PART (B) PERMIT APPLICATION REPORT

Part(b)/ARK/001/JC

Last Updated: 30/06/2016

1. Site Location

The installation is located at Stallingborough, near Immingham Docks, approximately 3km north of the A180 road, with Grimsby approximately 6km south-east of the site along the A180 - see the site location map in *Figure 1* in the figures section. The site is approximately 34 hectares and lies adjacent to the River Humber. Site surrounds are industrial and predominantly chemical industry, with the nearest residential development located at Immingham approximately 2km west of the site.

The installation boundary is also shown in *figure 1*.

The installation comprises the following areas:

- Intermediates (Polyester resin) tank farms;
- Styrene Storage tank ($30m^3$)
- Intermediate / Raw Material Drum and IBC storage areas;
- Waste storage area;
- Tanker parking area
- Dry Goods Warehouse;
- Steam Boiler (100kW)
- Engineering Building/workshops
- Amenity block (mess room and changing facilities);
- Administrative building;
- Polynt Composites Ltd Offices (Laboratory & Offices)
- Car park.
- A non-built area, occupied by an open land, outside the current boundary enclosure.
- Biological Effluent Treatment Plant (BETP) NOT CURRENTLY IN USE

The site layout plan is shown in *figure 2*, in the figures section.

2. Site History

Originally established as a joint partnership venture between Laporte Industries and Synres of Holland, the first resins were produced at the Arkema Coatings Resins Ltd site in 1967. In 1970 the Arkema factory was acquired by Coates Brothers who developed the site and produced resin here until 1990 when it was acquired by Cray Valley as part of Total Oils Resin Division.

The site was a multi-product resin plant with a manufacturing capacity of 45,000 tonnes per annum producing alkyd, gelkyds, unithane, industrial resins and unsaturated polyesters and gelcoat resins. Due to the storage and handling of TDI, the site was registered as a lower tier COMAH site.

In July 2011, Arkema Purchased the Coatings part of the business in July 2011, with the Structural business remaining with TOTAL under the name CCP Composites Ltd, however the Stallingborough site continues to manufacture structural resins for CCP Composites using a tolling and business agreement.

Arkema Coatings Resins Ltd comprised three main production units, an administrative block, an engineering workshop, a dry goods warehouse and various tank farms for raw material and finished product storage.

In addition, located within the site are the offices and research & development labs of CCP Composites who lease the building from Arkema.

Arkema employed 87 full time employees and operates a four - shift, seven days a week manufacturing operation, working 12 hours in the Reactor and Polyester Mixing Building. The Gelcoat department operates on a five day, two shift system. There are a further 22 people employed by CCP Composites.

2.1 Post July 2014

Arkema ceased coatings resin production on the Stallingborough site on the 9th July 2014, this resulted in the closure, decommissioning and demolition of the reactor building and all associated storage tanks, buildings etc.

The Gel Coal and PMB processes are continuing, with supply to Polynt Composites UK Ltd (formerly CCP Composites) on the same site under and operational agreement, expected to be ongoing for the next five years. Arkema are effectively providing manpower and buildings/equipment to produce CCP's structural resins.

There are now no Arkema HR, Sales or Logistics departments on site.

The site no longer uses TDI, hence is no longer a COMAH site, and has since surrendered its COMAH licence. Only low risk cold mixing processes remain on site.

As a result of the closure, the company had undergone a series of redundancies and have resulted in the workforce reducing from 85 to 25.

Note: CCP Composites were acquired by Polynt in December 2014, and became **Polynt Composites UK Ltd.**

2.2 EPR Permit History

The initial IPPC application was made in March 2006, with an Application Site Report (ASR) prepared and submitted with URS Corporation Ltd.

Status Log of the permit		
Detail	Date	Comments
Application VP3438LV	Duly made 06/04/06	
Additional Information Received	Requested 14/07/06	Response received 24/07/06
Additional Information Received	Requested 24/07/06	Response received 29/08/06
Additional Information Received	Requested 09/08/06	Response received 29/08/06
Permit determined VP3438LV	29/11/06	
Application EPR/PP3135FV/T001 (full transfer of permit)	Duly made 12/05/2011	
Transfer determined EPR/PP3135FV	09/06/2011	
Agency variation determined EPR/PP3135FV/V002	30/05/2013	Agency variation to implement changes introduced by IED

Superseded or Partially Superseded Licences/Authorisations/Consents relating to this installation			
Holder	Reference Number	Date of Issue	Fully or Partially Superseded
Cray Valley Limited	IPC Authorisation AK5555 Variation BX7967	24/06/04	Fully superseded
Cray Valley Limited	IPC Authorisation BR5418 Variation BX7975	24/06/04	Fully superseded

As a result of the Coatings Resins closure, no Part A permitted activities remain operational, so Arkema Coatings Resins Ltd are currently in the process of surrendering the permit; No. **EPR 3135FV**. This permit surrender will be coordinated with the part (b) application to ensure the site remains permitted at all times.

3. Process Description

Arkema Coatings Resins Ltd operates the manufacture of structural resins at the installation in Stallingborough on a batch process basis. Two generic types of resin are manufactured on site – modified Unsaturated Polyester Resins (UPR) and Gelcoats. These are manufactured in two production buildings on site, the Polyester Mixing Building (PMB) and the Gelcoats building. The resins are manufactured under an operational agreement for the supply of Polynt Composites UK, who are also based on the site.

The primary activities carried out at the installation fall within the definitions given in Chapter 6, Section 6.5, Part B, a (i) of Schedule 1 to the Environmental Permitting (England and Wales) Regulations 2010, and in accordance with those Regulations, this Part B permit application has been prepared for submission in April/May 2016.

The generic processes flow for both buildings are identical and summarised in the process flow diagram in *figure 3* and the process map *(figure 4)*, of the figures section. The processes are further described in the following sections of this report.

3.1 Delivery, unloading and storage base resins

All base resins for the production facilities are imported from Europe. This is mainly in the form of road tankers, which are offloaded directly into the on-site storage tanks. Base intermediate resins are also delivered and stored in drums or IBC's.

There are two base resin tanker offloading areas on site. A plc controlled tanker offloading station feeds PT K,L,M & T,U,V using a manifold system. The resins are pumped offloaded from the tanker into the storage tanks. Tankers are offloaded into PT A – F, by pressure (nitrogen) transfer using dedicated offloading lines for each tank. The location of the two base resin tanker offloading points is shown in *figure 2,* in the figures section.

All resin tank farms are provided with sufficient secondary containments in the form of concrete bunds. Tank farms are located outside two production buildings and piped to production vessels inside the production plant. Secondary containment measures are discussed further in *section 6*.

3.2 Delivery, unloading and storage of raw materials

Styrene is the main solvent used on site in the production of UPR and gelcoats resins. This is delivered by road tanker and stored in a dedicated, enclosed, 30m³ bunded tank. The location is shown in *figure 2*.

The only other bulk raw material stored on site is Calcium Carbonate, a filler used in the manufacture of filled UPR in the PMB. This is stored in an external 80m³ silo (RMT60) and is filled from road tankers.

Other liquid raw materials are delivered in a variety of various sized containers, ranging from 20L to 205L, and up to 1000L IBC containers. These are stored in designated storage areas of the yard as highlighted on the site layout map in *figure 2.*

The system used at ACR Ltd to segregate and store dangerous substances is based upon the ADR transport hazard classification to ensure incompatible materials are not stored together. The ADR system uses nine classes and where a material has more than one classification there is an agreed hierarchy to determine the most appropriate classification. The ACR Stallingborough system excludes Class 1 (explosives), Class 6.2 (infectious substances) and Class 7 (radioactive substances) as these are not used as part of our operations.

Powder raw materials are delivered in bags on pallets and unloaded by forklift trucks and stored in the on-site dry good warehouse and storage areas. Location shown in *figure 2.*

3.3 Polyester Mixing Building Process

The polyester mixing building is a cold mixing process. It uses the imported base Unsaturated Polyester Resins and blends them further in organic solvent (styrene). Depending on customer requirements various other materials are added to give the desired performance characteristics of the finished product, these include gel time, viscosity, thixotropic index, resistance to discolouring and resistance to water.

There are 8 mixing vessels in the building making batches between 1 Tonne and 18 Tonnes. The variety of sizes of mixer are required due to the varied nature of the customers that are supplied and their usage of the resins in terms of tonnage.

Base resins are mainly metered into the mixing vessels to recipe amounts from bulk storage resin tanks utilising closed systems. Base resins are also pump transferred into mixing vessels to recipe amounts from drums or IBC's, utilising a semi closed, pumped system. These systems are used in order to reduce VOC emissions during transfer.

Otherwise, various powdered and liquid pigment, fillers and additives are charged manually through the mixer manway as per the recipe job card. There is the potential for fugitive VOC releases during the charging stages, although any fugitives are collected in LEV systems. Ambient monitoring has demonstrated that emissions are negligible during this operation.

For mixer 8, calcium carbonate filler is charged from a bulk silo, utilising a closed system.

Once all materials are added as per recipe, the batches are mixed and recirculated for a pre-determined time. Vacuum is required on mixer 8 to remove the air that is entrained during the addition of powdered raw materials via screw feeding below liquid level. The vacuum is applied for approximately 30 minutes every batch.

Once mixing has finished, samples are collected and tested in the laboratory for viscosity, thixotropic index, gel-time, monomer content and any other tests specified on the QC control sheet. During the QC tests there is potential for fugitive VOC's. A new LEV fume cabinet has just been installed in this laboratory.

After the first test has been completed on a batch, additions may be required to correct viscosity or geltime, with additions been made in the same way as initial charging, utilising either closed metered transfer systems or manually though the manway.

Once the batches achieve specification, they are packaged ready for despatch. They are pumped from the vessels through filter systems to dedicated Pail, drum or IBC filling points. Large batches are also loaded onto Road Tankers for bulk delivery.

Fugitive VOC emissions can occur when draining or changing filters. This process takes approximately 5-10 minutes and is carried out 2 – 3 times per batch transfer, dependant on batch size and dirt loading. The filters are a cartridge type; these were selected because they offer the performance required by our customers in terms of particulate removal from the finished product. Where possible across the installation, self-cleaning metal edged filters are used as the only waste generated is the solid material removed by the filters. However, metal edge filters cannot be used in this case, as they do not achieve the required performance.

Mixers are dedicated to certain product streams to avoid cross contamination and reduce waste by eliminating the need to wash out the blenders between batches.

The PMB has a production capacity of approximately 17,500T per annum, currently running at 86% capacity (2015).

Shift pattern in PMB:

- 4 shifts
- 1 technician, 2 operators per shift
- 12 hour shifts, 7 days per week
- 2 x shutdowns, one at Easter (4 days) and one at Christmas (+/- 10days)

3.4 Gelcoat Mixing Process

The Gelcoat production facility is identical to the Polyester Mixing Building in terms of the charging, processing, sampling and testing operations, but on a smaller scale. However, in this building, once the base gelcoat has been made, it can be further blended on smaller mixing vessels to make various colour grades as per customer requirements.

There are 10 mixers in the building, capable of making batches ranging from 20Kg up to 6 Tonnes. Mixer 6 and 8 are multi mixing vessel high speed dispersion mixers. Mixer 6 services four, 2 Tonne vessels and a wash pot used for blade cleaning of the same size. Mixer 8 services two, 6 Tonne vessels. Mixer 6 and 8 are on a raised platform towards the South of the building.

The main production area features eight small mixers on the ground floor; drum, pot, and IBC filling points; mixing pot, drum and IBC storage areas.

Forklift trucks carry drums and IBC's around the production area to mixing, filling and storage points. There are eleven portable mixing pots that can be moved around the production areas as required. This building includes a laboratory (testing samples for colour consistency and various quality control test) and the gel coat warm room.

With the exception of metered base resin and styrene loading using closed systems, all other raw materials are added to mixing vessels manually through open vessels/manways. As a result, fugitive VOC emissions occur during all loading, mixing, sampling and containerisation stages of the process. LEV systems are used to collect fugitive's at all operational locations within the building.

Vacuum is also required in this building on mixer 6 and mixer 8 to remove the air that is entrained during the production process.

Batches are packaged and sent out in either pails, drums or IBCs.

The gelcoat building has a production capacity of approximately 3,000T per annum, currently running at 80% capacity (2015)

Shift pattern in Gelcoats:

- 2 Shifts
- 1 section leader and 3 operators per shift
- 8 hour shifts, 5 days per week
- 2 x shutdowns, one at Easter (4 days) and one at Christmas (+/- 10days)

3.5 Process equipment cleaning

Process equipment cleaning is a necessary stage in the manufacturing process and is performed in situ. Fixed mixing vessels in both production buildings are cleaned, where necessary between batches by recirculating styrene around the system, and where possible, using the mixing blades to create a spray effect on the walls of the vessel. Whilst these operations are ongoing, the vessels remain sealed at all times. By recirculating styrene around the system, this also cleans all associated pipework, pumps and filters etc.

Occasionally, where required for maintenance purposes, mixing vessels and storage tanks may be cleaned by external contractors using high pressured water jetting equipment. This method would typically be used where entry may be required into a vessel for inspection or NDT testing.

Physical cleaning techniques are also used for small items of equipment, such as removable mixing blades, using brushes and small quantities of styrene/acetone.

Laboratory equipment and some process valves are cleaned using acetone.

Local Exhaust Ventilation is in situ at all cleaning locations.

3.6 Waste

The following waste streams are generated by the processes on site:

Table 1 - ACR, Stallingborough Waste Streams

Internal Reference	Container(s)	Description	Disposal route	Annual Quantity (T)
General Waste	Compactor Skip	Non-hazardous general refuse waste	Bell Waste - Recycle + Landfill	41.52
Recyclables	Baler + Various Skips	Waste packaging - empty RM bags, cardboard, paper, plastic wrap etc.	Bell Waste - Recycle	16.7
Wood	Skip	Broken pallets	Bell Waste - Recycle	3.5
Hazardous waste	Pails / Drums / IBCs	Containing waste resin, old retain samples, filter waste, line clearance, cleared spillages, substandard materials and draining's. Also includes drained contaminated resin/pigment pails.	CSG - Waste Transfer Station	286
Scrap Metal	Skip	All non-contaminated, non-hazardous scrap metal	Metropes - Recycle	7

3.7 Ancillary services

3.1.1 Steam Boiler

The steam boiler is a Fulton EP100 KW Electropack boiler. There is a steam ring main around the site. It is used primarily for heating the warm room and the smelters in the PMB.

3.1.2 Compressed Air Generation

A 37KW compressor is used to generate compressed air on site. A back up 18KW is in place in the event of a failure of the main unit. The air is used to operate all the actuated valves and air pumps on site.

3.1.3 Nitrogen Supply

Nitrogen is supplied to the site via a dedicated pipeline from the supplier Air products. Nitrogen is used for the pressure transfer of base resin tankers into storage tanks.

4. Emissions to Air

The majority of air emissions are Styrene VOC's which are extracted from the production buildings using LEV systems. Other emissions include VOC's from tank vents during filling/ breathing losses and fugitive emissions from any production/storage areas, including from abnormal operations such as leaks or spillages.

Full details of the site emissions are given in *sections 4.1 & 4.2* below. A summary of emissions to air at each stage of the process is also given in *figure 5* in the figures section and further discussed in the sections below.

Please note that any point source emission release quantity described below was last obtained from emission monitoring undertaken during 2006 to measure the total VOC concentrations in the various vents. There was no requirement to further monitor emissions during the part (a) permit.

However, although the processes have not changed since 2006, the site is proposing to complete emission monitoring for all required process building vents in H1 2016, if required by the regulator. Further details are given in *section 5* below.

As required by the guidance document, annual extractive particulate monitoring will be completed, with the suitable location(s) agreed with the regulator.

4.1 Point Sources

There are a total of 36 point emission sources at the installation as detailed in *Table 2* below, with the location of each referenced point shown on the site plan in *figure 6*, of the figures section. Each emission point, release quantity and the choice of abatement are further discussed below.

Table 2 - Point Source Emissions

							Current Part (A) EPR Requirements		
Emission point ref.	**Location**	**Source**	**Type**	**Pollutants**	**Odour**	**Release Quantity** *(including unit)*	**Limit** (including unit)	**Monitoring standard / Method**	**Abatement**
A1	PMB	PMB Mixer 8 Vacuum vent	Powered	VOCs	Aromatic solvent	<5kg/Y	Not set	Not required	None
A2	PMB	Mixer 8 PMB vent	Breather	VOCs	Aromatic solvent	<5kg/Y	Not set	Not required	None
A3	PMB	PMB LEV extraction vent for mixers 1 - 9	Powered	VOCs	Aromatic solvent	2167kg/Y	Not set	Not required	Particulate Filter
				Particulates	N/A	92kg/Y	Not set	PCME Continuous	
A4	Yard	Calcium carbonate silo vent (RMT60)	Breather	Particulates	N/A	Not known	Not set	Not required	Particulate Filter
A5	Gelcoats	Gelcoat building mixer 6 & 8 LEV vent	Powered	VOCs	Aromatic solvent	151kg/Y	Not set	Not required	None
				Particulates	N/A	Not known	Not set	Not required	
A6	Gelcoats	Gelcoat building colour mixer LEV vent	Powered	VOCs	Aromatic solvent	138kg/Y	Not set	Not required	None
A7	Gelcoats	Gelcoat building laboratory LEV vent	Powered	VOCs	Aromatic solvent	645kg/Y	Not set	Not required	None
A8	Gelcoats	Gelcoat building spray booth vent	Powered	VOCs	Aromatic solvent	69kg/Y	Not set	Not required	None
A9	Yard	Styrene storage tank vent (RMT01)	Powered	VOCs	Aromatic solvent	Not known	Not set	Not required	Scrubber
A10	Yard	Polyester Resin Holding Tank vent (PTA)	Breather	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A11	Yard	PRHT (PTB)	Breather	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A12	Yard	PRHT (PTC)	Breather	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A13	Yard	PRHT (PTD)	Breather	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A14	Yard	PRHT (PTE)	Breather	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A15	Yard	PRHT (PTF)	Breather	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A16	Yard	PRHT (PTT)	Breather	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A17	Yard	PRHT (PTU)	Breather	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A18	Yard	PRHT (PTV)	Breather	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A19	Yard	PRHT (PTK)	Breather	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A20	Yard	PRHT (PTL)	Breather	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A21	Yard	PRHT (PTM)	Breather	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A22	Yard	Empty Tank - NOT IN USE	Breather	N/A	N/A	N/A	N/A	N/A	None
A23	Yard	Empty Tank - NOT IN USE	Breather	N/A	N/A	N/A	N/A	N/A	None
A24	Yard	Empty Tank - NOT IN USE	Breather	N/A	N/A	N/A	N/A	N/A	None
A25	Yard	Empty Tank - NOT IN USE	Breather	N/A	N/A	N/A	N/A	N/A	None
A26	Yard	Empty Tank - NOT IN USE	Breather	N/A	N/A	N/A	N/A	N/A	None
A27	Yard	Empty Tank - NOT IN USE	Breather	N/A	N/A	N/A	N/A	N/A	None
A28	Yard	Empty Tank - NOT IN USE	Breather	N/A	N/A	N/A	N/A	N/A	None
A29	Polynt	Polynt Demo area LEV system	Powered	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A30	Polynt	Polynt Laboratory LEV system	Powered	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A31	Yard	Gelcoats vacuum seal tank vent	Powered	VOCs	Aromatic solvent	Not known	Not set	Not required	None
A32	Engineering	Engineering workshop LEV vent	Powered	VOCs	Aromatic solvent	Negligible	Not set	Not required	None
				Particulates	N/A	Negligible	Not set	Not required	
A33	Buffer	Buffer tank vent 1 (EC20) - NOT IN USE	Breather	N/A	N/A	N/A	Not set	N/A	Carbon Filter
A34	Buffer	Buffer tank vent 2 (EC20) - NOT IN USE	Breather	N/A	N/A	N/A	Not set	N/A	Carbon Filter
A35	PMB	PMB Laboratory LEV Vent	Powered	VOCs	Aromatic solvent	Not known	Not set	New system	None
A36	PMB	PMB Drumming off Mixer 8 LEV Vent	Powered	VOCs	Aromatic solvent	Not known	Not set	New system	None

Although 36 point emission sources are listed, only 13 of these are from LEV extracted sources / mixing vessels. Emissions from all the other tank vents are just breathing losses or fugitive emissions from tank filling operations.

Nine of the potential point source emission points are on tanks / systems that are currently not in operation but may be reinstated in the future so the release points will be kept on the list in *table 2* for the time being.

All release point references have transposed onto the site plan to indicate its location. Release points associated with the two production buildings have also been marked on building layout plans. These can be found in *figures 6, 7 and 8* in the figures section.

LEV emissions have historically been quantified by measuring the VOC concentration in a specific vent (over a suitable sampling period as per the pre 2006 IPC permit), and then using an emission calculation process detailed below to quantify annual mass releases;

- The capture velocity of each LEV hood within a given system was measured with all other dampers closed to give the worst case (i.e. maximum capture velocity);
- The area of the ducting was measured to allow a calculation to be made of the extraction volume per hour.

- LEV is only used for occupational health purposes during the manual charging of raw materials to mixing vessels. The times taken to load these raw materials to each vessel were analysed to give the actual hours of operation per year.
- These factors were combined to give an estimation of the total volumes of air extracted by each system on an annual basis.
- Multiplying the measured VOC concentration by the total volume of air extracted per year will give a mass release from each vent.

The peak emission concentrations measured have been used to calculate the annual emission quantities listed in table 2 and in the sections below. This is to give a worst scenario for annual emissions, which in reality will be much lower.

In addition, weekly atmospheric VOC monitoring, using a portable FID, has been carried out in the process buildings for environmental and occupational health purposes. This is discussed in *section 4.2 – fugitive emissions*.

A1: Polyester Mixing Building Mixer 8 Vacuum Vent

Map #	Emission type	Quantity	Odour	Abatement
A1	VOC's - Styrene	<5Kg/Year	Aromatic Solvent	None

Vacuum is required on mixer 8 to remove the air that is entrained during the addition of powdered raw materials which are charged below liquid level. The vacuum is applied for approximately 30 - 45 minutes every batch. The vacuum exhausts to atmosphere at high level outside the PMB building.

Quantitative analysis of this system was not a requirement under the EPR permit, however it was a requirement under the previous IPC application (pre 2006). The nature of the vacuum vent means that the releases have a relatively high VOC concentration but only last a short duration per batch resulting in very low annual mass emissions.

The vent was last monitored for total VOCs for a period of 8 days, from 21st September – 28th September 2006. The average VOC concentration leaving the vent throughout this period was measured to be 88mg/m^3, this has been taken to be the normal concentration.

The peak concentration was taken to be the highest hourly average during the monitoring period. This was found to be 355mg/m^3. The peak release rate occurs during the time the vacuum pump is running.

The annual emission is extremely low, being calculated at less than 5 Kg per year of VOC (using peak concentration). Calculation was made by calculating the volume of air extracted per batch, multiplying this by the number of batches per year to calculate the volume of air extracted per year, and then multiplying this by the average VOC concentration in the vent.

Due to the nature of this process the emission is a high concentration but for a short duration resulting in very low annual mass emissions. For this reason no abatement was installed as none was considered necessary under the EPR permit.

A2: Polyester Mixing Building Mixer 8 Vent

Map #	Emission type	Quantity	Odour	Abatement
A2	VOC's - Styrene	<5Kg/Year	Aromatic Solvent	None

Mixer 8 is used to make filled resins and the filler and fumed silica materials are charged into the mixer using a closed system so the lid for mixer 8 is rarely opened for prolonged periods. Most other material additions are metered into the mixer via dedicated delivery lines so that the lid can remain closed.

The only emissions from this vent are from air displacement as there is no extraction fan fitted to this system. The displaced air may contain small amounts of VOC's (styrene).

Quantitative analysis of this system was not a requirement under the EPR permit, however it was a requirement under the previous IPC application (pre 2006).

The vent was last monitored for total VOCs for a period of 8 days, from 21st September – 28th September 2006. The average VOC concentration leaving the vent throughout this period was measured to be 110mg/m³, this has been taken to be the normal concentration as the process, products and capacity of the vessel have not changed in the last 10 years.

The peak concentration was taken to be the highest hourly average during the monitoring periods. This was found to be 906mg/m³.

The nature of the vent means that the releases have a relatively high VOC concentration but are only caused by the displacement of air from the mixer as there is no extraction fan. Typical displacement volumes are 18m³ per batch. The annual emission is therefore extremely low, being less than 5 Kg per year of VOC (using peak concentration).

For this reason no abatement was installed as none was considered necessary under the EPR permit.

A3: Polyester Mixing Building Vent – mixers 1 – 9 LEV extraction

Map #	Emission type	Quantity	Odour	Abatement
A3	VOC's - Styrene	2167Kg/Year	Aromatic Solvent	None
	Particulates	92kg/year	N/A	PCME Filter

Air from within the PMB operations floor is drawn through the LEV trunking and exhausted to atmosphere from a vent on the roof of the building. There is potential for a small concentration of VOC's to be extracted, which from this location will be Styrene.

Fugitive VOC emissions occur when the mixer lids are opened. To reduce them, many of the material additions are metered into the mixers via dedicated delivery lines so that the lid can remain closed. Materials that have to be charged from bags are done so as quickly as possible and lids replaced as sooner.

Quantitative VOC emission analysis of this system was not a requirement under the EPR permit, however it was a requirement under the previous IPC application (pre 2006). The vent was last monitored for total VOCs for a period of 8 days, from 21st September – 28th September 2006.

The average VOC concentration leaving the vent throughout this period was measured to be 97mg/m³, this has been taken to be the normal concentration as the process, products and capacity of the vessels have not changed in the last 10 years.

The peak concentration was taken to be the highest hourly average during the monitoring periods. This was found to be 906mg/m³.

Using this monitoring data, the annual VOC release from this vent is 2167Kg (peak). This figure was calculated from the peak concentration measured for the 8-day period, multiplied by the LEV fan capacity and the number of operational plant days. Peak concentration was used to give a worst case scenario, when in reality, emissions will be much lower.

Due to the low levels of emission from this vent, no VOC abatement is installed and none was considered necessary by the Environment Agency during the life of the EPR permit.

Due to the manual addition of powders on these mixers there is also the potential for particulates to be entrained in the LEV emissions consequently, the LEV vent is fitted with a dust filter to remove any particulates in the vent stream. There is a PCME particulate monitor installed to provide continuous monitoring of particulate concentration. The data is used to determine annual emissions and also when the bag filters need to be changed.

Using the PCME data from the last 3 years, an average of 92Kgs of particulates are emitted per year. This peaked in 2015, with 118Kgs of particulates being emitted.

A4: Calcium carbonate silo vent (RMT60)

Map #	Emission type	Quantity	Odour	Abatement
A4	Particulates	Not Known	N/A	Filters

The Calcium Carbonate is deliver to site on tankers, which are pressure transferred into the storage silo RMT60. Particulate emissions are possible during these filling operations, particularly at the start and end of transfer. Tankers are offloaded at an approximate frequency of once every 2 weeks.

The silo is fitted with a filter system to prevent dust emissions during filling operations. The silo and the associated filter systems are subject to planned maintenance regime, whereby all elements of the silo and filters are checked by a competent contractor (portasilo). This maintenance is performed every 6 months.

All deliveries are supervised by the driver in order to immediately identify any leaks from inlet connections or the arrestment filters during transfer.

There have never been any emission monitoring performed on this system when tankers are being offloaded and with current abatement systems installed, this is not considered necessary.

A5: Gelcoat Building – Mixer 6 & 8 platform LEV Vent

Map #	Emission type	Quantity	Odour	Abatement
A5	VOC’s	151Kg/Year	Aromatic Solvent	None
	Particulates	Not Known	N/A	None

Air from within the Gelcoat Building (mixers 6 & 8 mixing platform) is drawn through the LEV trunking and exhausted to atmosphere from a vent on the roof of the building. The expected emissions from this vent will by mainly VOC’s, which will predominantly be from styrene and also methyl methacrylate. Particulate matter will also be emitted from this vent during the manual charging of powders to mixing vessels

VOC emissions occur when the mixer lids are opened. To reduce them, the bulk material additions are metered into the mixer via dedicated delivery lines so that the lid can remain closed as often as possible. Materials that have to be charged from bags are done so as quickly as possible and lids replaced as soon as possible.

VOC emissions may also be released during vessel cleaning operations. Where possible, all lids remained sealed during cleaning, with minimal time where the lids or manways are open to reduce VOC emissions.

This LEV system also extracts VOCs created during pail/drum/IBC filling operations on the ground floor of the building.

Quantitative VOC emission analysis of this system was not a requirement under the EPR permit, however it was a requirement under the previous IPC application (pre 2006). The vent was last monitored for total VOCs for a period of 10 days, from 1st August – 10th August 2006. The average VOC concentration leaving the vent throughout this period was measured to be 22mg/m³. This has been taken to be the normal concentration as the process, products and capacity of the vessels have not changed in the last 10 years.

The peak concentration was taken to be the highest hourly average during the monitoring periods. This was found to be 51mg/m³.

Using this monitoring, the annual VOC release from this vent is 151Kg (peak). This figure was calculated from the peak concentration measured for the 10 day period, multiplied by the LEV fan capacity and the number of operational plant days. Peak concentration was used to give a worst case scenario, when in reality, emissions will be much lower.

Due to the low levels of emission from this. No abatement is installed and none was considered necessary by the Environment Agency during the life of the EPR permit.

There has been no particulate monitoring performed on this vent, and there is no particulate abatement installed.

A6: Gelcoat Building – Colour Mixing area LEV Vent

Map #	Emission type	Quantity	Odour	Abatement
A6	VOC's	138Kg/Year	Aromatic Solvent	None
	Particulates	Not Known	N/A	None

Portable mixing vessels (pails, drums and pots) ranging from 20kg – 1000Kgs are used in this area, which means that although fugitive VOC emissions can occur during mixing of these batches, they are only small scale mixers and there is no opportunity to have dedicated feed lines or closed systems.

All materials (resins, solvents, pigments and additives) are manually loaded into the mixing vessels. An LEV system is in place to cover all mixer and weighing locations. Air from within the Gelcoat Building colour mix area is drawn through the LEV trunking and exhausted to atmosphere from a vent on the roof of the building. Emissions from this vent will be predominantly VOC's (styrene) from gelcoat mixing/decanting operations.

On the larger mixers (mixer 4 & 5) lids are in place during all mixing operations. These mixers have LEV trunking attached to the lid, which is extracting VOC's from within the vessel. Typically 4 batches are made on these mixers per day, with a mixing time of approximately 2 hours per batch.

205L drums of gelcoat are mixed using mixer 2, 3 & 9. During charging and mixing operations, the drums are open containers with no lids. Once the customer specification is achieved, the drums are removed from the mixers and covered with lids to prevent further fugitive VOC emissions

Quantitative VOC emission analysis of this LEV system was not a requirement under the EPR permit, however it was a requirement under the previous IPC application (pre 2006). The vent was last monitored for total VOCs for a period of 10 days, from 1st August – 10th August 2006. The average VOC concentration leaving the vent throughout this period was measured to be 24mg/m³, this has been taken to be the normal concentration as the process, products and capacity of the vessels have not changed in the last 10 years.

The peak concentration was taken to be the highest hourly average during the monitoring periods. This was found to be 45mg/m³.

Using this monitoring data, the annual release from this vent was 138Kg (peak). This figure was calculated from the peak concentration measured for the 10 day period, multiplied by the LEV fan capacity and the number of operational plant days. Peak concentration was used to give a worst case scenario, when in reality, emissions will be much lower.

Due to the low levels of emission from this vent – No abatement is installed and none was considered necessary by the Environment Agency during the life of the EPR permit.

A7: Gelcoat Laboratory LEV Vent

Map #	Emission type	Quantity	Odour	Abatement
A7	VOC's	645kg/year	Aromatic Solvent	None

Once samples have been obtained, various Quality Control test are performed in the laboratory on the samples (typically max 500ml per sample), including viscosity and gel time tests. During these tests there is potential for

VOC emissions (styrene) from the samples, particularly the gel time tests which involves an exothermic reaction.

In addition to this, small quantities of acetone are used to clean laboratory equipment, leading to more VOC emissions.

The laboratory is fitted with LEV, which includes a number of bench extraction capture hoods. Air from the laboratory is extracted using this system and exhausted to atmosphere from a vent on the roof of the building.

Quantitative VOC emission analysis of this system was not a requirement under the EPR permit, however, it was a requirement under the previous IPC application (pre 2006). The vent was last monitored for total VOCs for a period of 10 days, from 1st August – 10th August 2006. The average VOC concentration leaving the vent was measured to be 33mg/m³ this has been taken to be the normal concentration as the laboratory processes have not changed in the last 10 years.

The peak concentration was taken to be the highest hourly average during the monitoring periods. This was found to be 108mg/m³.

Using this monitoring data, the annual release from this vent is 645Kg (peak). This figure was calculated from the peak concentration measured for the 10 day period, multiplied by the LEV fan capacity and the number of operational plant days. Peak concentration was used to give a worst case scenario, when in reality, emissions will be much lower.

Due to the low levels of emission from this vent. No abatement is installed and none was considered necessary by the Environment Agency during the life of the EPR permit.

A8: Gelcoat Building – Spray booth

Map #	Emission type	Quantity	Odour	Abatement
A8	VOC's	69Kg/Year	Aromatic Solvent	None

The spray booth is used for spraying small panels of Gelcoat finished product for testing purposes and for colour matching.

The booth is only operational for the time it takes to spray a panel which is typically 1 – 2 minutes from start to finish. It is estimated that the spray booth is in operation for 1 hour a day (max). Vapours are extracted through exhaust ventilation and directed through the roof of the building.

Quantitative VOC emission analysis of this system was not a requirement under the EPR permit, however it was a requirement under the previous IPC application (pre 2006). The vent was last monitored for total VOCs for a period of 10 days, from 1st August – 10th August 2006. The average VOC concentration leaving the vent was measured to be 33mg/m³ this has been taken to be the normal concentration as the processes have not changed in the last 10 years.

The peak concentration was taken to be the highest hourly average during the monitoring periods. This was found to be 95mg/m³.

Using this monitoring data, the annual VOC release from this vent was 69Kg. This figure was calculated from the peak concentration measured for the 10-day monitoring period, multiplied by the booth extraction fan capacity and the number of operational plant days. Peak concentration was used to give a worst case scenario, when in reality, emissions will be much lower.

A9: Styrene (RMT01) tank vent

Map #	Emission type	Quantity	Odour	Abatement
A9	VOC's	Not Known	Aromatic Solvent	Venturi Scrubber

Styrene vapours are displaced during the loading of the storage vessel via road tankers. The displaced gases are passed through a wet scrubber using glycol as the scrubbing medium.   Off-loading of tanker is inhibited by PLC control unless the scrubber is running. The scrubber effectively removes any styrene present in the vapour stream. Use of a scrubber system to control fugitive releases is therefore considered to represent BAT for these storage tanks and materials

When a delivery is offloaded the tank is also back vented in to the road tanker to eliminate emissions. Back venting to road tankers is considered BAT for this operation.

A10 – A21: Passive venting from storage tank vents (PT A-F, K-M & T-V) during loading & breathing losses

Map #	Emission type	Quantity	Odour	Abatement
A10-21	VOC's	Not Known	Aromatic Solvent	None

Storage tank solvent losses occur through either:

- vapour displacement on filling or
- vapour breathing losses due to the volume changes as a result of the daily rise and fall in temperature.

These solvent losses will create VOC (styrene) emissions.

These emissions have not been monitored or calculated. The site proposes to calculate the emissions by following the methodology contained within the "VOC workbook" guidance.

A22 – A28: Passive venting from storage tank vents (HT22-30) during loading & breathing losses

These tanks are empty and not currently in use, so have not been considered as part of this application.

A29: Polynt Demo area spray booth LEV system

Map #	Emission type	Quantity	Odour	Abatement
A29	VOC's	Not Known	Aromatic Solvent	None

The spray booth is used for spraying panels and moulds of Gelcoat finished product for testing, research and development purposes and for colour matching.

The booth is only operational for the time it takes to spray a panel which is typically 1 – 2 minutes from start to finish. It is estimated that the spray booth is in operation for 1 hour a day. Vapours are extracted through exhaust ventilation and directed through the roof of the building.
Air from the booth / demo area is extracted using this system and exhausted to atmosphere from a vent on the side the building. No abatement is installed on this vent.

This LEV vent was installed in 2011 and no emission monitoring has been completed, although emissions are expected to be low as per the gelcoats spray booth.

A30: Polynt Laboratory LEV System

Map #	Emission type	Quantity	Odour	Abatement
A30	VOC's	Not Known	Aromatic Solvent	None

The Polynt laboratory is operational 08:30 – 16:30 Monday - Friday and is used for various research and development tests and also quality control testing operations identical in nature to those performed in the Gelcoats and PMB Laboratory. During these tests there is potential for VOC emissions (styrene) from the samples, particularly the gel time tests which involves an exothermic reaction.

In addition to this, small quantities of acetone are used to clean laboratory equipment, leading to more VOC emissions.

The laboratory is fitted with LEV, which includes a number of bench extraction capture hoods. Air from the laboratory is extracted using this system and exhausted to atmosphere from a vent on the side of the building. No abatement is installed on this vent.

This LEV vent was installed in 2011 and no emission monitoring has been completed. However, emissions are expected to be no higher than Gelcoats laboratory, as the Polynt laboratory is only operational for 8 hours, in comparison to 16 hours for Gelcoats.

A31: Gelcoats Vacuum Seal tank vent

Map #	Emission type	Quantity	Odour	Abatement
A31	VOC's	Not Known	Aromatic Solvent	Carbon Filter

Vacuum is required on mixer 6 and mixer 8 vessels to remove the air that is entrained during the high speed dispersion mixing process. The vacuum is applied for approximately 20 minutes every batch. The vacuum exhausts via a vacuum seal vessel containing water outside the Gelcoats Building. A Carbon filter is installed on the vacuum seal vessel as abatement for VOC emissions.

This vaccum system was installed in 2014 and no emission monitoring has been completed.

A32: Engineering Workshop LEV vent

Map #	Emission type	Quantity	Odour	Abatement
32	VOC's	Not known	Aromatic Solvent	None
	Particulates	Not Known	N/A	None

The engineering LEV used to be used for on-site welding operations, which are no longer performed on site. It is now used to extract any particulates during fabrication work such as grinding and also to extract any VOCs from spray painting or cleaning activities using solvent.

This is very rarely used, so emissions will be negligible.

A33 & A34: BETP Buffer tank vents

Map #	Emission type	Quantity	Odour	Abatement
A33 & 34	VOC's	Not Known	Aromatic Solvent	Carbon Filters

The buffer tank is part of the Biological Effluent Treatment Plant (BETP) for the site that is no longer in use. This tank has now been emptied. As it is not in use, this had not been considered during this application.

A35: PMB Laboratory LEV Vent

Map #	Emission type	Quantity	Odour	Abatement
A35	VOC's	Not Known	Aromatic Solvent	None

Once samples have been obtained, various Quality Control test are performed in the laboratory on the samples (typically max 500ml per sample), including viscosity and gel time tests. During these tests there is potential for VOC emissions (styrene) from the samples, particularly the gel time tests which involves an exothermic reaction.

In addition to this, small quantities of acetone are used to clean laboratory equipment, leading to more VOC emissions.

The laboratory is fitted with LEV, which includes an extracted fume cabinet. Air from the laboratory is extracted using this system and exhausted to atmosphere from a vent on the roof of the building.

This system was installed in February 2016 and no emission monitoring has been completed. There is no abatement installed on this system.

A36: PMB Mixer 8 Drumming off LEV Vent

Map #	Emission type	Quantity	Odour	Abatement
A36	VOC's	Not Known	Aromatic Solvent	None

This LEV systems is used to extract VOC's away from the operator during drum/pail/keg filling operations from mixer 8.

The capture hood is position to draw VOCs away from open containers whilst they are being filled. This system was installed in February 2016 and no emission monitoring has been completed. There is no abatement installed on this system.

4.2 Fugitive Emissions to Air

Due to the nature of the processes, there are several potential sources of fugitive emissions at the installation, all relating to the potential release of VOCs. Although small in relation to Large Volume Organics plants, there are a considerable numbers of plant items, flanges, pumps and valves with seals, storage tanks, tanker connections, sample points, etc. All have the potential for leakage of VOCs - and a significant number of joints and vessels are opened on a regular basis between batches.

The volatility of manufactured resins and most raw materials is low. However, it is recognised that volatile solvents are used at the installation and fugitive emissions could occur through pumps, valves, flanges, open containers etc.

The fugitive VOC release point references have transposed onto the site plan to indicate its location. Release points associated with the two production buildings are summarised in *table 3* below.

Table 3 - Fugitive Emission Points

Emission point ref.	Location	Source	Type	Pollutants	Odour	Release Quantitiy *(including unit)*	Limit (including unit)	Monitoring standard / Method	Abatement
F1	Gelcoats	Gelcoats Building - Fugitive Emissions	Natural	VOCs	Aromatic Solvent	986kg/Y	Not set	Not required	None
				Particulates	N/A	Not known	Not set	Not required	None
F2	PMB	PMB - Fugitive Emissions	Natural	VOCs	Aromatic Solvent	132kg/Y	Not set	Not required	None
				Particulates	N/A	Not known	Not set	Not required	None

Although most of the emissions will be extracted by the LEV systems, there is potential for fugitive emissions caused by natural ventilation and air changes of production buildings. Calculation of fugitive VOC emissions for both production buildings have been completed for a number of years, using the following methodology.

Weekly ambient VOC concentrations were measured using a Foxboro TVA 1000 FID (digital). Measurements were taken from various pre-determined- sample locations in each building, across all areas. An annual ambient average of all the results for fugitive emissions inside the Gelcoat Building and PMB is then calculated. This is then used to calculate the average solvent concentration for each building.

Annual mass solvent emissions are calculated by measuring the total volume of each production building in order to calculate a mass solvent release per air change. This is multiplied by the number of air changes per day (currently estimated at 168) and then multiplied by the number of operational plant days per year for each building.

e.g. ((Average Solvent concentration (mg/m³) x Volume of building/1000000) x Number of air changes per day x operational plant days per year.

<u>Gelcoats 2015 example:</u> (4.52x5000)/1000000 x 168 x 260 = 0.0225 x 168 x 260 = **987Kgs/Year**

F1: Gelcoats Building fugitive emissions

Al process vessels are contained within the building and any fugitive emissions from these vessels and processes are generally extracted through building ventilation systems as described in Section 4.1.

Although most of the emissions will be extracted by these LEV systems, there is potential for fugitive emissions caused by natural ventilation and air changes of production buildings, this will include emissions summarised in *table 4* below.

Table 4 - Gelcoat fugitive emissions summary

Potential fugitive source	Location	What are the potential fugitive emissions	Quantify if possible	Techniques used to prevent emissions
1. VOCs & Particulates from loading powders / raw materials to mixing vessels blenders.	F1	VOCs Particulates from Mixer 6 & 8 processes	Total VOC's 987Kgs / Year (Calculated)	Closed systems used to charge resins & solvents as much as possible Open vessel time minimised – lids in place as much as possible. Trained operators.
2. VOCs from leaking valves, flanges, pipe work, open resin/solvent container, filters & spillages	F1	VOCs		Specification of parts. Planned maintenance system. Maintenance request system to identify problems. Leaks given high priority. Spillage clean up procedures in place. Regular inspections of process equipment. Trained operators.

F2: PMB fugitive emissions

Al process vessels are contained within the building and any fugitive emissions from these vessels and processes are generally extracted through building ventilation systems and emissions abatement equipment as described in Section 4.1.

There is potential for fugitive emissions caused by natural ventilation and air changes of production buildings, this will include emissions summarised in *table 5* below.

Table 5 - PMB fugitive emissions summary

Potential fugitive source	Location	What are the potential fugitive emissions	Quantify if possible	Techniques used to prevent emissions
1. VOCs & Particulates from loading powders / raw materials to mixing vessels blenders.	F2	VOCs Particulates from powder additions	Total VOC's 132Kgs / Year Calculated	Closed systems used to charge resins & solvents as much as possible Closed system used to charge bulk powders (calcium carbonate).

				Open vessel time minimised – lids in place as much as possible. Trained operators.
2. VOCs from leaking valves, flanges, pipe work, open resin/solvent container, filters & spillages	F2	VOCs		Specification of parts. Planned maintenance system Maintenance request system to identify problems. Leaks given high priority. Spillage clean up procedures in place. Regular inspections of process equipment. Trained operators.

5. Solvent Management Plan

Arkema Coatings Resins Ltd (ACR), Stallingborough operates the manufacture of Gelcoats and Unsaturated Polyester resins that fit within the definitions given in Chapter 6, Section 6.5, Part B, a (i) of Schedule 1 to the Environmental Permitting (England and Wales) Regulations 2010.

As part of the Part B permit application, the process authorisation has to be revised with respect to the Process Guidance note PG 6/44 (11) which takes into account the requirements of the EC directive 199/13EC, commonly known as the Solvent Emissions Directive (SED), which was incorporated into Directive 2010/75/EU of the European Parliament and the Council on industrial emissions (the Industrial Emissions Directive or IED). It is the main EU instrument regulating pollutant emissions from industrial installations. The IED was adopted on 24 November 2010,

In order to show VOC emission compliance with the IED, we propose the use of "the total emission limit" values in SE Box 6 (page 25) of the guidance PG6/44(11). The site uses over 1000 tonnes of solvent per annum, therefore the total emission limit value given in PG 6/44(11) is 3% of the sites total solvent input.

The site proposes to create a Solvent Management Plan based on the British Coatings Federation (BCF) booklet *"The VOC Workbook – Guidance for coatings manufacturing installation: demonstrating compliance with PG6/44 VOC emission limits and preparing solvent management plans".*

5.1 Solvent Inputs

The site has reviewed the following solvent inputs, in order to identify those applicable to the site:

SED/ IED I/O	Definition *(Annex III.3)*	Applicability to coatings manufacture	
		code	
I1	Purchases of: - solvents[9] - solvent containing preparations	 I1.1 I1.2 I1.3	Covers all: - bought-in "new" solvents - solvent in bought-in resins - solvent in other bought-in raw materials/ intermediates/ semi-finished products for use
I2	Solvent recovered and reused in the installation	 I2.1 I2.2	Covers all: - bought-in recovered solvent - on-site recovered solvent

I1 - All raw materials and intermediate resin purchases for 2015 were obtained from the site "Adage" purchasing & stock control system (ERP software). MSDS's and TDS's were all reviewed in order to identify the total solvent input to the site from each material.

I2 – No recovered solvent is used on site, so this is not applicable.

The full list of solvent inputs from all materials purchased is shown in *Appendix 1,* and the solvent input quantity is summarised in *table 6* below.

Table 6 - Solvent inputs

Activity	Solvent Input (kg)	VOC Emission (kg)	VOC emission (% Input)
I1 – Purchased solvent, solvent in resins, solvent in other materials	6,113,155		
I2 – Recovered solvent	0		
Total Inputs	6,113,155		

5.2 VOC emissions

The VOC emissions from the site are discussed in detail in *section 4 (above).* In order to calculate the total site VOC emissions, the following outputs are considered applicable:

O1 Solvent emissions in waste gases
O1.1 - powered vents (e.g. local exhaust ventilation, vessel extracts)
O1.2 - non-powered process vessel vents (e.g. breather vents)
O1.4 - bulk storage vessel (solvent, resin, intermediate) breather vents
O4.1 - natural ventilation (doors, windows etc) of buildings

Where raw materials (solvents and resins) and handled and processed, all operations are carried out under local exhaust ventilation (LEV) (O1.1). Whilst there is some historical emission monitoring data from 2006 available, this does not include the all LEV emission points on site. Three environmental monitoring companies have been contacted to provide quotes to carry out emission monitoring for each of the powered vents on site, if considered necessary. If historical data is considered adequate, then the monitoring will only include the vents where historical monitoring has never been completed.

Two proposals and quotations have currently been received, and we are currently awaiting a third quotation. Pleases note, that the new proposed monitoring would also include isokinetic particulate sampling for vents A3, A5 and A6 in order to calculate annual particulate emissions from process vents where powered raw materials are handled, which has historically not been completed.

As required by the guidance document, annual extractive particulate monitoring will be completed, with the suitable location(s) agreed with the regulator.

All sampling will be carried out over an appropriate period of plant operation to fulfil the requirements of Process Guidance Note 6/44(11) in order to obtain representative annual emission quantities from each vent. The preferred methods for each monitoring exercise are specified below. Please note, it has not yet been decided as to what frequency repeat monitoring exercises will be completed, however, it is not expected that process will change on site in the near future.

Determinant	Reference method	Typical limit of detection	Company accreditation for monitoring	Laboratory accreditation for analysis	Accreditation of results
Total VOC	EN 12619	0.3ppm	MCERTS	N/A	MCERTS
Total Particulate Matter	EN 13284-1	10µg	MCERTS	ISO 17025	MCERTS
Total Particulate Matter	MDHS 14/3	10µg	ISO 17025	ISO 17025	ISO 17025
Volumetric Flow	EN ISO 16991-1	N/A	MCERTS	N/A	MCERTS

Mixer 8 in the PMB has a non-powered breather vent installed (O1.2). FID monitoring data from 2006 is available for this vent. If necessary, the scope of the environmental monitoring proposed for the powered vents (above), will also include to monitor this breather vent to ensure accurate data is available,.

A number of solvent containing resins are stored in bulk storage vessels. Emissions from these vessels have not yet been calculated, but will be calculated using fixed roof bulk storage equations (O1.4). The VOC workbook spreadsheet will be used to perform these calculations.

As discussed in *section 4.2,* uncaptured VOC emissions escape through natural ventilation of both production buildings (O4.1), the measurement and calculation method described in *section 4.2* has been used to determine fugitive emissions from each of these buildings. The site proposes to use this data for the emission calculations unless otherwise instructed.

5.2.1 Preliminary emission hypotheses

Using the existing data on VOC emissions, as described in *section 4.2* a preliminary calculation has been made to give an indication as to whether the site is likely to be below the IED emission limit value of 3%. The results of this are shown below in *table 7*.

Table 7 – IED emission limits calculations

Activity	Solvent Input (kg)	VOC Emission (kg)	VOC emission (% Input)
I1 – Purchased solvent, solvent in resins, solvent in other materials	6,113,155		
I2 – Recovered solvent	0		
Total Inputs	6,113,155		
O1.1 - powered vents (e.g. local exhaust ventilation, vessel extracts)		3170*	
O1.2 - non-powered process vessel vents (e.g. breather vents)		1	
O1.4 - bulk storage vessel breather vents		TBD**	
O4.1 - natural ventilation (doors, windows etc.) of buildings		1118	
Total Emissions		4289	0.0701%

**Emission quantity does not include emissions from vents A29, A30, A35, A36 – still to be measured. Emissions are peak (worst case emissions) – Using average data, emissions are 700kgs).*
*** Emissions from fixed tank breather vents have yet to be calculated.*

Obviously this is not a true representation of the site emissions as not all powered vents have been monitored and the breather vents emissions are yet to be calculated. However, with the emissions being currently at 0.071%, it is considered highly likely that the site will be below the emission limit value of 3% and in compliance with the IED.

To be above the emission limit of 3%, the site would have to emit 184,420Kgs of VOCs per annum or 526Kgs per day, which is considered very unlikely. However, when all monitoring data and calculations have been completed, a definitive result can be obtained.

Also, the emission data used is from peak emission rates and not average emissions. If average emissions are used then the emission rate would be calculated at 0.032%.

6 Material Storage

The site has a number of bulk storage areas on site, which includes 3 tank farms for base polyester resins storage (12 tanks of various sizes), one styrene storage tank (30m³) and a silo (80m³) for calcium carbonate storage. A full list of the bulk storage tanks is give below in *table 8.*

Table 8 - Site storage tank inventory

Bund	Tank	Capacity		Contents/Use		Physical/health Hazard	Evironmental Hazard	H statements	Construction Material
		m3	Operational (T)	Code	Material				
RMT01	RMT1	30	30	11200	Styrene Monomer	Flammable, Harmful, Toxic to Reproduction	Harmful to aquatic organisms - may be dangerous for the aquatic environment if released.	H226, H304, H315, H319, H332, H335, H361d, H372, H412	Stainless Steel
PT A-F	PTA	100	92	IP 13239	UPR (Resin)	Flammable, Harmful, Toxic to Reproduction	Harmful to aquatic organisms - may be dangerous for the aquatic environment if released.	H226, H319, H335, H361d, H372, H412	Stainless Steel
PT A-F	PTB	100	92	IP 66109	UPR (Resin)	Flammable, Harmful, Toxic to Reproduction	Harmful to aquatic organisms - may be dangerous for the aquatic environment if released.	H226, H319, H335, H361d, H372, H413	Stainless Steel
PT A-F	PTC	100	92	IP 61119	UPR (Resin)	Flammable, Harmful, Toxic to Reproduction	Harmful to aquatic organisms - may be dangerous for the aquatic environment if released.	H226, H319, H335, H361d, H372, H414	Stainless Steel
PT A-F	PTD	100	92	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	Stainless Steel
PT A-F	PTE	100	92	IP 45120	UPR (Resin)	Flammable, Harmful, Toxic to Reproduction	Harmful to aquatic organisms - may be dangerous for the aquatic environment if released.	H226, H319, H335, H361d, H372, H414	Stainless Steel
PT A-F	PTF	100	92	IP45121	UPR (Resin)	Flammable, Harmful, Toxic to Reproduction	Harmful to aquatic organisms - may be dangerous for the aquatic environment if released.	H226, H319, H335, H361d, H372, H414	Stainless Steel
HT 22-31	HT22	50	49	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	Stainless Steel
HT 22-32	HT23	50	49	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	Stainless Steel
HT 22-33	HT24	50	44	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	Stainless Steel
HT 22-34	HT25	50	45	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	Stainless Steel
HT 22-35	HT26	50	47	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	Stainless Steel
HT 22-36	HT27	50	47	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	Stainless Steel
HT 22-37	HT28	50	47	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	Stainless Steel
HT 22-38	HT29	50	47	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	Stainless Steel
HT 22-39	HT30	50	47	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	Stainless Steel
HT 22-40	HT31	50	47	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	Stainless Steel
PT K-M	PTK	80	70	IP 25246	UPR (Resin)	Flammable, Harmful, Toxic to Reproduction	Harmful to aquatic organisms - may be dangerous for the aquatic environment if released.	H226, H315, H319, H335, H361d, H372, H412	Stainless Steel
PT K-M	PTL			NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	NOT IN USE	Stainless Steel
PT K-M	PTM	80	70	IP 61115	UPR (Resin)	Flammable, Harmful, Toxic to Reproduction	Harmful to aquatic organisms - may be dangerous for the aquatic environment if released.	H226, H315, H319, H335, H361d, H372, H414	Stainless Steel
PT T-V	PTT	55	50	IP 18125	UPR (Resin)	Flammable, Harmful, Toxic to Reproduction	Harmful to aquatic organisms - may be dangerous for the aquatic environment if released.	H226, H315, H319, H335, H361d, H372, H415	Stainless Steel
PT T-V	PTU	55	50	IP 92223	UPR (Resin)	Flammable, Harmful, Toxic to Reproduction	Harmful to aquatic organisms - may be dangerous for the aquatic environment if released.	H226, H315, H319, H335, H361d, H372, H416	Stainless Steel
PT T-V	PTV	55	50	IP 15239	UPR (Resin)	Flammable, Harmful, Toxic to Reproduction	Harmful to aquatic organisms - may be dangerous for the aquatic environment if released.	H226, H315, H319, H335, H361d, H372, H417	Stainless Steel
N/A	RMT60	80	80	RM 0041	Calcium Carbonate	Non Hazardous	N/A	N/A	Carbon Steel

All of the storage tanks are above ground and have been visually inspected for signs of degradation or corrosion mechanisms by a competent EEMUA 159 Tank assessor from TesTex on 10th October – 21st October 2011. A 350 page report was compiled (Report number VIS-11-10-730) and actions were taken in accordance with recommendations and issues raised.

Each atmospheric storage tank on site has had an individual Written Scheme of Examination (WSE) created by a competent person. The WSE's all include the following details:-

- **Technical Details**
  - ⇒ The design and construction details of the tank, including the usage and operating conditions of the tank and reference to the appropriate drawings.
  - ⇒ Details of the auxiliary equipment associated with the tank, which will have a separate preventive maintenance routine.
  - ⇒ Details of tank fixtures.

- **Corrosion Mechanisms**
  - ⇒ Likely degradation mechanisms for the storage tank, taking in to account the materials of construction, the tank contents and the normal and operating conditions.

- **Risk Assessment**
  - ⇒ In order to determine the Inspection frequency for all storage tanks, the site developed a Risk Rating system. This system uses a Risk Assessment methodology in order to determine the risk rating of each storage tank.

- **Tank history**
  - ⇒ Including any changes to contents, usage or capacity.

- **Tank repairs**
  - ⇒ Including any painting, welding or other repairs to tank or associated ancillary equipment.

- **Anticipated repairs**
  - ⇒ This includes future repairs to complete if the tank remains in operation.

- **Recommendations**
  - ⇒ Any other recommendations by the testing company.

All tanks on site are subject to in service and out of service inspections determined by the risk assessment findings. All completed inspections are undertaken in accordance with EEMUA 159 guidance by an approved, competent EEMUA Assessor. This procedure, risk assessment methodology and inspection regime was approved by the HSE.

Details of the last external visual inspection and the last Non Destructive testing dates is shown in *table 9* below, including the next due dates for NDT testing where this is yet to be completed.

Table 9 - Storage tank inspection summary

Bund	Tank	Capacity		Contents/Use		Inspection/testing	
		m3	Operational (T)	Code	Material	Visual Inspection	NDT
RMT01	RMT1	30	30	11200	Styrene Monomer	10/10/2011	Aug-16
PT A-F	PTA	100	92	IP 13239	UPR (Resin)	10/10/2011	13/05/2015
PT A-F	PTB	100	92	IP 66109	UPR (Resin)	10/10/2011	13/05/2015
PT A-F	PTC	100	92	IP 61119	UPR (Resin)	10/10/2011	13/05/2015
PT A-F	PTD	100	92	NOT IN USE	NOT IN USE	10/10/2011	13/05/2015
PT A-F	PTE	100	92	IP 45120	UPR (Resin)	10/10/2011	13/05/2015
PT A-F	PTF	100	92	IP45121	UPR (Resin)	10/10/2011	13/05/2015
HT 22-31	HT22	50	49	NOT IN USE	NOT IN USE		
HT 22-32	HT23	50	49	NOT IN USE	NOT IN USE		
HT 22-33	HT24	50	44	NOT IN USE	NOT IN USE		
HT 22-34	HT25	50	45	NOT IN USE	NOT IN USE		
HT 22-35	HT26	50	47	NOT IN USE	NOT IN USE		
HT 22-36	HT27	50	47	NOT IN USE	NOT IN USE		
HT 22-37	HT28	50	47	NOT IN USE	NOT IN USE		
HT 22-38	HT29	50	47	NOT IN USE	NOT IN USE		
HT 22-39	HT30	50	47	NOT IN USE	NOT IN USE		
HT 22-40	HT31	50	47	NOT IN USE	NOT IN USE		
PT K-M	PTK	80	70	IP 25246	UPR (Resin)	10/10/2011	Aug-16
PT K-M	PTL			NOT IN USE	NOT IN USE	10/10/2011	
PT K-M	PTM	80	70	IP 61115	UPR (Resin)	10/10/2011	Aug-17
PT T-V	PTT	55	50	IP 18125	UPR (Resin)	10/10/2011	Aug-17
PT T-V	PTU	55	50	IP 92223	UPR (Resin)	10/10/2011	Aug-17
PT T-V	PTV	55	50	IP 15239	UPR (Resin)	10/10/2011	Aug-17

6.1 Storage Bunds

All bulk liquid storage tanks are stored in secondary containment bunds. These bunds are used to contain any materials that could be released, should the safety systems fail on the primary containment. Risk Assessments for each of the sites bunded storage areas have been complete in order to ensure sufficient protective measures are in place to prevent unplanned releases from primary containment tanks and also to ensure that the secondary containment is of suitable size and condition to prevent escape of any material that is released unintentionally.

The “hazardous material storage risk assessments” are shown in **appendices 1 - 5**

The “bunded tank assessments” is shown in **appendix 6**

The integrity of the sites secondary containment measures is a key pollution prevention measure should a release from the primary containment systems occur. In order to ensure the continued integrity of the secondary containment measures, the condition has been monitored using the following systems.

- Contractor N J James Ltd was appointed to carry out a visual inspection of all existing bund structures at the Arkema site.

The purpose of the inspection was to establish the condition of the existing bunds relevant to the Environment Agency secondary containment policy requirements. The inspection was carried out on the 18th January 2012 and was made on a visual basis only; no plant or equipment was moved, no breaking out or intrusive investigations were undertaken. A summary of the bund conditions from this report are given below in *table 10.*

Table 10 - Bund structural integrity summary

	*Bund Material contents *Assumed worst case raw material within bund**			Bund condition		
Bund area	**Hazards**	**Environmental Toxicity Information**	**5% top tier COMAH**	**Walls**	**Slab**	**Remedial works / Comments**
Holding Tanks - 22 - 31 Not currently in use	Flammable, Harmful	Do not discharge into drains or the environment, Insoluble in water	No	Good	Fair	No Improvement required at this time. Continue to monitor.
PT A-F	Flammabe, Harmful	Do not discharge into drains or the environment, Insoluble in water	No	Fair	Fair	No Improvement required at this time. Continue to monitor.
PT KLM & TUV	Flammabe, Harmful	Do not discharge into drains or the environment, Insoluble in water	No	Fair	Fair	No Improvement required at this time. Continue to monitor.
STYRENE BUILDING	Flammabe, Harmful	Harmful to aquatic organisms	Yes	Good	Good	No Action Required

- In accordance with site Proc 10.002 (Procedure for Planned General Inspections), tanks and bunds have, and continue to be formally inspected on a monthly basis using an inspection checklist system, this checklist includes the following criteria:

Criteria	
1	Bunds are free of water?
2	Bund pump in place to remove water and operational?
3	Bund is clear of all debris
4	Loading/offloading pipework is in good condition?
5	All Static earthing points, clips and leads are in good condition?
6	Sample drip pails/drums are not full and are correctly labelled?
7	Offloading hoses appear in good condition?
8	There are no visible damage/cracks/faults etc to the bund wall?
9	There are no visible damage/cracks/faults etc to the bund floor?
10	There any no signs of vegetation growing in the bund?
11	There are no signs of damage, leaks or corrosion on any of the tanks contained within the bund?

6.1.1 Pipework inspection

The site ensures that all pipes and lines are regularly inspected to in order to identify any early signs of degradation that may lead to releases that could harm the environment. Pipework is inspected using the following systems and procedures:

- Informal visual inspections of transfer pipelines are conducted by site personnel during supervision of tanker loading / offloading.
- Pipework is inspected visually as part of the monthly bund PGI checks *(as above).*

In addition to this, a site wide pipeline inspection was carried out at Arkema Coatings Ltd, Stallingborough, on the 30th April to 30th May 2012 by TesTex, in accordance with Inspection Procedure Proc-010.

The inspection consisted of the following:

- A full visual inspection with digital images recorded for reporting purposes.
- Spot Ultrasonic (UT) thickness measurements to ascertain baseline readings.
- Additional UT scans and measurements to areas of concern at visual inspection.

No areas of concern have been highlighted for the remaining tanks on site as a result of these inspections.

6.2 Process Hazard Analysis

In addition to the Risk Assessment and inspections mentioned above, site management have completed detailed process Hazard Analysis (PHA) risk assessments for the offloading and storage of base resin and styrene on site. These high level process based risk assessment have been used to identify all potential failure modes on the systems and ensure sufficient layers of protection (technical, procedural, human) are in place to prevent process incidents, such as fire/explosion or loss of containment etc.

The completed PHA's can be found in *Appendix 8a* (Styrene offloading and storage) and *Appendix 8b* (resin offloading and storage.

7 Management

7.1 Introduction

The site has an integrated HSEQ Management Policy in place, which clearly describes the sites aims, objectives and commitment to the management of environmental issues, including *"to continually strive to reduce emissions to air, water and land and to ensure that systems are installed to prevent pollution are fully effective".*

The site was accredited to the ISO14001 Environmental Management system for the life of the part (a) permitted activities (2006-2014) and as such has a documented management system to effectively control all potentially environmentally harmful processes. When the coatings resins facilities where shut down in July-2014, the ISO14001 accreditation was not renewed, however, the policies and procedures remain in place to cover the remaining processes on site. The master reference for the system is the SHE manual (*Doc ref – Man 1.001*). The full SHE Management System Manual can be found in *appendix 9,* and a summary of some of the environmental systems described in the management system manual is given in section 7 below.

The EMS provides a vehicle for ensuring compliance with relevant environmental legislation. Key environmental aspects for the site have been identified such as raw materials selection and consumption, emissions and associated abatement, waste generation and disposal, energy use and consumption and the general site ground condition.

The site remains accredited to OHSAS 18001 and ISO 9001.

7.2 Operations and Maintenance

7.2.1 Documented Procedures

As part of the environmental management system at the installation, a review has been undertaken to identify the environmental aspects/impacts of the activities, products and services over which the installation has control or could be expected to have an influence. These are maintained in an environmental aspects and impacts register, which also includes maintenance activities and potential emergency scenarios.

In order to control those operations that may have an adverse significant impact on the environment, ACR has a number of documented procedures. These include:

- Operational procedures. These are divided into two process areas covering all aspects of manufacturing and control at the installation and are supported by training manuals.
- Emergency control plan that identifies roles and responsibilities in the event of an accident scenario at the installation.
- Spillage procedures.
- Waste disposal procedures.
- Materials delivery procedures.

Procedures include details of personnel responsibilities associated with the issue or plant covered.

7.2.2 Preventative Maintenance

The site operates a full planned preventative maintenance system for reviewing and prioritising items of plant/equipment requiring preventative maintenance. This includes the maintenance of all plant/equipment to ensure health, safety, environment, quality and production standards are not adversely effected by faulty machinery and to ensure all legislative requirement are being met. All planned maintenance is recorded scheduled and controlled by the site Shires asset control database.

All bunds and storage tanks are visually inspected for signs of damage or corrosion on a monthly basis as described in *section 6.1*. The hard standing and interceptors are inspected on an annual basis for signs of damage or wear. The inspections and frequencies are detailed in procedure *Proc 10.002 – "Planned General Inspection procedure"*.

The operation of the Planned Preventative Maintenance and Inspection Programme is covered by the sites internal auditing schedule to ensure the programme is being performed in accordance with the specified requirements.

The site also has a well implemented breakdown maintenance system, whereby all problems are promptly recorded on a database and repairs are allocated on a priority basis. This system allows breakdowns to be categorised and environmental, safety, production or quality issues.

7.2.3 Monitoring emissions and impacts

Environmental Emissions and impacts are monitored and measured according to the following procedures.

- Atmospheric VOC monitoring – Proc 7.002
- Dust Emission Monitoring – Proc 7.003
- Aspects and impacts assessment – Proc 7.007
- Determination of suspended solids – MO9.067
- Determination of COD – MO9.068
- Determination of pH – MO9.069

Procedures cover the monitoring frequency, method and location, together with an assessment of the significance of results considering uncertainty and accuracy of the equipment. Monitoring is conducted to meet the requirements of the current EPR part (a) permit for the site.

The calibration of monitoring equipment is the responsibility of the HSE Manager. Calibration of the COD and pH measurement is covered within the associated procedure. The VOC monitoring equipment is sent away to be calibrated annually by the manufacturer. The dust monitor is calibrated annually by a contractor to MCERTS standards.

Sampling and monitoring is carried out by the HSE Manager, and at the weekends, the Shift Technicians. Appropriate training has been given to the personnel in question.

The monitoring procedures will be upgraded as necessary to reflect any new requirements arising from the part (b) permit.

7.3 Competence and Training

All employees are given Environmental awareness training when they join the company and on a 3-yearly refresher basis, which was last completed in 2013. The training is given by the HSE manager and explains the following:

- The ways the site impacts on the environment (e.g. air emissions, waste disposal etc.)
- What can be done to minimise the impacts of these effects, including roles and responsibilities.
- The role of the Environment Agency EPR Regulations.
- Other legislative requirements.
- The requirements of the site Environmental Management System.

Key personnel that have environmental roles on site, have their responsibilities documented in role profiles. Training profiles are developed from these roles and these are documented and records are kept in the training records office.

These individuals also receive training in the requirements for reporting abnormal plant occurrences and possible breaches of permit conditions. It is the responsibility of the HSE Manager for reporting such incidents to the relevant authority.

Training needs for each department and for individuals are reviewed annually at the time of staff appraisals, and on an ongoing basis where new requirements may occur as a result of changing circumstances.

All contractors receive an induction when they first come on to site; the induction is valid for 2 years. The induction principally covers:

- Emergency procedures on site, including spillage procedures
- The permit to work system
- Site rules
- Waste disposal considerations
- PPE

Contractors must sign their training off to state that they have received and understood the information provided.

The site induction and environmental awareness training will be reviewed within 6 months of the part (b) permit issue and where appropriate updated to reflect the changes caused by the forthcoming permit. Any significant changes will be communicated to appropriate site personnel through refresher training.

Prior to commencing any work the contractors must obtain a permit to work from the Section Leaders, HSE Manager, PMB Technicians or Production Manager. At the issue of the permit all relevant hazards and potential Environmental impacts will be discussed. All persons required to issue permits to work are fully trained, refreshed every 3 years.

Jobs that are more complex require risk and method statements. The contractors in conjunction with the HSE manager, Production Manager and Plant manager complete these and ensure suitable HSE control measures are in place prior to authorising the work to proceed. For jobs that are likely to generate waste the HSE Manager is consulted to ensure quantities are minimised.

7.4 Accidents/Incidents/Non-conformance

The site has well established QSHE event reporting and investigation procedures (Proc 8.001 & Proc 8.002). This procedure is intended for use for any adverse event that occurs both on the Stallingborough site, or externally, related to transport, warehousing or an incident at our customers' premises.
It is used for all Health, Safety, Environmental and Quality accidents and near misses. This includes all events that have caused, or could cause one or more of the following losses:

- Personal injury or illness;
- Environmental damage;
- Quality failures;
- Customer quality complaints
- External environmental complaint;
- Damage to plant or equipment;
- Economic losses - For product and equipment etc;
- Production losses;
- Incident or failure that has exhibited abnormal process or control characteristics, or;
- Impact on public opinion, or damage to the company's reputation.

The Stallingborough site uses the IMPACT ERM software system for reporting, managing and tracking all events from initial reporting, right through until completion. Detailed Root Cause Analysis investigations are completed for all QSHE events on site, these reports are communicated throughout the site and also globally throughout the business unit in order for other sites to learn from mistakes. Actions are assigned for all events and actions tracked using the Impact system.

There is a full internal audit plan designed to cover all aspects of the Quality, Health, Safety and Environmental Management system on an annual basis. This plan is carried out by trained internal auditors and arranged in such a way that, wherever possible, the auditor is independent of the area/function being audited. The system is documented in *Proc 10.001 – "Internal QSHE auditing procedure*".

There is an annual SHE management review where the Safety, Health and Environmental performance for the previous year is reported. The agenda of the meeting is as per ISO14001 requirements. In addition, there is a monthly environmental performance report maintained, published and distributed to all personnel.

The site reports environmental performance data to the Environment Agency on a quarterly and annual basis, this includes:

- COD & Suspended solids data for water discharges (Quarterly)

The annual report to the EA, includes:

- Commercial output of the site
- Raw materials consumed
- Energy consumption
- Water consumption
- Waste Production data
- REPI – Pollution Inventory Reporting (Air emissions, releases to controlled waters, waste transfers)

In addition to the EA report, the site has to complete and annual environmental report to the Arkema corporate environmental team, called the REED report. This is a very detailed report containing energy and environmental performance, including, but not limited to:

- Fugitive air emissions
- Stack air emissions
- Energy & Fuel consumption + expenditure
- Water/effluent discharges
- Waste disposal breakdown

These annual reports are audited by the corporate team before being validated.

The site has implemented and maintains detailed emergency procedures. These procedures are described in the site Emergency Procedure Manual – Man3.001 – which can be found in *appendix 10.* This manual and its associated procedures are intended to cover all types of (major) emergencies that could occur at Arkema, Stallingborough and includes:

- Fire & Explosion.
- Major Spillage.
- Bomb Threat.
- Environmental Incidents.
- Emergencies arising from external sources.

7.5 Organisation

The company has an integrated HSEQ policy that details its commitment to compliance with relevant legislation, continuous improvement of environmental performance through the setting of objectives and targets, energy efficiency, waste reduction and emission reduction. This integrated policy includes the requirements of an Environmental policy as well as health and safety and quality issues.

The policy is located in key positions around the site and is also included in quarterly reports. The policy is reviewed annually at the SHE management review.

An organogram showing environmental roles and responsibilities can be seen *in figure 9* of the figures section.

There is a SHE project pre-assessment procedure that is used to identify options for using energy efficient equipment, minimising waste from new projects/equipment and minimising emissions. This process is detailed in *Proc 5.018 - SHE Engineering Project Risk Assessments.*

Capital expenditure for new build projects can only be approved once signatures are obtained from the HSE Manager, Plant Manager and Production Manager, to ensure that Environmental Issues are considered at the purchasing stage.

The company operates a fully electronic document control system to ensure that only authorised people can edit and issue documents on the site. This ensures that all personnel have access to the same version of a given document be they operating procedures, test methods or manuals and policies. The document control system is called "Quality Workbench"

Objectives and targets are reviewed on a monthly basis and the reports are kept in electronic format.

Audits, both internal and external are also kept electronically with an additional hard copy being located in the HSE Manager's office.

All corrective actions are entered on to the Impact system database and this is monitored and managed by the HSE Manager to ensure prompt completion of the actions.

8 Assessment of potential impact

This assessment was initially completed in 2006 as part of the site part (a) permit application. As the site is now much smaller, with the closure of the reactor building and associated processes, this assessment is still considered valid as a worst case scenario – **This is a direct copy from the 2006 permit application.**

The environmental effects the site has will be greatly reduced since these closures, due to a significant reduction in production capacity, reduction in the solvent types used, removal of large combustion boilers and as a result, a significant reduction in process emissions.

Full details of the 2006 assessment are given below. The site does not intend to review this assessment at this time, unless otherwise instructed. If instructed, the plan will be to complete this assessment following the completion of the emission monitoring exercise describe in *section 5.*

8.1 Impact assessment for point source emissions to air

8.1.1 Introduction

In order to assess the impact of the installation emissions to air on the environment, a screening assessment has been carried out for the principal process emission points, using the H1 software tool with reference to Horizontal Guidance Note H1.

An assessment has also been made of the potential impact of emissions on designated Habitat sites identified within 10km of the installation, discussed in *section 8.1.6* below.

Emissions are quantified and discussed in *Section 4*.

8.1.2 Air Quality Standards

For several of the most commonly emitted pollutants there are air quality objectives defined in the National Air Quality Strategy (NAQS) that must be achieved on a national scale by a set date – typically 2005. These so-called criteria pollutants include nitrogen dioxide and sulphur dioxide and the objectives can be regarded as legislative limits that cannot be exceeded.

For all other pollutants, there are no formal legislative limits for ambient air. In these cases, Environmental Assessment Levels (EALs) can be used to assess impact. EALs are based on Occupational Exposure Limits (OELs), divided by appropriate safety factors to account for the fact that sensitive parts of the population (such as the elderly) that are not protected by the OELs, may be exposed to ambient concentrations. EALs are provided in the EA Horizontal Guidance Note H1 for reference.

Since the emissions from the installation are mixed into the ambient air, an assessment must also include the contribution to pollutant levels derived from the ambient background levels. The Process Contribution (PC) must therefore be added to an appropriate Ambient Concentration (AC) to give the total Predicted Environmental Concentration (PEC). It is the PEC that must be compared with the appropriate EAL to ensure that air quality is not being significantly affected.

NAQS Objectives and EALs are set for both short term and long term averaging periods. It is unrepresentative to add the worst case PC to the worst case AC since it is highly unlikely that the two will coincide at the same event. Therefore, the AC added to the short term PC is typically a multiple of the annual average concentration, rather than the short term concentration over the equivalent averaging period.

There are additional National Objectives for the Protection of Vegetation and Ecosystems (NOPVEs) defined for various pollutants including sulphur dioxide and nitrogen dioxide, and Critical Levels for the Protection of Vegetation and Ecosystems (~~NOPVEs~~CLPVEs) defined for ammonia. These levels have been used to assess impact on sensitive Habitats sites - see Section 4.1.9 of this report.

8.1.3 Ambient Concentrations

The ambient concentrations of criteria pollutants (SO_2, NO_2) are available from the DEFRA background pollutant database http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2011, and are averaged over 1km^2 grids across the UK.

Ambient concentrations in the vicinity of the Stallingborough installation are detailed in *Table 11* below.

Table 11 - Pollutant background concentrations at the Stallingborough installation

Year	NO_X(µg/m^3) (1)	NO_2 (µg/m^3) (1)	PM10 (µg/m^3) (1)	Benzene (µg/m^3) (1)	CO_2(µg/m^3) (1)
2001	35.8	22.7	19.1	0.405	0.261
2003	-	-	-	-	-
2004	-	-	18.4	0.367	-
2005	32.1	21	-	-	-
2006	27.8	19.2	18.6	-	-
2007	27.0	18.8	18.4	-	-
2008	49.4	27.6	18.7	-	-
2009	47.2	26.7	18.3	-	-
2010	74.3	37.5	19.3	-	-
2011	59.3	34.2	19.7	-	-
2012	58.1	33.7	19.5	-	-
2013	56.8	33.2	19.2	-	-
2014	55.5	32.6	19.0	-	-
2015	54.3	32.1	18.8	-	-

Data taken from pollutant maps, UK Air Quality Strategy at grid reference [521500, 414500]

Typically ambient concentration data for non-criteria pollutants is not available, as these are not routinely or widely monitored. Therefore, in the absence of any available data and for the purposes of this assessment it is assumed that ambient concentrations of the pollutants emitted from the installation is zero.

North East Lincolnshire Council has completed the Air Quality Review and Assessment process and have designated two AQMA's. The first was declared in Immingham in October 2006 for particulate matter (PM10). The 24 hour mean objective had been exceeded in 2004 and 2005. The AQMA includes a residential area on Kings Road and Pelham Road, Immingham

The second AQMA has been more recently designated, in September 2010. This is for the nitrogen dioxide (NO2) annual mean objective that has been exceeded in 2008 & 2009. The AQMA includes a residential area on Cleethorpe Road, Grimsby.

None of these areas are thought to be affected by site activities.

8.1.4 H1 Screening Assessment Methodology

According to the methodology outlined in the Horizontal Guidance Note H1, it is possible to screen out insignificant emissions and those emissions where further assessment is not required, based on the appropriate Environmental Assessment Level (EAL) for each pollutant. Screening of the emissions is achieved using the simplified dispersion factors contained within H1. These factors are applied based on the effective stack height of the emission source and are used to estimate the ground level concentration per unit release of pollutant.

The degree of dispersion – and hence the likely ground level concentration – arising from an elevated pollutant release is affected by the presence of other buildings or structures in the vicinity of the stack. These structures can cause downwash to occur, which increases the ground level concentration arising from the emissions and in effect reduces the effective height of the release.

The effective stack height is calculated by assessment of the buildings close to the stack, which could affect the dispersion of the release. Effective stack heights have been calculated for each source, based on the methodology provided in the Horizontal Guidance Note H1. This states that:

- *Where the point of discharge is less than 3 m above the ground or building on which it is located, or is less than the height of any building within the equivalent of five stack heights,….the effective height of release can be considered to be zero;*
- *Where the height of release is greater than 3 m above the ground or building on which it is located, but less than 2.5 times the height of the tallest adjacent building, the effective height of release can be estimated:*

$U_{eff} = 1.66 \times H \{(U_{act} / H) - 1\}$

Where H = height of tallest adjacent building within five stack heights

U_{act} *= actual release height*

U_{eff} *= effective release height.*

The effective height of release from each source is provided in the H1 tables in the appendix. From this information, the appropriate entry in the Table in H1 can be selected for each release. Using the Table in H1 together with the release conditions, it is possible to estimate the worst case ground level concentrations arising from each source over short term and long term averaging periods. The predicted process contribution (PC) can then be compared with the appropriate Environmental Assessment Level contained in H1 to determine the significance of the pollutant emission; the total pollutant emission is defined as insignificant where:

- PC <= 1% of the EAL for long term releases;
- PC <= 10 % of the EAL for short term releases;

In addition, an estimate of the Predicted Environmental Concentration (PEC) can be made, by adding the PC to an appropriate estimate of the background Ambient Concentration (AC). The PEC can be compared with the appropriate Environmental Assessment Level to identify whether detailed modelling of emissions is necessary; a pollutant emission is considered to need further modelling where:

- Predicted Environmental Concentration (PEC) > 70% of the EAL for long term releases; or
- Process Contribution (PC) > 20 % of the difference between short term EAL and twice the long term AC.

An assessment has been made of the emissions to air from point sources at the installation. Selection of appropriate emissions data for each vent during normal operation is discussed in *Section 4*.

The results of the screening assessment are shown in *table 12* (below), and are discussed below.

8.1.5 Screening Results

The screening assessment, based on 2005 monitoring data, indicated that the combined emissions of the following pollutants are predicted to result in concentrations below the threshold for insignificance defined in H1:

- Xylene
- Styrene
- Acetone
- Toluene
- 2-Ethyl-4-Methyl-1,3-dioxolane
- Carbon Monoxide

Long term and short term predicted concentrations of these emissions are below 1% and 10% respectively of the relevant Environmental Assessment Levels. In accordance with H1 Guidance it is therefore considered that the impact from these emissions is unlikely to be significant, therefore further assessment of the emissions using detailed modelling has not been undertaken.

Table 12 - H1 Screening assessment - Process Contributions

Environment Agency H1 Database - [Air Impact Screening Base Option]

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module 3

3.3.2 Air Impact Screening

Screen out Insignificant Emissions to Air

This page displays the Process Contribution as a proportion of the EAL or EQS. Emissions with PCs that are less than the criteria indicated may be screened from further assessment as they are likely to have an insignificant impact.

Number	Substance	Long Term EAL	Short Term EAL	Long Term			Short Term		
				PC	% PC of EAL	> 1% of EAL?	PC	% PC of EAL	> 10% of EAL?
		µg/m3	µg/m3	µg/m3	%		µg/m3	%	
1	Xylene, o-, m-, p- or r	4,410	66,200	0.0214	0.000485	No	0.532	0.000804	No
1	Styrene	800	800	0.0664	0.00830	No	11.0	1.37	No
1	Carbon monoxide	350	10,000	1.37	0.390	No	35.3	0.353	No
2	Nitrogen dioxide (ecc	30.0	-	5.45	18.2	Yes	141	-	
2	Acetone	18,100	362,000	0.0214	0.000119	No	0.532	0.000147	No
3	Toluene	1,910	8,000	0.0327	0.00171	No	0.813	0.0102	No
3	Nitrogen dioxide (hur	40.0	200	5.45	13.7	Yes	141	70.6	Yes
4	2-Ethyl-4-Methyl-1,3-(	606	18,180	0.0372	0.00613	No	0.925	0.00509	No

PC = Process Contribution; EAL = Environmental Assessment Level

8.1.6 Habitats Assessment for Emissions to Air

Habitat Sites within 10km of the installation have been identified and are detailed in *table 13 below*. The potential impact of emissions from the installation on sensitive Habitat receptors has been assessed using the EALs for ecological receptors contained within H1, which correspond to the National Objectives for the Protection of Vegetation and Ecosystems (NOPVE) for nitrogen dioxide.

Table 13 - Identified habitat sites

Receptor	Designation	Area (Ha)	Grid Ref	Distance from Installation (km)
Humber Flats, Marshes and Coast	Ramsar	14962.5	522500, 414700	1.3 North East
Humber Flats	SPA	15007.7	522500, 414700	1.3 North East
Humber Estuary	SSSI	37000.6	522000, 415000	0.7 North East
North Killingholme Haven Pits	SSSI	21.6	516900, 419600	6.3 North West
Kirmington Pit	SSSI	9.1	510100, 411600	11.7 West

8.1.7 Deposition to Land from Air

An assessment has been made of the impact of emissions from the installation on land through deposition from the air, as defined in the H1 guidance.

The H1 methodology indicates that for pollutants where no Maximum Deposition Rate (MDR) is defined if the process contribution (PC) is less than 1% of the EAL there is unlikely to be a significant impact on soils. Emissions of the following substances can be screened as insignificant on this basis, as none of these species have MDRs listed in the H1 guidance.

- Styrene
- Xylene
- Acetone
- Toluene
- 2-Ethyl-4-Methyl-1,3-Dioxolane

There are therefore not considered to be issues associated with deposition to land associated with the installation.

8.2 Odour

In a period from 2003 – 2006 regular odour complaints were received. These were primarily from local residents in the nearby villages of Immingham (3.5 Km to the West of the site) and Stallingborough and Healing (4-5 Km to the South of the site). The complainants describe a sweet and sickly smell and claim the source to be our site.

Extensive investigations were undertaken to establish the cause of these complaints, which was discovered to be related to two different reactor effluent streams mixing to create the compound 2-ethyl-5,5-dimethyl-1,3-dioxane (2-EDD), during effluent treatment and discharge. The site implemented numerous actions in order to eliminate the source of these odour complaints, and as a result, no complaints have been received by the site, since 2006.

The sources of all historical odour complaints were from reactor building processes, which have now all been demolished or decommissioned. No odour complaints have ever been received as a result of the remaining processes /storage facilities on site.

9 Environmental Statements

No environmental impact assessment has been carried out under The Town and Country Planning (Environmental Impact Assessment)(England & Wales) Regulations 1999/293 as the site is an existing facility, operational since 1967.

Environmental aspect and impact assessments have been completed as required by ISO 14001.

10 Additional Information

Historically, the site has discharged effluent water on site, via Cristal Global outfall to the River Humber through release point W1 as described in *table 14* below, and shown on map in *figure 10* of the figures section.

Table 14 - Water discharge emission point

Release Point Reference	Source	Receiving water
W1	Main interceptor	Discharge is pumped to a lagoon on the neighbouring factory – Cristal – and hence to the Humber Estuary.

In the Part (a) permit discharge consents were set at 2000mg/l COD and 1000mg/l suspended solids for treated effluent through the sites BETP. However, since the shutdown of the reactor building processes, no process effluent requires treating, and as a result the BETP could not support activity so was decommissioned, the EA were informed.

Now, all uncontaminated surface water/domestic waste is passed through interceptors and discharged from the site straight to W1 from the sites main interceptor. Daily COD and suspended solids sampling/testing is still completed on all water discharges. The results of this sampling are still sent to the EA on a quarterly basis as per the part (a) permit conditions.

There are no releases to sewer from the Stallingborough site.

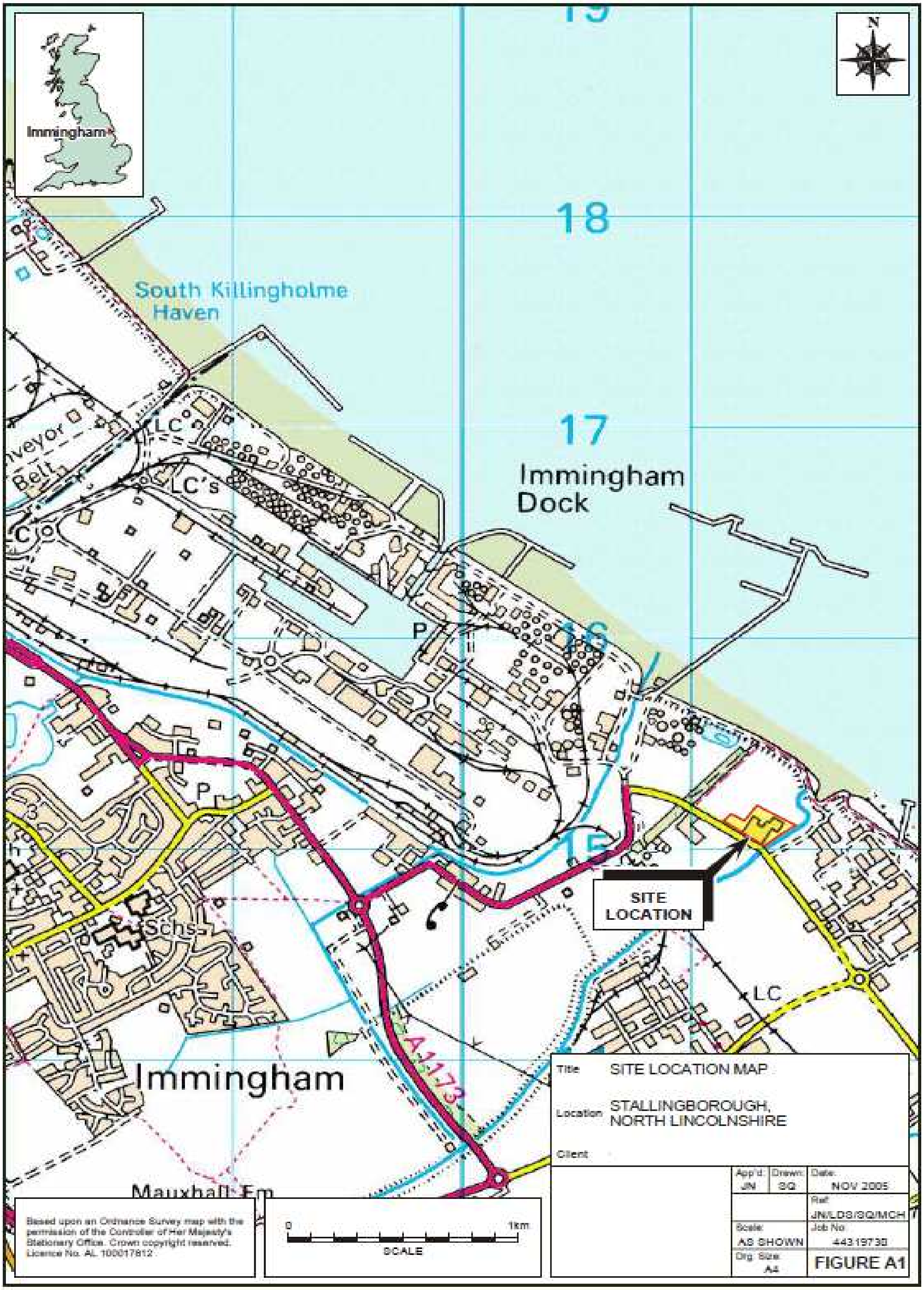
We have raised a question with the EA regarding if we will need a separate water discharge consent from the EA for storm water discharge, or whether this discharge be covered by the local authority who will be regulating us under the part (b) permit?

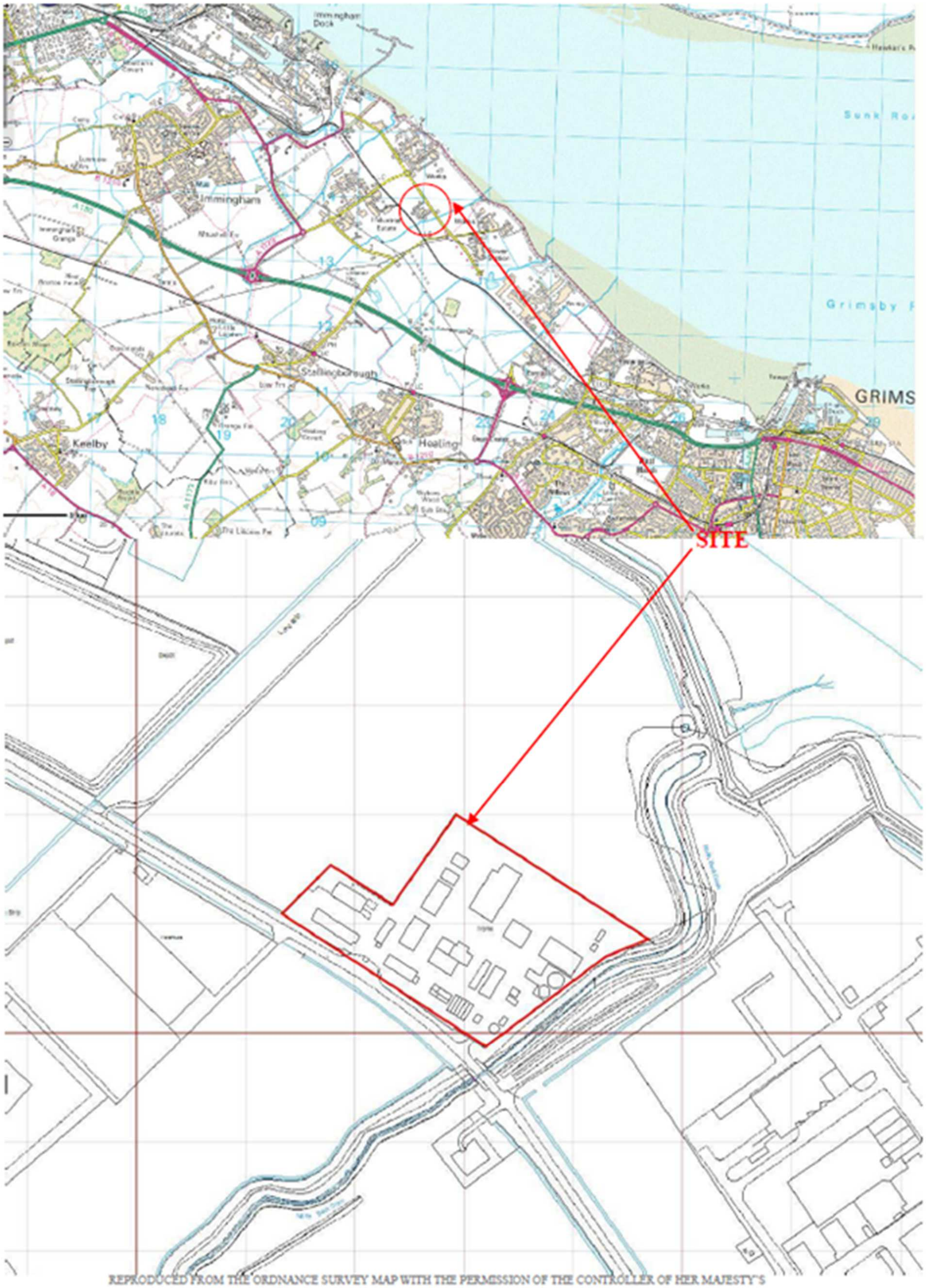
We have yet to receive clarification on this matter, and would like some further information as to how this will be regulated and whether we will need to continue daily COD and suspended solid sampling etc.

Any information that can be provided at this stage would be greatly received.

FIGURES

Figure 1 - Site Location Map





Immingham
Stallingborough
Keelby
Healing
GRIMS
Sunk Ro
Grimsby
SITE

Figure 2 - Site Layout

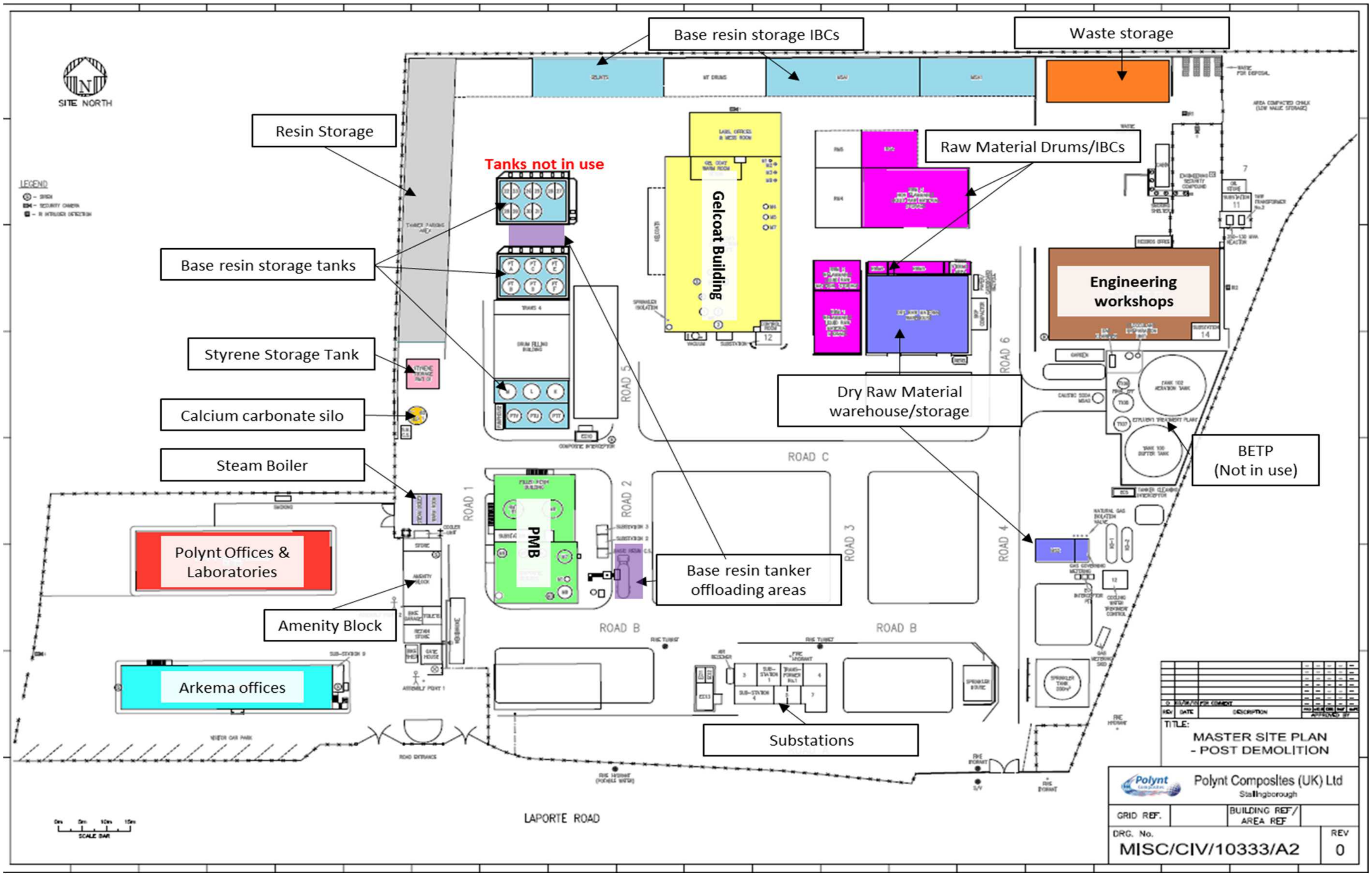


Figure 3 - Generic Process Flow

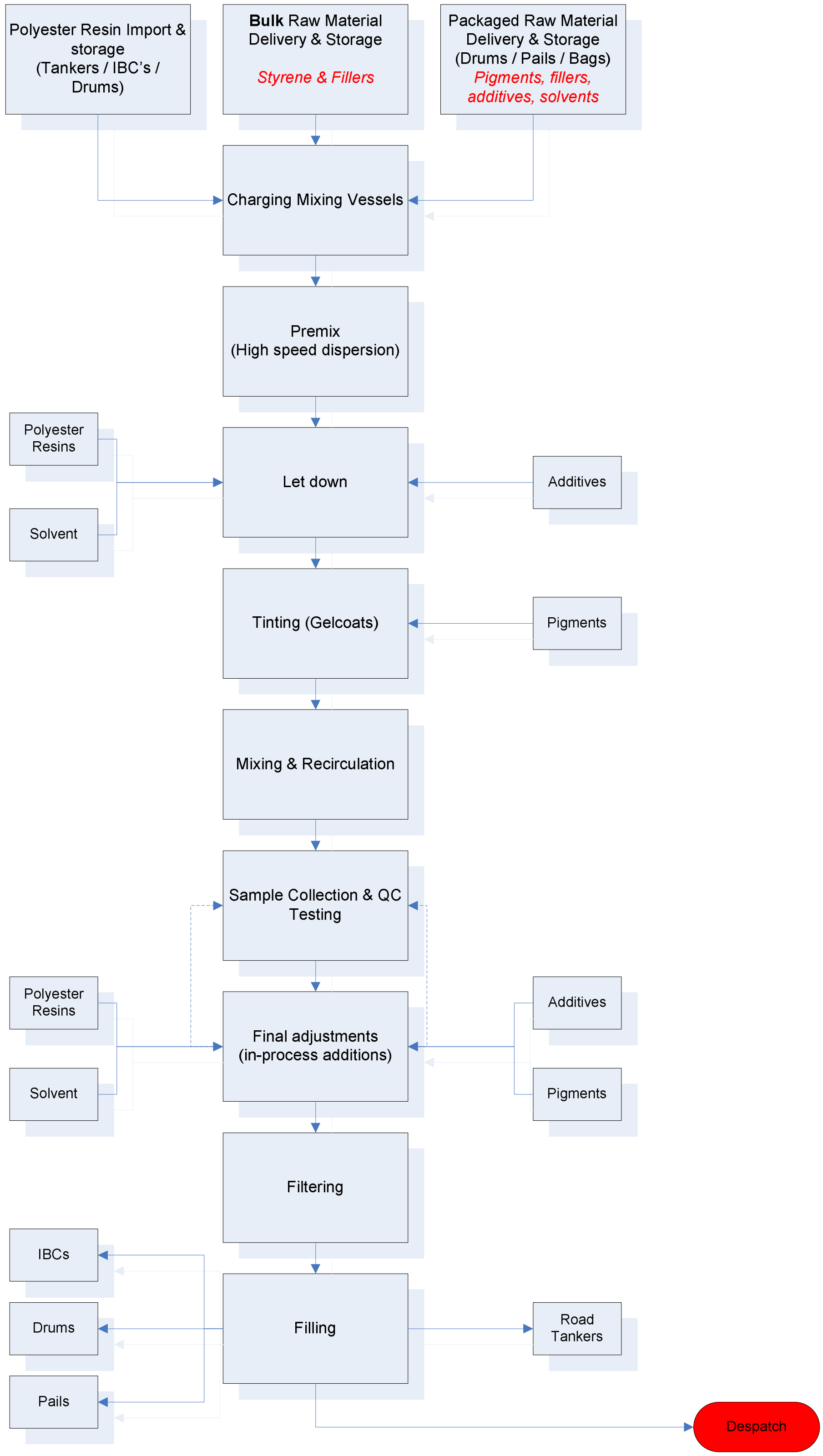


Figure 4 - Gelcoats and UPR generic process map

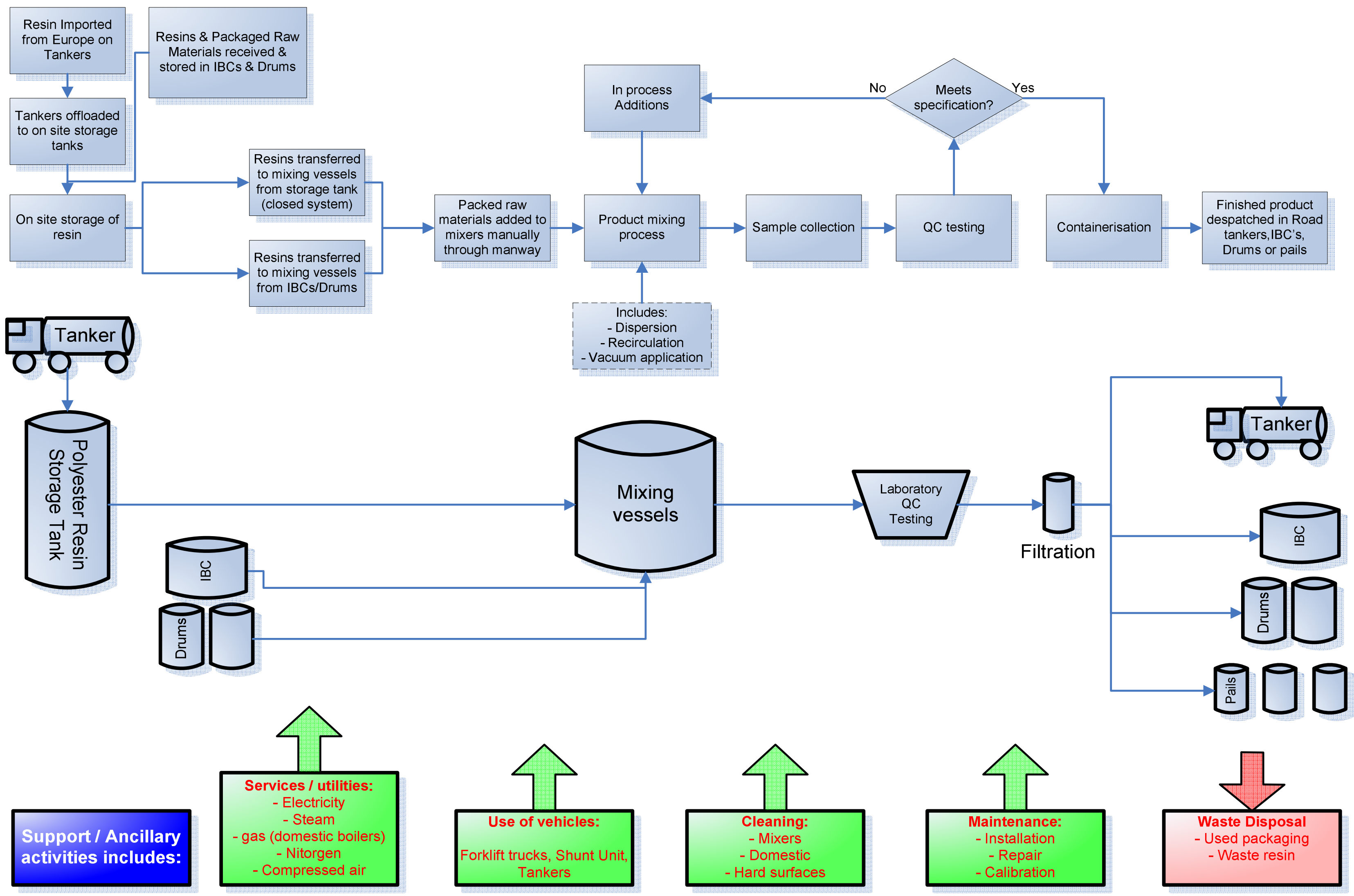


Figure 5 - Process Emissions

Process Stage / Activity		Source	Air Emissions	Odour	Fugitive	Point source	Release Points *(see plan)*
Receipt & Storage of Chemicals	Normal	Tanker venting *During/after offload*	VOC's *(Styrene)*	aromatic solvent	✓		
	Normal	Styrene Storage Tank scrubber venting - *During transfer*	VOC's *(Styrene)*	aromatic solvent		✓	A11
	Normal	Resin Storage Tank venting - *During transfer*	VOC's *(Styrene)*	aromatic solvent		✓	A10 - A21
	Normal	Silo Venting (during filling) *Powder*	Particulates *(Calcium Carbonate)*	None		✓	A4
	Normal	Storage Tank Breathing	VOC's *(Styrene)*	aromatic solvent		✓	A10 - A21
	Normal	Pump seals, flanges and connectors	VOC's *(Styrene)*	aromatic solvent	✓		
	Abnormal	*Fires*	Carbon oxides, smoke	N/A	✓		
	Abnormal	*Major Spillage (Liquid)*	VOC's *(Styrene)*	aromatic solvent	✓		
	Abnormal	*leaking valves, flanges, pipework*	VOC's *(Styrene)*	aromatic solvent	✓		
	Abnormal	*Spillage (Powder)*	Dust emissions	N/A	✓		

Process Stage / Activity		Source	Air Emissions	Odour	Fugitive	Point source	Release Points *(see plan)*
Gelcoats Production	Normal	Additions to mixing vessels *Pumped from storage*	VOC's *(Styrene)*	aromatic solvent	✓		A5
	Normal	Additions to mixing vessels *Pumped from drums/IBCs*	VOC's *(Styrene)*	aromatic solvent	✓		A5
	Normal	Additions to mixing vessels Solids additions via manlid	Dust emissions	N/A	✓		A5
	Normal	Collecting samples	VOC's *(Styrene)*	aromatic solvent	✓		A5
	Normal	Mixing / Vaccuum application	VOC's *(Styrene)*	aromatic solvent	✓		A31
	Normal	Filling containers (Drums, IBCs, Pails)	VOC's *(Styrene)*	aromatic solvent	✓		A5, A6
	Normal	Laboratory tests	VOC's *(Styrene)*	aromatic solvent	✓		A7, A8
	Normal	Vessel cleaning	VOC's *(Styrene)*	aromatic solvent	✓		A5
	Abnormal	*Vessel Overfill*	VOC's *(Styrene)*	aromatic solvent	✓		
	Abnormal	*Pump / Flange Leak*	VOC's *(Styrene)*	aromatic solvent	✓		
	Abnormal	*Gelation*	VOC's *(Styrene)*	aromatic solvent	✓		
	Abnormal	*Fire*	Carbon oxides, smoke	N/A	✓		

Process Stage / Activity		Source	Air Emissions	Odour	Fugitive	Point source	Release Points *(see plan)*
PMB Production	Normal	Additions to mixing vessels *Pumped from storage*	VOC's *(Styrene)*	aromatic solvent		✓	A2, A3
	Normal	Additions to mixing vessels *Pumped from drums/IBCs*	VOC's *(Styrene)*	aromatic solvent	✓	✓	A2, A3
	Normal	Additions to mixing vessels Solids additions via manlid	Dust emissions	N/A	✓	✓	A2, A3
	Normal	Adding Filler (ex silo) to mixer	Dust emissions	N/A	✓	✓	A2, A3
	Normal	Mixing (Vaccuum application)	VOC's *(Styrene)*	aromatic solvent		✓	A1
	Normal	Collecting samples	VOC's *(Styrene)*	aromatic solvent	✓	✓	A2, A3
	Normal	Filling containers (Drums, IBCs, Pails)	VOC's *(Styrene)*	aromatic solvent	✓	✓	A3, A36
	Normal	Filling Road Tankers	VOC's *(Styrene)*	aromatic solvent	✓		
	Normal	Laboratory tests	VOC's *(Styrene)*	aromatic solvent	✓	✓	A35
	Normal	Vessel Cleaning	VOC's (Styrene)	aromatic solvent	✓	✓	A2, A3
	Abnormal	*Vessel Overfill*	VOC's *(Styrene)*	aromatic solvent	✓	✓	A2, A3
	Abnormal	*Pump / Flange Leak*	VOC's *(Styrene)*	aromatic solvent	✓		
	Abnormal	*Gelation*	VOC's *(Styrene)*	aromatic solvent	✓		
	Abnormal	*Fire*	Carbon oxides, smoke	N/A	✓		

Process Stage / Activity		Source	Air Emissions	Odour	Fugitive	Point source	Release Points *(see plan)*
Ancillary services	Normal	Use of vehicles	Exhaust gases (CO2, SOx, NOx, particulates etc.	N/A	✓		
	Normal	Use of electricity (indirect)	carbon oxides, smoke	N/A	✓		
	Normal	Inert Gas use - Nitorgen	Nitrogen	N/A	✓		
	Normal	Maintenance activities - Line breaking	VOC's (Styrene)	aromatic solvent	✓		
	Normal	Maintenance - Painting	VOC's	aromatic solvent	✓		
	Abnormal	Emergency generator	Exhaust gases (CO2, SOx, NOx, particulates etc.	N/A	✓		
			Diesel Fumes	Characteristic	✓		

Figure 6 - Emission sources

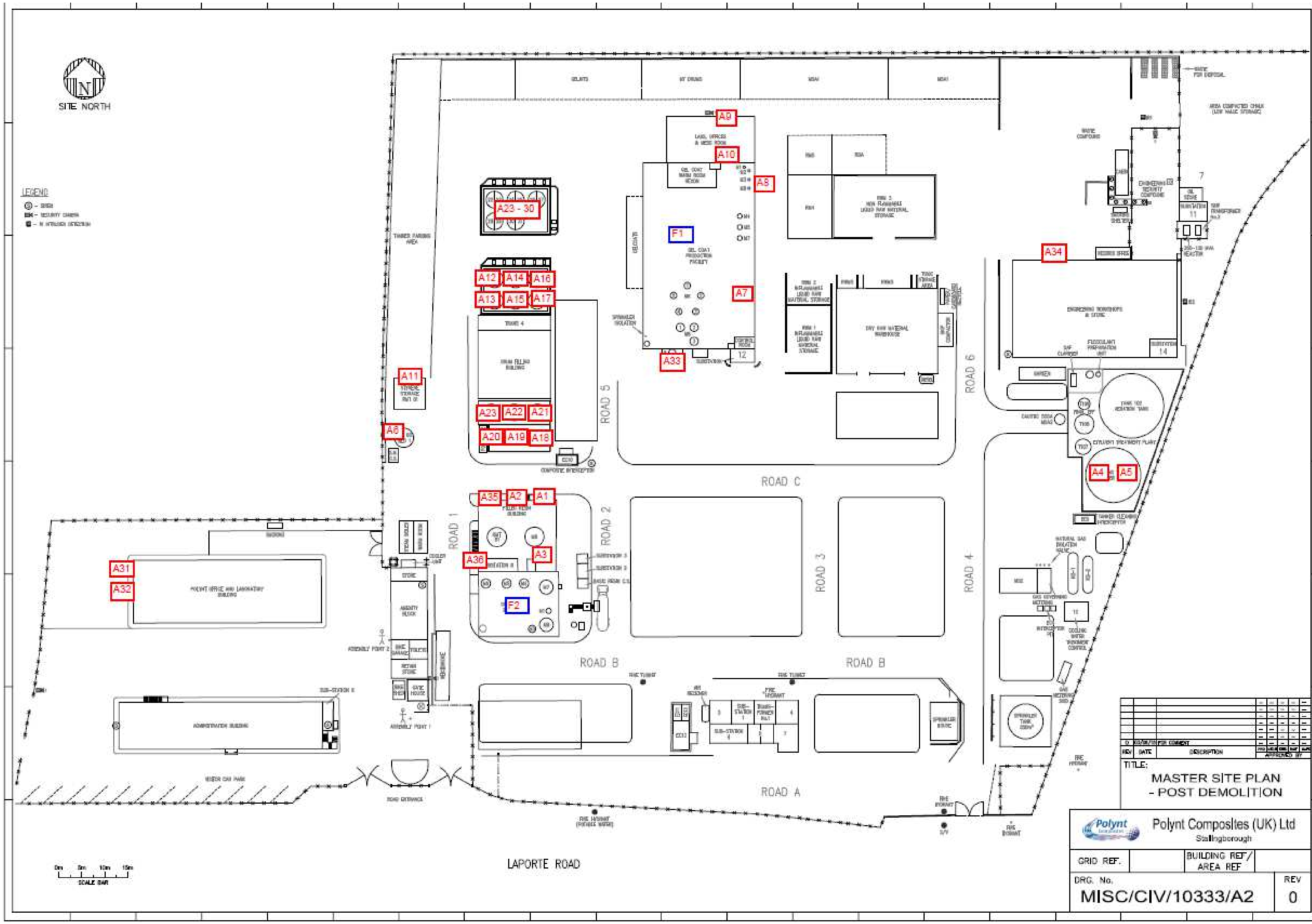

SITE NORTH
LEGEND
A9
A10
A8
F1
A7
A33
A23 - 30
A12
A14
A16
A13
A15
A17
A11
A23
A22
A21
A6
A20
A19
A18
A34
A4
A5
A35
A2
A1
A36
A3
F2
A31
A32
ROAD 1
ROAD 2
ROAD 3
ROAD 4
ROAD 5
ROAD 6
ROAD C
ROAD B
ROAD B
ROAD A
LAPORTE ROAD
TITLE:
MASTER SITE PLAN
- POST DEMOLITION
Polynt Composites (UK) Ltd
Stallingborough
GRID REF.
BUILDING REF/
AREA REF
DRG. No.
MISC/CIV/10333/A2
REV
0

Figure 7 - PMB layout with emission point sources

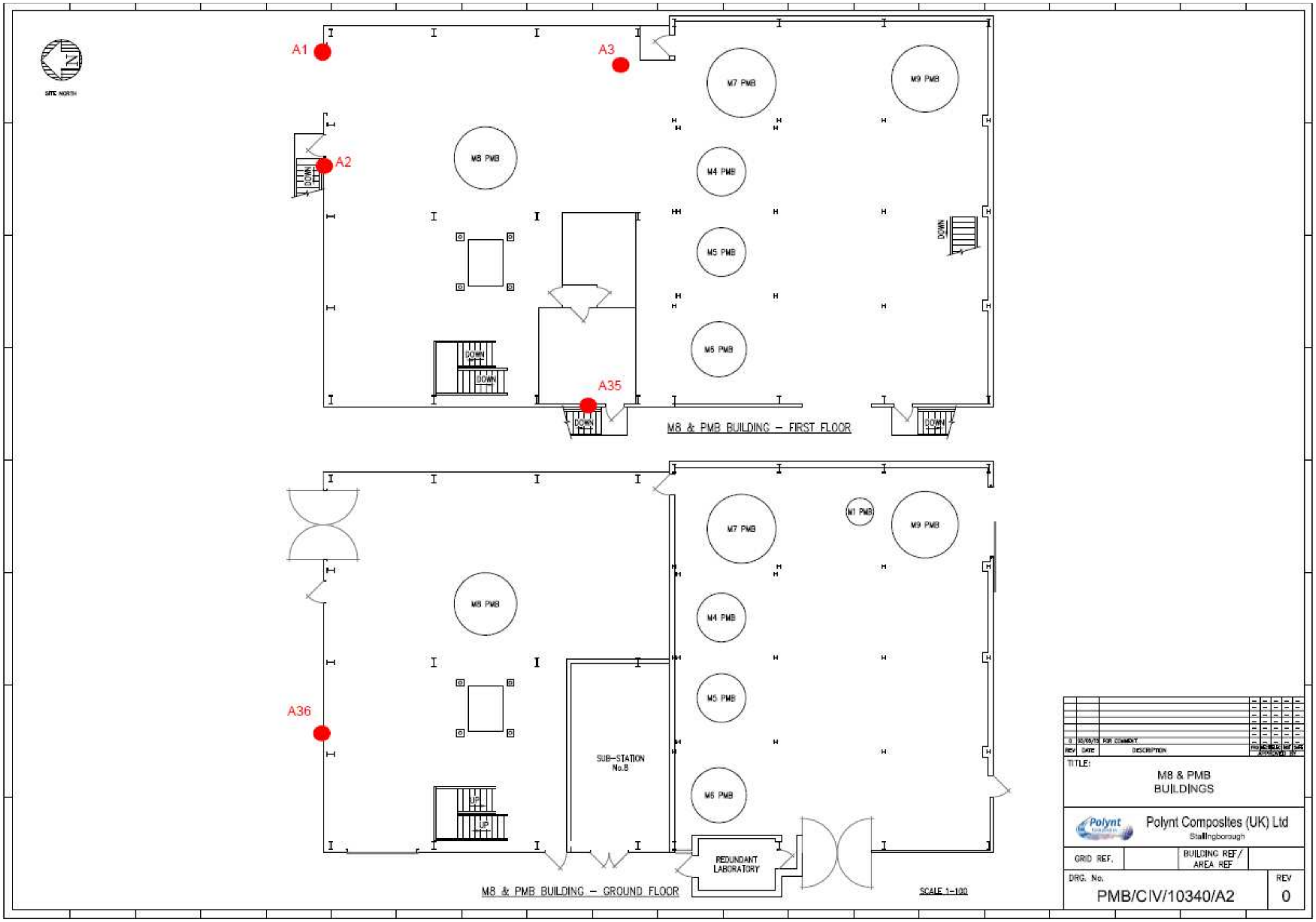

SITE NORTH
A1
A2
A3
A35
A36
M7 PMB
M9 PMB
M8 PMB
M4 PMB
M5 PMB
M6 PMB
M1 PMB
DOWN
UP
M8 & PMB BUILDING – FIRST FLOOR
SUB-STATION No.8
REDUNDANT LABORATORY
M8 & PMB BUILDING – GROUND FLOOR
SCALE 1–100
REV DATE DESCRIPTION
FOR COMMENT
TITLE:
M8 & PMB BUILDINGS
Polynt Composites (UK) Ltd
Stallingborough
GRID REF.
BUILDING REF/ AREA REF
DRG. No.
PMB/CIV/10340/A2
REV
0

Figure 8 - Gelcoats Layout with emission point sources

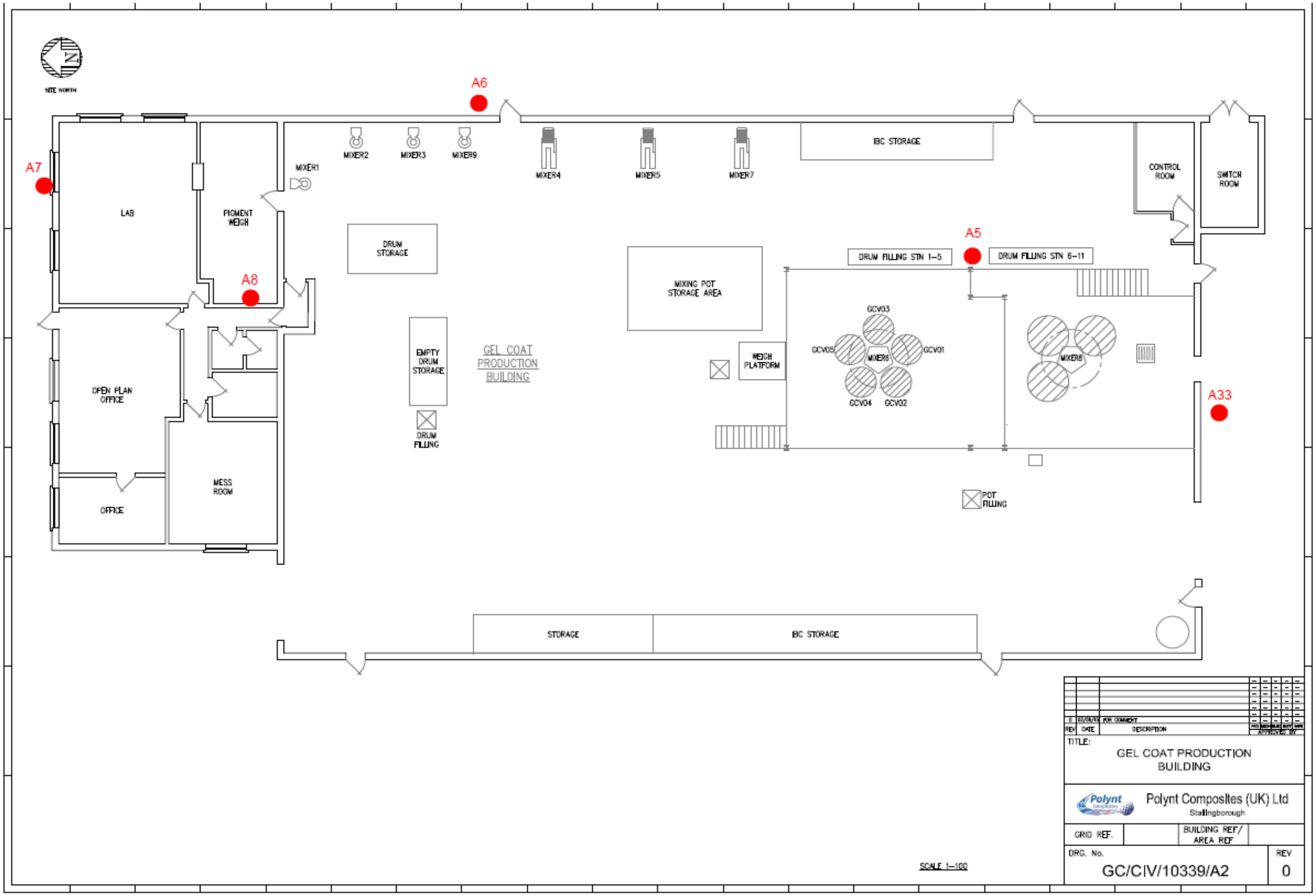


Figure 9 - Environmental Organogram

ARKEMA COATINGS RESINS LTD

ENVIRONMENTAL RESPONSIBILITIES

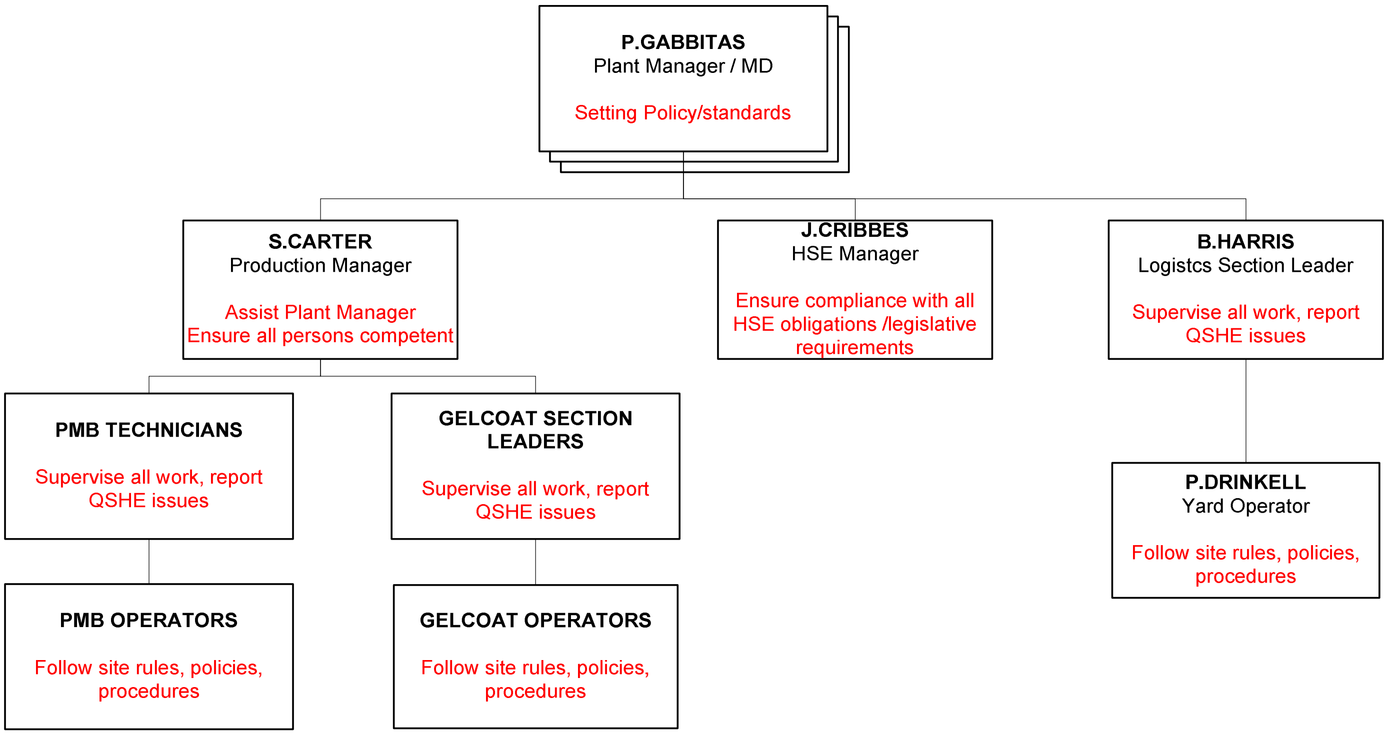
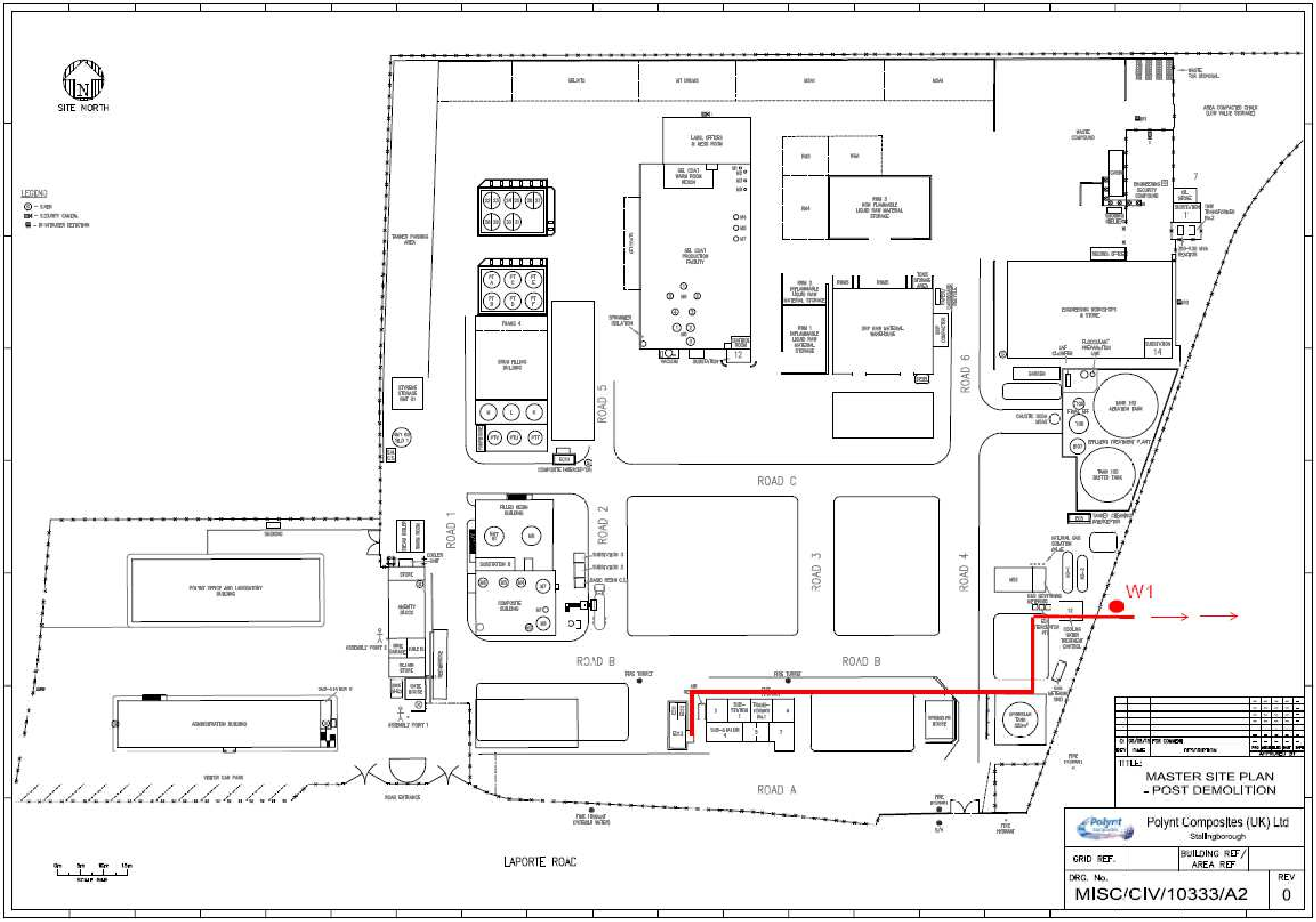


Figure 10 - W1 - Water discharge point



APPENDIX 1

SOLVENT INPUTS

APPENDIX 2

PT A-F MATERIAL STORAGE RISK ASSESSMENT

APPENDIX 3

PT K-M MATERIAL STORAGE RISK ASSESSMENT

APPENDIX 4

PT T-V MATERIAL STORAGE RISK ASSESSMENT

APPENDIX 5

RMT01 MATERIAL STORAGE RISK ASSESSMENT

APPENDIX 6

BUNDED TANK ASSESSMENTS (RA/Tanks/001)

APPENDIX 7

Process Hazard Analysis (PHA) – STYRENE OFFLOADING & STORAGE

APPENDIX 8a

Process Hazard Analysis (PHA) – RESIN OFFLOADING & STORAGE (1 of 2)

APPENDIX 8b

Process Hazard Analysis (PHA) – RESIN OFFLOADING & STORAGE (2 of 2)

APPENDIX 9

Safety, Health and Environmental Management System Manual (Man1.001)

APPENDIX 10

Emergency Procedure Manual (Man3.001)