



Hanson Cement Padeswood Works Regulation 60 BAT Conclusions notice 2 Response

BAT 18 Derogations

As stated in your request for additional information dated 26 June 2015. "Please note that Natural Resources Wales is currently reviewing the implementation of the BAT–AEL range for dust emissions from fabric filters as detailed in BAT Conclusion (BATC) 18, as well as the associated monitoring requirements. We will inform you of the outcome of our review as soon as possible."

At the MPA/ UK Regulator meeting on 8 June, at which David Griffith of Natural Resources Wales (NRW) participated by telephone, MPA members expressed their dissatisfaction with the manner in which this change of interpretation was communicated by the Environment Agency. The BAT conclusions were published in 2013 and there have been numerous meetings with regulators over the past two years at no point during this period was the interpretation of this BAT conclusion discussed or the interpretation of ranges in BATAELs. The response to the original regulation 60 notice, issued by NRW, was prepared on the basis that assessment of compliance would be based on operation at the upper end of the BAT AEL range as advised in the DEFRA guidelines to which MPA members were repeatedly referred by the regulators throughout this period.

In addition, NRW will be aware, that during the Sevilla working group meetings that led to the production of the Cement and Lime BAT Conclusion, that the BAT Conclusions were lifted directly from the BREF, which when written, was never intended to state Emission Limit Values. As such, the BAT Conclusion was never entirely 'fit for purpose'.

If NRW interpret the BAT conclusion such that an emission limit of 10 mg/Nm³ is applicable to the clinker cooler and cement mill emissions rather than the 20 mg/Nm³ (which would be consistent with DEFRA guidance paragraph 4.35) then Hanson Cement will need to additional time to review performance, assess options and prepare derogation requests for these emission points. MPA Cement has written to DEFRA seeking clarification on their guidance in relation to BATAELs given as ranges and the cement and lime BAT conclusions. Hanson Cement proposed that should DEFRA agree with the Environment Agency's interpretation of ranges in BAT AELs then any derogation requests required are submitted within 3 months of DEFRA responding to MPA Cement. At the time of writing DEFRA has not provided a substantive response to MPA.

Schedule 1

BATC 2 – Noise

(e) Use of soundproofed buildings to shelter any noisy operations involving material transformation equipment.

In your response you have queried the definition of transformation equipment. It is our interpretation that transformation equipment is 'any operation involving fracture, crushing, milling and screening of raw materials, fuels, clinker and cement'.

This technique is not applied at Padeswood Works. Soundproofing has been applied to equipment such as compressors and blowers which are often supplied in their own acoustic enclosures as shown in appendix 2.

I note that Appendix 2 of your response does review this criteria for various operations. If, in light of the above definition there are any additional items of transformation equipment not covered by your response, please review appendix 2 and resubmit accordingly.

The contents of Appendix 2 are unchanged as a result of this clarification.

(k) A written response was not received for sub criteria 'k' – please review your operations and provide a response accordingly.

This technique is not used at Padeswood Works.

BATC 5(g) & 16 – Channelled Dust Emissions / Monitoring

Please provide a list of channelled dust emissions from dusty operations and identify those with a volumetric flow rate >10,000 Nm³/hr.

For those >10,000 Nm³/hr, confirm the emissions monitoring provisions in place and that abatement is capable of meeting the BAT-AEL of <10mg/Nm³ by 9 April 2017.

*Following filters are currently in operation at Padeswood Works to control channelled dust emissions, those shown in **bold** have a volume flow rate larger than 10,000 Nm³/h. A planned preventative maintenance system is in place for dust plants across Padeswood Works.*

LOCATION	Manufacturer/additional information
CLINKER DOME	"A" CONV AIRMASTER
RAW MEAL	REDECAM (BLEND)
RAW MEAL	REDECAM (STORE)
CLINKER DOME	REDECAM (AUMUND)
CRUMBLISER	DALAMATIC FILTERS
CRUMBLISER	DALAMATIC FILTERS
PACKER 1	DUSCOVENT
PACKER 1	REDECAM
PACKER 1	ECS
PACKER 3	DUSCOVENT
PACKER 3	DUSCOVENT
ARODO PACKER LEV	NEDERMAN
CLINKER DOME	AIRMASTER FILTER
CLINKER DOME	G3-G4 CONV AIRMASTER
CLINKER DOME	G4 CONV AIRMASTER
CLINKER DOME	B-E CONV AIRMASTER
CLINKER DOME	C-E CONV AIRMASTER
CLINKER DOME	D-E CONV AIRMASTER
CLINKER DOME	E-F CONV AIRMASTER
CLINKER DOME	F-G1 CONV AIRMASTER

LOCATION	Manufacturer/additional information
CLINKER DOME	H-G1 CONV AIRMASTER
CLINKER DOME	G1-G2 CONV AIRMASTER
CLINKER DOME	G2-G3 CONV AIRMASTER
CLINK DE DUSTCM3	REDECAM
CLINK DE DUSTCM4	REDECAM
SILO'S 1-4	REDECAM FILTER
SILO 5	SIMATEK FILTER
SILO'S1 -5 (LOADING HEAD)	DUSCOVENT TA7 / 8/ 10
SILO 4 (LOADING HEAD)	DCE UNIMASTER UMA 70 - 250 ?
SILO 6	ECS
SILO 6 (LOADING HEAD)	DUSCOVENT
SILO 7	DCE FILTER DLM V14/7 ?
SILO 8	DCE FILTER DLM V14/7 ?
SILO 9	DCE FILTER DLM V14/7 ?
SILO 10	DCE FILTER DLM V14/7 ?
SILO 7 (LOADING HEAD)	DCE UNIMASTER UMA 70 - 250 ?
SILO 8 (LOADING HEAD)	DCE UNIMASTER UMA 70 - 250 ?
SILO 9 (LOADING HEAD)	DCE UNIMASTER UMA 70 - 250 ?
SILO 10 (LOADING HEAD)	DCE UNIMASTER UMA 70 - 250 ?
SILO 11	DCE FILTER DLM V14/7 ?
SILO 12	DCE FILTER DLM V14/7 ?
SILO'S 11 & 12 (LOADING HEADS)	DCE UNIMASTER UMA 70 - 250 ?
SILO 16	DCE FILTER VS20KS3
SILO 13	AIRMASTER FILTER RJX22L56
SILO 14	AIRMASTER FILTER RJX22L56
SILO 15	AIRMASTER FILTER RJX22L56
SILO'S 13 - 15 (LOADING HEADS)	AIRMASTER FILTER RJX22L56

LOCATION	Manufacturer/additional information
Cement Mill 2 FeSO4 Day bin	
Cement Mill 3 FeSO4 Day bin	
Cement Mill 4 FeSO4 Day bin	
Ferrous Sulphate Silo	
Coal plant	JET PULSE FILTER RC 1300/30HS-BFRL-E
Coal plant	JET PULSE FILTER IN-V36
SHALE MEAL	JET PULSE FILTER RC 1300
RAW MEAL 4	JET PULSE FILTER CE1-2-06 SLHRL-B
RAW MEAL 4	JET PULSE FILTER CE1-2-04 SLHRL-B
RAW MEAL 4	JET PULSE FILTER CE1-2-03 SLHRL-B
RAW MEAL 4	JET PULSE FILTER CE1-2-05 SLHRL-B
RAW MEAL 4	JET PULSE FILTER CE1-2-03 SLHRL-B
RAW MEAL 4	JET PULSE FILTER CE1-2-10 SLHRL-B
RAW MEAL 4	JET PULSE FILTER CE1-2-05 SLHRL-B
RAW MEAL 4	JET PULSE FILTER CE1-2-03 SLHRL-B
RAW MEAL 4	JET PULSE FILTER CE1-2-10 SLHRL-B
RAW MEAL 4	JET PULSE FILTER CE1-2-05 SLHRL-B
RAW MEAL 4	JET PULSE FILTER CE1-2-03 SLHRL-B
RAW MEAL 4	JET PULSE FILTER CE1-2-08 SLHRL-B
CL TRANSPORT	JET PULSE FILTER CE1-2-10 SHHRL-B
CL TRANSPORT	JET PULSE FILTER CE1-2-10 SHHRL-B
CL TRANSPORT	JET PULSE FILTER CE1-4-08 SHHRL-B
SRF PFISTER FEEEDER	INFA MINI JET

As part of their normal duties process operators will make a visual check on the emissions from these dust plants as they patrol their areas. In the event of an unacceptable visual emission being identified the operator will report the defect and corrective action initiated.

In addition to these observations there is an annual performance check carried out by specialist contractors. The performance test includes a visual check of emissions, measurement of air flow, static pressures and pressure drop across the filter. The performance test also covers the operation of reverse jet/pulse jet, compressed air systems including pressure before and after pulse, pulse duration, operation of solenoid valves, diaphragm valves and checks on the condition of the structure and casing.

There are routine safe inspections, internal and external audits carried out throughout the year which may also identify poorly performing filters.

The design of the vents on many of these filters means they are not suitable for isokinetic monitoring. As all these filters are fabric filters they are capable of meeting the BAT AEL of 10mg/Nm³ by 9 April 2017.

The two filters that have air flows greater than 10,000 Nm³/h, are subject to the same condition monitoring and planned maintenance regime as the other filters in the list above. There is no additional monitoring on these filters.

BATC 8 – Clinker Substitution

The response provided does not confirm how your installation complies with this BATC. Please explain how you have considered the reduction of the clinker content of cement products at the installation. If this BATC is not applicable (as defined in the BATC), please explain why.

Minor additional constituents (MAC) which replace clinker are included in the production of Cem I cement produced at Padeswood at levels of up to the 5% limit set in the European Cement standard EN197. Most packed cement produced at Padeswood is Cem 2 which has up to 20% clinker substitution. Increased levels of clinker substitution would not deliver the cement performance required by customers. In the UK clinker substitution is largely achieved through the use of additions such as GGBS and PFA at the concrete plant by customers in combination with Cem I cement in the production of ready mixed concrete. Increasing clinker substitution at the cement plant would simply require additional investment in equipment to move the point of addition of GGBS and PFA from the concrete plant to the cement plant without actually reducing the clinker content of the binder in the finished concrete.

BATC 9 - Cogeneration & CHP

The response supplied did not provide sufficient information on whether you have considered the utilisation of waste heat to produce electricity. Please provide details of how this has been considered fully for your works.

The data provided in the Regulation 60 response showed that a heat recovery system for cogeneration (figure 1) required gas temperatures above 100°C for an organic rankine cycle (ORC) system to be 10% efficient. Kiln 4 operates at an exhaust gas temperature of around 120°C thus there is very little potential for heat recovery on the kiln exhaust. There has been some experience in the HeidelbergCement Group of heat recovery to generate electricity at Slite in Sweden and Lengfurt in Germany both of which are described in the BREF. The installation at Slite was able to make use of an existing power generation plant adjacent to the cement plant. A 25% subsidy of the investment costs was also reported in the BREF, the investment to transfer heat from the cement plant to the power plant was €8M for the boiler and steam distribution system. The Slite kiln capacity is more than double that of Padeswood kiln 4, the raw material moisture less than half that at Padeswood and a cooler exhaust gas volume double that at Padeswood. The size of the plant and low efficiency of steam generation and absence of an existing power plant make the application of steam based power generation impractical.

The Lengfurt installation uses ORC technology and was financed as a demonstration project by the German Federal government. The BREF section 6.2.3 gives the investment costs at Lengfurt as €4M in 1999 with the cooler operating at 300-350°C and a thermal output of 14MW of which 9MW was recoverable generating 1MW net (i.e. 1MW of electricity is available for use at the cement plant after the parasitic load of the ORC plant has been consumed). The cooler air

temperature at Padeswood is similar but the flow is lower there is about 4MW thermal available which will generate 0.5MW electricity. A similar sized plant would be required the capital cost for such a plant would be in the region of £5M based on the BREF capital cost indexed to 2015 or £10,000 per kW installed approximately 3 times the cost of the Lengfurt installation which was partially funded by the state.

There are other ORC systems available which have a lower capital cost, however the return on capital does not currently meet the requirements of HeidelbergCement. Hanson Cement will review opportunities for use of waste heat from the clinker cooler to generate electricity in the light of changes in technology, the availability of capital and other means of funding the investment. At present the use of waste heat to generate electricity at Padeswood is considered to be uneconomic.

BATC 14 & 15 - Diffuse Dust Emissions

The site Dust Management Plan (as submitted to NRW 12/06/15) has identified a number of improvements to minimise/prevent dust emissions from dusty operations and bulk storage areas. Please confirm that improvement actions identified in this plan will be complete and you will secure compliance with these BAT conclusions by 9 April 2017.

The improvements identified in the dust management plan submitted in June 2015 will be complete by 9 April 2017.

NRW has recently witnessed fugitive dust emissions from the crane store building including via the 'gypsum door' (when open) to the east of the building.

Hanson Cement consider the operation of the crane store at Padeswood to be compliant with the requirements of the BAT conclusions, we note that other similar stores in the cement industry are not as fully enclosed as the store is at Padeswood. With reference to the potential emissions for dust from the gypsum door this only occurs during gypsum deliveries the works handles approximately 30,000 tonnes gypsum each year, or about 1000 deliveries assuming the door is open for 5 minutes per delivery then the door is open for about 1% of the year. It is unlikely that dust is emitted throughout the period the door is open but only as the last of the gypsum is tipped from the vehicle body. The use of water sprays has been suggested as an option to reduce fugitive dust, this is consider impractical as wetting gypsum will result in blockages and handling problems in the gypsum feed hoppers for the cement mills.

Further control measures may be required to secure compliance with BATC 14 & 15 by 9 April 2017. Please review this aspect of your operation and provide additional information detailing how you will comply with BATC 14 and 15.

BAT conclusions 14 and 15 require the use of "one or a combination of the following techniques", our response to these BAT conclusions demonstrate that most of the techniques listed are implemented at Padeswood therefore we consider the narrative BAT conclusions have been complied with. If NRW have specific areas which they consider need to be addressed then Hanson Cement will assess these areas and incorporate them into the dust management plan as part of our normal continual environmental improvement process.

BATC 16 - Channelled Dust Emissions

For small sources (volumetric flow rate $<10,000 \text{ Nm}^3$), your response states that 'replacement filters' are specified and designed to emit $<10\text{mg/m}^3$. Please confirm all such emission points will meet the BAT-AEL of 10mg/Nm^3 by 9 April 2017.

The design of small fabric filters is such that they are capable of operating at 10 mg/Nm^3 and will meet the BAT-AEL by 9 April 2017.

BATC 18 – Dust Emissions from Cooling & Milling Processes

NRW is currently reviewing the application of the BAT-AEL ($<10 - 20\text{mg/m}^3$) for these sources.

If NRW interpret the BAT conclusion such that an emission limit of 10 mg/Nm^3 is applicable to the clinker cooler and cement mill emissions rather than the 20 mg/Nm^3 (which would be consistent with DEFRA guidance paragraph 4.35) then Hanson Cement will need to additional time to review performance, assess options and prepare derogation requests for these emission points. MPA Cement has written to DEFRA seeking clarification on their guidance in relation to BATAELs given as ranges and the cement and lime BAT conclusions. Hanson Cement proposed that should any derogation requests be needed they are submitted within 3 months of DEFRA responding to MPA Cement.

BATC 19 – NO_x Emissions

Please confirm that the calciner is fitted with a low NO_x burner(s).

The calciner operates at temperatures below 1000°C , thermal NO_x formation takes place at temperatures in excess of 1500°C , and therefore the calciner system is de facto a low NO_x burner.

BATC 20 – Ammonia Slip

It is understood that the ammonia background monitoring exercise is likely to commence at your installation during August 2015. It is anticipated that the results will be available within 1 month of the trial having being completed.

In order for us to set an ELV for total ammonia emissions, please propose and justify an ELV based on the background ammonia emission level (no SNCR) and ammonia slip. You will also need to provide us with / or make reference to an appropriate environmental impact assessment or Air Dispersion Modelling on total ammonia emissions to support your proposal. Please do so within 1 month of the end of the trial unless otherwise agreed.

A separate report on the trial results will be submitted to NRW within 1 month of the completion of the trial period.