

## **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 2016 (as amended)**

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

The Permit number is: EPR/WP3633KH  
The Operator is: Vivergo Fuels Limited  
The Installation is: Saltend Bioethanol Plant  
This Variation Notice number is: EPR/WP3633KH/V005

#### **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 Best Available Techniques (BAT) Conclusions.

We have reviewed the permit for this installation against the revised BAT Conclusions for the Large Volume Organic Chemicals (LVOC) industry sector published on 07 December 2017 in the Official Journal of the European Union.

Where appropriate, we also considered other relevant BAT Conclusions published prior to this date but not previously included in a permit review for the installation:

Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector (CWW), published 09 June 2016.

In this decision document, we set out the reasoning for the consolidated variation notice that we have issued.

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 BAT Conclusions (BATc) for Production of LVOC and CWW as detailed in documents reference C(2017) 7469 and C(2016) 3127 respectively. It is our record of our decision-making

process and shows how we have taken into account all relevant factors in reaching our position.

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 decision
2. How we reached our decision
3. The legal framework
4. Annex 1– Decision checklist regarding relevant BAT Conclusions
5. Annex 2 – Assessment, determination and decision where an application(s) for derogation from BAT Conclusions with associated emission levels (AEL) has been requested
6. Annex 3 – Improvement conditions
7. Annex 4 – Advertising and consultation on the draft decision
8. Annex 5 – Review and assessment of changes that are not part of the BAT Conclusions derived permit review

# 1 Our decision

We have decided to issue the variation notice to the operator. This will allow them to continue to operate the installation, subject to the conditions in the consolidated variation notice that updates the whole permit.

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 (EPR) 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 61(1) of the Environmental Permitting (England and Wales) Regulations 2016 (a Regulation 61 Notice) on **04 May 2018** 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 07 December 2021 which will then ensure that operations meet the revised standard, or
- justifies why standards will not be met by 07 December 2021, 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 61 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 61 notice response from the operator was received on **12 September 2018** and **24 October 2018** (groundwater and soil contamination).

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 **08 April 2021**. Suitable further information was provided by the operator on **28 April 2021**.

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 61 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 61 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 requests as set out below:

<p>Request for additional information sent 05 May 2021 Clarification email sent 01 June 2021</p>	<p>Responses received 28 May 2021 and 18 June 2021. Technical standards LVOC BAT Conclusion 13, CWW BAT Conclusions 1 and 12 and speciated VOCs at emission points A8 to A10</p>
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We made a copy of this information available to the public.

## 2.4 Condition of Soil and Groundwater

Articles 16 and 22 of the Industrial Emissions Directive (IED) require that a quantified baseline is established for the level of contamination of soil and groundwater with hazardous substances, in order that a comparison can be made on final cessation of activities.

We have used the LVOC permit review to regulate against the above IED requirements. Our Regulation 61 notice required operators, where the activity of the installation involved the use, production or release of a relevant hazardous substance (as defined in Article 3(18) of the IED, to carry out a risk assessment considering the possibility of soil and groundwater contamination at the installation with such substances. Where any risk of such contamination was established we requested that the operator either:

- prepare and submit a baseline report containing information necessary to determine the current state of soil and groundwater contamination; or
- provide a summary report referring to information previously submitted where they were satisfied that such information represented the current state of soil and groundwater contamination so as to enable a quantified comparison to be made with the state of soil and groundwater contamination upon definitive cessation the activity.

Where operators concluded that there were no risks of soil or groundwater contamination (due to there not being any release of hazardous substances), they were required to provide a copy of the risk assessment.

The operator provided a groundwater and soil contamination summary report dated 11 September 2018. It confirmed that prior to the production of bioethanol, various organic chemicals were produced by BP Chemicals Ltd. in this location. BP carried out widespread remediation in 2007 and 2008 before construction of the current plant. This remediation work was documented to define a baseline for transfer of the site from BP Chemicals Ltd. to Vivergo Fuels Ltd. and was included as part of the Environmental Permit Application EPR/WP3633KH/A001 submitted in 2009.

They confirmed that since permit issue, there have been two spillages of materials that could have led to a small but persistent contamination of the ground surrounding the bioethanol facility. Both of these were hydraulic oil that was spilt due to hose failures associated with suppliers vehicles when delivering wheat to the plant.

Full remediation was carried out in both instances with contaminated gravel being removed from site and disposed of as hazardous waste by a licenced contractor leaving no potential for harm to the local environment.

They conclude that there have been no incidents that have either been left unremediated or were of a scale that could have led to persistent environmental contamination.

We agree that the original baseline report is representative of the condition of the surrounding soil and groundwater.

## 2.5 Surface Water Pollution Risk Assessment

As part of our delivery of the Water Framework Directive (WFD) requirements, we need to identify and assess the impact of all sources of hazardous pollutants to surface waters from regulated industry. We use the term 'hazardous pollutants' to collectively describe substances covered by the EQSD<sup>1</sup> (priority hazardous substances, priority substances and "other pollutants"). It also applies to the specific pollutants listed in the 2015 Directions<sup>2</sup>, and substances which have operational (non-statutory) Environmental Quality Standards (EQS).

For all installations with discharges to surface water and/or sewer we required the operator, via our Regulation 61 notice, to provide a summary report of the current hazardous pollutant releases referring to the series of screening tests, which are described in our H1 risk assessment guidance, which would allow us to assess whether the emissions of hazardous pollutants from the installation are significant.

The operator has not identified the presence of any hazardous substances in the effluent. The existing permit sets limits for cadmium, mercury and nickel which are classed as hazardous pollutants. We have set an improvement condition for the operator to address the WFD requirements.

## 3 The legal framework

The consolidated variation notice is issued 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, in 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.

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<sup>1</sup> Environmental Quality Standards Directive (EQSD) (2008/105/EC, as amended by 2013/39/EU)

<sup>2</sup> The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015

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

We have set emission limit values (ELV's) in line with the BAT Conclusions, unless a tighter, i.e. more stringent, limit was previously imposed and these limits have been carried forward. For emissions to each relevant environmental receptor (i.e. air, or surface water), the emission limits and monitoring requirements have been incorporated into the consolidated variation notice via two sets of tables in Schedule 3 – Emissions and Monitoring for:

- a) the existing ELVs and monitoring requirements which are effective from the date of issue of the notice; and
- b) amended ELVs where a BAT AEL is specified in the BAT conclusions, and any associated monitoring requirements which will take effect from 07 December 2021.



## **Annex 1: decision checklist regarding relevant BAT Conclusions**

BAT Conclusions for the Large Volume Organic Chemicals industry sector were published by the European Commission on 07 December 2017. There are 19 General BAT Conclusions and a further 71 BAT Conclusions in 10 subsector-specific sections.

Where appropriate, we also considered other relevant BAT Conclusions published prior to this date but not previously included in a permit review for the installation;

23 BAT Conclusions for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector.

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.

The overall status of compliance with the BAT Conclusion is indicated in the table as:

- NA Not applicable
- CC Currently compliant
- FC Future compliant (within 4 years of publication of LVOC BAT Conclusions)
- NC Not compliant

BATc No	Summary of BAT Conclusion requirement for Production of Large Volume Organic Chemicals	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
1	Monitor channelled emissions to air from process furnaces/heaters in accordance with the described standards and minimum frequencies	NA	<p>The operator confirmed that they do not operate any equipment classified as process furnaces or heaters.</p> <p>We agree that this BAT Conclusion is not applicable to the activities carried out at the installation.</p>
2	Monitor channelled emissions to air other than from process furnaces/heaters in accordance with the described standards and minimum frequencies	CC	Refer to Key issues section below.
3	Ensure optimised combustion from process furnaces/heaters to reduce emissions to air of CO	NA	<p>The operator confirmed that they do not operate any equipment classified as process furnaces or heaters, refer to BAT Conclusion 1 above.</p> <p>We agree that this BAT Conclusion is not applicable to the activities carried out at the installation.</p>
4	Reduce NO <sub>x</sub> emissions from process furnace/heaters by using one or a combination of the described techniques	NA	<p>The operator confirmed that they do not operate any equipment classified as process furnaces or heaters, refer to BAT Conclusion 1 above.</p> <p>We agree that this BAT Conclusion is not applicable to the activities carried out at the installation.</p>

5	Prevent or reduce dust emissions from process furnace/heaters by using one or a combination of the described techniques	<b>NA</b>	<p>The operator confirmed that they do not operate any equipment classified as process furnaces or heaters, refer to BAT Conclusion 1 above.</p> <p>We agree that this BAT Conclusion is not applicable to the activities carried out at the installation.</p>
6	Prevent or reduce SO <sub>2</sub> emissions from process furnace/heaters by using one or a combination of the described techniques	<b>NA</b>	<p>The operator confirmed that they do not operate any equipment classified as process furnaces or heaters, refer to BAT Conclusion 1 above.</p> <p>We agree that this BAT Conclusion is not applicable to the activities carried out at the installation.</p>
7	To reduce emission of ammonia optimise design/operation of SCR/SNCR	<b>NA</b>	<p>The operator confirmed that this is not applicable.</p> <p>We agree that this BAT Conclusion is not applicable to the activities carried out at the installation as there is no SCR/SNCR in place.</p>
8	Increase resource efficiency/reduce the pollutant load on final waste gas treatment by using one or a combination of the described techniques on process off-gas streams (8a/b take precedence over 9)	<b>CC</b>	<p>The operator confirmed that this is not applicable for the reasons set out below:</p> <ul style="list-style-type: none"> <li>a. Recovery and reuse of excess generated hydrogen – no hydrogen is generated in the process</li> <li>b. Recovery and use of organic solvents and unreacted organic raw materials – solvents are not used and the only organic raw material is wheat. The starch component is fermented to produce ethanol and the non-fermentable solids are processed to produce animal feed.</li> </ul>

			<p>c. Use of spent air - the air emitted from most emission points is essentially at atmospheric pressure. There is no energy saving to be made using this compared with fresh air.</p> <p>d. Recovery of HCl – no HCl is used in the process</p> <p>e. Recovery of H<sub>2</sub>S - there is the potential for small amounts of H<sub>2</sub>S to be generated from the water treatment facility but there is no downstream use that would make recovery economically viable. This gas stream was flared in the early operation of the plant. It will be used to supplement the natural gas supply in dryer Regenerative Thermal Oxidisers (RTOs) when the plant re-starts. There is also the potential to directly reuse the waste water from the process rather than treating it which will remove H<sub>2</sub>S generation.</p> <p>f. Reduce solids/liquids entrainment - cyclones are used to remove solids from the dryer RTO feeds which then go into the animal feed product. Filters in the mill return the solids to the process to be used as a raw material.</p> <p>We don't agree with the operator's status of NA and have changed the status to CC.</p>
9	Increase energy efficiency/reduce the pollutant load on final waste gas treatment by sending process off-gas streams of sufficient calorific value to a combustion unit	<b>NA</b>	<p>The operator confirmed that the plant uses process integration where possible and economically viable for energy recovery. Theoretically, the off-gas from the dryer RTOs could be reused in the dryers; however the animal feed quality legislation prevents this from being done. Any other potential reuse scenarios are not economically viable.</p> <p>We agree that this BAT Conclusion is not applicable to the activities</p>

			carried out at the installation.																																										
10	Reduce channelled emissions of organic compounds to air by using one or a combination of the described techniques.	<b>CC</b>	<p>The operator confirmed that:</p> <p>Every emission point on the facility has one of the listed abatement techniques, as set out in the table below.</p> <table border="1"> <thead> <tr> <th>Emission point</th> <th>Area/Name</th> <th>Technique</th> </tr> </thead> <tbody> <tr> <td>A1</td> <td>Mill</td> <td>Fabric filter</td> </tr> <tr> <td>A2</td> <td>Mill</td> <td>Fabric filter</td> </tr> <tr> <td>A3</td> <td>Mill</td> <td>Fabric filter</td> </tr> <tr> <td>A4</td> <td>Mill</td> <td>Fabric filter</td> </tr> <tr> <td>A5</td> <td>Mill</td> <td>Fabric filter</td> </tr> <tr> <td>A6</td> <td>Mill</td> <td>Fabric filter</td> </tr> <tr> <td>A7</td> <td>Mill</td> <td>Fabric filter</td> </tr> <tr> <td>A8</td> <td>Fermenter RTO</td> <td>Fermenter scrubber via thermal oxidiser</td> </tr> <tr> <td>A9</td> <td>Distillation T1</td> <td>Wet scrubbing</td> </tr> <tr> <td>A10</td> <td>Distillation T2</td> <td>Wet scrubbing</td> </tr> <tr> <td>A11</td> <td>Dryer 1</td> <td>Thermal oxidiser</td> </tr> <tr> <td>A12</td> <td>Dryer 2</td> <td>Thermal oxidiser</td> </tr> <tr> <td>A13</td> <td>Dryer 3</td> <td>Thermal oxidiser</td> </tr> </tbody> </table>	Emission point	Area/Name	Technique	A1	Mill	Fabric filter	A2	Mill	Fabric filter	A3	Mill	Fabric filter	A4	Mill	Fabric filter	A5	Mill	Fabric filter	A6	Mill	Fabric filter	A7	Mill	Fabric filter	A8	Fermenter RTO	Fermenter scrubber via thermal oxidiser	A9	Distillation T1	Wet scrubbing	A10	Distillation T2	Wet scrubbing	A11	Dryer 1	Thermal oxidiser	A12	Dryer 2	Thermal oxidiser	A13	Dryer 3	Thermal oxidiser
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			A14	Pellet 1	Cyclone
			A15	Pellet 2	Cyclone
			A16	Pellet 3	Cyclone
			A17	Pellet 4	Cyclone
			A19	Vapour combustion unit (VCU)	Thermal oxidiser
			BAT is to use one or a combination of techniques. We agree with the operator's stated compliance.		
11	Reduce channelled dust emissions to air, by using one or a combination of the described techniques.	<b>CC</b>	The operator confirmed that this is applicable to emission points A1 to A7 and A11 to A17. Emissions are reduced by fabric filters, thermal oxidiser and cyclones.  BAT is to use one or a combination of techniques. We agree with the operator's stated compliance		
12	Reduce emissions to air of sulphur dioxide and other acid gases (e.g. HCl), by using wet scrubbing.	<b>NA</b>	The operator confirmed that this is not applicable.  We agree that this BAT Conclusion is not applicable to the activities carried out at the installation as they do not generate sulphur dioxide or other acid gases.		
13	Reduce NO <sub>x</sub> , CO and SO <sub>2</sub> emissions from thermal oxidisers by using a combination of the described techniques	<b>CC</b>	The operator confirmed that:  a. Removal of NO <sub>x</sub> precursors - nitrogen compounds used as raw materials (i.e. urea used in fermentation) are minimised where		

		<p>possible. Urea was used at 1200 ppm up to plant closure with 800 ppm targeted for re-start. This affects emission points A8, A11, A12 and A13. The feeds to A19 are essentially ethanol from the product loading.</p> <ul style="list-style-type: none"> <li>b. Support fuel - natural gas is used due to its relatively clean burning nature and availability.</li> <li>c. Low NOx burners - the use of low NOx burners has not been considered yet as this is usually applicable to a new installation and can have limited applicability to existing units. This is something that they would consider if emission limits were restricted to a point where the existing units were not able to comply.</li> <li>d. RTO - this is used for emission points A8 and A11 to A13. Emission point A19 uses a direct burner as this is an intermittent flow used only during tanker loading operations.</li> <li>e. Combustion optimisation - combustion parameters are optimised where possible to minimise fuel use and environmental emissions.</li> <li>f. SCR - for future consideration if there is a requirement for NOx emissions to be reduced below current limits.</li> <li>g. SNCR – as SCR</li> </ul> <p>They also provided a summary of the thermal oxidisers as follows:</p> <p>A8 – Fermenter RTO  A11 to A13 – Animal Feed Dryers RTO  A19 – VCU</p>
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		<p><u>Fermenter RTO</u></p> <p>Has a destruction efficiency rating of +95%. The testing to prove the destruction efficiency was conducted in 2015 by a MCERTS emission monitoring company. The RTO consists of three chambers containing ceramic media. The hot media pre-heats the dirty gas going into the RTO. The pre-heated gas is then heated further by the gas burners to a temperature of at least 850 °C. At this temperature oxygen in the feed gases oxidises the pollutants. The hot clean gases then pass through a second media chamber where it loses heat to the cold media. The cooled, clean gas is then discharged to the stack. A small side stream of clean gas (purge) passes through the third media chamber. This chamber was used to pre-heat dirty gas on the previous cycle. The clean gas purge displaces residual contaminants back onto the feed stream. The cold media is then ready to be used for cooling the hot clean gas on the next cycle. The temperature of the chambers are controlled by the DCS system with a series of set points and alarms which would notify the operator if and when the temperature was to drop. Temperature control is critical to the destruction efficiency of the unit.</p> <p><u>Animal Feed Dryers</u></p> <p>Each have a RTO fitted on them to abate any emissions, with a destruction efficiency rating of +95%. The testing to prove the destruction efficiency was conducted in 2015 by a MCERTS emission monitoring company.</p> <p><u>VCU</u></p>
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			<p>The VCU has not been tested for its destruction efficiency, but this was planned for 2019.</p> <p>At the time of the original submission the plant was operational; however a decision was taken to close the facility from early October 2018. The VCU has not been used preventing any efficiency testing from taking place.</p> <p>It is anticipated that the plant will be re-starting in January 2022. The VCU will be used if the product is dispatched by road and testing will be planned from this point onwards. If product is dispatched exclusively by ship then this VCU will not be used. We have set an improvement condition requiring a summary of the environmental performance and optimisation of the unit against design parameters.</p> <p>BAT is to use an appropriate combination of techniques. We can confirm that the operator is CC with the requirements of this BAT Conclusion.</p>
14	Reduce the waste water volume, the pollutant loads discharged to a suitable final treatment (typically biological treatment), and emissions to water, by using appropriate techniques based on the information provided by the inventory of waste water streams specified in the CWW BAT conclusions.	<b>CC</b>	<p>The operator refers to “BAT for common waste water and waste gas treatment/management systems in the chemical sector directive” (CWW) which was submitted alongside this report.</p> <p>Refer to CWW BAT Conclusions 7 and 10 below.</p>
15	Increase resource efficiency when using catalysts by using a combination of the	<b>NA</b>	<p>The operator confirmed that this is not applicable as there are no catalysts used in the process. They use a range of enzymes to</p>

	described techniques.		transform the starch component of the wheat to fermentable sugars but the enzymes are classed as reagents rather than catalysts.  We agree that this BAT Conclusion is not applicable to the activities carried out at the installation.
16	Increase resource efficiency by recovery and reuse of organic solvents.	<b>NA</b>	The operator confirmed that this is not applicable as there are no solvents used in the process.  We agree that this BAT Conclusion is not applicable to the activities carried out at the installation.
17	Prevent, or where not practicable reduce, waste for disposal by using a combination of the described techniques.	<b>CC</b>	The operator confirmed that: <ul style="list-style-type: none"> <li>a. Addition of inhibitors to distillation systems - there is no waste produced by the distillation systems that could be reduced by the use of an inhibitor.</li> <li>b. Minimisation of high boiling residue formation in distillation systems - all high boilers from the distillation columns are either turned into animal feed for the first column or recycled as feed water for the second column, there are no residues produced.</li> <li>c. Material recovery - the majority of waste material produced is off-specification animal feed, which is not suitable for material recovery. Waste material is usually either sent for composting or as a feed into anaerobic digesters.</li> <li>d. Catalyst and adsorbent regeneration - see LVOC BAT Conclusion 15 above for catalysts. The enzymes used are degraded by the process conditions, with a few litres used per fermentation batch of around 4,500,000 litres. There is no practicable way of</li> </ul>

			<p>recovering these and essentially part of the protein component forms part of the animal feed product.</p> <p>e. Use of residues as a fuel - dry residues are not of a quantity where they could be used and composting / anaerobic digestion is the most energy efficient disposal route.</p> <p>As part of the Environmental Management System (EMS) they are committed to reducing the amount of waste produced as well as finding the most appropriate route for disposal following the waste hierarchy.</p> <p>We agree with the operator's stated compliance.</p>
18	Prevent or reduce emissions from equipment malfunctions, by using all the described techniques.	<b>CC</b>	<p>The operator confirmed that:</p> <ul style="list-style-type: none"> <li>a. Identification of critical equipment - all critical equipment is identified as such on a computerised maintenance system.</li> <li>b. Asset reliability programme for critical equipment – where required planned maintenance is in place for all critical equipment.</li> <li>c. Back-up systems for critical equipment - the plant is generally modular with 2 or 3 parallel production streams. Where there is an equipment failure that would result in a none compliance with emission limits, production of that stream would stop until the equipment/issue was rectified.</li> </ul> <p>The exception to this is the Fermentation vent where there is only a single item and no space for a standby.</p>

			We conclude that the operator is CC with this BAT Conclusion.
19	Prevent or reduce emissions to air and water occurring during other than normal operating conditions, by implementing measures commensurate with the relevance of potential pollutant releases for: i) Start-up and shut-down operations ii) Other circumstances	<b>CC</b>	<p>The operator confirmed that:</p> <p>They have start-up and shut-down procedures for all areas of the plant, and these procedures include any abatement equipment. Procedures are aimed to bring the plant online/offline as safely as possible. All start-up procedures must be carried out as part of a complete start-up.</p> <p>Operators must not work on the plant or equipment unless they are trained and passed out to work under supervision, or are deemed competent under the VFL Training and Competence Management Assurance Standards (VFL CMAS) and able to work without supervision.</p> <p>They must use, store and handle all equipment safely rectifying any substandard conditions immediately or reporting any substandard equipment or conditions through the Safety Health and Environment (SHE) tool reporting process.</p> <p>The operator will monitor the system, operate the plant and equipment, and as a result be prepared to intervene to assure safe operation of the plant and optimised conditions.</p> <p>All shutdown procedures must be carried out as part of a complete plant shut-down refer to (VMF-MAK-GEN-01123 "General Full Plant shutdown") see appendix v.</p>

			We agree with the operator's stated compliance.
-	BAT Conclusions that are not applicable to this installation	<b>NA</b>	<p>The following LVOC BAT Conclusions are not applicable to the activities carried out at the installation:</p> <p>20 to 23 inclusive – there is no production of lower olefins.</p> <p>24 to 30 inclusive - there is no production of aromatics.</p> <p>31 to 44 inclusive - there is no production of ethylbenzene and styrene monomer.</p> <p>45 to 47 inclusive - there is no production of formaldehyde.</p> <p>48 to 55 inclusive - there is no production of ethylene oxide and ethylene glycols.</p> <p>56 to 60 inclusive - there is no production of phenol.</p> <p>61 to 63 inclusive - there is no production of ethanolamine.</p> <p>64 to 74 inclusive - there is no production of toluene di-isocyanate (TDI) and methylene diphenyl di-isocyanate (MDI).</p> <p>75 to 85 inclusive - there is no production of ethylene dichloride and vinyl chloride monomer.</p> <p>86 to 90 inclusive - there is no production of hydrogen peroxide.</p>

## Key Issues

### LVOC BAT Conclusion 2

The operator identified the other channelled emissions points as set out in the table below.

We have included existing and LVOC monitoring requirements for each of the emission points. The justification for the LVOC monitoring requirements is set out for each emission point below the table.

<b>Emission point</b>	<b>Source</b>	<b>Parameter</b> Note 2	<b>Existing Monitoring requirement</b>	<b>LVOC Monitoring requirement</b> Note 1
A1 to A7	Mill	Particulate	Every six months	Annually
A8	Regenerative thermal oxidiser (RTO)	Oxides of nitrogen (NOx)	Every six months	Annually
		Carbon monoxide (CO)	Annually	Annually
		Class A VOC (as acetaldehyde) Note 3	Every six months	Every six months Notes 1 & 4
		Class B VOC (as carbon) Note 3	Every six months	Every six months Notes 1 & 4
A9 & A10	Distillation	Class A VOC (as acetaldehyde) Note 3	Every six months	Every six months
		Class B VOC (as carbon) Note 3	Every six months	Annually
A11 to A13	Dryer RTOs	Particulate	Every six months	Every six months
		NOx	Every six months	Every six months
		CO	Annually	Annually

		Class B VOC Note 3	Every six months	Every six months
A14	Pelleting and chaff line	Particulate	Every six months	Quarterly for first 12 months. Every 6 months thereafter
A15 to A17	Pelleting	Particulate	Every six months	Annually
A19	Vapour combustion unit (VCU)	NOx	Every six months	Annually
		CO	Every six months	Annually
		Class B VOC	Every six months	Annually
		TVOC	-	Annually
<p>Note 1: Where evidence has been provided confirming that emissions are sufficiently stable, we have reduced the monitoring frequency to once every year.</p> <p>Note 2: VOC – volatile organic compounds TVOC – total volatile organic compounds</p> <p>Note 3: For Class A VOCs, our approach is to set monitoring/limits for the relevant speciated VOCs, which is acetaldehyde. Class B VOCs are essentially TVOCs.</p> <p>Note 4: Retained six monthly monitoring due to exceedances.</p>				

### A1 to A7 - Mill

This BAT Conclusion requires monthly monitoring of dust. Note 2 to this BAT Conclusion allows for a reduction in monitoring frequency to once every year where emissions are proven to be sufficiently stable.

Particulate monitoring data was provided to demonstrate that emissions are sufficiently stable. On this basis they propose to monitor once per year.

With the exception of emission point A5, the measurements between 2014 to 2017 are significantly below the existing permit limit of 20 mg/m<sup>3</sup>, ranging from:

Emission point	Concentrations mg/m <sup>3</sup>	Existing limit mg/m <sup>3</sup>
A1	0.11 to 1.82	20
A2	0.05 to 4.6	20
A3	0.26 to 2.2	20
A4	0.16 to 4.1	20
A5	0.08 to 65.2	20

A6	0.1 to 4.7	20
A7	0.08 to 13.6	20

For emission point A5, the operator confirmed that one of the filter bags burst during the test period resulting in the elevated concentration. Since this, the nine month filter replacement frequency has been reduced to six months.

We agree that particulate emissions are sufficiently stable and have set monitoring to once every year. We have retained the existing permit limit on the basis of no backsliding.

### A8 - RTO

For thermal oxidisers, this BAT Conclusion requires monthly monitoring of NO<sub>x</sub> and CO. Note 2 to this BAT Conclusion allows for a reduction in monitoring frequency to once every year where emissions are proven to be sufficiently stable.

NO<sub>x</sub> and CO monitoring data was provided to demonstrate that emissions are sufficiently stable. The measurements between 2015 to 2017 are well below the existing permit limits of 50 mg/m<sup>3</sup> and 100 mg/m<sup>3</sup> respectively, ranging from:

Parameter	Concentrations mg/m <sup>3</sup>	Existing limit mg/m <sup>3</sup>
NO <sub>x</sub>	0.39 to 5.2	50
CO	0.92 to 60	100

We agree that NO<sub>x</sub> and CO emissions are sufficiently stable and have set monitoring to once every year. We have retained the existing permit limits on the basis of no backsliding.

For thermal oxidisers, this BAT Conclusion does not specify monitoring for VOCs. Class A and Class B VOC monitoring data was provided. The measurements between 2015 and 2017 show exceedances of the existing permit limits of 100 g/hour and 2000 g/hour respectively, ranging from:

Parameter	Concentrations g/hour	Existing limit g/hour
Class A VOC	22 to 796	100
Class B VOC	1.8 to 2463	2000

Our approach to classification of VOCs has changed. For Class A VOCs, our approach is to set monitoring/limits for the relevant speciated VOCs. The operator confirmed that for Class A VOCs the significant species is acetaldehyde.

Class B VOCs are essentially TVOCs.

We have retained the six monthly monitoring requirement for acetaldehyde (formerly Class A VOCs) and TVOCs (formerly Class B VOCs) on the basis of



no backsliding. We have retained the existing permit limits on the basis of no backsliding.

### **A9 & A10 – Distillation**

This BAT Conclusion requires monthly monitoring of total volatile organic compounds (TVOC). Note 2 to this BAT Conclusion allows for a reduction in monitoring frequency to once every year where emissions are proven to be sufficiently stable.

Monitoring data was provided with measurements between 2015 to 2017.

Acetaldehyde (Class A VOC) monitoring data does not demonstrate sufficient stability and there have been some significant exceedances of the 100 g/hour limit.

TVOC (Class B VOC) monitoring data demonstrates sufficient stability with no exceedances of the 2000 g/hour limit.

<b>Emission point</b>	<b>Class A VOC Concentrations g/hour</b>	<b>Existing limit g/hour</b>
A9	18.2 to 735	100
A10	15 to 1018	100

<b>Emission point</b>	<b>Class B VOC Concentrations g/hour</b>	<b>Existing limit g/hour</b>
A9	218 to 699	2000
A10	170 to 1607	2000

Our approach to classification of VOCs has changed, see A8 above.

We have retained the six monthly monitoring requirement for acetaldehyde (formerly Class A VOCs) on the basis of no backsliding. We have also retained the existing permit limits.

For TVOCs (formerly Class B VOCs) we have required monitoring once every year.

### **A11 to A13 – Dryer RTOs**

This BAT Conclusion is not applicable to the dryer RTOs as these are associated with the Section 6.8 Part A(1)(d)(ii) food and drink activity.

Particulate, NO<sub>x</sub>, CO and Class B VOC monitoring data was provided with measurements between 2015 to 2017:

<b>Emission point</b>	<b>Particulate conc. mg/m<sup>3</sup></b>	<b>Existing limit mg/m<sup>3</sup></b>	<b>NOx conc. mg/m<sup>3</sup></b>	<b>Existing limit mg/m<sup>3</sup></b>	<b>CO conc. mg/m<sup>3</sup></b>	<b>Existing limit mg/m<sup>3</sup></b>	<b>Class B VOC g/hour</b>	<b>Existing limit g/hour</b>
A11	0.055 to 1.9	40	68.8 to 99.5	200	11.2 to 96	100	374 to 1194	2000
A12	0.13 to 3.4	40	24.7 to 95.5	200	27.7 to 90.6	100	422 to 2491	2000
A13	0.15 to 1	40	59 to 94.9	200	37.4 to 81.7	100	757 to 2082	2000

We have retained the existing monitoring and permit limits on the basis of no backsliding. We have identified the Class B VOCs as TVOCs.

#### **A14 – Pelleting and chaff line**

Note that table S3.1 of the permit has been amended to remove emission points A20 and A21 added by variation EPR/WP3633KH/V004, refer to Annex 5 of this document. The operator confirmed that the new chaff filter will be connected into the existing vent line at emission point A14 and not new emission points A20 and A21. We have added a pre-operational condition for the operator to provide an update on the final design, also refer to Annex 5 of this document.

This BAT Conclusion requires monthly monitoring of dust. Note 2 to this BAT Conclusion allows for a reduction in monitoring frequency to once every year where emissions are proven to be sufficiently stable.

We have retained the existing monitoring frequency (which was set for emission points A20 and A21) of quarterly for the first 12 months and every 6 months thereafter as we would anticipate emissions from these sources to be minimal. The permit has provision for this to be reviewed based on actual monitoring data. We have retained the existing 20 mg/m<sup>3</sup> permit limit (which was set for emission points A20 and A21) on the basis of no backsliding.

#### **A15 to A17 - Pelleting**

This BAT Conclusion is not applicable to the cyclones as these are associated with the Section 6.8 Part A(1)(d)(ii) food and drink activity.

Particulate monitoring data was provided to demonstrate that emissions are sufficiently stable. On this basis they propose to monitor once per year. Measurements between 2015 to 2017 ranged from:

<b>Emission point</b>	<b>Concentrations mg/m<sup>3</sup></b>	<b>Existing limit mg/m<sup>3</sup></b>
A15	0.93 to 7.9	50
A16	0.13 to 3.4	50
A17	1.5 to 4.88	50

We agree that particulate emissions are sufficiently stable and have set monitoring to once every year. We have retained the existing permit limits on the basis of no backsliding.

**A19 – VCU**

This BAT Conclusion requires monthly monitoring of NOx, CO and TVOC. Note 2 to this BAT Conclusion allows for a reduction in monitoring frequency to once every year where emissions are proven to be sufficiently stable.

NOx, CO and Class B VOC monitoring data was provided to demonstrate that emissions are sufficiently stable with measurements between 2017 to 2018 ranging from:

<b>NOx conc. mg/m<sup>3</sup></b>	<b>Existing limit mg/m<sup>3</sup></b>	<b>CO conc. mg/m<sup>3</sup></b>	<b>Existing limit mg/m<sup>3</sup></b>	<b>Class B VOC g/hour</b>	<b>Existing limit g/hour</b>
31.9 to 42.3	50	3.8 to 26.5	100	1.7 to 4.9	2000

We agree that NOx, CO and TVOCs (formerly Class B VOCs) emissions are sufficiently stable and have set monitoring to once every year.

**A20 & A21 - Bag filter stack on wheat milling building**

Refer to emission point A14 above.

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
1	To improve overall environmental performance implement and adhere to an EMS incorporating all the described features.	<b>CC</b>	<p>The operator confirmed that:</p> <p>They are ISO14001 registered (EMS 588064). The executive summary from the BSI external audit conducted March 2018 states that “The assessment demonstrated that the management system is aligned with strategic direction and vision of the business. In line with this direction and the intended results of the organisation, the management system for energy and environment has demonstrated that it will support the direction and deliver the intended results.”</p> <p>They state that their continuous commitment to ISO14001 covers all aspects within this BAT Conclusion.</p> <p>They provided a certificate of registration with an expiry date of 18 June 2022 (certificate number EMS 588064).</p>

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
			We agree with the operator's stated compliance.
2	To facilitate reduction of emissions to water and air and water usage, establish and maintain an inventory of waste water and waste gas streams as part of BAT1 EMS incorporating the described features.	<b>CC</b>	Refer to Key issues section below.  We agree with the operator's stated compliance.
3	For relevant emissions to water monitor key process parameters at key locations.	<b>CC</b>	The operator confirmed that:  For both the clean (W1) and dirty (S2) effluent systems (refer to Key issues section below) there are continuous monitoring points for total organic carbon (TOC), chemical oxygen demand (COD), pH and flow. There is also continuous monitoring of temperature at W1.  For treated process condensate, the above parameters are measured together with the temperature of the water before UV treatment.

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
			We agree with the operator's stated compliance.
4	Monitor emissions to water in accordance with the described standards and minimum frequencies.	<b>FC</b>	<p>The operator confirmed that:</p> <p>The laboratory analytical schedule has been updated to reflect these requirements, with compliance being achieved from September 2018.</p> <p>Refer to Key issues section below.</p> <p>We agree with the operator's stated compliance.</p>
5	Periodically monitor diffuse VOC emissions to air from relevant sources using a combination (or for large amounts – all) of the described techniques.	<b>NC</b>	<p>The operator confirmed that consideration of applicable techniques will be undertaken upon plant start-up.</p> <p>I. Sniffing methods</p>

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
			<p>II. optical gas imaging</p> <p>These techniques should be suitable for the materials handled at the plant. They do not anticipate leak issues and will trial methods on re-start.</p> <p>III. Calculation of emissions will be carried out for the four storage tanks using the TANKS4.0 methodology with biannual measurements to verify the results.</p> <p>They confirm that the Saltend Chemicals Park environmental monitoring team will carry out leak detection and repair (LDAR) surveys. Test procedures will be in place prior to start-up based on those used for other plants.</p> <p>They also confirm that the equipment containing the ethanol product is high integrity and this is where large amounts of VOCs are present on plant. Control measures include:</p>

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
			<ul style="list-style-type: none"> <li>• Double packing seals on valves;</li> <li>• Pumps, compressors and agitators fitted with mechanical seals;</li> <li>• Corrosive resistant equipment.</li> </ul> <p>There is also a quarterly VOCs factory limit test which establishes, if there are any VOCs at the boundary of the site.</p> <p>The operator is currently none compliant and compliance will not be achieved until plant start-up which may extend beyond the 07 December 2021 compliance date. We have set the status to none compliant with an improvement condition to address the deficiencies.</p>
6	Periodically monitor odour emissions from relevant sources using the described standards.	<b>CC</b>	<p>The operator confirmed that they operate in accordance with their odour management plan.</p> <p>We agree with the operator's stated compliance.</p>



BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
7	Reduce usage of water and the generation of waste water, by reducing the volume and/or pollutant load of waste water streams, enhancing the reuse of waste water within the production process and recovery and reuse of raw materials.	<b>CC</b>	<p>The operator confirmed that:</p> <p>They operate a waste water treatment plant referred to as the process condensate treatment system (PCT). This system is described in BAT Conclusion 2 and recycles water from distillation to use in fermentation.</p> <p>When the PCT is fully operational, on average 70 tonnes/hour of water is saved. This is wastewater which is cleaned for use in liquefaction, which otherwise would have been discharged from the site. This therefore replaces the need for 70 tonnes/hour of 'fresh imported' process water.</p> <p>We agree with the operator's stated compliance.</p>
8	Prevent the contamination of uncontaminated water reduce emissions to water, by segregating uncontaminated	<b>CC</b>	<p>The operator confirmed that:</p> <p>There are two sources of effluent emissions:</p>

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
	waste water streams from waste water streams that require treatment.		<p>Clean trade effluent - which is mainly rain water collection and released via the PX Aquarius effluent system to the Humber Estuary if it meets consent limits.</p> <p>Dirty trade effluent - which is rainwater mixed with process water washings. This is released to the Yorkshire Water waste water treatment works via the PX Aquarius effluent system.</p> <p>We agree with the operator's stated compliance.</p>
9	Prevent uncontrolled emissions to water by providing an appropriate buffer storage capacity for waste water incurred during other than normal operating conditions based on a risk assessment, and taking appropriate further measures.	<b>CC</b>	<p>The operator confirmed that:</p> <p>They operate three clean trade effluent pits and six dirty trade effluent pits. Either one of these pits can be locked off and isolated for removal of its contents, without the contents entering the effluent system and going to Saltend Chemicals Park Ltd.</p> <p>There is also a dirty trade collection tank, which acts as a buffer tank</p>

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
			<p>before the effluent is sent to Saltend Chemicals Park Ltd. and then to Yorkshire water. This buffer tank is named T-7620 and holds a capacity of 743 m<sup>3</sup>.</p> <p>The fire water pit has a capacity of 1800 m<sup>3</sup> and is operated at a level of less than 50%. If there is an emergency it has the capacity to hold fire water run off for two hours.</p> <p>All of the effluent pits either go to the clean trade or dirty trade headers for discharge to PX Aquarius managed by Saltend Chemicals Park Ltd. The effluent will then either be discharged into the River Humber if it meets the requirements or sent to Yorkshire Water for treatment. At no point can the facility discharge directly to a receiving water body.</p> <p>We agree with the operator's stated compliance.</p>
10	Reduce emissions to water, by using an integrated waste water management and	<b>CC</b>	The operator confirmed that:

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
	treatment strategy that includes an appropriate combination of the described techniques (in the priority order given).		<p>The plant is designed as a fully integrated water management system. Water is recycled on plant where possible and this is aided by the on-site PCT which recycles process condensate water from the evaporators. This equates to 186,071 m<sup>3</sup>/year (2017) and 176,296 m<sup>3</sup>/year (2018).</p> <p>There are two waste water streams which leave the site, clean and dirty trade effluent, already described above.</p> <p>We agree with the operator's stated compliance.</p>

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
11	Reduce emissions to water, by pre-treating waste water that contains pollutants that cannot be dealt with adequately during final waste water treatment using appropriate techniques as part of an integrated waste water management and treatment strategy.	<b>CC</b>	<p>The operator confirmed that:</p> <p>The discharge water leaving the site is suitable for the PX Aquarius effluent system for either discharge into the River Humber or sent to Yorkshire Water for treatment.</p> <p>We agree with the operator's stated compliance.</p>
12	Reduce emissions to water, by using an appropriate combination of the described final waste water treatment techniques.	<b>CC (W1) FC (S2)</b>	<p>The operator refers to their response to CWW BAT Conclusion 10.</p> <p>There is no waste water treatment at the site. Effluent is reused and recycled into the process where possible with only small quantities of process washings and vessel cleaning effluent being discharged.</p> <p>Refer to Key issues section below.</p>

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
			We agree with the operator's stated compliance.
13	Prevent or, where this is not practicable, reduce the quantity of waste being sent for disposal by setting up and implementing a waste management plan as part of the environmental management system (see BAT 1) that, in order of priority, ensures that waste is prevented, prepared for reuse, recycled or otherwise recovered.	<b>CC</b>	<p>The operator confirmed that:</p> <p>As part of the EMS, the waste management procedure VMF-MTB-SEV-00435 provided as appendix iv, sets out the company aims and objectives regarding the waste hierarchy. At present 98.9% of all waste generated is recycled.</p> <p>We agree with the operator's stated compliance.</p>
14	Reduce the volume of waste water sludge requiring further treatment or disposal, and reduce its potential environmental impact, by using one or a combination of the described techniques.	<b>CC</b>	<p>The operator confirmed that:</p> <p>There is a sludge thicker package on the PCT plant, which thickens the sludge before waste disposal., this waste goes to land spreading operations.</p> <p>We agree with the operator's stated compliance.</p>

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
15	Facilitate the recovery of compounds and the reduction of emissions to air, by enclosing the emission sources and treating the emissions, where possible.	<b>CC</b>	<p>The operator confirmed that:</p> <p>The waste gas is initially treated in an anaerobic digester with all gaseous emissions being collected and stored in a biogas holder for use in the process.</p> <p>The operator is compliant with the requirements of this BAT Conclusion.</p>
16	Reduce emissions to air, by using an integrated waste gas management and treatment strategy that includes process-integrated and waste gas treatment techniques.	<b>CC</b>	<p>The operator confirmed that:</p> <p>Rather than treating the gas, due to the methane content, it is to be used as a fuel to supplement the natural gas supply to the dryer RTOs reducing the amount of imported fuel needed.</p> <p>The operator is compliant with the requirements of this BAT Conclusion.</p>

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
17	Prevent emissions to air from flares, by using flaring only for safety reasons or non-routine operational conditions (e.g. start-ups, shutdowns) using one or both of the described techniques.	CC	<p>The operator confirmed that:</p> <p>Flaring is in place only as a safety device and for plant start-up and shut-down purposes when gas cannot be supplied to the dryer RTOs.</p> <p>The operator is compliant with the requirements of this BAT Conclusion.</p>
18	Reduce emissions to air from flares when flaring is unavoidable, by using one or both of the described techniques.	CC	<p>The operator confirmed that:</p> <ul style="list-style-type: none"> <li>a. Correct design of flaring device - correct design of flaring devices, alongside with monthly monitoring of the exhaust stack gases for composition of gas. The flare gas is metered and monitored on a monthly basis, by an online metre in the DCS.</li> </ul> <p>BAT is to use one or both techniques.</p>



BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
			We agree with the operator's stated compliance.
19	Prevent or, where that is not practicable, reduce diffuse VOC emissions to air, by using a combination of the described techniques.	<b>CC</b>	<p>The operator referred to their response for CWW BAT Conclusion 5 to demonstrate compliance.</p> <p>The number of potential emission sources is limited. Maintenance schedules and enclosed systems are designed to maximise the containment of potential diffuse VOC emissions.</p> <p>Waste gas streams are collected and treated.</p> <p>We agree with the operator's stated compliance.</p>
20	Prevent or, where that is not practicable, reduce odour emissions, by setting up, implementing and regularly reviewing an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the described	<b>CC</b>	<p>The operator confirmed that:</p> <p>They referred to appendices II &amp; V odour management plan, document reference VMF-MTB-SEV-00389, dated 18 October 2017 and document VMF-MTB-SVE-00431 Environmental Emissions Monitoring.</p>

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
	elements:		We agree with the operator's stated compliance.
21	Prevent or, where that is not practicable, reduce odour emissions from waste water collection and treatment and from sludge treatment, by using one or a combination of the described techniques.	<b>CC</b>	<p>The operator confirmed that:</p> <p>There are currently no odour issues relating to the PCT plant, however monitoring is undertaken as follows:</p> <ul style="list-style-type: none"> <li>c. optimise aerobic treatment - Dissolved oxygen is controlled in the aeration tanks to ensure healthy biomass within the system.</li> <li>d. Enclosure - No tanks are enclosed, but as mentioned above there is no odour problem.</li> <li>e. End-of-pipe treatment – the only treatment is with UV which is for process benefit and not odour control.</li> </ul> <p>The sludge age in the PCT is monitored as it could be a source of odour.</p> <p>BAT is to use one or a combination of techniques.</p>

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	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
			We agree with the operator's stated compliance.
22	Prevent or, where that is not practicable, reduce noise emissions, by setting up and implementing a noise management plan, as part of the environmental management system (see BAT 1), that includes all of the described elements:	<b>CC</b>	<p>The operator confirmed that:</p> <p>Noise monitoring is controlled as part of the EMS system. Procedure VMF-MTB-SEV-00385 outlines the noise and vibration plan for the site. This includes scheduled monitoring, Appendix iiiv shows the procedure and an example noise report from.</p> <p>We agree with the operator's stated compliance.</p>
23	Prevent or, where that is not practicable, reduce noise emissions, by using one or a combination of the described techniques.	<b>CC</b>	<p>The operator referred to their response for CWW BAT Conclusion 22 to demonstrate compliance.</p> <p>We agree with the operator's stated compliance.</p>

## **Key Issues**

### **CWW BAT Conclusion 2**

The operator confirmed that:

- (i) Information about the chemical production processes - They carry out a yeast fermentation process to convert flour to beer in a manner similar to a brewery. The beer is then distilled and dehydrated to produce fuel grade ethanol.

Details of the reaction from the wheat starch to ethanol and carbon dioxide are recorded in the plant information. There are process flow diagrams (PFDs) and piping and instrumentation diagrams (P&IDs) for the full process showing the origin point for all emissions.

Process integration efficiencies are built in to the plant design, for example feeds to distillation need to be warmed up to reach the operating temperature of the first column, this is partially achieved by using transfer of heat from the process stream running from liquefaction to fermentation.

- (ii) Information about the characteristics of the waste water streams (see below) - the plant has continuous monitoring of flow rates, TOC and pH for emission points W1 (formerly S1) and S2 with temperature measurement for W1. Other components of the waste water streams are measured as tabulated below. The concentrations along with the average flow for the test period are used to give annualised figures for reporting purposes.

- (iii) Information about the characteristics of the waste gas streams - flows pressures and temperatures will be available for the gas produced from the process condensate treatment anaerobic digester when it is re-commissioned. This stream will be directed to the dryer RTOs.

There are three waste water streams:

1. Uncontaminated (clean) trade effluent
2. Contaminated (dirty) trade effluent
3. Treated process condensate

#### **1. Uncontaminated trade effluent (emission point W1 (formerly S1))**

If it meets limits set in the permit it is discharged from the site to the Saltend Chemicals Park Ltd. drainage system (PX Aquarius). This is then discharged into the River Humber or diverted to Yorkshire Water waste water treatment works.

There is the option on site to divert any clean effluent to the dirty effluent system by both manual and automatic valves. The automatic valves currently

auto divert on TOC and pH which are set to the existing permit limits of TOC at 70 mg/l and a pH of 6-9.

The table below shows the six monthly 2018 representative average of the effluent.

<b>Uncontaminated trade effluent (W1 formerly S1)</b>	
pH	7.43
pH instantaneous	7.05
TOC mg/l	27.09
TOC instantaneous mg/l	30.39
COD kg/day	81.60
Daily Flow m <sup>3</sup> /hr	298.96
Hourly Flow m <sup>3</sup> /hr	12.46
Oils and greases mg/l	1.45
Nickel mg/l	0.0002
TSS mg/l	11.63

**This effluent is identified as S1 in the existing permit. This is now identified as W1 as it is a 'direct' release to water without any treatment.**

## 2. Contaminated trade effluent (S2)

Dirty trade effluent is discharged to the Saltend Chemicals Park Ltd. drainage system (PX Aquarius) for treatment at Yorkshire Water waste water treatment works (YW WWTW) prior to discharge to the Humber Estuary.

Whilst there are no limits set in the permit, there are contractual limits set by Saltend Chemicals Park Ltd.

The table below shows the six monthly 2018 representative average of the effluent.

<b>Contaminated trade effluent (S2)</b>	
pH	7.07
pH instantaneous	6.68
TOC mg/l	1570.93
TOC instantaneous mg/l	2082.00
COD kg/day	6098.92
Daily Flow m <sup>3</sup> /hr	679.36
Hourly Flow m <sup>3</sup> /hr	28.31
Oils and greases mg/l	3.28

Nickel mg/l	0.0013
TSS mg/l	982.50

### 3. Treated process condensate

Process condensate is water that is produced as a result of the evaporation of thin stillage in the core process, in distillation. The untreated condensate contains volatile organic acids which will be removed by an anaerobic and aerobic digestion system as per process condensate treatment (PCT) system. The PCT system is divided into six distinct phases:

- Pre-treatment
- Anaerobic treatment – currently not commissioned
- Aerobic treatment
- Filtration
- Sterilisation
- Biogas storage and transfer – currently not commissioned
- Sludge holding and transfer

There are a number of parameters that must meet set limits to enable use in liquefaction.

The anaerobic side of the PCT is not operational and as such there is no biogas creation. Work is ongoing to improve operation of the PCT unit with the aim of fully commissioning the anaerobic section once operational.

CWW BAT Conclusion 4

The requirements of this BAT Conclusion for monitoring are set out in the first three columns.

The remaining columns set out existing and future requirements:

Substance/ parameter	Standard	Minimum monitoring frequency	Existing permit		CWW varied permit	
			S1 (W1)	S2	W1 (formerly S1)	S2
Total Organic compounds (TOC)	EN 1484	Daily	Daily/continuous	Daily	Daily/continuous	Daily
Chemical Oxygen Demand (COD)	No EN standard available		Daily	Daily	Daily	Daily
Total Suspended Solids (TSS)	EN 872		Weekly	Weekly	Daily	Weekly
Total Nitrogen (TN)	EN 12260		None	None	NA <sup>Note 1</sup>	NA <sup>Note 1</sup>
Total inorganic nitrogen TIN	Various EN standards available		None	None	NA <sup>Note 1</sup>	NA <sup>Note 1</sup>
Total phosphorus (TP)	Various EN standards available		None	None	Daily <sup>Note 2</sup>	NA <sup>Note 2</sup>
Absorbable organically bound halogens (AOX)	EN ISO 9562		Monthly	None	None	NA <sup>Note 3</sup>
Metals	Cr	None		None	NA <sup>Note 4</sup>	NA <sup>Note 4</sup>
	Cu	None		None	NA <sup>Note 4</sup>	NA <sup>Note 4</sup>
	Ni	Weekly		Weekly	Weekly (no	Weekly (no

						backsliding)	backsliding)
	Pb			None	None	NA <sup>Note 4</sup>	NA <sup>Note 4</sup>
	Zn			None	None	NA <sup>Note 4</sup>	NA <sup>Note 4</sup>
	Other if relevant			-	-	-	-
Toxicity	Fish Eggs	EN ISO 15088	To be decided based on a risk assessment , after initial characterisation	None		NA <sup>Note 5</sup>	
	Daphnia	EN ISO 6341		None		NA <sup>Note 5</sup>	
	Luminescent Bacteria	EN ISO 11348-1 EN ISO 11348-2 EN ISO 11348-3		None		NA <sup>Note 5</sup>	
	Duckweed	EN ISO 20079		None		NA <sup>Note 5</sup>	
	Algae	EN ISO 8692 EN ISO 10253 EN ISO 10710		None		NA <sup>Note 5</sup>	
<p>Note 1: The operator confirmed that nitrates and nitrogen compounds used in the process are too small a quantity to have a measured value.</p> <p>Note 2: The operator confirmed that phosphoric acid used in the process but in very small quantities.</p> <p>Note 3: The operator confirmed that the process does not use halogenated organic compounds.</p> <p>Note 4: The operator confirmed that analysis is below the reportable threshold.</p> <p>Note 5: The operator confirmed that toxicity is not required due to the nature of the materials used.</p>							



Emission point W1 (formerly S1)

We have set daily monitoring for TOC, TSS and TP which shall apply from 07 December 2021. There is provision for a reduced frequency if the data demonstrates sufficient stability.

The operator has been unable to provide evidence to demonstrate whether phosphorus is below the 300 kg/year BAT AEL emission threshold. On this basis we have set daily monitoring with provision for it to be removed if it can be demonstrated that the emission is below the threshold.

We are satisfied that nitrogen, halogens and metals are not added during the process, so the installation does not generate any additional emissions above those existing within the water supply. We have however retained the weekly Ni monitoring on the basis of no backsliding, with provision for a reduced frequency if the data demonstrates sufficient stability. For nitrogen, monitoring is not required as there is no biological waste water treatment.

We do not agree that the operator is CC with this BAT Conclusion and have set it to FC. We have set an improvement condition to ensure that the requirements are delivered.

Emission point S2

We have retained monitoring requirements for TOC, COD, TSS, nickel and oils and greases. This allows the discharge to the Saltend Chemicals Park Ltd. drainage system (PX Aquarius) to be monitored prior to treatment at YW WWTW.

CWW BAT Conclusion 12 (including BAT AELs)

There are two aqueous discharges from the site:

W1 (formerly S1)	classified as a ' <b>direct</b> ' discharge with no treatment
S2	classified as an ' <b>indirect</b> ' discharge following treatment, see above

Both of these effluent streams must comply with the BAT associated emission levels (BAT AELs), from the CWW BAT Conclusions, outlined in tables 1 to 3 of the BAT Conclusion and summarised in the table below.

Either the BAT AEL for TOC or COD applies in accordance with note 2 to table 1 of the BAT Conclusion.

## BAT AELs for emissions to a receiving water body

Parameter	BAT AEL mg/l (yearly average)
TOC (table 1)	33
COD (table 1)	100
TSS (table 1)	35
TP (table 2)	0.5

### 1. Uncontaminated trade effluent (emission point W1 (formerly S1))

The operator confirmed that:

Effluent to PX Aquarius must be within strict specifications agreed between the operator and Saltend Chemicals Park Ltd. This ensures that waste water released to the Humber complies with BAT AELs.

#### **TOC (table 1)**

The TOC concentration averages are under the BAT AEL limits (2018 average 22.6 mg/l).

The existing system automatically diverts flow to the dirty trade system if the continuous monitored measurements exceed 90 mg/ml to prevent a breach of the permitted limits (70 mg/l 24 hour average / 100 mg/l instantaneous).

Modifications will be required to ensure that the BAT AEL will be met.

The permit secures this requirement by setting the BAT AEL limit of 33 mg/l at W1. This means that any effluent with TOC levels exceeding this will be discharged to Saltend Chemicals Park Ltd. drainage system (PX Aquarius) via S2, for treatment at a YW WWTW prior to discharge to the Humber Estuary.

We have retained the TOC instantaneous limit of 100 mg/l.

#### **COD (table 1)**

The COD concentrations are under the BAT AEL limits (2018 average 64.5 mg/l).

Either the BAT AEL for TOC or COD applies in accordance with note 2 to table 1 of the BAT Conclusion. We have included the BAT AEL for TOC and on this basis the BAT AEL for COD is not required. We have retained the existing limit of 200 kg/day. At the permitted discharge of 2,400 m<sup>3</sup>/day, and the BAT AEL of 100 mg/l, COD would equate to 240 kg/day.

#### **TSS (table 1)**

The TSS concentrations are under the BAT AEL limits (2018 average 17.6 mg/l).

We have retained the existing limit of 30 mg/l on the basis of no backsliding.

**Nitrogen (table 2)**

We have not set a limit as this is only required where there is biological treatment of the waste water (foot note 2)

**Phosphorus (table 2)**

We have set a limit of 0.5 mg/l, at the lower end of the BAT AEL range. This applies where phosphorus mainly originates from heating or cooling systems (foot note 4).

**AOx and metals (table 3)**

There are no halogenated organic compounds used in the process. We are satisfied that AOx is not applicable to the discharge, so has not been included in the permit.

Chromium is measured, with an annual release of 0.17 kg/year in 2018. We have not set a limit as there is no requirement where the release falls below the 2.5 kg/year emission threshold.

Copper is measured, with an annual release of 0.56 kg/year in 2018. We have not set a limit as there is no requirement where the release falls below the 5 kg/year emission threshold.

Nickel is measured, with an annual release of 0.27 kg/year in 2018. There is no requirement to set a limit where the release falls below the 5 kg/year emission threshold. On this basis we have removed the limit for nickel but retained the monitoring.

Zinc is measured, with an annual release of 10.23 kg/year in 2018. We have not set a limit as there is no requirement where the release falls below the 30 kg/year emission threshold.

For W1, we agree that the operator is CC with this BAT Conclusion.

**2. Contaminated trade effluent (emission point S2)**

The operator confirmed that metals were below the emission threshold:

Chromium is measured, with an annual release of 0.3 kg/year in 2018, below the 2.5 kg/year emission threshold.

Copper is measured, with an annual release of 1.67 kg/year in 2018, below the 5 kg/year emission threshold.

Nickel is measured, with an annual release of 0.91 kg/year in 2018, below the 5 kg/year emission threshold.

Zinc is measured, with an annual release of 15.82 kg/year in 2018, below the 30 kg/year emission threshold.

The effluent sent to Yorkshire Water WWTW must also fall within specifications, as agreed by YW WWTW.

The YW WWTW handles large volumes of waste water from a number of sources. At the YW WWTW, waste effluent is passed through lamella settling tanks with chemical dosing to remove solids/waste organics and a secondary treatment process to biologically remove the remaining contaminants. Trade effluent to YW WWTW relies on treatment to ensure the effluent discharged complies with BAT AELs.

We did not consider it necessary to set limits for any of the parameters.

We have set a reporting requirement in the performance parameters table of the permit. This requires the operator to confirm whether there have been any significant changes at the site or at the YW WWTW.

The operator did not provide information to demonstrate that following treatment at YW WWTW and taking into account sewage treatment reduction factors, this release will comply with the BAT AELs. We have set an improvement condition to address this.

For S2, the operator is FC with this BAT Conclusion.

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

The operator did not request derogation from compliance with any AEL included within the BAT Conclusions as part of their Regulation 61 notice response.

### Annex 3: Improvement Conditions

Based on the information in the operator's Regulation 61 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 are provided at the relevant section of the decision document (Annex 1 or Annex 2).

We also consider that we need to set an improvement condition relating to changes in the permit not arising from the review of compliance with BAT Conclusions. The justification for this is provided in section 2.5 of this decision document.

If the consolidated permit contains existing improvement conditions that are not yet complete or the opportunity has been taken to delete completed improvement conditions then the numbering in the table below will not be consecutive as these are only the improvement conditions arising from this permit variation.

<b>Reference</b>	<b>Requirement</b>	<b>Date</b>
IC8	<p><u>CWW BAT Conclusions 4 and 5</u></p> <p>The operator shall submit, for approval by Environment Agency, a report setting out progress to achieving the 'Narrative' BAT where BAT is currently not achieved. The report shall include, but not be limited to, the following:</p> <ul style="list-style-type: none"> <li>- Methodology for achieving BAT.</li> <li>- Associated targets / timelines for reaching compliance.</li> <li>- Any alterations to the initial plan (in progress reports).</li> </ul> <p>The report shall address the following BAT Conclusions:</p> <ul style="list-style-type: none"> <li>- Common waste water and waste gas treatment/management systems in the chemical sector: BAT Conclusion 4 (monitor emissions to water) and BAT Conclusion 5 (monitor diffuse VOC emissions).</li> </ul> <p>Refer to BAT Conclusions for a full description of the BAT requirement.</p>	<p>Progress report by: 07/12/2021 (then six monthly intervals until start-up of the facility)</p>

<b>Table S1.3 Improvement programme requirements</b>		
<b>Reference</b>	<b>Requirement</b>	<b>Date</b>
IC9	<p><u>CWW BAT Conclusion 12</u></p> <p>The operator shall submit, for approval by the Environment Agency, a report to demonstrate how the final release from emission point S2 will comply with the relevant BAT AELs in Tables 1 to 3 of this BAT Conclusion. For this ‘indirect’ release to the Humber Estuary via Yorkshire Water waste water treatment works (YW WWTW) reduction factors should be used to demonstrate compliance and the efficiency of the waste water treatment plant.</p>	31/12/2021
IC10	<p><u>Surface water pollution risk assessment</u></p> <p>The operator shall submit a surface water pollution risk assessment to the Environment Agency for approval, which shall assess the impact of discharges of hazardous pollutants to surface water and sewer from the installation. The risk assessment shall include, but not be limited to the following:</p> <p>a) representative emissions data for the following hazardous pollutants: cadmium, mercury, nickel; and any other relevant substances discharged from the installation. Any emissions monitoring required should be carried out using the methods and standards described in Environment Agency M18 guidance; and</p> <p>b) a risk assessment in accordance with the screening procedures in Environment Agency guidance “Surface water pollution risk assessment for your environmental permit”, using the representative emissions data obtained in (a) above.</p>	31/03/2022
IC11	<p><u>Road tanker loading area Vapour Combustion Unit stack (A19)</u></p> <p>The operator shall submit a written report to the Environment Agency on the commissioning of the vapour combustion unit (VCU) at emission point A19. The report shall summarise the environmental performance and optimisation of the unit against the design parameters.</p>	Within 4 months of the completion of commissioning

#### **Annex 4: Advertising and consultation on the draft decision**

No consultation required.



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

<b>Condition/table</b>	<b>Justification</b>
1.5.1	Added for multi-operator installations to control the release of effluent from W1 to the Aquarius system.
2.5.1	Pre-operational condition added together with table S1.4 requiring the operator to confirm modifications to equipment associated with variation EPR/WP3633KH/V004. Also refer to table S3.1 below.
3.1.3	Deleted for annual emissions, refer to Tables S3.3/S3.4 below.
4.4.2	Amended consistent with the requirements for multi-operator installations. Refer to condition 1.5.1 above.
Table S1.3	Amended to remove completed improvement conditions IC1 to IC6. IC11 added for commissioning of the VCU.
Table S1.4	Added to include a pre-operational condition, refer to condition 2.5.1 above.
Table S3.1	Amended to remove emission points A20 and A21 added by variation EPR/WP3633KH/V004. The operator confirmed that the new chaff filter will be connected into the existing vent line at emission point A14 and not new emission points A20 and A21. They confirm that emission point A14 will remain unchanged from the original plant start-up. This emission point has been used for filtered air coming from the mill chaff line and the pellet 1 cyclone outlet.
Table S3.1a	Class A VOCs (as acetaldehyde) updated to VOC (as acetaldehyde). Class B VOC (as carbon) updated to TVOC (as carbon).
Table S3.2	The requirement for cadmium and mercury mass balance calculation at W1 (formerly S1) and S2 deleted, consistent with our current approach. The oils and greases monitoring at W1 (formerly S1) and S2 has been replaced with a visual inspection consistent with our current approach.
Table S3.3 (existing permit); this would have been S3.4 for this variation	Table deleted to remove the cadmium and mercury mass balance requirements at emission points W1 (formerly S1 in table S3.2) and S2. There are no BAT AELs associated with these parameters and it is consistent with our current approach.  Limits were initially set due to emissions resulting from

	impurities in sodium hydroxide and sulphur dioxide used at the bioethanol plant. Permit condition 1.3.1 ensures that the necessary controls are in place for raw materials.
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