Agilent Environmental Permit Application – Redacted for the Public Register

Best Available Techniques & Operating Techniques

Agilent Technologies LDA UK Limited

Essex Road, Church Stretton, Shropshire, SY6 6AX

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Basis of Report

Table of Contents

Tables in Text

Figures

Appendices

1.0 Introduction

SLR Consulting Limited (SLR) has been instructed by Agilent Technologies LDA UK Limited (Agilent) to prepare an application for an Environmental Permit (EP) for the existing organic polymer manufacturing site located at Essex Road, Church Stretton, Shropshire, SY6 6AX (the site). The EP application will be submitted to the Environment Agency (EA) for determination.

This Best Available Techniques and Operating Techniques (BATOT) report is an integrated document which describes both the operating techniques that will be implemented at the plant to ensure compliance with the conditions of the EP and to demonstrate that the permitted activities comply with Best Available Techniques (BAT).

1.1 Regulation of the Facility

The site manufactures silica and organic polymers for use in laboratory consumables and industrial applications at a rate of less than 5 tonnes per year. This is a listed activity as per the Environmental Permitting (England and Wales) Regulations (EPR) 2016 (as amended):

- *Section 4.1 Part A(1)(a)(viii) producing organic chemicals such as plastic materials (for example polymers, synthetic fibres and cellulose based fibres).*

Basic pre-application advice sought from the EA confirmed that the site was not eligible for regulation as a low impact installation and accordingly, an application for a bespoke installation permit for a chemical manufacturing facility has been prepared.

1.2 Key Technical Standards

The following key technical standards apply to the facility:

- European Commission. Reference Document on Best Available Techniques for Manufacturing Organic Fine Chemicals dated August 2006;
- European Commission. Reference Document on Best Available Techniques for Production of Polymers dated August 2007;
- European Commission. Reference Document on Best Available Techniques for Common Wastewater and Waste Gas Treatment / Management Systems in the Chemicals Sector dated June 2016;
- European Commission. Reference Document on Best Available Techniques for Common Waste Gas Management and Treatment Systems in the Chemical Sector dated January 2023; and
- Environment Agency. How to comply with your environmental permit Additional guidance for: Speciality Organic Chemicals Sector (EPR 4.02) dated February 2009.

1.3 The Site

The site is located in Church Stretton, Shropshire. The site is accessed via Essex Road and is centred on National Grid Reference (NGR) SO 45672 93772.

The site is located approximately 300m north of Church Stretton town centre and 17.5 km south of Shrewsbury, and is situated within a mix of commercial, recreational and residential property. The A49 runs in a north-south direction approximately 115m east of the site. Residential properties are in close proximity, with the closest located approximately 20m to the north and 35m to the west of the site respectively.

The site's location is illustrated on Drawing 001; the site layout and emission points on Drawing 002. The surrounding land uses, local receptors within 500m are illustrated on Drawing 003 and cultural and natural heritage receptors within 2km are identified on Drawing 004. Chemical storage locations are shown in Drawing 005.

A summary of the site's immediate surrounding land uses is provided in Table 1-1 below.

Table 1-1: Surrounding Land Uses

Boundary	Description
North	Directly north of the site comprises residential properties, with the closest property located approximately 20m north on Windsor Place. Ash Brook is located approximately 90m north. Church Stretton Cricket Club and Churchill Park are located approximately 140m to the north-west and Coppice Leasowes Nature Reserve is located approximately 120m to the north-east.
East	A railway line is located directly adjacent to the eastern site boundary. A bowling green, tennis courts and a play area are located beyond the railway line. Residential properties are also located approximately 200m east. A culverted stream, Town Brook passes directly beneath the site in an easterly direction from Essex Road, beneath the central carpark and below Unit 2.
South	Sandford Avenue (B4371) is located directly adjacent to the southern site boundary. Commercial/industrial premises are located a further 75m south. Church Stretton railway station and an unnamed surface water feature are located 120m and 165m south of the site respectively.
West	Essex Road and residential properties bound the site to the west, with the closest dwelling located 35m west. Church Stretton town centre and a playing field are located 300m and 340m west respectively.

1.4 Overview of Site Operations

The site manufactures silica and organic polymers (mostly in the form of microscopic particles) for use in laboratory and industrial applications in human clinical and diagnostics), liquid chromatography, and solid support synthesis particles. On-site processes include receipt and storage of raw materials; polymerisation of monomers and surface modification; storage, loading and despatch of finished products.

The processes are carried out at different scales of production, ranging from laboratory/R&D scale to larger-scale production and activities take place in four process buildings as summarised below:

- Unit 1: Loading of polymer and silica particles into stainless steel tubes to produce liquid chromatography columns.
- Unit 2: Research & Development facility – small laboratory scale processing.
- Unit 3: Main processing building for large scale polymerisation and surface modification activities.
- Unit 4: Chemical storage.

1.4.1 Process Steps

The polymerisation and surface modification processes consist of the following general steps, though this may vary depending on the product required:

1. Liquid monomers are dispensed along with diluent, solvents, initiator and other additives to form a monomer mix.
2. Water in the reactor is heated and organic and inorganic surfactants added and dissolved, before cooling to room temperature.
3. A monomer mix is pumped into the reactor and stirred with other additives to form droplets.
4. The droplets polymerize through the application of heat to form polymer or silica particles (product).
5. The mixture is cooled in the reactor and then pumped to a filter where the particles are separated from liquid and waste washed under vacuum using solvent and water.
6. Polymer beads are sieved using running water to achieve the required size distribution.
7. Undersize and oversize beads are collected for disposal off-site by a specialist contractor.
8. The particles are re-suspended in solvent or water and pumped to a pressure filter.
9. Solid beads are separated by pressure filtration and water/solvents mixtures are added and solid re-suspended by stirring, then filtered again.
10. Step 6 is repeated until solid porous bead products are internally free from diluent solvents, surfactants, and other polymerisation by-products.
11. Finally step 6 is repeated using 100% solvent to remove water.
12. The wash liquid solvents/water waste stream is discharged into a holding tank, then pumped into 205 litre steel drums for transfer to a suitable licensed facility for treatment.
13. The solvent waste stream is collected separately and transferred off site for recovery as cement kiln fuel.
14. Polymer beads are then either dried under vacuum and discharged as dry powder, or resuspended and discharged as suspension in solvent for sedimentation before returning to the filter for drying.
15. Polymer beads are either considered as final product or transferred to another pressure filter for surface modification to form a different product.
16. After surface chemical modification or coating, step 9-14 is repeated using a variety of washing solvents.

Figure 1 shows a block diagram of the process steps, and a schematic process flow diagram is shown in Figure 2.

Figure 1 General Process Steps for Polymerisation & Coating

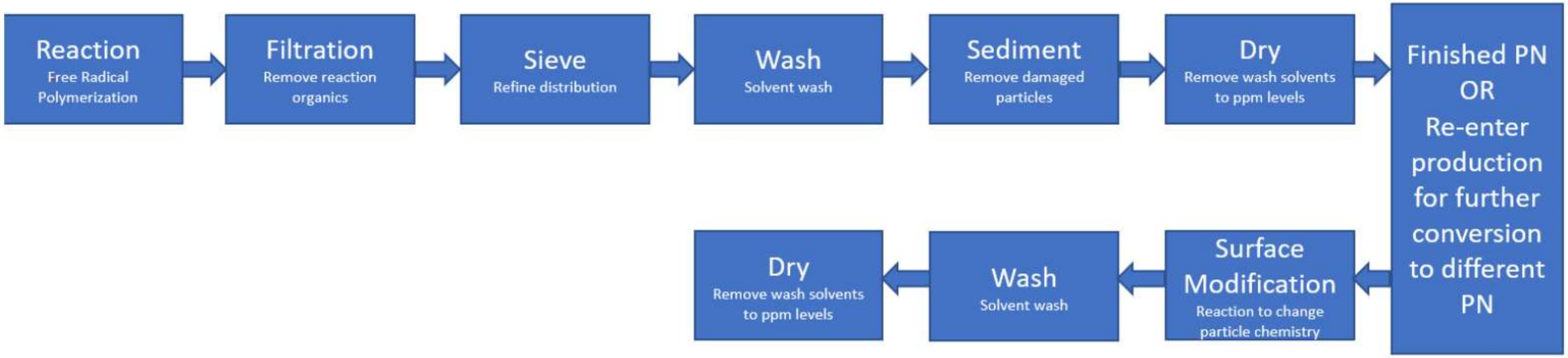
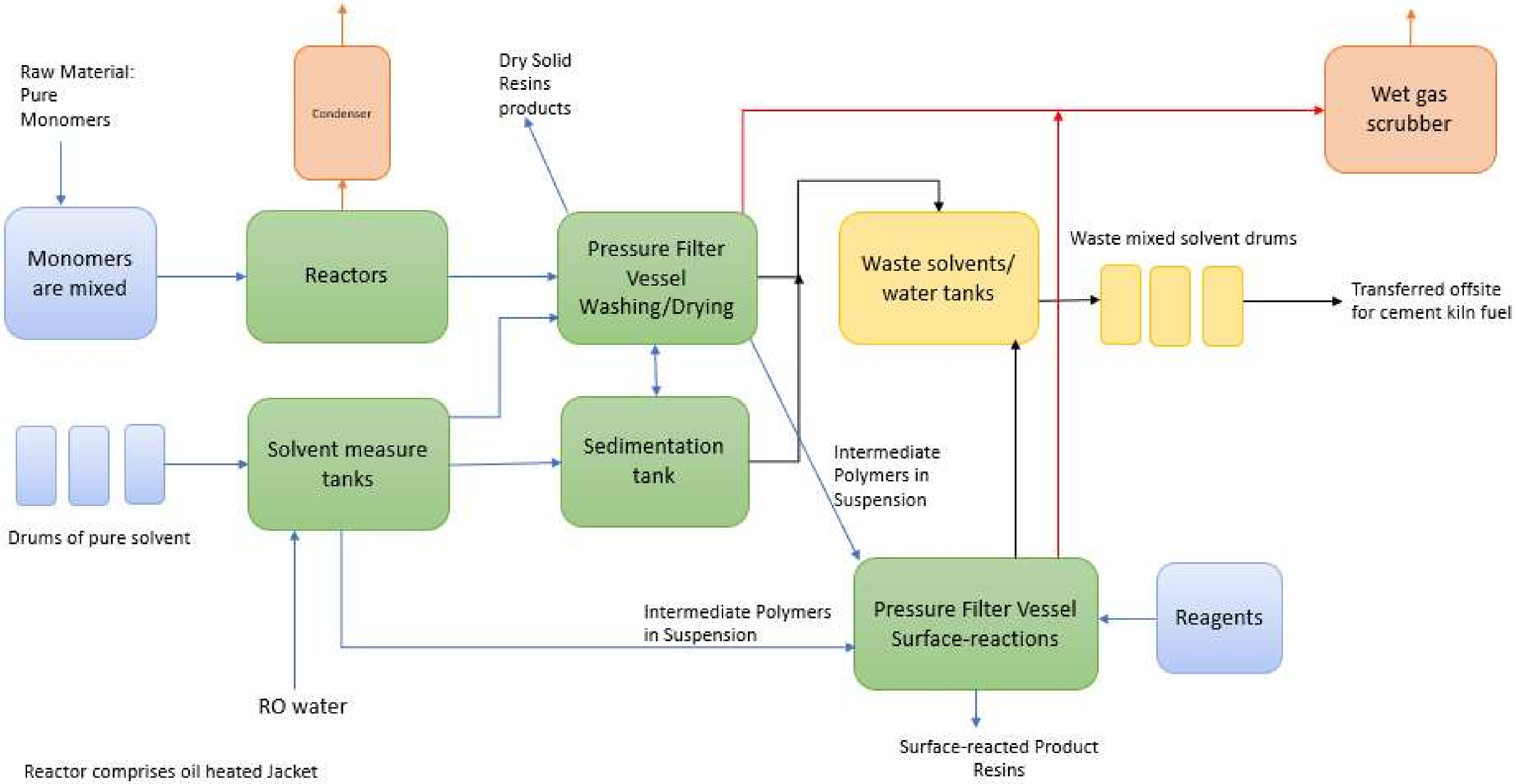


Figure 2 Schematic Manufacturing Process Flow Diagram



Reactor comprises oil heated Jacket
Vessel comprises heated water jacket
Surface reacted products vessel comprises water heated jacket.

The key raw materials used in the process include monomer feedstocks and organic solvents. Polymerisation is carried out in temperature-controlled reactors, followed by washing/drying in pressure vessels and where required, surface modification takes place in a pressure vessel.

Gaseous emissions from reactors and vessels are connected to a wet scrubber to abate volatile organic compound (VOC) emissions to air. Local exhaust ventilation systems for the fume cupboards (10 No. vents) are also present on site.

Wastewater generated at the site comprises:

- Process cooling and equipment wash water (laboratory waste water[1], cooling water, compressor condensate, ion exchange[2], sieving of polymer particles[3] and emptying of laboratory tanks[4]); and
- Chlorinated and unchlorinated waste solvent (containing water) from process vessels.

The current low temperature hot water systems (LTHW) do not generate blowdown.

The process cooling and equipment wash water is discharged to sewer under four trade effluent discharge consents with Severn Trent. The chlorinated and unchlorinated solvent waste (containing water) is collected twice a week by a waste contractor and reused as cement kiln fuel.

Solid waste produced by the manufacturing process comprises the oversize and undersize fractions produced by the sieving stage. This waste is transferred off site by a specialist contractor to a suitably licenced facility for recycling or for use as fuel in an energy from waste plant. Other incidental waste arisings comprise glassware from the laboratory (contaminated with low level solvents) and unchlorinated and chlorinated waste from the laboratory (i.e. gloves, filters, empty packaging and personal protective equipment).

The drum store comprises bunded, undercover storage for raw materials and waste.

A 10,000 litre underground attenuation tank is located on the surface water drainage system prior to the discharge point that connects to a Severn Trent storm water sewer along Essex Road.

The reaction vessels are heated via electrical heating systems. General heating and other processes are heated via the low temperature hot water system which is powered by several small gas fired boilers (<1MWth rated thermal input).

An emergency diesel generator (<1MWth rated thermal input) is also located onsite which backs up critical electrical supplies.

The site layout and EP boundary are presented on Drawing 002.

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[1] Laboratory waste water containing small volumes of detergents, residual acetone, polymeric solids and de-ionised water from glassware washing.

[2] Ion exchange from the reverse osmosis process.

[3] Sieving of polymer particles containing predominantly mains water, with a small amount of inert polymeric solids. Sieves and filters are used to removed particulates for discharges to sewer.

[4] Emptying of laboratory tanks comprises reserve osmosis water, deionised water and mains water. This does not contain any R&D chemicals.

2.0 Management of the Activities

2.1 Management Systems

Agilent operates the site under the site's Environmental, Health and Safety (EHS) Management System, which is a subset of the company wide EHS Management System that broadly applies to Agilent's design, development, manufacturing, and sourcing activities worldwide. The company-wide EHS Management System is certified to ISO 14001.

The management system ensures that:

- The risks that the activities pose to the environment are identified;
- The measures that are required to minimise the risks are identified;
- The activities are managed in accordance with the management system;
- Performance against the management system is audited at regular intervals; and
- The EP is complied with.

The management system will be reviewed at least once every four years or in response to significant changes to the activities, accidents, or any identified non-compliance. The management system will be supplemented by this BATOT document which outlines the proposed operating techniques at the site and demonstrates conformance with the requirements of EA guidance.

2.2 Environmental Policy, Objectives and Targets

Details of the company's environmental policy including environmental targets and objectives and improvement programme are contained within the management system.

2.3 Management Techniques

2.3.1 Operational Control, Preventative Maintenance & Calibration

Compliance with operating procedures will ensure effective control of site operations.

As part of the environmental management system, procedures are in place covering the following general topics:

- Management and training;
- Environmental protection and risk assessment;
- Equipment registers and calibration;
- Defects, non-conformance and complaints; and
- Operations control and equipment maintenance.

A maintenance programme for all critical equipment is implemented at the site. This follows the inspection and maintenance schedule recommended by the equipment manufacturer(s) or as determined appropriate based on operational experience. The maintenance programme is reviewed annually to ensure any necessary changes are implemented.

Also held on site are operation and maintenance manuals as provided by the equipment manufacturer(s) covering:

Engineering Team

- Equipment relating to the polymerisation reactors, wash and filtration and coating vessels; and gas-fired boiler and heating systems;
- Routine maintenance procedures and requirements;

Facilities Team

- Equipment associated with emission abatement systems;
- Environmental protection; and
- Emergency procedures.

Where necessary, all monitoring and process control equipment will be calibrated in accordance with manufacturers' recommendations or as determined appropriate based on operational experience.

2.3.2 Monitoring, Measuring & Reviewing Environmental Performance

A formalised management structure is in place to review environmental performance and ensure any necessary actions are taken.

The site management team reviews the facility's environmental performance on a regular basis to ensure policy commitments are met, that policy remains relevant, and to ensure that actions to improve environmental performance are identified. Records of environmental performance will be maintained within an appropriate filing system or within an electronic system.

2.3.3 Staffing, Competence & Training

The site management team is responsible for ensuring that training levels for operational staff are adequate, relevant and up to date.

All staff are under the supervision of a technically competent manager Staff employed on site benefit from training, which ensures their professional and technical development continues. There is commitment for staff at all levels to continual improvement, prevention of pollution and compliance with legislation. The training will ensure that staff are aware of:

- Skills and competencies required for each job;
- Regulatory implications of the permit for the site and activities;
- Prevention of accidental emissions and actions to be taken in response to accidents;
- Control of point source and fugitive emissions to air;
- Control of odour;
- Raw material and waste handling, waste minimisation, recovery and/or disposal;
- Noise;
- Environmental monitoring; and
- Health and safety.

The management system will be available at all times for site personnel to access. Furthermore, refresher training will be provided on site policies annually. This will reduce accidents and minimise the impact of the installation on the environment by ensuring the site operates correctly.

Training records are held electronically and maintained by the relevant department managers.

2.3.4 Communication & Reporting of Actual or Potential Non-compliances and Complaints

In the event that actual or potential non-compliances occur on site, the incident will be recorded, investigated and closed out as per the non-compliance procedure (reference EHS-05 Rev2 dated 19 April 2016). Records will be held electronically. If the non-compliance event is sustained, the operations may be stopped until a solution can be found, to minimise harm to the environment.

The remedial actions taken in response to the non-compliance may include:

- Obtaining additional information on the nature and extent of the non-compliance.
- Discussing and testing alternative solutions;
- Modifying procedures and responsibilities;
- Seeking approval for additional resources and training;
- Contacting suppliers and contractors to seek alterations to the way they operate; and
- Informing the Environment Agency (EA).

Members of the public can file complaints by contacting the site. All complaints received will be investigated with a follow up response communicated to the complainant.

2.3.5 Auditing

The site will benefit from regular auditing to ensure that it is compliant with the conditions of its permit, namely record keeping, monitoring and emission levels. The audit will be carried out by a Technically Competent Person from the EHS department, to ensure that all activities on site are in accordance with the conditions of the EP. The outcome of the audit will be reviewed and tracked to identify any frequent non-compliances.

2.3.6 Corrective Action to Analyse Faults & Prevent Re-Occurrence

The relevant department manager will deal with environmental complaints and other incidents of non-conformance. These include:

- System failure discovered at internal audit;
- Incidents, accidents, and emergencies; and
- Other operational system failures.

Environmental non-compliances, including remedial action taken and any changes to operation made to avoid re-occurrence are recorded. Complaints are reported to and investigated by the site management team and remedial measures implemented as required. Changes to prevent future complaints are proposed and implemented where appropriate. Written records of non-conformances, complaints and other incidents will be maintained electronically, in which the date, time and nature of the event, together with the results of investigations and remedial action taken, is recorded.

2.3.7 Reviewing & Reporting Environmental Performance

Senior management review environmental performance annually and take actions to ensure that policy commitments are met, and that policy remains relevant.

2.3.8 Managing Documentation & Records

The site management team is responsible for ensuring commitments to site audits and reviews and for ensuring that documents relevant to the EP are issued, revised and maintained in a consistent fashion.

An appropriate filing system will be maintained to ensure that all records relating to environmental monitoring, maintenance, reviews and audits are adequately maintained and updated. All records will be held electronically.

2.4 Emergency Plan

Agilent recognises the importance of the prevention of accidents that may have environmental consequences and that it is crucial to limit those consequences.

An Emergency Plan is implemented and maintained at the site to ensure the site's staff are fully prepared for such incidents. The Emergency Plan will be reviewed periodically and after any reportable incident on site. The document will be continually improved in these reviews to include best practice and minimise the risk of accidents occurring.

The site also operates under a Spill Management Plan, Fire Management Plan and Flood Management Plan.

An initial assessment of the risk of accidents and abnormal operating conditions posed to the environment and site personal is provided in the Environmental Risk Assessment (ERA), enclosed with this application (410.064951.00001_ERA). The mitigation measures identified within the ERA will be implemented to limit the consequences of accidents on the environment and site personnel.

The site undertakes Hazard Identification (HAZID) and Hazard and Operability (HAZOP) risk assessments and puts mitigation measures in place for any identified consequences.

2.4.1 Action to Minimise the Potential Causes & Consequences of Accidents

Action will be taken at the site to minimise the potential causes and consequences of accidents. These actions include:

- Maintaining a list of substances that would harm the environment if they were to escape;
- Raw materials and waste will be checked for compatibility with other substances with which they may come into contact;
- Raw materials, products and wastes will be stored to prevent their escape into the environment;
- Where appropriate, barriers will be constructed to prevent vehicles from damaging equipment;
- Primary and secondary containment will be provided to prevent the escape of potentially polluting materials;
- CCTV is installed to minimise the risk of unauthorised access;
- A log will be maintained of all incidents and near misses;
- Responsibilities for managing accidents will be clearly defined. Clear instructions on the management of accidents will be maintained; and
- Appropriate equipment will be maintained to limit the consequences of an accident.

2.4.2 Hazard Identification

The following potential hazards have been identified:

- Vehicle collision;
- Failure of site surfacing or site containment (including fire-water);
- Spillage of product and intermediates during transfer and handling;
- Spillage of liquid raw materials or fuel spills from vehicles;
- Fire;
- Security and vandalism;
- Asphyxiation and toxicity;
- Explosion;
- Flooding;
- Failure of machinery, equipment or abatement technology; and
- Failure of process heating and other site services.

The ERA included in Section 4 of this application provides details of how these risks will be mitigated at the facility.

3.0 Operations

3.1 Regulated Activities

3.1.1 Installation Activities

The primary regulated activity at the site is the manufacture of silica and organic polymers for use in laboratory consumables and industrial applications, which is listed in Schedule 1 Part 2 of the EPR as follows:

- *Section 4.1 Part A(1)(a)(viii) producing organic chemicals such as plastic materials (for example polymers, synthetic fibres and cellulose based fibres).*

3.1.2 Directly Associated Activities

The following directly associated activities (DAAs) to the primary activity are undertaken at the site:

- Storage of raw materials;
- Storage and handling of chemicals, oils, products and residues;
- Storage and off-site removal of waste solvent-based effluent;
- Storage and off-site disposal of solid waste;
- Combustion of natural gas in boilers to provide process heating; and
- Loading and dispatch of final products.

3.2 Process Design

The application is to permit an existing facility. Environmental issues have been taken into account during the design, construction and development of plant operational methods.

Emissions of contaminants and waste production will be kept to a minimum and the waste hierarchy will be adhered to at all times. Where possible, less environmentally harmful raw materials will be used.

3.3 Outputs & Manufacturing Capacity

Agilent produces a range of solid powder polymer and silica based products, such as magnetic beads for medical diagnostic testing; silica and polymers to be loaded into liquid chromatography columns to be used as the consumable in LC equipment deployed in numerous business segments such as food safety, pharma/bio pharma and advanced materials. The tonnage of polymers produced onsite is approximately 3 tonnes per year.

3.4 Operating Hours

The process will operate 24 hours per day, 365 days of the year except for maintenance periods.

Under normal circumstances, the site only accepts deliveries of incoming raw materials and only dispatches products and waste during daytime working hours, 07:30 to 19:00 Monday to Friday , with no delivery or despatch taking place on Saturdays, Sundays or bank holidays.

4.0 Detailed Process Description

4.1 Raw Materials Reception

The site uses a wide range of chemical feedstocks, including monomers, reagents, additives and solvents, to support the operations. Across the site as a whole, for all large scale and small-scale operations, the site maintains an operational stock of approximately 22,000 litres of solvents.

Chemicals for the smaller scale production activities are purchased from general chemical catalogue suppliers and delivered to the site by the general logistics network. Chemicals are inspected upon delivery and moved directly to the appropriate, pre-determined storage location through the SAP computerised system.

The delivery of chemicals required for the larger scale activities is by specialist hauliers in Heavy Good Vehicles (HGV) and is usually in the form of single or multiple 205 litre palletised drums. Drummed chemicals are unloaded by forklift operators and are moved from the HGV directly to dedicated storage locations as detailed within the Enterprise Resource Planning (ERP) system. Unloading takes place in a dedicated area with emergency drain bunding provisions and forklift operators are trained in procedures in the case of spillages.

The site has a number of chemical storage locations (internal, external, refrigerated, and frozen) to ensure chemicals are stored, segregated and bunded in line with regulatory guidance. These locations are shown in Drawing 005. Flammable solvents[5] are stored in an external, fully secured and bunded storage compounds that are ATEX rated. Within the main “drum store” compound there are 90-minute Fire Rated storage units (Fire Vaults) within which the drums of solvent are stored. The storage units have self-contained bunding, fire detection and automated monitoring devices to ensure doors are closed when not in

[5] Tetrahydrofuran, acetone, methanol, diethylbenzene, divinylbenzene, toluene, ethylene diamine, dichloromethane, pet ether, dimethylformamide, dimethylacetamide, diesel, methyl ethyl ketone, 3-methyl-1-butanol, diethylene glycol.

operation. Each container can hold 32 x 205 litre drums with a total of 4 Fire Vault containers within the compound.

The drum store contains other reagents used within large scale production. 205L drums are stored on bunded stillages within a concrete bund (considered to provide tertiary containment).

Smaller volume materials are removed from the storage areas and transferred to the laboratories when required for production. Materials are returned to their dedicated storage location immediately after use. The ERP system records decrements in stock as transactions are processed to register their use and regular cycle counting occurs to ensure stock accuracy.

4.2 Transfer of Liquid Reagents from Storage to the Process

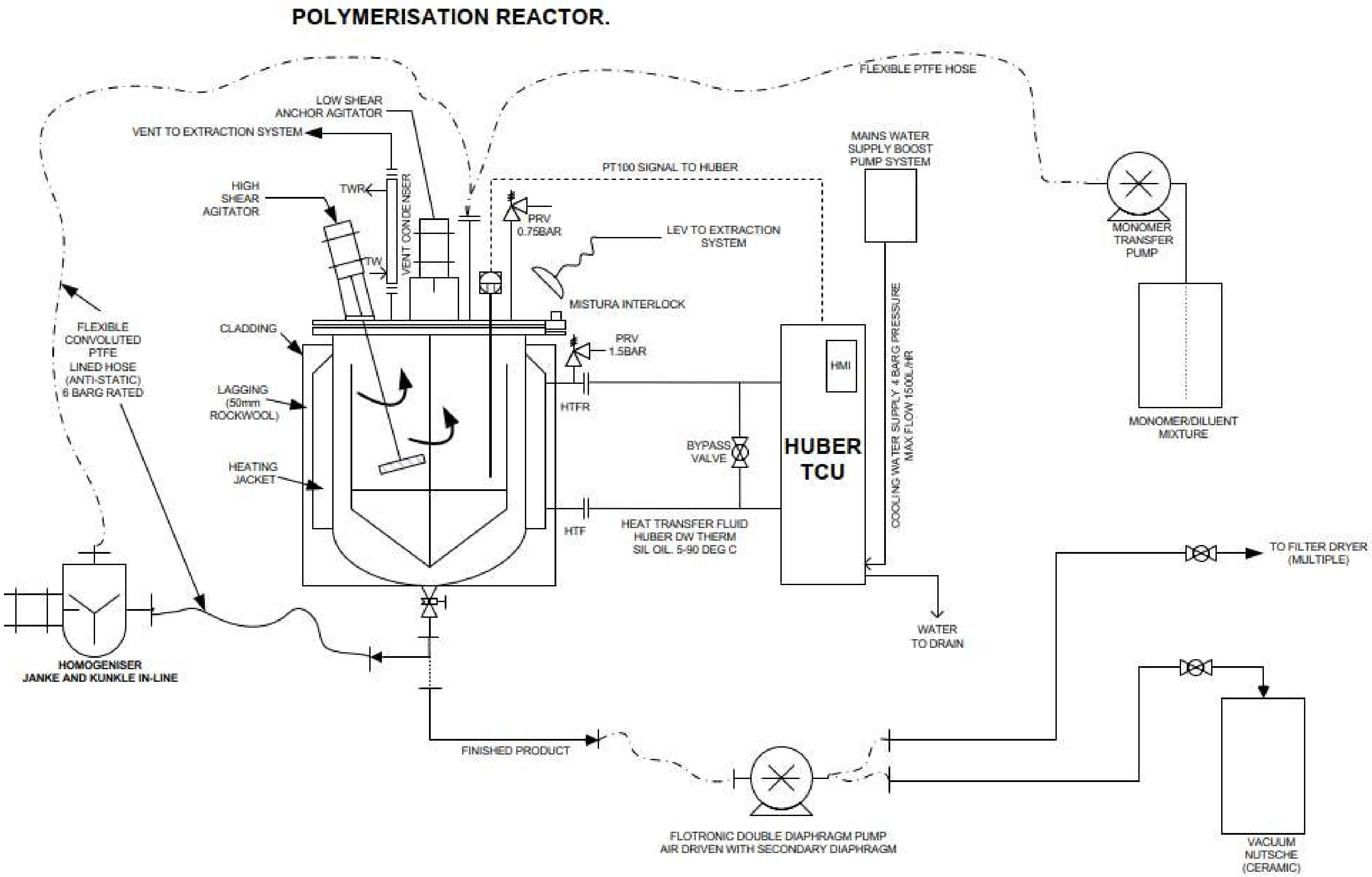
Liquids in the 205 litre drums located in the operational area of the drum store compound are dispensed from the drums into smaller transfer containers as required by the site's operations. Dispensing is conducted by ATEX rated air driven pumps into containers for transfer. The containers are then sealed and transported to the laboratory or larger-scale facility for use.

Pallets of 205 litre drums containing flammable solvents are transported from the fire vault containers to a dedicated pumping station located between Unit 3 and the drum store. The pumping station is a bunded container capable of holding 4 pallets (maximum 16 x 205L drums) from where flammable solvents are pumped by ATEX Rated air driven pumps, through dedicated pipework that is hard plumbed to the receiving vessels (weigh tanks) located within the manufacturing area.

4.3 Polymerisation Process

The production process is carried out batch-wise and consists of free radical polymerisation reactions which form narrow distribution polymeric particles in the micron size range. A schematic diagram of the polymerisation process is shown in Figure 3.

Figure 3 Typical Reaction Process – Stainless Steel Vessel



Chemicals required for the polymerisation process are transferred from storage in the required quantities to a mixing tank in the main production unit. This “reaction mix” contains monomers, free radical initiators and other organic chemicals. The reaction mix is then pumped from the weighing tank to stainless steel or glass lined reactors, which have been previously charged with water and low-level stabilisers such as polyvinyl alcohol. Each reactor is fitted with a water-cooled condenser that vents into the extraction system.

Polymerisation is initiated by heating the reactor contents, typically to 65°C - 80°C. The reactor contents are stirred and have a continuous nitrogen flow adding a positive pressure to the reactor. After a specific duration the heating is turned off and the contents cooled to room temperature. Both heating and cooling are achieved by closed loop heater/chillers using recirculating heat transfer fluid.

During heating polymerisation occurs forming the desired polymeric particles. From this stage the particles enter various process stages as detailed below.

4.4 Filtration & Sieving

The raw polymeric particle mix is pumped to a filter where vacuum is applied to retain the particles on the filter medium and separate the liquid waste which collects in the base of the vessel. The particles are washed with solvent to remove most of the organic residues following the polymerisation reaction. The liquid wastes are pumped into to 205 litre steel drums that are labelled with the correct waste stream classification, before being moved on pallets of 4 to one of the fire vault containers within the solvent storage compound pending transfer off-site by a licenced hazardous waste disposal contractor for treatment at an appropriately regulated facility.

The particles are transferred in a semi dry format from the filters into 25 litre containers which are then sealed before transportation to the sieving rooms (within Unit 3 located off the main production area). Sieving is used to refine the particle size distribution of the particles and is carried out by adding one bucket at a time to the sieves over which a slow constant water flow is applied.

Oversize particles are retained on the upper sieve and removed to a dedicated solid waste stream for specialised disposal. The undersized particles flow with the water to a multistage filtration unit that removes solid debris from the water flow. The solids are disposed of with the oversize. Depending on the process, the filtered water is either collected as effluent prior to removal off-site for treatment or discharged to sewer under an effluent discharge consent .

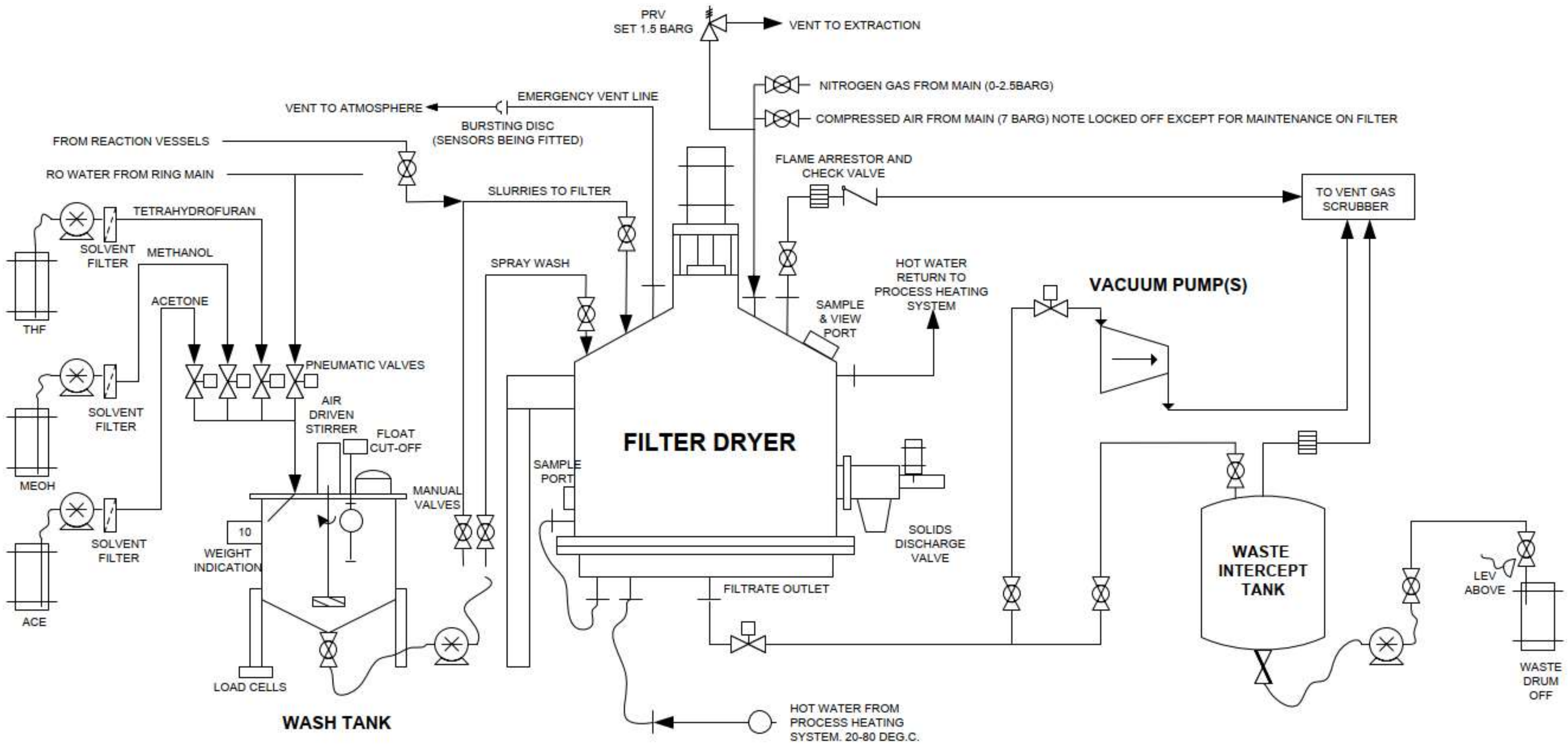
The desired product is retained in the middle sieve and placed into sealed containers ready for further processing.

4.5 Washing

Following sieving, the wet product is subject to further batch-wise washing in filter dryer vessels which range in working volume from 50 to 2,000 litres. The vessels work on the basic principle of having a filter medium to retain the beads, stirring to re-disperse the beads in the wash solvent, nitrogen supply to pressurise the vessel, ability to apply heat to the vessel jacket, ability to apply vacuum to the vessel and a dedicated weigh tank that is hard plumbed to both the flammable solvent pumping station and the filter dryer it supports. A schematic diagram of the filter dryer process is shown in Figure 4.

At the sieving stage the nature of liquid effluents is largely aqueous. At the washing stage the effluent predominantly comprises solvent.

Figure 4 Simplified Washing/Drying Process Typical Layout



The wet polymer product is physically loaded into the weigh tank with the wash water or solvent and stirred to disperse the particles. Both the weigh tanks and the filters sit within a bunded area.

The particle slurry is then pumped from the weigh tank to the filter where it is agitated again to ensure good dispersion before the filter is pressurised with nitrogen.

The waste liquid is collected in an interceptor tank that sits within a bunded area external to the building. As the interceptor tank fills, the waste liquid is pumped into pre-labelled drums within a bunded area within the solvent compound. The drums of liquid waste are then palletised and removed for storage in one of the fire vaults until collected by the licensed hazardous waste contractor for disposal.

Nitrogen gas used to pressurise the vessels, together with the exhaust from the associated vacuum pumps, is vented to atmosphere via a wet gas scrubber to remove volatile organic components.

The wash process is repeated, cycling through previous pre-determined solvent sequencies. During washing the filter dryers are maintained at 35°C. After the final wash sequence the particles are re-suspended in acetone and pumped directly from the filter to a sedimentation tank.

The sedimentation tanks sit within the bunded area with the weigh tanks. The particles are agitated to disperse them into suspension within the solvent. The agitation is then stopped to allow the particles to sediment out and form a solid “cake” at the base of the vessel. The solvent that remains is pumped to an interceptor tank and treated as waste through the same process as detailed in the washing stage. This process may be repeated several times until the required product quality is obtained.

After the final sedimentation the particles are re-suspended in solvent and pumped back to the filter dryer. The solvent is then filtered following the procedure detailed in the washing process.

The particles are then left for a period with nitrogen purging through them to drive off excess solvent. After this purging period vacuum is applied from a vacuum pump located within the building and the filter jacket temperature is increased to 45°C to aid the drying process. When the required dryness specification is achieved (low ppm) a polyethylene (PE) bag within an outer container is attached to the filter discharge port and the dry particle discharged. The PE bags are sealed, and the outer container lid secured.

At this point the dried polymer powder moves to a dedicated storage area and is either dispatched as product or further modified by a surface coating process.

4.6 Surface Modification

Surface modification is also carried out in the filter dryer units. The dry polymer powder is charged to the weigh tank, solvent is added, and the contents are stirred to disperse the powder. The resulting slurry is pumped from the weigh tank to the filter. Reagents are then added to the filter either directly through a charging port in the lid of the vessel (small quantities) or by weighing into the weigh tank and pumping. The reaction mix within the filter is then stirred and heated to the required reaction temperature. After a defined period, the filter is allowed to cool to room temperature before being pressurised to remove the waste, using the same procedures as described in the washing section above. The modified particles then undergo a wash and dry sequence identical to that described in the particle washing phase, to achieve the required cleanliness and dryness specification.

The dry, coated polymer particles are then transported to a dry sieve room. The dry powder is tipped onto a sieving unit. Aggregated particles and non-polymer objects are retained on the sieve where they are physically removed and disposed of as part of the polymer solid waste stream described earlier. The sieved product is collected in a polyethylene bag within an outer container. Once filled the bag is sealed and outer container lid secured, the product is moved to a dedicated storage area ready for dispatch.

4.7 Exhaust Gas Clean Up

Nitrogen gas used to pressurise the filter/dryer vessels in the main Unit 3 process area is treated in a wet gas scrubber to remove volatile organic components before being emitted to atmosphere. Vents from the associated vacuum pumps are also routed to the wet scrubber system.

Exhaust nitrogen gas from the laboratory processes in Unit 2 are extracted via a fume cupboard which vents to atmosphere. Table 4-1 below provides a list of the emission sources on site and Drawing 002 illustrates the location of each emission point.

The wet scrubber system is designed for the removal of tetrahydrofuran, acetone and methanol from a gas flowrate of $25m^3/h$. It uses a cyclonic design whereby exhaust gas enters the scrubber chamber tangentially to induce a vortex flow pattern. Scrubber liquid (water) is sprayed via jet nozzles in the centre of the chamber. The gas then passes to the droplet disengagement section where carryover is prevented by a rapid decrease in gas velocity. Gas then vents through the stack located at A1 to the north of Unit 3. The scrubber liquor from the main chamber and drop-out section is collected to the sump and recirculated.

Vents from associated vacuum pumps are either directed to a scrubber system prior to discharge to atmosphere, or for emission sources with insignificant emission levels they are vented directly to atmosphere. VOC condensers are installed on the majority of process plant with the potential for elevated levels of VOC emission.

Table 4-1 Emissions Sources

Emission Point Name	Emission Point	Activities Undertaken
Unit 3 -Impingement Scrubber Exhaust	A1	Main Process emissions point Product washing and filtering
Unit 3 - (Stack 1)	A2	Fume cupboard (FC) emissions Small scale processing activities
Unit 3 - (Stack 2)	A3	Smaller scale (1l-20l) processing/filtering in fume cupboards FC9-14
Unit 3 - (Stack 3)	A4	20 litre Tank in one fume cupboard (Sediment)
Unit 3 - (Stack 4)	A5	Hoods over wash measurement tanks - fugitive emissions during tank filling during wash/filter of pressure filters Batch polymerisation in reactors in a range of sizes (200 – 1000L).
Unit 3 - (Stack 5)	A6	Small scale distillations, rotary evaporation, cleaning and rinsing inside fume cupboards in Standards lab. Small scale solvent waste decanting. QC activities (small samples).
Unit 3 - Analytical Lab LEV	A7	Sample drying and handling
Unit 2 - Old R&D Lab Vent	A8	Small scale (1-20l) R&D polymerisations, surface modifications and glassware rinsing/washing

Emission Point Name	Emission Point	Activities Undertaken
Unit 2- New R&D Lab Vent	A9	Small scale (1-20l) R&D polymerisations, surface modifications and glassware rinsing/washing
Unit 1- Lab Extract (LHS) Column Production Lab LEV	A10	Liquid chromatography column production - column loading
Unit 1 – Lab Extract (RHS) Column Production Lab LEV	A11	Liquid chromatography column production - column loading

4.8 Heating & Cooling

Heating and cooling for the reactors are achieved by closed loop heater/chillers using recirculating heat transfer fluid. A list of the heating and cooling units used for the reactors is provided in Table 4-2.

Table 4-2 List of Heating and Cooling Units (Temperature Control Units) Used at Site.

No	Type/Model	Specification	Comments
1	P530w-H36	36kW heating / 24kW Cooling	Production Area
2	P510w-H24	24kW Heating / 5.4kW cooling	Production Area
3	510w-H12	12kW Heating / 5.4kW Cooling	Production Area
4	510w-H12	12kW Heating / 5.4kW Cooling	Laboratory
5	510w-H12	12kW Heating / 5.4kW Cooling	Laboratory
6	510w-H12	12kW Heating / 5.4kW Cooling	Not yet in use to replace No 11.
7	510w-H12	12kW Heating / 5.4kW Cooling	Laboratory
8	510w-H12	12kW Heating / 5.4kW Cooling	Laboratory
9	510w-H6	6kW Heating / 5.4kW Cooling	Laboratory, not yet in use
10	510w-H6	6kW Heating / 5.4kW Cooling	Laboratory, not yet in use
11	510w-H6	6kW Heating / 5.4kW Cooling	Laboratory, not yet in use
12	430w	4kW Heating / 4kW cooling	Production Area To be replaced by No 6
13	405	4kW heating / 2kW cooling	Laboratory, High Temp system
14	Ministat cc3	1.5kW Heating / 0.5kW cooling	Laboratory
15	Julabo	3kW heating / 1kW cooling	Laboratory

4.9 Process Equipment Cleaning

The manufacturing operations are batch processes. Vessels and reactors are cleaned between batches by firstly rinsing out with a 1% detergent mix followed by rinsing with reverse osmosis (RO) water. Cleaning is undertaken on impermeable hardstanding with drainage that leads to foul sewer. Wash water is discharged to foul sewer via emission point S1 (shown on Drawing 002). Small volumes of cleaning chemicals are stored within the process building in a store cupboard located on impermeable hardstanding.

4.10 Combustion Plant & Emergency Generator

There are nine on-site boilers which supply process and site heating and an emergency generator to provide back up for critical systems. Table 4-3 provides a summary of the plant.

Locations of the combustion plant and emergency generator are shown on Drawing 002.

Table 4-3 Combustion Plant

Equipment	Supplier	Date Installed	Model No.	Fuel	Rated Thermal Output (MWth)	Rated Thermal Input (MWth)
Boiler Unit 1	Worcester	2021	Greenstar 4000	Natural Gas	0.012	<1[1]
Boiler Unit 1	Hamworthy	2003	Wessex 50	Natural Gas	0.05	0.0595
Boiler Unit 1	Hamworthy	2003	Wessex 50	Natural Gas	0.05	0.0595
Boiler Unit 2	Rehema	2022	Quinta Ace 55	Natural Gas	0.0553	<1[2]
Boiler Unit 2	Rehema	2022	Quinta Ace 55	Natural Gas	0.0553	<1[2]
Boiler Unit 3	Rehema	2022	Quinta 160	Natural Gas	0.1611	<1[3]
Boiler Unit 3	Rehema	2022	Quinta 160	Natural Gas	0.1611	<1[3]
Boiler Unit 3	Rehema	2022	Gas 220	Natural Gas	0.2909	<1[4]
Boiler Unit 3	Rehema	2022	Gas 220	Natural Gas	0.2909	<1[4]
Diesel emergency generator	Scorpion	2001	DV204 (VOLVO PENTA TWD740GE)	Diesel	0.163	<1[5]

Estimated by SLR from the thermal output (0.012 MWth) presented in the Worcester Greenstar brochure. Estimated to be <1MWth as losses from the unit are unlikely to be 0.988 MWth.

[2] Estimated by SLR from the thermal output (0.0553 MWth) presented in the Remeha Quinta Ace 55 brochure. Estimated to be <1MWth as losses from the unit are unlikely to be 0.9447 MWth.

[3] Estimated by SLR from the thermal output (0.1611 MWth) provided by Agilent. Estimated to be <1MWth as losses from the unit are unlikely to be 0.8389 MWth.

[4] Estimated by SLR from the thermal output (0.2909 MWth) provided by Agilent. Estimated to be <1MWth as losses from the unit are unlikely to be 0.7091 MWth.

[5] Estimated by SLR from the thermal output (0.163 MWth) provided by Agilent. Estimated to be <1MWth as losses from the unit are unlikely to be 0.837 MWth.

4.10.1 Medium Combustion Plant / Specified Generator Requirements

Under the Environmental Permitting (England and Wales) (Amendment) Regulations 2018, a medium combustion plant (MCP) is defined as a combustion plant (such as an engine, boiler or turbine) burning any fuel, with a rated thermal input equal to or greater than 1 MWth but less than 50MWth.

A specified generator (SG) is defined as combustion plant with a capacity of between 1MWth to 50MWth burning any fuel which is used for the purpose of generating electricity.

Generators less than 1MWth may also be defined as an SG if they:

- Provide a 'balancing service' or have a capacity agreement; or
- Are part of a specified generator group which in total has a rated thermal input of between 1MWth and less than 50MWth.

The combustion plant at Agilent are for space heating only and do not generate electricity. As such, only MCP requirements may apply to these boilers and no SG requirements apply.

In some cases, there is a requirement to aggregate MCP which applies to new MCP only put in place after 20 December 2018. Aggregation is undertaken to form a single MCP by adding together the rated thermal input of 2 or more separate plant that discharge the waste gas through a common windshield. A common windshield is a shared structure or stack, and it may contain one or more flues. The total capacity discharging through the common windshield must be between 1MWth and 50MWth. MCP less than 1MWth are not included for aggregation.

Each of the boilers onsite has a rated thermal input of below 1MWth and therefore do not have to be aggregated. As such, the boilers do not need to be permitted as they each have a rated thermal input of <1MWth.

The emergency back-up generator also has a rated thermal input of less than 1MWth and therefore the MCP and SG requirements do not apply.

The emergency generator is tested 15 minutes per month to ensure that it is working in case of an emergency. The generator will not be operated for more than 50 hours per year.

5.0 Infrastructure & Equipment

5.1 Site Surfacing & Drainage

5.1.1 Surfacing

Operational areas of the site benefit from an engineered containment system comprising an impermeable concrete surface.

5.1.2 Sub-surface Structures

The precise locations of subsurface drains, pipework and interceptors will be recorded, and relevant documentation maintained electronically. An inspection and maintenance programme for all subsurface structures is followed and records will be maintained by the facilities team.

5.1.3 Bunds

Bunds will be provided for containers containing liquids whose spillage could be harmful to the environment. Containment bunds are provided to make sure that any leaks/spillages will be contained in the event of a leak of the primary containment. The containment measures are:

- Capable of containing at least 110% of the volume of the largest container within the bund;
- Constructed of materials which are impermeable and resistant to the stored materials in accordance with relevant material safety data sheets (MSDS);
- Constructed to the appropriate British Standard and Health and Safety Executive (HSE) guidance;
- Of a type suitable for the containment of the materials in the event of leak or spill;
- Pipework will be routed within bunded areas so that no penetration of walls or base of the bund takes place; and
- Connection points will be located within the bund.

The drum store comprises storage of chemicals and waste on bunded stillages. The 12.5m^3 capacity concrete bund is used as tertiary containment.

The January 2023 Adler & Allan Initial Bund Inspection Report (reference CW/AGI/BUND/050123 dated 05 January 2023) confirmed that the drum store bund required some repair. Agilent subsequently undertook repairs to the following:

- Cracking to the bund floor radiating from the entrance ramp;
- Damage and chipping of concrete bund walls;
- Concrete 'honeycombing' on external bund walls;
- Heavy cement weathering on floor surface; and
- Re-sealing of the concrete core area to C736 standards.

Resin injection methodologies (Fosroc Nitofill LV resin) were used in June 2023 to seal the cracks to the bund floor and to seal the reinstatement around a previous core sample hole.

SLR Consulting visited site to assess the repairs on 02 August 2023. SLR concluded in a letter (Agilent Chemical Storage Bund Crack Repair Inspection, reference 403_065044_00001 dated 04 August 2023) that overall, works had been performed to a reasonable standard and SLR is content that the bund repairs are C736 compliant.

5.1.4 Management & Operational Techniques

Containment engineering will prevent the release of potentially polluting liquids to surface water and groundwater. Plant operatives undergo awareness training to ensure a full understanding of the containment engineering which will minimise the environmental impact of the site. The engineered containment system is subject to routine visual inspection. Identified breaches in the engineered containment are remedied to ensure continued integrity of the facility, and to prevent pollution of surface or groundwater. Records of inspection and maintenance are maintained by the relevant department manager.

5.1.5 Drainage & Surface Water Management

The site benefits from impermeable surfacing and a sealed drainage system. Appendix A presents the drainage plan of the site.

Uncontaminated rainwater from the southern car park and roof of Unit 1 flows into a soakaway within the car park at location W1 shown in Drawing 002. Chemicals are not stored in this area.

Uncontaminated rainwater is collected from the roofs of Unit 3, the drums store and hardstanding in the northern portion of site and drains into a 10,000 litre underground attenuation tank, which is then pumped to discharge point W2 (shown on Drawing 002) for release into the local storm water drainage system.

Uncontaminated rainwater from the roof of Unit 2, Unit 4 and the central carpark flows directly to discharge point W2.

Process cooling and equipment wash water is discharged to S1 adjacent to Essex Road. This effluent is discharged to Severn Trent's foul sewer system on Essex Road under four separate discharge consents with Severn Trent.

The attenuation tank is subject to regular visual inspection, cleaning and maintenance, and the attenuation pumping equipment is serviced by an appointed contractor twice a year.

5.2 Plant & Equipment

The key items of process plant and equipment that will be used at the Site are detailed below. All items of plant and equipment will be maintained in accordance with the manufacturer's recommendations.

The key components will include, but not be limited to:

5.2.1 Fixed Plant

The following fixed plant is held on site:

- Reaction mixture tanks;
- 7 No. Wash tanks 250 - 1,000 litre;
- 7 No. Filter dryers 50 - 2,000 litre;
- 7 No. Reactors 60 - 1,000 litre;
- 3 No. Polymer holding tanks - 1,000 litre;
- 9 No. Gas fired boilers and
- Emergency diesel-fuelled generator.

5.2.2 Reactors in Production Area

Table 5-1 provides a list of the reaction equipment used in the production area. All the vessels are fitted with simple vent condensers (normally glass coil type) which vent directly into the local exhaust ventilation (LEV) system there are also LEV capture hoods above sample points on these for operator protection (refer Section 4.7 above for a list of vent points within the production area).

The 60 litre glass lined reactor vents to a simple water-based scrubber prior to the extraction system and the whole reactor is located inside an extracted enclosure.

Table 5-1 Reactors in Production Area

Reactor	Size and Specification	Typical Process
Reactor R1	100L Thermal oil heated 20-80°C Stainless Steel	Polymerisation Reactions
Reactor R2	1000L. Thermal oil heated 20-90°C Stainless Steel	Polymerisation and modifications

Reactor	Size and Specification	Typical Process
Reactor R3	200L, Thermal oil heated, 20-80°C Glass lined Steel	Polymerisation Reactions
Reactor R4	500L, Thermal Oil Heated, 20-80°C Glass lined Steel	Polymerisation Reactions
Reactor R5	60L, Thermal Oil Heated, 20-60°C Glass lined Steel	Sulphonation and Quaternisation reactions
Reactor R6	200L, Thermal Oil heated, 20-80°C Glass Jacketed	Magnetic Particle production
Reactor R7	200L, Thermal Oil heated, 20-80°C Glass Jacketed	Magnetic Particle production

5.2.3 Reactors in Laboratory Production Areas

Table 5-2 lists the reactor vessels used in the laboratory production areas. All reactors are located inside fume cupboards.

For polymerisation and magnetic particle reactions up at a 20 litre scale there are a number (approx. 10) of water baths (electrically heated 20-80°C) which are located inside fume cupboards.

Table 5-2 Reactors in Laboratory Production Area

Reactor	Size and Specification	Typical Process
Reactor L1	10L Vac Jacketed, 20-180°C Thermal oil heated	Polymerisation silica base
Reactor L2	15L Glass Jacketed, 20-120°C, thermal Oil Heated	Silica Particle processing
Reactor L3	15L Glass Jacketed, 20-120°C, Thermal Oil heated	Silica Particle processing
Reactor L4	To be installed process as above	Silica Particle processing
Reactor L5	30L Glass jacketed, 20-120°C, Thermal Oil heated	Silica Particle processing
Reactor L6	30L Glass jacketed, 20-70°C, Thermal Oil Heated	Sulphonation type reactions
Reactor L7	15L Glass Jacketed, 20-70°C, Thermal Oil heated	Magnetic Particle Production
Reactor L8	50L Glass jacketed, 20-70°C, Thermal oil heated	Magnetic Particle Production
Notes: For temperatures up to 120°C, Thermal oil used is Huber DW Therm, above this Huber Sil Oil M20 is used.		

5.2.4 Mobile Plant

The following items of mobile plant are held on site:

- Forklift Truck;
- Scissor Lift; and
- Pallet Trucks.

5.3 Site Security

The site has a number of security measures in place to limit the likelihood of arson or vandalism.

Security on site includes:

- Security fencing surrounding the site;
- Lockable gates;
- Security lighting;
- Access controlled entrances to the building;
- Inspection and maintenance procedures; and
- Recorded CCTV system covering full extent of the site.

All visitors and contractors are required to register in and out via electronic iLobby system and are then provided with a site induction. Visitors are escorted by a member of staff. This minimises the risk of unauthorised visitors being present at the site.

Any breach in security would be reported to the facilities manager (or in their absence, their deputy) and the emergency services as appropriate.

Site boundary checks are completed regularly to ensure site security is maintained. Any defects or damage which may compromise the integrity of the enclosure will be made secure by temporary repair by the end of the working day. Permanent repairs will be affected as soon as practicable. All inspections and any defects, damage, or repairs will be recorded by a site operative.

In the event of a breach of security at the site, the cause will be investigated, and appropriate mitigation measures implemented, such as repair of security

5.4 Chemical Storage

Drawing 005 illustrates the location of chemical storage at the site.

5.4.1 Chemical & Cold Stores

Drawing 005 presents the location of chemical and cold stores.

Outdoor chemical storage locations including the chemical store and temporary cold store along the northwestern site boundary are bunded.

Table 5-3 presents chemicals held within chemical and cold stores onsite.

Table 5-3 Chemicals Held Within Chemical Stores and Cold Stores

Table Redacted

5.4.2 Drum Store

Tables 5-4 and 5-5 present chemicals held within the drum store.

Table 5-4 Drum Store Storage

Substance	State	Property	Size (litres)	Amount (litres)
3-Methyl-1-butanol	Liquid	Flammable liquid	200	400
Acetone*	Liquid	Flammable Liquid	200	3,000
Dichloromethane*	Liquid	Toxic substance	200	1,000

Diethylbenzene*	Liquid	Flammable Liquid	200	800
Dimethylacetamide*	Liquid	Combustible Liquid	200	2,000
Dimethylformamide*	Liquid	Flammable Liquid	200	1,200
Divinylbenzene*	Liquid	Combustible Liquid,	200	300
Ethylenediamine*	Liquid	Corrosive	25	425
Methanol*	Liquid	Flammable liquid	200	2,800
Methyl Ethyl Ketone	Liquid	Flammable liquid	200	200
Petroleum Ether 40/60*	Liquid	Flammable Liquid	25	275
Tetrahydrofuran*	Liquid	Flammable liquid	200	1,600
Diethylene Glycol*	Liquid	Combustible Liquid	200	200
Toluene	Liquid	Flammable liquid	25	150
Petroleum Ether	Liquid	Flammable liquid	200	800
Diesel for the backup generator	Liquid	Combustible Liquid	200	500

**Primary raw material.*

The waste effluent described in Table 5-5 below is also stored within the drum store, prior to collection by a suitably licenced contractor who removes the effluent from site and reuses it as cement kiln fuel. The waste contractor collect effluent from site in 200L drums approximately twice a week.

Table 5-5 Effluent Stored in the Drum Store

Hazardous Wastes	State	Size (litres)	Maximum Amount Stored on Site (litres)
FLAMMABLE LIQUID, TOXIC, N.O.S. miscible with water (tetrahydrofuran, methanol)	Liquid	200	5,000
FLAMMABLE LIQUID, TOXIC, N.O.S. (methylene chloride, dimethylformamide)	Liquid	200	800

Empty solvent cans and drums are also stored in the drum store prior to collection.

5.4.3 Containment

Table 5-6 outlines the containment for each of the storage areas.

Table 5-6 Storage Area Containment

Area	Containment
Drum Store (northern boundary), including solvent transfer station	The drum store holds approximately 24,000 litres of flammable solvents in drums of up to 205 litre capacity. Stored in separate 90 minute fire rated units Chemicals and waste in the drum store are stored on bunded stillages and the drum store

Area	Containment
	concrete bund is used as tertiary containment. The drum store complies with CIRIA 736 (refer Section 5.1.3). The drum store includes a 200mm high concrete perimeter bund which has a capacity of 12.5m³.
Standalone chemical store along the northwestern boundary of site (CS02)	Concrete bunding with 1,250 litre capacity.
Outdoor temporary cold store (northwestern portion of site) (FR06)	Bunded.
Emergency back-up diesel generator house	Concrete bunding.
Indoor cold stores (FR03, FR04, FR05)	Located indoors, on impermeable hardstanding with bunded stillages.
Chemical store (CS01)	Located indoors, on impermeable hardstanding. Bunded stillages used.
Product store along northern site boundary.	Located on impermeable hardstanding with containment bund.

6.0 Raw Materials

6.1 Raw Materials Inventory

A list of the raw materials used at the site in financial year (FY) 2022, along with the tonnage is provided in Table 6-1.

A Control of Substances Hazardous to Health (COSHH) assessment will be undertaken prior to the use of chemicals, and if the chemical is found to present a hazard to health, it will be added to the COSHH inventory and appropriate safeguards implemented.

Material Safety Data Sheets (MSDS) for any potentially hazardous materials or chemicals will be kept on site together with the COSHH register. The MSDS will give information on how chemicals should be handled, stored and disposed of, and what to do in the event of an accident.

Table 6-1 Raw Materials

Table Redacted

6.2 Raw Materials Selection

Wherever possible, raw materials will be selected that minimise environmental risk. Consideration will be given to such factors as degradability, bioaccumulation potential, product contamination and toxicity. Reviews will be frequently undertaken to ensure that all raw materials are appropriate for use, that consumption is optimised and that opportunities for reduction and improvements are implemented through an action plan.

Alternative raw materials will be evaluated for their environmental impact on an on-going basis and, where there is no overriding quality requirement substitution will be given appropriate consideration. The manufacturing engineering team are responsible for review of new developments in product availability, raw material use and their implementation to minimise the use of raw materials.

6.3 Waste Minimisation

6.3.1 Waste Production

Wastes produced by the site include aqueous and solvent wash waste as well as over and undersize polymer and used laboratory consumables. These are summarised in Table 6-2.

Waste is removed from site by licensed and approved contractors. Waste transfer notes for each load are obtained and filed on site and copies held in the waste contractor's portal. Waste streams are clearly labelled and segregated, as detailed on the standard operating procedures (SOP) for waste removal routes.

Substandard product is removed from site by licensed and approved contractors. Waste transfer notes for each load are generated and stored electronically for the required period of time.

Table 6-2 Wastes Produced at the Site

Waste Stream	Source of Waste	Steps Employed to Minimise Amount Generated?	Quantity Generated per Annum (tonnes) (FY2022)	Onwards Recovery / Disposal Method
Laboratory glass, unchlorinated	Chemical bottles and lab glassware	M/T Glass Bottles returned to supplier where possible	3.88	Segregation / treatment / recycling
Laboratory glass, chlorinated	Chemical bottles and lab glassware	M/T Glass Bottles returned to supplier where possible	0.55	Segregation / treatment / recycling
Aqueous dilute heavy metal solution <0.01%	Polymerisation of diagnostic raw materials	Re-formulated to reduce quantity and concentration used	4.44	Treatment
Unchlorinated solvents / water	Washing of products	Number and volume of solvent washing steps minimized through optimisation projects and in process indicative tests	200.8	Cement kiln fuel incineration with heat recovery
Chlorinated solvents / water	Solid separation and swell/shrink internal washing of polymer products	Number and volume of solvent washing steps minimized through optimisation projects and in process indicative tests	23.2	Cement kiln fuel incineration with heat recovery
Tetrahydrofuran / water / chloromethyl styrene	Solid separation and swell/shrink internal washing of polymer products	Number and volume of solvent washing steps minimized through optimisation projects and in process indicative tests	36.8	Cement kiln fuel incineration with heat recovery
Acetonitrile	QC & R&D/Applications lab column chromatography solvent	Smallest column possible used for work and systems not run unnecessarily	2.4	Cement kiln fuel incineration with heat recovery
Solid lab waste, unchlorinated	Filter papers, cloths, spill materials, non-glass chem lab packaging etc.	Uncontaminated lab waste segregated for recycling as commercial waste	9.2	Cement kiln fuel incineration with heat recovery
Solid lab waste, chlorinated	Filter papers, PPE, cloths, spill materials, non-glass chem lab packaging etc.	Uncontaminated lab waste segregated for recycling as commercial waste	4	Cement kiln fuel incineration with heat recovery

Waste Stream	Source of Waste	Steps Employed to Minimise Amount Generated?	Quantity Generated per Annum (tonnes) (FY2022)	Onwards Recovery / Disposal Method
Steel waste drums	Hazardous waste streams	Drums filled before collection and M/T drums reused for waste where suitable	22.84	Cleaned, shredded and steel recycled
Paper	Offices	Unnecessary printing discouraged; use of electronic documents where practical	0.25	Recycled
Laboratory glass bottles returned & reused	QC & R&D/Applications labs	Smallest bottle for use ordered	0.48	Reused
Mixed commercial solids for recycling	General office/canteen/workshops/labs	Re-usable mugs provided to reduce paper cup use.	9.81	Sorted, segregated & recycled
Mixed commercial solids non-recyclable	General office/canteen/workshops/labs	Staff encouraged to use colour coded and labelled recycling receptacles when suitable	10.52	Incinerated

6.3.2 Waste Minimisation

Agilent has measures in place to ensure that:

- The waste hierarchy (referred to in Article 3 of the Waste Framework Directive) is applied in the generation of waste on site by the activities;
- Waste production will be avoided wherever possible;
- Any waste generated by the activities is treated in accordance with the waste hierarchy; and
- Where disposal is necessary, as opposed to recovery, that it is undertaken in a manner which minimises its impact on the environment.

All waste generated at the site is sent either for recycling, re-use as cement kiln fuel, for energy generation or treatment. No waste is disposed of to landfill.

Waste generation at the site will be reviewed periodically and where necessary an appropriate improvement programme will be implemented.

Any waste produced on site will be recovered, unless there are instances whereby it is not technically or economically practicable to do so.

6.4 Water Use

6.4.1 Water Consumption

The main uses of water at the facility are for the reverse osmosis system; cooling; reaction mixture and washing of polymer product. Other uses of mains water on site are in the laboratory, office and welfare facilities.

The total mains water usage for the 2023 financial year (November to November) was 12,449 m^3 per year.

6.4.2 Efficient Use of Water

The use of water will be regularly reviewed to ensure maximum efficiency and ensure that any further potential for reduction in consumption and recycling opportunities are identified in accordance with Best Available Techniques.

Due to the regulated markets that the products manufactured serve, risk of cross contamination needs to be eliminated. As such, it is not possible to re-use water used in the process.

The manufacturing engineering team periodically reviews the process and introduces water optimisation processes where possible (i.e., reducing the number of washes required to manufacture the product).

The reverse osmosis system is controlled to ensure that only the volumes of water required for the process are processed. Air cooled condensers are used wherever possible to minimise water use.

Agilent have investigated the use of ‘grey water’ at the site. However, the site was considered to be too small to house the necessary equipment to operate this system.

7.0 Energy Efficiency

Agilent is not a participant in a Climate Change Levy Agreement.

Agilent has committed to achieve net-zero greenhouse gas emissions no later than 2050. Agilent has also committed to interim greenhouse gas reduction targets. By 2030, Agilent will aim to reduce absolute scope 1 and 2 emissions by 50%, and scope 3 emissions by at least 30% (with a stretch goal of 40%) from a base year of 2019.

7.1 Energy Management System

Energy management will be reviewed every year as part of the site's EMS. This will be undertaken to confirm that the best environmental options are being used for energy usage at the installation and may also include, where applicable, energy reduction targets.

Agilent take part in an Energy Assessment and Energy Saving (ESOS) scheme, which comprises an annual audit of energy management at the site.

It is considered that the proposed arrangements represent BAT.

7.2 Energy Consumption

Table 7-1 summarises the typical energy consumption at the site.

Table 7-1 Energy Consumption

Utility	Consumption Financial Year 2023 (Nov-Nov)
Gas	1,192,886 kWh
Grid Electricity	1,045,914 kWh
Solar Electricity (Generated Onsite)	107,410 kWh

The 2023 ESOS review reported that over the past three years:

- Scope 1 CO_2e building fuel emissions have consistently fallen from 20.38% at baseline to 13.44%;
- Scope 1 CO_2e transport fleet fuel emissions have consistently fallen from 38.91% at baseline to 23.83%; and
- Scope 2 CO_2e electricity emissions have consistently fallen from 29.28% at baseline to 21.67%.

7.3 Energy Efficiency Measures

Energy efficiency will be managed in conjunction with the EMS and reviewed periodically.

The following basic energy control measures are also in place as appropriate to the activities taking place at the installation:

- ~90% of the lighting on site is now LED with the remaining 10% to be replaced with upcoming projects;
- Where safe and practicable, motion sensing to control light fixtures;
- Equipment and vehicles when not in use will be turned off;
- Vehicles will be maintained to ensure they operate efficiently; and
- Doors and windows in offices and buildings will be kept closed when heating or air conditioning is on and thermostats will be kept as low as possible, consistent with comfort levels.

The following energy saving measures have been undertaken recently at the site:

- Replacement of one steam boiler system with more efficient low temperature hot water (LTHW) boilers;

- Installation power factor correction system for Units 2 and 3;
- Installation of solar panels to contribute to the site's energy supply (155KW Solar Panel system installed on the roof of Unit 3);
- Replacement of water-cooled condensers with more water efficient air-cooled condensers ; and
- Upgrading the HVAC controls to reduce run-times of the chiller and air handling units.

8.0 In-Process Controls

8.1 Material Storage and Handling

Arrangements for raw material storage are detailed in Section 5.4 of this document.

The storage procedures that will be implemented on site are considered to be best practice for the following reasons:

- Storage areas will be clearly marked;
- Procedures will be in place for the regular inspection and maintenance of storage areas with any repairs being undertaken as soon as is practicable; and
- Storage areas and bunding will be designed to be fit for purpose, taking into account the nature of the material to be stored and the required design life.

8.2 Process Control Monitoring

Process control currently relies upon predominantly manual supervision to manage the basic automation of the process and ensure that reactions are within the required range. HAZOP and HAZID risk assessments are carried out regularly. In the next 12 months Agilent will begin a process of introducing more advanced automated controls to manage the process.

8.3 Inspection, Maintenance & Monitoring

There is a dedicated department responsible for ongoing maintenance at the site. The site has a pre-planned preventative maintenance (PPM) system in place. PPM involves daily checks including visual inspections, analysis of water quality, plant gauges, etc. There is a daily checklist detailing the checks that are required and recording the results of these checks. For larger plant there is a PPM planner in place. Additionally, Agilent's Insurance Company details plant maintenance and testing requirements that have to be undertaken to satisfy the insurance policy. Agilent uses the QPulse computerised system to manage the onsite PPM and calibration.

Some maintenance activities are undertaken by third party appointed specialist contractors, for example the maintenance of chillers and refrigeration systems and maintenance of the boilers.

Infrastructure and equipment within the site are inspected on a regular basis and maintained and repaired as necessary. In addition, Agilent undertakes visual checks on all plant and equipment regularly and, if deemed necessary, brings forward any planned maintenance or undertakes remedial works.

Records of all visual and scheduled inspections and details and certificates (where appropriate) of any maintenance work are regularly updated and maintained. Maintenance schedules for equipment are regularly reviewed and updated.

In the event of damage or deterioration being detected, all maintenance work will be carried out in conformance with Agilent's Health and Safety Policy.

9.0 Control of Noise

9.1 Noise Impact Assessment

A Noise Impact Assessment (NIA) has been carried out for the site and is presented in Section 6 of this application (410.064951.00001_NIA). Details of the locations, sources, frequency and estimated noise levels associated with operations at the site have been addressed as part of the NIA.

Noise emissions from the facility were calculated using proprietary modelling software and noise data for the plant and processes at the site. The Rating Noise level was compared to the existing background noise levels measured at the nearest properties and assessed in accordance with BS4142:2014.

Analysis of the results indicates the following:

- At Location 1 (residential dwelling on Essex Road), the predicted cumulative sound level is 3dB(A) above the measured background noise level during the daytime and 1dB(A) over at night.
- At Location 2 (residential dwelling adjacent to the railway Essex Road) the predicted cumulative sound level is above the measured background noise level during both the daytime and the night-time:
    - During the daytime, noise levels are predicted to be 4dB(A) above the background noise level.
    - During the night-time, modelling shows that background sound levels are exceeded by 8dB(A). However, it is understood that at night plant at unit 2 and 3 will be running at 25% capacity. Therefore, at night, the noise model is likely over-predicting the specific sound level, as the model sound input data for the plant that is operating, has been left at the measured noise level, which was measured at 100% capacity.

While modelling indicates the impact of site on the surrounding area is considered adverse, operating certain plant components at 25% capacity instead of the modelled 100% (due to data limitations) is likely to reduce noise levels at nearby receptors. This coupled with the implementation of the Noise Management Plan (NMP) (refer 410.064951.00001_NMP), has the potential to lessen the impact, reducing this to a low impact at the closest receptors.

It is noted that it is unlikely for all equipment to be running at 100% capacity at the same time and that the modelling within the NIA is considered to be conservative.

9.2 Noise Mitigation & Management Measures

A NMP (410.064951.00001_NMP) has been prepared for the site due to the potential for noise exceedances when equipment is running at 100% capacity (conservative assessment for potential noise generation).

The following processes and checks will be carried out to minimise the potential for noise emissions:

- Regular inspections by a suitably qualified third party will be made to ensure that the equipment is well maintained;
- Maintenance records will be kept up to date and be available upon request;
- Regular maintenance will be carried out periodically;
- Periodic maintenance checks will be undertaken in accordance with the manufacturer's instructions or as deemed appropriate based on operational

experience, to ensure efficient running of engine machinery. e.g., lubrication of moving parts to reduce noise;

- Plant will be commissioned to operate at suitable duty levels, to minimise noise emissions as far as practicable;
- Periodic checks of plant operation will be undertaken, to ensure that plant is running at the appropriate (lowest) operating duty;
- Equipment will be operated by trained, competent staff; and
- Potentially noisy activities will not be undertaken at night.

A noise surveillance programme will be implemented regardless of whether a noise complaint has been received. The purpose of noise surveillance is to demonstrate that the new plant is being operated in such a manner as to minimise the noise impact at nearby noise-sensitive receptors.

A complaint procedure will also be implemented to manage any noise complaints.

10.0 Control of Odour

Potential sources of odour from the chemical manufacturing activities include point-source VOC emissions associated with the feedstocks, reagents and solvents as well as liquid wastes produced. The potential for fugitive emissions to be generated at the site is considered to be minimal. It is understood that the site has not received any complaints from nearby receptors in recent years. In addition, the vast majority of raw materials handled onsite have low odour potential.

A qualitative risk assessment of the potential impact of odour on receptors has been carried out and is presented in the Environmental Risk Assessment (410.064951.00001_ERA) prepared for this application.

For the small number of chemicals utilised onsite that have the potential to generate odour; the following measures are employed on site to minimise the risk of impact from odour:

- A scrubber is used to removed VOCs from the exhaust gases from the main processing area;
- Vents from vacuum pumps are routed via the gas scrubber;
- Potentially odorous chemicals are stored in sealed containers;
- Potentially odorous chemicals are handled in low volumes, no more than 100 L at a time;
- Potentially odorous chemicals are handled indoors; and
- Potentially odorous chemicals are used within closed systems.

11.0 Control of Emissions to Air

11.1 Point Source Emissions

Table 11-1 lists the point source emissions from the activities carried out at the Site.

Table 11-1 Emission Points to Air

Emission Point	Emission Point Name	Activities Undertaken	Grid Reference (X,Y)	Height (m)	Diameter (m)	Release Type
Wet Scrubber						
A1	Unit 3 - Impingement Scrubber Exhaust	Main Process emissions point Product washing and filtering	345726.77, 293811.06	9	0.245	Horizontal
Vent Systems						
A2	Unit 3 - (Stack 1)	Fume cupboard emissions Small scale processing activities	345692.4, 293797.9	9	0.51	Horizontal
A3	Unit 3 - (Stack 2)	Smaller scale (1l-20l) processing/filtering in fume cupboards FC9-14	345692.99, 293798.95	9	0.45	Horizontal
A4	Unit 3 - (Stack 3)	20L Tank in one fume cupboard (Sediment)	345693.61, 293799.8	9	0.39	Horizontal
A5	Unit 3 - (Stack 4)	Hoods over wash measurement tanks - fugitive emissions during tank filling during wash/filter in pressure filters	345694.29, 293800.93	9	0.435	Horizontal

Emission Point	Emission Point Name	Activities Undertaken	Grid Reference (X,Y)	Height (m)	Diameter (m)	Release Type
A6	Unit 3 - (Stack 5)	Small scale distillations, rotary evaporation, cleaning and rinsing inside fume cupboards in Standards lab. Small scale solvent waste decanting QC activities for small scale reactions.	345695.03, 293802.01	9	0.375	Horizontal
A7	Unit 3 - Analytical Lab LEV	Sample drying and handling	345723.33, 293813.05	9	0.225	Horizontal
A8	Unit 2 - Old R&D Lab	Small scale (1-20l) R&D polymerisations and surface modifications	345691.5, 293746.87	7	0.49	Horizontal
A9	Unit 2- New R&D Lab	Small scale (1-20l) R&D polymerisations and glassware rinsing/washing	345689.24, 293763.37	7	0.39	Horizontal
A10	Unit 1- Lab Extract (LHS) Column Production Lab LEV	Liquid chromatography column production - column loading	345652.07, 293741.79	5	0.59	Horizontal
A11	Unit 1 – Lab Extract (RHS) Column Production Lab LEV	Liquid chromatography column production - column loading Column Production Lab LEV	345654.68, 293740.23	5	0.59	Horizontal
Combustion plant						

Emission Point	Emission Point Name	Activities Undertaken	Grid Reference (X,Y)	Height (m)	Diameter (m)	Release Type
A12	Boiler Unit 1, Worcester	Discharge from natural gas boiler	345626, 293702	-	-	-
A13	Boiler Unit 1, Hamworthy	Discharge from natural gas boiler	345622 293720	-	-	-
A14	Boiler Unit 1, Hamworthy	Discharge from natural gas boiler	345624, 293723	-	-	-
A15	Boiler Unit 2, Rehema	Discharge from natural gas boiler	345686, 293747	-	-	-
A16	Boiler Unit 2, Rehema	Discharge from natural gas boiler	345688, 293749	-	-	-
A17	Boiler Unit 3, Rehema	Discharge from natural gas boiler	345692, 293801	-	-	-
A18	Boiler Unit 3, Rehema	Discharge from natural gas boiler	345693, 293802	-	-	-
A19	Boiler Unit 3, Rehema	Discharge from natural gas boiler	345694, 293803	-	-	-
A20	Boiler Unit 3, Rehema	Discharge from natural gas boiler	345695, 293805	-	-	-
Diesel Generator						
A21	Emergency generator	Diesel powered emergency generator	345700, 293828	-	-	-
'- release point not modelled as rated thermal input below 1 MWth.						

Combustion units listed in Section 4.10 have not been included as emission points as they each fall below 1MWth rated thermal input and medium combustion plant and specified generator requirements as outlined in Environmental Permitting (England and Wales) (Amendment) Regulations 2018 do not apply.

11.1.1 Quantification of Point Source Emissions to Air

An emissions monitoring exercise was undertaken at the site by ECL during September and October 2023[6]. This monitoring assessment was undertaken in order provide emissions data to inform the assessment of BAT-AEL compliance and also to provide emissions data for use in the AERA.

The emission points A1 to A11 listed in Table 11-1 were assessed for TVOC emissions only. The combustion emission points were excluded as they fall well below 1MWth input, will not release VOCs and are unlikely to create significant emissions.

The site processes comprise small scale polymerisation reactions with subsequent purification stages (e.g. filtering and washing, distillation, evaporation, chromatography etc.). Such activities are batch processes, with the specific activities being undertaken varying from day-to-day (or in some cases hour-to-hour). Hence, none of the specific emissions are expected to be continuous in nature, and many will be intermittent and in some cases of relatively short duration.

The scheduled activities (reactions) undertaken during the monitoring process were representative of activities most likely to lead to the highest level of emissions from each item of plant. An operational log was also provided by Agilent detailing the activities being undertaken in each operational area and recording the chemical / VOC materials in use in each area as monitoring was underway. This allows a comparison to be made between the emission concentrations /rates reported and the activities being undertaken. This also has allowed an estimate to be made of the likely speciated chemical composition of the VOCs emitted to atmosphere.

The data on the estimated percentage composition of the materials being processed in each operational area, has been based upon the raw materials and solvents input to the particular process being undertaken at the time the sampling occurred. A review of the data identifies:

- Those VOC materials likely to be released via the emission point to air; and
- Those materials that would be consumed within the process and therefore would not be present at any significant level in the vented air e.g. monomers which would be fully reacted within the polymerisation processes and hence are unlikely to be emitted via the process vents.

The estimated average and maximum emission levels of each VOC predicted to be present in each vent system has been calculated by multiplying the recorded TVOC concentrations by the estimated percentage of each component present. The calculated mass emission rates (presented as grams of VOC as carbon) has been converted to mass emission rate(s) as the component VOC species. This then allows a direct comparison against the relevant EALs for each component VOC species.

For some emission points the mix of materials present varies throughout the process, and where this is the case the VOC composition data has been reviewed on an hour-to-hour basis to ensure that this variance has been accounted for.

The operational log provided by Agilent presented details of the percentage of each raw material fed into each process, and hence for the polymerisation processes, certain

[6] ECL Report Number P5595

materials e.g. monomers, will be consumed by the process, and hence are unlikely to be emitted in any significant quantities via the process vents.

The monitored Total VOC data for each vent, and the calculated Speciated VOC content of the emissions from each vent are presented in Appendix B. A summary of the VOC species which could potentially be present at each emission point are summarised in Table 11-2.

Table 11-2 Summary of VOC Species Which may Potentially be Present at Each Emission Point

Emission Point	Plant Area	Substances With the Potential to be Present at the Emission Point
A1	Unit 3 -Impingement Scrubber Exhaust	Acetone Methanol Tetrahydrofuran* Diethylbenzene Iso-Amyl Alcohol Total VOC
A2	Unit 3 - (Stack 1)	Acetone 60% Ethanol 40% Total VOC
A3	Unit 3 - (Stack 2)	Acetone 50% Methanol 50% Total VOC
A4	Unit 3 - (Stack 3)	Acetone 100% Total VOC
A5	Unit 3 - (Stack 4)	Process 1 Acetone 80% Methanol 19% Diethylbenzene trace Iso-amyl alcohol 1% Total VOC Process 2 Styrene* Vinylbenzene chloride Divinylbenzene Total VOC
A6	Unit 3 - (Stack 5)	Acetone 50% Methanol 45% Toluene <5% Tetrahydrofuran* - Trace Total VOC
A7	Unit 3 - Analytical Lab LEV	Acetone 50% Methanol 50% Total VOC

Emission Point	Plant Area	Substances With the Potential to be Present at the Emission Point
A8	Unit 2 - Old R&D Lab	Acetone Toluene Divinylbenzene Styrene Ethylene diamine – trace Total VOC
A9	Unit 2- New R&D Lab	Acetone Toluene** Divinylbenzene* Total VOC
A10	Unit 1- Lab Extract (LHS) Column Production Lab LEV	Acetone 50% Methanol 50% Total VOC
A11	Unit 1 – Lab Extract (RHS) Column Production Lab LEV	Acetone 25% Methanol 25% Heptane 25% Ethylbenzene 25% Total VOC
Table Notes * CMR 2 substance ** Named Substance with its own BAT-AEL		

11.1.2 Comparison Against BAT-AELs

The Environmental Permit will include a set of emission limits to be applied to the emission points to air on the Site. These emission limits are expected to be based upon the BAT Associated Emission Levels (BAT-AELs) as published in the Common Waste Gas Management and Treatment Systems in the Chemical Sector BREF and associated BAT Conclusions (WGC BREF) - January 2023.

The BAT-AELs that may be applied to emissions from the site are presented in Table 11-3. These are presented as daily averages, or the average over the monitoring period.

Agilent has completed a BAT options appraisal and technology selection (refer Appendix C) to address minor exceedances identified above the BAT AELs. Agilent intends to replace the current waste gas abatement system. An initial design basis statement and BAT assessment has been undertaken which has indicated that a water based wet scrubber system followed by a polishing stage using an activated carbon filter is currently proposed to enable compliance with applicable BAT AELs. Agilent intends that the upgraded waste gas abatement system should be operational by approximately Q3 2025 (based on a 42 week lead in time prior to installation). The site is committed to installing the BAT option to ensure compliance with the BAT-AELs. The abatement upgrades are expected to be implemented prior to determination of the EP by the EA.

Whilst the new waste gas abatement system is being commissioned and installed; Agilent proposes to hire a temporary scrubber to reduce concentrations of compounds in emissions to air. This will replace the current waste gas abatement system.

Table 11-3 EU BAT Associated Emission Levels

BAT-associated emission levels (BAT-AELs) for channelled emissions to air of organic compounds

Substance/Parameter	BAT-AEL (mg/Nm^3) (Daily average or average over the sampling period) [1]
Total volatile organic carbon (TVOC)	< 1-20 [2] [3] [4] [5]
Sum of VOCs classified as CMR 1A or 1B	< 1-5 [6]
Sum of VOCs classified as CMR 2	< 1-10 [7]
Benzene	< 0,5-1 [8]
1,3-Butadiene	< 0,5-1 [8]
Ethylene dichloride	< 0,5-1 [8]
Ethylene oxide	< 0,5-1 [8]
Propylene oxide	< 0,5-1 [8]
Formaldehyde	1-5 [8]
Chloromethane	< 0,5-1 [9] [10]
Dichloromethane	< 0,5-1 [9] [10]
Tetrachloromethane	< 0,5-1 [9] [10]
Toluene	< 0,5-1 [9] [11]
Trichloromethane	< 0,5-1 [9] [10]

(1) For activities listed under points 8 and 10, Part 1 of Annex VII of the IED, the BAT-AEL ranges apply to the extent that they lead to lower emission levels than the emission limit values in part 2 and 4 of Annex VII to the IED.
(2) TVOC is expressed in mg C/Nm^3.
(3) In the case of polymer production, the BAT-AEL may not apply to emissions from the finishing steps (e.g. extrusion, drying, blending) and from polymer storage.
(4) The BAT-AEL does not apply to minor emissions (i.e. when the TVOC mass flow is below e.g. 100 g C/h) if no CMR substances are identified as relevant in the waste gas stream based on the inventory given in BAT 2.
(5) The upper end of the BAT-AEL range may be higher and up to 30 mg C/Nm^3 when using techniques to recover materials (e.g. solvents, see BAT 9), if both of the following conditions are fulfilled:

— the presence of substances classified as CMR 1A/1B or CMR 2 is identified as not relevant (see BAT 2);
— the TVOC abatement efficiency of the waste gas treatment system is ≥ 95 %.

(6) The BAT-AEL does not apply to minor emissions (i.e. when the mass flow of the sum of the VOCs classified as CMR 1A or 1B is below e.g. 1 g/h).
(7) The BAT-AEL does not apply to minor emissions (i.e. when the mass flow of the sum of the VOCs classified as CMR 2 is below e.g. 50 g/h).
(8) The BAT-AEL does not apply to minor emissions (i.e. when the mass flow of the substance concerned is below e.g. 1 g/h).
(9) The BAT-AEL does not apply to minor emissions (i.e. when the mass flow of the substance concerned is below e.g. 50 g/h).
(10) The upper end of the BAT-AEL range may be higher and up to 15 mg/Nm^3 when using techniques to recover materials (e.g. solvents, see BAT 9), if the abatement efficiency of the waste gas treatment system is ≥ 95 %.
(11) The upper end of the BAT-AEL range may be higher and up to 20 mg/Nm^3 when using techniques to recover toluene (see BAT 9), if the abatement efficiency of the waste gas treatment system is ≥ 95 %.

The associated monitoring is given in BAT 8.

The BAT AELs applicable to the process are summarised in Table 11-4 below.

Table 11-4 BAT-AEL's Channelled Emissions to Air

Chemical Species	GHS Risk Phrases	TVOC	CMR 1A(1) or 1B (2)	CMR2 (3)	Named Substance	Applicable BAT AEL (6) (7) mg/Nm³
Total Volatile Organic Compound (TVOC)	-	Yes	No	No	No	1 - 20 (4) Applicable to Emission Points: A1, A2, A3, A4, A5, A6, A8, A9, A10 Please note that this BAT AEL does not apply to the following emission points due to maximum mass emission rates identified below 100 g/hr and no CMR substances being present - A7 and A11.
Acetone	H225 Flam Liq 2 H319 - Eye Irrit 2 H336 - STOT SE 3	Yes	No	No	No	As per TVOC
Methanol	H225 – flam Liq 2 H301 – Acute Tox 3 H311 – Acute Tox 3 H331 – Acute Tox 3 H370 – STOT SE 1	Yes	No	No	No	As per TVOC
Ethanol	H225 Flam Liq 2	Yes	No	No	No	As per TVOC
Diethylbenzene	H226 - Flam Liq 3 H304 - Asp Tox 1 H315 - Skin Irrit 2 H400 - Aquatic Acute 1 H410 - Aquatic Chronic 1	Yes	No	No	No	As per TVOC

Chemical Species	GHS Risk Phrases	TVOC	CMR 1A[(1)] or 1B [(2)]	CMR2 [(3)]	Named Substance	Applicable BAT AEL [(6)] [(7)] mg/Nm³
Isoamyl alcohol	H226 Flammable liquid and vapour H332 Harmful if inhaled H315 Causes skin irritation H318 Causes serious eye damage H335 May cause respiratory irritation.	Yes	No	No	No	As per TVOC
Tetrahydrofuran (THF)	H225 Highly flammable liquid and vapour H319 Causes serious eye irritation H335 May cause respiratory irritation H351 Suspected of causing cancer	Yes	No	Yes	No	CMR 2 substance with BAT-AEL of <1 - 10 [(5)] Applicable to Emission Point: A1 Please note that this BAT AEL does not apply to the following emission point due to maximum mass emission rates for THF identified below 50 g/hr: A6 THF is not present in other emission points
Styrene	H226 - Flam Liq 3 H315 - Skin Irrit 2 H319 - Eye Irrit 2 H332 - Acute Tox 4 H372 - STOT RE 1 H361d - Repr 2	Yes	No	Yes	No	CMR 2 substance with BAT-AEL of <1 - 10 [(5)] Please note that this BAT AEL does not apply to the following emission points due to maximum mass emission rates for styrene identified below 50 g/hr: A5, A8 Styrene is not present in other emission points
Toluene	H225 - Flam Liq 2 H315 - Skin Irrit 2 H304 - Asp Tox 1 H336 - STOT SE 3 H373 - STOT RE 2 H361d - Repr 2	Yes	No	Yes	Yes	Named substance with BAT AEL of <0.5 - 1 [(5)]. Please note that this BAT AEL does not apply to the following emission points due to maximum mass emission rates for toluene identified below 50 g/hr: A6, A8 and A9. Toluene is not present in other emission points

Chemical Species	GHS Risk Phrases	TVOC	CMR 1A[1] or 1B [2]	CMR2 [3]	Named Substance	Applicable BAT AEL [6] [7] mg/Nm^3
Divinylbenzene	H302 - Acute Tox 4 H315 - Skin Irrit 2 H319 - Eye Irrit 2 H335 - STOT SE 3 H411 - Aquatic chronic 2 H361d - Repr 2 - (this classification was notified in approximately 20% of C&L notifications submitted to ECHA)	Yes	No		No	CMR 2 substance with BAT-AEL of <1 - 10 [5] Please note that this BAT AEL does not apply to the following emission points due to maximum mass emission rates for divinylbenzene identified below 50 g/hr: A5, A8, A9 Divinylbenzene is not present in other emission points
Vinylbenzene chloride (chloromethyl) vinylbenzene (chloromethyl) styrene	H302 - Acute Tox 4 H311 – Acute Tox 3 H315 – Skin Irrit. 2 H317 - Skin Sens. 1 H319 - Eye Irrit 2 H331 – Acute Tox 3 H400 – Aquatic Acute 1 H410 – Aquatic Chronic 1	Yes	No	No	No	As per TVOC
Ethylene diamine	H226 - Flam Liq 3 H302 - Acute Tox. 4 H312 - Acute Tox. 4 H314 - Skin Corr. 1B H317 - Skin Sens. 1 H334 - Resp. Sens. 1	Yes	No	No	No	As per TVOC
Heptane	H225 - Flam. Liq. 2 H315 - Skin Irrit. 2 H304 - Asp. Tox. 1 H336 - STOT SE 3 H400 - Aquatic Acute 1 H410 - Aquatic Chronic 1	Yes	No	No	No	As per TVOC

Chemical Species	GHS Risk Phrases	TVOC	CMR 1A[1] or 1B [2]	CMR2 [3]	Named Substance	Applicable BAT AEL [6] [7] mg/Nm³
Ethylbenzene	H225 - Flam. Liq. 2 H332 - Acute Tox. 4 H304 - Asp. Tox. 1 H373 - STOT RE 2	Yes	No	No	No	As per TVOC

Table Notes

1) CMR Category 1A: Known human carcinogen (H340), mutagen (H350) or reproductive toxicant (H360) based on human evidence ;

2) CMR Category 1B: Presumed human carcinogen (H340), mutagen (H350) or reproductive toxicant (H360) based on animal studies;

3) CMR Category 2: Suspected carcinogen (H341), mutagen (H351) or reproductive toxicant (H361) based on limited evidence from animal studies or/and human.

(4) The BAT-AEL does not apply to minor emissions (i.e. when the TVOC mass flow is below e.g. 100 g C/h) if no CMR substances are identified as relevant in the waste gas stream.

(5) The BAT-AEL does not apply to minor emissions (i.e. when the mass flow of the substance concerned is below e.g. 50 g/h).

(6) The BAT-AEL's are the anticipated emission limit which will be applied at the emission point to atmosphere by the Environmental Permit. The statistical basis of these limits are as Daily Averages, or the average over the monitoring period.

(7) Maximum mass emission rates are provided in the 'Interpretation of Monitored Emissions Data and Comparison Against Anticipated Emission Limits / BAT-AEL's in Appendix B.

A comparison of the emissions monitoring data with the BAT AELs is provided in *'Interpretation of Monitored Emissions Data and Comparison Against Anticipated Emission Limits / BAT-AELs'* presented in Appendix B. This review identified that the following emission sources are not currently compliant with the relevant BAT-AELs:

- A1. Unit 3 -Impingement Scrubber Exhaust -Total VOC and CMR2 Limit for Tetrahydrofuran;
- A3. Unit 3 - (Stack 2) – Total VOC; and
- A4. Unit 3 - (Stack 3) – Total VOC (although this is a very slight exceedance).

11.2 Air Emissions Risk Assessment

The air emissions risk assessment (AERA) is provided in Section 5 of this application (410.064951.00001_AERA).

The AERA quantified and assessed the potential air quality impacts associated with potential emissions from the process operations at the Agilent's organic polymer manufacturing site. The AERA concluded that the emissions process contribution can be considered 'insignificant' against relevant long-term and short-term standards for the protection of human health.

11.3 Global Warming Potential Assessment

The Global Warming Potential is summarised in Table 11-5.

Direct Emissions

Closed loop refrigeration systems utilised onsite have recently been upgraded to contain refrigerant gases R410, R404A and R407C. These gases have a lower global warming potential than gases used previously. Refrigeration systems onsite are checked and serviced periodically by a registered contractor. As such, the refrigerant gases are expected to be enclosed within the refrigerant systems and not released to air, this has not been considered further.

Onsite boilers and the emergency generator will emit carbon dioxide from the combustion of gas.

Indirect Emissions

The process generates indirect emissions from the use of gas electricity to heat and power the site.

Table 11-5 Global Warming Potential

Source	Annual Energy Consumption (FY2023)	Conversion Factor[1]	CO_2 Tonnes	CO_2 kg
Electricity	1045.915 MWh	0.166 MWh	173.621 tonnes	173,621 kg
Gas	1192.886 MWh	0.19 MWh	226.64 tonnes	226,648.34 kg
Total				400,269.34 kg
Values obtained from Assess the impact of air emissions on global warming - GOV.UK (www.gov.uk) accessed on 05 January 2024.				

The process includes multiple measures to manage energy efficiency and hence reduce the impact on global warming potential, a summary of which is set out in Section 7.0 above.

11.4 Photochemical Ozone Creation Potential (POCP)

An assessment of the annual VOC emissions for the site for photochemical ozone creation potential (POCP) has been undertaken. This is summarised in Table 11-6.

Table 11-6 Photochemical Ozone Creation Potential (POCP) Assessment

Substance	Annual Mass (Tonnes)	POCP for Chemical	Annual POCP - Site
Acetone	7.44	9.4	69.94
Methanol	5.14	14	71.96
Styrene	0.13	14.2	1.85
Tetrahydrofuran	0.4	Not listed as POCP	-
Toluene	0.18	63.7	11.47
Ethanol	1.24	39.9	49.48
Diethylbenzene	0.01	Not listed as POCP	-
Ethylene diamine	0.0002	Not listed as POCP	-
Heptane	0.03	49.4	1.48
Iso-Amyl Alcohol	0.02	Not listed as POCP	-
Vinylbenzene chloride	0.02	Not listed as POCP	-
Divinylbenzene	0.14	Not listed as POCP	-
TOTAL POCP			206.17
Annual Mass (tonnes) calculated by converting average emissions rate (g/s) used for the long term (annual average) calculation in the AERA (410.064951.00001_AERA). This value has been converted to tonnes and then to per year. POCP values presented within: Horizontal Guidance Note Environmental Assessment and Appraisal of BAT - H1 Annex F – Air Emissions: Appendix A - Photochemical Ozone Creation Potential dated July 2023.			

The annual mass of emissions from the process that contribute to photochemical ozone creation potential are relatively small and are therefore not considered significant. The overall POCP for the process is 206.17 per year.

11.5 Fugitive Emissions to Air

The potential for fugitive emissions to be generated is low. No significant fugitive VOC emission sources are anticipated as:

- The amount of raw materials inputted into the process is low at 185.09 tonnes per year;
- Pipework is located indoors and is minimal. Pipework is visually inspected on a regular basis;
- Controls are in place where chemicals are transferred;
- Tetrahydrofuran, acetone and methanol are all transferred to process via a Diaphragm pump from an enclosed transfer unit. These chemicals are delivered in sealed drums, transferred via sealed indoor pipework into a sealed process that vents to a channelled emission point to air;

- Smaller volumes of chemicals (25 litre) are transferred into smaller containers within the drum store utilising pumps;
- The proposed process will operate under a preventative maintenance programme to manage equipment that could potentially result in diffuse emissions to air;
- The processes use high integrity equipment; and
- The process is sealed with the exception of the vent system which directs VOCs to channelled emission points.

12.0 Control of Emissions to Groundwater, Sewer & Surface Water

Wastewater generated at the site comprises process cooling and equipment wash water (laboratory waste water[7], cooling water, compressor condensate, ion exchange[8], sieving of polymer particles[9] and emptying of laboratory tanks[10]) and chlorinated and unchlorinated solvent waste (containing water) from process vessels. The current low temperature hot water systems (LTHW) do not generate blowdown.

Process cooling and equipment wash water is discharged to sewer under a series of four trade effluent discharge consents with Severn Trent. The waste chlorinated and unchlorinated solvent (containing water) is collected twice a week by a waste contractor and reused as cement kiln fuel.

12.1 Point Source to Groundwater

Uncontaminated rainwater from the southern car park and roof of Unit 1 flows into a soakaway within the car park at location W1 shown in Drawing 002. Chemicals are not stored, handled, offloaded or processed in this area.

Environmental awareness training at the site also informs employees of the potential risk posed by the presence of the soakaway.

12.2 Point Source Emissions to Surface Water

There are no direct releases to surface water.

12.3 Point Source Emissions to Sewer

Uncontaminated rainwater is collected from the roofs of Unit 3, the drums store and hard standing in the northern portion of site and drains into a 10,000-litre underground attenuation tank which is then pumped to discharge point W2 (shown on Drawing 002) for release into the local storm water drainage system.

Uncontaminated rainwater from the roof of Unit 2, Unit 4 and the central carpark flows directly to discharge point W2.

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[7] Laboratory waste water containing small volumes of detergents, residual acetone, polymeric solids and de-ionised water from glassware washing.

[8] Ion exchange from the reverse osmosis process.

[9] Sieving of polymer particles containing predominantly mains water, with a small amount of inert polymeric solids. Sieves and filters are used to removed particulates for discharges to sewer.

[10] Emptying of laboratory tanks comprises reserve osmosis water, deionised water and mains water. This does not contain any R&D chemicals.

Process cooling and equipment wash water discharges to S1 adjacent to Essex Road. This effluent is discharged to sewer under four separate discharge consents (refer Appendix D) with Severn Trent as summarised in Table 12-1 below.

Table 12-1 Discharge Consents

Effluent Stream	Discharge Consent Reference	Dated	Sewerage Undertaker
Cooling and reverse osmosis water	008362V	09 July 2014	Severn Trent
Trade effluent supplied in respect to the premises and laboratory water	008363V	09 July 2014	Severn Trent
Compressor condensate, boiler blowdown**, ion exchange, sieving of polymer particles	02412-SVL*	18 August 2014	Severn Trent
Laboratory waste water	02412-SVL*	18 August 2014	Severn Trent
**Same discharge reference provided for the two discharge consents.* ***Boiler blowdown was previously generated onsite. However, the current low temperature hot water systems (LTHW) do not generate blowdown.*			

Agilent has reviewed the raw materials list against the list of hazardous chemicals presented by the EA's Surface Water Pollution Risk Assessment for your Environmental Permit Guidance[11].

Agilent can confirm that the only 'hazardous chemicals' that are utilised onsite are styrene, toluene and dichloromethane (refer 410.065951.00001_SCR for the hazardous chemicals assessment). Agilent does not release these chemicals to sewer. Any effluent containing these chemicals is collected and transferred offsite by a suitably licenced contractor.

Agilent has also confirmed that the following chemicals are not discharged to sewer:

- Inorganic nitrogen.
- Phosphorus.
- Organically bound halogens.
- Metals (chromium, copper, nickel, lead, zinc)

Severn Trent currently undertakes periodic monitoring of chemical oxygen demand, total dissolved solids and pH and have not raised any concerns with Agilent over the concentrations recorded.

Agilent is currently reviewing the sampling protocol for discharge to sewer for total organic carbon, chemical oxygen demand, total dissolved solids, biological oxygen demand, flow, pH and temperature in line with BAT requirements.

[11] Environment Agency. Surface Water Pollution Risk Assessment for Your Environmental Permit dated 25 February 2022. Surface water pollution risk assessment for your environmental permit - GOV.UK (www.gov.uk)

12.4 Fugitive Emissions to Surface Water, Sewer & Groundwater

There will be no fugitive emissions to surface water, sewer and groundwater under normal operating conditions. To avoid fugitive emissions to surface water, sewer and/or groundwater, all floors internally and externally associated with the plant are constructed from impermeable materials. Planned preventative maintenance will ensure regular observational checks of all surfacing.

Spill kits will be provided at strategic locations as required. The used spill-kits will be disposed of in leak-proof containers before final disposal offsite. Containment measures in place at the site are described in Section 5.4.3 of this document. These are designed to contain accidental spillages. Chlorinated and unchlorinated waste solvent (containing water) is pumped into containers and stored in a bunded area pending transfer off site for treatment. Secondary containment bunds and sumps are inspected by the site services engineer on a 6-monthly basis in line with bund specifications and CIRIA C736 guidance.

13.0 Control of Litter, Mud and Pests

The nature of the activities taking place means that the risk of litter, mud or pests arising at the site is very low. Nonetheless, the following general measures will be taken to ensure that these risks are controlled:

- The facilities team inspect the site and surrounding area on a regular basis to collect any litter and return it to the main storage areas;
- Regular visual inspections of the site surfacing and access road are carried out. If there is evidence of mud or other debris carried onto or off-site by delivery vehicles measures will be taken to clean the vehicles and road surface;
- Waste accumulation within production areas is controlled and limited with external waste collection containers;
- Waste streams are clearly labelled and segregated;
- No biodegradable or putrescible waste is generated from the process;
- Waste is removed from site regularly by licensed and approved contractors;
- Incoming raw material is transported in enclosed vehicles (curtain sided trucks) to ensure no escape of materials (e.g., packaging) during transit. The material is stored within the covered drum store prior use within indoor production areas;
- Finished products are despatched from the site in enclosed vehicles; and
- The site management team is responsible for implementing risk management measures in accordance with operational and management procedures.

14.0 Monitoring

The site will be subject to a comprehensive programme of monitoring to ensure it operates to the specified design standards and does not give rise to unacceptable environmental impact.

Monitoring comprises the following:

- General observations;
- Monitoring of infrastructure and equipment;
- Monitoring of process variables; and
- Emissions monitoring.

14.1 General Observations

Routine observations and monitoring will be undertaken by site personnel to ensure that the site operates correctly and without giving rise to unacceptable levels of emissions.

Where a non-compliance is detected; this will be managed through the non compliance procedure. Investigations and any subsequent mitigation measures will be recorded electronically.

14.2 Monitoring of Infrastructure and Equipment

Infrastructure and equipment will be subject to regular visual inspection. In the event of deterioration or damage, appropriate remedial action will be taken to restore the infrastructure and equipment to a satisfactory condition.

14.3 Monitoring of Process Variables

Monitoring of process conditions and variables is described in Section 8.2.

14.4 Emissions Monitoring

14.4.1 Proposed Emissions Monitoring – Air

The proposed monitoring of emissions from the emission points be undertaken in compliance with the requirements of:

- EU BAT Reference Document – Monitoring of Emissions to Air and Water from Industrial Emissions Directive Installations (ROM)- July 2008; and
- The issued EP.

Monitoring will also comply with the requirements of the following EA guidance where appropriate.

- Environment Agency Monitoring Stack Emissions: Environmental Permits (19 December 2019) (the formerly the EA's M1 and M5 guidance notes).

Prior to undertaking stack emissions monitoring a Site-Specific Protocol (SSP) will be prepared to ensure the monitoring is carried out in accordance with the EA guidance, referenced above, to ensure that representative samples are taken. Specifically, the SSP will consider the following aspects:

- Selection of the sampling position, sampling plan and sampling points;
- Access, facilities and services required; and
- Safety considerations.

The sampling approach, technique, method and equipment that are chosen will ensure:

- A safe means of access to the sampling position;
- A means of entry for sampling equipment into the stack;
- Adequate space for the equipment and personnel; and
- Provision of essential services such as electricity.

Monitoring will be in compliance with MCERTS as a minimum standard. Monitoring equipment will be calibrated, serviced and maintained in line with manufacturer recommendations.

Table 14-1 outlines the monitoring proposed for the emission points.

Table 14-1 Proposed Emissions Monitoring

Substance	Monitoring Required (1)	Monitoring Test Method (Periodic Monitoring)	Data to be Reported
Total Volatile Organic Compounds (TVOC) Includes – acetone, ethanol, methanol, diethylbenzene, iso amyl alcohol, vinylbenzene chloride, ethylene diamine, heptane, ethylbenzene	If the final emission point emits more than an average of 2 kg/h of total organic carbon (as carbon), then continuous monitoring is required. The predicted mass emissions of TVOC will be <2kg/h per emission point (refer Table B-3 of 410.064951.00001_AERA). It is proposed that periodic monitoring will be undertaken at least once every 6 months for the first year of operation to confirm the emission levels. The minimum monitoring frequency may then be reduced to once every year or once every 3 years if the emission levels are proven to be sufficiently stable. Applicable to Emission Points: A1, A2, A3, A4, A5, A6, A8, A9, A10	EN 12619 extractive sampling and FID analyser. or EN ISO 13199. extractive sampling and a NDIR analyser equipped with a catalytic converter for the oxidation of VOCs to carbon dioxide.	Daily Average / Average over the monitoring period.
Speciated Volatile Organic Compounds (SVOC) Including: CMR2 substances (tetrahydrofuran, divinylbenzene, styrene); and Named substance (toluene)	It is proposed that periodic monitoring will be undertaken at least once every 6 months. Applicable to Emission Point: A1 Note that although the substances named are released from other emission points, these are minor emissions and the BAT-AEL's do not apply to minor emissions (i.e. when the mass flow of the substance concerned is below e.g. 50 g/h). Hence no SVOC monitoring of these other emission points is proposed.	CEN TS 13649. extractive sampling onto sorbent tubes, followed by solvent extraction and analysis. Or US EPA method 18. extractive sampling and a portable gas chromatograph with an appropriate detector. Or CEN TS 17337 extractive sampling and a portable FTIR analyser.	Daily Average / Average over the monitoring period.
(1) Test method to be agreed in writing with the Environment Agency			

14.4.2 Monitoring Emissions to Surface Water

Emissions to surface water from uncontaminated run-off will not be routinely monitored. The effluent removed off-site for treatment at an appropriately permitted facility will be monitored, including sampling and testing, in accordance with the requirements of the receiving facility, however it is not proposed that such data be reported to the Environment Agency under the EP.

Effluent released to sewer will be monitored as set out in Table 14-2 for applicable determinands aligned with the nature of the process cooling and equipment wash water (expected to include: total organic carbon, chemical oxygen demand, total suspended solids and VOCs). VOCs will not be intentionally discharged to sewer.

Effluent released to sewer will be intermittent. As such continuous monitoring is not considered to be appropriate. Effluent will be sampled at discharge point S1.

Table 14-2 Monitoring of Releases to Sewer

Substance / Parameter	Standard(s)	Minimum Monitoring Frequency
Total Organic Carbon (TOC) (3)	EN 1484	Weekly composite
Chemical Oxygen Demand (COD) (3)	BS 6068-2.34 (same as ISO 6060). Or BS ISO 15705	
Total Suspended Solids (TSS)	EN 872	
Volatile organic carbons (VOCs)	BS EN ISO 10301. Or BS EN ISO 15680. Or BS EN ISO 20595.	Monthly
Flow	EA Guidance[12] BS ISO 17025	Weekly
pH		
Temperature		

14.5 Monitoring Action Plan

In the event that the monitoring programme identifies a potentially significant release the following actions will be undertaken:

- The facilities manager will be informed immediately;
- Actions to isolate and contain the source of release will be undertaken; and
- The causes of the release will be evaluated, and where possible, procedures put in place to prevent a re-occurrence.

[12] EA Monitoring discharges to water: guidance on selecting a monitoring approach. Monitoring discharges to water: guidance on selecting a monitoring approach - GOV.UK (www.gov.uk)

In the event that abnormal monitoring results are identified, site personnel will inform the site management team and appropriate action will be taken to return the process to normal operating conditions. An inspection of the facility will be undertaken to identify the cause and necessary remedial action will be taken.

14.6 Management, Reporting and Training

All monitoring results will be recorded and stored electronically. The EHS team or their nominated deputy will inspect the monitoring records at a suitable frequency to ensure monitoring is being undertaken in accordance with procedures. Results will be examined annually as part of the site's management review.

Staff involved in sampling and monitoring will be trained sufficiently to carry out the set procedures and will be trained in the reporting requirements of the EP.

15.0 Assessment of Best Available Techniques

An assessment of the pollution prevention and control techniques proposed for the facility against the Best Available Techniques relevant to the activities carried out at the site has been carried out. This includes the following:

- Environment Agency. How to comply with your environmental permit Additional guidance for: Speciality Organic Chemicals Sector (EPR 4.02) dated February 2009.

  The requirements of the reference document on Best Available Techniques for Manufacturing Organic Fine Chemicals dated August 2006 have been incorporated into the EA's Guidance How to comply with your environmental permit (EPR 4.02) dated February 2009. Accordingly, a summary of how the site complies with EPR 4.02 is provided in Appendix E.
- European Commission. Reference Document on Best Available Techniques for Production of Polymers dated August 2007 (Polymers BREF). A summary of how the site complies with this BRef is provided in Appendix F.
- European Commission. Reference Document on Best Available Techniques for Common Wastewater and Waste Gas Treatment / Management Systems in the Chemicals Sector dated June 2016 (CWW BREF). A summary of how the site complies with this BRef is provided in Appendix G.
- European Commission. Reference Document on Best Available Techniques for Common Waste Gas Management and Treatment Systems in the Chemical Sector dated January 2023 (WGC BREF). A summary of how the site complies with this BRef is provided in Appendix H.

16.0 Closure

16.1 Operations During the Lifetime of the Environmental Permit

The chemical manufacturing activities at the site should not lead to a deterioration of the land by the introduction of any polluting substances due to the containment and control measures that will be implemented to ensure the processes are contained within the appropriate structure / containers.

In the unlikely event of a potentially polluting incident which impacts the site, the site management team will record the details of the incident together with any further investigation or remediation work carried out. This will ensure that there is a continuous record of the state of the site throughout the period of the permit.

The site will implement a site protection and monitoring plan (SPMP). This will focus on planned monitoring and maintenance of containment and pollution prevention systems at the site. This will ensure that the condition and integrity of these systems remains fit for purpose.

Monitoring and maintenance records will be kept during the lifetime of the EP.

Records will be maintained of the location of facilities, services, and sub-surface structures. During any modifications or alterations on the site, care will be taken to update these records to ensure closure of the site. The design of any modifications will ensure that:

- There is provision for the draining and clean out of vessels and pipe work prior to dismantling.
- Materials used are recyclable, if practicable (having regard for operational and other environmental protection objectives).

16.2 Site Closure Plan

Once the site is planned for closure, a site closure / decommissioning plan will be put into place to ensure that the closure process is correctly managed to remove pollution risk from the site, avoid pollution risk during decommissioning and return the site to a satisfactory condition.

The facility's site closure / decommissioning plan will be prepared in accordance with appropriate guidance in place at the time and with due consideration of the specific environmental risks associated with the decommissioning and closure of the site.

The sections below present an overview of key components expected to be included in the plan.

16.2.1 Communication

Agilent will inform the EA in writing in advance of the planned date of cessation of operation. This will allow Agilent to liaise with the EA throughout the closure process and to ensure that the activities undertaken as part of the closure / decommissioning are acceptable to the EA.

16.2.2 Access & Security

Security provision will be audited to ensure that the site is in a secure condition and that unauthorised access is avoided. Site security will be maintained through building security measures including access controlled lockable entrances, local perimeter fencing and lockable gates. Regular inspections of the fencing and gates will be carried out, and damage will be repaired as soon as practicable. If necessary temporary repairs will be implemented until permanent repairs can be carried out.

16.2.3 Decommissioning

Substances will be removed in such a way as to protect land and groundwater from potentially harmful contents.

Containers and other structures will be dismantled in such a way as to prevent pollution risk to the surrounding environment.

Storage and treatment vessels and drainage systems will be drained and cleaned prior to dismantling, with all effluent and solid residues being contained and taken to an appropriate treatment or disposal facility.

The decommissioning process will be managed appropriately, and detailed records of all decommissioning activities and cleaning / decontamination undertaken will be retained.

16.2.4 Permit Surrender

An application to surrender the EP will be submitted to the EA as and when the decommissioning process has progressed sufficiently for any residual risk of pollution to soil or groundwater linked to the EP permitted activities to have been removed from site and when sufficient data on the site condition has been collated to demonstrate that the site is in a suitable condition for Surrender.

Appendix A Drainage Plan

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Best Available Techniques & Operating Techniques

Agilent Technologies LDA UK Limited

SLR Project No.: 410.064951.00001

4 July 2025

Appendix B Interpretation of Monitored Emissions Data

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Best Available Techniques & Operating Techniques

Agilent Technologies LDA UK Limited

SLR Project No.: 410.064951.00001

4 July 2025

Interpretation of Monitored Emissions Data and Comparison Against Anticipated Emission Limits / BAT-AEL'sPlant Area	Chemicals Used in the Process and % Used in the Process	Average Emission Concentration (over the sampling period) (1) mgC/Nm³ as carbon	Maximum Hourly Average Emission Concentration (during the sampling period) (1) mgC/Nm³ as carbon	Average Mass Emission Rate g/h as carbon	Maximum Mass Emission Rate g/h as carbon	Average Mass Emission Rate g/h as VOC Species	Maximum Mass Emission Rate g/h as VOC Species	TVOC >2kg/hour?	TVOC <100g/h No CMR / Named Substance Present	CMR2 / Named Substance <50g/h	Expected BAT-AEL to be Applied (2) mg/Nm³	BAT-AEL Compliant?
A1	Acetone	13.70	331.24	24.75	597.72	39.85	963.44					
Unit 3 -Impingement Scrubber Exhaust	Methanol	12.14	250.61	21.91	452.23	58.44	1,206.35					
	Tetrahydrofuran*	16.46	317.61	29.71	573.13	44.59	860.22			No	1 – 10	No
	Diethylbenzene	0.32	0.90	0.58	1.63	0.64	1.82					
	Iso-Amyl Alcohol	0.32	0.90	0.64	1.81	0.94	2.65					
	Total VOC	35.99 over 2 runs Or highest of 2 runs 41.89	331.24	64.94	597.72			No	No		1 – 20	No
A2	Acetone 60%	8.60	16.96	110.53	217.91	178.16	351.25					
Unit 3 - (Stack 1)	Ethanol 40%	5.73	11.30	73.69	145.28	141.31	278.60			No CMR		
	Total VOC	14.33	28.26	184.22	363.19			No	No		1 – 20	Yes
A3	Acetone 50%	13.74	26.92	115.97	227.13	186.92	366.09					
Unit 3 - (Stack 2)	Methanol 50%	13.74	29.92	115.97	227.13	309.34	605.87			No CMR		
	Total VOC	27.49	53.84	231.93	454.25			No	No		1 - 20	No
A4	Acetone 100%	20.75	51.55	126.61	314.55	204.08	507.01					
Unit 3 - (Stack 3)	Total VOC	20.75	51.55	126.61	314.55			No	No	No CMR	1 - 20	No
A5	Process 1											
Unit 3 - (Stack 4)	Acetone 80%	10.62	14.66	65.45	90.34	105.49	145.62					
	Methanol 19%	2.52	3.48	15.54	21.46	41.46	57.24					
Note 2 sets of monitoring data for Process 1 and 2 respectively – emissions cannot be concurrent.	Diethylbenzene trace	0.01	0.02	0.08	0.11	0.09	0.13					
	Iso-amyl alcohol 1%	0.13	0.18	0.82	1.13	1.20	1.66					
	Total VOC	13.28	18.33	81.81	112.93			No	No		1 - 20	Yes
	Process 2											
	Styrene*											
	Vinylbenzene chloride	2.13	2.13	13.11	13.11	14.21	14.21			Yes	No Limit	
	Divinylbenzene*	0.25	0.25	1.54	1.54	2.18	2.18					
		0.13	0.13	0.77	0.77	0.84	0.84	No	No	Yes	No Limit	
	Total VOC	2.5	2.5	15.42	15.42						1 - 20	Yes

Interpretation of Monitored Emissions Data and Comparison Against Anticipated Emission Limits / BAT-AEL'sPlant Area	Chemicals Used in the Process and % Used in the Process	Average Emission Concentration (over the sampling period) (1) mgC/Nm³ as carbon	Maximum Hourly Average Emission Concentration (during the sampling period) (1) mgC/Nm³ as carbon	Average Mass Emission Rate g/h as carbon	Maximum Mass Emission Rate g/h as carbon	Average Mass Emission Rate g/h as VOC Species	Maximum Mass Emission Rate g/h as VOC Species	TVOC >2kg/hour?	TVOC <100g/h No CMR / Named Substance Present	CMR2 / Named Substance <50g/h	Expected BAT-AEL to be Applied (2) mg/Nm³	BAT-AEL Compliant?
A6	Acetone 50%	5.77	6.43	34.81	38.82	56.12	62.56					
Unit 3 - (Stack 5)	Methanol 45%	5.19	5.79	31.33	34.93	83.58	93.19					
	Toluene** <5%	0.58	0.64	3.48	3.88	3.82	4.25		Named	Yes	No Limit	
	THF* – Trace	0.01	0.01	0.07	0.08	0.10	0.12		CMR	Yes	No Limit	
	Total VOC	11.53	12.86	69.63	77.63			No	No		1 - 20	Yes
A7	Acetone 50%	1.20	1.38	1.61	1.85	2.59	2.98					
Unit 3 - Analytical Lab LEV	Methanol 50%	1.20	1.38	1.61	1.85	4.29	4.93					
	Total VOC	2.40	2.76	3.21	3.70			No	Yes	No CMR	No Limit	Yes
A8	Acetone	1.66	3.70	8.33	18.6	13.43	29.98					
Unit 2 - Old R&D Lab	Toluene**	0.41	0.92	2.08	4.65	2.28	5.10		Named	Yes	No Limit	
	Divinylbenzene*	0.10	0.23	0.52	1.16	0.56	1.26		CMR	Yes	No Limit	
	Styrene*	0.10	0.23	0.52	1.16	0.56	1.26		CMR	Yes	No Limit	
	Ethylene diamine – trace	0.002	0.005	0.01	0.02	0.03	0.06					
	Total VOC	2.07	4.62	10.41	23.25			No	Yes		1 - 20	Yes
A9	Acetone	1.16	1.85	13.60	21.68	21.93	34.94					
Unit 2- New R&D Lab	Toluene	1.16	1.85	13.60	21.68	14.91	23.75					
	Divinylbenzene*	1.16	1.85	13.60	21.68	14.74	23.49		CMR	Yes	No Limit	
	Total VOC	2.32	3.69	27.21	43.35			No	Yes		1 - 20	Yes
A10	Acetone 50%	4.48	8.47	32.59	61.62	52.53	99.31					
Unit 1- Lab Extract (LHS) Column Production Lab LEV	Methanol 50%	4.48	8.47	32.59	61.62	86.94	164.36					
	Total VOC	8.96	16.93	65.18	123.23			No	No	No CMR	1 - 20	Yes
A11	Acetone 25%	0.61	0.84	3.34	4.59	5.38	7.40					
Unit 1 – Lab Extract (RHS)	Methanol 25%	0.61	0.84	3.34	4.59	8.90	12.24					
	Heptane 25%	0.61	0.84	3.34	4.59	3.98	5.47					
	Ethylbenzene 25%	0.61	0.84	3.34	4.59	3.73	5.13					
	Total VOC	2.44	3.36	13.345	18.36			No	Yes	No CMR	No Limit	Yes

Table Notes

(1) – Note that emissions data for speciated VOC materials has been calculated from the Total VOC concentration monitored, multiplied by the estimated proportion of each VOC material used in the process.

(2) – Note that the BAT-AEL for Total VOC is reported in mg of total VOC as carbon per Nm³. The BAT-AEL's for all individual VOC species are reported as mg of the VOC species per Nm³.

Data from ECL Monitoring Survey dated 27 October 2023 reference P5595 R001

* CMR 2 substance.

** Named Substance with its own BAT-AEL.

Appendix C ERG BAT Assessment & Design Basis

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Best Available Techniques & Operating Techniques

Agilent Technologies LDA UK Limited

SLR Project No.: 410.064951.00001

4 July 2025

Appendix D Discharge Consents

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Agilent Technologies LDA UK Limited

SLR Project No.: 410.064951.00001

4 July 2025

Appendix E Organic Fine Chemicals BATc / Production of Speciality Organic Chemicals Sector (EPR 4.02) BAT Assessment

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Best Available Techniques & Operating Techniques

Agilent Technologies LDA UK Limited

SLR Project No.: 410.064951.00001

4 July 2025

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Appendix F Production of Polymers BAT Assessment

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Best Available Techniques & Operating Techniques

Agilent Technologies LDA UK Limited

SLR Project No.: 410.064951.00001

4 July 2025

SLR

Appendix G Common Wastewater and Waste Gas Treatment/Management Systems in the Chemical Sector BAT Assessment

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Best Available Techniques & Operating Techniques

Agilent Technologies LDA UK Limited

SLR Project No.: 410.064951.00001

4 July 2025

Appendix H Common Waste Gas Management and Treatment Systems in the Chemical Sector BAT Assessment

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Agilent Technologies LDA UK Limited

SLR Project No.: 410.064951.00001

4 July 2025

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