

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)

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

The Permit number is: EPR/BR7992IU

The Operator is: Mitsubishi Chemical UK Limited

The Installation is: Cassel Site

This Variation Notice number is: EPR/BR7992IU/V015

Consultation commences on: 21 October 2022

Consultation ends on: 18 November 2022

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 the Best Available Techniques (BAT) conclusions (BATc).

We have reviewed the permit for this installation against the revised BAT Conclusions for the Large Volume Organic Chemicals 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. Published 09 June 2016

In this decision document, we have set out the reasoning for the draft consolidated variation notice that we are minded to issue.

The Decision Document explains how we have reviewed and considered the techniques used by the operator in the operation and control of the plant and activities of the installation. This review has been undertaken with reference to the decision made by the European Commission establishing Best Available Techniques (BAT) conclusions (BATc) for Production of Large Volume Organic Chemicals and Common Waste Water And Waste Gas

Treatment/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 draft 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.

This document is in draft at this stage, because we have yet to make a final decision. Because the operator has requested a relaxation of certain otherwise mandatory standards, before we make this decision the IED requires us to explain our thinking to the public and other interested parties, to give them a chance to understand that thinking and, if they wish, to make relevant representations to us. We will make our final decision only after carefully taking into account any relevant matter raised in the responses we receive. Our mind remains open at this stage. Although we believe we have covered all the relevant issues and reached a reasonable conclusion, our ultimate decision could yet be affected by any information that is relevant to the issues we have to consider. However, unless we receive information that leads us to alter the conditions in the draft consolidated variation notice, or to reject it altogether, we will issue the notice in its current form with an explanation of how we have addressed consultation responses..

In this document we frequently use the expression “we have decided”. This may give the impression that our mind is already made up; but as we have explained above, we have not yet done so. The language we use enables this document to become the final decision document in due course with no more re-drafting than is absolutely necessary.

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

How this document is structured

1. Our proposed decision
2. How we reached our decision
3. The legal framework
4. Annex 1 – 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 proposed decision

We are minded to issue the variation notice to the operator. This will allow it to continue to operate the Installation, subject to the conditions in the consolidated variation notice that updates the whole permit.

As part of our proposed decision we have decided to grant the operator's request for a derogation from the requirements of Section 3.4 Table 1, BAT-AEL for total organic carbon (TOC) as identified following BAT Conclusion 12 in the Common Waste Water and Waste Gas Treatment/Management Systems in the Chemicals Sector BAT Conclusions document. The way we assessed the operator's request for derogation and how we subsequently arrived at our conclusion is recorded in Annex 2 to this document.

The operator has also requested a derogation from the requirements of BAT Conclusion 12 (Table 2, BAT-AEL for total phosphorus and Table 3, BAT-AELs for chromium, copper, nickel and zinc) as identified in the Common Waste Water and Waste Gas Treatment/Management Systems in the Chemicals Sector BAT Conclusions document. We have deferred a decision on this derogation request. See further explanation in Annex 2 to this document.

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

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

2 How we reached our draft decision

2.1 Requesting information to demonstrate compliance with BAT Conclusion techniques

On 4 May 2018 we issued a Regulation 61 Notice ("the Notice") under regulation 61(1) of the Environmental Permitting (England and Wales)

Regulations 2016 (EPR 2016) 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 7 December 2021 which will then ensure that operations meet the revised standard, or
- justifies the reason(s) why standards will not be met by 7 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 the reason(s) 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.

On 10 August 2018, the Environment Agency (“the Agency”) received the response to the Regulation 61 Notice from the operator.

We considered the response to be in the correct form and it contained sufficient information for us to begin our determination of the permit review but the response did not contain 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.

Where the operator has stated that they will not be compliant with a BAT Conclusion and a course of action to achieve compliance has been agreed,

this is recorded in the Key Issues section of Annex 1 with reference to improvement conditions in Annex 3 where appropriate.

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 received further information in response to our requests on:

- 29/09/2020 – Updated permit review response, Total Organic Carbon (TOC) derogation request, Total Phosphorus (Total P) and metals derogation request.
- 30/06/2021 – Details of improvement projects.
- 25/11/2021 – Effluent treatment plant report.
- 21/01/2022 – Surface water outfalls.
- 24/01/2022 – Effluent data on chromium, metals and total phosphorus and river modelling input data.
- 31/01/2022 – Corrections to modelling results.
- 14/04/2022 – Update to improvement projects.
- 27/04/2022 – Total nitrogen data.
- 01/09/2022 – Clarifications and confirmations including plant capacities and raw material specifications.
- 13/09/2022 – Updated site plan with emission points

Having carefully considered the Regulation 61 Notice response and all other relevant information, we are now putting our draft decision before the public and other interested parties in the form of a draft consolidated variation notice, together with this explanatory document.

We are now providing the public with an opportunity to comment on our proposed decision and conclusion to the permit review which includes our draft consolidated variation notice and this decision document. We will consider all relevant representations we receive in response to this consultation and will amend this explanatory document as appropriate to explain how we have done this, when we publish our final decision.

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 Large Volume Organic Chemicals 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 Industrial Emissions Directive), 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 of 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 undertook site investigation work in 2003 as part of the permit application for the installation. This included the drilling and analysis of 48 boreholes across the site. Beneath the made ground there is a significant layer of clay that acts as an aquiclude to prevent the downward migration of any potentially contaminated groundwater into the sandstone and limestone aquifers. A conceptual model suggests that any potential contaminants within groundwater in the made ground would migrate towards Billingham Beck. As a result of advances in pollution control we are confident that any new spillages can be prevented or mitigated from reaching the Beck by appropriate removal and remediation of any affected soil and groundwater.

Since the 2003 site investigation, any releases to soil or groundwater have been promptly remediated in order to prevent any deterioration of soil and groundwater quality from the baseline study. The operator is compliant with the permit requirement for periodic monitoring at least once every 5 years for groundwater and 10 years for soil.

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 Environmental Quality Standards Directive (EQSD) (priority hazardous substances, priority substances and "other pollutants"). It also applies to the specific pollutants listed in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015, 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 identified the releases of hazardous pollutants in their effluent in 2006 and have provided data to show significant reductions in the majority of these by 2017. These include cyanide, chlorine, mercury, zinc, copper, nickel and chromium.

The operator has requested a derogation because they cannot meet the Best Available Techniques – Associated Emission Levels (BAT-AELs) for chromium, copper, nickel and zinc (in addition to the derogation request for total phosphorus and sanitary determinands). It is important that the impacts of any hazardous pollutants are considered as part of any improvements to the quality of the effluent. The permit contains an improvement condition to address this – see Annex 3.

3 The legal framework

The consolidated variation notice will be issued, if appropriate, under Regulations 18 and 20 of the EPR 2016. 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;
and
- subject to aspects of other relevant legislation which also have to be addressed.

We consider that, if we issue 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, (except for TOC from emission point W6) unless a tighter, i.e. more stringent, limit was previously imposed and these limits have been carried forward.

For TOC at emission point W6, we have set time limited higher ELV in accordance with the approved derogation. Refer to Annex 2 of this document.

For emissions to each relevant environmental receptor, the emission limits and monitoring requirements have been incorporated into the consolidated variation notice via tables with notes in Schedule 3 – Emissions and Monitoring.

Annex 1: decision checklist regarding relevant BAT Conclusions

BAT Conclusions for the Large Volume Organic Chemicals (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 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 Compliant in the future (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
	BAT Conclusions that are not applicable to this installation	NA	<p>LVOC BAT Conclusions 1 and 3 to 6 are not applicable as there are no relevant process furnaces/heaters.</p> <p>LVOC BAT Conclusion 7 is not applicable as there is no Selective catalytic reduction (SCR) or Selective non-catalytic reduction (SNCR) at this installation.</p> <p>LVOC BAT Conclusion 11 is not applicable as there are no dust emissions from the LVOC processes.</p> <p>LVOC BAT Conclusion 16 is not applicable because no organic solvents are used in the processes.</p> <p>LVOC BAT Conclusions 20 to 23 inclusive are not applicable as there is no production of lower olefins at this installation.</p> <p>LVOC BAT Conclusions 24 to 30 inclusive are not applicable as there is no production of aromatics at this installation.</p> <p>LVOC BAT Conclusions 31 to 44 inclusive are not applicable as there is no production of ethylbenzene and styrene monomer at this installation.</p> <p>LVOC BAT Conclusions 45 to 47 inclusive are not applicable as there is no production of formaldehyde at this installation.</p> <p>LVOC BAT Conclusions 48 to 55 inclusive are not applicable as there is no production of ethylene oxide and ethylene glycols at this installation.</p> <p>LVOC BAT Conclusions 56 to 60 inclusive are not applicable as there</p>

			<p>is no production of phenol at this installation.</p> <p>LVOC BAT Conclusions 61 to 63 inclusive are not applicable as there is no production of ethanolamine at this installation.</p> <p>LVOC BAT Conclusions 64 to 74 inclusive are not applicable as there is no production of toluene diisocyanate(TDI) and methylene diphenyl diisocyanate (MDI) at this installation.</p> <p>LVOC BAT Conclusions 76 to 85 inclusive are not applicable as there is no production of ethylene dichloride and vinyl chloride monomer at this installation.</p> <p>LVOC BAT Conclusions 86 to 90 inclusive are not applicable as there is no production of hydrogen peroxide at this installation.</p>
2	Monitor channelled emissions to air other than from process furnaces/heaters in accordance with the described standards and minimum frequencies	CC	Updated monitoring standards & frequencies and assessment of stability for reduction in frequency to annual submitted as Appx 4 of Reg 61 response.
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	<p>There is no demand for hydrogen so tail gas is combusted in Tail Gas Burners (TGB) to recover heat.</p> <p>Appropriate techniques are used to minimise and recover unreacted organic raw materials from vent streams.</p> <p>Knock out pots, mist filters and demisters are used as appropriate.</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	CC & NC	<p>Tail gas on Hydrogen Cyanide (HCN) plants is combusted in Tail Gas Burners (TGB) to recover heat, with a minimal feed to retain flare operation for safety purposes.</p> <p>Improvement achieved from end of 2020:</p> <ul style="list-style-type: none"> Vents from MM8 will be combusted in the Sulphuric Acid Recovery (SAR) furnace and steam raised in the SAR waste heat

			<p>boiler. (See plan no.4 in Appendix 5 of operator's Permit Review response, updated 14/04/22.)</p> <p>Improvement planned:</p> <ul style="list-style-type: none"> Plans to combust MM7 and MAA2 vents at SAR (See plans no.3 & 9 in Appendix 5 of operator's Permit Review response, updated 14/04/22.). See Improvement Condition 51 in Annex 3.
10	Reduce channelled emissions of organic compounds to air by using one or a combination of the described techniques.	NC	<p>A number of vents do not have any of the listed abatement techniques to reduce organic compounds. (See improvement already achieved under BAT 9.)</p> <p>Improvements planned (refer to Appendix 5 of operator's Permit Review response, updated 14/04/22, for details of each plan):</p> <ul style="list-style-type: none"> Plan no.7 – install VOC vent abatement equipment on release point C5. See Improvement Condition 52 in Annex 3. Plan no.3 & 9 – VOC and SO₂ emissions from the MM7 plant vents F1 to F8 and the MAA2 Diverter Stack H2 are planned to be abated in the SAR furnace. See Improvement Condition 51 in Annex 3.
12	Reduce emissions to air of Sulphur Dioxide (SO ₂) and other acid gases (e.g. Hydrogen Chloride), by using wet scrubbing.	NC	<p>Improvements planned (see BAT 10) See Improvement Condition 51 in Annex 3.</p> <p>Abatement N/A at some emission points as release concentration is already low.</p>
13	Reduce NO _x , CO and SO ₂ emissions from thermal oxidisers by using a combination of the described techniques	CC	<p>Thermal oxidisers are used to treat the tail gas from the HCN6&8 processes to reduce VOC and HCN releases to air. Both HCN plants have a tail gas burner which raises steam and a flare stack. Combustion is optimised in terms of temperature and excess oxygen.</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.	NC	Improvements planned – see Common Waste Water (CWW) BAT 10 & 12.
15	Increase resource efficiency when using catalysts by using a combination of the described techniques.	CC	<p>The HCN plants at Cassel use the Andrussov process where methane, ammonia and oxygen are reacted over a platinum/rhodium gauze to give optimum performance. The feed gases are passed through filters to remove any contaminants, with the gauze performance and plant efficiency closely monitored.</p> <p>The Tri n-Butyl Titanate catalyst for the nBMA process is selected to minimise impurities, with control also on raw material specifications and the temperature set to ensure efficiency and promote conversion. Process parameters are monitored.</p>
17	Prevent, or where not practicable reduce, waste for disposal by using a combination of the described techniques.	CC	<p>The monomer plants use a variety of different stabilisers throughout the processes to limit the production of polymer. The type of stabiliser used, addition rate and location are optimised to ensure that all appropriate areas are stabilised and the stabiliser is suitable for the plant conditions.</p> <p>Vacuum distillation is used on the methyl methacrylate/methacrylic acid/n-butyl methacrylate (MMA/MAA/n-BMA) processes to minimise operating temperatures and limit polymer formation.</p> <p>Materials are recovered at various stages in the process.</p> <p>HCN – spent gauzes are regenerated off-site and re-used.</p>

			Residues such as tars, stabilisers and short chain polymers which remain within the BMA from the MMA and MAA plants are combusted within the SAR furnace.
18	Prevent or reduce emissions from equipment malfunctions, by using all the described techniques.	CC	Critical equipment is identified and registered. Standard Operating Procedures are in place for all registered equipment as well as preventative monitoring, inspections, maintenance and modification records. Appropriate back-up systems are in place.
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 shutdown operations ii) Other circumstances	CC	Start up and shutdown for all processes is covered by Standard Operating Procedures to ensure that these activities are completed consistently, safely and with minimal environmental impact.

Key Issues

Scheduled Activities

We have reviewed the Section 1.2 Part A(1)(a) activity against the refinery BAT-conclusions and confirmed that none are applicable to the operations. As such, we do not need to pursue a BAT assessment from the operator against the refinery BAT-conclusions.

We have reviewed the scheduled activity table (now S1.1). Although each different scheduled activity only appears in one row it is clear from the description which apply to multiple production lines.

AR1, AR3 and AR5 relate to producing a final product. AR2, AR4 and AR6 consume raw materials but their products are consumed as raw materials for other on-site processes. AR7, sulphuric acid and oleum production, is also consumed as a raw material on site but apart from a small sulphur 'top-up' it recovers by-product streams from other plants so it continues to be classed as a Directly Associated Activity (DAA).

The DAA for abatement treatment has been split into two parts (now AR9 and AR10) for abatement treatment of emission to air and emission to water for clarity.

The DAA for support services (now AR11) has been clarified to show that steam is raised from waster heat boilers that are integral parts of the production plants and not separate combustion plants. Importing of low pressure steam has now ceased but some intermediate pressure steam can be imported/high pressure steam exported to/from CF Fertilisers UK Limited if needed.

Monitoring

None of the emissions to air are from a process furnace/heater so the monitoring frequencies in LVOC BAT-Conclusions 1 for continuous monitoring do not apply. However, where continuous monitoring is already in place it has been retained with existing emission limit values

Where the minimum periodic monitoring frequency of emissions to air in BAT-Conclusion 2 is monthly but may be reduced to once every year if the emission levels are proven to be sufficiently stable, the operator has provided historical monitoring data (appendix 4 of Reg 61 notice response) to demonstrate this stability:-

For A2 (Sulphur Dioxide SO₂), D2 (SO₂), E1 (SO₂), E2 (SO₂), F7 (Volatile Organic Compounds VOC), F8 (VOC), H1 (VOC), I1 (VOC) and I2 (VOC) the recent emissions are stable, often very low, and always less than 20% of the Emission Limit Value so we have set annual monitoring.

For A2 (Nitrogen Oxides NO_x) and D2 (NO_x) the emissions are always measurable but are shown to be relatively stable and less than 60% of the Emission Limit Value so we have set annual monitoring.

In other cases where LVOC BAT-Conclusion 2 states a minimum monitoring frequency that may be reduced to once per year (e.g. A2 and D2 carbon monoxide CO) we have reviewed our own records of submitted monitoring results for stability to assess whether a reduction from monthly is appropriate.

Where a monitored substance is not included in the LVOC BAT-Conclusion 2 table we have used the current monitoring frequency.

Where a monitoring standard is specified in LVOC BAT-Conclusion 2 the current monitoring standard in the permit has been updated to this. Where the monitoring standard is not specified but we know the current permit monitoring standard has been superseded we have updated it.

The tables in Schedule 3 have been amended accordingly.

End of LVOC BAT-conclusions

BATc 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
	BAT Conclusions that are not applicable to this installation	NA	CWW BAT Conclusions 6 and 20 are not applicable as there are no odour nuisance issues. CWW BAT Conclusions 14 and 21 are not applicable as there is no effluent treatment and therefore no sludge is produced. CWW BAT Conclusions 22 is not applicable as there are no noise nuisance issues. See also BAT 8 below.
1	To improve overall environmental performance implement and adhere to an EMS incorporating all the described features.	CC	Cassel Site has been certified to the ISO14001 standard since December 2000 and ISO50001 since January 2015.
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	The environmental aspects register details the inventory of waste water and waste gas streams.
3	For relevant emissions to water monitor key process parameters at key locations.	CC	Outfalls W3, W6 and S1 are compliant with this requirement. An improvement plan to connect the W7 drainage system to the W6 drain was completed in December 2021 and resolves the non-compliance for monitoring at W7.

BATc 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.	CC	Monitoring takes place at W3, W6 and S1. Some of the monitoring frequencies did not meet the BAT frequency requirements and total phosphorus was not measured. An improvement plan to resolve this was completed in December 2021.
5	Periodically monitor diffuse VOC emissions to air from relevant sources using a combination (or for large amounts – all) of the described techniques.	CC	The site has a Leak Detection and Repair (LDAR) programme in place for VOC emissions to air with an agreed written procedure.
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	Measures are taken to reduce effluent volumes and re-use water and this has been an area of particular focus for the site in recent years.
8	Prevent the contamination of uncontaminated water reduce emissions to water, by segregating uncontaminated waste water streams from waste water streams that require treatment.	NA	Due to the age and complexity of the site we accept that it is difficult to achieve complete rainwater segregation. However, an improvement plan to prevent contamination of surface water (around 50% of the site's rainwater) discharging via W3, was completed in January 2022.
9	Prevent uncontrolled emissions to water by providing an appropriate buffer storage capacity for waste water incurred during	CC & NC	Buffer storage capacity and diversion systems are in place for W6, S1 and the east leg of W3. (W7 drain is now connected to W6, so is also compliant.)

BATc 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
	other than normal operating conditions based on a risk assessment, and taking appropriate further measures.		Improvement planned: A penstock valve and transfer system will be installed in the W3 drain, which will allow diversion and containment of any leaks or spills to the BB06 diversion tank. (See plan no.1 in Appendix 5 of operator's Permit Review response, updated 14/04/22.). See Improvement Condition 53 in Annex 3.
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).	NC	Techniques are used to reduce the generation of water pollutants, recover pollutants at source and undertake pre-treatment. Improvements planned: TOC derogation – vacuum engine project. See Improvement Condition 48 in Annex 3. The operator will need to submit a variation application and/or gain a local agreement with the Environment Agency to assess the resultant increases in emissions to air. (See plans no.3 & 5 in Appendix 5 of operator's Permit Review response, updated 14/04/22.)
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	NA	N/A as no final waste water treatment. (Note that an existing improvement condition (IC41) is being updated to address the need for waste water treatment. See Improvement Condition 50 in Annex 3.)

BATc 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 waste water management and treatment strategy.		
12	Reduce emissions to water, by using an appropriate combination of the described final waste water treatment techniques.	NC	Improvements planned and derogations requested (see Appendix 5 of operator's Permit Review response, updated 14/04/22.): <u>Improvement Plan – see Appendix 5 for further details and timescales</u> TSS in W7 – see plan No.2 TOC in W6 – see plan No.5 TOC in W3 – see plan No.1 TP in W6 and S1 – see plan No.10 Cr, Ni, Zn, & Cu in S1 – see plan No.10
	BAT-AELs Table 1 – TOC, COD, TSS Table 2 – nutrients Table 3 – AOX and metals	NC	Derogation request for Total Organic Carbon (TOC) approved – see Annex 2 and IC 48. Derogation request for total Phosphorus (total P) and metals deferred – see Annex 2, update to improvement projects received 14/04/22 and IC49.
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	CC	A periodic review of wastes generated is carried out to ensure waste is minimised, reused or recovered where possible to reduce the amount of waste that has to be disposed of off-site.

BATc 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
	that waste is prevented, prepared for reuse, recycled or otherwise recovered.		
15	Facilitate the recovery of compounds and the reduction of emissions to air, by enclosing the emission sources and treating the emissions, where possible.	NC	All vent emissions are enclosed in vent pipework and routed to a high point for dispersion or directed to an abatement unit. Improvements planned: Some vents have been identified via LVOC BAT 10 & 12 that require treatment – see above.
16	Reduce emissions to air, by using an integrated waste gas management and treatment strategy that includes process-integrated and waste gas treatment techniques.	NC	Improvements planned – see LVOC BAT 10 & 12 above.
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 primary route for the disposal of waste gases is via the Tail Gas Burners (which recovers steam). A minimum steady flowrate is directed to the flare for safety reasons in order to keep the flame lit and available at all times.
18	Reduce emissions to air from flares when flaring is unavoidable, by using one or both of the described techniques.	CC	Flaring systems are optimally designed to ensure ground level concentrations are acceptable at maximum design flowrates. The gas flowrate to each flare is monitored and recorded.

BATc 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
19	Prevent or, where that is not practicable, reduce diffuse VOC emissions to air, by using a combination of the described techniques.	CC	Systems containing VOCs are registered systems that undergo regular inspection and monitoring for leaks. VOC emissions are minimised through plant design, equipment construction, assembly and commissioning and plant operation and maintenance.
23	Prevent or, where that is not practicable, reduce noise emissions, by using one or a combination of the described techniques.	CC	Noise levels are a consideration when purchasing and siting new equipment. Appropriate enclosures are installed where noise levels are not acceptable.

Key Issues

A derogation has been granted for emissions to water of TOC from W6. This is explained in Annex 2.

A derogation request is in assessment for emissions to water of total phosphorus (W6, S1) , chromium, copper, nickel and zinc (S1). Further details of the derogation request are given in Annex 2.

It is not possible at present to make a sufficiently precise assessment of the impact of these emissions on the receiving environment to support a derogation decision. The Environment Agency is progressing further monitoring of the Tees Estuary and development of a water quality model by 30/06/24. When notified by the Environment Agency (IC49) the operator must review their derogation application and submit an updated version if necessary. This will then be assessed and granted or refused.

We are satisfied that the changes made to the site drainage and effluent systems are such that the stream to W3 does not now contain direct discharge of effluent subject to CWW BAT Conclusions (and that a diversion system to W6 can be deployed if

necessary). The existing permit monitoring for W3 is retained with update monitoring methods but BAT-AELs have not been applied for TOC, Total P or metals. Copper continues to be monitored against a 100 µg/l limit.

Improvement Condition IC41.

Improvement Condition IC9 (target completion date 01/1/06) required the operator to assess the need for a centralised effluent treatment plant for all process effluents. IC41 (target completion initially 01/01/13 successively extended to 01/01/19) required the operator to install a centralised effluent treatment plant to at least treat Chemical oxygen demand (COD) and Ammoniacal Nitrogen discharges.

A number of possible techniques were considered and suitability trials and design scoping were carried out for both the use of activated sludge treatment on site and sending the effluent to Bran Sands waste water treatment plant. In 2015 both these options were considered technologically possible but unfeasible on economic grounds: Capital Expenditure (CAPEX) and Operating Expenses (OPEX).

The use of reed beds was then explored. Pilot trials established the existing Billingham red beds were not a suitable design/capacity. Further pilot trials of passive and aerated reed beds eventually concluded in 2019 that the reed bed technology being tested could not reliably meet all the wastewater discharge requirements for the site, particularly as the scope is now expanded to a requirement to meet all the CWW BAT-AELs above mass thresholds including total phosphorus and some metals.

IC41 has been superseded by IC50 which requires the reporting of progress towards the installation of treatment systems, either by plant or centrally, to meet the emission limit values in the permit (allowing for any granted derogation periods) and any relevant CWW narrative BAT requirements.

Nutrients – Total N. No current limit in permit, although there is monitoring and a limit for ammoniacal nitrogen from W3, W6 and S1. Water Framework Directive and nutrient neutrality requirements will likely make an ELV in the permit for total nitrogen necessary but until the further monitoring and modelling of the Tees estuary is complete this cannot be determined. Until that time monitoring of nitrate and nitrite without a limit has been added to W6 and S1 to gather data. This data can be used in the design and assessment of the future effluent treatment plant to be reported under Improvement Condition IC50.

TOC derogation (BAT10).

There will be a requirement to set an ELV to air for phase 2b of the programme of work in order to regulate the temporary increase of VOC and SO₂ to air. This will need to be done through a future permit variation and/or a local agreement with the Environment Agency, as the stack design, air emissions screening and modelling work have not been finalised. The mass emissions are known. Continuous emissions monitoring (CEM) to air has been proposed by the operator at this vent.

The Phase 3 tie-in to SAR in 2026 onwards completes the improvement programme to reduce air emissions from the MM7 plant.

We accept that the potentially highly toxic nature of emissions to air from each of the HCN plants makes the use of a tail gas burner (thermal oxidiser) appropriate. The gas flow to the tail gas burner is monitored and the combustion heat is recovered. The diversion to flare when these cannot be operated is for safety reasons. We have added a requirement to report the dates and durations of flare use in Table S4.3 Performance parameters to ensure the use of flares is being minimised to only other than normal operating conditions. Table 2.2.11 Equivalent parameters and technical measures relating to operation of tail gas burners and flares had been included in the varied permit as condition 2.3.8.

Where relevant and appropriate, we have incorporated the techniques described by the operator in their Regulation 61 notice response as specific operating techniques required by the permit, through their inclusion in Table S1.2 of the consolidated variation notice.

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

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

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

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

(b) the technical characteristics of the installation concerned.

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

A summary of any derogation granted is also recorded in an Annex to the consolidated variation notice in accordance with the requirement of IED Article 15(4) as described above.

Request for Derogation from BAT-AEL For Total Organic Carbon at W6 to Billingham Beck

The operator requested a time-limited derogation from the BAT Associated Emission Level (BAT-AEL) for total organic carbon (TOC) from a direct emission to water in Table 1 under BAT 12 of the BAT Conclusions for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector (published 09/06/2016). The BAT-AEL for TOC is 10 – 33 mg/l and the operator requested an emission limit of 80 mg/l until 31/03/2024, later extended to 31/03/2025. This is the basis of the technical characteristics of the installation infrastructure, and the future investment cycle of the business.

In the operator’s Regulation 61 Notice response, they asserted that their wetlands project would achieve compliance with the BAT-AELs by September 2021. It became apparent that this was not going to be successful and further information was subsequently supplied on 29/09/2020. This included an update to the permit review response and information to support the derogation request.

On review and assessment of this information we have decided to grant the derogation requested by the operator in respect to the BAT-AEL value for TOC described in BAT Conclusion 12 (Table 1), but have included other emission limit values in the consolidated variation notice that will ensure suitable protection of the environment. A limit of 80 mg/l for TOC will apply until 31/03/2025, after which it will reduce to the BAT-AEL of 33 mg/l.

As part of their response the operator stated that the reason for their derogation request was that they require additional time to carry out the phased plant upgrades to achieve the programme of improvement works within the next investment cycle.

The way in which we have considered, assessed and determined the derogation request is detailed in the section below.

Derogation assessment

Description of the derogation request

The BAT Conclusions for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector (CWW) includes tables of BAT-AELs under BAT 12:

“In order to reduce emissions to water, BAT is to use an appropriate combination of final waste water treatment techniques” as listed in the narrative table of techniques a) to k) in order to achieve the BAT-AELs which are specified in Tables 1, 2, and 3.

The BAT-AEL in Table 1 for direct emissions of total organic carbon (TOC) is 10 – 33 mg/l.

BAT 12 is linked to BAT 10: *“In order to reduce emissions to water, BAT is to use an integrated waste water management and treatment strategy that includes an appropriate combination of the techniques in the priority order given below.”*

- a) Process-integrated techniques
- b) Recovery of pollutants at source
- c) Waste water pretreatment
- d) Final waste water treatment

The operator cannot meet the BAT-AEL for TOC for emission point W6. They have established that over 90% of the TOC going into the W6 outfall is generated by the seal water purge from the vacuum engines within the MM7 Plant. They are therefore planning to upgrade these to dry running vacuum engines to minimise the generation of contaminated process waste water from this source.

The existing vacuum engines are 25 years old and typically have a lifetime of 20-30 years. The operator requires additional time to carry out the phased plant upgrades to achieve the programme of improvement works within the next investment cycle.

For the duration of the implementation project (i.e. until 31/03/2025), the operator has proposed an emission limit value (ELV) of 80mg/l TOC compared to the BAT-AEL maximum value for TOC of 33mg/l, at emission point W6 to Billingham Beck.

The project will also require a temporary vent to air for a period of two years until the vent can be tied into the SAR furnace. The operator will need to submit a variation application and/or gain local Environment Agency agreement for assessment of these emissions to air, with a new emission point and emission limit values for TVOC, SO₂ and CO. This requirement will be confirmed in writing by the Environment Agency as part of the approval of the response to Improvement Condition IC48.

Derogation criteria

The derogation request is based on the technical characteristics of the plant:

- Site 5 year investment cycle 2021 to 2025.
- The effect of reducing the excess emission upon other pollutant emissions, energy efficiency, water use or waste arisings from the installation as a whole.
- The intended remaining operational lifetime of the installation as a whole or of the part of it giving rise to the emission of the pollutant, where the operator is prepared to commit to a timetable for closure.

As explained above, the operator requires additional time to implement the proposed plant upgrades, without impacting upon the existing product quality or production commitments. This will be undertaken during the next investment cycle and replace the vacuum engines that are reaching the end of their typical lifespan. We are satisfied that the derogation criteria are met.

Options appraisal

The operator has considered eight options for achieving the BAT-AEL. Three of these have been screened out as not viable:

- Control technique: send the seal water to the SAR furnace rather than to W6. This recovery option would have high operating costs, due to the additional natural gas requirement, and would generate additional CO₂ emissions.
- Abatement technique: activated sludge plant (on-site). High investment and operating costs. Alternative on-site treatment method is preferred.
- Abatement technique: activated sludge plant (off-site). High investment and operating costs, plus no existing pipeline to suitable treatment facility.

The remaining options were progressed for cost benefit analysis (CBA) and are included in the following table, in addition to continuing with business as usual (BAU).

Options considered as viable and taken forward for disproportionality assessment in Stage 2		
Option	Description	Timescale for completion
Business as usual (BAU)	This option demonstrates the existing operation of the installation and would be applicable if the installation operations were to continue without any changes being made.	No change
1) Proposed derogation Process integrated technique – prevent by reduction at source, of the water pollutants	Preferred option - replacement/ upgrade of the four MM7 vacuum engines Change the manufacturing process equipment that is responsible for generating the main source of TOC on the MM7 Plant. This involves changing the vacuum pumps from water cooled to dry running vacuum engines, with a vent abatement project. This however, has cross media effects with increased emissions to air for two years for SO ₂ and TVOC, which have been included in the CBA tool for 24 months.	The BAT-AEL for TOC to river would be met following completion of this upgrade, from 31 March 2024. This upgrade will not address TN, TP or Metals to river. Only the TOC. (A further request was received to extend the timescale to 31 March 2025)
2) BAT- AEL indefinite Final waste water treatment	Off-site disposal of the Water discharge stream. The initial proposal was a tankering waste water for a number of years (20 years was used in the CBA tool).	BAT achievable immediately. This option could be a <i>long-term option</i> so as to solely meet the BAT_AEL for TOC to water by the compliance deadline of 7 th December 2021.
3) Option alternate A Waste water pre-treatment – abate pollutants prior to final waste water treatment	Bio-treatment of the seal water. Pre-treat the waste water from the MM7 plant vacuum engines with a standalone biological treatment unit. The unit would remove up to 80% of the TOC in the water. This option would generate a bio-mass sludge for disposal. The sludge generated would be approx. 7000m ³ /annum, which would need to be transported for disposal.	Small containerised biological treatment unit for the pre-stills seal water only. This would be new technology for the site and could be installed by end-2024.

Options considered as viable and taken forward for disproportionality assessment in Stage 2		
Option	Description	Timescale for completion
4) Option Alternate B Final waste water treatment	Central Biological Treatment Plant Investigations had been carried out since 2012 and included two laboratory and pilot scale trials and feasibility work for reed bed treatment from mid-2017 to Q1 2019. High investment and operational costs.	A Central Wetland Treatment Plant for all site process effluent. This would be a major infrastructure project and could not be installed until end-2025. This option would allow all the BAT-AELs to be met.
5) BAT-AEL for two years until the vacuum engines are installed, then proposed derogation	Off-site disposal of the Water discharge stream. The initial proposal was a tankering waste water for a number of years (20 years in the CBA); however this added scenario was considered for a short term tankering waste for two years, until the proposed derogation option is installed. Allows the main investment in the vacuum engines to proceed in parallel with this option until March 2024.	BAT achievable immediately. This option could be <i>short-term option</i> so as to solely meet the BAT-AEL for TOC to water by the compliance deadline of 07 December 2021.

Cost Benefit Analysis (CBA)

The operator has provided a credible argument that the increased costs linked to the technical characteristics are disproportionate for achieving the BAT-AEL. A detailed range of options were reviewed, and those identified as technically viable were considered further. Viable options were taken forward for CBA, were adequately described in the CBA, and the cost of the BAT-AEL option (and other options) was confirmed as disproportionate compared to the environmental benefits.

Summary of NPV analysis					
Option	Proposed derogation	BAT-AEL case – tanker for 20 years	Bio-treatment of Seal water	Centralised Biological Treatment Plant	BAT-AEL case until 2024 then new engines
Central (£millions)	0.00	-6.67	-3.19	-62.26	-1.94
Sensitivity analysis					
Lowest NPV (£millions)	0.00	-6.96	-3.35	-77.18	-2.20
Highest NPV (£millions)	0.00	-6.37	-2.97	-47.34	-1.69

Summary of NPV analysis					
Option	Proposed derogation	BAT-AEL case – tanker for 20 years	Bio-treatment of Seal water	Centralised Biological Treatment Plant	BAT-AEL case until 2024 then new engines
Scenario analysis					
Lowest NPV – High costs, Low benefits (£millions)	0.00	-5.65	-2.85	-94.10	-2.28
Highest NPV – Low costs, high benefits (£millions)	0.00	-7.48	-3.33	-39.96	-1.73

The CBA using central assumptions shows negative Net Present Values (NPVs) for both the BAT-AEL options and for the other options, and therefore the cost of compliance is disproportionate compared to the environmental benefit achieved overall.

We have interrogated the CBA inputs (including capital/operational costs and savings, as well as the value of benefit of improvements to the Tees estuary) and carried out sensitivity analysis, in addition to confirming that the effects to air of VOC and SO₂ over 2024 and 2025 do not make any appreciable difference to the environmental damage costs of the scenarios, and do not influence the outcome of the CBA tool. We are satisfied with the operator's approach and justification for the data input for each of the options.

The outcome of the CBA supports the choice of the proposed derogation project to replace the vacuum engines, in the phased installation upgrade project, and to modify the plant infrastructure to route waste gas from the chemical plant into the Sulphuric Acid Recovery (SAR) unit.

Risks of allowing the derogation – environmental impact

The operator has provided modelling to assess the impact of TOC in the discharge from the W6 outfall to Billingham Beck and the Tees estuary. Predictions have been made using the Finite Volume Coastal Ocean Model (FVCOM) 3D hydrodynamic and water quality model of the Tees estuary. The model has been run for up to 20 tidal cycles starting with neap tidal conditions. Calm conditions have been used for each simulation and the release has been continuous throughout the whole model run. These represent worst case conditions because they give the least amount of dispersion in the river.

The model predicts the tidal average and maximum concentrations for each substance. There is no environmental quality standard (EQS) for TOC in transitional and coastal waters and no monitoring data for TOC concentrations in the lower Tees. The average and maximum concentrations of TOC in the

estuary have been estimated using dissolved organic carbon (DOC) as a proxy, with a DOC/TOC conversion factor of 1.7 (as supported by a literature review) giving TOC estimates for the lower Tees of:

- Mean 6.8 mg/l
- Maximum 11 mg/l

These compare reasonably well with monitoring data upstream of the Tees barrage:

- Mean 8 mg/l
- Maximum 16 mg/l

Modelling of the current discharge, which the operator proposes to continue with until they meet the BAT-AEL for TOC, finds that the TOC concentration at the W6 outfall is 14.4 mg/l to 43.2 mg/l. Following mixing, the predicted contributions of TOC from W6 are:

- Tidal average 2 mg/l
- Tidal maximum 10 mg/l

As such, any plume of elevated concentrations of TOC is limited to an area in extremely close proximity to the W6 outfall. We are satisfied that the ongoing discharge of TOC from W6 will not cause significant deterioration to the water quality in Billingham Beck or the Tees estuary for the duration of the time-limited derogation. Improvements will be made once the BAT-AEL has been met.

The following table shows the load of TOC that will be discharged for the duration of the derogation against the load once the BAT-AEL has been met, with a difference of 81.5 tonnes per year.

Units	Load at BAT-AEL of 33mg/l	Load at proposed limit of 80mg/l	Difference
t/y	57.5	139	81.5

The permit currently includes a TOC limit of 1500kg per day, which equates to 547 tonnes per year. The operator does not propose to discharge at this level, so an emission limit value of 80 mg/l will remove any perceived headroom.

We have checked the location of the W6 outfall to assess if it is within the screening distances we consider relevant for impacts on nature conservation, landscape, heritage and protected species and habitat designations. The outfall is within our screening distances for these designations: Teesmouth and Cleveland Coast Special Protection Area, Site of Special Scientific Interest and proposed Ramsar, as well as migratory fish species.

We have assessed the TOC derogation and its potential to affect the sites and protected species identified in the nature conservation screening report as part of the permitting process. We consider that the TOC derogation will not

affect these and we have not consulted Natural England. The decision was taken in accordance with our guidance.

We are satisfied that the operator has demonstrated that the proposed derogation option achieves the best overall environmental outcome and we have no concerns regarding the ongoing BAU impact on Billingham Beck or the River Tees for the duration of the time-limited derogation. The BAT-AEL for TOC will be achieved at a later date than required by the BREF, with no significant impact on the environment, as demonstrated by modelling work carried out on the emissions to water. Allowing the proposed TOC derogation would not cause any significant pollution, or prevent a high level of protection of the environment as a whole to be achieved.

Derogation conclusion

The operator has supplied a valid derogation request against the BAT-AEL for TOC in the direct waste water discharge. The operator has provided a credible argument that the increased costs linked to the technical characteristics are disproportionate for achieving the BAT-AEL immediately. We are satisfied that the proposed time-limited derogation is the best option to meet the BAT-AEL for TOC and allow for phased infrastructure investments at the installation. It achieves the best overall environmental outcome and we have no concerns regarding the ongoing BAU impact on Billingham Beck or the River Tees.

The permit variation will include an emission limit value for TOC of 80 mg/l until 31/03/2025, after which it will reduce to the BAT-AEL of 33 mg/l. The permit will also include an improvement condition requiring the operator to monitor and report on progress with the improvement works.

Request for Derogation from BAT-AEL for Total Phosphorus at W6 to Billingham Beck and Total Phosphorus, Copper, Zinc, Chromium and Nickel at S1 to Billingham Complex Drainage System and River Tees

The operator has requested a time-limited derogation from the BAT Associated Emission Level (BAT-AEL) for total phosphorus (Tot P), Chromium, Copper, Nickel and Zinc from a direct emission to water in Table 1 under BAT 12 of the BAT Conclusions for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector (published 09/06/2016) based on the technical characteristics of the installation infrastructure and the associated future investment cycle of the business.

The BAT-AELs thresholds, current estimated mass discharges, ranges and the operator requested an emission limit values (ELVs) until 31/12/2029, are:

Substance	Mass Threshold (kg/yr)	Estimated current discharge (kg/yr)	BAT-AEL range (µg/l)	Operator requested temporary ELV (µg/l)
Tot P at W6	300	40,000	500 - 3000	21,000
Tot P at S1	300	25,000	500 - 3000	26,000
Cr at S1	2.5	163	5.0 - 25	170
Cu at S1	5.0	168	5.0 – 50	175
Ni at S1	5.0	701	5.0 – 50	750
Zn at S1	30	432	20 - 300	450

The operator proposed several options to reduce the Tot P and metals to the BAT-AELs. The techniques are the same or similar for all the substances so they are considered as one derogation request.

Due to the operator's plans (based on a necessity) to uprate the current hydrogen cyanide (HCN) and acetone cyanohydrin (ACH) production capacity following the closure of an off-site ACH facility in 2019, it has proposed to install the TP/metals treatment plant at the same time as the uprated/new HCN manufacturing plant, in the next Mitsubishi 5-year business investment cycle 2026 – 2030. The treatment plant can then be designed to accommodate the existing and future effluent streams.

The operator also submitted a cost/benefit analysis for three options that passed an initial feasibility screening step.

Derogation assessment

We carried out a first stage assessment of eligibility and initial screening of options and the second stage assessment of the demonstration of disproportionality of costs over benefits.

However, we were unable to reach a conclusion about the risks of allowing the derogation for the requested period until further monitoring and modelling of the River Tees receiving water has been completed.

Therefore, until the monitoring/modelling and the subsequent derogation request assessment is complete temporary emission limits will apply with an improvement condition (IC49) to review the derogation submission when requested by the Environment Agency before assessment. If the derogation is granted further temporary emission limits will be agreed at that time for the period of the derogation.

The operator submitted supporting monitoring data, where available, and a summary of the derivation method for their proposed temporary ELVs.

We accept all these proposed temporary emission limit values except for Zinc where the headroom between the submitted values and the proposal is much larger. From the submitted data we consider the operator will be able to comply with the BAT-AEL annual limit of 300 µg/l.

The temporary ELVs are shown in Table S3.2 and S3.3 of the permit with table notes controlling their use.

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).

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.

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
IC 1 to IC 40	-	Complete
IC 41	The operator is to install a centralised effluent treatment plant to at least treat COD and Ammoniacal Nitrogen discharges to BAT levels generally as detailed in his response to IC9, received 30-Oct-06. Prior to commencement of detailed design of this plant, the operator is to seek the advice of the Environment Agency on what discharge concentrations of BOD/COD, Ammoniacal Nitrogen and Cyanide are considered to be BAT.	Superseded by IC50
IC 42 to IC 43	-	Complete
IC 44	The operator is to provide a report with the final details of measures to minimise tail gas flow to D4 flare stack and improve tail gas burner process control to minimise plant trips, as outlined in operator application EPR/BR7992IU/V011. The plan should outline facility and operating procedures changes and the timescales to complete each change. Further the report is to include the commissioning plan measures to be completed to assess the effectiveness of these changes. The report is to be approved in writing by the Environment Agency. The improvement plan is to be actioned after approval in writing by the Environment Agency.	Complete
IC 45	The operator is to provide a report on progress that has been made on identifying the improvements that need to be made to minimise the HCN6 tail gas flow to D4, and to	Complete

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
	confirm that appropriate expenditure for the work has been approved.	
IC 46	<p>The operator is to submit a report of commissioning within 3 months of replacement of heat exchangers on the SAR plant (as outlined in Schedule 5 notice response dated 06/11/15).</p> <p>The report should include, but not be limited to, typical hourly average sulphur dioxide concentration measurements from discharge point C1 under normal operating conditions during the commissioning period and a comparison to corresponding measurements prior to the plant maintenance shutdown in 2014.</p> <p>This improvement condition is complete on receipt of written confirmation to that effect from the Environment Agency.</p>	Complete
IC 47	<p>Until the completion of Improvement Condition IC 46 the operator is to report to the Environment Agency for each calendar month:</p> <ol style="list-style-type: none"> i. The hourly average SO₂ emission concentrations from the SAR plant discharge point C1, in mg/m³. ii. The hourly average SO₂ concentrations, wind direction and wind strength at the installation boundary fence monitoring station in µg/m³ and for each hour whether the MM8 plant to SAR vent is working or not. <p>The reports shall comprise tables of the data and a graphical presentation of the month's results and are to be submitted by the end of the sixth working day following the end of the calendar month</p>	Complete
IC 48	<p><u>Derogation for total organic carbon</u></p> <p>The operator shall submit written reports setting out progress to achieving the BAT conclusion AEL, where a derogation has been applied for and granted, to the Environment Agency, for the Environment Agency's approval. The reports shall include, but not be limited to, the following:</p> <ol style="list-style-type: none"> 1) Current performance against the BATc AEL. 2) Methodology for reaching the AELs. 3) Associated targets / timelines for reaching compliance by 31/03/2025 for discharges from the MM7 Plant to emission point W6. 4) Any change in emissions of other pollutants resulting from the actions to reach the AELs. 5) Any alterations to the initial plan. <p>The report shall address the following BAT Conclusion:</p> <ul style="list-style-type: none"> • Common waste water and waste gas treatment/management systems in the chemical sector, section 3.4, Table 1 (compliance with BAT- 	<p>Progress report by 31/03/2023 then at six monthly intervals until compliance is reached, which shall be no later than 31/03/2025.</p>

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
	<p>AEL for TOC, emission point W6) under BAT 12 (waste water treatment).</p> <p>Refer to BAT Conclusions for a full description of the BAT requirement.</p> <p>A final report, summarising the actions taken and the performance achieved, shall be submitted to the Environment Agency, for the Environment Agency's approval.</p> <p>Approval of reports under this Improvement Condition shall include an:</p> <ul style="list-style-type: none"> • Assessment of any temporary increase of emission of other pollutants (including to air) resulting from the actions taken to meet the BAT-AELs to water And • A written local Environment Agency agreement and/or notification of the need to apply for a permit variation to operate the developed process. 	<p>Final report 3 months after compliance is achieved.</p>
IC49	<p><u>Review of Derogation request for Total Phosphorus and Metals discharge to water</u></p> <p>The operator shall submit a review of the derogation request for delay in meeting the BAT-AELs in the direct waste water discharge for Total Phosphorus (W6 and S1), Chromium, Copper, Nickel and Zinc (S1) to the Environment Agency for the Environment Agency's approval .</p> <p>The review shall include, but not be limited to, a surface water pollution risk assessment which shall assess the impact of discharges of hazardous chemicals and elements to surface water and/or sewer from the installation. The risk assessment shall include, but not be limited to the following:</p> <ol style="list-style-type: none"> a) representative emissions data for any relevant hazardous chemicals and elements and any other relevant substances discharged from the installation, including cyanide. Any emissions monitoring required should meet the requirements of, or be carried out using the methods and standards described in, Environment Agency guidance "Monitoring discharges to water" on gov.uk; And b) a risk assessment should meet the requirements of, or be carried out in accordance with, the screening procedures in Environment Agency guidance "Surface water pollution risk assessment for your environmental permit" on gov.uk, using the representative emissions data obtained in (a) above. 	<p>3 months after request from the Environment Agency or 30/06/24, whichever is sooner.</p>

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
	The results of the updated assessment shall be used to assess the derogation request and determine the requirement for any additional control measures together with a timetable for implementation of any proposed measures for approval by the Environment Agency.	
IC 50	<p><u>Effluent treatment</u></p> <p>The operator shall submit reports on progress towards the installation of treatment systems, either by plant or centrally, to meet the emission limit values in the permit (allowing for any granted derogation periods) and any relevant CWW narrative BAT requirements to the Environment Agency for the Environment Agency's approval.</p> <p>This should include, but not be limited to,</p> <ul style="list-style-type: none"> Processes to treat hazardous pollutants and nutrients (N and P) and sanitary determinands. Assessment of the resulting environmental impact both in design and commissioned operation. An assessment against the techniques described in directly relevant BAT Conclusions CWW 10-12 and LVOC 14 but also with regard to potential consequential BAT Conclusions such as CWW 14 (sludge) and 21 (Odour) <p>Approval by the Environment Agency of reports under this Improvement Condition does not preclude the need for the operator to submit permit variation application(s) to operate the developed process.</p>	<p>First progress within 3 months of notification by the Environment Agency but no later than 31/12/24.</p> <p>Then at 6 monthly reports until full compliance with BAT-AELs has been demonstrated.</p>
IC 51	<p><u>BAT to reduce emissions to air</u></p> <p>The operator shall submit, for approval by the 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"> Methodology for achieving BAT Associated targets / timelines for reaching compliance Any alterations to the initial plan (in progress reports), with reference to improvement plans no. 3 & 9 in Appendix 5 of the operator's Permit Review response, updated 14/04/22 Plans for an enhanced pre-application request and/or submission of a permit variation application. <p>The report shall address the following BAT Conclusions:</p> <ul style="list-style-type: none"> Production of Large Volume Organic Chemicals BAT 9, 10 & 12 (reduce emissions to air) Common waste water and waste gas treatment/management systems in the chemical sector BAT 15 & 16 (reduce emissions to air). 	<p>Progress report by 30/06/2023 then at six monthly intervals until compliance is reached, which shall be no later than 31/12/2027.</p> <p>Final report 3 months after achieving compliance</p>

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
	<p>Refer to BAT Conclusions for a full description of the BAT requirements.</p> <p>Approval by the Environment Agency of reports under this Improvement Condition does not preclude the need for the operator to submit permit variation application(s) to operate the developed process.</p>	
IC52	<p><u>BAT to reduce emissions of organic compounds to air</u></p> <p>The operator shall submit, for approval by the Environment Agency, a report confirming achievement of compliance with 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"> • Methodology for achieving BAT • Date that compliance was reached • Any alterations to the initial plan, with reference to improvement plan no. 7 in Appendix 5 of the operator's Permit Review response, updated 14/04/22. <p>The report shall address the following BAT Conclusions:</p> <ul style="list-style-type: none"> • Production of Large Volume Organic Chemicals BAT 10 (reduce emissions of organic compounds to air). • Common waste water and waste gas treatment/management systems in the chemical sector BAT 15 & 16 (reduce emissions to air). <p>Refer to BAT Conclusions for a full description of the BAT requirements.</p>	31/01/23
IC53	<p><u>BAT for buffer storage capacity</u></p> <p>The operator shall submit, for approval by the Environment Agency, a report confirming achievement of compliance with 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"> • Methodology for achieving BAT • Date that compliance was reached • Any alterations to the initial plan, with reference to improvement plan no. 1 in Appendix 5 of the operator's Permit Review response, updated 14/04/22. <p>The report shall address the following BAT Conclusion:</p> <ul style="list-style-type: none"> • Common waste water and waste gas treatment/management systems in the chemical sector BAT 9 (buffer storage capacity for W3). <p>Refer to BAT Conclusions for a full description of the BAT requirement.</p>	31/01/2023

Annex 4: Advertising and Consultation on the draft decision

This section will report on the outcome of the public consultation on our draft decision carried out between 21 October 2022 and 18 November 2022.

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

- Emission point to air C5 for the SAR product BPA Tank has been fitted with a spray pot to act as a condenser and wet scrubber with the condensate recycled back into process. The vent is now redirected to the SAR where any remaining VOC's will be converted to carbon dioxide. Emission point C5 has therefore been removed from Table S3.1
- Emission point to air J1 for the i-BMA vacuum engine is removed from Table S3.1 as the plant ceased operation in August 2005 and there are no plans to re-start this process.
- The performance parameter regarding LP Steam is removed from Table S4.3 as this is no longer imported.
- Improvement Condition 46 is complete and the temporary relaxation of the emission point C1 non startup/shutdown SO₂ emission limit to 1700mg/m³ has ended so the ELV had been returned to 920mg/m³.