Cyfoeth Naturiol Cymru
Natural Resources Wales

Natural Resources Wales permitting decisions

Purolite Limited – Decision Document

Bespoke permit

The application number is: PAN-002216

The permit number is: EPR/AB3894ZF

The Applicant/Operator is: Purolite Limited

The Installation is located at: Purolite, Unit C, Llantrisant Business Park, Llantrisant, Rhondda Cynon Taff, CF72 8LF

We have decided to grant the permit for the installation operated by Purolite Limited.

We consider that in reaching our decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure the appropriate level of environmental protection is provided.

Purpose of this document

This decision document:

- explains how the application has been determined
- provides a record of the decision-making process
- shows how all relevant factors have been taken into account
- justifies the specific conditions in the permit other than those in our generic permit template.

Unless the decision document specifies otherwise we have accepted the applicant's proposals

Structure of this document

- Table of contents
- Key issues
- Annex 1 – Improvement Conditions
- Annex 2 – Consultation Responses

Table of Contents

Contents

Natural Resources Wales permitting decisions 1
Bespoke permit 2
Purpose of this document 2
Structure of this document 2
Table of Contents 3
Contents 3
Key issues of the decision 5
1. Our decision 5
2. How we reached our decision 6
2.1 Receipt of Application 6
2.2 Consultation on the Application 6
2.3 Requests for Further Information 7
3. The Legal Framework 7
4. The Installation 8
4.1 Description of the Installation and related issues 8
4.1.1 The permitted activities 8
4.1.2 The Site 8
4.1.3 What the Installation does 9
4.1.4 Key Issues in the Determination 10
4.2 The site and its protection 11
4.2.1 Assessment of site baseline condition report 11
4.2.2 Proposed site design: potentially polluting substances and prevention measures 12
4.2.3 Closure and decommissioning 13
4.2.4 Handling and storage of raw materials 14
4.3 Operation of the Installation – general issues 15
4.3.1 Administrative Issues 15
4.3.2 Relevant Convictions 15
4.3.3 Financial Provision 15
4.3.4 Management 16
4.3.5 Accident Management 16
4.3.6 Site Security 16
4.3.8 Operating Techniques 17

4.3.9 Energy Efficiency 17
4.3.10 Efficient use of raw materials and water 18
4.3.11 Avoidance, recovery or disposal of wastes produced by the activities ... 19
5. Minimising the Installation's environmental impact 20
5.1 Emissions to Air 20
5.2 Assessment of Impact on Air Quality 22
5.3 Assessment of impact to surface and ground water 24
5.4 Emissions to sewer 24
5.5 Fugitive emissions 25
5.6 Assessment of odour impact 26
5.7 Noise Assessment 28
5.8 Impact on Habitats sites, SSSIs, non-statutory conservation sites etc 28
5.8.1 European Sites 28
5.8.2 SSSI Assessment 29
5.9 Flood Risk 29
6. Application of the Best Available Techniques 30
6.1 BAT Assessment 30
6.2 Setting ELVs and other Permit conditions 30
6.3 Translating BAT into Permit conditions 31
6.4 Monitoring 31
6.4.1 Steam raising boiler 31
6.4.2 Class B VOC's 32
6.4.3 Class A VOC's 32
6.5 Reporting 33
6.6 OPRA Score 33
ANNEX 1. Improvement Conditions 34
ANNEX 2: Consultation Reponses 35

Key issues of the decision

1. Our decision

We have decided to grant the Permit to the Applicant. This will allow them to operate the Installation, subject to the conditions in the Permit.

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

This Application is to operate an Installation which is subject principally to the Environmental Permitting Regulations 2016 ('EPR') and is subject to the requirements of the Industrial Emissions Directive ('IED').

The Permit contains many conditions taken from our Environmental Permit template conditions, including the relevant Annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the EPR and other relevant legislation. This document does not therefore include an explanation for these template conditions. Where they are included in the Permit, we have considered the Application and accepted the details are sufficient and satisfactory to make the template condition appropriate.

2. How we reached our decision

2.1 Receipt of Application

The Application was accepted as duly made on the 19th January 2018. This means we considered it was in the correct form and contained sufficient information for us to begin our determination, but not that it necessarily contained all the information we would need to complete that determination.

The Applicant made a claim for commercial confidentiality. We have accepted the Applicants claim for commercial confidentiality.

2.2 Consultation on the Application

We carried out consultation on the Application in accordance with the Environmental Permitting Regulations 2016 ('EPR'), the Industrial Emissions Directive ('IED') and our statutory Public Participation Statement ('PPS'). We have also considered our obligations under the Public Participation Directive ('PPD').

We advertised receipt of the Application by a notice placed on our website, which contained all the information required by the EPR and IED, including telling people where and when they could see a copy of the Application. The consultation ran from the 16th February 2018 to 16th March 2018.

At the same time, we sent copies of the Application to the following bodies, which includes those with whom we have "Working Together Agreements".

- Rhondda Cynon Taf Council (Environmental Protection Department)
- Rhondda Cynon Taf Council (Planning Department)
- Public Health Wales

These are bodies whose expertise, democratic accountability and/or local knowledge make it appropriate for us to seek their views directly.

Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 2. We have taken all relevant representations into consideration in reaching our final determination.

2.3 Requests for Further Information

In order for us to be able to consider the Application duly made, we needed more information. We requested further information relating to the Applicants' Environmental Management System (EMS). Upon receipt of this information we could consider the application Duly Made.

3. The Legal Framework

The Permit application was determined and granted in accordance with the EPR. We address some of the specific legal requirements directly within the relevant sections of this document and have included an overview of the relevant legislation in section 7.

The summary list of relevant legislation and regulations includes:

- Environmental Permitting Regulations 2016 ('EPR')
- The Industrial Emissions Directive 2010 ('IED')
- The Water Framework Directive 2000 ('WrFD')
- The Habitats Directive 1992 ('HD')
- The Energy Efficiency Directive ('EED')
- The Ambient Air Directive ('AAD')
- The Conservation of Habitats and Species Regulations 2017 ('Habs Regs')
- The Environment (Wales) Act 2016 ('EWA')
- The Countryside and Rights of Way Act 2000 ('CRoW')
- The Well-being of Future Generations (Wales) Act 2015 ('WFG')
- The Natural Resources Body for Wales (Establishment) Order 2012
- The Natural Resources Body for Wales (Functions) Order 2013
- The Equalities Act 2010 ('EqA')

We consider that the Permit 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.

4. The Installation

4.1 Description of the Installation and related issues

4.1.1 The permitted activities

Regulation 8 EPR defines the categories of 'regulated facility' and provides that a regulated facility of some categories may be carried on as part of the operation of a regulated facility of another category.

For the purpose of regulation 8 EPR, NRW has concluded that the regulated facility is an 'Installation'.

The Installation is subject to the EPR because it carries out an activity listed in Part 1 of Schedule 1 to the EPR:

- S4.1 A1 (a)(viii) Producing organic chemicals such as – (viii) plastic materials (for example polymers, synthetic fibres and cellulose based fibres)

An installation may also comprise "directly associated activities", which at this Installation includes; raw materials and waste stream tanks in a tank farm. Together, these listed and directly associated activities comprise the Installation.

4.1.2 The Site

The site is located within the Llantrisant Business Park immediately opposite the Applicants existing site. The industrial unit is currently unoccupied and was formally used to produce orange juice.

The proposed site includes an industrial building, surrounding tarmac/concrete access road, car park and service yard covering an area of approximately 0.5 hectares with a perimeter of approximately 250m. The main building is 30m x 40m x 7m and it is in this building that the main process takes place.

The site is located 17km north-west of Cardiff, it is approximately 1.2km north, north west of Llantrisant. The northern and western perimeters of the site are bounded by industrial units on the Llantrisant Business Park. The eastern perimeter is adjacent to the Llantrisant Commons and Pastures SSSI, a tributary of the Nant Muchudd runs adjacent to the permit boundary. The southern boundary rises approximately 10m above the site and is bordered by agricultural land. The region is mountainous, with the site residing in an area of marshy grassland.

4.1.3 What the Installation does

The installation develops a range of chromatographic resins; these resins are based on agarose for sale into the pharmaceutical industry where they are used in the production of biosimilars and antibody therapies. The resin is manufactured from agarose, a naturally occurring polysaccharide.

The manufacturing process involves taking the powdered polysaccharide and making an aqueous solution with a specific concentration, to give the final properties of the product. The solution is then mixed with an immiscible organic phase using a viscosity modifier to create an emulsion. The process is highly controlled to use the agitation speed in the emulsion to give highly specific particle size distributions. The emulsion is then cooled to create the solid resin bead. The organic phase and viscosity modifier is washed out using a solvent and then water.

The next stage of the process is to take the washed resin and crosslink the batch to increase the rigidity. This process uses a crosslinking agent which is accurately dosed into the process along with reagents to control the pH and added to prevent discolouration of the resin. Temperature control of this stage of the process is essential to achieve optimum crosslinking. The resin is then washed with water to remove excess reagents.

The installation will have the capacity to produce 100,000 litres of product. This can then be further processed to produce 50,000 litres of a higher performance product. The process is operated in a batch manner taking 21 days with 3.5 batches started each week. This process is carried out within an enclosed building under highly controlled conditions, this will result in only emissions to air and foul sewer.

The main emissions to air are in the form of Volatile Organic Compounds (VOC's), these are not emitted continuously and will be in a batch manner. The primary control for VOC emissions to air is very strict process control.

The process is a step-by-step process whereby the correct sequence needs to be followed, this means it is a highly controllable process, the Applicant has a comprehensive set of operating procedures that need to be adhered to. All steps of the process are controlled by a complex SCADA system, which monitors start-up/shut-down of reactors, gas injections, powder injection, equipment in-use, addition of water, volume control, temperature control and timings. If at any stage there are errors, alarms sound alerting the plant operators to an issue. The Applicant has put a comprehensive training schedule in place for all plant operators, this is tracked through site procedures and the EMS.

Nitrogen is used at the installation to create inert atmospheres; to purge reactors and prevent flammable atmospheres. It is also used where Hydrogen is used to reduce the risk of the flammable nature of the gas. This system is also connected to the SCADA controller so that conditions can be carefully monitored, and failures can be quickly identified by plant operators.

4.1.4 Key Issues in the Determination

The key issues arising during this determination are;

- Emissions to air

We therefore describe how we determined these issues in more detail in this document.

4.2 The site and its protection

4.2.1 Assessment of site baseline condition report

The installation is located within an existing industrial unit, on the site of an old orange juice production plant. The site is approximately 0.5 hectares. The proposed site includes an industrial building, surrounding tarmac/concrete access road, car park and service yard covering an area of approximately 0.5 hectares with a perimeter of approximately 250m.

The proposed site is located on a Secondary Class A aquifer and is outside any Groundwater protection zone. The proposed site is adjacent to a tributary of the Nant Muchudd, which is classified under the Water Framework Directive as having ‘good’ ecological and chemical status.

The Applicant employed Terra Firma Wales to carry out investigations into the condition of the ground and soils on the site prior to development. The reports highlighted no evidence of historic pollution/contamination.

Terra Firma Wales also conducted baseline soil sampling at the proposed site. As part of this test, soil was removed from the site. The samples were submitted to a UKAS accredited lab for testing. The results showed that no Petroleum Hydrocarbons or Asbestos were detected. A suitable baseline was set by the Applicant

There was no evidence of soil contamination found. Groundwater was not encountered in any of the exploratory boreholes that were drilled, based on this there is no background groundwater data.

The site activities are carried out on concrete hardstanding, all tanks are appropriately bunded and the site is served by a sealed drainage system and underground ‘crash tank’, therefore the risk of pollution to ground is low.

We are satisfied with the baseline condition report submitted by the Applicant. There is also a condition in the Permit that requires the Applicant to carry out soil testing every 10 years and groundwater every 5 years.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

The applicant provided a high-level drainage strategy showing the site's foul and surface water drainage systems are separate. The Applicant will re-use as much of the existing drainage as possible, however, the Applicant is dealing with Dŵr Cymru Welsh Water directly with regards to formal sewerage arrangements.

The main element of the work carried out is refurbishment of the existing site and some minor changes to the front of the site. Major work is however, being carried out to the rear of the site. Here, the Applicant is building a;

- pump-house – this is an enclosed building on concrete hardstanding and therefore, all substances will be contained in the building.
- sprinkler system housing - this is an enclosed building on concrete hardstanding and therefore, all substances will be contained in the building.
- dedicated waste storage area – this area is on concrete hardstanding and has been covered and positive drainage provision has been removed, thus minimising any pollution incident or spill to surface water or land. Any substances that have a potential to precipitate out and cause blockages to the drainage network will be transferred to IBCs and stored in this area.
- dedicated above ground tank farm – the tank farm does not have any positive, gravity drainage provisions. If one of the vessels ruptures within the tank farm all liquid will be held within the above ground bund, this means that the spillage can be dealt with on the surface where it easier to handle. The bund has been designed in accordance with CIRIA C736 – Containment systems for the prevention of pollution, in addition to this the bund capacity has been designed to account for an appropriate rainfall event in addition to the required capacities of the tanks (25% complete volume or 110% of the largest tank.)

Any surface water that accumulates within the bund, will be tested on a regular basis and removed to the surface water drainage system. Any contaminated water found within the bund will be pumped to the foul water system. If it is too contaminated it will be removed by an authorised waste contractor. All tanks in this area are fitted with level detectors to ensure that over-filling cannot happen. This procedure forms part of the Applicants Formal Operations and Maintenance procedures.

- associated tanker off-loading area – this area has been designed so that all liquids run towards the crash tank inlet holes on the surface, the crash tank has a 28,000-litre capacity, which is designed to hold an entire tankers volume if it were to spill. This tank has been designed and built in-line with CIRIA C736 as the largest of 25% complete volume or 110% of the largest tank. There are procedures in place that control how the off-loading occurs and to prevent spillages. These procedures form part of the Applicants Formal Operations and Maintenance procedures. Under normal conditions (when there are no deliveries) the penstock valve remains open to divert the clean surface water run-off to the surface water system, when a delivery is taking place the penstock valve will be closed. In the event of a spillage, all effluent will be contained within the crash tank, this can then be dealt with accordingly by either routing the effluent to the tank farm and subsequently the foul sewer or have it tankered off-site by an authorised waste contractor. Tanker off-loading will not happen in any extreme rainfall events to minimise any potential for pollution to surface water or land.

4.2.3 Closure and decommissioning

Having considered the information submitted in the permit application, we are satisfied that the appropriate measures will be in place for the closure and decommissioning of the Installation. Permit condition 1.1.1a requires the operator to have a written management system in place which identifies and minimises risks of pollution including those arising from closure.

At the definitive cessation of activities, the Operator must satisfy us that the necessary measures have been taken so that the entire Installation ceases to pose a risk to soil or groundwater, considering both the baseline conditions and the site's current or approved future use. To do this, the Operator must apply to us for surrender, which we will not grant unless and until we are satisfied that these requirements have been met.

4.2.4 Handling and storage of raw materials

All reactive chemicals that are used within the process are stored as per the manufacturer's instructions. MSDS sheets are present on the storage vessels at all times.

Bulk materials are delivered to site via sealed tanker, they are off-loaded in the tanker storage area, this area is served by a dedicated crash tank to contain any spillages.

Storage tanks are all fully sealed and subject to frequent visual integrity checks by the Applicant, this check procedure will form part of the installations EMS.

The tanks are located within a bund designed to CIRIA C736 standards and a dedicated crash tank is available if any spills occur. The tank farm bund is equipped with flammable vapour detectors, that will alert plant operators to any spills.

Foam canons are in place at the tank farm, allowing the plant operators to cover the bunded tank farm area and crash tank in a foam blanket if necessary. The foam will then be removed from the site by an authorised waste contractor. This bund has been water tested during the commissioning phase and passed all tests.

All powdered raw materials arrive at site in sealed containers, are added to a mobile delivery system and discharged into the individual reactors via a vacuum delivery system, this process is controlled by the SCADA control system.

A small quantity of liquid raw materials is delivered by IBC or container; these are stored inside the warehouse or flammable storage area. There are comprehensive site procedures controlling the storage, handling and usage of raw materials on-site.

4.3 Operation of the Installation – general issues

4.3.1 Administrative Issues

The Applicant is the sole Operator of the Installation. We are satisfied that the Applicant is the person who will have control over the operation of the Installation; and that the Applicant will be able to operate the Installation to comply with the conditions included in the Permit.

We are satisfied that the Applicant's submitted OPRA profile is accurate. The OPRA score will be used as the basis for subsistence and other charging, in accordance with our Charging Scheme. OPRA is Natural Resources Wales method of ensuring application and subsistence fees are appropriate and proportionate for the level of regulation required.

4.3.2 Relevant Convictions

NRW's COLINS Database has been checked to ensure that all relevant convictions have been declared. No relevant convictions were found. The operator satisfies the criteria in RGN 5 on Operator Competence.

4.3.3 Financial Provision

There is no known reason to consider that the operator will not be financially able to comply with the permit. The decision was taken in accordance with RGN 5 on Operator Competence.

4.3.4 Management

The Applicant has stated in the Application that they will implement an Environmental Management System (EMS) that will meet the requirements for an EMS in our "*How to comply with your environmental permit guidance*". The Applicant submitted a summary of the EMS with their application.

The applicant has an EMS which is certified to ISO14001.

We are satisfied that appropriate management systems and management structures will be in place for this Installation, and that sufficient resources are available to the Applicant to ensure compliance with all the Permit conditions.

4.3.5 Accident Management

The site falls below the thresholds for a lower tier COMAH site however the Applicant has decided to implement a Major Accident Prevention Policy (MAPP); this is ordinarily a requirement of COMAH and is a comprehensive safety plan. The Applicant also holds a Safety Management System accredited to OHSAS 18001:2007. We are satisfied with the Applicants proposals.

To ensure that the management system proposed by the applicant sufficiently manages the residual risk of accidents, permit condition 1.1.1a requires the implementation of a written management system which addresses the pollution risks associated with, amongst other things, accidents.

4.3.6 Site Security

Having considered the information submitted in the Application, we are satisfied that appropriate infrastructure and procedures will be in place prior to start up to ensure that the site remains secure.

4.3.7 Operating Techniques

We have specified that the Installation must be operated in accordance with the techniques set out in table S1.2 of the Permit. The details referred to in that table describe the techniques that will be used for the operation of the Installation that have been assessed by Natural Resources Wales as BAT; they form part of the Permit through condition 2.3.1 and Table S1.2 in the Permit schedules.

We have reviewed the techniques used by the operator and compared these with the relevant guidance notes. The proposed techniques/emission levels for priorities for control are in line with the benchmark levels contained in the TGN and the Additional guidance for Speciality Chemicals EPR4.02 and we consider them to represent appropriate techniques for the facility.

4.3.8 Energy Efficiency

We are satisfied that the Applicant will ensure that energy is used as efficiently as possible.

The Applicant has fully justified the electricity and steam requirement for the installation. Over the 4-year pilot plant stage, the process has been developed to be as resource efficient as possible, with energy efficiency being a key design point. The Applicant has proposed to minimise energy requirements and heat loss through process design and technology selection, here the equipment is selected and sized appropriately for the task at hand. The operation of the process is also designed to minimise energy by having timed systems, full inspection and maintenance programmes for the equipment and operated in an energy efficient way.

The Applicant is part of the Energy Savings Opportunities Scheme (ESOS), the ESOS regulations are applied and every 4 years ESOS assessments are carried out to audit the energy used by the installation and identify any energy saving opportunities.

The Operator is required to report energy usage under condition 4.2 and Schedule 4 of the permit. The following parameters are required to be reported: water usage, energy usage and the total amount of raw material used. This will enable Natural Resources Wales to monitor energy recovery efficiency at the Installation

4.3.9 Efficient use of raw materials and water

The Applicant has stated that only low volumes of raw materials will be handled on site every year, meaning high-purity raw materials and solvents will be used on-site. In addition to this high purity inert gas and water will also be used. The actual process is set by the chemistry of the reactions and as such raw material use is dictated by the process, however, the Applicant has stated that the reactions themselves have been optimised to reduce the raw material used and waste produced.

The Applicant has considered several ways to efficiently use the raw materials. These range from sourcing materials close to the installation where possible, sourcing materials from companies that are ISO14001 accredited, replacing where possible high-risk materials with less harmful substances and reducing the use of materials in the process itself.

Water use will be monitored regularly through meter readings and recorded on site. Through optimisation of the process, water consumption has been reduced from the original projected value.

It is not possible to recirculate water that comes into direct contact with the process as the water is used for washing and therefore discharged to sewer once used.

The Applicant consulted the Industrial Cooling Systems BREF to ensure that the proposed cooling system is fit for purpose and met BAT for the installation. The cooling system employed on-site is a closed loop system that doesn't require constant filling, water treatment chemicals will be used to ensure the system is well maintained. This reduces the water usage on site. There is a comprehensive maintenance and testing plan for the cooling system to ensure performance is maintained.

Steam on-site is generated by a highly efficient, appropriately sized CERTUSS system and piped to the point of use. Based on the design and control measures of the system, a thermal efficiency of more than 93% is achieved.

4.3.10 Avoidance, recovery or disposal of wastes produced by the activities

This requirement addresses wastes produced at the facility. Having considered the information submitted in the Application, we are satisfied that the waste hierarchy referred to in Article 4 of the Waste Framework Directive will be applied to the generation of waste and that any waste generated will be treated in accordance with this Article.

We are satisfied that waste from the Installation that cannot be recovered will be disposed of off-site using a method that minimises any impact on the environment. Permit condition 1.4.1 will ensure that this position is maintained.

The Applicant has designed the process over a 4-year period involving both HAZOP and HAZID studies, this ensures the operation is as safe and efficient as possible and wastes are kept to a minimum. The Applicant will look at additional measures to reduce the volume of waste once operational.

Wastes are moved through the production buildings to their storage location via vacuum filtration, wastes are segregated into waste streams A, C, D & F. Each of these waste streams is stored appropriately in a bunded storage area served by a crash tank to contain any potential spillages, these are then removed from site by an authorised waste contractor. Waste stream E is discharged to foul sewer under a trade effluent consent from Dŵr Cymru Welsh Water.

5. Minimising the Installation's environmental impact

Regulated activities can present different types of risk to the environment, these include odour, noise and vibration; accidents, fugitive emissions; as well as point source releases to air, water, sewer and discharges to ground or groundwater, global warming potential and generation of waste. All these factors are discussed in this and other sections of this document.

For an installation of this kind, the principal emissions are: emissions to air.

The next sections of this document explain how we have approached the critical issue of assessing the likely impact of emissions from the Installation on human health and the environment and what measures we require to ensure a high level of protection.

We have reviewed the operator's assessment of the environmental risk from the facility. The operator's risk assessment is satisfactory.

The assessment shows that, applying the conservative criteria in our guidance on Environmental Risk Assessment, all emissions may be categorised as environmentally insignificant. We will discuss the operators risk assessment in more detail as follows:

5.1 Emissions to Air

Emissions to air are considered batch emissions and not continuous. The process runs over a 21-day period and involves numerous phases, as this is batch manufacturing the process cannot be operated continuously.

The Applicant has considered ways to reduce the emissions to air and has designed the process and storage vessels to minimise release to air.

There are 4 point-source emissions to air from the installation, these are;

- A1 - Main vent stack
- A2 - Hydrogen vent routing
- A3 - Epichlorohydrin tank vent
- A4 – small steam raising boiler

Emission point A1 is the main vent stack, this is a 12.7m stack discharging at approximately 15m/s. This emission point handles almost all the emissions from various processes, process vessels and vapour releases. The one exception is the venting of Hydrogen; this is handled separately due to the highly flammable nature of Hydrogen. Several raw material and waste storage tanks also vent to the main stack, to aid with the dispersion of emissions.

The operator has spent close to 4 years developing the R&D and pilot scale processes and has a thorough understanding of the likely emissions associated with the process, based on chemical engineering principles.

Under normal operating conditions these tanks do not vent to the main stack, as this would result in large losses of raw materials, the tanks only vent under abnormal conditions such as rising temperatures.

Most reactors used within the process are equipped with condensers to allow for maximum solvent recovery and thus ensuring good process control. Based on the ability to recover a large proportion of the solvent, the low volumes emitted from the stack and the fact that all emissions screen out, active abatement is not required.

The emissions from the main vent stack have been quantified and undergone a H1 assessment for impact, this process screened out the need for detailed dispersion modelling as the impact was insignificant, however, the Applicant carried out detailed dispersion modelling. This is explained in further detail in section 5.2.

Emission point A2 is for the venting of Hydrogen. In a specific reaction phase of the process hydrogen is generated, this occurs in 6 vessels over a 2-hour period for each of the processes, due to the flammability of Hydrogen it cannot be vented via the main vent stack and as such is vented via emission point A2. There are processes in place to minimise the volume of Hydrogen within the reaction pathways. The Hydrogen is heavily diluted with Nitrogen; no other vapours are expected during this phase and as such no other monitoring required. Both Hydrogen and Nitrogen and naturally occurring gases and not considered pollutants or odorous, however, the applicant has included them in the H1 assessment and have screened them out as insignificant.

Emission point A3, deals with the extractive air from the storage of Epichlorohydrin. It is used as a cross-linking agent in the process and is dosed in a highly controlled manner. Small volumes are used (approx. 100L). The storage tank is inerted with Nitrogen gas to set a pressure, the storage tank is filled by pumping from the drum to the tank, the pressure is balanced by a vapour line back to the drum, this reduces emissions from the tank. Under normal operations the tank will discharge directly to atmosphere via a carbon filter, the tank normally vents low volumes of nitrogen only, the carbon filter is in place to prevent any emissions of Epichlorohydrin. The emission point is located at the apex of the main building at a height of 9m.

Emission point A4 is connected to a 0.5MW gas-fired steam raising boiler, as this is less than 5MW and fired on natural gas it is not considered to pose a significant risk to the environment and therefore no modelling is required.

5.2 Assessment of Impact on Air Quality

The applicant carried out a H1 screening assessment of the emissions, the H1 showed that the emissions all screened out as insignificant, where long-term emissions were below 1% and short-term emissions below 10% for all the substances emitted. However, as odour modelling was required, the applicant carried out detailed dispersion modelling of the aerial emissions.

This section of the decision document deals primarily with the dispersion modelling of emissions to air from the main stack (A1) and its impact on local air quality.

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon human health. These assessments predict the potential effects on local air quality from the Installation's stack emission.

We agree with this approach. The assumptions underpinning the model have been checked and are reasonably precautionary. The way in which the Applicant used dispersion models, its selection of input data, use of background data and the assumptions it made have been reviewed by Natural Resources Wales.

The applicant used ADMS modelling to assess the impact of aerial emissions, 5 years of hourly sequential met data was used to inform the assessment. The applicant used the met data from Cardiff Airport which is approximately 17km away, this data provides a reasonable picture of conditions present at the installation.

The applicant chose to model 2 stack heights; 9m and 12.7m, based on the results the 12.7m stack was chosen as the final height to build.

Based on the emissions from the process the applicant modelled the following pollutants;

- Acetic Acid
- Allyl glycidyl ether (AGE)
- Epichlorohydrin
- Ethanol
- Ethanol (as IMS)
- Hydrogen
- Methanol
- Toluene

The impact of these emissions was assessed by comparing the maximum ground level concentrations against the respective Environmental Assessment Levels (EAL's).

The applicant has taken a very conservative approach to the assessment, whereby they have assumed the facility will run continuously, whereas this is not the case. The assessment assumed peak emissions occur throughout the year, which again is a vast over estimate. Abatement equipment has also not been factored into the assessment as it is not required, and the worst met data year was used.

The applicant identified 22 sensitive human receptors and the modelling assessment looked at the impact at these discreet receptors.

The maximum ground level concentration for all long-term contributions was found to occur to the South-East of the installation, close to the permit boundary and within an area of open agricultural land. This area is not a sensitive receptor as identified above and all concentrations at sensitive receptors are much lower.

The applicant's modelling assessment showed that for all the substances listed above were below the significance thresholds, short-term emissions were below 10% and long-term emission were below 1% at all the sensitive receptors modelled. We are satisfied that the emissions from the installation are insignificant.

5.3 Assessment of impact to surface and ground water

There are no point source emissions to either ground water or surface water. The installation has separate surface water and foul water drainage and both will be kept separate. The whole site consists of hardstanding areas of concrete and tarmac. All surface water on-site will pass through a 3-stage petrol interceptor prior to leaving site.

5.4 Emissions to sewer

The applicant has applied for a trade effluent consent from Dŵr Cymru Welsh Water. Trade effluent generated on-site, arises from the effluent in the tank farm, production wastes and effluent from the 'crash tank'.

The emission point is listed in the sites environmental permit however, regulation will be through the effluent consent by Dŵr Cymru Welsh Water, as such, no limits or monitoring requirement have been imposed in the environmental permit.

Any effluent on-site that does not comply with the trade effluent consent will be stored in tanks on-site to be removed by an authorised waste contractor.

5.5 Fugitive emissions

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise fugitive emissions and to prevent pollution from fugitive emissions.

There are 3 tank breather valves (IMS tank vent, Waste tank vent, Toluene tank vent)

The above 3 emission points are from tank breather valves and are therefore not considered to be point source emissions, these are fugitive emissions. The emissions are vented this way to prevent the mixing of flammable vapours in the main vent stack and thus creating a health and safety risk. These tanks are situated in the installations tank farm.

There are 2 tanks that are associated with the storage of raw materials and 1 tank associated with the storage of waste materials. There are 2 further tanks in the tank farm with breather values but the substances in these tanks are so heavily diluted with water that the emissions to air are insignificant and therefore not listed as emissions.

The tank breathers will not emit continuously throughout the day; losses will only occur when the weather is warm enough that the vapour expands, and the pressure build-up overcomes the breather valve.

The breather valves for the tanks above are not considered to be odorous and are therefore not connected to the main vent stack. The emissions from these tanks are minimised through tank design, whereby the tanks are tall with a low surface are and appropriate pressure ratings.

The emissions from the above emission sources are considered insignificant as the emission points are emergency breather valves only, therefore no further assessment has been carried out. No monitoring is required of these emission points.

Operational procedures minimise the loss of powders from any of the operational areas. Extracted air from the rooms is directly released to atmosphere via 2 filters. The air is not expected to contain any emissions, other than warm air.

The installation has a comprehensive maintenance plan for equipment to ensure fugitive emissions are kept to a minimum. The process was carefully designed and formalised through HAZID and HAZOP assessment. All pumps and vacuum systems are linked through a SCADA process control system that monitors performance of the equipment and identifies any failures. There is leak detection equipment which uses sensors to monitor drops in pressure, if this occurs the SCADA system alerts the operator.

The potential for fugitive releases of dust or particulates is insignificant, all processes are carried out inside a building to strict procedures.

5.6 Assessment of odour impact

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where not practicable to minimise the effects of odour.

The applicant assessed the same substances as listed above in Section 5.2 for odour emissions.

The impact of these emissions was assessed by comparing them against the Environment Agency H4 odour management guidance. Based on moderately offensive odour benchmark of 3 $OU_{E/}m^3$as a 98^{th} percentile.

The applicant based the assessment on 2 stack heights of 9m and 12.7m.

Table 1 – Maximum odour concentrations; 9m stack

Averaging period	Odour threshold (mg/m^3)	98th percentile of hourly means	OU/m^3
Acetic acid	0.043	48.9	1.1
Allyl glycidyl ether (AGE)	44	314.2	0.0
Epichlorohydrin	3.52	107.1	0.0
Ethanol	0.28	58.2	0.2
Ethanol (as IMS)	0.28	905.3	3.2
Hydrogen	-	740.1	No DDT
Methanol	4	1866.5	0.5
Toluene	1	958.9	1.5
Total odour concentration (OU/m^3)		6.6	
As % of odour benchmark (3 OU/m^3)		219%	

Table 2 – Maximum odour concentrations; 12.7m stack

Averaging period	Odour threshold (mg/m^3)	98th percentile of hourly means	OU/m^3
Acetic acid	0.043	18.5	0.4
Allyl glycidyl ether (AGE)	44	118.9	0.0
Epichlorohydrin	3.52	40.5	0.0
Ethanol	0.28	22.0	0.1
Ethanol (as IMS)	0.28	342.6	1.2
Hydrogen	-	280.1	No DDT
Methanol	4	706.3	0.2
Toluene	1	362.9	0.6
Total odour concentration (OU/m^3)		2.5	
As % of odour benchmark (3 OU/m^3)		88%	

As can be seen from the above tables, the odour benchmark of 3 OU is exceeded with a stack height of 9m. With a stack height of 12.7m all the substances are below the 3 OU benchmark value as quoted by H4 guidance. Based on this, the applicant has chosen to build a 12.7m stack, we are therefore, satisfied that the impact from odour will be insignificant. The applicant will carry out daily olfactory checks at different locations within the installation and at the perimeter.

5.7 Noise Assessment

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise the effects of noise.

The installation is located on an industrial estate. All activities carried out within the installation will be carried out in enclosed buildings. Sources of noise, such as; compressors and pumps are all contained inside. The air compressors are the largest sources of noise; however, they are contained within a specific building, designed for high noise levels and therefore suitable noise abatement is present. There is an air-handling unit outside, however, this is not predicted to be a significant source of noise. There are only 4 vehicle movements a week and this is not considered to be a significant source of noise.

The Applicant will carry out daily noise checks at various location within the installation and at the perimeter. If noise does become an amenity issue, then a noise and vibration management plan will be prepared by the Applicant.

5.8 Impact on Habitats sites, SSSIs, non-statutory conservation sites etc

5.8.1 European Sites

Habitats Regulations Assessment (HRA) is not required because there is no conceivable impact pathway to any Natura 2000/Ramsar site. The European site, Cardiff Beech Woods SAC, is within the 10km screening threshold and is approximately 7 km from the site.

The site has modelled impact on human health for the substances being; Acetic Acid, Allyl glycidyl ether, Epichlorohydrin, Ethanol, Ethanol (as IMS), Hydrogen. Methanol and Toluene, these have been assessed for human receptors and screened out as insignificant. However, there is no assessment criteria (critical levels/loads) for ecological receptors. Conservation specialists within NRW have confirmed that this is acceptable.

5.8.2 SSSI Assessment

The Applicant looked at two SSSI's, these were screened from the assessment due to fact that there are no critical levels/loads for the substances being emitted from the installation.

- Llantrisant Commons & Pastures SSSI
- Rhos Tonyrefail SSSI

The site has modelled impact on human health for the substances; Acetic Acid, Allyl glycidyl ether, Epichlorohydrin, Ethanol, Ethanol (as IMS), Hydrogen. Methanol and Toluene, these have been assessed for human receptors and screened out as insignificant. However, there is no assessment criteria (critical levels/loads) for ecological receptors, therefore this has not been carried out. Conservation specialists within NRW have confirmed that this is acceptable.

5.9 Flood Risk

The installation lies in an area of low to medium surface water flood risk affecting the rear service yard, originating from the watercourse on the installations eastern boundary. This is confirmed by NRW flood mapping. The medium risk designation corresponds to an annual event probability of occurrence between 1 in 30 and 1 in 100. The installation has been designed and profiled to take account of this risk probability. Water would be directed around the building affording the building adequate protection.

All other external infrastructure has been raised with flood in mind. The Applicant also provided a drainage strategy that accounts for extreme flood events. In the event of flood events the water would begin pooling in the corner of the service yard away from all critical plant. The water would be able to enter the drainage networks from there.

6. Application of the Best Available Techniques

6.1 BAT Assessment

In this section, we explain how we have determined whether the Applicant's proposals are the Best Available Techniques (BAT) for this Installation. There are no BAT conclusions for the Speciality Organic Chemicals Sector and as such, the Applicant has used the *'How to comply with your environmental permit. Additional guidance for: Speciality Organic Chemicals Sector (EPR4.02), Natural Resources Wales, September 2014.'*

All indicative BAT references have been taken from the Organic Chemical Sector BAT document. These standards have been derived from current IPPC BREF document; *'Integrated Pollution Prevention and Control Reference Document on the Best Available Techniques for the manufacture of Organic Fine Chemicals, European Commission, August 2006.'*

The Applicant considered the management, accident management, energy efficiency, efficient use of raw materials and water, management of wastes, design, emissions to air, water & land, containment, storage & handling of raw materials, process control, system design, system safety, odour, noise and monitoring.

The above topics have been assessed and are detailed throughout this document, NRW are satisfied that the proposals described by the Applicant represent the Indicative BAT.

6.2 Setting ELVs and other Permit conditions

We have decided that emission limits will not be set as the emissions to air screen out as insignificant and there are sufficient control measures in place to minimise emissions to the environment.

There is however, an Improvement Condition in the permit that means the operator must carry out emission testing for 3 months to confirm the predictions in the application and further confirm the emissions are insignificant. The actual Improvement Condition can be seen in Annex 1 of this document.

6.3 Translating BAT into Permit conditions

Article 14(3) of IED states that BAT conclusions shall be the reference for permit conditions. Article 15(3) further requires that under normal operating conditions; emissions do not exceed the emission levels associated with the best available techniques as laid down in the decisions on BAT conclusions.

At the time of writing of this document, no BAT conclusions have been published for Speciality Organics Chemicals and therefore relevant sector guidance has been used to compare emissions from the installation against relevant emission benchmarks.

The emission limits described in the air dispersion modelling sets the worst-case scenario. This shows the emissions from the site are low and that they will not cause a breach of air quality objectives in the area.

We are satisfied that the emissions from the site will not adversely impact the surrounding environment or the health of the local community. As detailed in section 5, the environmental impact of the installation has been assessed against relevant EQSs, at the level of performance required by IED. The installation will not result in the breach of any EQSs. We accept that the applicant's proposals are acceptable.

6.4 Monitoring

6.4.1 Steam raising boiler

The site has 1 small natural 0.5MW gas-fired boiler, due to the size no monitoring is required.

6.4.2 Class B VOC's

The Applicant has assessed their emissions against the relevant emission benchmark values as stated in the Organic Chemical Sector guidance document. As the main emissions are fugitive releases and point source release of solvents, the emissions can be rationalised to VOC's. Based on the substances released from the installation, they are Class B VOC's.

The emission benchmark for Class B VOC's is 75 mg/Nm^3. This emission benchmark is only applicable however and applied if the following mass release rates are exceeded;

- Total class B – 5 tonnes/year or 2kg/hour (whichever is lower) (as Carbon)

In this instance the Applicant has estimated mass emissions from calculations and has shown that the emissions from the installation do not exceed the above mass emissions, for either annual or hourly, therefore the emission benchmark of 75mg/Nm^3 does not apply.

Based on this and the fact that all emissions screen out as insignificant, as shown by the H1 Risk Assessment Tool and detailed modelling there is no requirement for monitoring of Class B VOC emissions on-site.

6.4.3 Class A VOC's

The other emissions from the installation are Allyl Glycidyl Ether (AGE) and Epichlorohydrin, there are no emission benchmarks for either substance, the applicant has instead used the emissions benchmark for Benzene. Benzene is classified as a Category 1A carcinogen, whereas Epichlorohydrin is a Category 1B and AGE a Category 2 carcinogen. This use of Benzene for comparison is a conservative comparator for the actual emissions.

The emission benchmark for Benzene is 5mg/Nm^3.

The estimated concentration for Epichlorohydrin is 2mg/Nm^3, this falls below the above benchmark and therefore screens out. There is no requirement for monitoring of Epichlorohydrin.

The estimated concentration for AGE is 23mg/Nm^3, this is above the emission benchmark for Benzene. However, it should be noted that this is not a continuous emission and the choice of Benzene for a benchmark is highly conservative. The emissions are on a batch basis. The process takes 21 days and emissions of AGE are only seen from day 12 onwards and only for approximately 3.5 hours in total per batch. Based on the installation running for 48 weeks per year this total 8064 hours of operation per year, there will only be 585 hours of emissions per year from the process, this equates to 7.25% of the year. Once fully operational there are 3.5 batches started each week, with up to 10 batches in progress at any one time.

Based on the control measures in place to minimise emissions to air, the low volume of emissions and the low operational time (7.25%) of the year when emissions will be seen, it is deemed that no monitoring of AGE is required, however, an Improvement Condition has been put in the permit that requires the Applicant to monitor emissions of AGE and Epichlorohydrin to air, to prove the predictions made and that emissions to air are in-fact insignificant when compared to the emission benchmark for Benzene.

6.5 Reporting

We have specified the reporting requirements in Schedule 4 of the Permit to ensure data is reported to enable timely review by Natural Resources Wales to ensure compliance with permit conditions and to monitor the efficiency of material use and waste recovery at the installation.

6.6 OPRA Score

The agreed OPRA score at the installation is 57. This will form the basis for ongoing subsistence fees.

ANNEX 1. Improvement Conditions

Table S1.3 Improvement programme requirements		
Ref.	**Requirement**	**Date**
1	The operator shall carry out monthly emission testing of AGE and Epichlorohydrin for 3 months from the main stack to ensure that the predictions made in the application are accurate and emissions are insignificant. The emissions will be compared to the emission benchmark for Benzene as quoted in the *'Additional guidance for Speciality Organic Chemicals Sector guidance EPR 4.02'* A report shall be submitted to NRW within 6 months for approval, if the results show emissions are not insignificant then additional measures will be proposed by the operator.	3 months of emission monitoring from date of commencement of operation.

ANNEX 2: Consultation Reponses

A) Advertising and Consultation on the Application

The Application has been advertised and consulted upon in accordance with Natural Resources Wales Public Participation Statement. The way in which this has been carried out along with the results of our consultation and how we have taken consultation responses into account in reaching our draft decision is summarised in this Annex. Copies of all consultation responses have been placed on Natural Resources Wales public register.

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from: Cwm Taf University Health Board	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
• The consultee had no grounds for objection to the granting of an environmental permit	• No action required
• Ensure the site has an accredited management system	• The site has an EMS accredited to ISO 14001:2015 and a safety system accredited to OHSAS18001
• Recommendation that odour and noise are satisfactory	• The Applicant has provided both noise and odour assessments with the application, we are satisfied with both assessments.
• The consultee has noted that combustion gases have not been assessed – the regulator should be satisfied that the site will not give rise to these emissions	• We are satisfied that this is the case, the site has a very small 0.5MW natural gas-fired boiler.