

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/NP3532UG
The Operator is: Unilever UK Limited
The Installation is: Port Sunlight Sulphonation Plant
This Variation Notice number is: EPR/NP3532UG/V004

What this document is about

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

We have reviewed the permit for this installation against the revised BAT Conclusions for the 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 set out the reasoning for the consolidated variation notice.

It explains how we have reviewed and considered the techniques used by the operator in the operation and control of the plant and activities of the installation. This review has been undertaken with reference to the decision made by the European Commission establishing best available techniques (BAT) conclusions (BATc) for 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. It also provides a justification for the inclusion of any specific conditions in the permit that are in addition to those included in our generic permit template.

As well as considering the review of the operating techniques used by the operator for the operation of the plant and activities of the installation, the consolidated variation notice takes into account and brings together in a single document all previous variations that relate to the original permit issue. Where this has not already been done, it also modernises the entire permit to reflect the conditions contained in our current generic permit template.

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

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

How this document is structured

1. Our decision
2. How we reached our decision
3. The legal framework
4. Annex 1– 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 – 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 it to continue to operate the Installation, subject to the conditions in the consolidated variation notice that updates the whole permit.

As part of this update we have:

- Reviewed the process description, to ensure consistency across the sulphonation sub-sector.
Although the continuous sulphonation process generates sulphur trioxide and uses it in a concerted process with low inventory the formation and reaction take place in separate reactors so S4.2 A(1)(a)(i) Producing inorganic chemicals such as gases for the sulphur dioxide/trioxide production from sulphur is retained.
As the operator has confirmed that all the products are surfactants under S4.1A(1)(a)(xi) it is not necessary to add S4.1A(1)(a)(iii) for production of organic compounds containing sulphur.
- Reviewed, and updated where necessary; the permit introduction, operational techniques and improvement conditions status. However, we have also imposed an improvement condition to confirm the accuracy of our update.
- Updated the site address postcode.
- Moved the bespoke off-site effluent treatment plant monitoring to Table S3.4 Off-site monitoring of effluent treatment plant referenced by condition 3.5.1.
- Added the point for discharge of water collected in the site interceptor to the table S3.2 for point source emissions to sewer, sampled at the interceptor exit penstock valve.
- Removed the table for point source emissions to water (other than sewer) as there are no such discharges from the installation.
- Removed the table for process monitoring requirements associated with the continuous sulphur dioxide analyser as continuous monitoring is now included in Table S3.1 against the EN14181 standard that covers span and zero corrections.

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

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

however, provide an explanation of our use of “tailor-made” or installation-specific conditions, or where our permit template provides two or more options.

2 How we reached our decision

2.1 Requesting information to demonstrate compliance with BAT Conclusion techniques

We issued a notice under regulation 61(1) of the Environmental Permitting (England and Wales) Regulations 2016 (a Regulation 61 Notice) on 04/05/18 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 07/12/21 which will then ensure that operations meet the revised standard, or
- justifies why standards will not be met by 07/12/21, and confirmation of the date when the operation of those processes will cease within the installation or an explanation of why the revised BAT standard is not applicable to those processes, or
- justifies why an alternative technique will achieve the same level of environmental protection equivalent to the revised standard described in the BAT Conclusions.

Where the operator proposed that they were not intending to meet a BAT standard that also included a BAT Associated Emission Level (BAT AEL) described in the BAT Conclusions Document, the Regulation 61 notice required that the operator make a formal request for derogation from compliance with that AEL (as provisioned by Article 15(4) of IED). In this circumstance, the notice identified that any such request for derogation must be supported and justified by sufficient technical and commercial information that would enable us to determine acceptability of the derogation request.

The Regulation 61 notice response from the Operator was received on 10/08/18.

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 on 20/02/20. Some further information was provided by the operator on 17/04/20 although not all that had been requested. This lack of information did not prevent us issuing the permit variation but is addressed in Improvement Conditions IC14 to IC18.

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 BAT Conclusion 2, 5, and 13. 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 and response to further request for information. We have therefore included Improvement Conditions IC11, IC12 and IC13 in the consolidated variation notice to ensure that the requirements of the BAT Conclusion are delivered before 07/12/21.

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 a further information request on 20/02/20 that was partially answered on 17/04/20. A copy of the further information request and the responses was placed on our public register.

We have included Improvement Conditions IC14 – IC18 for submission of the remaining information in connection with narrative CWW BAT Conclusions 4 and 12; an updated Site Plan; a review of the permit introduction and operational techniques; and an assessment of emissions of hazardous pollutants to water.

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 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 Regulation 61 notice response contains an assessment by TerraConsult Limited to address the requirement for a baseline report. The assessment refers to a baseline report prepared as part of the 2007 EPR permit application and a 2008 Improvement Condition (IP4) to prepare a conceptual site model as part of a Site Protection and Monitoring Plan.

This involved borehole analyses and consideration of the NW to SE hydraulic gradient under the installation. The TerraConsult report states annual borehole analyses are taken check there are no significant groundwater changes.

There is no unsealed ground within the installation boundary and there is a minimum quarterly inspection of the containment condition. There have been no reported incidents leading to potential contamination of land.

We are satisfied this fulfils the requirement for a summary report and consideration of the current state of soil and groundwater contamination.

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).

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

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.

This summary report was not submitted in response to the original Regulation 61 notice nor in the 17/04/20 response to the further request for information. We have included Improvement Condition IC18 to submit a report of the assessment.

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

Annex 1: decision checklist regarding relevant BAT Conclusions

BAT Conclusions for the Large Volume Organic Chemicals industry sector were published by the European Commission on 07 December 2017. There are 19 General BAT Conclusions and a further 71 BAT Conclusions in 10 subsector-specific sections. Where appropriate, we also considered other relevant BAT Conclusions published prior to this date but not previously included in a permit review for the Installation; 23 BAT Conclusions for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector. This annex provides a record of decisions made in relation to each relevant BAT Conclusion applicable to the installation. This annex should be read in conjunction with the consolidated variation notice.

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

- NA Not Applicable
- CC Currently Compliant
- FC Compliant in the future (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
	BAT Conclusions that are not applicable to this installation	NA	BAT Conclusions (BATc) 20 to 90 for Chemical sub-sectors.
1	Monitor channelled emissions to air from process furnaces/heaters in accordance with the described standards and minimum frequencies	NA	Under the definition of process furnaces/heaters in the BATc the sulphur burning process is not a process furnace or heater. The catalyst tower is preheated on start up by gas heating of air that transfers the heat, The furnace is electrically heated to 300 degC before introduction of sulphur that then self-ignites. Once ignited the combustion is self-sustaining.
2	Monitor channelled emissions to air other than from process furnaces/heaters in accordance with the described standards and minimum frequencies	FC	In compliance with the permit before review, the operator continuously monitors SOx as SO2 with 10 minute average using US EPA Method 8. US EPA Method 8 is a periodic rather than continuous method for H2SO4 (including H2SO4 mist and SO3) and SO2 so this is only appropriate for periodic validation of the continuous analyser. The LVOC BATc2 method for all process/sources of sulphur dioxide is EN14791 which is also a periodic method (with a 30 minute reference period). The operator has also asked to change the 10 minute average reference period to 60 minutes to improve operational response. This is

		FC	<p>acceptable as the periodic method should be at least 3 periods of 30 minutes.</p> <p>The Table S3.1 entry has therefore been amended to Continuous EN 14181 limit 30 mg/m³ with 60 minute reference period plus Periodic EN 14791 and annual monitoring frequency limit 30mg/m³ with 3 x 30 minute reference period. This is broadly consistent with other operators in the sulphonation sub-sector.</p> <p>TVOC monitoring retained with method EN12619 but frequency dropped to annual for stable emissions.</p> <p>Emissions pass through a caustic scrubber after bag filters so dust monitoring is not required (not identified as a pollutant in the waste gas). A more fully integrated data recording system is planned before end 2021. IC10 raised to report on the implementation of this system.</p>
3	Ensure optimised combustion from process furnaces/heaters to reduce emissions to air of CO	NA	Under the definition of process furnaces/heaters in the BATc the sulphur burning process is not a process furnace or heater.
4	Reduce NO _x emissions from process furnace/heaters by using one or a combination of the described techniques	NA	Under the definition of process furnaces/heaters in the BATc the sulphur burning process is not a process furnace or heater.
5	Prevent or reduce dust emissions from process furnace/heaters by using one or a combination of the described techniques	NA	Under the definition of process furnaces/heaters in the BATc the sulphur burning process is not a process furnace or heater.
6	Prevent or reduce SO ₂ emissions from process furnace/heaters by using one or a combination of the described techniques	NA	Under the definition of process furnaces/heaters in the BATc the sulphur burning process is not a process furnace or heater.

7	To reduce emission of ammonia optimise design/operation of SCR/SNCR	NA	SCR/SNCR not used.
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	Specific techniques 8a-8e not applicable. Under generic techniques 8f: The process off-gas streams are routed either through fabric filters or a cyclone and electrostatic precipitator to reduce particulates mist and aerosol. The streams are then combined to pass through a caustic scrubber final waste gas treatment to removed SO ₂ . Meets BAT.
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	NA	Completed previous Improvement Condition IP9 assessed the likely Organic components of the off-gas stream as being of insignificant concentration. Therefore the off-gas stream does not have sufficient calorific value to be sent to a combustion unit.
10	Reduce channelled emissions of organic compounds to air by using one or a combination of the described techniques.	CC	Completed previous Improvement Condition IP9 assessed the likely Volatile Organic Compounds as the products: linear alkylbenzene, alcohol ethoxylate, lauric acid, linear alkyl benzene sulphonic acid and sodium lauryl ether sulphonate. The latter 4 might be sufficiently polar for wet scrubbing but we accept the levels are insignificant. The other techniques are not appropriate. The electrostatic precipitator, cyclone and candle filter techniques that are employed will abate misting/aerosols.
11	Reduce channelled dust emissions to air, by using one or a combination of the described techniques.	NA CC	The operator has stated the sulphonation process does not produce dust, only mist/aerosol. However the techniques such as fabric filters, cyclone and electrostatic precipitator used are appropriate for reduction of dust as well. The sulphur raw material arrives molten and the dust emissions during unloading has been assessed as insignificant.

12	Reduce emissions to air of sulphur dioxide and other acid gases (e.g. HCl), by using wet scrubbing.	CC	A caustic scrubber is used to reduce emissions to air of oxides of sulphur. Meets BAT.
13	Reduce NO _x , CO and SO ₂ emissions from thermal oxidisers by using a combination of the described techniques	NA	There is no thermal oxidiser 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	See CWW BATc Response section BATc2
15	Increase resource efficiency when using catalysts by using a combination of the described techniques.	CC	Vanadium Pentoxide used for SO ₂ to SO ₃ conversion. Temperature controlled by cooling between reaction stages to optimum 435-445 degC. Catalyst performance monitored by reviewing a monthly KPI of level of conversion. The catalyst is the industry standard for the contact process. The risk of poisoning from contaminants in the sulphur raw material is accepted as very low.
16	Increase resource efficiency by recovery and reuse of organic solvents.	NA CC	Organic solvents are not used in the reaction process. Alkyl benzene is sprayed into gas streams to coalesce particulates. The recovered mixture is fed back into the process. 100% of the 16R1 waste stream is directly reworked into the LAS acid process prior to aging. 60% of 26R1 is sent off site as waste as this cannot be reworked due to quality constraints with the finished product.

17	Prevent, or where not practicable reduce, waste for disposal by using a combination of the described techniques.	CC	None of the described techniques are appropriate but there is a tank to recover off-spec start up material back into the process.
18	Prevent or reduce emissions from equipment malfunctions, by using all the described techniques.	CC	Non-destructive testing and other appropriate techniques are used to assess asset reliability. Asset ranking is aligned to Major Accident Hazard scenarios, two of which involve SOx release. Appropriate predictive maintenance techniques are deployed derived from historical data developed by the facility. There are duty standbys for critical equipment we have a duty standby process, maintained through the facility asset integrity programme.
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	Caustic scrubber strength is increased during start up in anticipation of increased SO2 in waste gas. A minimum 12 hour 'blow through' is used at shutdown and before any maintenance activities. All maintenance activities are undertaken within adequately bunded areas and such activities are subject to risk assessment.

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 FC	Evidence of how the 3 rd party audited EMS addresses features (i) to (xiv) provided. Responses to iv(g) (BAT18), v(a) (several BAT), vii BAT 7&10 and xi (BAT2) reference the response to other BATc. No odour or noise management plans (xiii and xiv) are required for the installation. However, section x Waste Mgt Plan (see BATc13) was omitted in the Reg61 notice the response. In response to a request for further information examples were given of waste reduction to support monitoring of waste generation on a monthly basis but not how this is addressed in a waste management plan. IC12 raised to require evidence of a suitable Waste Management Plan as part of an EMS.
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	Evidence of establishment of inventory of waste water and waste gas streams supplied, although there is some disparity between the retained sample COD and United Utilities receipt analysis for tankered effluent. IC13 raised to require the submission of an inventory of waste water and waste gas streams that should also address this disparity. Spent caustic scrubber liquor is pumped to a 90tonne holding tank, where if required, it can be pH corrected prior to be tankered for off-site

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
			disposal.
3	For relevant emissions to water monitor key process parameters at key locations.	CC	Batch disposal (measured) of process stream effluent (including washdown water) tested for COD, pH and active detergent prior to discharge (by tanker transfer) to larger Unilever Effluent Treatment Plant and subsequently to public sewer. Bund rainwater tested prior to discharge via interceptor to Wood St Mains sewer. The COD of this stream will exceed 10 tonne per year but we accept this is an indirect discharge under consent to a sewerage contractor with adequate capacity to treat it (United Utilities).. Emission point W1 for collection interceptor tank added to Table S3.2 with monitoring for COD, pH, Active detergent and flow with no limits. Annual reporting of total discharged COD added to Table S4.3 Performance Parameters.
4	Monitor emissions to water in accordance with the described standards and minimum frequencies.	FC	The response states methods are ISO9001 accredited but that is a QMS standard not analytical methods. Permit method for COD just says spectrophotometry. Request for further information response 17/04/20

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
			did not address this point so IC14 has been raised to require the submission of details of the method and assessment of how it meets the requirements of the relevant standards.
5	Periodically monitor diffuse VOC emissions to air from relevant sources using a combination (or for large amounts – all) of the described techniques.	FC	No fugitive emission monitoring currently carried out. IC11 raised to submit a proposal for monitoring to the Environment Agency for approval and to implement the approved scheme.
6	Periodically monitor odour emissions from relevant sources using the described standards.	NA	No substantiated odour nuisance reports. No odour nuisance expected.
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	The sulphonation process does not generate any process waste water streams. Seal water from a vacuum pump is recycled to the Sodium Lauryl Ether Sulphonate neutralisation step.

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	Rainwater from roofs is collected and directed to site drains avoiding potentially contaminated plant areas. Storage tank bund rainwater is separately collected and analysed. If uncontaminated it is discharged via interceptor Wood St Mains sewer under consent. There are no discharges to surface water from the installation.
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	All storage tanks have bunding but there is also a site retention pond (interceptor) with 31,000 m ³ capacity to contain site water runoff in other a than normal operating conditions including firewater.
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	The sulphonation process itself does not produce waste water streams. Vacuum pump seal water is recycled and bund rainwater is collected separately to process effluent (see response to BATc 7 and 8). No pre-treatment is performed on the process effluent as it is sent to the operator's adjoining site effluent treatment plant, that handles similar effluent streams, before discharge to the public sewer for further

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			treatment. If the process effluent is to be sent to a different effluent treatment plant a pH adjustment may be performed.
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	There are no identified pollutants that cannot be dealt with adequately during the final waste water treatment. If the process effluent is to be sent to a different effluent treatment plant a pH adjustment may be performed with 47% caustic soda to pH 5-9.
12	Reduce emissions to water, by using an appropriate combination of the described final waste water treatment techniques.	FC	Routine final waste water treatment is provided by the operator's adjoining site effluent treatment plant, that handles similar effluent streams, before discharge to the public sewer for further treatment. Assessment of techniques and STRF against the BAT12 list is required to allow the need for adjusted BAT-AELs to be considered. However, compliance information implies the process effluentT is no longer being treated on the adjoining site effluent plant and may all be being sent for third-party offsite treatment/disposal

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
			Request for further information response 17/04/20 did not address this point so IC15 has been raised to require the submission of a report on the fate of the waste water from the installation.
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.	FC	<p>The sulphonation process does not generate any process waste water streams. Seal water from a vacuum pump is recycled to the Sodium Lauryl Ether Sulphonate neutralisation step.</p> <p>Rainwater from roofs is collected and directed to site drains avoiding potentially contaminated plant areas. Storage tank bund rainwater is separately collected and analysed. If uncontaminated it is discharged via interceptor sewer.</p> <p>However, BATc1 section (x) Waste Management Plan (see BATc13) was omitted in the Reg61 notice the response.</p> <p>In response to a request for further information examples were given of waste reduction to support monitoring of waste generation on a monthly basis but not how this is addressed in a waste management plan.</p> <p>IC12 raised to require evidence of a suitable Waste Management Plan as part of an EMS.</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
14	Reduce the volume of waste water sludge requiring further treatment or disposal, and reduce its potential environmental impact, by using one or a combination of the described techniques.	NA	No sludge generated by processes on installation.
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	The generation of sulphur trioxide and sulphonation processes are entirely enclosed with the vent streams being abated. Alkyl benzene is sprayed into gas streams to coalesce particulates. The recovered mixture is fed back into the process. 100% of the 16R1 waste stream is directly reworked into the LAS acid process prior to aging. 60% of 26R1 is sent off site as waste as this cannot be reworked due to quality constraints with the finished product.
16	Reduce emissions to air, by using an integrated waste gas management and treatment strategy that includes process-integrated and waste gas treatment techniques.	CC	See response to LVOC BATc 8/10/12

BAT Conclusion No	Summary of BAT Conclusion requirement for Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
17	Prevent emissions to air from flares, by using flaring only for safety reasons or non-routine operational conditions (e.g. start-ups, shutdowns) using one or both of the described techniques.	NA	No flaring on installation processes.
18	Reduce emissions to air from flares when flaring is unavoidable, by using one or both of the described techniques.	NA	No flaring on installation processes.
19	Prevent or, where that is not practicable, reduce diffuse VOC emissions to air, by using a combination of the described techniques.	FC	Technique (g) employs non-destructive testing and other appropriate techniques to assess asset reliability. The facility has gas detection units, which extends to include diffuse emission (SO2). Prior to breaking into pipe work the Plant is blown through for a minimum of 12hrs hence the Plant will be free of diffuse VOC emissions. If vessel entry is required (another potential source for diffuse VOC emissions) local gas monitoring takes place, this is a requirement of the Permit to Work system. IC11 raised to submit a proposal for monitoring of fugitive emissions of

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
			VOCs to the Environment Agency for approval and to implement the approved scheme.
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:	NA	No substantiated odour nuisance reports. No odour nuisance expected.
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.	CC	No sludge treatment on the installation. Routine final waste water treatment is provided by the operator's adjoining site effluent treatment plant. If the process effluent is to be sent to a different effluent treatment plant a pH adjustment may be performed with 47% caustic soda to pH 5-9. This is the only wastewater treatment on the installation. The sulphur containing processes do not generate an effluent stream. No substantiated odour or nuisance reports. No odour nuisance expected.

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
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:	NA	No substantiated noise nuisance reports. No noise nuisance expected.
23	Prevent or, where that is not practicable, reduce noise emissions, by using one or a combination of the described techniques.	NA	No substantiated noise nuisance reports. No noise nuisance expected.

Key Issues

There are no direct discharges to surface waters. Bund and surface rainwater is collected in the site interceptor for analysis. If within consent it is discharged to sewer.

BAT-AEL Table 1 - Direct Emissions of TOC, COD and TSS to a receiving water body

There are no direct discharges to a receiving water body. COD is analysed in the process effluent (at point of discharge from the installation and also at the point of discharge from the effluent treatment plant for the Unilever site (in which the installation is

located). Site rainwater (including from bunds) is collected and analysed for COD before discharge to Wood St Main sewer. We accept the sewerage contractor is capable of treating these consented indirect discharges and no emission limit values are set for COD

BAT-AEL Table 2 - Direct Emissions of nutrients to a receiving water body

There are no direct discharges of nutrients to a receiving water body.

BAT-AEL Table 3 - Direct Emissions of AOX and Metals to a receiving water body

There are no direct discharges of AOX and metals to a receiving water body.

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).

A permit review and issue of a consolidated variation is the opportunity to delete completed improvement conditions from the permit. Improvement Conditions IP1-IP9 are complete and have been removed.

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
IC10	The operator shall confirm to the Environment Agency the operational details of the more fully integrated oxides of sulphur vent monitoring data system (relates to emission point A1)	Within 3 month of the completion of implementation
	<i>In the LVOC BATc1 response to the Reg61 notice the operator state 'In 2017 UL integrated an electronic data recording system to enable fast retrieval of emissions data, currently this data is reported in PPM some further development work is required to convert the data from PPM to mg/m3. More fully integrated system with live feed by end 2019'</i>	
IC11	The operator shall submit to the Environment Agency for approval a survey of the need to monitor diffuse VOC emissions (CWW BAT19). The assessment should include, but not be limited to: <ul style="list-style-type: none"> • Consideration of fugitive emissions from all potential sources on the installation including material storage and effluent handling. • Methods to be used (in accordance with CWW BAT 5). • Timescales for an initial survey. 	30/09/21

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
	<ul style="list-style-type: none"> Proposals for frequency of monitoring if the initial survey identifies a not insignificant VOC emission. Unless the Environment Agency agrees that no monitoring is necessary the monitoring shall be carried out to the methods and timescales in the approved proposal. 	
	<i>Currently no monitoring of diffuse VOC emissions to air is carried out. Measures are employed before maintenance and vessel entry that will minimise Diffuse releases but there has been no systematic consideration of potential for release of VOCs (CWW BATc19)</i>	
IC12	The operator shall make available to the Environment Agency for approval, in an agreed manner, evidence of a Waste Management Plan as part of an Environmental Management System to meet the requirements of CWW BAT13 (and CWW BAT1).	30/09/21
	<i>Although the Rgg61 response included an outline of the Environmental Management System in response to CWW BAT1 and some examples of waste reduction measures were provided the inclusion of a Waste Management Plan in the EMS was not addressed.</i>	
IC13	The operator shall submit to the Environment Agency for approval an inventory of waste water and waste gas streams demonstrating all the features that are relevant from CWW BAT 2 and evidence of how the inventory is maintained. The quantitative values in the inventory should address the apparent disparity between disposal and retained effluent sample analyses.	30/09/21
	<i>CWW BAT2 requires the inventory of waste water and waste gas streams to address their source in chemical production processes and full characteristics against a number of headings</i>	
IC14	The operator shall submit to the Environment Agency for approval details of the analytical method for Chemical Oxygen Demand in effluent and how it meets the requirement to be in accordance with recognised ISO, national or international standards (CWW BAT 4)	31/08/21
	<i>The Reg 61 response states methods are ISO9001 accredited but that is a QMS standard not analytical methods. Permit method for COD just says spectrophotometry.</i>	

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
IC15	The operator shall submit to the Environment Agency for approval a report on the fate of waste water from the installation including, but not limited to: a) whether all waste water from the installation (other than the bund water sent to the interceptor) is consigned for off-site disposal (after neutralisation primary treatment) as individually analysed waste loads. and b) If waste water is sent to a waste water treatment facility (e.g. under sewer consent) an assessment of the removal effected by any further treatment for the substances in the CWW. (CWW BAT 12)	29/10/21
	<i>It is unclear whether any effluent is being sent to the adjoining larger site effluent treatment plant. The UK interpretational guidance for CWW states that where an indirect effluent disposal route through third-party is used there must be some assessment of its ability to achieve satisfactory reduction in relevant pollutants.</i>	
IC16	The operator shall submit to the Environment Agency for approval an updated site plan (based on the one in Schedule 7) including the installation boundary in red and the location of emissions points A1, E1, OS1 and the bunds that can discharge to the site interceptor (dock)	31/08/21
	<i>The current site plan in the permit does not show the updated locations of A1, E1, OS1 and the bunds that can discharge to the site interceptor. The route via OS1 may no longer be in use dependent on the response to IC15.</i>	
IC17	The operator shall submit to the Environment Agency for approval an update (if required) of the Introduction section of this permit and a review for accuracy of the operational techniques references in Table S1.2.	30/09/21
	<i>A review of the Introduction section of the permit and Operational Techniques Table S1.2 was requested in the letter with the Reg61 notice to ensure they reflect current processes. This was not addressed in the response. The permit review variation contains updates to these sections but they need to be checked by the operator.</i>	
IC18	The operator shall submit a water pollution risk assessment to the Environment Agency for approval, which shall assess the impact of discharges of hazardous pollutants to surface water and/or sewer	29/10/21

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
	<p>from the installation. The risk assessment shall include, but not be limited to the following:</p> <p>a) representative emissions data for any identified relevant substances discharged from the installation. Any emissions monitoring required should be carried out using the methods and standards described in Environment Agency guidance “Monitoring discharges to water:environmental permits” https://www.gov.uk/government/collections/monitoring-discharges-to-water-environmental-permits;</p> <p>and</p> <p>b) a risk assessment in accordance with the screening procedures in Environment Agency guidance “Surface water pollution risk assessment for your environmental permit”, using the representative emissions data obtained in (a) above. https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit</p>	
	<p><i>This information was requested in the Reg61 notice. The report may conclude that there are no relevant hazardous pollutants and/or that they are adequately treated (with evidenced) in off-site facilities.</i></p>	

Annex 4: Review and assessment of changes that are not part of the BAT Conclusions derived permit review.

The operator asked to change the 10 minute average reference period to 60 minutes for SO₂ to air to improve operational response. This is acceptable as the periodic method should be at least 3 periods of 30 minutes.

The Table S3.1 entry has therefore been amended to
Continuous EN 14181 limit 30 mg/m³ with 60 minute reference period plus
Periodic EN 14791 and annual monitoring frequency limit 30mg/m³ with 3 x 30 minute reference period.

This is broadly consistent with other operators in the sulphonation sub-sector.