006 - Point Source Emissions

Unifrax, Line 4 Permit Variation

Safety Risk Business Risk Environment Risk

Document History

Version	Issue	Date	Notes	Author	Reviewer
1	-	23/03/22	Working draft with client.	J. Carroll R. Nibbs	C. Nicholls
2	1	01/07/22	Issue as part of permit application.	J. Carroll R. Nibbs	C. Nicholls R. Ritchie R. Nibbs

Contents

1 Introduction

This document is submitted as part of Form C3 of the environmental permit variation.

Please note that this document refers to the site as Unifrax Widnes and to the owning company as Unifrax. Unifrax was the name of the American company that owns Widnes site. A further complexity is added because due to a recent merger, Unifrax has changed its name to Alkegen. So, it is possible in correspondence or discussions that the site may be referred to as Alkegen.

The legal entity that owns the site at Widnes is however called Saffil Ltd and remains so despite the name changes to Unifrax and Alkegen – and it is in this name that the EPR application is made on the accompanying forms.

2 Point Source Emissions

The table below indicates the point source emissions to air, sewer and water from the site. These represent the worst case maximum concentrations recorded for each point between 2016 and 2021. There are no emissions to land or groundwater. The concentrations for Line 4 are taken as those for Line 3.

Table 1 Point source emissions

Emission point reference and location	Source	Parameter	Quantity	Unit
Point source emissions to air				
A2	Line 1 dust collection	Particulates (PM10) (24hr mean)	2.9	mg/m^3
A3	Line 2 Heat Treatment	Ethylene Oxide	4.6	mg/m^3
A3	Line 2 Heat Treatment	Hydrogen Chloride	2.4	mg/m^3
A3	Line 2 Heat Treatment	Vinyl Chloride	8.2	mg/m^3
A3	Line 2 Heat Treatment	Class A VOCs (Acetaldehyde as representative)	32.8	mg/m^3
A3	Line 2 Heat Treatment	Class B VOCs (Toluene as representative)	17.7	mg/m^3
A3	Line 2 Heat Treatment	Dioxin	0.61	ng/m^3
A4	Line 2 dust collection	Particulates (PM10) (24hr mean)	3.2	mg/m^3
A5	Line 3 Heat Treatment	Ethylene Oxide	1.7	mg/m^3
A5	Line 3 Heat Treatment	Hydrogen Chloride	8.5	mg/m^3
A5	Line 3 Heat Treatment	Vinyl Chloride	5.5	mg/m^3
A5	Line 3 Heat Treatment	Class A VOCs (Acetaldehyde as representative)	52.9	mg/m^3

Emission point reference and location	Source	Parameter	Quantity	Unit
A5	Line 3 Heat Treatment	Class B VOCs (Toluene as representative)	73.10	mg/m^3
A5	Line 3 Heat Treatment	Dioxin	0.18	ng/m^3
A6	Line 3 dust collection	Particulates (PM10) (24hr mean)	2.8	mg/m^3
A7	Boiler	Nitrogen Dioxide	152	mg/m^3
A9	Boiler	Nitrogen Dioxide	117	mg/m^3
A11	Line 4 Heat Treatment	Ethylene Oxide	1.7	mg/m^3
A11	Line 4 Heat Treatment	Hydrogen chloride	8.5	mg/m^3
A11	Line 4 Heat Treatment	Vinyl chloride	5.5	mg/m^3
A11	Line 4 Heat Treatment	Class A VOCs (Acetaldehyde as representative)	52.9	mg/m^3
A11	Line 4 Heat Treatment	Class B VOCs (Toluene as representative)	73.10	mg/m^3
A11	Line 4 Heat Treatment	Dioxin	0.18	ng/m^3
A12a	Line 4 Dust Collection (General process dust extraction)	Particulates (PM10) (24hr mean)	2.8	mg/m^3
A12b	Line 4 Dust Collection (Fibre picking, shredding and milling)	Particulates (PM10) (24hr mean)	2.8	mg/m^3
A13	Boiler	Nitrogen Dioxide	117	mg/m^3
A14	Line 4 Indirect Gas Firing – Heat Treatment	Nitrogen Dioxide	50	mg/m^3

Emission point reference and location	Source	Parameter	Quantity	Unit
Point source emissions to sewer				
S2	Line 2	Chemical Oxygen Demand (COD)	735	mg/l
S2	Line 2	Suspended Solids	732	mg/l
S2	Line 2	Mercury	0.00022	mg/l
S2	Line 2	Cadmium	0.0028	mg/l
S2	Line 2	1, 2 Dichloroethane	0.0070	mg/l
S3	Line 3	COD	876	mg/l
S3	Line 3	Suspended Solids	376	mg/l
S3	Line 3	Mercury	0.000070	mg/l
S3	Line 3	Cadmium	0.0028	mg/l
S3	Line 3	1, 2 Dichloroethane	0.050	mg/l
S5	Line 4	COD	876	mg/l
S5	Line 4	Suspended solids	376	mg/l
S5	Line 4	Mercury	0.000070	mg/l
S5	Line 4	Cadmium	0.0028	mg/l
S5	Line 4	1, 2 Dichloroethane	0.050	mg/l
Point source emissions to water				
W1	Line 1	COD	682	mg/l

Emission point reference and location	Source	Parameter	Quantity	Unit
W1	Line 1	Suspended Solids	1,440	mg/l
W1	Line 1	Cadmium	0.0017	mg/l
W1	Line 1	Mercury	0.0044	mg/l
W2	Line 2	COD	56	mg/l
W2	Line 2	Suspended Solids	12	mg/l
W3	Line 3	COD	197	mg/l
W3	Line 3	Suspended Solids	1,070	mg/l
W3	Line 3	Cadmium	0.0033	mg/l
W3	Line 3	Mercury	0.038	mg/l

3 Control of point source emissions

3.1 To air

The table below provides details of emissions control relating to point source emissions to air.

Table 2 Control of point source emissions to air

Release point reference	Emission	Source of emission	Location of emission point (Grid reference)	Techniques used to minimise emissions
A2	Particulates	Line 1 dust collection	352922, 385322	Wet scrubber and screen filtration
A3	HCl, Dioxin and VOCs	Line 2 heat treatment	352868, 385336	Hot gas filtration. Regenerative Oxidation and scrubbing
A4	Particulates	Line 2 dust collection	352917, 385346	Bag filtration
A5	HCL, Dioxin and VOCs	Line 3 heat treatment	352923, 385285	Hot gas filtration. Regenerative Oxidation and scrubbing
A6	Particulates	Line 3 dust collection	352978, 385299	Bag filtration
A11	HCl, Dioxin and VOCs	Line 4 heat treatment	352951, 385254	Hot gas filtration. Regenerative Oxidation and scrubbing
A12a	Particulates	Line 4 dust collection - process	353043, 385288	Bag filtration
A12b	Particulates	Line 4 dust collection – shredding and milling	353021, 385278	Bag filtration
A7	Nitrogen Dioxide, Sulphur Dioxide	Three core boiler	352942, 385328	Low NOx Burners, Low sulphur fuel Low sulphur natural gas
A9	Nitrogen Dioxide, Sulphur Dioxide			
A13	Nitrogen Dioxide, Sulphur Dioxide			
A14	Nitrogen Dioxide, Sulphur Dioxide	Indirect gas firing heat treatment	352933, 385247	Low NOx burners with recuperation, low sulphur natural gas

The locations of emission points to air are shown in Document 003 – Site Drawings.

3.1.1 Plant Equipment and Control Systems

Control System Philosophy

The emissions control section treats the vent gases from the heat treatment section. The contaminants include:

- Hydrogen chloride (HCl)
- Volatile organic compounds (VOC) (e.g. Ethylene Oxide, Acetaldehyde)
- Particulates
- Oxides of carbon and methane
- Dioxins

Line 1

Fibre shredding, reeling machine and baler will be retained on Line 1 to allow reprocessing of fibre for sale. Particulates are generated in this process and will be extracted under the action of a vent fan and abated using a wet filter and vented through stack A2.

Line 2 and Line 3

The pollutants from Lines 2 and 3 are reduced via very similar air abatement systems before discharge via a 40 metre stack to atmosphere (A3 and A5 respectively).

The process includes the following equipment:

- VOC and dioxin emissions arising in the LT furnace and decomposition oven are extracted and pre-filtered (to remove particulate matter) ahead of being rapidly quenched (to prevent the possibility of dioxin reformation) before passing to the thermal oxidiser and then to the two stage scrubbing system.
- A second stage scrubber circulating the make-up water into the emissions control plant. The two-stage scrubber provides an effective means of reducing the HCl concentration in the gas. The dilute acid solution from the second stage is fed to the first stage scrubber where the vent gas is quenched and contacted with a dilute HCl solution.

Both scrubbers are complete with duty/standby circulation pumps, and a similar degree of control and instrumentation to the first stage scrubber.

Emission sources throughout various parts of the processes before final discharge via the point sources assessed are shown in the table below:

Table 3 Emission sources within the process Lines 2 and 3

Emission source	Pollutant	Treatment	Emission Point
Secondary air purge	HCl (low level)	Mixed with heat treatment hood extraction and oven vents post treatment. HCl - Dual water scrubbing	A3, A5

Emission source	Pollutant	Treatment	Emission Point
Pre-heater	HCl Dioxin (trace) VOC (trace) Particulates (low)	Mixed with secondary air purge and other heat treatment hood extraction and oven vents post treatment. HCl/particulates - Dual water scrubbing.	A3, A5
Decomposition oven	HCl VOC Dioxin Particulates	Particulate – hot gas filtration VOC/dioxin – thermal oxidation HCl – dual water scrubbing	A3, A5
LT furnace	HCl VOC Particulates	HCl - Dual scrubbing VOC/potential dioxin formation - Vent to thermal oxidation from furnace body Particulates – dual scrubbing	A3, A5
HT furnace	Particulates	Bag filtration	A4, A6
General dust extraction from production line and packing area and between heat treatment units	Particulates	Bag filtration	A4, A6

Line 4

Line 4 will have emissions control systems and equipment that will generally be similar to those that have given successful performance in the operation of Lines 2 and 3. Learning from operation of Lines 2 and 3 will however be built into the design of Line 4 in order to ensure further improvements in performance.

Table 4 Emissions sources within the process

Emission source	Pollutant	Treatment	Emission Point
Secondary air purge	HCl (low level)	Mixed with heat treatment hood extraction and oven vents post treatment. HCl - Dual water scrubbing	A11
Pre-heater	HCl Dioxin (trace)	Mixed with secondary air purge	A11

Emission source	Pollutant	Treatment	Emission Point
	VOC (trace) Particulates (low)	and other heat treatment hood extraction and oven vents post treatment. HCl/particulates - Dual water scrubbing.	
Low temperature (LT) kiln	HCl VOC Dioxin Particulates	Particulate – hot gas filtration VOC/dioxin – thermal oxidation HCl – dual water scrubbing	A11
High temperature (HT) kiln	HCl VOC Particulates NOx (due to gas fired)	HCl/NOx - Dual scrubbing VOC/potential dioxin formation - Vent to thermal oxidation from furnace body Particulates – dual scrubbing	A11
HT furnace	Particulates	Bag filtration	A12a
General dust extraction from production line and reeling machine between heat treatment units	Particulates	Bag filtration	A12a
Dust extraction from shredding, chopping, milling operations	Particulates	Bag filtration	A12b
Indirect gas firing – heat treatment ovens and furnaces	NOx	Low NOx burners with heat recuperation	A14

Boilers

The waste gases from the dual fuel boiler A7, gas fired boiler A9 and the new dual fuel boiler A13 are discharged through a 30 m three core stack.

The main gaseous pollutants are nitrogen dioxide and carbon oxides generated during combustion. Emissions of carbon monoxide have not been considered here since it is only produced due to incomplete combustion. Correct air in boiler combustion-set up will ensure high boiler efficiency, which will also ensure minimisation of carbon monoxide. Carbon dioxide emissions are dealt with within the H1 assessment tool in terms of energy consumption.

Principal pollution control is choice of low sulphur fuel, low NOx burners and general good management and maintenance of the boilers to maintain efficiency and operating standards.

3.1.2 Process Control

The Process control systems for each of the lines are described below and shown schematically in the diagrams.

Line 4

Line 4 will have emissions control systems and equipment that will equal or improve upon emissions performance of Lines 2 and 3, in line with Best Available Techniques.

Steaming Oven

Oven temperature control is critical to ensure effective removal of organics and VOCs and not damage fibre. The kiln is profiled from 200 – 650°C and is electrically fired.

Superheated steam is introduced to enable chemical reactions resulting in the removal of organic species. Vent gases will be recirculated within the kiln and temperature-controlled in a similar fashion to the ovens on Lines 2 and 3. The oven is likely to be indirectly gas-fired.

The design of the kiln is likely to differ from the Lines 2 and 3 decomposition ovens in order to modernise and improve the design. It is likely that the kiln will be smaller than the Line 2/3 ovens with improved insulation and heat recovery features.

The philosophy with regard to containment and abatement of the HCl and organics generated within the kiln remain consistent with the principles employed on Lines 2 and 3.

Flow balancing is controlled (steam in versus gas out) to maximise the amount of exhaust gas passing to thermal oxidation rather than captured by the extraction hoods at the end of the kiln (which do not pass via the thermal oxidation unit). All gases from the oven are scrubbed to remove HCl.

A further method of reducing escape of the exhaust gas to the extraction hoods consists of baffles between zones of the oven. The height of these baffles is adjustable so that the clearance between their lower edges and the mat passing through is reduced to a minimum consistent with zero impact with the top surface of the mat. The sealing between zones is thereby maximised as far as is reasonably practicable.

Low Temperature Kiln Control

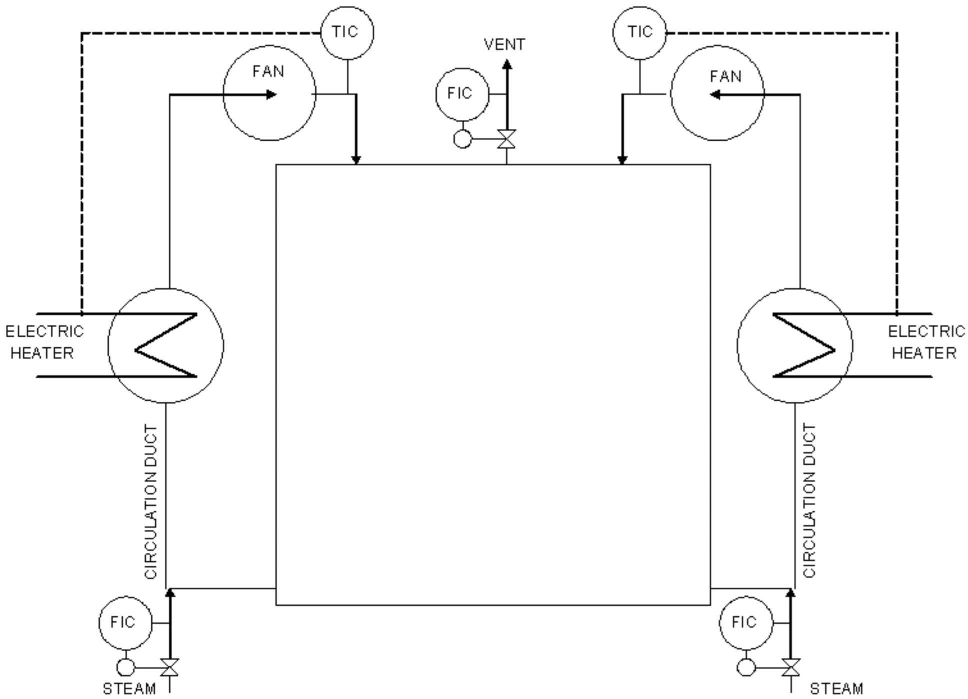

Figure 1: Line 4 Steaming Oven Control

- The schematic represents a cross-section of the oven as seen from the end. The product therefore flows down into the page.
- There are likely to be 4 zones in the decomposition oven. Each zone is made up of a convection loop on both sides of the zone. The heating loop contains an indirectly gas fired heating element, and a fan that circulates heated air over the mat.
- Process gases are circulated from the bottom of the oven back to the top via ducts containing heaters, the outputs of which are controlled by thermocouples in the ducts.
- Steam is fed into both ducts in each zone. Vent gas is withdrawn from the top of each zone at a rate equal to the steam inlet rate, the aim being to minimise air ingress and steam egress.

Low Temperature Furnace Control System

The kiln is profiled from 650-1000°C and is gas fired providing radiant heat to process the mat – there will be no recirculation of vent gases in this kiln.

The design of the kiln is likely to differ from the Lines 2 and 3 LT furnaces in order to modernise and improve the design. It is likely that the kiln will be smaller than the Line 2/3 LT furnaces with improved insulation and heat recovery features.

The philosophy with regard to containment and abatement of the HCl and organics generated within the kiln, however, remain consistent with the principles employed on Lines 2 and 3.

The pollutants arising in the LT furnaces are organics and HCl stripped out of the mat. De novo dioxin formation is possible in the waste gas ducting at temperatures within the formation window. To prevent/minimise this, the furnace is under suction to avoid points of stagnation in the extract system so avoiding conditions favourable to dioxin formation.

Refer to schematic below

- The product flow in the schematic is from left to right.
- Purge air is fed in the base to burn out residual organics & to flush out residual HCl.
- A slightly greater volume of air containing the pollutants is extracted via the vent to the VOC destruction unit.
- The temperature of each part of the furnace is controlled to optimise the removal of pollutants & the formation of the fibre crystal structure.

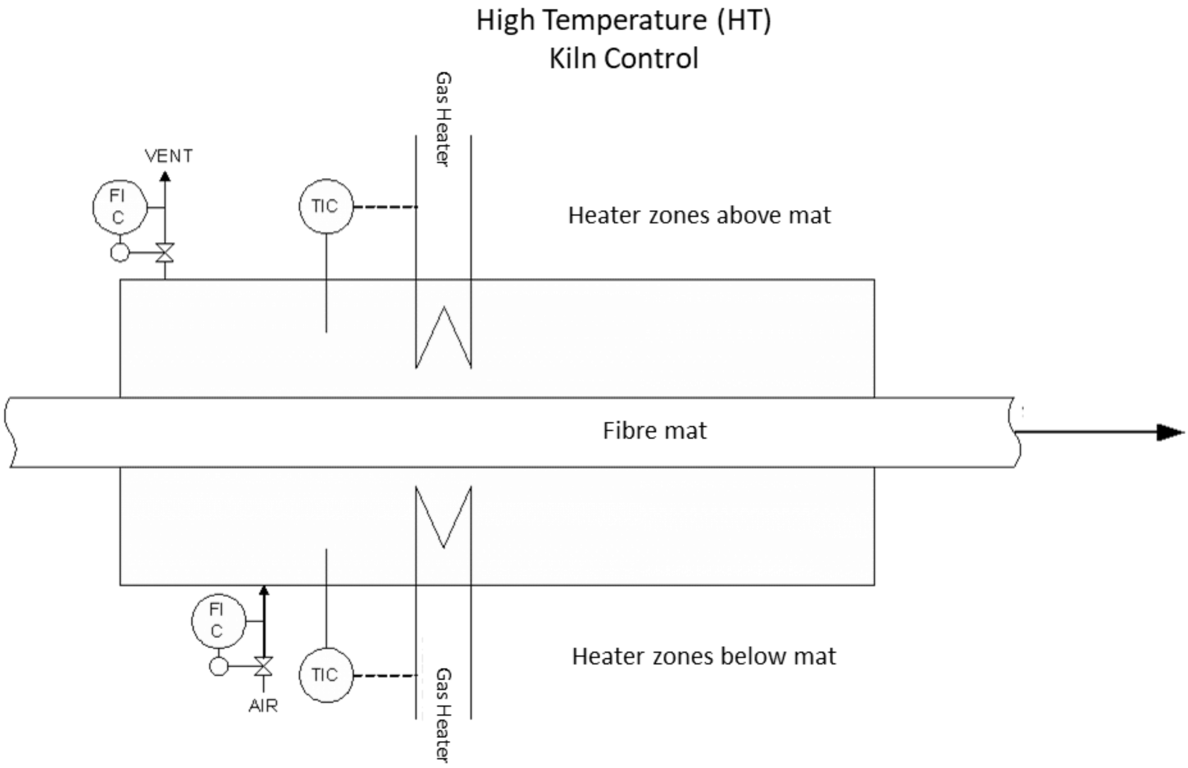

Figure 2: Line 4 Low Temperature Kiln Control System

Scrubber Control and Effluent Control

The scrubbing solution is circulated at a fixed rate over each section of the packed scrubbing towers. Fresh water is fed to tower 2 and overflow from tower 2 is fed to tower 1. Tower 1 absorbs the bulk of the acid gases and tower 2 acts as a polishing scrubber, removing the last traces of HCl. Flow detection instruments are included to indicate loss of solution flow.

The make-up of fresh water to the scrubber is set to provide sufficient water for the adiabatic cooling stage, and to maintain an acid solution in the scrubber of less than approximately 4%. A loss of make-up water is indicated eventually by a low level in the scrubber sump.

The liquid level in the scrubber sump is controlled by purging dilute acid out of the scrubber circuit to the effluent neutralisation tanks. The effluent is neutralised in a multi-stage neutralisation process in which caustic soda solution is used to neutralise the acid stream. The pH is monitored in the acid purge line from the scrubber and the two agitated neutralisation tanks; if the pH after the third neutralisation stage is outside an acceptable range, a plant trip may be initiated, depending on the nature and duration of the loss of control. The aqueous effluent discharge to drain from the neutralisation process is sampled automatically, as well as monitored for pH.

Critical parameters indicative of problems:

- Scrubber circulation rates.
- Quench high temperature.
- Effluent flow rate to neutralisation section.
- pH in stages on neutralisation section.

Thermal oxidiser operation

The following key control features are included:

- TIC adjusting support fuel (natural gas)
- Trip system allowing untreated gas to bypass round thermal oxidiser in the event of high pressure drop, out of range temperature profile, or other fault condition in the thermal oxidiser.
- Temperature monitoring inside thermal oxidiser to ensure no cold spots, bypassing, etc, which would adversely affect destruction of pollutants.
- A facility for changing over gas direction of flow through the regenerator beds, with method of minimising untreated gas breakthrough during changeover.
- Upstream filtration with pressure drop monitoring and self-cleaning system.
- Cooling before the thermal oxidiser (to keep gas temperature exit the thermal oxidiser less than de novo dioxin formation temperature range),
- The thermal oxidiser control panel is connected to the Plant Pax 5.0 control computer to enable monitoring of operation and alarms by the control room operator.

The hot vent stream to the oxidiser is quenched adiabatically at the inlet by direct contact with acid circulating in a quench column. The quench section is equipped with temperature and flow instruments to indicate the gas temperature in the column and the flow-rate of water to the quench. A loss of water to the quench or high temperature in the quench section will initiate a partial plant shutdown.

The main vent fan downstream of the thermal oxidiser and scrubber induces the vent stream flow through the equipment. A trip/ failure of this fan will initiate a full plant shut down. The fan downstream of the filter, quench and oxidiser induces the flow from the high VOC zones. A trip/failure of this fan shuts off the entry of air and steam into the LT furnace and Decomposition oven. A full plant shut down is then only initiated if the operator decides that the situation is not recoverable.

Dust Extraction

The Dust Extraction system comprises a large bag filter system. Settled material is collected and bagged for disposal during routine cleans.

Lines 2 and 3

Decomposition Oven Control

Oven temperature control is critical to ensure effective removal of organics and VOCs and not damage fibre.

In addition, flow balancing is effected (steam in versus gas out) to maximise the amount of exhaust gas passing to thermal oxidation rather than captured by the extraction hood (this does not pass via the thermal oxidation unit).

A further method of reducing escape of the exhaust gas to the extraction hood consists of baffles between zones of the oven. The height of these baffles is adjustable so that the clearance between their lower edges and the mat passing through is reduced to a minimum consistent with zero impact with the top surface of the mat. The sealing between zones is thereby maximised as far as is reasonably practicable.

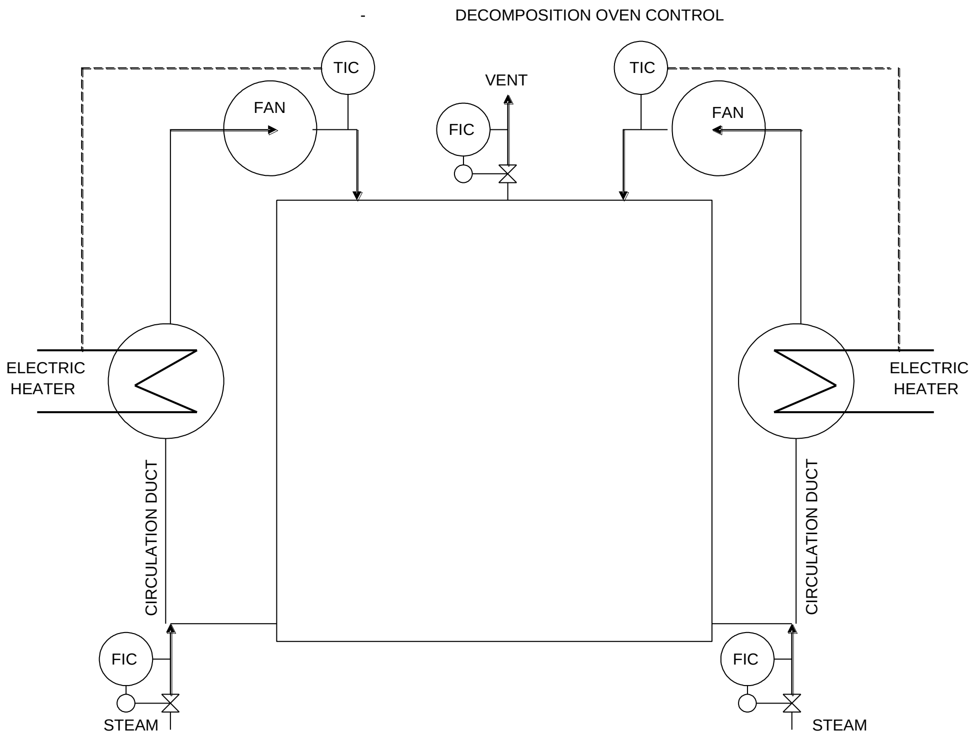

Figure 3 Line 2/3 Decomposition oven control

- The schematic represents a cross-section of the oven as seen from the end. The product therefore flows down into the page.
- There are 4 zones in the decomposition oven. A typical zone is shown.
- Gas is circulated from the bottom of the oven back to the top via ducts containing heaters, the outputs of which are controlled by thermocouples in the ducts.

- Steam is fed into both ducts in each zone. Vent gas is withdrawn from the top of each zone at a rate equal to the steam inlet rate, the aim being to minimise air ingress & steam egress.

Low Temperature Furnace Control System

The pollutants arising in the LT furnaces are organics and HCl stripped out of the mat. De novo dioxin formation is possible in the waste gas ducting at temperatures within the formation window. To prevent/minimise this, the furnace is under suction to avoid points of stagnation in the extract system so avoiding conditions favourable to dioxin formation.

Refer to schematic below

- The product flow in the schematic is from left to right.
- Purge air is fed in the base to burn out residual organics & to flush out residual HCl.
- A slightly greater volume of air containing the pollutants is extracted via the vent to the VOC destruction unit.
- The temperature of each part of the furnace is controlled to optimise the removal of pollutants & the formation of the fibre crystal structure.

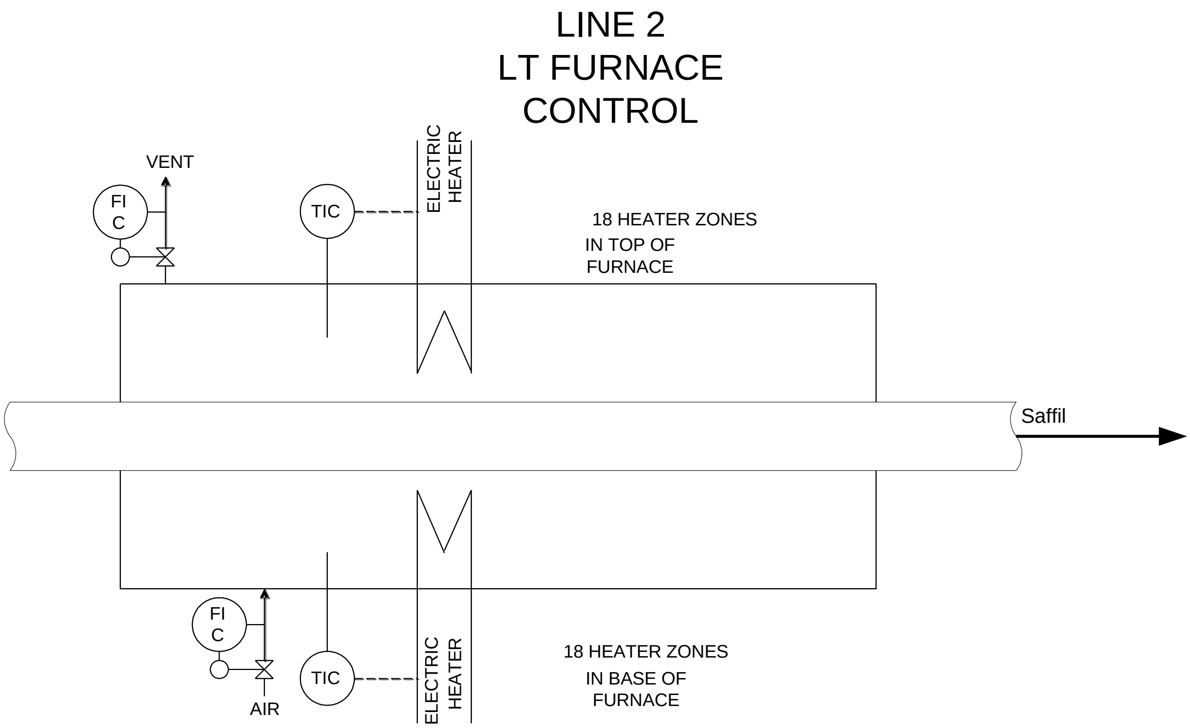

Figure 4 Line 2 LT Furnace Control System

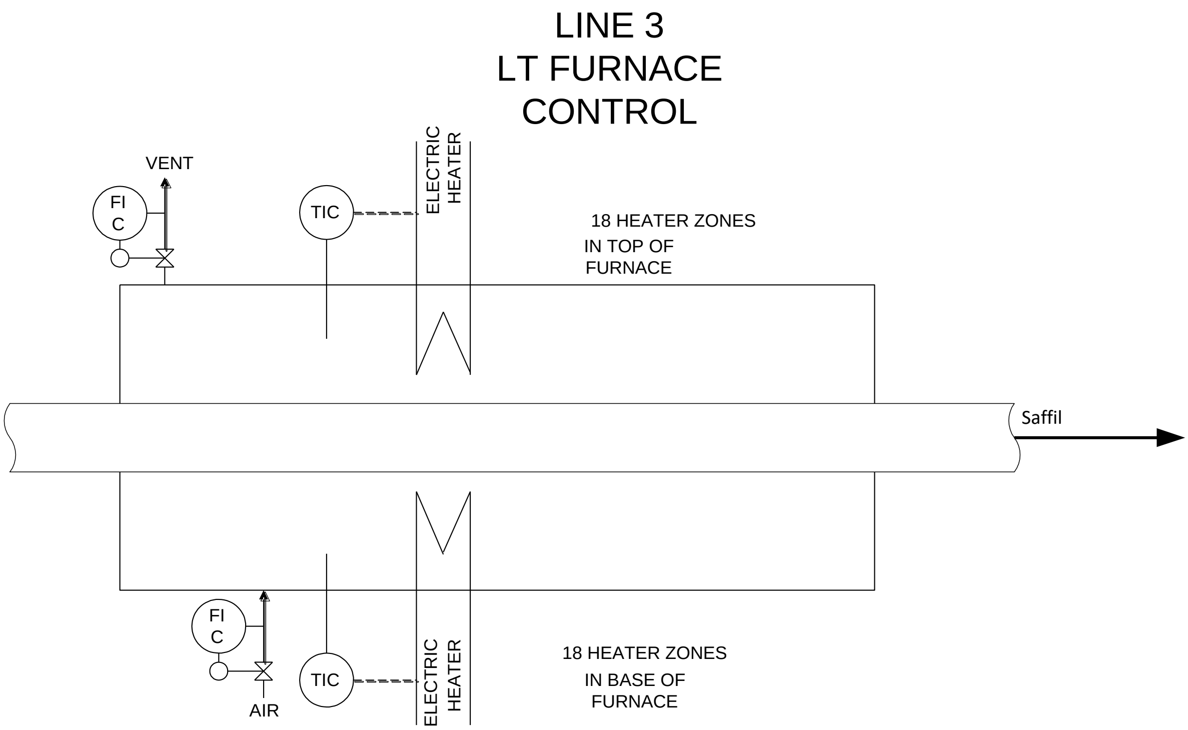

Figure 5 Line 3 LT Furnace Control System

Scrubber Control and Effluent Control

The scrubbing solution is circulated at a fixed rate over each section of the packed scrubbing towers. Fresh water is fed to tower 2 and overflow from tower 2 is fed to tower 1. Tower 1 absorbs the bulk of the acid gases and tower 2 acts as a polishing scrubber, removing the last traces of HCl. Flow detection instruments are included to indicate loss of solution flow.

The make-up of fresh water to the scrubber is set to provide sufficient water for the adiabatic cooling stage, and to maintain an acid solution in the scrubber of less than approximately 4%. A loss of make-up water is indicated eventually by a low level in the scrubber sump.

The liquid level in the scrubber sump is controlled by purging dilute acid out of the scrubber circuit to the effluent neutralisation tanks. The effluent is neutralised in a multi-stage neutralisation process in which caustic soda solution is used to neutralise the acid stream. The pH is monitored in the acid purge line from the scrubber and the two agitated neutralisation tanks; if the pH after the third neutralisation stage is outside an acceptable range, a plant trip may be initiated, depending on the nature and duration of the loss of control. The aqueous effluent discharge to drain from the neutralisation process is sampled automatically, as well as monitored for pH.

Critical parameters indicative of problems:

- Scrubber circulation rates.
- Quench high temperature.

- Effluent flow rate to neutralisation section.
- pH in stages on neutralisation section.

Thermal oxidiser operation

The following key control features are included:

- TIC adjusting support fuel (natural gas)
- Trip system allowing untreated gas to bypass round thermal oxidiser in the event of high pressure drop, out of range temperature profile, or other fault condition in the thermal oxidiser.
- Temperature monitoring inside thermal oxidiser to ensure no cold spots, bypassing, etc, which would adversely affect destruction of pollutants.
- A facility for changing over gas direction of flow through the regenerator beds, with method of minimising untreated gas breakthrough during changeover.
- Upstream filtration with pressure drop monitoring and self cleaning system.
- Cooling before the thermal oxidiser (to keep gas temperature exit the thermal oxidiser less than de novo dioxin formation temperature range),
- The thermal oxidiser control panel is connected to the Delta V control computer to enable monitoring of operation and alarms by the control room operator.

The hot vent stream to the oxidiser is quenched adiabatically at the inlet by direct contact with acid circulating in a quench column. The quench section is equipped with temperature and flow instruments to indicate the gas temperature in the column and the flow-rate of water to the quench. A loss of water to the quench or high temperature in the quench section will initiate a partial plant shutdown.

The main vent fan downstream of the thermal oxidiser and scrubber induces the vent stream flow through the equipment. A trip/ failure of this fan will initiate a full plant shut down. The fan downstream of the filter, quench and oxidiser induces the flow from the high VOC zones. A trip/ failure of this fan shuts off the entry of air and steam into the LT furnace and Decomposition oven. A full plant shut down is then only initiated if the operator decides that the situation is not recoverable.

Dust Extraction

The Dust Extraction system comprises a large bag filter system. Settled material is collected and bagged for disposal during routine cleans.

Summary of Air Emissions Control

Line	Area	Activity	Emissions	Control Measures
2	Emissions control	VOC destruction by thermal oxidation	VOCs and dioxins	PLC control linked to DeltaV system. Link of key operating parameters to plant shutdown systems. Operation of bypass valve closely monitored and reported to EA. Cannot start plant up unless oxidiser is online at required temperature.
2	Emissions control	Quench chamber	Prevent dioxins reforming via de	Control quench water flow rate and temperature. Instrumentation to

Line	Area	Activity	Emissions	Control Measures
			novo mechanism	warn of sprays blockage.
2	Emissions control	2 stage scrubber system	Scrubbing liquor (aqueous HCl solution)	Minimise use of flanges, cap and plug open ends, bund. Registered pipework
2	Emissions control	2 stage scrubber system	HCl removal	Control of water input rate, effluent output rate, liquor circulation rate operating temperatures and regular internal inspections of distributors, packing and demister.
2	Vent stack	Venting	VOCs, HCl, dioxins	Quarterly MCERTS accredited samples taken. Continuous monitoring is not BAT as it would be expensive to install and run and less reliable than surrogate values.
3	Emissions control	VOC destruction by thermal oxidation	VOCs and dioxins	PLC control linked to DeltaV system. Link of key operating parameters to plant shutdown systems. Operation of bypass valve closely monitored and reported to EA. Cannot start plant up unless oxidiser is online at required temperature.
3	Emissions control	Quench chamber	Prevent dioxins reforming via de novo mechanism	Control quench water flow rate and temperature. Instrumentation to warn of sprays blockage.
3	Emissions control	Scrubber	Scrubbing liquor (aqueous HCl solution)	Minimise use of flanges, cap and plug open ends, bund. Registered pipework
3	Emissions control	Scrubber	HCl removal	Control of water input rate, effluent output rate, liquor circulation rate operating temperatures and regular internal inspections of distributors, packing and demister.
3	Vent stack	Venting	VOCs, HCl, dioxins	Quarterly MCERTS accredited samples taken. Continuous monitoring is not BAT as it would be expensive to install and run and less reliable than surrogate values.
4	Emissions control	VOC destruction by thermal oxidation	VOCs and dioxins	PLC control linked to Plant Pax 5.0 system. Link of key operating parameters to plant shutdown systems. Operation of bypass valve closely monitored and reported to EA. Cannot start plant up unless oxidiser is online at required temperature.
4	Emissions control	Quench chamber	Prevent dioxins reforming via de novo	Control quench water flow rate and temperature. Instrumentation to warn of sprays blockage.

Line	Area	Activity	Emissions	Control Measures
			mechanism	
4	Emissions control	Scrubber	Scrubbing liquor (aqueous HCl solution)	Minimise use of flanges, cap and plug open ends, bund. Registered pipework
4	Emissions control	Scrubber	HCl removal	Control of water input rate, effluent output rate, liquor circulation rate operating temperatures and regular internal inspections of distributors, packing and demister.
4	Vent stack	Venting	VOCs, HCl, dioxins	Quarterly MCERTS accredited samples taken. Continuous monitoring is not BAT as it would be expensive to install and run and less reliable than surrogate values.

4 Control of point source emissions to surface water and sewer

4.1 Plant equipment and control systems

4.1.1 Trade effluent

Process effluent arisings, predominantly from spent scrubber liquor (dilute aqueous sodium chloride), are discharged under Trade Effluent agreement into United Utilities sewerage system.

The effluent passes by sewer via the Ditton pumping station to the United Utilities treatment works at Widnes. Here it passes through screens and grit removal, settlement and biological treatment before discharge to the River Mersey near Pickering's Pasture.

There will be an additional connection to sewer serving Line 4. The trade effluent consent for Line 4 (S5) has been discussed with United Utilities prior to submission of this application and is likely to be the same as that for Line 3. A copy of the current agreement is provided in the Appendix.

4.1.2 Surface water discharge

There are 3 surface water discharges from the site to the River Mersey, these being:

- W1 – road drains
- W2 – Cooling tower blowdown.
- W3 – Steam trap condensate, humidifier overflow, rainwater and bund water (following pH measurement).

These effluent streams join together with other surface water drainage from the Pilkington Sullivan Site before discharge to controlled waters.

4.1.3 Neutralisation system

Effluent from all the lines has similar but separate treatment. The scrubber effluent is more concentrated from Line 2 as the scrubber is two stage. Neutralisation with sodium hydroxide is used on both effluents. The system on line 3 is a repeat of that used on Line 2 but with improvements designed into the neutralisation tanks and control system to improve pH control. These include larger neutralisation tanks to increase residence time, in line mixing of effluent and caustic soda on ratio control prior to neutralisation and effluent feeds dip piped to the neutralisation tanks. The system for Line 4 is proposed to be similar to that of Line 3.

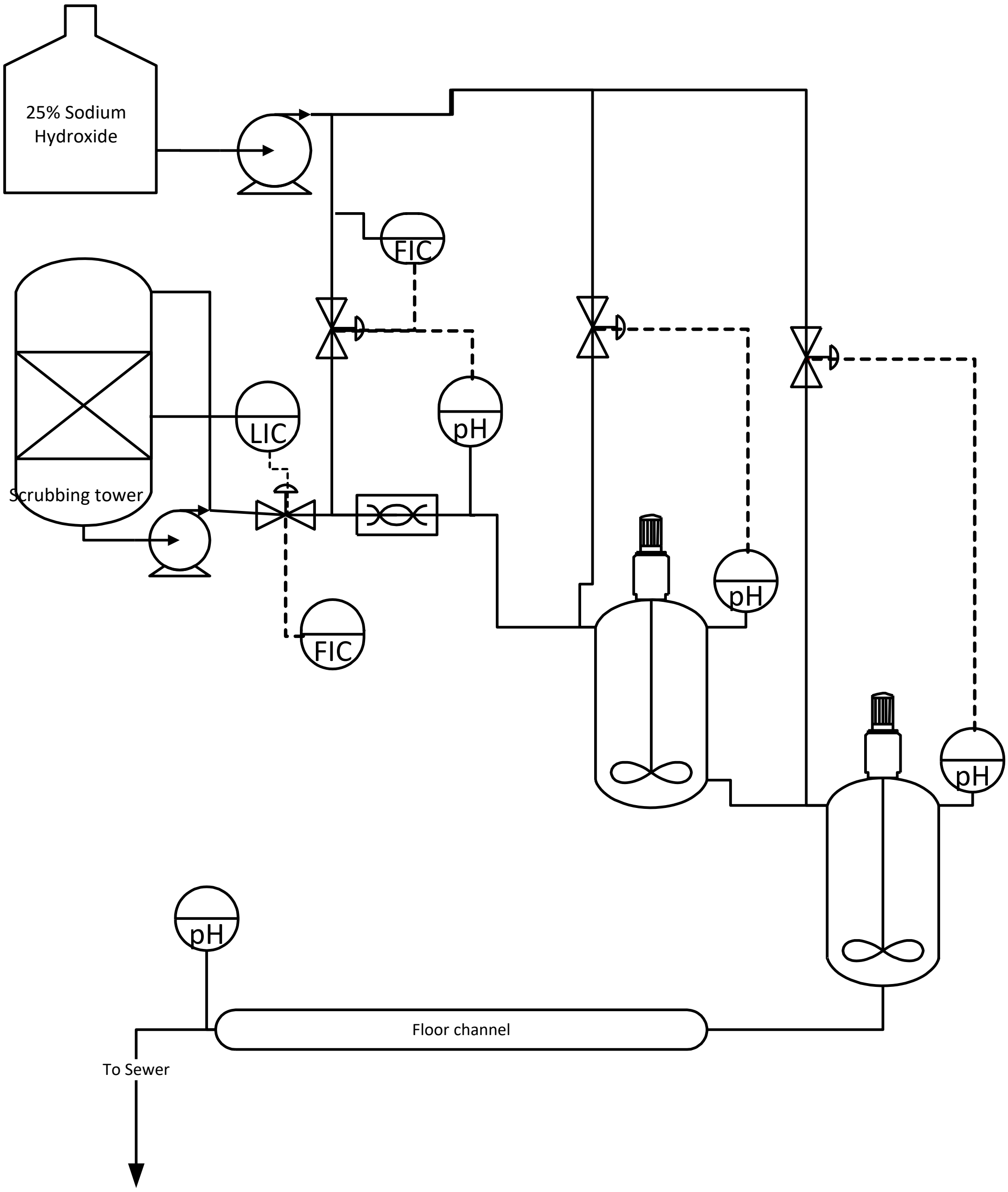

Figure 6 Effluent Neutralisation System

5 Control of point source emissions to groundwater

There are no direct or indirect emissions to groundwater from the installation.

6 Appendix

The following appendices include the existing discharge consent with United Utilities.