

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/KP3706LM
The Operator is: Mitsubishi Chemical UK Limited
The Installation is: Saltend EVOH Plant
This Variation Notice number is: EPR/KP3706LM/V002

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 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 (CWW and WGT) Management Systems in the Chemical Sector, 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 and WGT Management Systems in the Chemical Sector 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, 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 **09 August 2018**.

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 **05 October 2018**. Suitable further information was provided by the operator on **28 November 2018**.

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 consider that the operator will be able to comply with the techniques and standards described in the BAT Conclusions other than for those techniques and requirements described in CWW and WGT BAT Conclusions 3 and 4. In relation to these BAT Conclusions, we do not fully agree with the operator in respect of their current stated capability as recorded in their Regulation 61 Notice response. We have therefore included an improvement condition in the consolidated variation notice to ensure that the requirements of the BAT Conclusion are delivered before 07 December 2021.

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:

Request for additional information sent 18 February 2021	Response received 04 March 2021 Technical standards LVOC BAT Conclusion 2 & 18, CWW & WGT BAT Conclusions 1, 3, 4, 13 and H1 WFD
Request for additional information sent 09 March 2021	Response received 29 April 2021 Clarification of technical standards CWW & WGT BAT Conclusions 1, 3, 4 and 15 to 23
Request for additional information sent 10 May 2021	Response received 20 May 2021 Clarification of technical standards CWW & WGT BAT Conclusions 3 and 4
Request for additional information sent 01 June 2021	Response received 22 June 2021 Site plan with emission points

A copy of each further information request and response was placed on our public register.

2.4 Condition of Soil and Groundwater

Articles 16 and 22 of the 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 site condition report, Jaguar Site Clearance Validation Report March 2002 BP Chemicals Limited Summary, 2003 site report and Ground Investigation Report dated October 2010. We are satisfied that this satisfies the IED requirements.

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 EQSD¹ (priority hazardous substances, priority substances and "other pollutants"). It also applies to the specific pollutants listed in the 2015 Directions², 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 confirmed that there have been no significant changes to the process undertaken at the site or the emissions arising from the process since the H1 assessment was performed in 2011 as part of the environmental permit variation. They provided this assessment and concluded that it is a valid impact assessment of the worst case emissions to controlled water. This information was not in the format we require and did not follow our current screening approach.

Further information was provided which confirmed that there are no hazardous pollutants in the releases to sewer at emission point S1 or to water at emission point E1.

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

² The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015

3 The legal framework

The consolidated variation notice will be 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.

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

We have set emission limit values (ELVs) 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 and surface water), the emission limits and monitoring requirements have been incorporated into the consolidated variation notice via tables in Schedule 3.

- 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 LVOC 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 CWW and WGT/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

BAT Conclusion 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 this BAT Conclusion is not applicable to the activities carried out at the installation as there are no process furnaces/heaters in use.</p> <p>We agree that this BAT Conclusion is NA 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	FC	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 this BAT Conclusion is not applicable to the activities carried out at the installation as there are no process furnaces/heaters in use.</p> <p>We agree that this BAT Conclusion is NA to the activities carried out at the installation.</p>
4	Reduce NO _x emissions from process furnace/heaters by using one or a	NA	The operator confirmed that this BAT Conclusion is not applicable to the activities carried out at the installation as there are no process

	combination of the described techniques		furnaces/heaters in use. We agree that this BAT Conclusion is NA to the activities carried out at the installation.
5	Prevent or reduce dust emissions from process furnace/heaters by using one or a combination of the described techniques	NA	The operator confirmed that this BAT Conclusion is not applicable to the activities carried out at the installation as there are no process furnaces/heaters in use. We agree that this BAT Conclusion is NA to the activities carried out at the installation.
6	Prevent or reduce SO ₂ emissions from process furnace/heaters by using one or a combination of the described techniques	NA	The operator confirmed that this BAT Conclusion is not applicable to the activities carried out at the installation as there are no process furnaces/heaters in use. We agree that this BAT Conclusion is NA to the activities carried out at the installation.
7	To reduce emission of ammonia optimise design/operation of SCR/SNCR	NA	The operator confirmed that this BAT Conclusion is not applicable to the activities carried out at the installation as there are is no SCR/SNCR. We agree that this BAT Conclusion is NA to the activities carried out at the installation.
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)	CC	The operator confirmed that: The process conforms to this criterion by utilising technique b: b. Recovery and use of organic solvents and unreacted organic

			<p>raw materials.</p> <p>In order to reduce the load of pollutants sent to the final waste gas treatment and to increase resource efficiency, the process includes the recovery of methanol, unreacted ethylene and vinyl acetate monomer (VAM). This reduces the proportion of waste produced and reduces the quantities of raw materials used, as unreacted VAM/ethylene are reused. Additionally, in the pelletising area of the process plant, the air is extracted to a water scrubber to minimise emissions of methanol.</p> <p>BAT is to use one or a combination of techniques. We agree that the operator is 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. BAT 8a and 8b have priority over sending process off-gas streams to a combustion unit.	CC	<p>The operator confirmed that:</p> <p>As technique 8b is utilised at the site (see above), the recovery and use of organic solvents has priority over sending process off-gas streams to a combustion unit.</p> <p>However, the production process creates a number of waste gas streams which cannot be re-used in the process and require disposal. These waste streams are generated from a number of sources, including:</p> <ul style="list-style-type: none"> - Displacement and boil-off vapours from vessels and tanks - Heat exchanger vents - Nitrogen/solvent vapours from tank/vessel blanketing and breathing - Nitrogen from off-gas header continuous inert gas purge

		<ul style="list-style-type: none"> - Ethylene compressor seal purge <p>These off-gas streams are collected in the off-gas header, which has a knock out pot for the removal of condensable liquids (refer to BAT Conclusion 10 below). These off-gases are sent onto the flare header which collects purge gas from the reactor/compression circuit via the recycle gas tank.</p> <p>Small nitrogen flows are provided into the off-gas header and flare header to sweep flammable gases through into the flare system for release to atmosphere. Any combustible materials present in the waste gas stream are burnt in the flare stack.</p> <p>The flare stack is located at the adjacent Ineos installation, authorised by permit EPR/HP3235CG.</p> <p>The applicability of this criterion is limited, as sending process off-gas streams to a combustion unit may be restricted due to the presence of contaminants or due to safety considerations. The presence of nitrogen and large amounts of condensable liquids, has ruled out sending process-off gas streams to a combustion unit. To meet specifications of the combustion unit, a chiller and re-heater would be required, to remove the condensable liquids, needing capital investment and incurring substantial running costs of around £130,000/year. Cost benefit analysis has dictated that installation of such a system is not justified against the benefits of combustion of the off gas-stream. We are satisfied that this is the case.</p>
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			We agree that the operator is CC with the requirements of this BAT Conclusion.
10	Reduce channelled emissions of organic compounds to air by using one or a combination of the described techniques.	CC	<p>The operator confirmed that:</p> <p>The site conforms to this criterion using a combination of techniques. Predominantly, the reduction of channelled emissions of organic compounds to air is achieved through techniques a and c:</p> <p>a. Condensation Off-gas streams are removed by reducing their temperature below their dew point to liquefy.</p> <p>Recently, improvements have been made to the knock out pot condensation process, which is now recovered through the water extractive distillation (WED) column. The knock out plot flow is now recovered through the WED column at an average of 130 kg/day, the composition is on average:</p> <p>Vinyl acetate 15% Methanol 80% Methyl acetate 2% Acetic acid 1% Water 2%</p> <p>When the water content of the waste organic stream is below 14%, it is sent to the off-site Ineos boiler for raising steam. When it is above 14%, as in the average composition for 2018, the waste is sent off site by</p>

			<p>tanker for recovery, which is also used to raise steam.</p> <p>c. Wet scrubbing Within the pellet formation area, a ventilation hood is in place with a ventilation scrubber using steam to reduce methanol emissions.</p> <p>BAT is to use one or a combination of techniques. We agree that the operator is CC.</p>
11	Reduce channelled dust emissions to air, by using one or a combination of the described techniques.	CC	<p>The operator confirmed that:</p> <p>A combination of the techniques described are utilised at the site to reduce dust emissions to air:</p> <p>a. Cyclone c. Fabric filter f. Wet dust scrubbing</p> <p>The techniques are utilised within the drying of the pelletised ethylene vinyl alcohol co-polymer (EVOH) polymer. The EVOH pellets are sent to the fluidised bed dryer as wet pellets and are partially dried by heated air that is discharged to atmosphere via cloth filters. The pellets are then conveyed by nitrogen to the hopper dryers. In the hopper dryers, the pellets are dried by heated nitrogen. The nitrogen is circulated by blowers through water scrubbers to condense moisture and organics. Within the EVOH polymer warehouse, where the transport of product generates dust, fabric filters are utilised to remove caustic dust.</p>

			BAT is to use one or a combination of techniques. We agree that the operator is CC.
12	Reduce emissions to air of sulphur dioxide and other acid gases (e.g. HCl), by using wet scrubbing.	NA	The operator confirmed that this BAT Conclusion is not applicable to the activities carried out at the installation as there are no acid gas emissions. We agree that this BAT Conclusion is NA to the activities carried out at the installation.
13	Reduce NO _x , CO and SO ₂ emissions from thermal oxidisers by using a combination of the described techniques	NA	The operator confirmed that this BAT Conclusion is not applicable to the activities carried out at the installation as there are no thermal oxidisers. We agree that this BAT Conclusion is NA to the activities carried out at the installation.
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.	CC	The operator referred to the horizontal BREF assessment for BAT Conclusions for CWW and WGT/ Management Systems in the Chemical Sector. See below. The operator is CC with this BAT Conclusion.
15	Increase resource efficiency when using catalysts by using a combination of the described techniques.	NA	The operator confirmed that: To conform to this criterion and to increase resource efficiency when using catalysts, technique a. catalyst selection has been utilised by the site. The catalyst utilised at the site has recently changed from

			<p>caustic soda to sodium methylate due to greater efficiency in catalysing the polymerisation reaction.</p> <p>However, sodium methylate does not strictly meet the definition of a catalyst, as it is used up in the reaction and is not regenerated and therefore, is not reusable. Therefore, sodium methylate should be accurately classified as a reagent, rather than a catalyst and this criterion is not relevant to the process.</p> <p>We agree that this BAT Conclusion is NA to the sodium methylate catalyst.</p>
16	Increase resource efficiency by recovery and reuse of organic solvents.	CC	<p>The operator confirmed that:</p> <p>The philosophy of the plant is to recover and reuse organic solvents wherever possible. Organic solvents used in process or operations are recovered, to be reused.</p> <p>Methanol is recovered after the alcoholysis process, through two distillation columns, the pure methanol stream being stored and reused. Furthermore, vinyl acetate and methanol azeotropic solution is recovered and directly recycled to the polymerisation reaction.</p> <p>Any remaining solution is fed to the WED column to separate methanol from vinyl acetate, before both are recycled.</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>

17	Prevent, or where not practicable reduce, waste for disposal by using a combination of the described techniques.	CC	<p>The operator confirmed that:</p> <p>The following techniques are utilised to reduce the amount of waste being sent for disposal from the site:</p> <p>c. Material recovery Utilised to reduce the amount of waste by recovery of solvents, by-products and starting materials. As outlined in BAT Conclusion 16 above, organic solvents are recovered and recycled. Furthermore, methyl acetate is recovered as a by-product of the alcoholysis process through distillation and sold to Ineos as feedstock. Additionally, unreacted vinyl acetate and ethylene from the polymerisation reaction are recovered and re-inserted into the polymerisation reaction.</p> <p>e. Use of residuals as a fuel Utilised for the waste organics stream. If the water content of the waste organics stream is sufficiently low (below 14%), then the stream is transferred to FB8, to be used as a fuel. If the water content in the waste organic stream is higher than this, it is tankered off and used as fuel off-site. A small waste organics purge stream is also sent to the existing raising unit where it is used as secondary liquid fuel.</p> <p>BAT is to use an appropriate combination of techniques. We agree that the operator is CC.</p>
18	Prevent or reduce emissions from equipment malfunctions, by using all the described techniques.	CC	<p>The operator confirmed that:</p> <p>This criterion is relevant to the ethylene compressor and relief valves.</p> <p>a. Identification of critical equipment</p>

			<p>Has been utilised for the ethylene compressor. The ethylene compressor Failure Mode Effects Analysis (FMEA) identifies all equipment critical to the protection of the environment.</p> <p>b. Asset reliability programme for critical equipment Is in use with standard operating procedures in place, as well as preventative maintenance programmes, monitoring, recording of incidents and continual improvements.</p> <p>c. Back-up system for critical equipment Identified through process safety assessments with measures in place to ensure the necessary maintenance, inspection and tests are in place for equipment. The operator also provided the 'Safety Critical Equipment Management (SCEM)' manual.</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>
19	<p>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:</p> <p>i) Start-up and shut-down operations ii) Other circumstances</p>	CC	<p>The operator confirmed that:</p> <p>During shut-down operations, there is provision for waste minimisation which includes measures to minimise inventories to reduce emissions.</p> <p>There are no composition issues as the scrubber is only offline when the plant is offline and there are no alternative routes. The vents are washed and drained ready for shut-down and the wash is captured, sent to the column and onto the Yorkshire Water, Waste Water Treatment Works (YW WWTW). The reactor vessel is vented to flare for shut-down, this is the normal route but more ethylene is used.</p> <p>Procedures are in place for both plant shut-down and start-up and all</p>

			<p>environmental protection measures are commissioned prior to any start-up. Shut-down maintenance planning meetings consider minimising the effects on the environment and shut-down review meetings are held post every shut-down maintenance to learn lessons. The Site Aspects and Impacts Register considers specific shut-down activities.</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>
-	BAT Conclusions that are not applicable to this installation	NA	<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 diisocyanate (TDI) and methylene diphenyl diisocyanate (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>
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Key Issues

BAT Conclusion 2

Emission point A2 - scrubber

The operator confirmed that:

Continuous monitoring is performed at emission point A2 (methanol scrubber vent) for the parameters set out below:

- Pressure drop
- Water make-up flows
- Temperature of discharge gas
- Temperature of scrubbing water

Furthermore, methanol measurements are checked daily during commissioning and every six months. Any blockages would be identified by frequent, routine inspections.

This BAT Conclusion does not require monitoring for methanol.

The existing permit requires six monthly monitoring of methanol.

We have retained the existing six monthly methanol monitoring (together with the existing permit limit) in the permit on the basis of no backsliding.

Emission point A4 – fluidised bed drier

The operator confirmed that due to the physical size and layout of the fluidised bed drier, it has been deemed impractical to monitor. This is recognised in our compliance assessment report (CAR) form ref: RDR/120423/BR6643. The emission point is a louvre vent and we agree that there is no monitoring location available that would give meaningful results. On this basis we have not required any monitoring.

Emission points A6a, A6b and A6c – packaging bag filters

The operator confirmed that:

A monitoring report was provided for particulate matter from emission points A6a, A6b and A6c (packaging bag filters). This report was submitted in 2013 in response to permit improvement condition 5.

The monitoring was performed by an MCERTS contractor using suitably trained individuals and certified equipment/methods. The monitoring was undertaken during maximum production rate and therefore, is considered to represent worst case emissions data.

Results of the monitoring exercise demonstrate that both the concentration and mass release (over an hour reference period) are low (0.17 mg/Nm³ to 1.52 mg/Nm³) (0.00026 kg/hour to 0.0015 kg/hour).

Particulate monitoring from A6c is not practical, as the level of uncertainty is too high for meaningful monitoring and as such annual mass limits are utilised as a surrogate method. The results from the monitoring of A6a and A6b are taken to determine a mass load of particulate emissions from A6c. This is recognised in our CAR form ref: RDR/120423/BR6643.

This BAT Conclusion requires monitoring of dust where the pollutant is present in the waste gas. It specifies a monthly frequency with footnote 2 allowing for a reduction to once every year if the emission levels are proven to be sufficiently stable.

Based on the submission for permit improvement condition 5, we have set annual dust monitoring at emission points A6a and A6b. The results from this will be used to determine the mass load of particulate emissions from A6c.

The operator is FC with the requirements of this BAT Conclusion.

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.	CC	<p>The operator confirmed that:</p> <p>For each of the features (i) to (xiv) they provided the reference in their EMS.</p> <p>The management system is designed to meet the Environment Management Standard ISO 14001 and has completed the transition to the updated ISO 14001:2015. An external audit of the management system against ISO 14001 takes place every six months.</p> <p>Certification evidencing compliance with ISO 14001:2015 is provided, valid until 12 January 2023, Ref EMS 87731 2019.</p> <p>The management system will also satisfy the requirements of the COMAH regulations and other essential business needs.</p> <p>Employees are selected on the basis of qualifications and experience.</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>They are required to have proven competence to operate, and improve the management of the installation.</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>
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.	CC	<p>The operator confirmed that:</p> <p>The site have an inventory of waste water and waste gas streams which contains all information relevant to this criterion. This includes information about the chemical production process and the source of waste gas/water streams. The average parameters of the waste gas and water streams are also outlined as comprehensively as possible. This was provided as Appendix 1 of the submission.</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>
3	For relevant emissions to water monitor key process parameters at key locations.	CC	Refer to Key issues section below.

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
4	Monitor emissions to water in accordance with the described standards and minimum frequencies.	NC	Refer to Key issues section below.
5	Periodically monitor diffuse VOC emissions to air from relevant sources using a combination (or for large amounts – all) of the described techniques.	CC	<p>The operator confirmed that:</p> <p>A description of the monitoring performed in line with US EPA 21 and 42, including the methodology utilised, was provided in Appendix 2 of the second submission. The emission levels and calculations are also provided.</p> <p>BAT is to use an appropriate combination of the techniques I to III.</p> <p>The operator implements techniques I and III.</p> <p>We agree that the operator is CC with 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
6	Periodically monitor odour emissions from relevant sources using the described standards.	NA	<p>The operator confirmed that this BAT Conclusion is not applicable to the activities carried out at the installation as there are no compounds with odour thresholds of concern. Furthermore they have developed management plans to avoid causing nuisance from fugitive releases.</p> <p>They have not received any complaints about odour since start-up in 2004.</p> <p>We agree that this BAT Conclusion is NA to the activities carried out at the installation.</p>
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.	CC	<p>The operator confirmed that:</p> <p>They are committed to energy efficiency and this includes limiting the amount of waste water produced on site. High pressure (HP) steam is supplied to the site from a power station. Steam is used on site at four different pressures, high pressure (HP), medium pressure (MP), low</p>

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			<p>pressure (LP) and low low pressure (LLP).</p> <p>HP steam is used direct to the methanol column reboiler. MP steam is generated by reducing the pressure of the incoming HP steam and is used as the heating medium in a number of heat exchangers. LP and LLP steam are generated from high pressure steam condensate from the heat exchangers supplied by the MP and LP steam respectively.</p> <p>Condensate from the heat exchangers supplied by the LP and LLP steam is collected and cooled using cooling water and then transferred to the site demin water tank. This is used in the process in the strand forming, extraction column and methanol scrubber as well as been used as the temperature medium in the reactor jacket.</p> <p>The water from the methanol scrubber is recycled within the plant as demineralised water added to the WED column and water added to the strand forming area.</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>Minor steam traps from steam tracing go direct the classification pit.</p> <p>To reduce the steam usage on site the original plant design uses the methanol vapour from the methanol column as a heating medium for other heat exchangers on site. This philosophy has been continued with recent modifications that utilise waste heat from the condensate system to pre heat streams to various distillation columns.</p> <p>The main uses of water on site are in strand forming and the methanol scrubber, which are optimised for efficiency to reduce water use. Furthermore, the number of polymer grade changes in the reaction vessel has been reduced, which incurs a lower washing frequency of the vessel between changes and therefore reduces water use. Raw materials are recovered and reused after each reaction.</p> <p>We agree that the operator is CC with 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
8	Prevent the contamination of uncontaminated water reduce emissions to water, by segregating uncontaminated waste water streams from waste water streams that require treatment.	CC	<p>The operator confirmed that:</p> <p>The conformity to this criterion is ensured by maintaining segregation of contaminated waste water on site. The two effluent collection sumps are only pumped off-site after assessment for contamination. Any effluent outside of the 'clean effluent' specification agreement with Saltend Chemicals Park Ltd. would be sent to YW WWTW for treatment via the S1 emission point. If the effluent is also outside of the specification for YW WWTW it is collected in the waste water holding tank TA-080, which is then diluted before sending to YW WWTW. The separate effluent streams are colour coded on the site, to prevent contamination.</p> <p>'Clean effluent' is discharged without treatment at emission point E1, ('direct' release to water) to the Saltend Chemicals Park Ltd. effluent system (PX Aquarius), for final discharge to the Humber</p> <p>We agree that the operator is CC with 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
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.	CC	<p>The operator confirmed that:</p> <p>The site has a range of buffer storage facilities available to contain waste water incurred during other than normal operating conditions and prevent uncontrolled emissions to water.</p> <p>There is continuous on-line monitoring of the two aqueous effluent streams (E1 & S1) leaving the site which are only pumped out after assessment for contamination.</p> <p>The classification pit will provide containment of any contaminated waste water with a capacity of 180 m³. A high level alarm is fitted to the classification pit and should it be overwhelmed, the effluent will overflow to the storm water pit. Manual transfer to the holding tank TA-080 (1700 m³) or the firewater lagoon is also available to contain the contaminated effluent. If waste water is outside of the YW WWTW specifications it is collected in the waste water holding tank (TA-080). Ultimately TA-080</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>disposal is via dilution to YW WWTW.</p> <p>Additionally, the dilute aqueous methanol tank TA-011, smooths demand on the methanol column and can provide interim storage. The interim storage of contaminated rainwater would be in the storm water pit, with available capacity in the classification pit if required, before transfer to the Saltend Chemicals Park Ltd. drainage system (PX Aquarius).</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>
10	Reduce emissions to water, by using an integrated waste water management and treatment strategy that includes an appropriate combination of the described techniques (in the priority order given).	CC	<p>The operator stated that this BAT Conclusion is NA to the activities carried out at the installation. Only pH correction is carried out prior to transfer to YW WWTW for final treatment.</p> <p>We have set an annual requirement in the performance requirements table of the permit requiring the operator to confirm whether there have been any significant changes at the facility or at the YW WWTW that</p>

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			<p>may affect whether treatment off-site at the WWTW is BAT and provides an equivalent level of protection of the environment as if the effluent were treated on-site.</p> <p>We don't agree that this BAT Conclusion is NA to the activities carried out at the installation. Techniques a, b and c apply which prevent/reduce generation of pollutants, recover and abate pollutants prior to discharge. CWW/WGT BAT Conclusions 7 and 12 address these requirements.</p> <p>We conclude that the operator is CC with this BAT Conclusion.</p>
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.	CC	<p>The operator confirmed that:</p> <p>Waste water pre-treatment is carried out to protect the final waste water treatment plant in the form of pH adjustment, temperature monitoring and flow control to ensure waste water is within YW WWTW specifications.</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 that the operator is CC with this BAT Conclusion.
12	Reduce emissions to water, by using an appropriate combination of the described final waste water treatment techniques.	CC	<p>The operator confirmed that:</p> <p>To reduce emissions to water, a combination of final waste water treatment techniques are utilised at the site. This includes the preliminary and primary treatment of neutralisation, which is undertaken to ensure the pH of the effluent is within the specification range for acceptance at YW WWTW (between 5.5 and 10.0).</p> <p>Another technique utilised at the site is final solids removal. Dust wash down and suspended solids are captured in the classification pit where they are 'gulped out'. This system is shut down annually for maintenance.</p> <p>The other techniques listed in the BAT Conclusion are not applicable as</p>

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			<p>the pollutants are not generated at the site.</p> <p>Total organic carbon (TOC), chemical oxygen demand (COD), pH and temperature are monitored at S1 before transfer to YW WWTW, to ensure the effluent is within specification. (This is not required by the permit).</p> <p>We will also require monitoring of the appropriate parameters at emission point E1 to ensure that the requirements of this BAT Conclusion are met, refer to Key issues section below.</p> <p>The operator is required to demonstrate that emissions at E1 and S1 can comply with the BAT AELs within Tables 1-3 including reduction factors (S1) to demonstrate the efficiency of any treatment plant. Refer to Key issues section below.</p> <p>Also refer to BAT Conclusion 10 above for additional reporting</p>

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			<p>requirements.</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>
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.	CC	<p>The operator confirmed that:</p> <p>Site Procedure, 'SP 703 Disposal of Waste' provides the overarching guidance for the management of all waste created on site. Using the guidance all departmental managers are responsible for waste minimisation within their areas of control.</p> <p>Any disposal of waste will only be considered when prevention, minimisation, recycling or recovery is not reasonably practicable.</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>
14	Reduce the volume of waste water sludge requiring further treatment or disposal, and	NA	The operator confirmed that this BAT Conclusion is not applicable to the

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
	reduce its potential environmental impact, by using one or a combination of the described techniques.		<p>activities carried out at the installation.</p> <p>There is no on-site treatment so no production of waste water sludge.</p> <p>We agree this BAT Conclusion is NA to the activities carried out at the installation.</p>
15	Facilitate the recovery of compounds and the reduction of emissions to air, by enclosing the emission sources and treating the emissions, where possible.	CC	<p>The operator confirmed that the emissions sources are captured as far as possible. This enables the recovery and re-use of compounds, to reduce the load of pollutants sent to the final waste gas treatment and to increase resource efficiency. Waste gas streams which cannot be re-used in the process are collected in the off-gas header.</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>
16	Reduce emissions to air, by using an integrated waste gas management and treatment strategy that includes process-	CC	<p>The operator confirmed that the plant utilises process integrated techniques to recover and re-use organic solvents and unreacted organic raw materials. In order to reduce the load of pollutants sent to</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
	integrated and waste gas treatment techniques.		<p>the final waste gas treatment and to increase resource efficiency, the process includes the recovery of methanol and unreacted ethylene and VAM. This reduces the proportion of waste produced and reduces the quantities of raw materials used, as unreacted VAM/ethylene are re-used.</p> <p>The off-gas steams which are collected in the off-gas header, pass through a knock out pot to remove condensable liquids.</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>
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	The operator confirmed that the waste gases collected in the off-gas header are sent onto the flare header which collects purge gas from the reactor/compression circuit via the recycle gas tank. Small nitrogen flows are provided into the off-gas header and flare header to sweep flammable gases through into the INEOS flare system for disposal to atmosphere. Any combustible materials present in the waste gas stream are burnt in the INEOS flare stack.

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>Historically, there was an intention to send the off-gas stream to a neighbouring site for combustion and steam generation. However, due to the large amount of condensable liquids within the steam, a chiller and re-heater would be required to meet the specification of the combustion unit, incurring significant installation and operating costs.</p> <p>The calorific value of the off-gas steam was insufficient for this route to be viable, considering the significant costs involved. Hence, cost benefit analysis dictated that installation of such a system was not justified against the benefits of combustion of the off-gas stream. Consequently, the off-gas stream continues to be sent to the INEOS flare.</p> <p>Over recent years, the quantity of off-gas sent to flare has been significantly reduced through plant efficiencies. The operational improvements have minimised as far as practicable, the load of gases sent to flare for combustion.</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>We have included reporting requirements for the use of the flare in table S4.3 (performance parameters) of the permit.</p> <p>We agree that the operator is CC with 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> <p>a. Correct design of flaring devices This is limited as the INEOS flare is an existing flare in continuous operation.</p> <p>b. Monitoring and recording as part of flare management Over recent years, the quantity of off-gas sent to flare has been minimised through plant efficiencies. The operational improvements have minimised as far as practicable, the load of gases sent to flare for combustion.</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>The off-gas flow to the INEOS flare is monitored. Flare reports are shared with INEOS and every 6 months totals are shared with the Environment Agency. Recording of flaring events is outside of the site's control, as the flare is the responsibility of INEOS.</p> <p>They confirm that the aspects of this criterion which are relevant to the site are met by the monitoring and reporting systems in place.</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>
19	Prevent or, where that is not practicable, reduce diffuse VOC emissions to air, by using a combination of the described techniques.	CC	<p>The operator confirmed that:</p> <p>They utilise a number of techniques, to prevent or where that is not practicable, reduce diffuse VOC emissions to air.</p> <p>For an existing plant, the applicability of techniques a. to d. may be restricted due to operability requirements. However, the plant design</p>

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			<p>does limit the number of potential emissions sources as far as practicable in line with technique a. Furthermore, the plant design maximises process-inherent containment as far possible, high integrity equipment is utilised as required and the maintenance programme in place incorporates preventative maintenance and monitoring to identify any loss of containment.</p> <p>Techniques e. and f. are applied to plant or equipment construction, assembly and commissioning.</p> <p>e. Procedures for plant/equipment construction and assembly. f. Plant/equipment commissioning and handover</p> <p>There are well-defined and comprehensive procedures in place for plant/equipment construction and assembly and there are robust commissioning and handover procedures for new equipment/plant.</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>For techniques:</p> <ul style="list-style-type: none"> g. Maintenance and timely replacement of equipment h. Risk based leak detection and repair i. Prevent diffuse VOC emissions <p>The inspection and maintenance process in place at the site ensures the integrity of equipment and prevents issues such as corrosion leading to a fault or mechanical failure, which could cause a loss of containment.</p> <p>The asset reliability programme in place ensures that the correct maintenance philosophy is applied to each asset on a risk basis, considering the potential consequences of asset failure.</p> <p>As far as it is reasonably practical, diffuse VOC emissions are prevented though the integrity of equipment, containment systems, the asset reliability programme and the maintenance process in place.</p> <p>We agree that the operator is CC with 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
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 elements:	CC	<p>The operator confirmed that:</p> <p>It is not anticipated that under normal operating conditions that odours emanating from the site will impact off-site individuals. There have never been any complaints from external parties in relation to odours but there is a procedure in place to handle such occurrences.</p> <p>The potential for odorous emissions is restricted to emergency releases and the response arrangements in place at the site are considered sufficient to prevent and reduce the exposure of on-site and off-site individuals. It is not considered reasonable to implement an odour management plan when the only foreseeable route to odorous exposure are emergency releases and there are no odour issues identified for normal operating conditions.</p> <p>We agree that the operator is CC with 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
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.	NA	<p>The operator confirmed that this BAT Conclusion is not applicable to the activities carried out at the installation as no waste water collection or treatment takes place on site.</p> <p>We agree that this BAT Conclusion is NA to the activities carried out at the installation.</p>
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:	CC	<p>The operator confirmed that:</p> <p>It is not anticipated that under typical operating conditions that noise emanating from the site will impact members of the general public. There have never been any complaints from external parties in relation to noise but there is a procedure in place to handle such occurrences.</p> <p>As part of the management of change process, the potential for a modification to cause noise issues is considered. For any new</p>

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			<p>equipment or process this would identify any potential issues relevant to noise emissions and ensure they are thoroughly considered and effectively managed.</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>
23	Prevent or, where that is not practicable, reduce noise emissions, by using one or a combination of the described techniques.	CC	<p>The operator confirmed that:</p> <p>a. Appropriate location of equipment and buildings This is limited, for an existing site.</p> <p>c. Low noise equipment This technique would only be relevant to new or replacement equipment.</p> <p>The approach to noise management at the site is best described by techniques b. and d. A combination of operator measures and noise-control equipment are utilised to ensure that onsite personnel are not exposed to excessive noise levels.</p>

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			<p>b. Operational measures</p> <p>d. Noise control equipment</p> <p>e. Noise abatement The potential benefit of implementing abatement is considered limited, as outlined in response to the CWW and WGT BAT Conclusion 22 above.</p> <p>BAT is to use one or a combination of techniques.</p> <p>We agree that the operator is CC with this BAT Conclusion.</p>

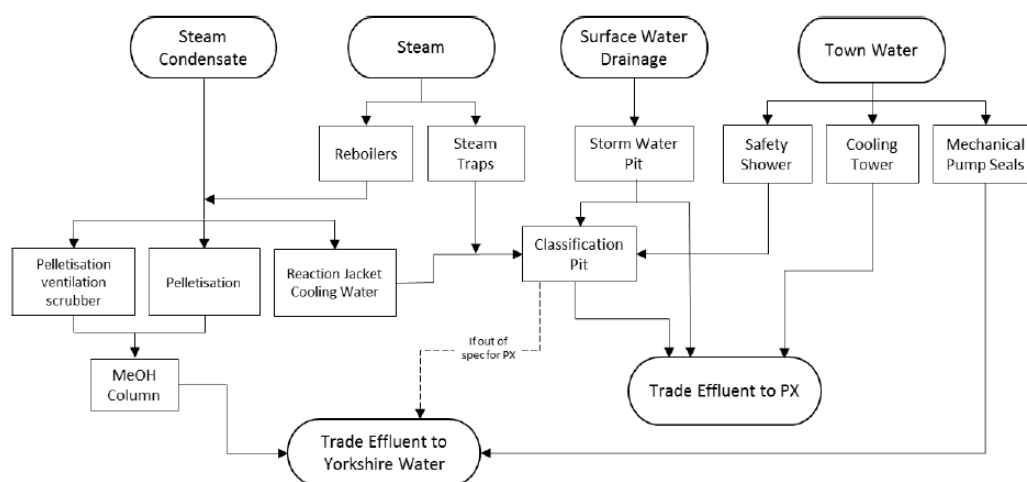
Key Issues

Waste water streams

There are two aqueous discharges from the site, these are:

1. Light effluent from emission point E1 ('direct' release to water) to the Saltend Chemicals Park Ltd. effluent system (PX Aquarius), for final discharge to the Humber.
2. Process effluent from emission point S1 (release to sewer, 'indirect' release to water) to YW WWTW for treatment prior to discharge.

1.2.1 Waste Water Streams



BAT Conclusion 3

This BAT Conclusion requires the continuous monitoring of flow, pH and temperature at 'key locations' for emissions to water. We do not consider emission point E1 to be a 'key location' as it flows to PX Aquarius prior to release to the Humber (see below).

The operator confirmed that:

Emission point E1

The E1 emission point flows to PX Aquarius, where it is collected in a tank with effluent streams from other sites. The tank contents are then pumped to the Humber outfall. There is continuous monitoring of pH and temperature with an auto divert on the outflow to the Humber outfall. If any of the parameters exceed consent limits, the waste water is sent to the divert tanks. This prevents the emission to the Humber exceeding consent limits.

Flow

The monitoring of flow may be possible utilising existing equipment and this is to be evaluated further to consider practicality. We have specified MCERTs monitoring for flow; however permit condition 3.5.3 allows some flexibility to agree other methods.

pH

The existing permit requires monitoring of pH, however no reference period or monitoring frequency is specified. We have retained the existing monitoring requirements for pH and included the reference period (instantaneous) and monitoring frequency (continuous). Permit condition 3.5.3 allows some flexibility to agree alternative monitoring methods.

Temperature

Monitoring of temperature would require significant modification to the existing infrastructure and there would be downtime associated with this. We have not required monitoring of temperature as we would not expect any impacts from the release.

We agree that the operator is CC with this BAT Conclusion.

Emission point S1

The trade effluent flow is routed directly from the manufacturing areas by above ground pipe-work systems into an above ground trade effluent vessel (VE-080). The contents of the trade effluent vessel are pumped at a constant flow rate (controlled by a flow control valve) of ~1,728 m³/day via a dedicated pipe to YW WWTW.

Continuous monitoring is undertaken for the following key process parameters:

Flow, pH and temperature

If the quality of the waste water is outside the agreed specification, the tank outlet valve is automatically closed and it is diverted to the adjacent above ground effluent holding tank (TA-080). Under normal circumstances the contents of this tank can be bled back slowly into the trade effluent discharge tank (VE-080) to ensure by mixing and dilution the effluent remains within the agreed specification.

The last variation (EPR/BR6643IR/V002) removed limits and monitoring requirements for flow, pH and temperature. This is consistent with our approach for releases to sewer where we would not seek to replicate the requirements of the trade effluent consent for process parameters. We have maintained this approach.

BAT Conclusion 4

The operator confirmed that:

The only routes off-site leading to emissions to water are E1 and S1 (see above).

The only substance/parameters applicable to these waste water streams are:

TOC, COD and total suspended solids (TSS)

This BAT Conclusion requires daily monitoring of these parameters; however it makes provision for monitoring frequencies to be adapted if the data demonstrates sufficient stability.

Emission point E1

The existing permit requires monitoring of TOC; however no reference period or monitoring frequency is specified.

For TOC we have set the reference period to instantaneous instead of 24-hour flow proportional sample. The operator has recently installed an in-line TOC monitor providing continuous instantaneous measurements. We consider this method to be preferable as it provides real time measurements.

Due to the current operational arrangements, it is not possible to take a sample from the transfer to PX Aquarius at E1. We have set an improvement condition to address this; however this will not be in place by 07 December 2021.

In the interim period, the classification pit has been identified as a viable alternative to sampling at E1 and will be used to demonstrate compliance with the TOC and TSS limits from 07 December 2021. Although the classification pit is not the only route to the E1 emission point (refer to schematic above), it is considered the main likely source of TOC and TSS. This monitoring shall be used to demonstrate compliance with the TOC and TSS limits.

We do not agree that the operator is CC with this BAT Conclusion and have set it to NC.

Emission point S1

The last variation (EPR/BR6643IR/V002) removed limits and monitoring requirements for COD and TSS. This is consistent with our approach for releases to sewer where we would not seek to replicate the requirements of the trade effluent consent for relevant parameters. We have maintained this approach.

BAT Conclusion 12 (including BAT AELs)

There are two aqueous discharges from the site, E1 and S1, see above.

Both of these effluent streams must comply with the BAT associated emission levels (BAT AELs), from the CWW and WGT BAT Conclusions, outlined 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	33
COD	100
TSS	35

Emission point E1 - Light effluent to PX Aquarius

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. Waste water routed to PX Aquarius originates from the classification and storm-water pits.

The specifications are as follows:

Classification pit: COD 50 mg/l

Storm-water pit: COD 20 mg/l

Effluent with COD levels exceeding these values will not be transferred to PX Aquarius and therefore, emissions will be well within the 100 mg/l COD limit.

Yearly average calculations for TOC to PX Aquarius

Parameter	2014	2015	2016	2017	Yearly Average
TOC (mg)	7.99E+08	3.01E+09	3.43E+09	2.13E+09	2.34E+09
Volume of effluent each year (L)	5.30E+07	1.41E+08	1.73E+08	8.38E+07	1.13E+08
TOC per year (mg/L)	15.1	21.4	19.9	25.4	20.8

Furthermore, as outlined in the table above, the yearly average TOC for effluent to PX Aquarius is 20.8 mg/l, which is well within the upper limit of 33 mg/l as shown in the BAT AEL table above.

Reduction factors are not taken into account within this average figure, as the effluent to PX Aquarius does not receive any treatment before being released to the Humber.

We have included the BAT AELs in the permit for TOC and TSS at emission point E1, in accordance with the associated improvement condition and interim monitoring at the classification pit.

	TOC (mg/l)	TSS (mg/l)
Existing permit	50	No limit set
Varied permit	33	35

Emission point S1 - Process effluent to Saltend YW WWTW

Process effluent which is outside the specification for transfer to PX Aquarius is transferred to the Saltend YW WWTW, to receive treatment prior to discharge to the Humber. The effluent sent to YW 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.

During 2015-2016, the YW WWTW underwent significant process improvement works, resulting in the plant achieving an average COD value of 82 mg/l and 85% COD removal. For the waste stream to the YW WWTW, the BAT AEL for COD levels is used in place of the TOC BAT AEL, due to a greater availability of data.

The average annual COD concentration released from the site indirectly to water, via the YW WWTW, can be calculated by taking the annual COD mass release from the site and dividing this by the annual flow into the YW WWTW.

The annual flow into the YW WWTW is 65,700,000,000 l, of which less than 1% originates from the site, as outlined in the table below.

Volume of effluent from the facility to YW WWTW	Annual flow into YW WWTW (l/year)	% of flow at YW WWTW originating from the facility
3.43 x 10 ⁸	6.57 x 10 ¹⁰	0.52

The COD levels in the waste stream from the site are provided in the table below and on their own, they would exceed the BAT AEL maximum limit. However, these values do not account for the concentration of the site effluent within the total flow into YW WWTW, or the treatment performed at the YW WWTW prior to release.

Hence, the annual COD mass release to the YW WWTW is calculated by multiplying by the annual effluent flow. The annual COD mass release is then divided by the total volume of flow into the YW WWTW, to calculate the COD concentrations at the YW WWTW. The treatment performed at the YW

WWTW is then accounted for using the COD reduction factor of 85%, to calculate the indirect COD emissions from the site to the Humber via the YW WWTW. The emission levels calculated are well within the BAT AEL maximum limit of 100 mg/l.

Yearly average calculations of COD from the site to the YW WWTW

Parameter	2014	2015	2016	2017	Yearly Average
COD in NG flow to YW WWTW (mg/L)	1052.5	1150.6	1198.6	986.9	1097.2
COD mass release to YW WWTW (mg)	3.48E+11	3.20E+11	4.30E+11	3.62E+11	3.66E+11
COD into YW WWTW (mg/L)	5.30	4.87	6.54	5.50	5.57
COD emitted to Humber following treatment (mg/L)	0.79	0.73	0.98	0.83	0.84

Furthermore, the overall annual emission COD value from the YW WWTW to the Humber is 82 mg/l, which is within the allowable BAT AEL.

In addition to COD, the TSS within the trade effluent from the site are also monitored and are set out in the table below.

Yearly average calculations of TSS from the site to the YW WWTW

Parameter	2014	2015	2016	2017	Yearly Average
TSS (mg/L) – without treatment	36.7	46.6	59.1	52.0	48.6
TSS (mg/L) – with YW WWTW treatment	14.7	18.7	23.7	20.8	19.4

Applying a reduction factor of 60 %, stated as the average solids removal by the lamella settling tanks, the emitted TSS yearly average falls within the allowable BAT AEL.

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 that may affect whether treatment off-site at the YW WWTW is BAT and provides an equivalent level of protection of the environment as if the effluent were treated on-site.

We agree that the Operator is CC 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 is 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 Annex 5 of this decision document.

The opportunity has been taken to delete improvement conditions 9.1 to 9.15 due to completion or being met by the requirements of conditions of this permit variation.

Table S1.3 Improvement programme requirements		
Ref.	Requirement	Date
IC1	<p>The operator shall submit, for approval by the Environment Agency, a report setting out how the following 'Narrative' BAT requirements shall be achieved for the Common waste water and waste gas treatment / management systems in the chemical sector:</p> <p>BAT Conclusion 4 for monitoring of the effluent discharge at emission point E1.</p> <p>The report shall include, but not be limited to, the following:</p> <ul style="list-style-type: none"> • Methodology for achieving BAT • Associated targets / timelines for reaching compliance <p>Refer to BAT Conclusions for a full description of the BAT requirement.</p> <p>The proposals shall be implemented in accordance with the Environment Agency's written approval.</p>	30/09/2021
IC2	<p>The operator shall submit, for approval by the Environment Agency, a report setting out the acetic acid mass balance and calculation of the annual limit in table S3.4 of this permit.</p>	31/12/2021

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.

Permit condition/table	Justification
Condition 1.5.1	Required for multi operator installation.
Table S1.2	Incorporates the relevant operating techniques from the 'old' style permit, where operating techniques were split over a number of tables.
Table S1.3 Improvement conditions 9.3, 9.4, 9.6, 9.14 and 9.15 deleted	<p>9.3 – the requirements will be met by permit condition 1.4.2</p> <p>9.4 – the requirements will be met by permit condition 1.3.1</p> <p>9.6 – the requirements will be met by permit conditions 1.2.1 and 4.2.2</p> <p>9.14 – the requirements will be met by the inclusion in table S4.3 (performance parameters)</p> <p>9.15 – complete, refer to Compliance Assessment Report (CAR) ID: RDR/120423/BR6643</p> <p>IC2 – added requiring validation of the acetic acid mass balance</p>
Table S3.1 amended	Emission point A1 (caustic silo bag filter) removed at the request of the operator. They confirmed that they no longer use caustic pearl. There were no limits or monitoring requirements associated with this release.
Table S3.4 amended	<p>Clarification that the acetic acid annual limit is based on calculation (i.e. not monitoring data).</p> <p>Note 1 to the table added referencing a new improvement condition to validate the acetic acid mass balance and calculation of the annual limit.</p>
Schedule 7 site plan	Updated to include emission points.