH8	ZnAc		WATER									✓													
148	BH9	1Iglass		WATER				✓						✓										✓	✓	✓
149	BH9	1Iglass		WATER								✓			✓	✓	✓	✓	✓	✓	✓	✓	✓			
150	BH9	H2SO4		WATER					✓	✓																
151	BH9	NaOH		WATER							✓															
152	BH9	ZnAc		WATER									✓													

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	3
CLIENT	K T Cullen & Co Ltd.	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	12/8/1995	TURNAROUND	Standard
LOCATION	BGE Limerick		

Nonhazardous ☐
Hazardous ☐
Type .....

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Alkalinity Total	Mg Hardness	Chloride Kone	T.O.C. in Water	Calcium	Magnesium	Sodium	Potassium	Iron	Manganese	Aluminium	Nitrate Kone	Nitrite Kone	pH (water)
133	TP18	1lglass		WATER	✓	✓	✓	✓								✓	✓	2
134	TP18	1lglass		WATER					✓	✓	✓	✓	✓	✓	✓			
135	TP18	H2SO4		WATER														
136	TP18	NaOH		WATER														
137	TP18	ZnAc		WATER														
138	BH7	1lglass		WATER														
139	BH7	1lglass		OIL					✓	✓	✓	✓	✓	✓	✓			
140	BH7	H2SO4		OIL														
141	BH7	NaOH		OIL														
142	BH7	ZnAc		OIL														
143	BH8	1lglass		WATER	✓	✓	✓	✓								✓	✓	2
144	BH8	1lglass		WATER					✓	✓	✓	✓	✓	✓	✓			
145	BH8	H2SO4		WATER														
146	BH8	NaOH		WATER														
147	BH8	ZnAc		WATER														
148	BH9	1lglass		WATER	✓	✓	✓	✓								✓	✓	2
149	BH9	1lglass		WATER					✓	✓	✓	✓	✓	✓	✓			
150	BH9	H2SO4		WATER														
151	BH9	NaOH		WATER														
152	BH9	ZnAc		WATER														

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	3
CLIENT	K T Cullen & Co Ltd.	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	12/8/1995	TURNAROUND	Standard
LOCATION	BGE Limerick		

Nonhazardous ☐
Hazardous ☐
Type . . . . . .

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Solv. Ext. Matter	Total sulphate	Phenol (soil)	pH (soil)	Total cyanide	Arsenic	Lead	Cadmium	Chromium	Mercury	Nickel	Zinc	Copper	Total sulphur	Ac.Sol.Sulphide	Thin-layer chro.	Sat Quant (GC)	Tot Vol by GC	BTEX by GC	DIN leach	Thiocyanate *	Free cyanide
153	BH10	1lglass		WATER																						
154	BH10	1lglass		WATER																						
155	BH10	H2SO4		WATER																						
156	BH10	NaOH		WATER																						
157	BH10	ZnAc		WATER																						
158	BH11	1lglass		WATER																						
159	BH11	1lglass		WATER																						
160	BH11	H2SO4		WATER																						
161	BH11	NaOH		WATER																						
162	BH11	ZnAc		WATER																						
163	BH12S	1lglass		WATER																						
164	BH12S	1lglass		WATER																						
165	BH12S	H2SO4		WATER																						
166	BH12S	NaOH		WATER																						
167	BH12S	ZnAc		WATER																						
168	BH12D	1lglass		WATER																						
169	BH12D	1lglass		WATER																						
170	BH12D	H2SO4		WATER																						
171	BH12D	NaOH		WATER																						
172	BH12D	ZnAc		WATER																						

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GEOCHEM ANALYTICAL SERVICES
TEST SCHEDULE

JOB NUMBER	95/1035/02/01	BATCH NUMBER	3
CLIENT	K T Cullen & Co Ltd.	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	12/8/1995	TURNAROUND	Standard
LOCATION	BGE Limerick		

Nonhazardous ☐
Hazardous ☐
Type . . .

NAMAS TESTING No. 1291

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Soluble Ext. Matter	Total sulphate	Phenol (soil)	pH (soil)	Total cyanide	Arsenic	Lead	Cadmium	Chromium	Mercury	Nickel	Zinc	Copper	Total sulphur	Ac.Sol.Sulphide	Thin-layer chro.	Sat Quant (GC)	Tot Vol by GC	BTEX by GC	DIN leach	Thiocyanate*	Free cyanide
173	BH7G TUB			SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
174	BH7G	Vial		SOIL																		✓	✓			
175	BH11G TUB			SOIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
176	BH11	Vial		SOIL																		✓	✓			
Total number of tests					2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0

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TEST SCHEDULE

NAMAS TESTING No 1291

JOB NUMBER	95/1035/02/01	BATCH NUMBER	3
CLIENT	K T Cullen & Co Ltd.	CLIENT REF/CODE	809
CONTACT	CONOR WALL	ORDER NUMBER	
DATE OF RECEIPT	12/8/1995	TURNAROUND	Standard
LOCATION	BGE Limerick		

Nonhazardous ☐
Hazardous ☐
Type

Numeric values indicate additional scheduling

** Indicates test subcontracted*

Sample No.	Sample Identity	P / V	Depth (m/ft)	Sample Type	Complex cyan.	Soluble SO4	PAH by MS	O2 Dissolved	Phenol (water)	Amm. N2 (W)	Total CN Water	PAH by MS	Sulphide (H2O)	Sulphate Kone	Arsenic	Cadmium	Chromium	Lead	Mercury	Selenium	Copper	Nickel	Zinc	Colour	Turbidity Test	Hardness
173	BH7G TUB			SOIL			2																			
174	BH7G	Vial		SOIL																						
175	BH11G TUB			SOIL		2																				
176	BH11	Vial		SOIL																						
Total number of tests					0	1	1	7	8	8	8	8	8	7	8	8	8	8	8	8	8	8	8	7	7	7

Checked by JH Print Name JANE ALCOCK

☐ NAMAS Accredited

APPENDIX G

Mercury Analytical Ltd.

Raheen Industrial Estate,
Limerick, Ireland.
Phone: (061) 229055
Fax: (061) 229327

Trace metal, compositional, bacteriological & environmental analysis.

Kevin Cullen & Co. Ltd.
Parkview House,
Beech Hill,
Clonskeagh,
Dublin 4.

Attn. Conor Wall

30-08-95

CERTIFICATE OF ANALYSIS

Material: Bore Hole Water Samples

Received: 11-Aug-95

Your ref.: Project No. 809

Code	Lab No.	BOD (mgO2/L)	COD (mgO2/L)
BH7	95-1670-1	9141	1126168
BH8	95-1670-2	177	4000
BH9	95-1670-3	89	988
BH10	95-1670-4	1412	617648
BH11	95-1670-5	105	3104
BH12 S	95-1670-6	127	1476
BH12 D	95-1670-7	47	300

Note: Because of the oily nature of the sample it is very difficult to get a representative aliquot.

for Maurice Daffy

Cert checked

Mercury Analytical Ltd.

Raheen Industrial Estate,
Limerick, Ireland.
Phone: (061) 229055
Fax: (061) 229327

Trace metal, compositional, bacteriological & environmental analysis.

RECEIVED
14 AUG 1995

Kevin Cullen & Co. Ltd.
Parkview House,
Beech Hill,
Clonskeagh,
Dublin 4.

Attn. Conor Wall

31-07-95

CERTIFICATE OF ANALYSIS

Material	Trial Pit Water Sample		
Received	21-Jul-95		
Your ref.	Project No. 809 Sample TP13	Project No. 809 Sample TP16	Project No. 809 Sample TP19
Lab No.	95-1540-1	95-1540-2	95-1540-3
Analysis			
BOD (mgO2/L)	18	560	50
COD (mgO2/L)	31	2120	105

Note: Because of the oily nature of the sample it is very difficult to get a representative aliquot.

Maurice Daffy

Cert checked

Mercury Analytical Ltd.

Trace metal, compositional, bacteriological & environmental analysis.

Raheen Industrial Estate,
Limerick, Ireland.
Phone: (061) 229055
Fax: (061) 229327

Kevin Cullen & Co. Ltd.
Parkview House,
Beech Hill,
Clonskeagh,
Dublin 4.

Attn. Conor Wall

27-07-95

CERTIFICATE OF ANALYSIS

Material	Trial Pit Water Sample
Received	18-Jul-95
Your ref.	Project No. 809 Sample TP15 (3.1m)
Lab No.	95-1519
Analysis	
BOD (mgO2/L)	1330
COD (mgO2/L)	16320

Note: Because of the oily nature of the sample it is very difficult to get a representative aliquot.

Maurice Daffy

Cert checked

APPENDIX H

VARIABLE HEAD PERMEABILITY TEST

CONTRACT: LIMERIC BORD GAIS BOREHOLE No.: 9W TEST No.: 1

TYPE OF TEST: *FALLING* HEAD

Diameter of casing/standpipe (D): 200 (mm)
Height of TOP of casing/standpipe above ground level: 0.640 (m)
Depth to bottom of casing below ground level (m): 1.2 (m)
Depth to bottom of borehole below ground level before test (m): 1.5 (m)
Depth to bottom of borehole below ground level after test (m): 1.5 (m)
Standing ground water level (mbgl): 0.8 (m)

DATUM:All depths to water level measured from top of casing/standpipe.
i.e.SWL 1.440 m below datum.

TIME LAPSE (mins)	WATER LEVEL* (m)	HEAD H (m)	HEAD RATIO H/Ho
-60			
0	0	1.44	1.0000
0.5	0.76	0.68	0.4722
1	0.772	0.668	0.4639
1.5	0.776	0.664	0.4611
2	0.776	0.664	0.4611
2.5	0.776	0.664	0.4611
3	0.776	0.664	0.4611
3.5	0.776	0.664	0.4611
4	0.776	0.664	0.4611
4.5	0.776	0.664	0.4611
5	0.776	0.664	0.4611
6	0.776	0.664	0.4611
7	0.777	0.663	0.4604
8	0.777	0.663	0.4604
9	0.777	0.663	0.4604
10	0.777	0.663	0.4604
11	0.777	0.663	0.4604
12	0.777	0.663	0.4604
14	0.777	0.663	0.4604
16	0.777	0.663	0.4604
18	0.777	0.663	0.4604
20	0.777	0.663	0.4604
22	0.778	0.662	0.4597
24	0.778	0.662	0.4597
26	0.778	0.662	0.4597
28	0.778	0.662	0.4597
30	0.778	0.662	0.4597
32	0.758	0.682	0.4736
36	0.756	0.684	0.4750
40	0.754	0.686	0.4764
44	0.754	0.686	0.4764
48	0.754	0.686	0.4764
52	0.754	0.686	0.4764
56	0.754	0.686	0.4764
60	0.754	0.686	0.4764
65	0.747	0.693	0.4813
70	0.781	0.659	0.4576
75	0.795	0.645	0.4479
80	0.792	0.648	0.4500
90	0.792	0.648	0.4500
100	0.792	0.648	0.4500
110	0	1.44	1.0000
120	0	1.44	1.0000
120			0.37
0			0.37

CALCULATION OF PERMEABILITY OF SOIL:

Employing Hvorslev formula: k = A/FT
where k is the permeability of soil
A is the cross-section area of borehole casing/standpipe
F is the intake factor (see below)
T is the basic time lag factor as defined in Figure 9 of BS 5930:1981 (Page 38)

Values of intake factors (F) for various conditions, Cases (a)-(f), are given in Figure 7 of BS 5930:1981 (Page 36):

Assumed condition: Case ,hence:
F = 2D
i.e. F = #N/A (m)
and A = 0.0314 (m^2)
and T = (mins); (see graph of log H/Ho v Time.)

!Wrong Case selected in Cell I40 --please cor
hence, k = #N/A x10^-6 m/s

CALCULATION NOT POSSIBLE DUE TO HYDRAULIC CONNECTION WITH THE HARDCORE

VARIABLE HEAD PERMEABILITY TEST

CONTRACT: LIMERICK BORD GAIS BOREHOLE No.:12W TEST No.: 1

TYPE OF TEST: FALLING HEAD

Diameter of casing/standpipe (D): 200 (mm)
Height of TOP of casing/standpipe above ground level: 0.700 (m)
Depth to bottom of casing below ground level (m): 3.6 (m)
Depth to bottom of borehole below ground level before test (m): 4 (m)
Depth to bottom of borehole below ground level after test (m): 4 (m)
Standing ground water level (mbgl): 2.2 (m)

DATUM:All depths to water level measured from top of casing/standpipe.
i.e.SWL 2.900 m below datum.

TIME ELAPSED (mins)	WATER LEVEL* (m)	HEAD H (m)	HEAD RATIO H/Ho
-60			
0	0.7	2.2	1.0000
0.5	0.8	2.1	0.9545
1	0.85	2.05	0.9318
1.5	0.86	2.04	0.9273
2	0.86	2.04	0.9273
2.5	0.88	2.02	0.9182
3	0.9	2	0.9091
3.5	0.91	1.99	0.9045
4	0.93	1.97	0.8955
4.5	0.94	1.96	0.8909
5	0.96	1.94	0.8818
6	0.98	1.92	0.8727
7	1.01	1.89	0.8591
8	1.03	1.87	0.8500
9	1.05	1.85	0.8409
10	1.07	1.83	0.8318
11	1.09	1.81	0.8227
12	1.11	1.79	0.8136
14	1.14	1.76	0.8000
16	1.17	1.73	0.7864
18	1.2	1.7	0.7727
20	1.23	1.67	0.7591
22	1.26	1.64	0.7455
24	1.29	1.61	0.7318
26	1.31	1.59	0.7227
28	1.32	1.58	0.7182
30	1.34	1.56	0.7091
32	1.37	1.53	0.6955
36	1.41	1.49	0.6773
40	1.44	1.46	0.6636
44	1.47	1.43	0.6500
48	1.51	1.39	0.6318
52	1.52	1.38	0.6273
56	1.54	1.36	0.6182
60	1.57	1.33	0.6045
65	1.59	1.31	0.5955
70	1.61	1.29	0.5864
75	1.63	1.27	0.5773
80	1.65	1.25	0.5682
90	1.67	1.23	0.5591
100	1.69	1.21	0.5500
110	1.71	1.19	0.5409
120	1.73	1.17	0.5318

CALCULATION OF PERMEABILITY OF SOIL:

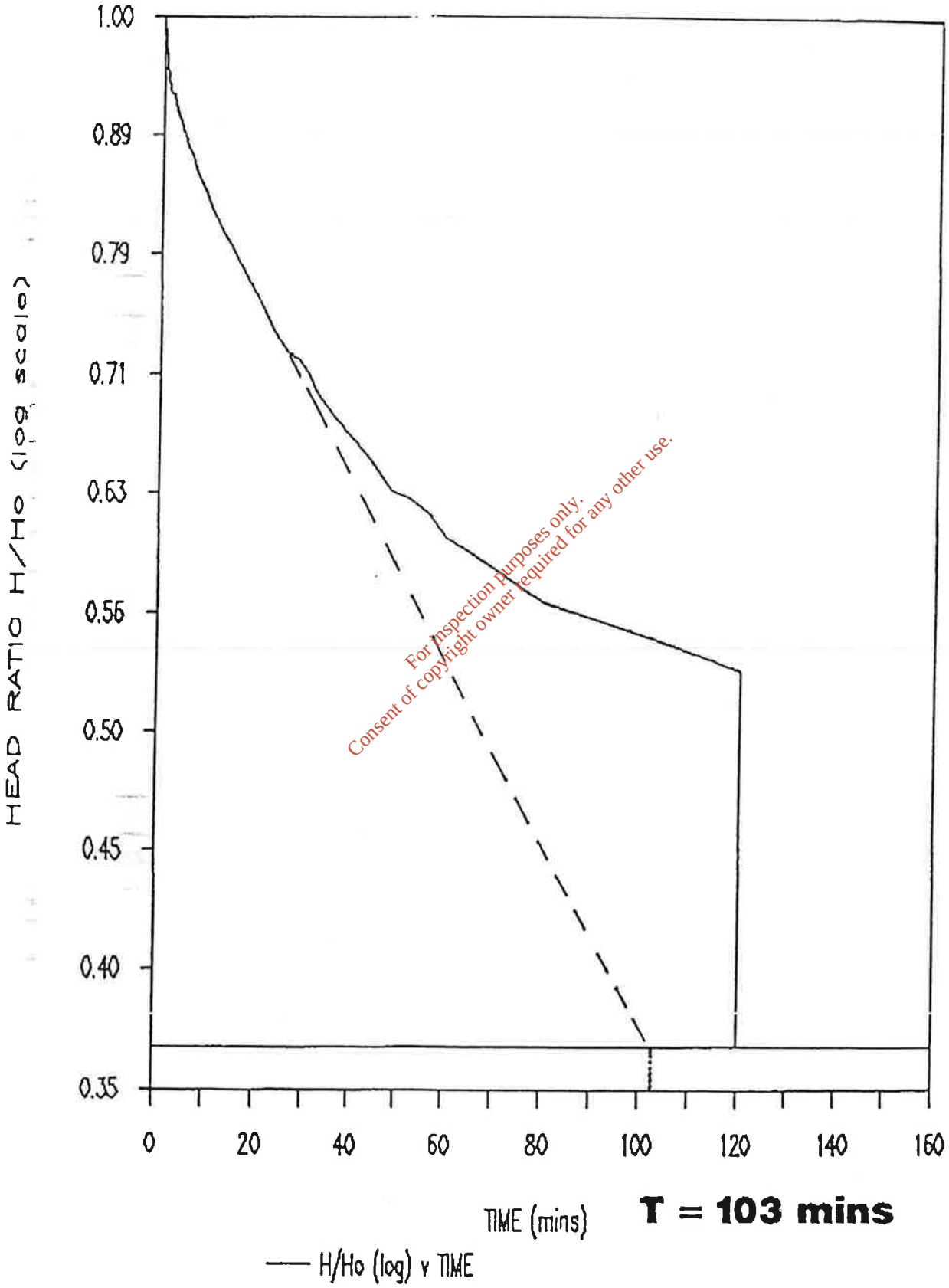
Employing Hvorslev formula: k = A/FT
where
k is the permeability of soil
A is the cross-section area of borehole casing/standpipe
F is the intake factor (see below)
T is the basic time lag factor as defined in Figure 9 of BS 5930:1981 (Page 38)

values of intake factors (F) for various conditions, Cases (a)-(f), are given in Figure 7 of BS 5930:1981 (Page 36):

Assumed condition: Case D ,hence
F = 2*PI*L/loge[(L/D)+(1+(L/D)^2)^0.5]
i.e. F = 1.7409 (m)
and A = 0.0314 (m^2)
and T = 103 (mins);(see graph of log H/Ho v Time.)

hence k = 2.9 x10^-6 m/s

LIMERICK BORD GAIS B.H.No.12W



VARIABLE HEAD PERMEABILITY TEST

CONTRACT: LIMERIC BORD GAIS BOREHOLE No.: 11G TEST No.: 1

TYPE OF TEST: *FALLING* HEAD

Diameter of casing/standpipe (D): 200 (mm)
Height of TOP of casing/standpipe above ground level: 0.000 (m)
Depth to bottom of casing below ground level (m): 2.2 (m)
Depth to bottom of borehole below ground level before test (m): 2.5 (m)
Depth to bottom of borehole below ground level after test (m): 2.5 (m)
Standing ground water level (mbgl): 1.5 (m)

DATUM:All depths to water level measured from top of casing/standpipe.
I.e.SWL 1.500 m below datum.

TIME LAPSE (mins)	WATER LEVEL* (m)	HEAD H (m)	HEAD RATIO H/Ho
-60			
0	0	1.5	1.0000
0.5	0.01	1.49	0.9933
1	0.015	1.485	0.9900
1.5	0.02	1.48	0.9867
2	0.024	1.476	0.9840
2.5	0.028	1.472	0.9813
3	0.031	1.469	0.9793
3.5	0.036	1.464	0.9760
4	0.04	1.46	0.9733
4.5	0.044	1.456	0.9707
5	0.048	1.452	0.9680
6	0.057	1.443	0.9620
7	0.067	1.433	0.9553
8	0.077	1.423	0.9487
9	0.086	1.414	0.9427
10	0.096	1.404	0.9360
11	0.105	1.395	0.9300
12	0.112	1.388	0.9253
14	0.13	1.37	0.9133
16	0.148	1.352	0.9013
18	0.164	1.336	0.8907
20	0.179	1.321	0.8807
22	0.195	1.305	0.8700
24	0.209	1.291	0.8607
26	0.227	1.273	0.8487
28	0.239	1.261	0.8407
30	0.255	1.245	0.8300
32	0.269	1.231	0.8207
36	0.298	1.202	0.8013
40	0.33	1.17	0.7800
44	0.365	1.135	0.7567
48	0.392	1.108	0.7387
52	0.428	1.072	0.7147
56	0.45	1.05	0.7000
60	0.477	1.023	0.6820
65	0.511	0.989	0.6593
70	0.537	0.963	0.6420
75	0.57	0.93	0.6200
80	0.598	0.902	0.6013
90	0.634	0.866	0.5773
100	0.667	0.833	0.5553
110	0.7	0.8	0.5333
120	0.734	0.766	0.5107
120			0.37
0			0.37

CALCULATION OF PERMEABILITY OF SOIL:

Employing Hvorslev formula: k = A/FT
where
k is the permeability of soil
A is the cross-section area of borehole casing/standpipe
F is the intake factor (see below)
T is the basic time lag factor as defined in Figure 9 of BS 5930:1981 (Page 38)

Values of intake factors (F) for various conditions, Cases (a)-(f), are given in Figure 7 of BS 5930:1981 (Page 36):

Assumed condition: Case D ,hence:

F = 2*PI*L/loge[(L/D)+(1+(L/D)^2)^0.5

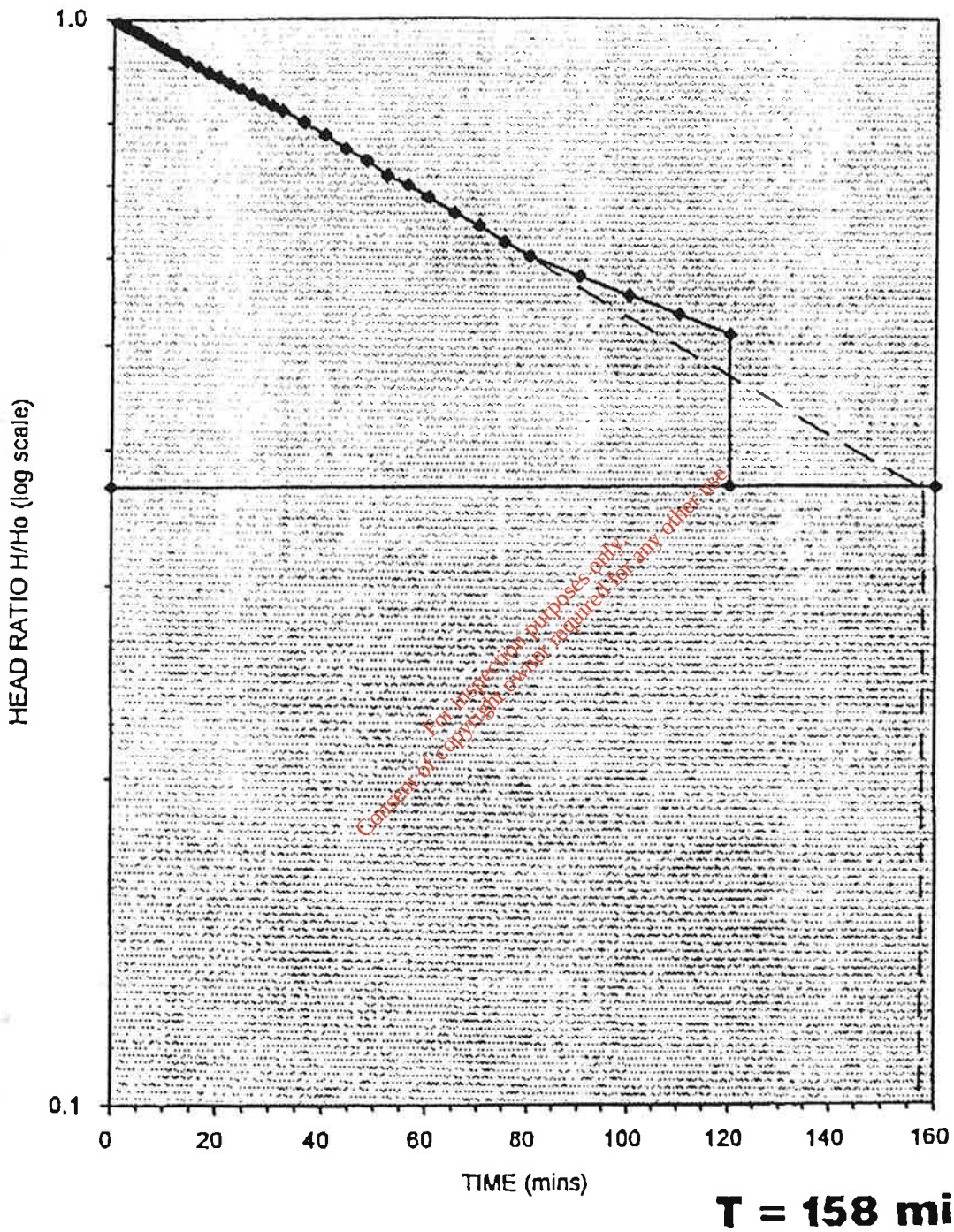
I.e. F = 1.57 (m)
and A = 0.0314 (m^2)
and T = 158 (mins); (see graph of log H/Ho v Time.)

hence, k = 2.1 x10^-6 m/s

VARIABLE HEAD PERMEABILITY TEST

CONTRACT: Limerick Bord Gais

B.H.No. 11G TEST No. 1



GSI

GLOVER SITE INVESTIGATIONS LTD.

BS 5930 : 1981

PACKER TESTS

Packer or Lugeon test. Sheet 1		Site: Bord Gais Limerick	Location:
Depths below ground level to:		Job No:	Borehole No: SW
(a) top of test section:	3.1 m	Date: 7-0-95	Sheet: 1 of: 1
(b) bottom of test section:	4.9 m	Ground level: (Ordnance datum) m	Crew/operator:
(c) centre of test section:	4.0 m	Weather:	
(d) bottom of hole at time of test:	4.9 m	Packer pressure: 420	Test No:
(e) bottom of casing:	1.9 m	Packer type: Single	
(f) initial ground water level:	0.95 m	Dia. of hole in test area:	86 mm
Gauge height above ground level:	m	Type of rock: Limestone	

Test record

1st period	Time, min	0	5	10	15		Average flow q litres/min
Gauge pressure:	Flowmeter / Dipstick readings, litres	1450	1456	1464	1474		
20 psi	Water take, litres	6	8	10			1.6
2nd period	Time, min	0	5	10	15		Average flow q litres/min
Gauge pressure:	Flowmeter / Dipstick readings, litres	1482	1555	1618	1689		
40 psi	Water take, litres	73	63	72			13.8
3rd period	Time, min	0	5	10	15		Average flow q litres/min
Gauge pressure:	Flowmeter / Dipstick readings, litres	1713	1947	2172	2420		
60 psi	Water take, litres	234	225	248			47.2
4th period	Time, min	0	5	10	15		Average flow q litres/min
Gauge pressure:	Flowmeter / Dipstick readings, litres	2427	2630	2827	3020		
40 psi	Water take, litres	203	197	193			39.6
5th period	Time, min	0	5	10	15		Average flow q litres/min
Gauge pressure:	Flowmeter / Dipstick readings, litres	3028	3148	3266	3380		
20 psi	Water take, litres	120	118	114			23.4

Remarks (to include details of pipework where relevant):-

PACKER STILL INTACT AFTER TEST.

THEREFORE INCREASED FLOW IS DUE TO WASHING OUT OF SILT ETC. FROM THE FISSURES.

PACKER TEST - BORD GAIS, LIMERICK

B.H. 9W FROM 7.3 TO 9.1m

From BS 5930 : 1981 Page 39

$$k = \frac{Q}{2\pi HL} \log_e \frac{l}{r}$$

Q = Rate of injection = m^3/s

H = The Pressure Head (at mid test zone) in metres water.

L = Length of Test Section = 1.8m

r = Radius of Test Section = 0.043m

Use Stage 4 of Test to access permeability

$Q = 6.6 \times 10^{-4}$ m^3/s

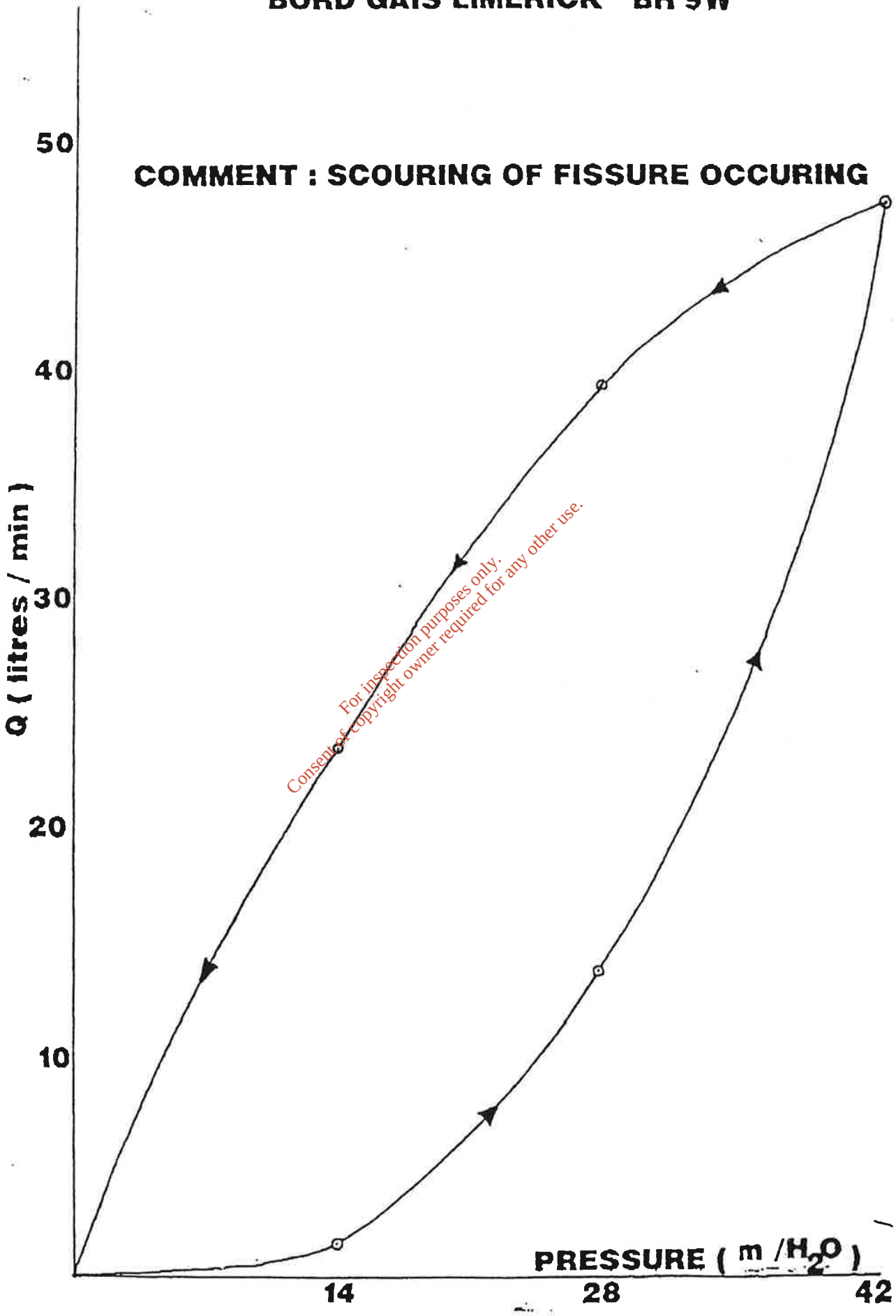
H = 24.17 metres (allowing for head losses)

L = 1.8m

r = 0.043m

$k = 9.0 \times 10^{-6}$ m/s

BORD GAIS LIMERICK BH 9W



GLOVER SITE INVESTIGATIONS LTD. BS 5930 : 1981

PACKER TESTS

Packer or Lugeon test. Sheet 1		Site: Bord Gais Limerick	Location:
Depths below ground level to:		Job No:	Borehole No: 7G
(a) top of test section:	7.3 m	Date: 8-8-95	Sheet: 1 of: 1
(b) bottom of test section:	9.1 m	Ground level: (Ordnance datum) m	Crew/operator: TC/SL
(c) centre of test section:	8.2 m	Weather:	
(d) bottom of hole at time of test:	9.1 m	Packer pressure: 420	Test No:
(e) bottom of casing:	6.1 m	Packer type: Single	
(f) initial ground water level:	0.3 m	Dia. of hole in test area:	86 mm
Gauge height above ground level:	m	Type of rock: Limestone	

Test record

1st period	Time, min	0	5	10	15		Average flow q litres/min
Gauge pressure:	Flowmeter / Dipstick readings, litres	3384.5	3384.5	3384.5	3384.5		
20 psi	Water take, litres	0	0	0			0
2nd period	Time, min	0	5	10	15		Average flow q litres/min
Gauge pressure:	Flowmeter / Dipstick readings, litres	3385.0	3385.0	3385.0	3385.0		
40 psi	Water take, litres	0	0	0			0
3rd period	Time, min	0	5	10	15		Average flow q litres/min
Gauge pressure:	Flowmeter / Dipstick readings, litres	3385.5	3385.6	3385.6	3385.6		
60 psi	Water take, litres	0.1	0	0			0.03
4th period	Time, min	0	5	10	15		Average flow q litres/min
Gauge pressure:	Flowmeter / Dipstick readings, litres	3385.4	3385.4	3385.4	3385.4		
40 psi	Water take, litres	0	0	0			0
5th period	Time, min	0	5	10	15		Average flow q litres/min
Gauge pressure:	Flowmeter / Dipstick readings, litres	3385.1	3385.1	3385.1	3385.1		
20 psi	Water take, litres	0	0	0			0

Remarks (to include details of pipework where relevant):

FLOW IF ANY SO LOW AS TO BE BEYOND DETECTION OF THE METER.

∴ PERMEABILITY VERY SMALL i.e. $k \leq 10^{-12}$