Cyfoeth Naturiol Cymru
Natural Resources Wales

Craig Davies
Knauf Insulation Ltd
Chemistry Lane
Queensferry
Flintshire
CH5 2DB

Ein cyf / Our ref: BR9383ID
Eich cyf / Your ref:

Dyddiad/Date: 26 November 2014

Dear Mr Davies

Environmental Permitting (England and Wales) Regulations 2010
Oven Oxidiser Operating Temperature

I refer to the imformation provided by Claire Hensley in September following a trial to assess the effects of running the oven oxidiser at a lower temperature. I can confirm that the proposal to run the oven at 750°C is acceptable and can become part of the permitted operating techniques under Condition 2.3 of your Environmental Permit.

If you wish to carry out further trials at lower temperatures the same process should be followed with a prior notification to Natural Resources Wales and an assessment of the effect on emissions.

Yours sincerely

Alison Soper
Regulatory Officer PPC/RSR

Ebost/Email alison.soper@cyfoethnaturiolcymru.gov.uk
Ffôn/Tel 01244 894595

Natural Resources Wales brings together the work of the Countryside Council for Wales, Environment Agency Wales and Forestry Commission Wales, as well as some functions of Welsh Government. Our purpose is to ensure that the natural resources of Wales are sustainably maintained, used and enhanced, now and in the future.

www.cyfoethnaturiolcymru.gov.uk www.naturalresourceswales.gov.uk

Chester Road, Buckley, Flintshire CH7 3AJ

Croesewir gohebiaeth yn y Gymraeg a'r Saesneg
Correspondence welcomed in Welsh and English

	INITIALS	DATE
OK FOR PUBLIC REGISTER	AS	27/11/14
COPIED TO PUBLIC REGISTER	JB	EDRM

Cyfoeth Naturiol Cymru
Natural Resources Wales

OK ... PUBLIC REGISTER	AS	3/10/13
COPIED TO PUBLIC REGISTER	JB	EDRM

Claire Hensley
Knauf Insulation Ltd
Chemistry Lane
Queensferry
Flintshire
CH5 2DB

Ein cyf / Our ref: BR9383ID
Eich cyf / Your ref:

Dyddiad/Date: 03 October 2013

Dear Ms Hensley

Environmental Permitting (England and Wales) Regulations 2010
Minor change in operating techniques

I refer to your e-mail submission of the 19th of September detailing the outcome of trials of reduced temperature combustion in the cupola abatement oxidiser. I can confirm that these changes will not require a permit variation and can now be agreed under Condition 2.3.1 (a) of your Environmental Permit. The relevant parts of your Application will be deemed to be amended to include the new techniques and the submission should be kept with the application document for completeness. This letter should now be kept with the permit.

Yours sincerely

Alison Soper
Regulatory Officer PPC/RSR

Ebost/Email alison.soper@cyfoethnaturiolcymru.gov.uk
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Correspondence welcomed in Welsh and English

Soper, Alison

From: Hensley, Claire [Claire.Hensley@knaufinsulation.com]
Sent: 19 September 2013 09:58
To: Soper, Alison
Cc: Lewis, Mark; Bowser, Corinne; Pickard, Tony R.; Griffiths, Stuart; Bishop, Philip
Subject: Re: Notification of Proposed Trials
Attachments: Stack A Trend Analysis Data.xls; Dioxin & Furan Isomers_08.08.13.xls

Dear Alison

Further to this morning's telephone conversation, I am writing to you with the results of The "cupola abatement oxidiser combustion chamber temperature reduction trial undertaken at Knauf Insulation, Queensferry", in order to ascertain whether the combustion temperature maintained in the cupola abatement oxidiser combustion chamber could be lowered without reducing the effectiveness of the abatement below acceptable levels, as identified in comparable processes in Europe and beyond, in an effort to reduce CO_2 emissions, which has proved very successful.

During the trial, which encompassed small stepwise reductions of temperature in the combustion chamber, the concentrations of emissions recorded by the CEMs equipment were monitored and during this period, significantly lower combustion temperatures were maintained without breaching the current emission concentration limits. No effects were identified on the other process temperatures or on the melting furnace, as monitored using the SCADA system.

Dioxin testing on the cupola stack (Emission Point A) was undertaken, by MCerts Consultants, to validate the control of dioxins and furans at a lower operating temperature; the measurement of dioxins and furans (afterburner operating at 770°C at the time of testing) gave a very low result (0.0025ng/m^3). The result is expressed below in terms of the toxic equivalent values (TEQ) derived by applying the factors to the distribution of species found. Both the NATO international toxic equivalents (I-TEQ) and the World Health Organisation toxic equivalents (WHO-TEQ) have been applied to the data. The distributions of congeners detected in the actual sample obtained is attached for reference.

Results of dioxins and furans for Cupola Furnace Stack Emission Point A:				
Sampling Date	I-TEQ ng/Nm^3 Dry Gas @8% O_2		WHO-TEQ ng/Nm^3 Dry Gas @8% O_2	
	I-TEQmin	I-TEQmax	WHO-TEQmin	WHO-TEQmax
8th August 2013	0.0025	0.0025	0.0016	0.0016
Values corrected to the standard monitoring conditions for Stack A: 273K, 101.3kPa. dry gas at 8% O_2				

I have also attached for reference, Stack A Trend Analysis Data, which depicts very low monitoring results for dioxins and furans and illustrates the recent monitoring data obtained during the trial to be in the same order of magnitude as per the monitoring results for the 2013 and 2012 compliance testing for dioxins and furans for Stack A.

Thus, results have shown that continual operation of the process with the modified process condition of reducing the combustion temperature in the cupola abatement oxidiser combustion chamber, can be maintained whilst ensuring control of emissions. Therefore, as a continuation to our commitment to further improve energy efficiency, I would request to continue process operations at lower afterburner operating temperatures within a range which will encompass the lower limit tested as the lowest limit at which the process can be operated at.

As we discussed and agreed, a permit variation will not be required as this is a modification to the process condition without impact as opposed to a change in process operation, thus, I look forward to receiving NRW's formal agreement.

Kind regards, Claire

Claire Hensley
Environmental Manager

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From: Soper, Alison [mailto:Alison.Soper@cyfoethnaturiolcymru.gov.uk]
Sent: 30 July 2013 11:48
To: Pratley, Keith
Cc: Hensley, Claire
Subject: RE: Notification of Proposed Trials

Keith,

This sounds as though it may offer quite significant efficiencies. The only concern, as you've identified, would be that the temperatures are controlled to ensure dioxin destruction or avoid de-novo synthesis. Please could you let me know the outcome of the trials once completed.

Regards,
Alison

Alison Soper
Regulatory Officer 1 (PIR/RSR) – Swyddog Rheoliadol 1 (RhDP/RhSY)

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E-bost / E-mail: Alison.soper@cyfoethnaturiolcymru.gov.uk

Ein diben yw sicrhau bod adnoddau naturiol Cymru yn cael eu cynnal, eu gwella a'u defnyddio yn gynaliadwy, yn awr ac yn y dyfodol.

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Gwefan / Website: www.cyfoethnaturiolcymru.gov.uk / www.naturalresourceswales.gov.uk

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From: Pratley, Keith <keith.pratley@knaufinsulation.com>
Sent: 26 July 2013 15:20
To: Soper, Alison; North Wales PPC
Cc: Lewis, Mark; Pickard, Tony R.; Bowser, Corinne; Griffiths, Stuart; Hensley, Claire; Bishop, Philip
Subject: Notification of Proposed Trials

Alison,

In line with Knauf Group policy, we have an ongoing programme of process optimisation on this site to minimise consumption of raw materials and to improve energy efficiency. As part of this we have been managing coke usage in the melting furnace which has resulted in significant reductions of especially CO_2 emissions from the process in terms of kg per tonne of melt. So that overall process CO_2 emission is reduced by more than 12% compared with ten years ago.

It has been suggested that further CO_2 emission reductions could be achieved by limiting the use of natural gas combustion in the process and one means of achieving this would be to reduce the temperatures in parts of the process equipment that are heated by gas.

Comparison of the operating conditions found in the process with others in Europe and beyond has indicated that the combustion temperature maintained in the cupola abatement oxidiser combustion chamber could be lowered, quite significantly, without reducing the effectiveness of the abatement below acceptable levels. So, we would like to test the possibility that the combustion chamber temperature could be reduced without breaching the current emission concentration limits for carbon monoxide, which is the more difficult substance to control by these means.

It is proposed to carry out a trial with small stepwise reductions of temperature in the combustion chamber and to monitor the effects of the changes upon the concentrations of emissions recorded by the CEMs equipment also to measure the effects on the other process temperatures and the behaviour of the melting furnace, using the SCADA data with observations. If the reductions can achieve a sustainable lower operating temperature then the levels of furanes and dioxins resulting will be measured in the cupola stack (Emission Point A) to ensure that the control of these substances can be maintained at suitably low levels, as is currently seen.

It is proposed to start the trials by Monday 12th August 2013 and to report the outcomes to you so that we can agree that the modified process conditions are BAT for the process operation.

Please contact me directly if you require any further information.

Best Regards,
Keith.

Keith Pratley
Environmental Manager

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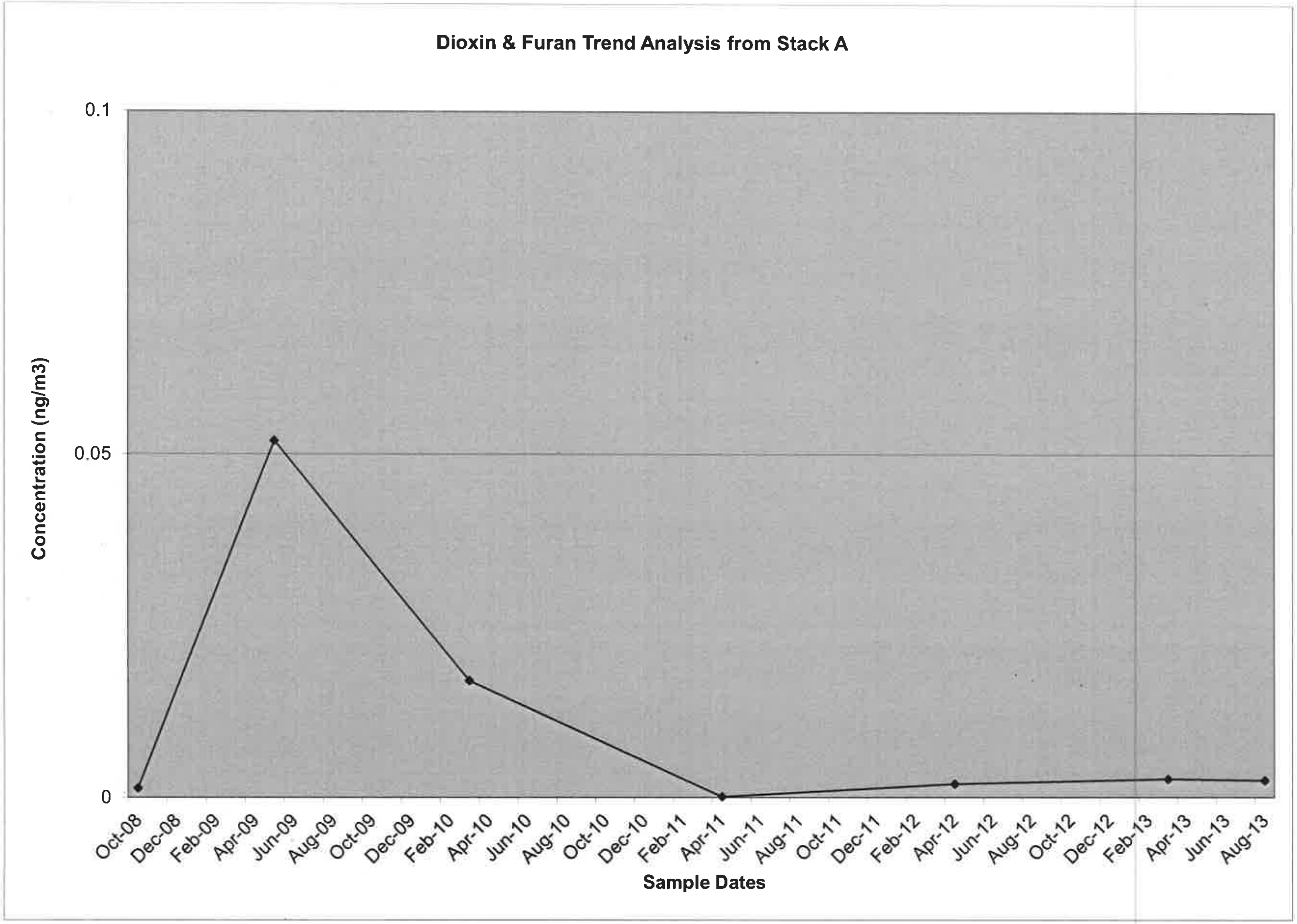

Dioxin & Furan Trend Analysis from Stack A
Concentration (ng/m3)
0.1
0.05
0
Oct-08
Dec-08
Feb-09
Apr-09
Jun-09
Aug-09
Oct-09
Dec-09
Feb-10
Apr-10
Jun-10
Aug-10
Oct-10
Dec-10
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
Aug-12
Oct-12
Dec-12
Feb-13
Apr-13
Jun-13
Aug-13
Sample Dates

Stack A - Trend Analysis

Dioxins & Furans

Results at S.T.P., dry gas, 8% Oxygen

Type **C = Compliance, R = Retest, E = Experimental, T = Trials**

Emissions Limit	None Set

Note: Concentrations are those reported with non detected congeners at the detection limit

Type	Date	Concentration ng/m3	Limit of Detection
C	24/10/2008	0.0014	
C	19/05/2009	0.052	
C	02/03/2010	0.017	
C	01/04/2011	0.00013	
C	26/04/2012	0.0020	
C	21/03/2013	0.0027	
T	08/08/2013	0.0025	

Sample Date: 8 August 2013

Congener	Sample	WHO-TEF	I-TEF	WHO-TEQ min	WHO-TEQ max	I-TEQ min	I-TEQ max	Det. Limit
2378-TCDD	ND	1	1	0	0.0008	0	0.0008	0.0008
Total TCDD	ND							
12378-PeCDD	0.0019	1	0.5	0.0019	0.0019	0.00095	0.00095	0.0007
Total PeCDD	0.0019							
123478-HxCDD	0.0014	0.1	0.1	0.00014	0.00014	0.00014	0.00014	0.0003
123678-HxCDD	0.0033	0.1	0.1	0.00033	0.00033	0.00033	0.00033	0.0002
123789-HxCDD	0.0032	0.1	0.1	0.00032	0.00032	0.00032	0.00032	0.0002
Total HxCDD	0.0079							
1234678-HpCDD	0.0198	0.01	0.1	0.000198	0.000198	0.00198	0.00198	0.0002
Total HpCDD	0.0198							
OCDD	0.0428	0.0003	0.001	0.00001284	0.00001284	0.0000428	0.0000428	0.0003
2378-TCDF	0.0111	0.1	0.1	0.00111	0.00111	0.00111	0.00111	0.0007
Total TCDF	0.0111							
23478-PeCDF	0.0780	0.3	0.5	0.0234	0.0234	0.039	0.039	0.0006
12378-PeCDF	0.0067	0.03	0.05	0.000201	0.000201	0.000335	0.000335	0.0006
Total PeCDF	0.0847							
123478-HxCDF	0.0060	0.1	0.1	0.0006	0.0006	0.0006	0.0006	0.0005
123678-HxCDF	0.0059	0.1	0.1	0.00059	0.00059	0.00059	0.00059	0.0005
234678-HxCDF	0.0041	0.1	0.1	0.00041	0.00041	0.00041	0.00041	0.0004
123789-HxCDF	0.0009	0.1	0.1	0.00009	0.00009	0.00009	0.00009	0.0004
Total HxCDF	0.0169							
1234678-HpCDF	0.0140	0.01	0.01	0.00014	0.00014	0.00014	0.00014	0.0003
1234789-HpCDF	0.0021	0.01	0.01	0.000021	0.000021	0.000021	0.000021	0.0004
Total HpCDF	0.0161							
OCDF	0.0105	0.0003	0.001	0.00000315	0.00000315	0.0000105	0.0000105	0.0003

I-TEQ (min)	0.0461
I-TEQ (max)	0.0469
WHO-TEQ (min)	0.029
WHO-TEQ (max)	0.030

WHO-TEQ min	WHO-TEQ max	I-TEQ min	I-TEQ max
0.029	0.030	0.046	0.047

Factor I-TEQ to WHO-TEQ
0.64575

Stack Emission @ 8%O2 Dry

I-TEQ (min)	0.0025
I-TEQ (max)	0.00250
WHO-TEQ (min)	0.0016
WHO-TEQ (max)	0.0016

Factor I-TEQ to WHO-TEQ
0.64575

Blank

Congener	Blank	WHO-TEF	I-TEF	WHO-TEQ min	WHO-TEQ max	I-TEQ min	I-TEQ max	Blank Det. Limit
2378-TCDD	ND	1	1	0	0.0004	0	0.0004	0.0004
Total TCDD	ND							
12378-PeCDD	0.0005	1	0.5	0.0005	0.0005	0.00025	0.00025	0.0005
Total PeCDD	0.0005							
123478-HxCDD	ND	0.1	0.1	0	0.00004	0	0.00004	0.0004
123678-HxCDD	0.0005	0.1	0.1	0.00005	0.00005	0.00005	0.00005	0.0004
123789-HxCDD	0.0004	0.1	0.1	0.00004	0.00004	0.00004	0.00004	0.0003
Total HxCDD	0.0009							
1234678-HpCDD	0.0070	0.01	0.1	0.00007	0.00007	0.0007	0.0007	0.0002
Total HpCDD	0.007							
OCDD	0.0284	0.0003	0.001	0.00000852	0.00000852	2.84E-05	2.84E-05	0.0002
2378-TCDF	0.0011	0.1	0.1	0.00011	0.00011	0.00011	0.00011	0.0004
Total TCDF	0.0011							
23478-PeCDF	0.0011	0.3	0.5	0.00033	0.00033	0.00055	0.00055	0.0002
12378-PeCDF	ND	0.03	0.05	0	0.000006	0	0.00001	0.0002
Total PeCDF	0.0011							
123478-HxCDF	0.0010	0.1	0.1	0.0001	0.0001	0.0001	0.0001	0.0002
123678-HxCDF	0.0014	0.1	0.1	0.00014	0.00014	0.00014	0.00014	0.0002
234678-HxCDF	0.0010	0.1	0.1	0.0001	0.0001	0.0001	0.0001	0.0002
123789-HxCDF	0.0005	0.1	0.1	0.00005	0.00005	0.00005	0.00005	0.0002
Total HxCDF	0.0039							
1234678-HpCDF	0.0037	0.01	0.01	0.000037	0.000037	0.000037	0.000037	0.0002
1234789-HpCDF	0.0004	0.01	0.01	0.000004	0.000004	0.000004	0.000004	0.0002
Total HpCDF	0.0041							
OCDF	0.0021	0.0003	0.001	0.00000063	0.00000063	2.1E-06	2.1E-06	0.0002

I-TEQ (min)	0.0022
I-TEQ (max)	0.0026
WHO-TEQ (min)	0.002
WHO-TEQ (max)	0.002

WHO-TEQ min	WHO-TEQ max	I-TEQ min	I-TEQ max
0.0015	0.0020	0.0022	0.0026

Factor I-TEQ to WHO-TEQ
0.76054