Bypass Dust

NORTHUMBRIAN WATER
Scientific Services

WHO PCB

ANALYSIS REPORT

NUMBER D7111P

UKAS TESTING
1181

This analysis is based on Northumbrian Water Scientific Services Organics Laboratory method O-84 which is accredited under the **UKAS** accreditation scheme.

WHO PCB

ANALYSIS REPORT

NUMBER D7111P

Laboratory Address:

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Wallsend
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NE28 0QD

Report Ref: D7111P

Client Address:

D.Quick
Hanson Cement
Padeswood Works
Padeswood
Mold
Flintshire
CH7 4HB

Prepared by: B Shields **Signed:** **Date:**18/11/13

Issued under the authority of Steve Wilson – Laboratory Manager (Howdon Organics)

CONTENTS

SECTION 1

SUMMARY

One sample taken on behalf of Hanson Cement was analysed for WHO PCB contamination. Analysis of the sample gave the following TEQ values (to 2 significant figures).

	Toxic Equivalent Results ng/kg			
Sample	**WHO (1998) HUMANS TEQ**	**WHO (2005) HUMANS TEQ**	**WHO (1998) FISH TEQ**	**WHO (1998) BIRDS TEQ**
BYPASS DUST	0.0025	0.0017	0.0013	0.64

Full results for individual congeners together with information on any deviations from methodology/quality systems are shown in section 2.

INTRODUCTION

One sample was submitted to Northumbrian Water Scientific Services by Hanson Cement for analysis to determine the levels of the 12 polychlorinated biphenyls assigned TEQ values by the World Health Organisation (WHO PCBs).

The sample was received on 04/11/13. Details of the sample are shown below.

CONTRACT - HANSONCEM_00244

DATE REC'D	SAMPLE	LAB N°	REF
04/11/13	BYPASS DUST	659035	D7111P

TOXIC EQUIVALENTS

In order to assess the toxicity of complex mixtures of PCDDs, PCDFs and PCBs the concept of toxic equivalents was devised. Toxic Equivalent Factors (TEF) are assigned to individual dioxins, furans and PCBs on the basis of how toxic they are in comparison with 2,3,7,8-TCDD, the most potent dioxin which has been assigned a value of 1.0. By comparison, animal and cell tests show that 2,3,7,8-TCDF is approximately one-tenth as toxic as 2,3,7,8-TCDD. Consequently its toxic equivalent factor is 0.1.

Of the 210 dioxins and furans, 17 contribute most to the toxicity of a complex mixture and are of most concern. Of the 209 PCBs 12 contribute most to the toxicity of a complex mixture and are of most concern. Therefore it is these 29 compounds that have TEFs assigned shown in the table below for various schemes.

TEF tables	NATO/CCMS	WHO (1998)	WHO (2005)	WHO (1998)	WHO (1998)
Congener		Humans/ mammals	Humans/ mammals	Fish	Birds
2,3,7,8-TCDF	0.1	0.1	0.1	0.05	1
2,3,7,8-TCDD	1.0	1	1	1	1
1,2,3,7,8-PeCDF	0.05	0.05	0.03	0.05	0.1
2,3,4,7,8-PeCDF	0.5	0.5	0.3	0.5	1
1,2,3,7,8-PeCDD	0.5	1	1	1	1
1,2,3,4,7,8-HxCDF	0.1	0.1	0.1	0.1	0.1
1,2,3,6,7,8-HxCDF	0.1	0.1	0.1	0.1	0.1
2,3,4,6,7,8-HxCDF	0.1	0.1	0.1	0.1	0.1
1,2,3,7,8,9-HxCDF	0.1	0.1	0.1	0.1	0.1
1,2,3,4,7,8-HxCDD	0.1	0.1	0.1	0.5	0.05
1,2,3,6,7,8-HxCDD	0.1	0.1	0.1	0.01	0.01
1,2,3,7,8,9-HxCDD	0.1	0.1	0.1	0.01	0.1
1,2,3,4,6,7,8-HpCDF	0.01	0.01	0.01	0.01	0.01
1,2,3,4,7,8,9-HpCDF	0.01	0.01	0.01	0.01	0.01
1,2,3,4,6,7,8-HpCDD	0.01	0.01	0.01	0.001	<0.001*
OCDF	0.001	0.0001	0.0003	0.0001	0.0001
OCDD	0.001	0.0001	0.0003	<0.0001*	0.0001
PCB BZ 81	-	0.0001	0.0003	0.0005	0.1
PCB BZ 77	-	0.0001	0.0001	0.0001	0.05
PCB BZ 123	-	0.0001	0.00003	<0.000005*	0.00001
PCB BZ 118	-	0.0001	0.00003	<0.000005*	0.00001
PCB BZ 114	-	0.0005	0.00003	<0.000005*	0.0001
PCB BZ 105	-	0.0001	0.00003	<0.000005*	0.0001
PCB BZ 126	-	0.1	0.1	0.005	0.1
PCB BZ 167	-	0.00001	0.00003	<0.000005*	0.00001
PCB BZ 156	-	0.0005	0.00003	<0.000005*	0.0001
PCB BZ 157	-	0.0005	0.00003	<0.000005*	0.0001
PCB BZ 169	-	0.01	0.03	0.00005	0.001
PCB BZ 189	-	0.0001	0.00003	<0.000005*	0.00001

* **NB** Where < figure is quoted for TEF the actual figure is used in all calculations in this report giving a worst case scenario.

METHOD SUMMARY

The analytical method used for this analysis, AES O84, is based on US EPA 1668.

Air dried soil samples are ground, spiked with a mixture of 12 stable isotopically labelled standards, (see following page for spiking scheme), mixed and allowed to equilibrate. The samples are then soxhlet extracted for a minimum of 16 hours with toluene. Ash samples are pre-treated with hydrochloric acid before being spiked and extracted as above.

Impurities are removed from the extracts by acid/base back-extraction and column chromatography using silica and alumina absorbents and HPLC, any or all of the techniques being used.

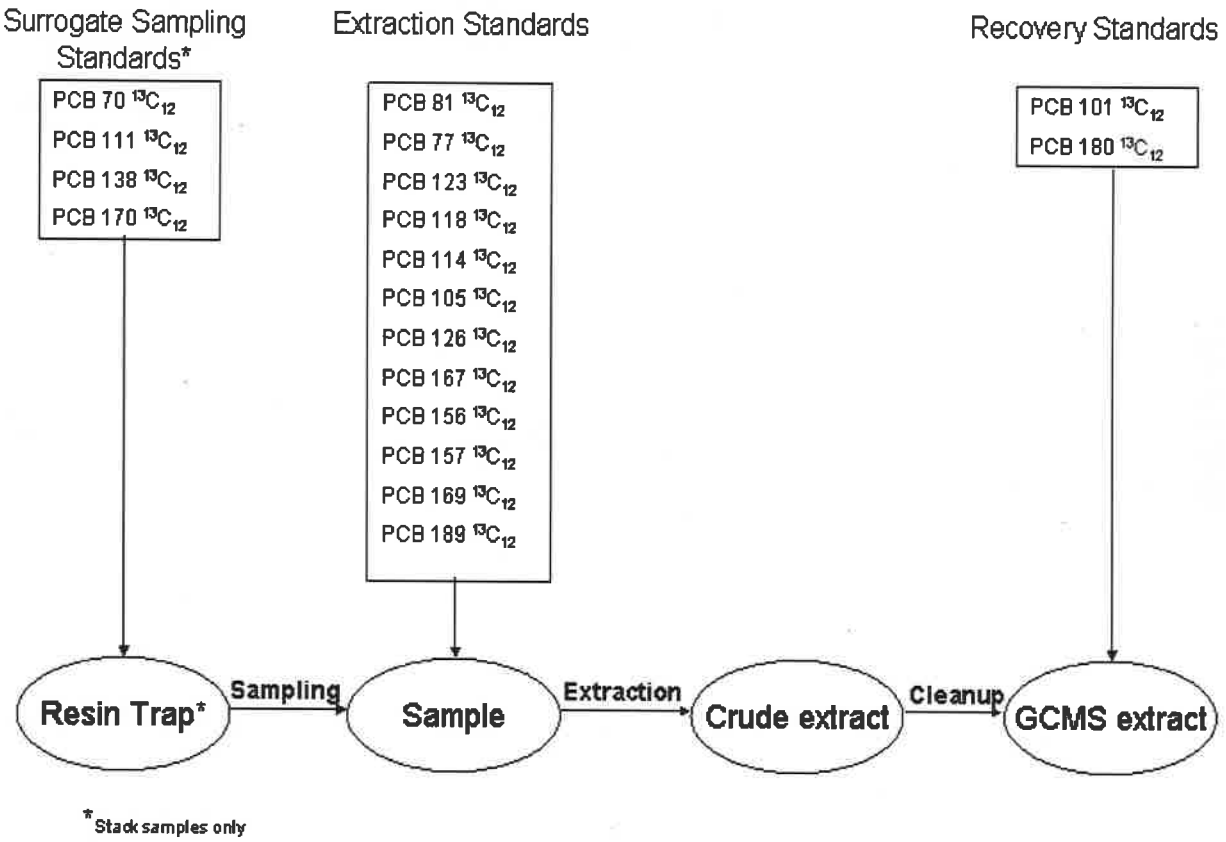
The resulting extracts are concentrated and solvent exchanged to give a final volume of 10 µl in nonane.

Two stable isotopically labelled internal standards are added before analysis by high resolution gas chromatography- high resolution mass spectrometry (HRGC-HRMS) using a DB5-MS column.

Identification of the WHO PCBs is based on comparison of GC retention times and the ion abundance ratios of the monitored mass signals with the corresponding retention times of authentic standards and the theoretical ion abundance ratios.

If results for individual targeted WHO PCBs exceed the calibration range of the instrument then these results are flagged in the analytical report. The mass spectrometer is operated at a resolution in excess of 10000 to minimize the potential for interference. Selected ions characteristic of the WHO PCBs are monitored. The mass spectrometer is continuously calibrated during acquisition to correct for any mass drift using mass signals from a reference compound FC43 (heptacosafluorotributylamine).

WHO PCB LABELLED STANDARD ADDITIONS (AES 084)



*Stack samples only

SECTION 2

RESULTS

The following pages contain the detailed analytical results for the isomer specific analysis for each sample and blank along with recovery information for the labelled standards.

A matrix blank is analysed alongside the samples to show any possible contamination. This consists of a sample of quartz sand.

The following points should be noted.

- All results are on a dry weight basis.
- Results have not been blank corrected. Results have not been rounded. This is to permit further processing if necessary and does not imply the level of accuracy. Summary results on page 5 have been rounded to two significant figures.
- n.d. - not detected – Limits of detection (LOD) for the analysis are calculated on a sample specific basis by the GCMS software, and are based on a signal to noise value of 2.5 to 1
- Results marked * are over the normal calibration limit of the method.

All quality criteria in the method O84 have been met with any deviations outlined below.

Deviations from methodology/quality criteria/comments: -none.

WHO PCB RESULTS

CLIENT HANSON CEMENT **CONTRACT** HANSONCEM_00244

SAMPLE LABORATORY BLANK

LAB NO N/A **REF** D7111P

CONGENER	ng/kg	Recovery of $^{13}C_{12}$ %	WHO TEQ			
			Humans[a]	Humans[b]	Fish[a]	Birds[a]
PCB BZ 81	<0.33	85	n.d.	n.d.	n.d.	n.d.
PCB BZ 77	10.70	88	0.001070	0.001070	0.001070	0.535000
PCB BZ 123	<0.48	86	n.d.	n.d.	n.d.	n.d.
PCB BZ 118	<0.47	88	n.d.	n.d.	n.d.	n.d.
PCB BZ 114	<0.5	88	n.d.	n.d.	n.d.	n.d.
PCB BZ 105	<0.53	84	n.d.	n.d.	n.d.	n.d.
PCB BZ 126	<0.58	94	n.d.	n.d.	n.d.	n.d.
PCB BZ 167	<0.14	92	n.d.	n.d.	n.d.	n.d.
PCB BZ 156	<0.14	94	n.d.	n.d.	n.d.	n.d.
PCB BZ 157	<0.15	89	n.d.	n.d.	n.d.	n.d.
PCB BZ 169	<0.15	88	n.d.	n.d.	n.d.	n.d.
PCB BZ 189	<0.09	85	n.d.	n.d.	n.d.	n.d.
	TEQ TOTAL		0.001070	0.001070	0.001070	0.535000

[a] WHO 1998 TEQ values, [b] WHO 2005 TEQ values

All of the recoveries quoted above are within the acceptance limits of method O84.

WHO PCB RESULTS

CLIENT HANSON CEMENT **CONTRACT** HANSONCEM_00244

SAMPLE BYPASS DUST

LAB NO 659035 **REF** D7111P

CONGENER	ng/kg	Recovery of $^{13}C_{12}$ %	WHO TEQ Humans[a]	WHO TEQ Humans[b]	WHO TEQ Fish[a]	WHO TEQ Birds[a]
PCB BZ 81	<0.29	94	n.d.	n.d.	n.d.	n.d.
PCB BZ 77	12.76	91	0.001276	0.001276	0.001276	0.638000
PCB BZ 123	<0.53	91	n.d.	n.d.	n.d.	n.d.
PCB BZ 118	12.62	96	0.001262	0.000379	0.000063	0.000126
PCB BZ 114	<0.56	87	n.d.	n.d.	n.d.	n.d.
PCB BZ 105	<0.58	84	n.d.	n.d.	n.d.	n.d.
PCB BZ 126	<0.45	111	n.d.	n.d.	n.d.	n.d.
PCB BZ 167	<0.12	97	n.d.	n.d.	n.d.	n.d.
PCB BZ 156	<0.11	102	n.d.	n.d.	n.d.	n.d.
PCB BZ 157	<0.11	102	n.d.	n.d.	n.d.	n.d.
PCB BZ 169	<0.1	104	n.d.	n.d.	n.d.	n.d.
PCB BZ 189	<0.06	98	n.d.	n.d.	n.d.	n.d.
	TEQ TOTAL		0.002538	0.001655	0.001339	0.638126

[a] WHO 1998 TEQ values, [b] WHO 2005 TEQ values

All of the recoveries quoted above are within the acceptance limits of method O84.

SECTION 3

EXPLANATION OF APPENDICES

APPENDIX 1 CHAIN OF CUSTODY FORMS/EXTRACTION/AUTOSAMPLER LISTS

These pages show copies of forms that document the progress of the sample from the sampling stage through all analysis stages.

The chain of custody form documents the date that the sample was taken and contains sample identification information together with records of the transfer of the sample prior to analysis.

The extraction log shows the dates of all extraction and cleanup processes, including details of the spiking standards used for analysis. The final extract volume after addition of internal standards is also shown.

The autosampler list shows the run order of the samples GCMS analysis together with the datafile names under which data is stored.

APPENDIX 2 GLOSSARY

This is a list of abbreviations used in this report.

APPENDIX 1

Page No.

NWSS / COMMERCIAL SAMPLE SUBMISSION SHEET

CLIENT	HANSON CEMENT	NWSS CONTRACT REF	HANSONCEM-00244
CLIENT PROJECT MANAGER	D. QUICK	NWSS PROJECT MANAGER	J MCBRIDE
TEL		AGREED TURNAROUND	

NORTHUMBRIAN WATER
Scientific Services
Tel: 0191 296 8386
email nwss.customer@nwl.co.uk

MATRIX: Cl. water	Effluent	Gas	Sludge	Soil	Water	Sample Name / Sample Point	Consent	Sampler	Sample Comments	On-Site Results	Analysis / Test Schedule Required	DATE SAMPLED	TIME SAMPLED	NWSS LAB No.
				/		BYPASS		MD	BYPASS DUST		W.LSA 00H09	30/10/13	1530	659035
				/		"		"	"		"	"	"	

ADDITIONAL INFORMATION / HAZARD DATA	KEY TO SAMPLE SOURCE / CONSENT		ENTERED BY:	(DATE)
Detail any health or reactive hazards associated with your samples Enclose Material Safety Data Sheets where appropriate	PWS – Private Water Supply	TS – Tank Supplied / Tank	NO. OF SAMPLES CORRECT? ✓	(DATE)
	SP – Swimming Pool waters		IF NO THEN REPORTED TO:	

CHAIN OF CUSTODY		
Relinquished By	Date	Received By
[signature]	04/11/13	[signature]
Relinquished By	Date	Received By
Relinquished By	Date	Received By

Invoicing Information

Samples without a valid PO no & invoice address will not be analysed until this information is provided. This may delay reporting of your results. Name & signature of person submitting samples must also be provided.

Purchase Order Number/WRN

Invoice Address (where NWSS/NWL should send invoice)

Name: _____ Signature: _____

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PCB

SAMPLE EXTRACTION LOG

LAB NO	N/A	654144-	658085	N/A			
PCBs REQD ?	Y	Y	Y	Y			
SAMPLE ID	LAB BLANK	UNIV_EDIN 402130 COMBINED 3 550°C	HANSONCEM BYPASS DUST PADESWOOD RUN 7	DX3			
WT/VOL/TRAP	1.085	1.012	1.070	1.023			
SIGN	JLR / [signature]						
$^{13}C_{12}$ STD ADDITIONS							
DATE/TIME	4/11/13	/1530					
STD	LS2 300913	/PCBES1		251012			
VOL	20µL/	20µL					
SIGN	JLR / [signature]						
EXTRACTION							
EXT DATES & TIMES	4/11/13 1600	5.11.13 → 1700	} →	→			
GLASSWARE N°	1	2	3	6			
ALUMINA CLEANUP							
DATE	7/11/13	} →		→			
SIGN	JLR / [signature]						
PCB KEEP?	Y	Y	Y	Y			
MIXED SILICA CLEANUP							
DATE	6/11/13	} →		→			
SIGN	JLR / [signature]						
OTHER CLEANUPS 1							
TYPE							
DATE	N/A	} →		→			
SIGN							
OTHER CLEANUPS 2							
TYPE							
DATE	N/A	} →		→			
SIGN							
CONCENTRATION INTO NONANE							
DATE	7/11/13		} →	→			
VOL	10µL						
SIGN	JLR / [signature]						
RECOVERY STD ADDITION							
DATE/TIME	7/11/13	/1600					
STD	PCBRS2	040913					
VOL	10µL		} →	→			
Final VOL	20µL						
SIGN	JLR / [signature]						

AUTOSAMPLER RUN LIST

Date of Run 15/11/13

A/S POSITION	DATA FILE NAME	LAB NUMBER	SAMPLE DETAILS	NOTES
2	hvb001	—	PCBCSI COLUMN CHECK	
2	02		PCBCS1	
3	03		PCBCS2	
4	04		PCBCS3	
5	05		PCBCS4	
6	06		PCBCS5	
7	07		N	
8	08		N	
9	09		N	
10	10		N	
11	11	↓	LAB BLANK 4.11.13	
12	12	661444	COMBINED 3 550°C	
13	13	—	N	
14	14	669085	PADESWOOD RUN 1	
15	15	—	N	
16	16		DX3 4.11.13	
17	17		N	
4 ~~18~~ 6	18		PCBCS3	

COMMENTS N=Nonane wash

APPENDIX 2

GLOSSARY

The following terms and abbreviations are used throughout this report.

WHO	World Health Organisation
PCB	Polychlorinated biphenyl
TEF	Toxic Equivalent Factor
TEQ	Toxic Equivalent
I-TEF	International Toxic Equivalent Factor (NATO/CCMS)
I-TEQ	International Toxic Equivalent (NATO/CCMS)
LOQ	Limit of Quantitation