



Tier Environmental Ltd
Elm House Farm
Saighton
Chester
CH3 6EN

Jackie Lewis
Housing & Public Protection Department,
Ruthin Road,
Wrexham,
LL13 7TU

BY EMAIL

02 April 2013

Ref: T/11/1134/GA/L01

Dear Jackie,

RE: LAND SOUTH OF UNIT 54, CLYWEDOG ROAD SOUTH, WREXHAM INDUSTRIAL ESTATE (P/2012/0771) – SUPPLEMENTARY GROUND INVESTIGATION AND RISK ASSESSMENT

Further to our recent correspondence with regard to the proposed pond at the above site, this letter presents the findings of our recent trial pitting works, chemical analysis and subsequent risk assessment. This letter has specifically been written in order to discharge the pre commencement planning condition which states the following:

The development of the land drainage system and holding pond shall not commence until a scheme to deal with potential contamination at the part of the site relating to this particular development has been submitted to and approved in writing by the Local Planning Authority. This scheme shall include a phased investigation approach to identify the extent of contamination and any measures required to remediate the site, including post-development monitoring."

Background

A contaminated land risk assessment report has been submitted for this site as part of a previous planning application (P/2011/0131). It was noted that the proposed development is situated on ground which is on land in an area with historical use as a railway and the manufacture of explosives, which have resulted in potential contamination issues. The previous report was sufficient to permit the discharge of that planning condition based on the proposed use of the land at the time; however, the revised plans include the proposal for a pond and, as such, it has been requested that we ensure that any potential contamination issues are adequately dealt with.

Pond Construction

The pond is to be unlined; however, given the thickness of clay beneath the site and the relatively thin layer of Made Ground, contamination through throughflow is not considered to be likely.

• Structural Engineering	• Civil Engineering	• Project Management	• Planning Supervision
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Site Investigation

On the 12th March 2013, Tier Environmental excavated 4 No. trial holes to the base of the Made Ground in the area surrounding the pond (TP201 to TP204), the locations of which are attached to this email. 4 No. samples of said Made Ground were taken samples from each of the Made Ground soils within the trial pits. These samples were analysed for leachable concentrations of our standard suite of metals and PAHs.

As encountered in the previous site investigation, Made Ground soils have been shown to be very limited, with a maximum thickness of 0.45m bgl. Made Ground was either described as a brown slightly sandy slightly gravelly clay with fragments of sandstone and brick (TP201 to TP203) or a dark grey very sandy gravelly clay with fragments of ash and clinker (TP204)

The material below this was recorded as a grey mottled brown slightly sandy slightly gravelly clay which is considered to represent Glacial Till.

Risk Assessment

For the qualitative and quantitative assessment of risks posed by potential pollutant linkages to all receptors, a common terminology has been employed throughout this report.

Evaluated significance of pollutant linkage	Definition
Very High	There is a high probability that severe harm or pollution by the identified contaminant could arise at the identified receptor unless appropriate remedial action is taken.
High	It is probable that harm to, or pollution of, the identified receptor by the identified contaminant could occur unless appropriate remedial action is taken.
Moderate	It is possible that harm to, or pollution of, the identified receptor by the identified contaminant could occur unless appropriate remedial action is taken. However, it is relatively unlikely that the consequences would be severe.
Low	It is possible that harm to, or pollution of, the identified receptor by the identified contaminant could occur. However, if any harm is realised it is likely that any effects will be mild.
Negligible	The presence of an identified contaminant will not cause significant harm or pollution to the identified receptor <i>via</i> the specified pathway(s).

The appropriate GAC for controlled waters receptors values presented within the main report has been determined from the conceptual model for the site (specifically, the receptor(s) that may be impacted) and the type of data being evaluated (water samples or leachate). Given that there is a significant thickness of clay between the site and any underlying aquifer, it has been assumed that there is no hydraulic continuity between the site Made Ground and groundwater beneath the Site. As such, the proposed pond has been considered to be a relatively low vulnerability receptor for the purposes of soil leachate assessment. As such, appropriate freshwater Environmental Quality Standards have been used as assessment criteria with UK Drinking Water Standards or other available EU or WHO Drinking Guideline values used in the absence of available EQS standards. Where the EQS value is dependent on the water hardness, a hardness value of >250 mg/l has been selected based on the results of recent groundwater monitoring undertaken as part of these works.



In some instances, the laboratory method detection limit is greater than the appropriate EQS value. In these instances, only measured concentrations in excess of the laboratory method detection limit have been considered likely to potentially represent a risk to controlled waters.

After initial screening against the relevant GACs, all determinands were found to be below the adopted criteria, with the exception of 3 No. marginal exceedences for lead, 1 No. marginal exceedence for Mercury and 1 No. sample which recorded a marginal exceedence for Phenanthrene and total PAHs. The lead exceedences were recorded at concentrations of between 8 µg/l and 17 µg/l which marginally exceed the EQS value of 7.2 µg/l; however, these do not exceed the UKDWS of 25 µg/l. The Mercury sample exceeded the GAC of 1 µg/l with a recorded value of 2 µg/l. The phenanthrene and total PAH GACs (both 0.1 µg/l) were exceeded by values of 0.12 µg/l and 0.22 µg/l, respectively.

Due to the very marginal nature of the exceedences and the absence of hydraulic conductivity to groundwater abstractions within the vicinity of the site, it is therefore considered that Made Ground soils at the site do not pose a risk to the proposed pond and, as such, no remedial measures are required.

Kind Regards,

A handwritten signature in black ink, appearing to read 'James Blyth', followed by a horizontal line.

James Blyth MSc BSc (Hons) FGS

Director

Tier Environmental Ltd

Encs. Exploratory Hole Logs

Exploratory Hole Location Plan

Chemical Results



Tier Consult Ltd
Tel: 01244 333 080
www.tierconsult.co.uk

Trialpit No
TP201
Sheet 1 of 1

Project Name
Clywedog Road

Project No.
T/11/1034

Co-ords: -
Level: -

Date
10/03/2013

Location: Wrexham Industrial Estate

Dimensions: -

Depth
0.85m



Scale
1:25

Client: C4

Logged By
JB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.20	D					MADE GROUND: Brown slightly subangular sandy gravelly CLAY. Gravel is angular to rounded fine to coarse of brick, sandstone and rare clinker. (MADE GROUND)	
			0.45			Firm to stiff consistency gravelly mottled brick slightly subangular sandy gravelly CLAY. Gravel is rounded fine to coarse of sandstone. (GLACIAL TILL)	
			0.85			Trialpit Complete at 0.85 m	1
							2
							3
							4

Remarks: 1) Terminated in natural ground. 2) Trial pit stable. 3) Trial pit dry.

Groundwater:





Tier Consult Ltd
Tel: 01244 333 080
www.tierconsult.co.uk

Trialpit No
TP202
Sheet 1 of 1

Project Name Clywedog Road	Project No. T/11/1034	Co-ords: - Level: -	Date 10/03/2013
Location: Wrexham Industrial Estate		Dimensions: - Depth 0.60m	Scale 1:25
Client: C4			Logged By JB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.30	D					MADE GROUND: Brown slightly subangular sandy gravelly CLAY. Gravel is angular to rounded fine to coarse of brick, mudstone and sandstone. (MADE GROUND)	
			0.40			Firm to stiff consistency gravelly mottled brick slightly subangular sandy gravelly CLAY. Gravel is rounded fine to coarse of sandstone. (GLACIAL TILL)	
			0.60			Trialpit Complete at 0.60 m	
							1
							2
							3
							4

Remarks:	1) Terminated in natural ground. 2) Trial pit stable. 3) Trial pit dry.
Groundwater:	





Tier Consult Ltd
Tel: 01244 333 080
www.tierconsult.co.uk

Trialpit No
TP203
Sheet 1 of 1

Project Name
Clywedog Road

Project No.
T/11/1034

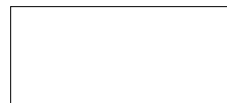
Co-ords: -
Level: -

Date
10/03/2013

Location: Wrexham Industrial Estate

Dimensions: -

Depth
0.55m



Scale
1:25

Client: C4

Logged By
JB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.20	D					MADE GROUND: Brown slightly subangular sandy gravelly CLAY. Gravel is angular to rounded fine to coarse of brick, sandstone and rare clinker. (MADE GROUND)	
			0.30			Firm to stiff consistency gravelly mottled brick slightly subangular sandy gravelly CLAY. Gravel is rounded fine to coarse of sandstone. (GLACIAL TILL)	
			0.55				
Trialpit Complete at 0.55 m							
							1
							2
							3
							4

Remarks: 1) Terminated in natural ground. 2) Trial pit stable. 3) Trial pit dry.

Groundwater:





Tier Consult Ltd
Tel: 01244 333 080
www.tierconsult.co.uk

Trialpit No
TP204
Sheet 1 of 1

Project Name
Clywedog Road

Project No.
T/11/1034

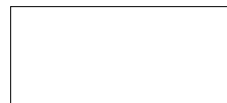
Co-ords: -
Level: -

Date
10/03/2013

Location: Wrexham Industrial Estate

Dimensions: -

Depth
0.80m



Scale
1:25

Client: C4

Logged By
JB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.35	D		0.40			MADE GROUND: Dark grey very sandy slightly gravelly CLAY. Gravel is angular fine to coarse of ash and clinker. (MADE GROUND)	
			0.80			Firm to stiff consistency gravelly mottled brick slightly subangular sandy gravelly CLAY. Gravel is rounded fine to coarse of sandstone. (GLACIAL TILL)	
Trialpit Complete at 0.80 m							1
							2
							3
							4

Remarks: 1) Terminated in natural ground. 2) Trial pit stable. 3) Trial pit dry.

Groundwater:

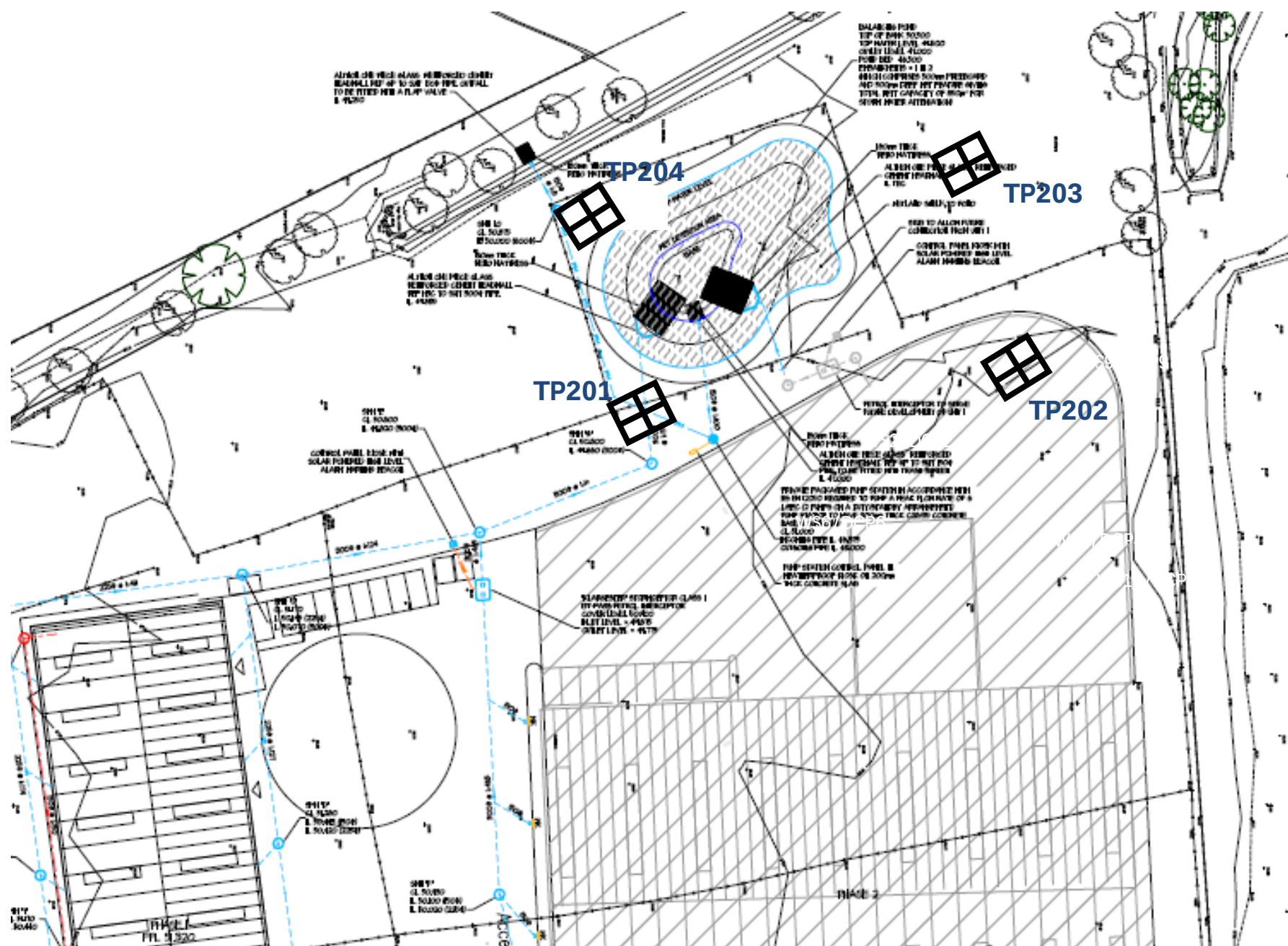




Exploratory Hole Location

Contract Number	T/11/1034
Contract	Clywedog Road, Wrexham Industrial Estate
Client	C4

 Trial pit location



Scale	NTS	
Drawn by	AR	Approved JB
Drawing Number	T/11/1034/GA/2	



Jones Environmental Laboratory

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tier Environmental
Chadwick house
Birchwood Park
Warrington
WA3 6AE

Tel: +44 (0) 1244 833780
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Attention :	James Blyth
Date :	20th March, 2013
Your reference :	T/11/1034
Our reference :	Test Report 13/2700 Batch 1
Location :	
Date samples received :	11th March, 2013
Status :	Final report
Issue :	1

Four samples were received for analysis on 11th March, 2013. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

A handwritten signature in black ink, appearing to read 'B. Leslie'.

Bruce Leslie
Project Co-ordinator

A handwritten signature in black ink, appearing to read 'B. Millward'.

Bob Millward B.Sc
Principal Chemist

Client Name: Tier Environmental
Reference: T/11/1034
Location:
Contact: James Blyth
JE Job No.: 13/2700

Report : NRA Leachate

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1	2	3	4							Please see attached notes for all abbreviations and acronyms		
Sample ID	TP201	TP202	TP203	TP204									
Depth	0.2	0.3	0.2	0.35									
COC No / misc													
Containers	T	T	T	T									
Sample Date	11/03/2013	11/03/2013	11/03/2013	11/03/2013									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	11/03/2013	11/03/2013	11/03/2013	11/03/2013									
Dissolved Arsenic	<2.5	<2.5	<2.5	4.3							<2.5	ug/l	TM30/PM14
Dissolved Boron	<12	34	<12	13							<12	ug/l	TM30/PM14
Dissolved Cadmium	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Dissolved Chromium	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM30/PM14
Dissolved Copper	<7	<7	<7	<7							<7	ug/l	TM30/PM14
Dissolved Lead	8	7	17	8							<5	ug/l	TM30/PM14
Dissolved Mercury	<1	<1	<1	2							<1	ug/l	TM30/PM14
Dissolved Nickel	<2	<2	<2	2							<2	ug/l	TM30/PM14
Dissolved Selenium	<3	<3	<3	<3							<3	ug/l	TM30/PM14
Dissolved Zinc	6	16	35	14							<3	ug/l	TM30/PM14
PAH MS													
Naphthalene	<0.014	<0.014	0.040	<0.014							<0.014	ug/l	TM4/PM30
Acenaphthylene	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Acenaphthene	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Fluorene	<0.014	<0.014	0.020	<0.014							<0.014	ug/l	TM4/PM30
Phenanthrene	<0.011	<0.011	0.120	<0.011							<0.011	ug/l	TM4/PM30
Anthracene	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Fluoranthene	<0.012	<0.012	0.020	<0.012							<0.012	ug/l	TM4/PM30
Pyrene	<0.013	<0.013	0.020	<0.013							<0.013	ug/l	TM4/PM30
Benzo(a)anthracene	<0.015	<0.015	<0.015	<0.015							<0.015	ug/l	TM4/PM30
Chrysene	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
Benzo(bk)fluoranthene	<0.018	<0.018	<0.018	<0.018							<0.018	ug/l	TM4/PM30
Benzo(a)pyrene	<0.016	<0.016	<0.016	<0.016							<0.016	ug/l	TM4/PM30
Indeno(123cd)pyrene	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
Dibenzo(ah)anthracene	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
PAH 16 Total	<0.195	<0.195	0.220	<0.195							<0.195	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	90	81	96	88							<0	%	TM4/PM30
Total Phenols HPLC	<0.1	<0.1	<0.1	<0.1							<0.1	mg/l	TM26/PM0
Sulphate	2.07	8.16	5.79	3.04							<0.05	mg/l	TM38/PM0
Dissolved Organic Carbon	5	7	8	7							<2	mg/l	TM60/PM0
pH	8.12	8.19	8.10	8.12							<0.01	pH units	TM73/PM0

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 13/2700

SOILS

Please note we are only MCERTS accredited for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. If we are instructed to keep samples, a storage charge of £1 (1.5 Euros) per sample per month will be applied until we are asked to dispose of them.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

WATERS

Please note we are not a Drinking Water Inspectorate (DWI) Approved Laboratory. It is important that detection limits are carefully considered when requesting water analysis.

UKAS accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

NOTE

Data is only accredited when all the requirements of our Quality System have been met. In certain circumstances where the requirements have not been met, the laboratory may issue the data in an interim report but will remove the accreditation, in this instance results should be considered indicative only. Where possible samples will be re-extracted and a final report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	UKAS accredited.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance.
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
CO	Suspected carry over
NFD	No Fibres Detected

JE Job No 13/2700

[illegible]