Environment Agency

Review of an Environmental Permit for an Installation subject to Chapter II of the Industrial Emissions Directive under the Environmental Permitting (England & Wales) Regulations 2010 (as amended)

Decision document recording our decision-making process following review of a permit

The Permit number is: EPR/BK0787IZ
The Operator is: Tata Steel UK Limited
The Installation is: Shapfell Lime Works
This Variation Notice number is: EPR/BK0787IZ/V003

Consultation commences/commenced on: 3 March 2017
Consultation ends/ended on: 30 March 2017

What this document is about

Article 21(3) of the Industrial Emissions Directive (IED) requires the Environment Agency to review conditions in permits that it has issued and to ensure that the permit delivers compliance with relevant standards, within four years of the publication by the European Commission of updated decisions on BAT conclusions.

We have reviewed the permit for this installation against the revised BAT Conclusions for the Cement, Lime and Magnesium Oxide industry sector published on 9 April 2013 in the Official Journal of the European Union. In this decision document, we set out the reasoning for the consolidated variation notice.

It explains how we have reviewed and considered the techniques used by the Operator in the operation and control of the plant and activities of the installation. This review has been undertaken with reference to the decision made by the European Commission establishing best available techniques (BAT) conclusions (BATc) for the Manufacture of Cement, Lime and Magnesium Oxide as detailed in document reference 2013/163/EU. It is our record of our decision-making process and shows how we have taken into account all relevant factors in reaching our position. It also provides a justification for the inclusion of any specific conditions in the permit that are in addition to those included in our generic permit template.

As well as considering the review of the operating techniques used by the Operator for the operation of the plant and activities of the installation, the consolidated variation notice takes into account and brings together in a

single document all previous variations that relate to the original permit issue. Where this has not already been done, it also modernises the entire permit to reflect the conditions contained in our current generic permit template.

The introduction of new template conditions makes the Permit consistent with our current general approach and with other permits issued to installations in this sector. Although the wording of some conditions has changed, while others have been deleted because of the new regulatory approach, it does not reduce the level of environmental protection achieved by the Permit in any way. In this document we therefore address only our determination of substantive issues relating to the new BAT Conclusions and any changes to the operation of the installation.

We try to explain our decision as accurately, comprehensively and plainly as possible. Achieving all three objectives is not always easy, and we would welcome any feedback as to how we might improve our decision documents in future.

How this document is structured

1. Our proposed decision
2. How we reached our decision
3. The legal framework
4. Annex 1– Review of operating techniques within the Installation against BAT Conclusions.
5. Annex 2 – Review and assessment of derogation request(s) made by the operator in relation to BAT Conclusions which include an Associated Emission Level (AEL) value.
6. Annex 3 – Improvement Conditions
7. Annex 4 – Consultation responses
8. Annex 5 – Review and assessment of changes that are not part of the BAT Conclusions derived permit review.

1 Our decision

We have issued the Variation Notice to the Operator Tata Steel UK Limited. This will allow it to continue to operate the Installation, subject to the conditions in the Consolidated Variation Notice that updates the whole permit.

As part of our proposed decision we have decided to grant the Operator's request for a derogation from the requirements of BAT Conclusion 42 as identified in the production of Cement, Lime and Magnesium Oxide BAT Conclusions document. The way we assessed the Operator's request(s) for derogation and how we subsequently arrived at our conclusion is recorded in Annex 2 to this document.

We consider that, in reaching our decision, we have taken into account all relevant considerations and legal requirements and that the varied permit will ensure that a high level of protection is provided for the environment and human health.

The Consolidated Variation Notice contains many conditions taken from our standard Environmental Permit template including the relevant annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting Regulations and other relevant legislation. This document does not therefore include an explanation for these standard conditions. Where they are included in the Notice, we have considered the techniques identified by the operator for the operation of their installation, and have accepted that the details are sufficient and satisfactory to make those standard conditions appropriate. This document does, however, provide an explanation of our use of "tailor-made" or installation-specific conditions, or where our Permit template provides two or more options.

2 How we reached our decision

2.1 Requesting information to demonstrate compliance with BAT Conclusion techniques

We issued a Notice under regulation 60(1) of the Environmental Permitting (England and Wales) Regulations 2010 (a Regulation 60 Notice) on 7 August 2014 requiring the Operator to provide information to demonstrate where the operation of their installation currently meets, or how it will subsequently meet, the revised standards described in the relevant BAT Conclusions document. The Notice required that where the revised standards are not currently met, the operator should provide information that

- Describes the techniques that will be implemented before 9 April 2017 which will then ensure that operations meet the revised standard, or

- justifies why standards will not be met by 9 April 2017, and confirmation of the date when the operation of those processes will cease within the installation or an explanation of why the revised BAT standard is not applicable to those processes, or
- justifies why an alternative technique will achieve the same level of environmental protection equivalent to the revised standard described in the BAT Conclusions.

Where the Operator proposed that they were not intending to meet a BAT standard that also included a BAT Associated Emission Level (BAT AEL) described in the BAT Conclusions Document, the Regulation 60 Notice required that the Operator make a formal request for derogation from compliance with that AEL (as provisioned by Article 15(4) of IED). In this circumstance, the Notice identified that any such request for derogation must be supported and justified by sufficient technical and commercial information that would enable us to determine acceptability of the derogation request.

The Regulation 60 Notice response from the Operator was received on 6 January 2015.

We considered that the response did not contain sufficient information for us to commence determination of the permit review. We therefore issued a further information request to the Operator. Suitable further information was provided by the Operator on 2 October 2015.

We considered it was in the correct form and contained sufficient information for us to begin our determination of the permit review but not that it necessarily contained all the information we would need to complete that determination.

The Operator made no claim for commercial confidentiality. We have not received any information in relation to the Regulation 60 Notice response that appears to be confidential in relation to any party.

2.2 Review of our own information in respect to the capability of the installation to meet revised standards included in the BAT Conclusions document

Based on our records and previous experience in the regulation of the installation we have no reason to consider that the operator will not be able to comply with the techniques and standards described in the BAT Conclusions.

2.3 Requests for Further Information during determination

Although we were able to consider the Regulation 60 Notice response generally satisfactory at receipt, we did in fact need more information in order to complete our permit review assessment, and issued further information

request on 22 May 2015. A copy of the further information request was placed on our public register.

In addition to the responses to our further information requests, we received additional information during the determination from the Operator relating to the kiln emissions on 19 January 2016, 1 March 2016 and 25 May 2016. We made a copy of this information available to the public in the same way as the responses to our information requests.

3 The legal framework

The Consolidated Variation Notice will be issued, if appropriate, under Regulations 18 and 20 of the EPR. The Environmental Permitting regime is a legal vehicle which delivers most of the relevant legal requirements for activities falling within its scope. In particular, the regulated facility is:

- an *installation* as described by the IED;
- subject to aspects of other relevant legislation which also have to be addressed.

We consider that by issuing the Consolidated Variation Notice, it will ensure that the operation of the Installation complies with all relevant legal requirements and that a high level of protection will be delivered for the environment and human health.

We explain how we have addressed specific statutory requirements more fully in the rest of this document.

Annex 1: decision checklist regarding relevant BAT Conclusions

BAT Conclusions for the production of cement, lime and magnesium oxide, were published by the European Commission on 9 April 2013. There are 69 BAT Conclusions; 1 and 2 are generally applicable, 3 – 29 apply to the cement industry, 30 – 54 apply to the lime industry, and 55 – 69 apply to the production of magnesium oxide. This annex provides a record of decisions made in relation to each relevant BAT Conclusion applicable to the installation. This annex should be read in conjunction with the Consolidated Variation Notice.

Our assessment of the overall status of compliance with the BAT conclusion is indicated in the table as:

NA	Not Applicable
CC	Currently Compliant: we have reviewed the information available to us and consider that it provides sufficient evidence to show that the operator is currently compliant with the BAT conclusion, and we have no reason to believe that this will change before the implementation date.
FC	Compliant in the future (within 4 years of publication of BAT conclusions): we have reviewed the information available to us and consider that it provide sufficient evidence to show that the operator has suitable plans in place to ensure that they will be compliant with the BAT conclusion by the implementation date.
NC	Not Compliant

BAT Conclusion No	Summary of BAT Conclusion requirement for production of cement, lime and magnesium oxide	Status NA/ CC/ FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
3-29 55-69	BAT Conclusions that are not applicable to this installation	**NA**	BAT Conclusions 3 – 29 inclusive are not applicable as they apply to cement industry only. BAT Conclusions 55 – 69 inclusive are not applicable as they apply to the magnesium oxide industry only.
1	In order to improve the overall environmental performance of the plants/installations producing cement, lime and magnesium oxide, production BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the listed features.	**CC**	An EMS certified to ISO14001 is in place.
2	In order to reduce/minimise noise emissions during the manufacturing processes for cement, lime and magnesium oxide, BAT is to use a combination of the listed techniques.	**CC**	Tata Steel UK Ltd carries out both occupational and environmental noise monitoring surveys. Data collected in these surveys is used to identify potential noise sources and an improvement programme is in place to minimise noise from these sources. Equipment such as compressors are replaced over time by more energy efficient and less noisy equipment. Stone chutes are lined, and buildings are maintained to provide sound containment. The operations at Tata Steel UK Ltd use a combination of the noise reduction and management techniques listed in the BATC.
30	In order to reduce all kiln emissions and use energy efficiently, BAT is to achieve a smooth and stable kiln process, operating close to the process parameter set points by using the listed techniques.	**CC**	The kilns at Tata Steel UK Ltd are operated using a modern computer based control system. Kiln operations are covered by safety, quality and environmental management systems. Various parameters are taken into consideration, such as production rates, product quality, temperatures and pressures to monitor and maintain smooth and stable operations. Solid fuels are not used at Tata Steel UK Ltd.
31	In order to prevent and/or reduce emissions, BAT is to carry out a careful selection and control of the raw materials entering the kiln.	**CC**	The limestone input to the kilns is from a single source location and has consistent properties. It has a high calcium carbonate content with a low sulphur component. It is washed effectively during the process to remove impurities.

BAT Conclusion No	Summary of BAT Conclusion requirement for production of cement, lime and magnesium oxide	Status NA/ CC/ FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
32	BAT is to carry out monitoring and measurements of process parameters and emissions on a regular basis and to monitor emissions in accordance with the relevant EN standards or, if EN standards are not available, ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality. Particulate matter (PM) Oxides of Nitrogen (NOx) Oxides of Sulphur (SOx) Carbon monoxide (CO) Hydrogen Chloride (HCl) Hydrogen Fluoride (HF) Total organic carbon (TOC) Dioxins and Furans (PCDD/F)	**CC** **FC**	BAT is in place for BAT conclusion 32 a – d, and 32 g a. all appropriate process parameters are measured and used for kiln control and to demonstrate kiln stability. The installation utilises, monitors and controls the lime-burning process via numerous in-process sensors including temperature, air pressure, air flow and gas CV. These sensors are linked and provide continuous signals to digital control systems b. Critical process parameters are monitored; stone is metered in via calibrated load cells and the gas fuel and air are metered. c. Periodic monitoring of dust, NOx, SOx and CO is carried out by appropriate MCERTS analysers. d. No waste is incinerated, so HCl and HF is not measured g. Periodic measurements of non-kiln dust emissions are undertaken by an accredited testing organisation. Refer to Key issues section and derogation request outcome. BAT 32 e and f: Monitoring of TOC, PCDD/F and metals is not routinely undertaken as "there is no permit requirement to do so". Due to the nature of the raw material and fuel, high levels of these pollutants is not likely, and this was confirmed for PCDD/F with a sampling exercise carried out after the last permit review. We are including the requirement to carry out annual periodic monitoring to ensure compliance with BAT. Refer to Key issues section 2.
33	In order to reduce/minimise thermal energy consumption, BAT is to use a combination of the listed techniques.	**CC**	Tata Steel UK Ltd, RFI have stated that the thermal energy consumption of the kilns at Shapfell is within the range of 3.2-4.2 GJ/tonne of product as specified in table 4.6. (BAT-associated levels for thermal energy in the lime and dolomite industry.) This has been accepted. The following techniques are used at Tata Steel UK Ltd to minimise thermal energy consumption:

BAT Conclusion No	Summary of BAT Conclusion requirement for production of cement, lime and magnesium oxide	Status NA/ CC/ FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			• Process control optimisation, ensuring consistent kiln parameters which controls product quality and production costs as well as minimizing energy consumption. The inputs to this control system include temperature monitoring throughout the kilns, product quality, input gas calorific value and kiln pressures. The process control system is an automated one, and any alterations to parameters are changed only with reference to the management system in order to ratify and record changes. • The use of a contract-specified feed stone size to minimise raw stone variability, maximising calcination as defined through a loss-on-ignition (LOI) test. • Minimisation of planned kiln shutdowns and the associated additional fuel usage on startup, by optimising kiln throughputs to match sales requirements. Good kiln management techniques also extend refractory life, maintaining improved thermal efficiency throughout the kiln life. • Maintaining excellent kiln availability (circa 98% typically) to minimise unplanned shutdowns with the associated increased fuel usage upon restart. Efficient maintenance also minimises direct heat loss, air and fuel leaks from the kilns.'
34	In order to minimise electrical energy consumption, BAT is to use one or a combination of the listed techniques.	**CC**	To minimise electrical energy usage Tata Steel UK Ltd uses process optimisation and energy management techniques to ensure an efficient process. Numerous electricity meters are installed throughout the site which provide a record of usage. The site's engineering department undertakes reviews of these meters. Systems are in place to minimise electricity usage, especially during electricity supply triad periods. There has been a recent change to LED lighting throughout the site, along with optimisation of switch placement and utilisation of timers. There is a policy of switching plant, equipment and lighting off when not in use.
35	In order to minimise limestone consumption, BAT is to use one or a combination of the listed techniques	**CC**	Limestone is purchased to a quality specification that includes size parameters. Daily monitoring is undertaken to ensure consistency.

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36	In order to prevent/reduce emissions, BAT is to carry out a careful selection and control of fuels entering the kiln	**CC**	Natural gas is the only fuel utilised in lime burning at Tata Steel UK Ltd. This gives consistent burning characteristics and minimises pollutants
37	In order to guarantee the characteristics of waste to be used as fuel in a lime kiln, BAT is to apply the listed techniques:	**NA**	Tata Steel UK Ltd does not use waste as a fuel in the kilns.
38	In order to prevent/reduce emissions occurring from the use of waste fuels into the kiln, BAT is to use the listed techniques	**NA**	Tata Steel UK Ltd does not use waste as a fuel in the kilns.
39	In order to prevent accidental emissions, BAT is to use safety management for the storage, handling and feeding into the kiln of hazardous waste materials	**NA**	Tata Steel UK Ltd does not use waste as a fuel in the kilns..
40	In order to minimise/prevent diffuse dust emissions from dusty operations, BAT is to use one or a combination of the listed techniques	**CC**	Tata Steel UK Ltd employs a number of BAT techniques to minimise and prevent dust emissions from dusty operations, including; the mills are within a building vented via a bag filter unit, conveyors and elevators are enclosed, preventative maintenance includes cleaning, material handling within closed systems. Fugitive dust is not an issue at the site, which is generally clean and dust free.
41	In order to minimise/prevent diffuse dust emissions from bulk storage areas, BAT is to use one or a combination of the listed techniques	**CC**	Tata Steel UK Ltd RFI response lists the techniques used to minimize / prevent diffuse dust emissions from bulk storage areas. 1. The minimisation of stocked tonnages. This having economic benefits as well as environmental ones. Only limestone can be stored externally, as lime must remain covered at all times to prevent hydration. All imported limestone is washed prior to arrival, then secondary washing is carried out, so that subsequent stocks have a low fines content which reduces that available to be wind blown.

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			2. External stockpiles tonnages are minimised and are situated in lower-lying areas of site where they are protected from wind by the landform, buildings and vertical greenery. 3. Once fed to the plant, all limestone and lime stocks are enclosed within silos or covered conveyors. Fabric filters are placed on lime conveyor transfer points and on the main lime storage bunkers. 4. Internal roads and stocking areas are watered by bowser as weather conditions dictate, and a roadsweeper is employed on the days when limestone is imported. 5. Stocking areas have mainly been converted to hardstanding areas to increase the effectiveness of cleaning, and to reduce the amount of wheel lift-off from wagons and shovels. 6. Speed limits on vehicles are reduced to below 15mph to minimize vehicular dust. 7. A vacuum cleaning system is installed on the lime handling system to allow the more effective cleaning of lime. 8. Good housekeeping practices are employed, monitored, managed and recorded. Bullet points 2,3 & 4 satisfy BATC the other points are also good practise but not specifically stated in BATC
42	In order to reduce channelled dust emissions from dusty operations other than those from kiln firing processes, BAT is to use one of the listed techniques and to use a maintenance management system which specifically addresses the performance of filters	**NC** **FC by 2017**	Fabric filters are applied to channelled dust emissions such as major conveyor transfer points. They are subject to both inspection and maintenance regimes. Regular inspections are carried out on the external aspects of the filter with an at least annual internal inspection and performance report. These inspections are used to define maintenance plans to ensure satisfactory performance of the filtration system to external environments. Replacement filters are designed to be less than 10mg/Nm3 In addition to A5 and A6 identified in the permit the operator supplied a list of 8 small volume (typically 5600 Nm^3/hr) emission points . There is no means to measure

BAT Conclusion No	Summary of BAT Conclusion requirement for production of cement, lime and magnesium oxide	Status NA/ CC/ FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			particulates emitted from these discharge points. All filters are managed through an engineering maintenance regime, and their function is alarmed should a fault develop. Surrogate monitoring through measuring differential pressure and flow is undertaken monthly. The Shift Supervisor carries out a visual inspection daily.' A site visit in July 2015 confirmed there is no way to measure these points
43	In order to reduce dust emissions from the flue-gases of kiln firing processes, BAT is to use flue-gas cleaning with a filter. One or a combination of the listed techniques can be used	**NC**	Wet scrubber technology is used at Tata Steel UK Ltd to control kiln flue-gas emissions below 20 mg/Nm^3. (Current permit limit 50mg/Nm^3 on all 4) The technique of using venturi plate modifications to traditional wet scrubber design has been pioneered at Tata Steel UK Ltd. As the scrubbers have been replaced the venturi plate technology has been added. Maintenance and inspection procedures are in place to ensure ongoing efficiency. They have been shown to work initially, however over time their efficiency drops. This efficiency drop is still being investigated as the drop happens over a number of years. Refer to Annex 2 derogation.
44	In order to reduce the emissions of gaseous compounds (i.e. NOx, SOx , HCl, CO, TOC/VOC, volatile metals) from the flue-gases of kiln firing processes, BAT is to use one or a combination of the listed techniques	**CC**	Gaseous compounds are controlled at Tata Steel UK Ltd through selection of raw materials (high purity limestone), use of a clean fuel (natural gas), and controlled production parameters.
45	In order to reduce the emissions of NOx from the flue-gases of kiln firing processes, BAT is to use one or a combination of the listed techniques	**CC**	Use of natural gas as a fuel, along with consistent production parameters ensures low NOx emissions. Limit already 100mg/m^3 on 4 kilns this is retained.
46	When SNCR is used, BAT is to achieve efficient NOx reduction, while keeping the ammonia slip as low as possible, by using the listed technique	**NA**	BAT not applicable as the installation dos not use SNCR.

BAT Conclusion No	Summary of BAT Conclusion requirement for production of cement, lime and magnesium oxide	Status NA/ CC/ FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
47	In order to reduce the emissions of SOx from the flue-gases of kiln firing processes, BAT is to use one or a combination of the listed techniques	**CC**	Limestone feedstock and natural gas fuel have low sulphur content. The BAT-AEL is a range up to 200mg/Nm^3 and current limit is 300 mg/Nm^3. Historic operation and monitoring returns indicate that compliance with the tighter limit is achievable and the operator states that no derogation is required or requested.
48	In order to reduce the emissions of CO from the flue-gases of kiln firing processes, BAT is to use one or a combination of the listed techniques	**CC**	The limestone feedstock has a low organic compound. The pre-kiln washing process cleans the stone further. Production parameters ensure stable and complete combustion. The BAT-AEL is 500mg/Nm^3 and the current installation ELV is 50mg/Nm^3. The existing limit (of 50mg/Nm^3) is to be retained within the permit as it is achievable.
49	In order to minimise the frequency of CO trips when using electrostatic precipitators, BAT is to use the listed techniques	**NA**	BAT not applicable as the installation does not use ESP on the main kiln exhaust.
50	In order to reduce the emissions of TOC from the flue-gases of kiln firing processes, BAT is to use one or a combination of the listed techniques	**CC**	General primary techniques and monitoring are applied at Tata Steel UK Ltd. (See BAT 30-32 responses.) The limestone feedstock used at Tata Steel UK Ltd has a low VOC content. The BAT-AEL of 30mg/Nm^3 has been applied in the permit. This is a new monitoring requirement on the permit as required by the BATC. Refer to key issues Section 1.
51	In order to reduce the emissions of HCl and the emissions of HF from the flue-gas of kiln firing processes, when using waste, BAT is to use the following primary techniques	**NA**	Tata Steel UK Ltd only uses natural gas as a fuel which is low in chlorine and fluorine. BATC51 is applicable when burning wastes. Tata Steel UK Ltd installation does not utilise waste fuels and as such no ELV has been included in the permit.
52	In order to prevent or reduce the emissions of PCDD/F from the flue-gas of kiln firing processes, BAT is to use one or a combination of the listed primary techniques	**CC**	Only natural gas fuel is utilised at Tata Steel UK Ltd, which has a low chlorine content. No copper is introduced through the fuel. Flue gases have a minimal residence time in zones of the relevant temperature range. The BAT-AEL of <0.05-0.1 ng PCDD/F I-TEQ /Nm^3 30mg/Nm^3 has been applied in the permit. This is a new monitoring requirement on the permit as required by the BATC. Refer to key issues section 1

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53	In order to minimise the emissions of metals from the flue-gases of kiln firing processes, BAT is to use one or a combination of the listed techniques	**CC**	The natural gas utilised at Tata Steel UK Ltd has a low metals content. Waste fuels are not used. The limestone feedstock has a low mercury content. Wet scrubbers are used at Tata Steel UK Ltd to remove particulates, including metals from the flue gases. Tata Steel UK Ltd installation does not utilise waste fuels and as such no ELV has been included in the permit
54	In order to reduce the solid wastes from the lime manufacturing processes and to save raw materials, BAT is to use the listed techniques	**CC**	Wherever possible and within quality control restraints, kiln dust is recovered at Tata Steel UK Ltd. Any excess can be handled by external recovery companies for beneficial recovery purposes such as agricultural soil improvement. The use of landfill for disposal is a 'last resort' in accordance with the waste hierarchy.

Key Issues

Where relevant and appropriate, we have incorporated the techniques described by the Operator in their Regulation 60 Notice response as specific operating techniques required by the permit, through their inclusion in Table S1.2 of the Consolidated Variation Notice.

We have reviewed the limits and monitoring requirements for all emissions at the installation to ensure that they are in accordance with the requirements of the BATCs. The review includes emission points, many fairly small, not currently listed in the permit. The Operator provided a comprehensive list of all channelled dust emissions together with an indication of volumetric flow rate to enable us to assess inclusion and appropriate monitoring.

The general approach is that dust emissions >10,000 Nm^3/h are listed individually, have a dust limit applied (in accordance with the BAT-AEL for the type of abatement) with a monitoring requirement to demonstrate compliance. Dust emissions <10,000 Nm^3/h, which are deemed "small sources" by the BATCs, are included as group.

Section 1 covers emission limits and section 2 covers monitoring.

1. Emission limit changes: BATc 42, 43, 50 and 52

Changes to some emission limits and the introduction of new ones are required to ensure compliance with the BAT Conclusions. All the new and revised limits apply from 9 April 2017, the compliance date.

The following table provides an overview of emission limits within permit tables S3.1 and S3.2, with changes highlighted in bold text:

Overview of changes to emission limit values:

Parameter	**ELVs (mg/m^3)**		
Kiln emissions (permit table S3.1):	**Previously: Variation V002 *(superseded by this variation)***	**New Limit: (Variation V003) Limits valid from 9 April 2017**	**BAT-AEL mg/Nm^3**
Particulate matter (mg/Nm^3)	50	**K1-30 (1) K2-20 K3-20 K4-30**	<20
NOx (mg/Nm^3)	100	100	100 – 350
SOx (mg/Nm^3)	**300**	**50**	<50 – 200
CO (mg/Nm^3)	50	50	<500
TOC (mg/Nm^3)	No previous limit	**30**	<30
Dioxin & furans PCDD/F (ng/Nm^3)		**0.1**	<0.05-0.1 (ng/Nm^3)

Non-kiln dust emissions (permit table S3.2):			
A5, A6 (ng/Nm^3)	30	**10**	<10
A7-A14 (ng/Nm^3)	No previous limit	**10**	<10
All other abated channelled dust emissions (<10,000Nm^{3}hr)	No previous limit	**10**	10

(1) The tighter limit of 30mg/Nm^3 will apply for Kiln 1 following the introduction of venturi scrubbers at the next kiln shutdown after the 9 April 2017. The actual date of kiln shut down was not available at the time of issuing the permit.

a. TOC and PCDD/F :

The BAT conclusions introduce BAT-AELs for TOC (BATC 50) and dioxins/furans (BATC 52) in kiln emissions, despite the fact that we do not expect to find these parameters in significant quantities due to the nature of the process and fuel used. A limit is now included for each parameter in line with the BAT-AEL, applied from the compliance date.

All other kiln parameters (NOX and CO) have existing limits which are within the BAT-AEL, so these limits are retained.

b. Dust:

Non kiln dust emissions are all abated by filters and hence every dust limit is reduced to 10 mg/Nm^3, in line with the BAT-AEL for fabric filters set by BATC 42 and 43, non-kiln and kiln emissions. Kiln emissions are abated using venturi scrubbers with a Bat-AEL of <20 mg/Nm^3. These emission points were subject to a derogation and ELVs were set appropriate to the outcome of the derogation review. Refer Annex 2.

The group "*all other channelled dust emissions abated by fabric filters*" is provided as a catch-all for non-listed "small source" emission points provided with abatement as these need a dust emission limit set in line with BATC 42. This group consists of abated emission points, mainly from silos and transfer points.

Information provided by the operator indicates that emission points A7-A14 have air flow <10,000 m^3/hr. These are bag filters relating to lime transfer points and can be regulated through a maintenance management approach.

Table S3.2 also lists the group "All other non-channelled dust emissions". No limit is set for these emissions, as the BATC applies to "channelled" emissions, however the requirement to maintain them is included within the table.

2. BATC32 Frequency of monitoring

The basis for choosing a frequency and method (continuous or periodic) of monitoring of emissions included reference to the BATC, an assessment of the mass of release, potential impacts, previous compliance history and process variability. The results are summarised here and reflect the permit conditions.

Referring to BATC 32 c-g, there are no specific regulatory requirements defined in the BREF other than the statement "continuous or periodic" for the parameters dust, NOx, SOx, CO, TOC, HCl and HF. For PCDD/F and metals, it is periodic only. Each emission point has been assessed to decide if it should be monitored continuously or

periodically, and if the latter, the frequency of sampling has been decided based upon risks posed. We have taken into account the history of compliance as well as the scale and impact of a potential release in setting the monitoring requirements.

a. Kiln dust, NOx, SOx and CO (BATC 32c):
The kiln releases have been monitored periodically for particulates. From the compliance date (9 April 2017), we are increasing the frequency of sampling in-line with the derogation outcomes and associated improvement condition.

The dust monitoring frequency is initially set at quarterly as there have been some exceedances of the (higher) ELV over the past year, and we would like to be confident that the new limit of 20mg/Nm^3 is complied with. This frequency can be reviewed once compliance with the new lower limit is demonstrated.

The frequency of periodic monitoring for NOx, SOx and CO is retained 6 monthly, however the reference period is increased from 30 minutes to 1 hour minimum, to enable more reliable, accurate results.

b. Kiln TOC, Dioxins/Furans and metals (BATC 32e, f):
The BATc description states that for periodic measurements of PCDD/F, TOC and metal emissions "*a frequency appropriate to the raw materials and fuels that are used in the process should be applied*". Due to the nature of the raw material (high purity, washed limestone) and fuel (natural gas), we do not expect high levels of these pollutants to be emitted. This was confirmed for PCDD/F with a sampling exercise carried out after the last permit review.

IED article 14(d) requires a demonstration of compliance at least annually against permit conditions. As an ELV is being set for TOC and PCDD/F, an annual compliance check is required, so we are setting periodic monitoring at a minimum frequency – **annual**.

In the UK, dioxin monitoring trials have taken place at many different lime kilns and the highest concentration recorded was 0.017 ng I-TEQ/Nm^3, which is only 17% of the relevant BAT AEL. Most results were much lower than this. UK plants use natural gas as a fuel and do not burn any waste materials, and so the chloride input and the risk of high dioxin emissions is minimal. A risk-based approach would suggest that frequent dioxin monitoring is not required at lime kilns in the UK, unless there is a significant change in fuel, raw materials or residence time in the critical 300°C to 400°C temperature window.

An alternative protocol for dioxin monitoring, taking into account the known risk factors leading to dioxin formation has been adopted:

> A dioxin and furans PCDD/F test by an approved MCERTS contractor will be carried out on one kiln of each type per site. Provided the result is well below the limit of 0.1 ng/Nm^3 and the fuel type (natural gas) does not change and the stone feed type does not change and there are no significant kiln process changes (e.g. new type of burner, change in physical configuration of the kiln which affects internal kiln gas flow) then that result will stand for a maximum of four years. A report will be written confirming the no change in operation and issued to the Environment Agency on an annual basis. Any changes will require a new baseline dioxin year to be established.

This protocol (a combination of a baseline measurement to prove that current emissions are well below the ELV and assessment of surrogate parameters to

ensure that the risk of high dioxin concentrations remains minimal) would be adequate to demonstrate compliance with the ELV, without the cost burden of annual monitoring for each kiln.

There is no limit for emissions of metals when not burning waste, so monitoring is not required.

c. Non-kiln dust (BATC 42):
We have applied a periodic monitoring frequency appropriate to the scale of the release, process variability and environmental risk :

For all emissions clearly <10,000 Nm^3/h, no periodic monitoring is set as these are regarded as "small sources" by BATC 32 which states that "*for small sources, the frequency of the measurements should be based on a maintenance management system*". This includes the emission group "*all other channelled dust emissions*" and a maintenance management system is now required to ensure compliance.

The group "*all other non-channelled dust emissions"* do not have an ELV set, however the maintenance management system is also applied to ensure dust emissions are minimised.

All periodic dust monitoring has a reference period of 30 minutes (minimum). This is considered to be an appropriate period for these emissions.

Emission point	Parameter	Type of monitoring	Frequency	Reference period
A1, A2, A3, A4 (kilns)	Particulates	Periodic	Quarterly/ 6 monthly	Min 30 min
	NOx, SOX, CO	Periodic	6 monthly	Min 30 min
	TOC	Periodic	Annually	Min 30 min
	PCDD/F	Periodic	Annually (1)	6 – 8 hr
A5, A6	Particulates	Periodic	6 monthly	Min 30 min
All other abated emission points	Particulates	Maintenance schedule		

(1) See section 2 above in relation to agreement for dioxin sampling.

We have set monitoring methods according to our monitoring guidance note, M2.

Monitoring - Reference conditions
The reference conditions for reporting measured emissions from non-combustion sources has been changed by the BATCs from no correction required for temperature, pressure, oxygen or water vapour content, to reporting **dry at Standard temperature and pressure (STP)** with no correction for oxygen, and for lime hydrating plants, **at STP** with no correction for oxygen or water vapour. The Schedule 6 interpretation has been updated for this change.

The length of sampling period can vary from ½ hour to 6-8 hours depending on the sampling strategy and standard used. For compliance purposes the selection of sampling period reflects the likelihood of variance, potential impacts and the

frequency of sampling. In general terms smaller releases with limited potential for impact have sampling frequencies as low as ½ hour. Larger releases, or where compliance is based on infrequent sampling, have a longer sampling period to allow it to be more representative.

Annex 2: Assessment, determination and decision where an application(s) for Derogation from BAT Conclusions with associated emission levels (AEL) has been requested.

The IED enables a competent authority to allow derogations from BAT AELs stated in BAT Conclusions under specific circumstances as detailed under Article 15(4):

'By way of derogation from paragraph 3, and without prejudice to Article 18, the competent authority may, in specific cases, set less strict emission limit values. Such a derogation may apply only where an assessment shows that the achievement of emission levels associated with the best available techniques as described in BAT conclusions would lead to disproportionately higher costs compared to the environmental benefits due to:

(a) the geographical location or the local environmental conditions of the installation concerned; or

(b) the technical characteristics of the installation concerned.

The competent authority shall document in an annex to the permit conditions the reasons for the application of the first subparagraph including the result of the assessment and the justification for the conditions imposed. '

A summary of any derogations granted is also recorded in Annex 1 of the Consolidated Variation Notice in accordance with the requirement of IED Article 15(4) as described above.

As part of their Regulation 60 Notice response, the operator has requested a derogation from compliance with the AEL values included in the following BAT Conclusion as detailed below.

Tata Steel UK limited (TS), Shapfell Lime works, has requested a particulate emission derogation to reduce their current emission limits set at 50mg/Nm^3 per stack to 40mg/Nm^3 per stack for 3 operational Kilns from April 2017. This is in excess of that of BATC 43 which sets a BAT-AEL for particulate matter (PM) at <20 mg/Nm^3 for a lime Kiln wet dust separator, as the daily average or average over the sampling period (spot measurements for at least half an hour). TS have fitted venturi scrubbers to Kilns 3 and 4 and plans are in place to fit this technology to Kiln 1 in 2017.

The basis of the request relating to derogation from PM is derived from the technical characteristics of the installation pursuant to article 15(4)(b) of the Industrial Emissions Directive (IED). TS reviewed multiple criteria as defined in the DEFRA guidance: (Environmental Permitting Guidance, Core guidance, For the Environmental Permitting (England and Wales) Regulations 2010, Last revised: March 2013), and argued that many of these applied. Each request was considered in turn but the most compelling was the link to the recent history of pollution control investment.

Although information was provided in their response to allow us to commence assessment of the derogation request it was insufficient to enable us to complete the determination and further information was requested and subsequently supplied on 19 January 2016 (design of venturi scrubber), 1 March 2016 (additional Cost Benefit Analysis (CBA0 data) and 25 May 2016 (Particle size distribution data).

On review and assessment of this information we have decided to grant the derogation requested by the operator in respect to the AEL values described in BAT Conclusion 43, but have included different Emission Limit Values in the Consolidated Variation Notice that will ensure suitable and achievable protection of the environment.

As part of their response the operator stated that the reason for their derogation request was that TS invested in new venturi scrubber technology in 2009 and 2011. This was on the basis that they believed this new technology could meet a 20mg/Nm^3 limit for particulates 100% of the time. The technique of wet scrubbing is an accepted technique in the BREF document that should be able to achieve the relevant BAT-AEL. The technological change improved performance significantly on the existing old wet scrubbers which at the time were performing just within the existing permit limit of 50mg/Nm^3. Since then both venturi Scrubbers fitted on Kiln 4 & Kiln 3 have performed well below the 50mg/Nm^3 permit level and the majority of results have been below the BAT-AEL of 20mg/Nm^3. However, the BATC established a mandatory limit of 20mg/Nm^3 and the operator has struggled to maintain compliance levels below the BAT-AEL 100% of the time. As such a derogation was requested.

The way in which we have considered, assessed and determined the derogation request is detailed in the section below. The operator requested that the ELV be set at 40mg/Nm3.
In their application the operator considered 6 options for meeting the BAT AEL. They have proposed to implement the ongoing use of venturi scrubbers on all Kilns 1, 3 and 4 and rejected all the other options.

The Environment Agency has reviewed the application and concluded

The application is based on the technical characteristics of the plant (specifically the recent history of pollution control investment) and this is considered within the scope of derogations allowed under article 15(4) of the Industrial Emissions Directive. This decision is based on the evidence provided showing the fitting of venturi scrubbers on Kilns 3 and 4. The BAT Conclusions for Cement, Lime and Magnesium Oxide (CLM) identifies the utilisation of venturi scrubbers are appropriate for this industry.

- Tata Steel applied for a derogation based on the technical characteristics of the plant. This is within the scope of derogations allowed under article 15(4) of the Industrial Emissions Directive with the criteria that meets it (in bold) below. Tata Steel reviewed multiple criteria as defined in the DEFRA guidance and argued that many of these

applied. Each request was considered in turn but the most compelling was the link to the recent history of pollution control investment. The local environmental conditions for the site location do not meet with our understanding of being remote but it is an additional factor in support of this derogation decision as receptors are not adversely impacted by it.

- Under '***recent history of pollution control investment in the installation in respect of the pollutant**' (PM),* The operator invested in new venturi scrubber technology in 2009 and 2011. This was on the basis that they believed this new technology could meet a 20mg/Nm^3 limit 100% of the time. The technological change improved performance significantly on the existing old wet scrubbers which at the time were performing just within the current permit limit of 50mg/Nm^3. Since then both venturi Scrubbers fitted on Kiln 4 & Kiln 3 have performed well below the permit level and the majority of results have actually been well below the BAT-AEL of 20mg/Nm^3. This investment in venturi scrubbers has already been made for Kiln 3 & 4 and for Kiln 1 the same change is planned in the next half of this financial year (2016-17).

- Tata Steel also referred to the criteria ***'to meet with the general investment cycle'*** *i.e. for TS at Shapfell this is every 10 years (campaign) when the Kiln's refractory lining needs replacement (Kiln re-line) and coincides as planned with the scrubber replacement programme which is also based on their 10 year life.* If TS reduced the 10 yearly cycle they would also be '***stopping the activity to install equipment*.** The lime Kilns are a continuous process and the integrity of the refractory lining depends on the Kilns being held constantly at the high temperatures (required for calcining the limestone). Therefore it's very desirable that the timing of fitting abatement equipment has to coincide with Kiln shut down/re-line or there is the risk of significant costs or damage to the Kiln lining.

- TS made an argument for derogation under the criteria '***the configuration of the plant.'*** All four of Shapfell's Kiln structures were designed to support wet dust scrubbers including venturi scrubbers with short stacks directly on top of the Kilns. Alternative types of abatement plant e.g. bag filters cannot be installed in the same location due to their size and weight and the need to remove dust from the bottom of them. In order to achieve this, new additional engineering is needed including ducting down to the base of the site, building new high stacks for dispersion and the additional fans that would be needed to assist the exhaust gas flow. However the additional costs of this 'additional engineering' compared to the overall project costs when the Kilns are being re-lined and abatement being purchased is less than 10% of the overall CAPEX for Kilns 1 & 4 and therefore it has been considered this is not a factor in itself for ruling out an abatement change in the future i.e. at Kiln reline cycles. For Kiln 3 the extra costs of the engineering plus additional heating push it just over the 10% CAPEX cost of a new filter therefore it is a factor taken into account. To conclude, it is technically possible to install bag filtration systems but this would be at ground level and incur significant costs.

- Kiln 3 is a special case, it has 'three' shafts, rather than 'two' like all the other Kilns on site making it more energy efficient. This means there are increased heat losses as exhaust gas travels through the regenerative heat capture process. By consequence the waste gas temperature is always below the dew point. This precludes the use of any dry dust abatement technology such as fabric filters unless additional heating is installed to raise the waste gas temperature. The additional heating requires extra

energy, costs and produces extra CO2 emissions. *This is clearly a case under' **configuration of the plant'** criteria and that by reducing the excess dust emissions and installing bag filters it will also have **additional impacts on emissions*** such as CO2, it reduces the *energy efficiency, and increases additional bag filter dust (possibly hazardous waste) that will need disposing.*

- The Shapfell site is located away from large urban areas, which means that the population exposed to emissions from the site is smaller than would be the case for more typical installations, and the benefit of reducing emissions is correspondingly smaller. This location means the environmental benefits of meeting the BAT-AEL are more disproportionate to the costs. This is also borne out by previous dust impact assessments showing insignificant impacts during the permitting of the site even at current emission levels of 50mg/Nm^3.

The request for a derogation for Kiln 3 has been rejected on the basis that the historical emissions monitoring data does not support the claim that the kiln, when using venturi scrubbers) cannot achieve the BATAEL by April 2017.

The operator has provided a credible argument that the increased costs for achieving the BAT AEL are linked to the technical characteristics of the installation. The operator showed that alternative techniques, such as bag filters, would be inappropriate due to costs at this installation compared to the proposed solution of venturi scrubbers. The assessment included a review of the Cost benefit analysis argument presented, consideration of the particle size distribution and the potential costs associated with ducting exhaust gases to ground level. The extra costs linked to the utilisation of bag filtration systems compared to the benefits were assessed and considered disproportionate.

That the operator has demonstrated that the costs of achieving the BAT AEL by April 2017 are disproportionate to the environmental benefits. The current ELVs provide a high level of environmental protection with the impact of particulate releases considered insignificant. The venturi scrubbers can provide BATAEL levels of protection for Kiln 3 but for Kilns 1 and 4 further optimisation is required as achieving the BATAEL appears subject to Kiln design and operating conditions. Tightening the Emission Limit Values (ELV) further to 20mg/Nm^3 for Kiln 3 and 30mg/Nm^3 for Kilns 1 and 4 will ensure ongoing environmental protection.

The Environment Agency is therefore minded to allow this derogation request subject to the following conditions.

- Kiln 3 - ELV will be set at the BATAEL level of 20mg/Nm^3
- Kilns 1 and 4 - the ELV will be set at 30mg/Nm^3
- *An improvement condition based on the following:*

The operator shall establish a programme of enhanced testing of particulate releases on kiln 1 and 4 (as agreed in writing with the EA) to establish criteria for optimal performance to minimise release below a level of 20mg/Nm^3. The programme shall include sampling a minimum of 4 times per year for two years on kilns 1 and 4

Annex 3: Improvement Conditions

Based on the information in the Operator's Regulation 60 Notice response and our own records of the capability and performance of the installation at this site, we consider that we need to set improvement conditions so that the outcome of the techniques detailed in the BAT Conclusions are achieved by the installation. These improvement conditions are set out below - justifications for them is provided at the relevant section of the decision document in Annex 2.

We also consider that we need to set improvement conditions relating to changes in the permit not arising from the review of compliance with BAT conclusions. The justifications for these are provided in Annex 5 of this decision document.

The opportunity has been taken to delete completed improvement conditions from the permit but we have retained the numbering in the table to allow reference still to be made to completed improvement conditions.

Completed improvement conditions

The following table lists the improvement conditions contained with permit V003. These have been deemed complete and are therefore being removed from the permit.

Reference	Improvement Condition	Completion date
IC1	The operator shall carry out an exercise to characterise the variation in levels of sulphur in the local limestone deposits and provide an assessment of future SO_2 releases from the kilns when using this source of limestone	Completed
IC2	The operator shall produce and submit a project plan setting out how releases of particulates in the exhaust gases from the kilns will be minimised and at least reduced to <20 mg/m^3 as averaged over a sampling period of at least half an hour by the target date of 30 June 2014. The project plan will be based on consideration of costs and benefits of all relevant options and using options appraisal methodology H1 or equivalent.	Completed
IC3	The operator shall produce and submit a project plan setting out how releases of particulates from all significant non-kiln sources will be minimised and at least reduced to <20 mg/m^3 as averaged over a sampling period of at least half an hour by the target date of 30 June 2014. The plan will have a prioritised approach for reducing particulate releases from these sources, and will be based on consideration of costs and benefits of all relevant options and using options appraisal methodology H1 or equivalent	Completed

Reference	Improvement Condition	Completion date
IC4	The operator shall carry out an exercise, agreed in writing with the Environment Agency, to characterise the releases of NOx, CO, particulates and SO2 in the exhaust gases from the kilns, and submit a risk based plan describing any changes to monitoring arrangements that will be taken including consideration of installing continuous monitors, or more frequent periodic monitoring as described in the Sector Guidance Note for the Lime Sector (EPR3.01b).	Completed
IC5	The operator shall carry out a sampling exercise to monitor dioxins and furans from one representative lime kiln on site, and send the results of the monitoring to the Environment Agency. The results of monitoring for dioxin and furans on the kiln obtained in the previous 12 months prior to this variation may be submitted instead of carrying out this sampling exercise. The results will be used to decide whether any future monitoring is required.	Completed
IC6	The operator shall carry out a sampling exercise to monitor suspended solid discharges from the kiln site settlement lagoons (W1) and quarry settlement lagoons (W2) during periods of heavy rainfall. The results of the monitoring shall be used to assess the effectiveness of the bypass channel system for quarry settlement lagoons and determine whether any further improvements to both the kiln site settlement lagoons and quarry settlement lagoons are required. A report summarising the findings shall be submitted to the Environment Agency and include if necessary details and timescales for completing any improvements identified. The findings of the report shall be used as the basis for setting daily suspended solid limits for W1 and W2.	Completed

New Improvement conditions

The following are improvement conditions set at this permit variation:

Reference	Improvement Condition	Completion date
IC7	The operator shall undertake a review of the baseline report (as provided in response to our Regulation 60 Notice issued), and submit a report to the Environment Agency for approval in writing. The review shall include the at least the following:- • Reference to historical spillages, the chemicals involved and locations so as to inform and supplement existing location of chemicals and storage tanks. • Reference made to EQS's as opposed to ICRCL criteria for assessing contamination, specifically "Industrial emissions Directive Draft EPR Guidance on Part A installations.' Dated March 2011 by DEFRA which gives guidance in section 5.8 - 5.13 on baseline reports, and Annex 3 that indicates the EQS's required for assessment. Where the review establishes that additional baseline data is required, the operator shall provide details of the data to be collected (to ensure that all areas containing potential hazardous substances are assessed) together with a proposed date for submission of an updated baseline report. Any updated baseline report shall include a monitoring plan (for the testing of soil every 10 years and groundwater every 5 years) in consideration of condition 3.1.5 of this permit unless demonstration can be made that this is not required.	30/11/17
IC8	The operator shall establish a programme of enhanced testing of particulate releases on kiln 1 and 4 (as agreed in writing with the EA) to establish criteria for optimal performance with the aim to minimise releases below a level of 20mg/Nm^3. The programme shall include sampling a minimum of 4 times per year for two years on kilns 1 and 4.	31/06/17
IC9	The operator shall provide a report summarising an investigation into the factors affecting the uncertainty of TOC measurements from PFRK kilns. The investigation shall consider the practical application of the relevant standard when dealing with cyclical process associated with PFRK operation. Where appropriate, the operator may undertake stack sampling outside normal compliance testing to further the investigation. The final report may suggest adjustments to the method to ensure uncertainties can be minimised.	31/07/17

IC7 - The operator submitted information in response to the Regulation (60) request detailing the site condition. This has been reviewed and additional information is considered necessary to ensure it meets the requirements 'Industrial emissions

Directive EPR Guidance on Part A installations.' This has been requested through the use of an improvement condition.

IC8 – To ensure the installation of venturi scrubbers can be optimised to reduce particulate releases an improvement condition has been applied.

IC – 9 Uncertainties around the measurement of TOC from PFRK has meant that an improvement condition to investigate the factors that influence accuracy has been developed.

Annex 4: Advertising and Consultation on the draft decision

This section reports on the outcome of the public consultation on our draft decision carried out between <insert date> and <insert date> and the public drop-in event held on <insert date> at <insert venue>.
Drafting Note: Delete second part if no public drop-in event was undertaken.

The draft decision record and associated draft Consolidated Variation Notice was published and made available to view on .Gov website between the dates detailed above.

Summary of responses to consultation and the way in which we have taken these into account in the determination process.

Response received from
Brief summary of issues raised
Summary of actions taken or show how this has been covered

Annex 5: Review and assessment of changes that are not part of the BAT Conclusions derived permit review.

1. Change of Installation name

The installation name has been changed from Shapfell Works to Shapfell Lime Works, to define both the location and the type of activity undertaken. .

2. Introductory Note

The installation description has been updated to provide consistency within the cement and lime sector. We have included additional information such as the installation NGR, kiln production capacity, details of process wastes and emissions to air and water, and local sensitive receptors.

3. Table S1.1 Activities

We have reviewed Table S1.1 for all CLM sector permits, to ensure these accurately reflect the activities on each site.

We have reviewed and revised Shapfell lime works Table S1.1, specifically:

- Amended the kiln activity description to reflect EPR Sch 1 activity wording,
- Added Directly Associated Activities (DAAs) to ensure that all activities (listed and non-listed) at the installation are included,
- Amended the Limits of Specified Activity for all activities to ensure they are clearly defined.

The amended Table S1.1 is reproduced below with new and revised text identified by shaded sections:

Table S1.1 activities			
Activity reference	**Activity listed in Schedule 1 of the EP Regulations**	**Description of specified activity**	**Limits of specified activity**
AR1-AR4	Section 3.1 Part A(1)(b)	Producing lime on 4 parallel flow regenerative (PFRK) lime kilns with a production capacity of more than 50 tonnes per day	From kiln feed stockpile through screening and feed of limestone into kilns along with fuel, through to intermediate storage of quicklime product prior to further processing or despatch by road, and associated releases to air from stacks and process vents.
	Directly Associated Activity		

Table S1.1 activities			
Activity reference	**Activity listed in Schedule 1 of the EP Regulations**	**Description of specified activity**	**Limits of specified activity**
AR5	Raw materials preparation conveying and storage	Crushing and screening of limestone and its storage in hoppers and in emergency stockpile.	Crushing and screening of limestone and its storage in hoppers and in emergency stockpile.
AR6	Lime processing	Crushing, grading, storage and despatch of lime products	Receipt of lime from kilns to despatch of lime products
AR7	Product storage and despatch	Storage of product in silos and subsequent loading into mobile tankers	Storage of product in silos and subsequent loading into mobile tankers
AR8	Water discharge to controlled water	Management of site drainage and process water.	From collection of surface water drainage including reuse within site activities through to discharge to controlled waters

The Limit of activity for AR1-AR4, the lime kilns (the primary activity), has been updated and combined into one row.

4. Schedule 6 Interpretation

Schedule 6 has been revised to remove interpretations which are no longer relevant, and introduce new ones, such as the Industrial Emissions Directive (IED). The standard tables for TEF Schemes for dioxins and furans has been retained as monitoring for PCDD/F is now required for lime works regardless of whether a waste-derived fuel is burned.

Schedule 6 previously included an interpretation for "*management system*" which referenced the EA's Horizontal guidance Note H6, Environmental Management systems. This guidance has now been withdrawn. The Gov.uk website provides guidelines on what a management system should cover when operating a regulated industry. https://www.gov.uk/guidance/develop-a-management-system-environmental-permits It is no longer considered necessary to define management system in the interpretation section and so this interpretation has been removed.

5. Other permit changes:

IED standard conditions: this variation includes the latest IED permit template conditions: 1.4.1 (waste), 3.1.4 (soil and groundwater monitoring) and 4.3.1 (notifications)

Table S3.4 Annual limits: this table is removed as is no longer relevant.

Mothballed kilns. As of December 2016, two kilns: Kiln 2 and Kiln 4 have been mothballed due to reducing production demands. Kiln 2 was not subject to a derogation request but Kiln 4 was. If Kiln 4 is restarted the derogation exception of a limit of 30mg/Nm^3 would apply only on the basis of allowing optimising performance of venturi scrubbers. If other techniques are applied the appropriate BAT-AEL limit would apply.