Permitting Team
Natural Resources Wales,
Cambris House,
29 Newport Road,
Cardiff
CF24 0TP

Your ref: **BR9685IX**

Our Ref : V010-JMS

13th July 2020

Dear Sir/Madam,

Environmental Permitting Regulations (England and Wales)

Dow Silicones UK Ltd EPR BR9685IX

V010 – Normal variation application: VLVF process expansion, Final effluent TOC and 1307 quencher decommissioning

I am writing to request a normal permit variation to include expansion of the VLVF process, including two new authorised air release points, changes in the monitoring requirements for the Final treated effluent and decommissioning of 1307 quencher.

We have already discussed the details of this variation with our local inspector Tony Leakey.

I have attached the required documents:

- Part A Form
- Part C2 Form
- Part C3 Form
- Part F1 form
- Appendix A – Main activities update – Section 16
- Appendix B - Main activities update – Section 17
- Appendix C - Main activities update – Section 11
- Appendix D – Non Technical Summary – D1 and D2
- Appendix E – Environmental assessment – E1 and E2
- Appendix F – Climate change agreements
- Appendix G – Map of authorised release points
- Appendix H – Contents of Main activities
- Appendix I – ISO14001 certificate, ODMS Overview and LRQA letter
- Appendix J – Request for confidentiality

If you need further information or clarification regarding this request please don't hesitate to contact me.

Yours faithfully,

Judith Sartor, Environmental Specialist
Direct Telephone: 01446 723960
Email judith.sartor@dow.com

Application for an environmental permit: Part A – About you

Fill in this part A if you are applying for a new permit, applying to change or surrender an existing permit, or want to transfer an existing permit to yourself.

Please check that this is the latest version of the form available from our website.

Please read through this form and the guidance notes that come with it. All relevant guidance documents can be found on our website.

Where you see the term 'document reference' on the form, give the document references and send the documents with the application form when you've completed it.

Contents

1 About you

Are you applying as an individual, an organisation of individuals (for example, a partnership), a company (this includes Limited Liability Partnerships) or a public body?

An individual	☐	*Go to section 2*
An organisation of individuals (for example, a partnership)	☐	*Go to section 3*
A public body (such as a local council)	☐	*Go to section 4*
A registered company or other corporate body	☒	*Go to section 5*

2 Applications from individuals

2a Please give us the following details

Title		
First name		
Last name		*Go to section 6*

3 Applications from organisations of individuals

3a Organisation details

Organisation name	
Type of organisation	
If 'Other', please specify	

3b Main representative's details

Title	
First name	

Last name

3c Second representative's details:

Title

First name

Last name

3d Other representative's details

If relevant, please provide details of all other representatives on a separate sheet and tick here to show that you have done so. ☐ *Go to section 6*

4 Applications from public bodies

4a Public body details

Public body name

Type of public body

If 'Other', please specify

4b Executive officer's details

The executive is an officer of the public body authorised to sign on your behalf.

Title

First name

Last name

Position *Go to section 6*

5 Applications from a registered company or other corporate body

5a Company details

Company name: Dow Silicones UK Ltd

Company registration number: 486170

Date of registration: 08/09/1950

If you are applying as a corporate organisation that is now a limited company, please provide evidence of your status and tell us the reference number you have given this document with this evidence.

Document reference *Go to section 6*

6 Your address

6a Your main (registered office) address

For companies this *must* be the address on record at Companies House.

Address: Barry Plant

Cardiff Road

	Barry
	Glamorgan
Postcode	CF63 2YL
Telephone - mobile	
Telephone - office	+44 1446 732350
Email address	

If you are applying as an organisation of individuals, every partner needs to give us their details, including their title. If necessary, continue on a separate sheet and tell us the reference you have given the sheet.

Document reference	

6b UK business address *only* if different from above

Address	
Postcode	
Telephone - mobile	
Telephone - office	
Email address	

Go to section 7

7 Contact details

7a Who can we talk to about your application?

This can be someone acting as a consultant or 'agent' for you.

Title	Mrs
First name	Judith
Last name	Sartor
Address	Dow Silicones UK Ltd
	Cardiff Road
	Barry

	Vale of Glamorgan
Postcode	CF63 2YL
Telephone - mobile	NA
Telephone - office	+44 1446 723960
Email address	judith.sartor@dow.com

7b Who can we talk to about your operation?

Same as the application contact in 7a	☒
Title	
First name	
Last name	
Address	
Postcode	
Telephone - mobile	
Telephone - office	
Email address	

7c Who can we talk to about your billing or invoice?

Same as the application contact in 7a	☒
Same as the operation contact in 7b	☐
Title	
First name	
Last name	
Address	

Postcode	
Telephone - mobile	
Telephone - office	
Email address	

Application for an environmental permit:
Part C2 – General: Varying a bespoke permit

Fill in this part of the form, together with part A, the relevant parts of C3 to C7 and part F1 or F2.

Please check that this is the latest version of the form available from our website.

Note: If you are applying to convert your existing permit to a standard permit or add a standard facility you need to fill out form C1.

If you want to make an administrative change, you should complete form C0.5.

You only need to give us details in this application for the parts of the permit that will be affected (for example, if you are adding a new facility or changing existing ones).

You do not need to resend any information from your original permit application.

Please read through this form and the guidance notes that came with it. All relevant guidance documents can be found on our website.

Contents

1 About the permit

1a Discussions before your application

If you have had discussions with us before your application, give us the case reference number or details on a separate sheet.

Case or document reference	

1b Permit number

Permit number this application relates to?	BR9685IX

1c Site details

What is the name, address and postcode of the site?

Site name	Dow Silicones UK Ltd
Address	Barry Plant
	Cardiff Road
	Barry
	Glamorgan
Postcode	CF63 2YL

2 About your proposed changes

2a Type of variation

What type of variation are you applying for? (Please tick)

Standalone water discharge activity or point source groundwater activity	☐
Minor technical	☐

Normal variation ☒

Substantial ☐

2b Provide a non-technical summary of your application

Please give us brief details of all the proposed changes to current activities, and any new activities you want to add to your permit.

You can use the box below, in Table 1 below. Or, you can use a separate sheet and send it to us with your application form. Tell us below the reference you have given this document.

Document reference	Appendix D

Table 1 – Details of the proposed changes

2c Consolidating existing permits into the modern style

Consolidating you permit can mean:

- combining the original permit and all subsequent changes into a single document (modern permit), or

- combining two or more environmental permits for the same operator and site into a single permit.

Note: In both cases we may require additional information from you about, for example your management system. Therefore we would always advise you to talk to us before you submit any application to modernise or consolidate permits.

2c1 Do you want to have a modern style (consolidated) permit?

No ☐ *Go to section 2d*

Yes ☒ *Please note: An additional charge may apply for modernising your permit(s).*

2c2 Identify all the permits you want to consolidate by listing the permit numbers/ versions in Table 2 below.

Table 2 – Permit numbers
BR9685IX

2d Low impact installations (installations only)

Are any of the regulated facilities low impact installations?

No ☒ *Go to section 2e*

Yes ☐

Please give us a description of your proposed activity telling us how you meet the conditions for a low impact installation and send it to us with your application form.

Document reference

Tick the box to confirm you have filled in the low impact installation checklist in Appendix 1 for each regulated facility. ☐

2e Treating batteries

Are you planning to treat batteries? (See the guidance notes on part C2.)

No ☒

Yes ☐ Tell us how you will do this, send us a copy of your explanation and tell us the reference you have given this explanation.

Document reference

2f Medium Combustion Plant

Are you applying to *add* additional new Medium Combustion Plant(s) to your existing permit

No ☒

Yes ☐ Please complete Table 3 below

Table 3 – Adding Additional Medium Combustion Plant		
	Number Currently permitted for	**Number you wish to add**
Medium Combustion Plant		

Please complete Appendix 8 of Form C3 for each new Medium Combustion Plant you wish to add.

2g Combined Medium Combustion Plant and Specified Generators

2g1 Are you applying to add a Specified Generator to your existing permit?

No ☒ *Go to section 3*

Yes ☐ *Go to section 2g2* and complete Appendix 9 of Form C3 for each generator that comprises the Specified Generator.

2g2 Is the Specified Generator also a new Medium Combustion Plant?

No ☒

Yes ☐ Please complete Appendix 8 and Appendix 9 of Form C3 for each new Medium Combustion Plant you wish to add that is also a Specified Generator.

3 Your ability as an operator

If you are only applying to change or add a water discharge activity, you only have to fill in question 3d.

If you are applying to add waste installations or waste operations to a permit that has not previously had them, you need to fill in all of section 3.

If you are applying to consolidate two or more permits or have an updated permit you must fill in question 3d.

3a Relevant offences – installations, waste operations, medium combustion plant and specified generators (See guidance notes on part C2)

Have you, or any other relevant person, been convicted of any relevant offence?

No ☒ *Go to section 3b*

Yes ☐ Please give details below

Title	
First name	
Last name	
Date of birth (DD/MM/YYYY)	
Position held at the time of the offence	
Name of the court where the case was dealt with	
Date of conviction (DD/MM/YYYY)	
Offence and penalty set	
Date any appeal against the conviction will be heard (DD/MM/YYYY)	

If necessary, use a separate sheet to give us details of other relevant offences, and tell us below the reference number you have given the extra sheet.

Document reference	

3b Technical ability - relevant waste operations only (see the guidance notes on part C2)

3b1 Which approved scheme are you using to show you have the suitable technical skills and knowledge to manage your facility?

CIWM / WAMITAB ☐

ESA / EU ☐

3b2 Do you already hold the relevant, formal qualifications to manage your facility?

Yes ☐ Tick to confirm you've included all original *and* continuing competence evidence. ☐

No ☐ Tick to confirm you've included evidence you've registered with a Scheme. ☐

3c Finances (installations, waste operations, mining waste operations, medium combustion plant and specified generators)

Do you or any relevant person have current or past bankruptcy or insolvency proceedings against you?

No ☒ *Go to section 3d.*

Yes ☐ Please give details of the required set-up (including infrastructure), maintenance and clean up costs for the proposed facility, against which a credit check may be assessed.

Please note: We may want to contact a credit reference agency for a report about your business's finances.

Landfill, Category A mining waste facilities and mining waste facilities for hazardous waste only

How do you plan to make financial provision (to operate a landfill or a mining waste facility you need to show us that you are financially capable of meeting the obligations of closure and aftercare)?

Bonds ☐

Escrow account ☐

Trust fund ☐

Lump sum ☐

Other ☐

Provide a plan of your estimated expenditure on each phase of the landfill or mining waste facility.

Document reference

3d Management systems (all)

You can find guidance on management systems in both 'How to Comply' and 'Horizontal Guidance Note 6 – Environmental Management Systems'. We have also developed environmental management toolkits for some business sectors which you can use to produce your own management system. You can get these by calling 0300 065 3000 or by downloading them from our guidance webpages.

3d1 Does your management system meet the conditions set out in our guidance?

Yes ☒

No ☐

3d2 What management system will you provide for your regulated facility?

EC Eco-Management and Audit Scheme (EMAS) ☐

ISO 14001 ☒

BS 8555 (Phases 1–5) ☐

Green Dragon ☐

Own management system ☐

3d3 Make sure you include a summary of your management system which sets out any changes or additional measures you will put in place to the address risks from the proposed changes. Tick the box to confirm you've done this and tell us the reference below. ☒

Document reference Appendix I

Water discharge activities: *Go to section 5.*

4 Consultation (fill in 4a to 4c for installations and waste operations and 4d for installations only)

Could the waste operation or installation involve releasing any substance into any of the following?

4a A sewer managed by a sewerage undertaker

No ☒

Yes ☐ Please name the sewerage undertaker

4b A harbour managed by a harbour authority

No ☒

Yes ☐ Please name the harbour authority

4c Direct into relevant territorial waters or coastal waters within the sea fisheries district of a local fisheries

No ☒

Yes ☐ Please name the fisheries committee

4d Is the installation on a site for which:

4d1 a nuclear site licence is needed under section 1 of the Nuclear Installations Act 1965?

No ☒

Yes ☐

4d2 a policy document for preventing major accidents is needed under regulation 5 of the Control of Major Accident Hazards

No ☐

Yes ☒

5 Supporting information

5a Provide a plan or plans for the site (see guidance notes on part C2 for what needs to be marked on the plan)

Document reference: Appendix G

5b Do any of the variations you plan to make need extra land to be included in the permit?

No ☒

Yes ☐ Please provide a site report for the extra land.

Document reference

5c Adding an installation

If you are applying to add an installation, tick the box to confirm that you have sent in a baseline report and provide a reference. ☐

Document reference

6 Environmental risk assessment - if you need one (see the guidance notes on part C2)

Provide an assessment of the risks each of your proposed activities cause to the environment. The risk assessment must use H1 or an equal method.

Document reference: Appendix E

Appendix 1 – Low impact installation checklist (see guidance notes on part C2)

Installation reference					
Condition	**Response**				**Do you meet this?**
A – Management techniques	Provide references to show how your application meets A.				Yes ☐
	References				No ☐
B – Aqueous waste	Effluent created		m3/day		Yes ☐
					No ☐
C – Abatement systems	Provide references to show how your application meets C.				Yes ☐
	References				No ☐
D - Groundwater	Do you plan to release any hazardous substances or non-hazardous pollutants into the ground?		Yes	☐	Yes ☐
			No	☐	No ☐
E – Producing waste	Hazardous waste		Tonnes per year		Yes ☐
	Non-hazardous waste		Tonnes per year		No ☐
F – Using energy	Peak energy consumption		MW		Yes ☐
					No ☐
G – Preventing accidents	Do you have appropriate measures to prevent spills and major releases of liquids? (See 'How to comply'.)		Yes	☐	Yes ☐
			No	☐	No ☐
	Provide references to show how your application meets G.				
	Reference				
H - Noise	Provide references to show how your application meets H.				Yes ☐
	Reference				No ☐
I - Emissions of polluting substances	Provide references to show how your application meets I.				Yes ☐
	Reference				No ☐
J – Odours	Provide references to show how your application meets J.				Yes ☐
	Reference				No ☐
K – History of keeping to the regulations	Say here whether you have been involved in any enforcement action as described in Compliance History Appendix 1 explanatory notes.		Yes	☐	
			No	☐	

Application for an environmental permit: Part C3 – Variation to a bespoke installation permit

Fill in this part of the form, together with parts A, C2 and F1, if you are varying a bespoke permit for an installation.

Please check that this is the latest version of the form available from our website.

Please read through this form and the guidance notes that came with it. All relevant guidance documents can be found on our website.

Contents

1 About your activities

1a Tell us about the activities you want to do.

Fill in Table 1a below with details of all the activities listed in schedule 1 of the Environmental Permitting Regulations (EPR) and all directly associated activities (DAAs) (in separate rows) that you propose to carry out at the installation. Please also use this table if you are applying for a Medium Combustion Plant(s) or Specified Generator(s).

Fill in a separate table for each installation you are applying for. Use a separate sheet if you have a long list and send it to us with your application form. Tell us the document reference.

Document reference	

Notes to help you complete Table 1a:

1 Quote the section number, part A1 or A2 or B, then paragraph and sub paragraph number as shown in part 2 of schedule 1 to the regulations.

2 Use the description from schedule 1 of the regulations. Include any extra detail that you think would help to accurately describe what you want to do.

3 By 'capacity', we mean:

- the total incineration capacity (tonnes every hour) for waste incinerators;
- the total landfill capacity (cubic metres) for landfills;
- the total treatment capacity (tonnes each day) for waste treatment;
- the total storage capacity (tonnes) for waste storage operations;
- the processing and production capacity for manufacturing operations; or
- the thermal input capacity for combustion activities.

4 The R (recovery) and D (disposal) codes are as set out in Annex I and/or Annex II of the European Waste Framework Directive (as amended).

5 Fill this in as a separate line for each directly associated activity and give an accurate description of any other activities associated with your schedule 1 activities.

6 By 'total storage capacity', we mean the maximum amount of waste, in tonnes, you are able to store on the site at any one time.

Table 1a – Types of activities

Important: Put your main activity first, when listing all of the activities you want to do. Note; some questions only apply to activities involving the acceptance of waste.

Schedule 1 listed activities				**For installations that take waste only**		
Installation / Activity name	Schedule references (See note 1)	Description of the Activity (See note 2)	Activity capacity (See note 3)	Annex I and Annex 2 (disposal and recovery) codes (See note 4)	Hazardous waste treatment capacity (if this applies) (See note 3)	Non-hazardous waste treatment capacity (if this applies) (See note 3)
BR9685IX	S4.2 A(1)(a)(v)	Producing inorganic chemicals such as – non-metals, metal oxides, metal carbonyls or other inorganic compounds (for example calcium carbide, silicon, silicon carbide, titanium dioxide) - W405 VLVF process				
BR9685IX	S5.4 A(1)(a)(i)	S5.4 A(1)(a)(i) – Disposal of non-hazardous waste in a facility exceeding 50 tonnes per day by biological treatment - W806 WWT Process				

Directly associated activities (See note 5)

Name of DAA	Description of the DAA (please identify the schedule 1 activity it serves)
W1205 / W1206 Quench process	Receipt of material for quenching/encapsulation, treatment, product storage and associated emissions

For installations that take waste	Total storage capacity of non-hazardous waste (See note 6)	
	Total storage capacity of hazardous waste (See note 6)	
	Annual throughput (tonnes each year)	

1b Do you intend to accept waste as part of your activities?

No ☒ *Go to section 2*

Yes ☐ Tell us about the waste types you want to accept. See notes below.

For each line in Table 1a (including DAAs), fill in a separate document to list those types of waste you will accept onto the site for that activity. Give the List of Wastes catalogue code and description.

If you need to exclude wastes from your activity or facility by restricting the description, quantity, physical nature, hazardous properties, composition or characteristic of the waste, include these in the document. Send it to us with your application form.

If you want to accept any waste with a code ending in 99, you must provide more information and a full description in the document. You can use Table 1b as a template.

Document references

Table 1b – Template example: types of waste accepted and restrictions	
Waste code	Description of waste
Example	Example
02 01 08*	Agrochemical waste containing dangerous substances
06 01 02*	Hydrochloric acid

2 Emissions to air, water and land

Fill in Table 2 below with details of the emissions that result from the operating techniques at each of your installations.

Fill in one table for each installation. You can use Table 2 as a template. Please provide the reference for each document.

Document references

Table 2 – Emissions (releases)				
Installation / Activity name	BR9685IX			
Point source emissions to air				
Emission point reference and location	Source	Parameter	Quantity Unit	Unit
A123 - see Appendix G for location	W405 VLVF process	Siloxanes	No individual limit – within cumulative site VOC limit	kg/yr
A124 - see Appendix G for location	W405 VLVF process	Siloxanes	**No individual limit – within cumulative site VOC limit**	kg/yr
Point source emissions to water (other than sewers)				
Emission point reference and location	Source	Parameter	Quantity Unit	Unit
W1	Wastewater treatment process	TOC	100 mg/l (annual average)	mg/l

Point source emissions to sewers, effluent treatment plants or other transfers off site				
Emission point reference and location	Source	Parameter	Quantity Unit	Unit
Point source emissions to land				
Emission point reference and location	Source	Parameter	Quantity Unit	Unit

3 Operating techniques

3a Technical standards

Fill in Table 3a for each activity at the installation you have referred to in Table 1a above, and list the relevant technical guidance note (TGN) or notes you are planning to use. If you are planning to use the standards set out in the TGN, there is no need to justify using them.

You must justify your decisions in a separate document if:

- there is no technical standard;
- the technical guidance provides a choice of standards; or
- you plan to use another standard.

This justification could include a reference to the Environmental Risk Assessment provided in section 6 of part C2 (General Bespoke Permit) of the application form. The documents in Table 3a should summarise the main measures you use to control the main issues identified in the H1, H1 assessment, assessment or technical guidance. For MCP/Specified Generators please use the Environment Agency's Specified Generator Tranche B Screening Tool.

For each of the activities listed in Table 3a, describe the type of operation and the options you have chosen for controlling emissions from your process.

Fill in one table for each installation. You can use Table 3a as a template. Please provide the reference for each document.

Document references

Table 3a – Technical standards		
Installation / Activity name		
Schedule activity or directly associated activity description	Relevant technical guidance note/document or best available techniques as described in BAT conclusions under IED*****. You will need to refer to 'How to comply' for all permits.	Document reference (if appropriate)
	'How to comply'	

S4.2 A(1)(a)(v)	H1 and upgrading site siloxane emisions to be within the cumulative VOC limit	
S5.4 A(1)(a)(i)	CWW Bref guidance	
*****Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).		

If appropriate, use block diagrams to help describe the operation and process. Give the document references you use for each diagram and description.

Document references

3b General requirements

Fill in a separate Table 3b for each installation. You can use Table 3b as a template. Please provide the reference for each document.

Document references

Table 3b – General requirements	
Installation / activity name	
If the TGN or H1 assessment shows that emissions of substances not controlled by emission limits are an important issue, send us your plan for managing them	Document reference or references
If the TGN or H1 assessment shows that odours are an important issue, send us your odour management plan	Document reference or references
If the TGN or H1 assessment shows that noise or vibration are important issues, send us your noise or vibration management plan (or both)	Document reference or references
If our fire prevention guidance or H1 assessment shows that fire risk is an important issues, send us your fire management plan	Document reference or references
If the Environment Agency's Specified Generator Tranche B Screening Tool shows that dispersion modelling is not required to assess the risk to the environment, please send us a completed copy of the tool to support your decision	Document reference or references
If the Environment Agency's Specified Generator Tranche B Screening Tool shows that dispersion modelling is required to assess the risk to the environment, please send us a completed copy of the tool and your completed modelling report and modelling input files to support your application.	Document reference or references

3c Types and amounts of raw materials

Fill in Table 3c for all schedule 1 activities. Fill in a separate table for each installation. You can use Table 3c as a template. Please provide the reference for each document.

Document references

Table 3c – Types and amounts of raw materials	
Installation name	
Capacity (See note 1 below)	

Schedule 1 activity	Description of raw material and composition material	Maximum amount (tonnes) (See note 2 below)	Annual throughput (tonnes per year)	Description of how the raw material is used including any main hazards (include safety information sheets)

Notes

1 By 'capacity', we mean the total storage capacity (tonnes) or total treatment capacity (tonnes each day).

2 By 'maximum amount', we mean the maximum amount of raw materials on your site at any one time.

Use a separate sheet if you have a long list of raw materials and send it to us with your application form. Please provide the reference for each document.

Document reference

3d Information for specific sectors

For some sectors, we need more information to be able to set appropriate conditions in the permit. This is as well as the information you may provide in sections 5, 6 and 7.

For those activities listed below, you must answer the questions in the related document.

Table 3d – Questions for specific sectors	
Sector	Appendix
Combustion	See the questions in appendix 1
Chemicals	See the questions in appendix 2
Intensive farming	See the questions in appendix 3
Clinical waste	See the questions in appendix 4
Hazardous and non-hazardous waste recovery and disposal	See the questions in appendix 5
Incinerating waste	See the questions in appendix 6
Landfill sector	See the questions in appendix 7
Medium Combustion Plant (includes mobile plant)	See the questions in appendix 8
Combined Medium Combustion Plant/Specified Generator (includes mobile plant)	See the questions in appendix 8 and 9
Specified Generator (includes mobile plant)	See the questions in appendix 9

4 Monitoring

4a Describe the measures you use to monitor emissions by referring to each emission point in Table 2 above

You should also describe any environmental monitoring. Tell us:

- how often you use these measures;
- the methods you use; and

- the procedures you follow to assess the measures.

Document reference	Appendix E

4b Point source emissions to air only

Provide an assessment of the sampling locations used to measure point source emissions to air. The assessment must use Technical Guidance Note M1 (Monitoring). This is available in the Guidance section on our Website.

Document reference	Appendix E & Appendix G

5 Environmental impact assessment

5a Have your proposals had an environmental impact assessment under Council Directive 85/337/EEC of 27 June 1985 [Environmental Impact Assessment] (EIA)?

No ☒ Now go to section 6

Yes ☐ Please provide a copy of the environmental statement and, if the procedure has been completed:

- a copy of the planning permission; and
- the committee report and decision on the EIA.

Document reference	N/A

6 Resource efficiency and climate change

If the site is a landfill, you only need to fill in this section if the application includes landfill gas engines.

6a Describe the basic measures for improving how energy efficient your activities are

Document reference	N/A

6b Provide a breakdown of any changes to the energy your activities use and create Document reference

	N/A

6c Have you entered into, or will you enter into, a climate change levy agreement?

No ☐ Describe the specific measures you use for improving your energy efficiency.

Document reference	N/A

Yes ☒ Please give the date you entered (or the date you expect to enter) into the agreement. 01/04/2013

Please also provide documents that prove you are taking part in the agreement.

Document reference	Appendix F

6d Tell us about, and justify your reasons for, the raw and other materials, other substances and water you will use

Document reference	N/A

6e Describe how you avoid producing waste in line with Council Directive 2008/98/EC on waste

If you produce waste, describe how you recover it.
If it is technically and financially impossible to recover the waste, describe how you dispose of it while avoiding or reducing any effect it has on the environment.

Document reference	N/A

7 Medium Combustion Plant

7a Is the total aggregated thermal input of the MCP 20 MW thermal or more?

No ☒

Yes ☐ You must either submit a report which shows how your MCP also meets the requirements of Schedule 24 of the Environmental Permitting Regulations which implement the relevant requirements of the Energy Efficiency Directive (2012/27/EU), or an explanation of why Schedule 24 does not apply in your case.

Tell us the reference for this document, below.

Document reference

7b Is the MCP either (a) an individual unit greater than or equal to 20MWth, or (b) one that burns waste biomass as described in Article 3(18) (b) of MCPD?

Yes ☐ An individual unit greater than or equal to 20MWth *Go to section 7c*

Yes ☐ Burns waste biomass as described in Article 3(18) (b) of MCPD. *Go to section 7c*

No ☒

7c Do any of the MCPs on site meet the criteria of a Chapter 1, Section 1.1 Part B activity or Chapter 5, Section 5.1 Part B activity?

Yes ☐ Chapter 1, Section 1.1 Part B activity.

Yes ☐ Chapter 5, Section 5.1 Part B activity.

No ☒

If you have ticked 'Yes' to either Chapter 1 or 5 above you must complete a Best Available Techniques assessment in line with the relevant Environmental Permitting technical guidance note. Tell us the reference for this document, below.

Document reference

8 Combined Medium Combustion Plant/Specified Generators

8a Is the total aggregated thermal input of the Specified Generators 20 MW thermal or more?

No ☒

Yes ☐ You must either submit a report which shows how your MCP/Specified Generator also meets the requirements of Schedule 24 of the Environmental Permitting Regulations which implement the relevant requirements of the Energy Efficiency Directive (2012/27/EU) or an explanation of why Schedule 24 does not apply in your case.

Tell us the reference for this document, below.

Document reference

8b Is the Specified Generator an individual unit with thermal input greater than or equal to 20 MWth?

No ☒ Now complete all relevant appendices.

Yes ☐ *Go to section 8c*

8c Does the Specified Generator meet the criteria of a Chapter 1, Section 1.1 Part B activity?

No ☒ Now complete all relevant appendices.

Yes ☐ This is a Chapter 1, Section 1.1 Part B activity.

You must complete a Best Available Techniques assessment in line with the relevant Environmental Permitting technical guidance note. Tell us the reference for this document, below.

Document reference	

Appendix 1 – Specific questions for the combustion sector (Not for use for Medium Combustion Plant)

1 Identify the type of fuel burned in your combustion units (including when your units are started up, shut down and run as normal). If your units are dual fuelled (that is, use two types of fuel), list both the fuels you use

Fill in a separate table for each installation.

Installation reference			
Type of fuel	When run as normal	When started up	When shut down
Coal			
Gas oil			
Heavy fuel oil			
Natural gas			
WID waste			
Biomass (see notes 1 and 2 below)			
Biomass (see notes 1 and 2 below)			
Biomass (see notes 1 and 2 below)			
Biomass (see notes 1 and 2 below)			
Biomass (see notes 1 and 2 below)			
Other			

Notes

1 Not covered by Industrial Emissions Directive 2010/75/EU.

2 'Biomass' is referred to in The Renewables Obligation Order 2002 (SI 2002 No. 914).

Give extra information if it helps to explain the fuel you use.

Document reference

2 Give the composition range of any fuels you are currently allowed to burn in your combustion plant

Fill in a separate table for each installation.

Installation reference					
Parameter	Unit	Fuel 1	Fuel 2	Fuel 3	Fuel 4
Maximum percentage of gross thermal input	%				
Moisture	%				
Ash	% wt/wt dry				
Sulphur	% wt/wt dry				
Chlorine	% wt/wt dry				
Arsenic	% wt/wt dry				
Cadmium	% wt/wt dry				
Carbon	% wt/wt dry				
Chromium	% wt/wt dry				

Copper	% wt/wt dry				
Hydrogen	% wt/wt dry				
Lead	% wt/wt dry				
Mercury	% wt/wt dry				
Nickel	% wt/wt dry				
Nitrogen	% wt/wt dry				
Oxygen	% wt/wt dry				
Vanadium	mg/kg dry				
Zinc	mg/kg dry				
Net calorific value	MJ/kg				

3 If NOx factors are necessary for reporting purposes (that is, if you do not need to monitor emissions), please provide the factors associated with burning the relevant fuels

Fill in a separate table for each installation.

Installation reference	
Fuel	NOx factor (kgt–1)
Fuel 1	
Fuel 2	
Fuel 3	
Fuel 4	
Note: kgt–1 means kilograms of nitrogen oxides released for each tonne of fuel burned	

4 Will your combustion plant be subject to Chapter III of the Industrial Emissions Directive 2010/75/EU? (see Government guidance)

No ☐ *This Annex is complete.*

Yes ☐

5 Is your plant (tick an option)

an existing plant (a plant licensed before 1 July 1987)? ☐

a new plant (a plant licensed on or after 1 July 1987 but before 27 November 2002, or a plant for which an application was made before 27 November 2002 and which was put into operation before 27 November 2003)? ☐

a new-new plant (a plant for which an application was made on or after 27 November 2002)? ☐

6 If you run more than one type of plant or a number of the same type of plant on your installation, please list them in the table below

Fill in a separate table for each installation.

Installation reference	
Type of plant	Number within installation
Existing	
New	
New-new	

Gas turbine (group A)	
Gas turbine (group B)	

7 If you run an existing plant, have you submitted a declaration for the 'limited life derogation' set out in Article 33 of Chapter III of the Industrial Emissions Directive?

No ☐ *Go to section 9*

Yes ☐

8 Have you subsequently withdrawn your declaration?

No ☐

Yes ☐

9 List the existing large combustion plants (LCPs) which have annual mass allowances under the National Emission Reduction Plan (NERP), and those with emission limit values (ELVs) under the LCPD

Installation reference	
LCPs under NERP	LCPs with ELVs

10 Do you meet the monitoring requirements of Chapter III of the Industrial Emissions Directive?

Yes ☐

Tell us how you meet the monitoring requirements of Chapter III and give us the reference for this document.

Document reference

Appendix 2 – Specific questions for the chemical sector

1 Please provide a technical description of your activities

The description should be enough to allow us to understand:

- the process;
- the main plant and equipment used for each process;
- all reactions, including significant side reactions (that is, the chemistry of the process);
- the material mass flows (including by products and side streams) and the temperatures and pressures in major vessels;
- the all emission control systems (both hardware and management systems), for situations which could involve releasing a significant amount of emissions – particularly the main reactions and how they are controlled;
- a comparison of the indicative BATs and benchmark emission levels standards in Technical Guidance Notes (TGNs) EPR 4.01, EPR 4.02 and EPR 4.03, and chemical sector BREFs.

Document reference	Appendices A & B

2 If you are applying for a multi-purpose plant, do you have a multi-product protocol in place to control the changes?

No ☒

Yes ☐ Provide a copy of your protocol to accompany this application

Document reference	

3 Does Chapter V of the Industrial Emissions Directive (IED) apply to your activities?

No ☒ This Annex is complete.

Yes ☐ Fill in Table 3a – listing each of the activities controlled under the IED.

Table 3a – activities controlled under the IED.	
Installation reference	
Activities	

3b Describe how the list of activities in question 3a above meets the requirements of the IED

Document reference	

Appendix 3 – Specific questions for the intensive farming sector

1 For each type of livestock, tell us the number of animal places you are applying for

Installation reference	
Type of livestock	Number of places

2 Is manure or slurry exported from the site?

No ☐

Yes ☐

3 Is manure or slurry spread on the site?

No ☐

Yes ☐

Appendix 4 – Specific questions for the clinical waste sector

If you are applying for an activity covered by the Waste Incineration Directive and wish to accept clinical waste you should fill in questions 1, 2 and 3 of this appendix.

Note: If your procedures are fully in line with the standards set out in EPR5.07 then you should tick the 'yes' box and provide the procedure reference. There is no need for you to supply a copy of the procedure.

1 Are pre-acceptance procedures in place that are fully in line with the appropriate measures set out in section 2.2 of EPR 5.07 and which are used to assess a waste enquiry before it is accepted at the installation?

No ☐ Provide justification for departure from EPR 5.07 and submit a copy of the procedures

Document reference

Yes ☐ Document reference

2 Are waste acceptance procedures in place that are fully in line with the appropriate measures set out in section 2.2 of EPR 5.07, and which are used to cover issues such as loads arriving and being inspected, sampling waste, rejecting waste, and keeping records to track waste?

No ☐ Provide justification for departure from EPR 5.07 and submit a copy of the procedures

Document reference

Yes ☐ Document reference

3 Are waste storage, handling and dispatch procedures, and infrastructure in place that are fully in line with the appropriate measures set out in section 3.2 of EPR 5.07?

No ☐ Provide justification for departure from EPR 5.07 and submit a copy of the procedures

Document reference

Yes ☐ Document reference

4 Are monitoring procedures in place that are fully in line with the appropriate measures set out in section 3.3 of EPR 5.07?

No ☐ Provide justification for departure from EPR 5.07 and submit a copy of the procedures

Document reference

Yes ☐ Document reference

5 Are you proposing to either

- accept an additional waste not included in Table 2.1 of section 2.1 of EPR 5.07, or
- apply a permitted activity to a waste other than that identified for that waste in Table 2.1?

No ☐

Yes ☐ Provide justification : Document reference

6 Please provide a summary description of the treatment activities undertaken on the installation. This should cover the general principles set out in section 2.1.4 of EPR 5.07

Document reference

7 Please provide layout plans detailing the location of each treatment plant and main plant items and process flow

Document reference

Appendix 5 – Specific questions for the hazardous and non-hazardous waste recovery and disposal sector

Note: If your procedures are fully in line with the standards set out in SGN 5.06 then you should tick the 'yes' box and provide the procedure reference. There is no need for you to supply a copy of the procedure.

1 Are pre-acceptance procedures in place that are fully in line with the appropriate measures set out in section 2.1.1 of SGN 5.06, and which are used to assess a waste enquiry before it is accepted at the installation?

No ☐ Provide justification for departure from SGN 5.06 and submit a copy of the procedures

Document reference

Yes ☐ Document reference

2 Are waste acceptance procedures in place that are fully in line with the appropriate measures set out in section 2.1.2 of SGN 5.06, and which are used to cover issues such as loads arriving and being inspected, sampling waste, rejecting waste, and keeping records to track waste?

No ☐ Provide justification for departure from SGN 5.06 and submit a copy of the procedures

Document reference

Yes ☐ Document reference

3 Are waste storage procedures and infrastructure in place that are fully in line with the appropriate measures set out in section 2.1.3 of SGN 5.06?

No ☐ Provide justification for departure from SGN 5.06 and submit a copy of the procedures

Document reference

Yes ☐ Document reference

4 Provide a layout plan giving details of where the installation is based, the infrastructure in place (including areas and structures for separately storing types of waste which may be dangerous to store together) and capacity of waste storage areas and structures

Document reference

5 Provide a summary of the treatment activities carried out on the installation. This should cover the general principles set out in section 2.1.4 of SGN 5.06 and the specific principles set out in sections 2.1.5 to 2.1.15 as appropriate of SGN 5.06

Document reference

6 Provide layout plans giving details of where each treatment plant is based, the main items at each plant, and process flow diagrams for the treatment plant

Document reference

Appendix 6 – Specific questions for the waste incineration sector

If you are proposing to accept clinical waste please also fill in questions 1, 2 and 3 of appendix 4 above.

1a Do you run incineration plants as defined by Chapter IV of the Industrial Emissions Directive (IED)?

No ☐ You do not need to answer any other questions in this appendix.

Yes ☐ WID applies

1b Are you subject to IED as an incinerator or co-incinerator?

As an incinerator ☐

As a co-incinerator ☐

2 Do any of the installations contain more than one incineration line?

No ☐ *Go to section 4*

Yes ☐

3 How many incineration lines are there within each installation?

Fill in a separate table for each installation

Installation reference	
Number of incineration lines within the installation	
Reference identifiers for each line	

You must provide the information we ask for in questions 4, 5 and 6 below in separate documents. The information must at least include all the details set out in section 2 ('Key Issues') of TGN S5.01 (under the subheading 'European legislation and your application for an EP Permit').

4 Describe how the plant is designed, equipped and will be run to make sure it meets the requirements of IED, taking into account the categories of waste which will be incinerated

Document reference

5 Describe how the heat created during the incineration and co-incineration process is recovered as far as possible (for example, through combined heat and power, creating process steam or district heating)

Document reference

6 Describe how you will limit the amount and harmful effects of residues and describe how they will be recycled where this is appropriate

Document reference

For each line identified in question 3, answer questions 7 to 13 below

Question 3 identifier, if necessary

7 Do you want to take advantage of the Article 45 (1)(f) allowance (see below) if the particulates, CO or TOC continuous emission monitors (CEM) fail?

No ☐ *Go to section 8*

Yes ☐ This article allows 'abnormal operation' of the incineration plant under certain circumstances when the CEM for releases to air have failed. Annex VI, Part 3(2) sets maximum half hourly average release levels for particulates (150mg/m3), CO (normal ELV) and TOC (normal ELV) during abnormal operation.

Describe the other system you use to show you keep to the requirements of Article 13(4) (for example, using another CEM, providing a portable CEM to insert if the main CEM fails, and so on).

8 Do you want to replace continuous HF emission monitoring with periodic hydrogen fluoride (HF) emission monitoring by relying on continuous hydrogen chloride (HCl) monitoring as allowed by IED Annex VI, Part 6 (2.3)?

Under this you do not have to continuously monitor emissions for hydrogen fluoride if you control hydrogen chloride and keep it to a level below the HCl ELVs.

No ☐ *Go to section 9*

Yes ☐ Please give reasons for doing this.

9 Do you want to replace continuous water vapour monitoring with pre-analysis drying of exhaust gas samples, as allowed by IED Annex VI, Part 6 (2.4)?

Under this you do not have to continuously monitor the amount of water vapour in the air released if the sampled exhaust gas is dried before the emissions are analysed.

No ☐

Yes ☐ Please give reasons for doing this.

10 Do you want to replace continuous hydrogen chloride (HCl) emission monitoring with periodic HCl emission monitoring, as allowed by IED Annex VI, Part 6 (2.5), first paragraph?

Under this you do not have to continuously monitor emissions for hydrogen chloride if you can prove that the emissions from this pollutant will never be higher than the ELVs allowed.

No ☐

Yes ☐ Please give reasons for doing this.

11 Do you want to replace continuous HF emission monitoring with periodic HF emission monitoring, as allowed by IED Annex VI, Part 6 (2.5), first paragraph?

Under this you do not have to continuously monitor emissions for hydrogen fluoride if you can prove that the emissions from this pollutant will never be higher than the ELVs allowed.

No ☐

Yes ☐ Please give reasons for doing this.

12 Do you want to replace continuous SO_2 emission monitoring with periodic sulphur dioxide (SO_2) emission monitoring, as allowed by IED Annex VI, Part 6 (2.5), first paragraph?

Under this you do not have to continuously monitor emissions for sulphur dioxide if you can prove that the emissions from this pollutant will never be higher than the ELVs allowed.

No ☐

Yes ☐ Please give reasons for doing this.

13 If your plant uses fluidised bed technology, do you want to apply for a derogation of the CO WID ELV to a maximum of 100 mg/m_3 as an hourly average, as allowed by IED Annex VI, Part 3?

No ☐

Does not apply ☐

Yes ☐ Please give reasons for doing this.

Appendix 7 – Specific questions for the landfill sector

1 Provide your Environmental Setting and Installation Design (ESID) report

Document reference

2 Provide your hydrogeological risk assessment (HRA) for the site

Document reference

3 Provide your stability risk assessment (SRA) for the site

Document reference

4 Provide your landfill gas risk assessment (LFGRA) for the site

Document reference

Templates for these four reports can be found using the links on our Guidance Webpages.

5 Provide your proposed plan for closing the site and your procedures for looking after the site once it has closed

Document reference

Appendix 8 – Medium Combustion Plant ('MCP') and combined MCP/Specified Generator Check List

Please provide the information below for each new medium combustion plant or combined MCP/Specified Generator as identified in Annex I of the Medium Combustion Plant Directive (EU/2015/2193).			
Questions	**Answers**		
1 What is the MCPD identifer[1] (As shown on site plan)?			
2 What is the rated thermal input (MWth) of the medium combustion plant. Where there is more than one medium combustion plant, please provide the individual and aggregated total thermal input for all plants.		MWth (only one)	
		MWth (If more than one)	
3 Please indicate the type of medium combustion plant by ticking the appropriate option.	Diesel engine		☐
	Gas turbine		☐
	Dual fuel engine		☐
	Other engines		☐
	Other medium combustion plant		☐
4 Please state the type of fuels used	Fuel type	Tick relevant options	Share of fuels used (%)
	Solid Biomass	☐	
	Other Solid Fuels	☐	
	Gas Oil (Diesel)	☐	
	Liquid fuels other than gas oil	☐	
	Natural Gas	☐	
	Gaseous fuels other than natural gas	☐	
5 Please state the start date of the operation of the Medium Combustion Plant. Or where the exact start date is unknown, provide proof that the operation started before 20th December 2018.		Start date	
	Or, if start date unknown; provide proof:		
		Document reference	
6 Please state the sector of activity of the Medium Combustion Plant or the facility in which it is applied (NACE code[2])			
7 Please state the expected number of annual operating hours of the Medium Combustion Plant, and average load in use.		Hours	
		Average load in use	
8 Please confirm that where the option of exemption under article 6(3) or article 6(8) of the medium combustion plant directive is used, the medium combustion plant will not be operated more than the number of hours referred to in those paragraphs.	Yes, I/We confirm that where the option of exemption under article 6(3) or article 6(8) of the medium combustion plant directive is used, the medium combustion plant will not be operated more than the number of hours referred to in those paragraphs		☐

9 Please confirm that the operator name, registered office address and in the case of stationary medium combustion plant, the address where the plant is located is as stated in Form Part A and Form Part B1.	Yes, I/We confirm that the operator name, registered office address and in the case of stationary medium combustion plants, the address where the plant is located is as stated in Form Part A and Form Part B1.	☐

Explanatory notes to checklist

1. Identifier – the MCP must be traceable via a serial number or other unique identifier, name plate, manufacturer and/or model.

2. NACE code* means Nomenclature of Economic Activities and is the European statistical classification of economic activities.

Appendix 9 – Specific questions for Specified Generators

Please provide the information below for **each** generator identifier, which comprises the Specified Generator (Excluded generators are not required to be included in this appendix).

If your application is for a specified generator that is also a new medium combustion plant, you will also need to complete appendix 8 for each new medium combustion plant.

Questions	**Answers**	
1 What is the generator identifier[1] (As shown on the site plan)?		
2 What is the rated thermal input (MW) of the generator?		MWth
3 Please provide details of any capacity agreement(s) or balancing service agreement(s) for each individual generator, i.e. if they are Tranche A or Tranche B generators.		
4 Please state the total rated thermal input of all generators on site.		MWth
5 Please indicate if the operating hours for each individual Tranche A generator be restricted to 50 hour or less per year.	Yes	☐
	No	☐
6 Please indicate if the aggregated operating hours for all Tranche A generators be restricted to 50 hour or less per year.	Yes	☐
	No	☐
7 Will the NOx emissions of any individual Tranche A generator will be greater than 500mg/Nm3 per year (STP, 15% O_2)?	Yes	☐
	No	☐

Explanatory notes to checklist

1. Identifier – the gnerator must be traceable via a serial number or other unique identifier, name plate, manufacturer and/or model

Application for an environmental permit: Part F1 – Opra, charges and declarations

Fill in this part for all applications for installations, waste operations, mining waste operations and groundwater discharges onto land.

Please check that this is the latest version of the form available from our website.

For applications for water discharge and point source groundwater discharge activities you need to fill in part F2 instead.

Please read through this form and the guidance notes that came with it. All relevant guidance documents can be found on our website.

Contents

1 Working out charges (you must fill in this section)

You have to submit an application fee with your application. You can find out the charge by looking at our current environmental permitting charging scheme. This can be found on our 'How we regulate you' webpages. Please remember that the charges are revised on 1 April each year and that there is an annual subsistence charge (for site based permis) to cover the costs we incur in the ongoing regulation of the permit.

Examples: We have included examples to help you complete the table. The Tier 2 charge example is for an application for a 'New standard rule' permit. The Tier 3 charge example is for an installation Opra based charge for a normal variation (multiplier) application.

Note: for Opra charged Tier 3 Facilities you also need to complete an Opra profile (see section 2).

Table 1 – Working out charges				
Type of application	Normal variation			
	Summary of charges			
Tier 2 facilities (including Part A(2) and Part B)	Charge identifier	Number of facilities	Charge for each facility (£)	Charges due (£)
EXAMPLE: SR2010 No12	S060A (W)	1	1,630.00	1,630.00
Tier 3 facilities				
EXAMPLE: Total Opra charging score for installations	90	× charge multiplier	57	5,130.00
Total Opra charging score for installations	366	× charge multiplier	58	21,228.00
Total Opra charging score for waste operations		× charge multiplier		
Total Opra charging score for mining waste facilities				
Other charges (such as one-off assessments or fixed charge applications etc.)				
			Total charges due	21,228.00

2 Opra profile (does not apply to standard facilities, or other tier 2 permit applications)

If you are submitting a bespoke application, you must include a completed electronic copy in Excel of the *current* Opra spreadsheet. You can find the current Opra spreadsheet in the 'Our charges' section on our 'How we regulate you' webpages.

For all variations, full and partial surrenders: you will need to submit a copy of your current Opra profile based on your existing profile, not a new profile following the variation or surrender.

For transfers: you will need to submit a revised Opra profile to include your own operator performance. Note: this will not change the set transfer fee.

Important: your Opra profile (score) must match our records. If you are unsure about your current Opra profile (score), you should talk to your regulatory officer before submitting your application.

Tick this box to confirm that you have included the electronic OPRA spreadsheet ☐

3 Payment

3a How do you want to pay?

Tick an option below to show how you will pay.

Electronic transfer (for example, BACS)	☒	*Go to section 3b*
Credit or Debit card	☐	*Go to section 3c*
Cheque	☐	*Go to section 3d*
Postal order	☐	*Go to section 3d*

3b Paying by electronic transfer

If you choose to pay by electronic transfer use the following information to make your payment.

Company name:	Natural Resources Wales
Company address:	Income Dept., PO BOX 663, Cardiff, CF24 0TP
Bank:	RBS
Address:	National Westminster Bank Plc, 2 ½ Devonshire Square, London, EC2M 4BA
Sort code:	60-70-80
Account number:	10014438

Reference number

You can use any reference number but we prefer the number to be 'EPR' followed by the first nine letters of your organisation name followed by a four-digit number.

For example, for a company named Joe Bloggs Ltd, the reference number might be EPRJOEBLOGGS0001. (Remember you can use any four-digit number at the end.)

The reference number you will provide will appear on our bank statements so we can check your payment. We may need to contact your bank to make sure the reference number is quoted correctly.

You should also email your payment details and payment reference number to banking.team@naturalresourceswales.gov.uk / banking.team@cyfoethnaturiolcymru.gov.uk or fax it to 0300 065 3001 and enter it in the space provided below.

BACS reference	EPRDOWSILICO0720
Amount paid	£21,228.00

Making payments from outside the UK

These details have changed. If you are making your payment from outside the United Kingdom (which must be received in sterling), our IBAN number is GB70 NWBK6070 8010 0144 38 and our SWIFT/BIC number is NWBKGB2L.

If you do not quote your payment reference number, there may be a delay in processing your payment and application.

3c Paying by credit or debit card

If you are paying by credit or debit card, please fill in the separate form CC1.

You can download this from our website or you can ask for one of our customer service providers to send one by post. We will destroy your card details once we have processed your payment. We can accept payments by Visa, MasterCard or Maestro UK card only.

3d Paying by cheque or postal order

You should make cheques or postal orders payable to Natural Resources Wales and they should be marked 'A/c Payee'.

We *will not* accept post-dated cheques (cheques with a future date written on them).

Cheque/ postal order number	
Amount paid	

4 The Data Protection Act 1998 and General Data Protection Regulations

We, the Natural Resources Body for Wales (hereafter "Natural Resources Wales"), will process the information you provide so that we can:

- deal with your application;
- make sure you keep to the conditions of the licence, permit or registration;
- process renewals; and
- keep the public registers up to date.

We may also process or release the information to:

- offer you documents or services relating to environmental matters;
- consult the public, public organisations and other organisations (for example, the Health and Safety Executive, local authorities, the emergency services, the Department for Environment, Food and Rural Affairs) on environmental issues;
- carry out research and development work on environmental issues;
- provide information from the public register to anyone who asks;
- prevent anyone from breaking environmental law, investigate cases where environmental law may have been broken, and take any action that is needed;
- assess whether customers are satisfied with our service, and to improve our service; and
- respond to requests for information under the Freedom of Information Act 2000 and the Environmental Information Regulations 2004 (if the Data Protection Act allows). We may pass the information on to our agents or representatives to do these things for us.

5 Confidentiality and national security

We will normally put all the information in your application on a public register of environmental information. However, we may not include certain information in the public register if this is in the interests of national security, or because the information is confidential

Confidentiality

You can ask for information to be made confidential by enclosing a letter with your application giving your reasons. If we agree with your request, we will tell you and not include the information in the public register. If we do not agree with your request, we will let you know how to appeal against our decision, or you can withdraw your application.

Only tick the box below if you wish to claim confidentiality for your application.

Please treat the information in my application as confidential ☒

Tick the box to confirm you have provided evidence to support your confidentiality claim and give us the document reference, below. ☒

Document reference	Appendix J

National security

You can tell the Welsh Ministers that you believe including information on a public register would not be in the interests of national security.

You must enclose a letter with your application telling us that you have told the Welsh Ministers and you must still include the information in your application. We will not include the information in the public register unless the Welsh Ministers decides that it should be included.

You can find guidance on national security in 'Core Environmental Permitting Guidance' published by Defra and available via the .Gov website.

You cannot apply for national security via this application.

6 Application checklist (you must fill in this section)

Tell us about the supporting evidence and information you have sent with this application.

Application fee - You must submit the correct application fee in line with our current charging scheme.

Tick the box to say you have included the correct fee. ☒

List all the documents you have included in Table 2. Please see the guidance notes for examples on how to complete the checklist.

If the relevant information for a question forms part of a larger document, please specify the relevant section(s) of the document. This will speed up the process of checking your application and making decisions.

If necessary, continue on a separate sheet and tell us the reference you have given the document below.

Document reference	

Table 2 – application checklist

Question reference	Document title/ reference	Document section
Form C3 – A2 Q1	Appendix A – Process description VLVF	All
Form C3 – A2 Q1	Appendix B – Process description WWT	All
	Appendix C – Process description Quench	All
Form C2 Q 2b	Appendix D – Non technical summary	All
Form C2 Q6, Form C3 Q4a &4b	Appendix E – Environmental assessment and monitoring	All
Form C3 Q6	Appendix F – Climate change agreement	All
Form C2 Q5a, Form C3 4b	Appendix G – Authorised release points map	All
	Appendix H – Contents for Process descriptions	All
Form C2 Q3d3	Appendix I – EMS details	All
From F1 Q5	Appendix J – Request for confidentiality	All

7 Declaration

You must read this section before making the declaration and sending your form to us.

For transfer applications - Both you and the person receiving the permit must make the declaration.

Section 7d must be completed by the current holder *and* Section 7e must be completed by the proposed new holder.

A relevant person should make the declaration. You must be a relevant person or have the authority of a relevant person to sign this application on their behalf.

Relevant people means each applicant, and in the case of a company, a director, manager, company secretary or any similar officer or employee listed on current appointments in Companies House. In the case of a Limited Liability Partnership (LLP), it includes any partner. If the permit holder is an organisation of individuals, each individual (or individual trustee) must complete the declaration.

To simplify and speed up the application process we recommend that the declaration is filled in by an officer of a company or one of the partners in a Limited Liability Partnership (LLP).

If you wish a manager, employee or consultant etc. to sign the declaration on behalf of a relevant person, we will need written confirmation from a relevant person; that is, an officer of the company, a partner in the LLP or the individual, confirming that the person has the authority to fill in the declaration.

If you are joint permit holders you should each fill in your own declaration. We have provided extra spaces for this below. Please send in a separate sheet with your application if you need more room for signatories.

Where the operator is the subject of any insolvency procedure, the declaration must be filled in by the official receiver/appointed insolvency practitioner.

7a Are you signing the form on *behalf of* a relevant person?

If you are *not* a relevant person, but want to sign the application on their behalf, you must include confirmation that you can do this.

I have included written confirmation from a relevant person to confirm I can sign on their behalf. ☐

7b Does your application include a standard facility?

If your application includes a standard facility, you also need to confirm that you are able to meet all relevant criteria of the standard rule set/sets for which you are applying.

I confirm that my standard facility will fully meet the rules that I have applied for. ☐

7c Does your application include ecological survey information?

If your application includes ecological survey information, please see the guidance notes on part F1 and tick the box below to confirm that you have no issue with us using information from any ecological survey you have supplied with your application.

I confirm I am happy for the ecological survey information I have supplied to be used as set out in the guidance. ☐

7d Declaration

If you're transferring the permit, the current holder or holders should sign this section of the declaration, and the proposed new holder or holders of the permit should sign the declaration in section 7e.

If you knowingly or recklessly make a statement which is false or misleading to help you get an environmental permit (for yourself or another person), you are committing an offence under the Environmental Permitting (England and Wales) Regulations 2016.

I declare that the information in this application is true to the best of my knowledge and belief. I understand that this application may be refused or approval withdrawn if I give false or incomplete information.

I understand that if I knowingly or recklessly make a false or misleading statement:

- **I may be prosecuted; and**
- **if convicted, I may have to pay a fine and/or go to prison.**

By signing below, you are confirming that you understand and agree with the declaration above.

Title	Mr	
First name	Eduardo	
Last name	Gadea	
On behalf of (if relevant)		

Today's date	14/07/2020

If you knowingly or recklessly make a statement which is false or misleading to help you get an environmental permit (for yourself or another person), you are committing an offence under the Environmental Permitting (England and Wales) Regulations 2016.

I declare that the information in this application is true to the best of my knowledge and belief. I understand that this application may be refused or approval withdrawn if I give false or incomplete information.

I understand that if I knowingly or recklessly make a false or misleading statement:

- **I may be prosecuted; and**
- **if convicted, I may have to pay a fine and/or go to prison.**

By signing below, you are confirming that you understand and agree with the declaration above.

Title		
First name		
Last name		
On behalf of (if relevant)		
Today's date		

7e Declaration for the person or persons *receiving* the permit (transfers only)

The persons 'receiving the permit' is the proposed new permit holder.

Note: If you cannot trace a person or persons holding the permit you may be able to transfer the permit without their declaration (in section 7d above). Please contact us to discuss this and supply evidence in your application to confirm you are unable to trace one or all of the permit holders.

If you knowingly or recklessly make a statement which is false or misleading to help you get an environmental permit (for yourself or another person), you are committing an offence under the Environmental Permitting (England and Wales) Regulations 2016.

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Title		
First name		
Last name		
On behalf of (if relevant)		
Today's date		

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First name		
Last name		
On behalf of (if relevant)		
Today's date		

Appendix A

IPPC Appendix 4 – The Main Activities : Section 16 Update

Table of Contents

16 W306 W404 W406 W422 Fluids Areas

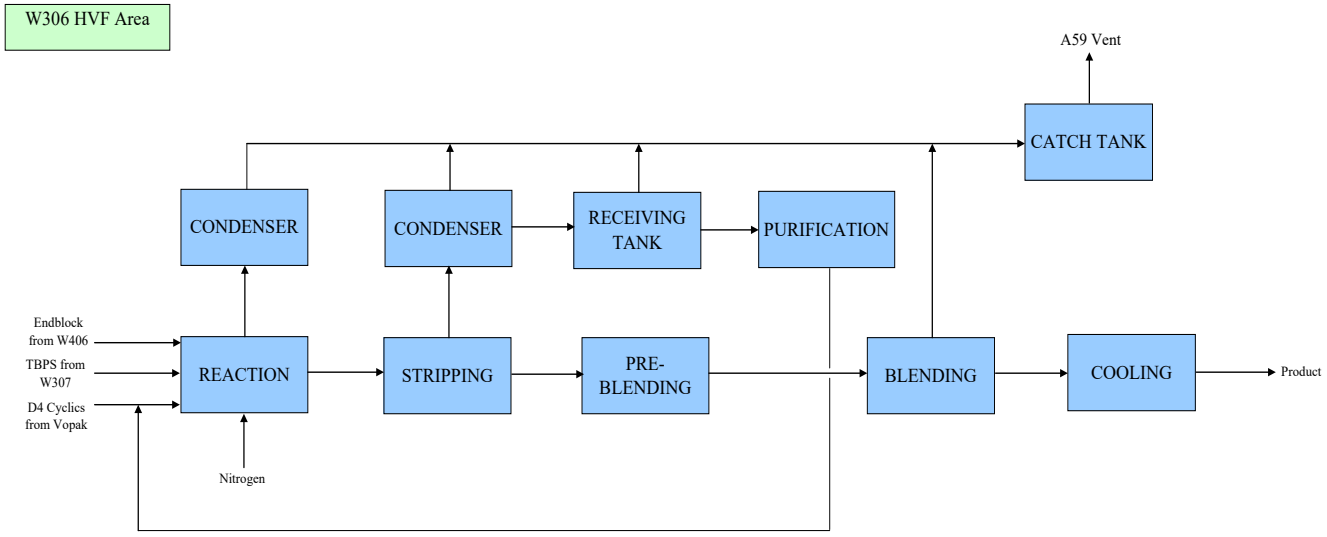
The Fluids area generally receives siloxane intermediates from the Basics train and processes them into silicone fluids.

There are several production plants in the Fluids area as follows: (All Figures in Appendix 12, Section 16)

W306 High Viscosity Fluids, see Figure 1
W306 DC1107, see Figure 2
W306 Gum in Cyclics, see Figure 3
W404 Tank farm
W406 Cyclic Siloxane Splitter and Distillation, see Figures 4-7
W422 Polymerisation Process, see Figure 8
W405 Very Low Viscosity Fluids, See Figure 9

16.1 W306 High Viscosity Fluids Area (HVF)

High viscosity fluids (HVF) are viscous polydimethyl siloxanes, manufactured by the polymerisation of cyclic siloxanes in the presence of a catalyst. The fluid viscosity is controlled by adjusting the amount of trimethyl endblocker used during polymerisation. The viscosity ranges from 2000cSt to 60000cSt.



Block Diagram of W306 HVF Process

Volatile cyclic siloxanes are stripped from the HVF product and recycled and the final product is then transferred to blending vessels and packaged directly.

The polymeriser reactor is fed with a heated mixture of trimethyl endblocked siloxane fluid, D4 cyclics, catalyst and some recycled volatiles stripped later in the process. These polymerise in the agitated polymeriser reactor and are then pumped to the stripper via a preheater. The polymeriser is purged with nitrogen to reduce the water content. The vent gases are condensed and any

cyclics are returned to the polymeriser. The polymeriser can be steam heated to allow fine tuning to the reaction temperature, which may be necessary due to the heat sensitive nature of the catalyst.

The stripped fluid can then be sent directly to the pre-blend storage tanks or back to the stripper feed tank for recycle. The vapour from the top of the stripper is condensed and volatile siloxanes flow directly to the volatiles receiver. The vent from the vacuum pump passes to the vent tank via a separator tank. Any liquid collecting in this separator tank is sent back to the volatiles receiver where it passes through a carbon treatment bed and then is recycled back to the polymeriser reactor. The volatiles are mixed with the D4 prior to the feed preheater and treated with a molecular sieve to remove any water. The carbon treatment beds remove catalyst decomposition products that are produced during stripping.

The stripped fluid is then sent to one of the pre-blend tanks before transferring to the main blenders to achieve the correct viscosity. Finally, the product is filtered and cooled before being sent to be packed in drums, IBCs or tankers.

16.1.1 Plant equipment and reactor conditions

Description	Equipment volume m^3	Operating pressure barg	Operating temperature ^oC	Notes Eg exotherms, catalysts etc
794 Polymeriser reactor		atm	1120-135 ^oC	Baffled and agitated
354 Stripper / falling film evaporator		40-50 mbara	300-320 ^oC	
255 Vacuum vent separator		atm	25-35 ^oC	

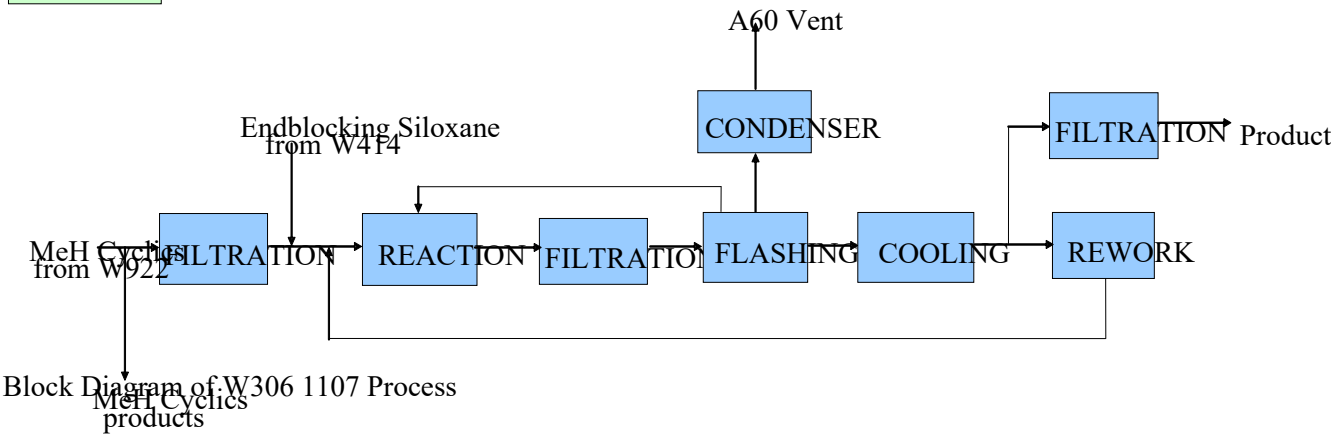
16.1.2 W306 HVF Process Control for Emission Minimisation

Vent Description	Continuous? Y/N	Emission Minimisation Techniques in place.
A59 255 Tank vent	Y	Vent contains some volatile siloxanes (at release quantities below the BAT benchmark for class B VOC's). No abatement is proposed for this vent.

16.2 W306 DC1107 Process

DC1107 fluid is a trimethyl end blocked linear siloxane chain with hydrogen functionality. It is produced by reacting methyl hydrogen cyclic siloxanes (MeH cyclics) with trimethyl endblocker (EBB).

W306 1107 Process



Block Diagram of W306 1107 Process

The methyl hydrogen cyclic siloxanes are produced in W922 and pumped via an overhead pipeline from a storage tank directly into the equilibration reactor of the W306 DC1107 process. Trimethyl endblocker is supplied from W414 tank farm and is mixed with the methyl hydrogen cyclics stream before entering the reactor.

A catalyst in the reactor opens up the cyclic rings and forms endblocked linear chains. The reactor product is heated before being flash distilled. Volatiles driven off are condensed and recycled. The DC1107 liquid product passes through a cooler to product storage, where it is either sold or used as an intermediate in the manufacture of further products.

16.2.1 Reaction Chemistry

The MeH cyclics and EBB are mixed together and fed to a reactor. The catalyst allows the cyclic rings to open, forming short chain linear compounds. These short chains can then join together to form longer chain linear polymers. The endblocker will react with the chain ends to prevent further chain growth.

The chemical reaction can be represented as follows :-

MeH Cyclics + Trimethyl Endblocker $\rightarrow$ Long chain trimethyl end blocked linears

or as a chemical equation:-

$x(MeHSiO)_{4,5} + Me_3\text{-}Si\text{-}O\text{-}Si\text{-}Me_3 \rightarrow Me_3\text{-}(MeHSi\text{-}O)_x\text{-}OMe_3$

where Me_3 = trimethyl functionality
x = ~68 for a 30cS fluid.

The overall heat of reaction is essentially zero, hence no heating or cooling is necessary for the reaction to take place.

The viscosity of the fluid produced is directly related to the length of the polymer chains produced. The longer the chain length, the higher the viscosity. The chain length is controlled by the amount of endblocker present. The higher the concentration of endblocker, the shorter the

chain length produced and hence the lower the fluid viscosity. Similarly, a lower concentration of endblocker will lead to longer chain lengths and hence higher fluid viscosity.

Two rework streams are added to the mixture before it enters the equilibration reactor. The first is from the Rework Tank. The second stream is from the Flash Condenser/Accumulator bottoms. The combined streams then enter the equilibration reactor.

The reacted product, consisting of long chain linears (1107EU), short chain linears and unreacted cyclics passes out of the bottom of the reactor to the equilibration reactor filter.

16.2.2 Stripper, Vacuum and Storage Sections

The reactor products are then heated before passing to the flash drum to remove, under vacuum, most of the unreacted cyclics and EBB from the product. These pass overhead to the flash drum/accumulator. The bottom product is then cooled.

Cooled product can be sent either to storage tanks or to the rework tank. The 1107EU product is pumped through the final product filter to tanker loading or drum and IBC filling.

The storage tanks are maintained under a constant pressure nitrogen blanket.

Flash drum overheads are drawn under vacuum into the flash condenser/accumulator. Gases which do not condense are drawn into the vacuum pump and discharged into the vent condenser, where they do condense and drain to the rework tank. Any nitrogen and uncondensed trace cyclics and EBB is vented through a silencer to atmosphere, together with the vent from the rework tank.

The condensed MeH cyclics and EBB from the flash drum overheads are accumulated and pumped back into the reactor.

16.2.3 Plant equipment and reactor conditions

Description	Equipment volume m^3	Operating pressure barg	Operating temperature °C	Notes Eg exotherms, catalysts etc
3370 Equilibration reactor		0 - 4 barg	Amb	catalyst
3373 Flash Drum		10-20 mbara	160-180°C	
3379 Rework tank		Atmos.	Amb	
3380/81 Storage tanks		0.10-0.20 barg	Amb	
3378 Vent condenser		Atmos.	Amb	

16.2.4 W306 DC1107 Process Control for Emission Minimisation

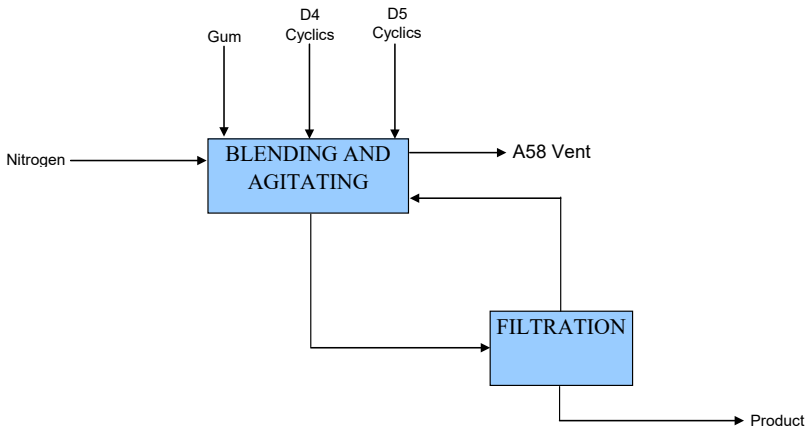
Vent	Continuous?	Emission Minimisation Techniques in place.

Description	Y/N	
A60 3378 Process vent	Y	Releases of siloxanes are minimised by passing the vent through a water condenser. The resulting levels of volatile siloxanes in the vent are at release quantities below the BAT benchmark for class B VOC's. The vent is primarily nitrogen and no further abatement is proposed for this vent.
3380 / 3381 Tank vents	Y	Pressure is kept constant in this tank using a split range controller. The tank is only required to vent when filling. This is deemed an insignificant vent
3379 Rework tank vent	Y	Tank is at atmospheric pressure and the vent point has a liquid seal (U bend). Insignificant vent

16.3 W306 Gum-in-Cyclics Process

This unit is used for the batch blending of high viscosity silicone gums and cyclic siloxanes.

W306 Gum in Cyclics Process



Block Diagram of W306 GIC Process

The D5 cyclics are supplied from W406 and fed via W404 tank farm. The D4 cyclics come via pipeline directly from Vopak. The silicone gums are supplied in drums from the Dow Corning site in Midland Michigan, USA.

The siloxane gum is charged to either of the two stainless steel hoppers via a drum handler and is then pumped in to either blender. The cyclics are piped directly into the required blender. Each blender has an agitator, which enables the feed streams to be mixed within the vessel. A nitrogen sweep is also supplied in order to ensure a dry and inert atmosphere. The nitrogen passes out of a small top hole in each blender and is extracted to atmosphere outside the building by means of a fume extraction fan.

After blending, the gum in cyclics product is passed through a cartridge filter before being sent to the packaging station where both drums and IBCs are filled.

There is a recycle facility around the cartridge filter back to the associated blender, which can be used to add rework material and achieve the product appearance specification.

16.3.1 Plant equipment and reactor conditions

Description	Equipment volume m^3	Operating pressure barg	Operating temperature °C	Notes Eg exotherms, catalysts etc
953 and 602 Blenders		atm	15-25 °C	
955 Filter		< 8 barg	15-25 °C	

16.3.2 W306 Gum in Cyclics Process Control for Emission Minimisation

Vent Description	Continuous? Y/N	Emission Minimisation Techniques in place.
A58 Plant vent – fume extraction from blenders	Y	Fume extraction vent only, contains some volatile siloxanes (at release quantities below the BAT benchmark for class B VOC's) but release is primarily nitrogen. No abatement is proposed for this vent.

16.4 W404 Tank Farm

The bulk storage facility in W404 tank farm provides bulk storage for both intermediates and finished fluids. There are connections from the tank farm to the Vopak storage facility, where tankers and boats can be loaded with finished products.

W404 contains sixteen tanks, eleven of which are atmospheric tanks with nitrogen purge and four of which are pressure vessels operating under a nitrogen blanket. One tank is empty and not used and has a slight nitrogen pressure in it.

The tank area is divided into two sections: one area contains nine tanks inside a bund, spills from which can be pumped out into the W404 spill pond from where they may be recovered or sent for offsite incineration, the other six tanks drain directly into the spill pond. Pumps for the tanks are located outside of the bunded areas and any spills are directed into W404 spill pond.

The W404 Spill Pond has two sections. The fluid side, which is the smaller of the two, should contain fluid with water underneath. The water passes under the weir and into the larger side, so the fluid level must be kept to a minimum to ensure there is no fluid travelling to the recovery side from this location. The recovery side, which is the larger of the two, should contain mostly water, with some fluid from the tanker bay and W404 Tank Farm drains. The water is sent down to waste control for treatment before it is discharged back to the river.

16.4.1 Cyclics Blending

Tank 126 differs from the other tanks in the tank farm as it is not used purely for storage. Its main function is to produce volatile fluid blends by mixing together different cyclics streams - D4 from VOPAK, D5 from T142, D6 from T124, D4 bottoms from T401, and D5 bottoms from T136.

16.4.2 Tanker Loading

There are four tanker bays for loading / off-loading road tankers:
Bay number 1 is used for loading different grades of 200 fluids.
Bay number 2 is used for loading different cyclics - D5, DC345, D6 and cyclics blends.
Bay number 3 is used for loading linears.
Bay number 4 is used for off-loading.

16.4.3 Fluids tank numbers, sizes and contents

Tank	Fluid	Capacity	Tank venting
T172	200 fluid		Nitrogen blanket
T174	200 fluid		Nitrogen blanket
T176	Blend of D5 and D6 cyclics		Nitrogen blanket
T138	200 fluid		Atmospheric, N_2 bubbler
T140	Mixture of 200 fluid, cyclics, EBB and linears		Atmospheric, N_2 bubbler
T142	D5 Cyclics		Atmospheric, N_2 bubbler
T132	200 fluid		Atmospheric, N_2 bubbler
T134	200 fluid		Nitrogen blanket
T136	D5 bottoms/crude D6		Atmospheric, N_2 bubbler
T128	Miscellaneous 200 fluids + agitator for blending		Atmospheric, N_2 bubbler
T130	Linears		Atmospheric, N_2 bubbler
T163	Miscellaneous 200 fluids		Atmospheric, N_2 bubbler
T122	100 cs		Atmospheric, N_2 bubbler
T124	246/D6		Atmospheric, N_2 bubbler
T126	Cyclics blends		Atmospheric, N_2 bubbler

16.4.4 Arrangement of nitrogen inerting for atmospheric and pressurized tanks.

All tanks vent directly to atmosphere. The nitrogen inerting is set up such that when no product is leaving the tank, a small purge of nitrogen flows through the rotameter into the tank. If there is a liquid flow out of the tank, then the nitrogen flood valve on the top of the tank opens ensuring that the tank is kept inerted. The set up on T142 is slightly different since a permanent nitrogen purge is left on the tank.

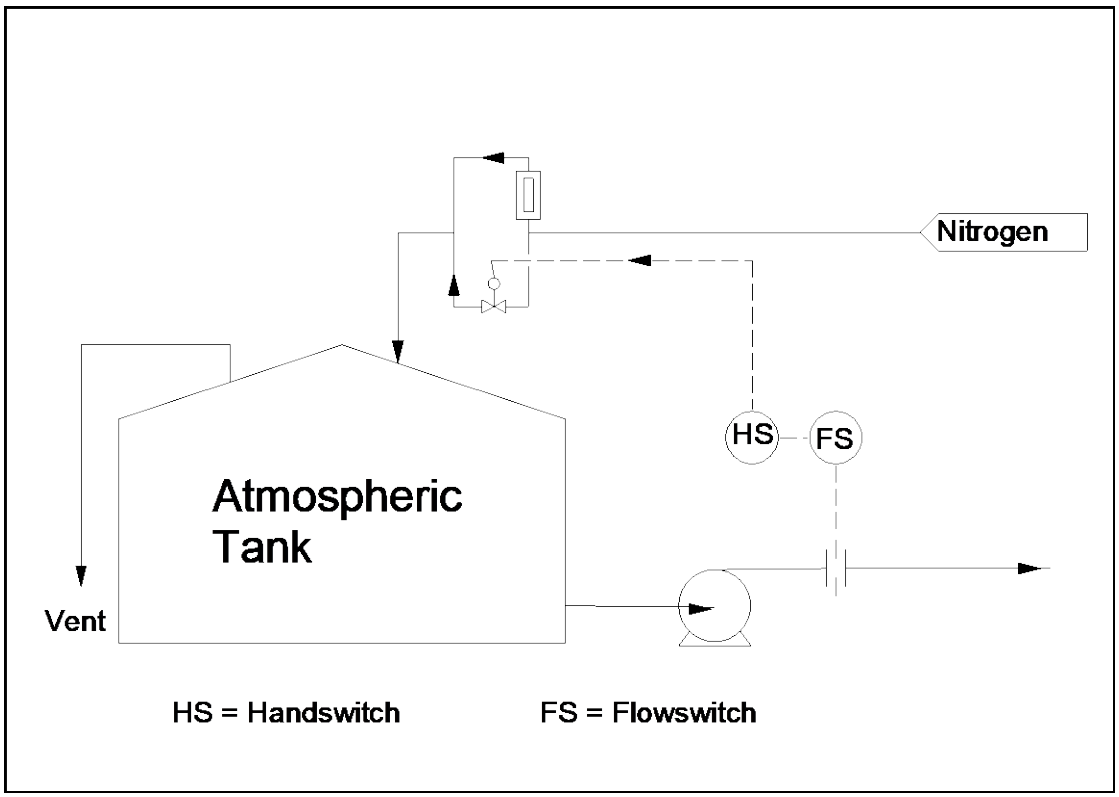


Diagram showing inerting and venting arrangements for atmospheric tanks

The venting and nitrogen inerting on pressurised tanks is via a local split range pressure controller.

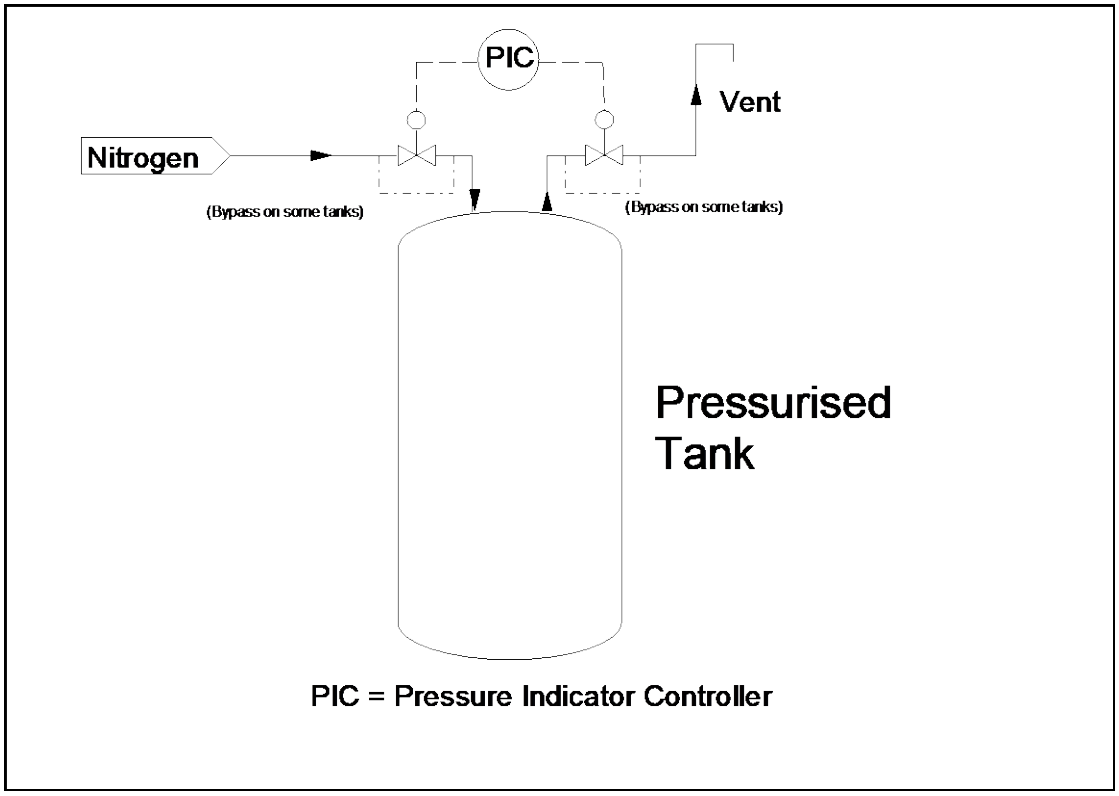
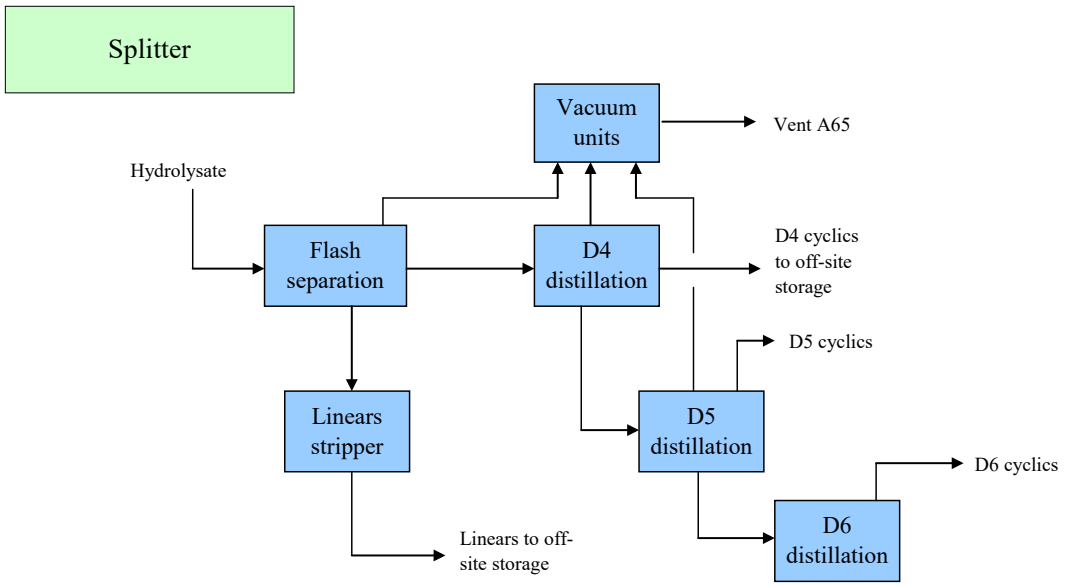


Diagram showing inerting and venting arrangements for pressurised tanks

16.5 W406 Cyclic Siloxane Splitter and Distillation

16.5.1 W406 Splitter



Block Diagram of W406 Splitter and Distillation Processes

The products from the Hydrolysis processes (W705, W716, W920) can be separated into their constituent linear and cyclic species in the Splitter processes. One unit is located in W406 Fluids building and the other in W920 (integrated with the Hydrolysis process).

In W406, the hydrolysate is pumped from T400 in W406 tank farm, through a heater to an evacuated flash vessel, where separation of the linear and cyclic siloxanes takes place. The volatile cyclics are taken overhead from the flash still and are then condensed, collected and pumped to the D4 distillation unit back at W920. Any water vapour and traces of HCl passing over the top of this condenser are condensed in a secondary condenser and then separated from any siloxane. The aqueous phase is drained to the chemical sewer, whilst the siloxane is recycled back to the feed tank.

The vacuum pump supplying vacuum to the splitter and the two distillation units (descriptions to follow), discharges a mixture of nitrogen, water and cyclics vapours. These pass into the seal fluid tank. The seal fluid for this pump is a mixture of hydrol, cyclics and water. Any vapours in the seal fluid tank enter an overhead condenser where most of the cyclics are condensed. Non condensables, such as nitrogen, and low levels of cyclics pass into the vent catch tank, which vents to atmosphere.

The linears from the bottom of the stripper still contain some cyclics and so pass through a further vacuum stripper where additional cyclics boil off. Nitrogen is fed counter-currently to aid the stripping process. These cyclics are condensed and recycled to the feed tank and there is a disposable route to LPO's if needed. The linears exchange heat with the hydrol feed, and are then

cooled and pumped to storage in W404 tank farm. This tank is linked to off-site storage at Vopak.

As can be seen from the block diagram in this section, the crude cyclics from the splitter are distilled in W920 D4 distillation, to give a D4 overhead stream and a D5 and higher bottoms stream. This stream is normally distilled in W920 new D5 column to produce a D5 product stream and a crude D6 cyclics stream. It is possible to send the crude D5 back to W406 via W810 tank farm for use in the W406 D5 distillation processes. This D5 distillation process is described in the next section (16.5.4).

16.5.2 Plant equipment and reactor conditions

Description	Equipment volume m^3	Operating pressure Barg	Operating temperature ^oC	Notes Eg exotherms, catalysts etc
303 Flash still		30-50 mbara	< 150	
502 Linears stripper		15-25 mbara	<250	
329 Vent condenser		Atm	20-30	

16.5.3 W406 Splitter Process Control for Emission Minimisation

Vent Description	Continuous? Y/N	Emission Minimisation Techniques in place.
A65 1113 tank	Y	Vent consists mainly of nitrogen. Releases of siloxanes are minimised by first passing the vent through a water condenser (329). However the resulting levels of volatile siloxanes in the vent are at release quantities above the BAT benchmark for class B VOC's. See improvement plan.
Vacuum vent condenser vent direct to atmosphere	N	Insignificant vent. This vent is only used when sampling of vent is taking place
A66 Tank 400 vent	N	Locally controlled nitrogen blanket, vent to atmosphere in W406 tank farm. Vent contains some volatile siloxanes (at release quantities below the BAT benchmark for class B VOC's). No abatement is proposed for this vent.
A67 Crude D5 Tank	N	Vent contains some volatile siloxanes (at release quantities below the BAT benchmark for class B VOC's). No abatement is proposed for this vent.

16.5.4 W406 D5 Distillation

Crude D5 from T133 in W810 tank farm is pumped to T401 in W406 tank farm. From here it is sent to the D5 distillation column where it is separated into pure D5 and crude D6. The process may also be described as the 316 distillation unit which is the unit number of the D5 distillation column.

Firstly, the crude D5 can be passed through a carbon treatment bed, which lengthens any short chain linears entrained in the stream by means of a condensation reaction. However, this bed is normally bypassed. The stream is then preheated and sent to the distillation column. Pure D5 passes overhead while crude D6 forms the bottoms product together with any linears present and is cooled and sent to T136 in W404 tank farm. There is a knockback condenser at the top of the column, which condenses the pure D5 product and this is taken off just below. The vacuum line is taken from the top of the knockback condenser and joins the vacuum inlet to pump 327 covered in W406 splitter process. Vents from this unit all join up with the Splitter unit vent. The D5 product is collected in an accumulator vessel, where it can be sent back into the column as reflux or sent forward to a carbon bed and a series of molecular sieves which take out any remaining –OH groups. The pure D5 is then sent to T142 in W404 tank farm for storage.

16.5.5 Plant equipment and reactor conditions

Description	Equipment volume m^3	Operating pressure barg	Operating temperature ^oC	Notes Eg exotherms, catalysts etc
311 Carbon bed		4-8	25-35	Activated carbon bed
316 Distillation column		45 – 49 mbara	<165	
310 Carbon bed		3-7	30-40	Activated carbon bed

16.5.6 W406 D5 Distillation Process Control for Emission Minimisation

Vent Description	Continuous? Y/N	Emission Minimisation Techniques in place.
See splitter unit		

16.5.7 W406 D6 Distillation

This process takes crude D6 from T136 in W404 tank farm and separates it into a pure D6 product stream and a bottoms stream containing D7+. The D7+ is fed to the SAPR process in W422. Again, this process may be referred to as the 410 distillation unit as this is the column identification number.

This process can also take crude D5 as a feed stream to make pure D5 as in the D5 distillation process above, or a mixture of D5 and D6, if required, to make a blend known as DC345.

The distillation process preheats the feed stream, which then enters the distillation column. The column is operated under vacuum supplied by 327 vacuum pump on the W406 splitter process (described previously). The column has an internal knockback condenser located on top of the column and the liquid product stream is taken off just below this. It is sent to an accumulator and then cooled before being sent to product storage in W404 tank farm.

The bottoms product is also cooled before being sent for storage on W406 tank farm, from which it is sent to W422 SAPR.

16.5.8 Plant equipment and reactor conditions

Description	Equipment volume m^3	Operating pressure barg	Operating temperature ^oC	Notes Eg exotherms, catalysts etc
410 distillation column		50-70 mbara	< 190	

16.5.9 W406 D6 Distillation Process Control for Emission Minimisation

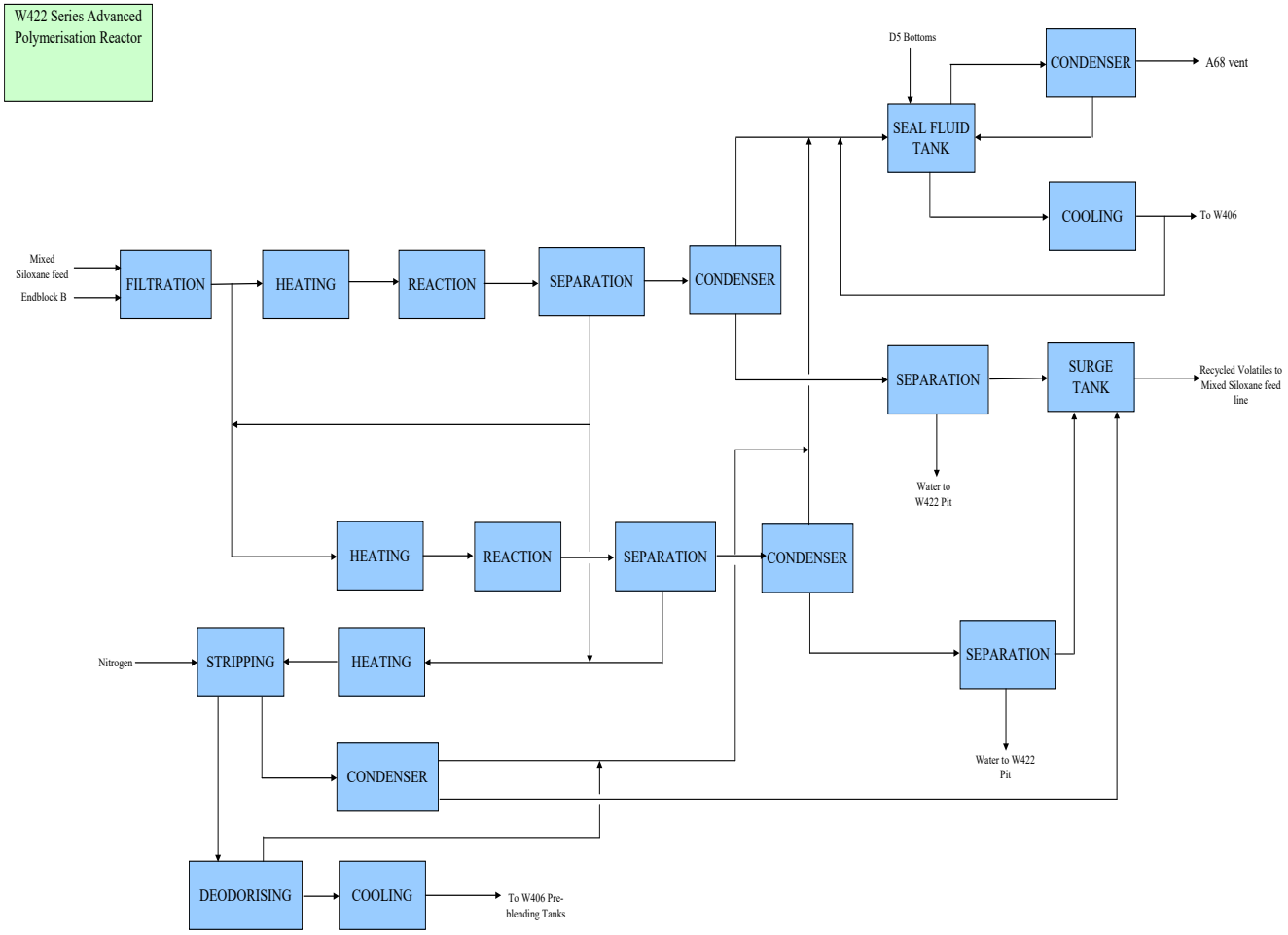
Vent Description	Continuous? Y/N	Emission Minimisation Techniques in place.
See splitter process		

16.6 W422 Polymerisation Process (Series APR)

The Series Advanced Polymerisation Reactor (SAPR) produces siloxane polymer fluids that range in viscosity from 50 – 1000 cSt.

The process uses an equilibrium condensation reaction involving mixed siloxanes, endblocker (EBB from W410) and recycled volatiles (for example, short chain siloxanes). This feed is preheated and fed to a fixed bed catalytic reactor. Volatiles are subsequently stripped from the reactor product under vacuum and recycled. The volatile free siloxane fluid product is then filtered, cooled and transferred into product tanks.

The mixed feeds may consist of any proportion of the following as dictated by availability: D4 cyclics fed directly from the Vopak storage farm by pipeline, D5 and D6 cyclics bottoms from W404 tank farm, pure D5 cyclics from W404 tank farm, hydrol and crude D5 cyclics from the W406 tank farm. Linears are fed from W404 tank farm and/or from Vopak storage farm by pipeline into a buffer tank inside W406 building. It is the proportion of EBB in the feed stream that dictates the final viscosity of the fluid. The feed ratio of siloxane to EBB is controlled from viscosity measurements taken from the reactors and the final stripped product viscosity.



Block Diagram of W422 Polymerisation Process

The polymerisation reaction occurs in two reactors arranged in series, filled with catalyst. The feeds to the reactors are preheated and the reactor product is sent in each case to a separator vessel held under vacuum. The vapours (a mixture of volatile siloxanes and water) that are flashed off from each separator are condensed and separated. The volatile siloxanes are recycled to the feeds via a buffer tank and the water is sent to a holding tank, which is drained periodically to W422 spill pit. W422 pit is then pumped to the spill pond on W404 tank farm from where any siloxanes may be recovered and sent back to rework tank 856 in W406 tank farm.

The main reactions that take place in the APRs are condensation, ring opening and equilibrium endblock insertion. Other reactions can also occur; longer chain –OH and Me_3 endblocked materials can be broken down into shorter chains, or the two –OH ends of one linear molecule can react with one another via condensation and form a cyclic. The fluid mixture leaving the APRs contain a distribution of different length polymer chains which are trimethyl endblocked, along with the volatile siloxanes (also known as low polymer oils or LPOs).

The liquid portion of the reactor products is re-heated and sent to a stripping column in order to remove volatile siloxanes. These are again cooled and separated and sent to join the rest of the recycle volatiles stream.

The bottoms from the stripper column pass to a degassing column, which is again purged with nitrogen. This is to remove any formaldehyde, which adversely affects the product odour. Formaldehyde (HCHO) is formed when hot 200 fluid comes into contact with oxygen, this may occur if there are any vacuum leaks in the system.

The product is cooled and sent to one of five preblenders held in W406 tank farm. These enable the product to exactly meet the required product viscosity.

16.6.1 Plant equipment and reactor conditions

Description	Equipment volume m^3	Operating pressure Barg	Operating temperature °C	Notes Eg exotherms, catalysts etc
1810 Reactor		Max 4 barg	Max 140 °C	catalyst
1830 Reactor		Max 4 barg	Max 140 °C	catalyst
1872 Vent condenser		Atm	25-35 °C	
1850 Stripper		50-70 mbara	280-320 °C	
1855 Degasser		120-130 mbara	100-140 °C	

16.6.2 W422 SAPR Process Control for Emission Minimisation

Vent Description	Continuous? Y/N	Emission Minimisation Techniques in place.
A68 1875 catch tank vent	Yes	Vent consists mainly of nitrogen. Releases of siloxanes are minimised by first passing the vent through a water condenser (1872). However the resulting levels of volatile siloxanes and hydrocarbons in the vent are at release quantities above the BAT benchmark for class B VOC's. See improvement plan.

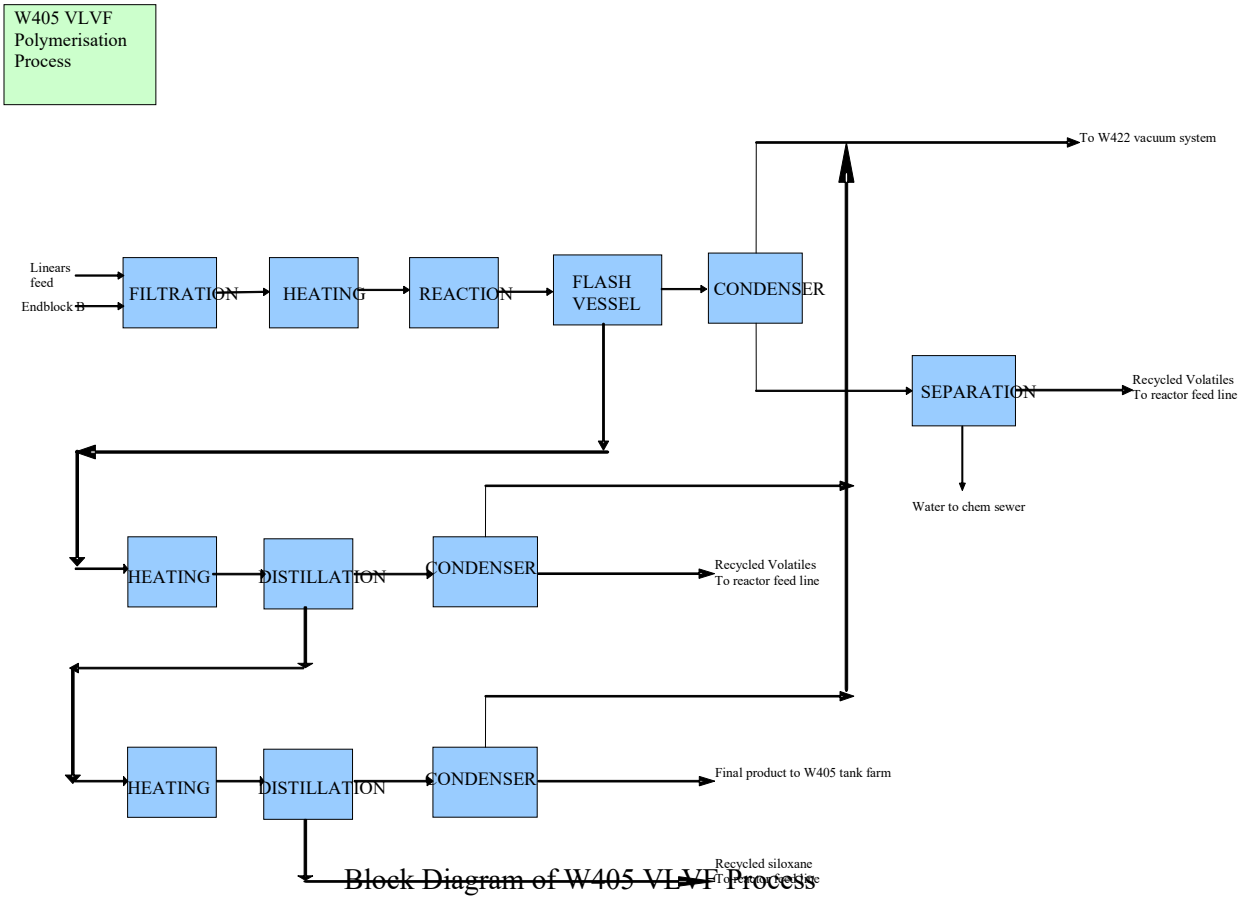
16.7 W405 Very Low Viscosity Fluids (VLVF) Process

The VLVF process produces siloxane polymer fluid of 2 cSt in viscosity.

The process uses an equilibrium condensation reaction involving linear siloxanes, endblocker (EBB from W410) and recycled volatiles (for example, short chain siloxanes). This feed is filtered and water is removed prior to being preheated and fed to a fixed bed catalytic reactor. Volatiles are subsequently stripped from the reactor product under vacuum and recycled. The volatile free siloxane fluid product is then filtered, cooled and transferred into product tanks.

The linear siloxanes are fed from W404 tank farm and/or from Vopak storage farm by pipeline into a buffer tank inside W406 building. It is the proportion of EBB added to the feed stream that

dictates the final viscosity of the fluid. The feed ratio of siloxane to EBB is controlled from viscosity measurements taken from the reactors and the final stripped product viscosity.



Block Diagram of W405 VLVF Process

The polymerisation reaction occurs in a reactor filled with catalyst. The feeds to the reactors are preheated and the reactor product is flashed under vacuum to remove water and EBB. The vapours (a mixture of volatile siloxanes, EBB and water) are collected. The water is removed before recycling the volatile siloxanes and EBB back to the reactor.

The main reactions that take place in the reactor are condensation, ring opening and equilibrium endblock insertion. Other reactions can also occur; longer chain –OH and Me_3 endblocked materials can be broken down into shorter chains, or the two –OH ends of one linear molecule can react with one another via condensation and form a cyclic. The fluid mixture leaving the reactor contains a distribution of different length polymer chains which are trimethyl endblocked, along with the volatile siloxanes.

The liquid portion of the reactor products is re-heated and processed through 2 distillation columns in order to remove volatile siloxanes and higher boiling polymers to reach the required product specifications. The volatiles and high boilers are recycled back to the reactor.

16.7.1 Plant Equipment and Conditions

Description	Equipment volume [m^3]	Operating pressure [bara]	Operating temperature °C	Notes E.g. exotherms, catalysts etc
5046 APR	~ 1.25	2	100	catalyst
5047 flash drum	1.5	0.4	90	
5048 condenser		0.4	90 / 30	
5049 separator	0.5	0.4	30	
5055 column	12	0.085	40 / 208	
5057 ovhd condenser		0.085	90 / 30	
5058 reflux drum	1.5	0.085	30	
5059 column	5	0.085	40 / 180	
5061 ovhd condenser		0.085	80 / 30	
5062 reflux drum	0.6	0.085	30	
5000 tank	125	0.5	up to 30	
5042 tank	50	0.5	up to 100	Typical operating temp ~ 30°C

16.7.2 W405 VLVF Process Control for Emission Minimisation

Vent Description	Continuous? Y/N	Emission Minimisation Techniques in place.
A68 1875 catch tank vent (on W422)	Yes	Vent consists mainly of nitrogen from W422. Releases of siloxanes, in particular EBB, from W405 are minimised by sub-cooling the distillation columns' overhead streams to 30°C (summer time) in order to condense as much as possible of the EBB and by not using nitrogen sweeps in W405. In addition W422 and W405 vents pass through a water vent condenser (1872).
Product tank 5000	No	5000 tank is the 2 cSt product tank, with a split range pressurised N2 blanket. Tank will vent almost pure N2 when it is filling. There is no EBB present in this tank.
Rework tank 5042	No	5042 tank is the rework tank, with a split range pressurised N2 blanket. Tank will vent N2 and small amounts of siloxanes when it is filling. There could be some EBB present in this tank.

Appendix B

IPPC Appendix 4 – The Main Activities : Section 17 Update

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17 Site Utilities

17.1 Site water supplies

The site is supplied with three different sources of water:

- Potable Water (Town's Water) is supplied by Welsh Water via a number of connections along Cardiff Road. It is used for domestic purposes, emergency shower systems, topping-up fire water storage, and for some process uses via water bye-law approved connections.

- River Water is abstracted from the Cadoxton River at W417 and its main use is to supply make-up water to W342 cooling water tower. It is also used directly in some processes. The river water passes through two screens as it flows from the river weir. River water is pumped through sand and gravel filters (W411) to the cooling tower basins. A fraction of the river water passes through a Bromination unit supplied by BetzDearborn. This unit is installed across the river water filters and is operated and maintained by BetzDearborn personnel. This unit gives a free chlorine reserve of approximately 0.2ppm in the river water to the cooling tower. The chemical used to adjust the water quality is : BetzDearborn OX1200 - A Chloro - Bromo compound.

- Well Water from the Bigliss well on Sully Moors is used as main supply to the CHP, and make-up for the W954 nitrogen plant and W911 cooling water towers. It is also used as a supplementary supply to the W342 cooling water tower.

Process Water is a site term used for cooling water supplied to miscellaneous site users from one of the two central cooling water towers at W342 and W911. Process water is used for indirect process cooling via heat exchangers, and direct one-off process uses such as vent scrubbers, lime slaking, pump seal fluid and housekeeping operations. W342 serves the Finishing and Basics Areas 1 and 2 other than the W718 methyl chloride plant, Waste Water treatment and parts of the Quenching process. W911 serves Areas 3 and 4, W718 and parts of the Quenching process..

17.2 W960 CHP Steam Generating System

The Barry site is supplied with steam from an on-site combined heat and power plant (CHP) at W960. The plant also supplies electrical demand for the site and provides supplies of demineralised and boiler feed water. Natural gas is routed through the CHP site to supply onsite processes such as the ERU and W948 Hot Oil as required.

The water supply to feed the CHP plant comes from the Biglis well. Condensate is returned to the CHP plant for treatment and reuse. The CHP plant sewers are routed to the Dow chemical sewer system.

The steam supply to the site is supplemented by waste heat boilers located in the fluid bed reactor processes W709, W714, W348 and W930 and also W949 ERU. The boiler feed water for the Dow waste heat boilers is a combination of treated condensate return and treated make-up well water from CHP. All condensate return systems are fitted with on-line analysers to detect any failure of steam heated process plant at an early stage.

17.3 W954 Nitrogen Plant

Nitrogen is supplied from an on-site cryogenic air separation plant owned and operated by BOC located in W954. Main air intake is via pre-filters into a multi-stage turbo compressor. After compression the air is filtered and dried and then split into two streams.

An off-take of compressed air at a nominal 6 barg is sent to the site air distribution system. The main flow is directed into a separation unit where a near pure nitrogen stream is produced. Nitrogen is produced as gas for immediate use on site.

Gaseous nitrogen from the separation unit is either fed into the site 5 barg nitrogen distribution system after pressure regulation, or compressed by a single stage reciprocating compressor to 40 barg. This is then stored in a gas buffer tank and reduced in pressure, to provide the supply of 10.5 barg nitrogen to the site higher pressure distribution system. The high pressure system is only used for discrete applications (e.g. pump seals) and is not generally made available around the site.

The plant is equipped with two liquid nitrogen storage tanks. During periods of high demand, liquid nitrogen is vapourised using steam to supplement site gaseous nitrogen production. In addition, the liquid nitrogen tanks provide an emergency back-up capacity, which can be used to supply the site nitrogen needs in the event of a failure of the on-site production unit. Back up air vapourisers are capable of providing sufficient flowrate to allow the site to be shut down safely in the event of complete power and steam failure. Liquid nitrogen is supplied to site as required by BOC road tankers.

The nitrogen plant can also be configured to produce a small flow of liquid nitrogen for storage, but at present this mode of operation is very rarely used. At the time of writing, plans are being developed to install a ‘make tank’ to allow the plant to make a small flow of liquid nitrogen continuously.

The nitrogen plant is not continuously manned; control is via a telemetry link to the BOC Margam plant. Key information on nitrogen flow, pressure, storage level and plant status is displayed in the Dow W910 control room.

Cabot Carbon and Vopak are also supplied with Nitrogen from this BOC facility.

17.4 W954 Compressed Air Supply

Instrument air is supplied from the main air compressor that feeds the nitrogen plant (W954). It is backed up by a further two compressors located in W330, and a supplementary machine in W954. BOC own and are responsible for operation and maintenance of all the air compressors, in addition to the nitrogen plant.

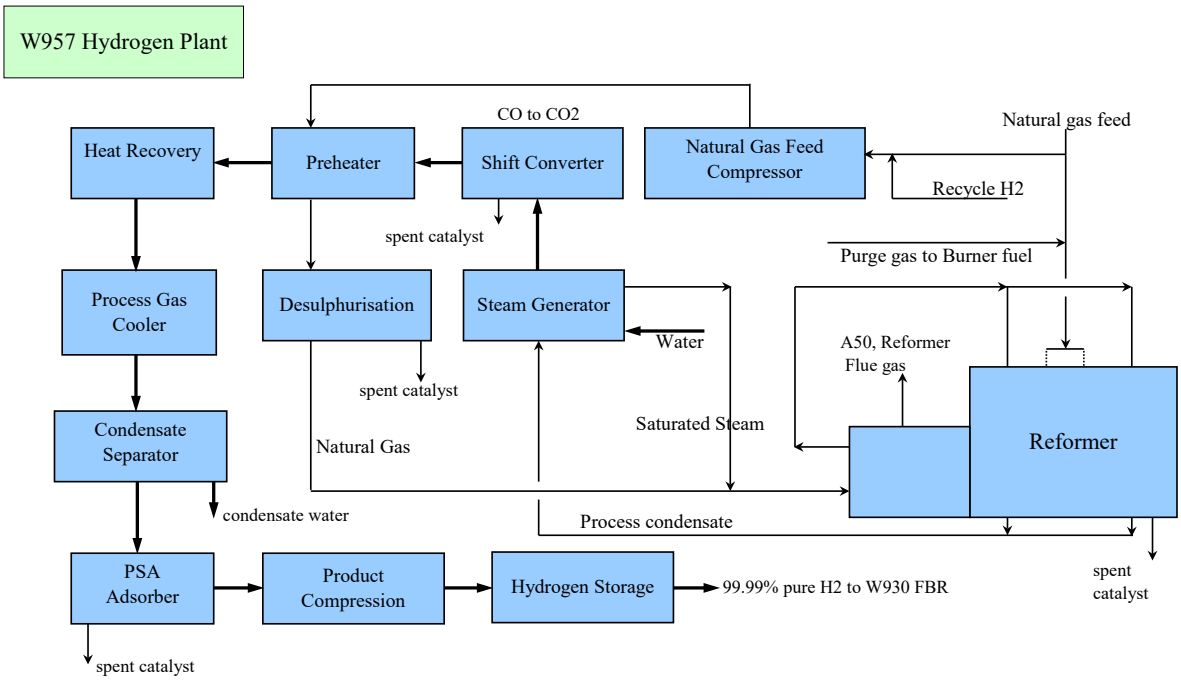
The normal operating mode is to bleed excess air from the main nitrogen compressor into the air system, and run one of the compressors in W330. The additional W330 compressors and/or the supplementary air compressor in W954 nitrogen plant can be run if required, to meet additional demand

In W954, BOC also own and operate a twin cell cooling tower to provide cooling to the on plant machines. The air plant is not continuously manned; control is via a telemetry link to the BOC Margam plant. BOC are responsible for dosing the cooling tower water and the plant has drains to the Dow chemical sewer for condensate and cooling tower overflow in addition to storm water drains.

Cabot Carbon is also supplied with compressed air from this facility.

17.5 W957 Steam Methane Reformer Hydrogen Plant

W957 produces a supply of hydrogen by steam reforming natural gas, see Figure 1. The plant is owned and operated by BOC. The hydrogen is supplied as a raw material for the DPR Hydrogenolysis process, Pheonix.



Block Diagram of W957 Steam Methane Reformer (Hydrogen Plant) Process

Natural gas enters the hydrogen plant and is mixed with a small flow of recycled hydrogen, compressed, preheated and passed through a desulphurisation stage, where sulphur is removed to a low level by adsorption. The hot process gas is then mixed with a controlled quantity of steam and heated further in a superheater. The gas is then passed through heated catalyst tubes in the reformer furnace where it reacts to produce a mixture containing H_2, CO, CO_2, residual CH_4 and H_2O. The gas is then cooled in a boiler to produce steam. The proportion of hydrogen in the gas is increased in a catalytic high temperature shift stage where CO and H_2O react to form CO_2 and H_2. The raw hydrogen gas is cooled to ambient temperature. Excess steam is condensed, separated and recycled as condensate. The cold gas is sent for final purification in a pressure swing adsorption (PSA) unit.

The product hydrogen is fed to a single 230 bar hydrogen compressor via the hydrogen purification unit for distribution and gaseous storage within the BOC facility at Dow . The gaseous storage unit allows for import or export of hydrogen via BOC road tankers.

17.6 Cooling Water Plant

17.6.1 W911 Cooling tower

Cooling water up to 35°C returns from the process users and is distributed to the top of the cooling towers. The cooling tower contains six cross flow, low evaporative loss type cells, each

one equipped with a variable speed induced draught fan. Air is drawn through the tower to cool the water to 24°C or below by means of evaporative and sensible cooling. The cooled water is then collected in the cooling tower sump. There are isolation valves in the return header pipework along with 'Penstock' valves on each sump, which allows the individual cells and sumps to be segregated for maintenance and cleaning. There is also a screen on each of the 'Penstock' valves to prevent any debris from entering the flume. If the cooling towers are not required for service (for example, due to maintenance or cold weather), the cooling water can by-pass the cooling towers and be directed straight to the sump.

The cooling water collected in the sumps then flows to the pump basin via a concrete flume. The pump basin contains the Cooling Water circulation pumps and double trash screens located in the pump basin, which prevent debris from entering into the pumps and causing damage. The water from the pumps is distributed to the plant areas using a header main.

To prevent the build up of contaminants in the cooling tower water there will be a continuous 'blowdown' of the water from the system. This blowdown stream is sent to the W342 cooling tower. If W342 is not available to accept this stream then it is discharged to the chemical sewer, local to the cooling tower basin. The discharge rate of the cooling water blowdown is controlled by the dissolved solids in the water, measured by a conductivity probe in the cooling water return line. Biglis well water and/or process water from W342 cooling tower is used to make up the lost water and it is added to the sump under level control.

To maintain the cooling water in a clean and safe condition and prevent it from damaging down stream equipment, it is treated with Sulphuric acid, Spectrus OX1272 and Inhibitors Gengard GN7110 and Gengard GN7004, these all being supplied by GE Power and Water.

The Spectrus OX1272 and Inhibitors Gengard GN7110 and Gengard GN7004 are delivered by multi-compartment tankers and off loaded under pressure via a meter on the tanker into the respective storage tanks. The storage tanks, which are made of plastic, are vented to atmosphere and contained in a bunded area for spill containment. These three treatment chemicals are stored in separate storage tanks and charged to the cooling water sump using their own dedicated metering pump. The Sulphuric acid is piped to storage tank 101 (W715) from Sulphuric acid storage bullet 3601 (W712).

17.6.2 W342 Cooling tower

This process water system provides water for process cooling and process consumption for Finishing, Basics Areas 1 and 2 (except W718 Methyl Chloride plant), BOC and Cabot Carbon and parts of Area 5. Water is pumped around the site through the distribution system using two out of three process water pumps. The majority of the water is returned to the cooling tower basins via the cooling towers.

The process water system is made up of the following:

- Cooling Tower
- Cooling Tower Basins
- Water Pumps
- Distribution System
- Return System

The quality of the process water system is important to the overall site operations. The water quality is chemically controlled and monitored by GE Power and Water.

The chemicals used to adjust the water quality are:

a. Sodium Hypochlorite
b. Betz Depositrol BL6501

A corrosion inhibitor is dosed into the BOC air compressor process water supply adjacent to W342 cooling towers, which then returns into the cooling water system.

Make up water is continuously added to the system to make up for the losses. The normal source for make up water is the river.

17.6.3 W715 chemical treatment store

The treatment chemicals stored in W715 for use in W911 cooling tower are held in intermediate bulk tanks within a bunded area. Any spills are held in this bunded area for subsequent treatment depending on the nature of the material. Transfer to intermediate bulk tanks is from road transport. The unloading area is fitted with a barrier interlock system to prevent the truck moving away when still connected to the intermediate bulk tanks. Any small spillage during the operation will run via the chemical drainage system to the on-site waste water treatment plant.

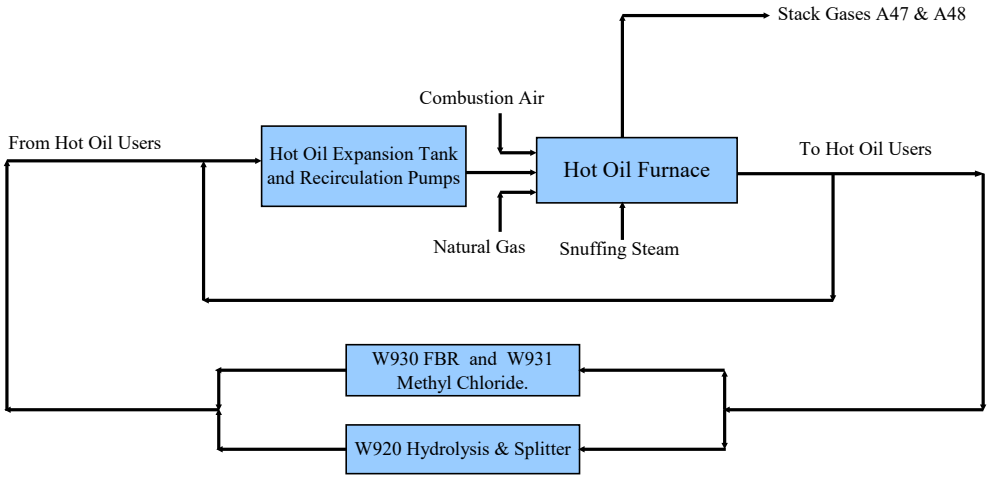
17.7 Hot oil units (W948, W420 and W322)

The Basics Unit has three independent hot oil units which supply Syltherm 800 fluid to various process units including the fluid bed reactors, hydrolysis/splitter plants and the methyl chloride process. W948 serves Areas 3 and 4 and W420 the remainder of the Basics Area, see Figure 2. W322 serves the Finishing Area of the site, see Figure 3.

17.7.1 W948

The unit comprises the Fired Heater, Air Pre-heater, Forced Draught Combustion Air Fan, Induced Draught Flue Gas Fan, and a Burner Management System, together with a Syltherm Expansion Tank, Circulation Pump and a Relief Vent Tank

W948 Genesis Hot Oil



Block Diagram of W948 Hot Oil Process

The Furnace contains six independent burners, controlled by a DCS and BMS system. These burn natural gas to generate the heat required to raise the heat transfer oil (Syltherm 800) up to its operating temperature.

Syltherm 800 is a complex mixture of siloxane polymers. The main constituent is 200 fluid which is a Dow registered material. This material must be conditioned before use. In order to do this, it is charged into the expansion tank (4502) which is then heated to remove all moisture. A stabiliser is then added to prevent cross-linking/polymerisation of the material, whilst also producing the correct balance of polymers in the fluid. During this conditioning operation any residual moisture contained in the 200 fluid is vaporised and disengaged in the expansion tank. The vent from this vessel passes to a vent knock-out stack, which collects any droplets of liquid before venting to atmosphere.

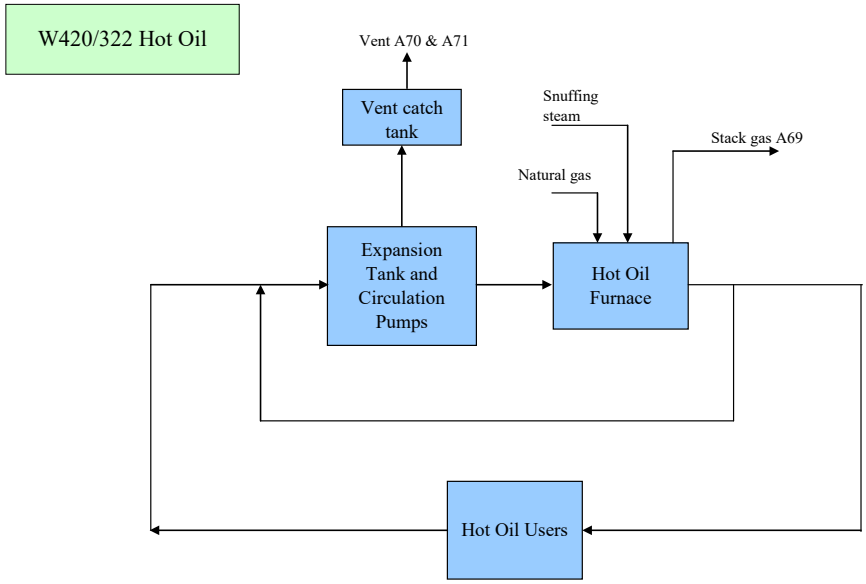
17.7.2 W420

W420 Fired Heater provides a source of high grade heat for users in the Rearranger, Fluid Bed Reactors and Hydrolysis areas.

The unit comprises the Fired Heater, Air Preheater, Forced Draught Combustion Air Fan, Induced Draught Flue Gas Fan, and a Burner Management System, together with a Syltherm Expansion Tank, Circulation Pump and a Blowdown Tank

The initial charge of Syltherm is pumped from the delivery tanker into the Expansion Tank. From here, Syltherm is pumped by the circulation pump through the Heater. This burns natural gas to heat the Syltherm, prior to entering the Syltherm distribution header.

As Syltherm volatiles freeze at 65°C all vapour space instrumentation, vent and emergency relief pipework are permanently steam traced. Syltherm volatiles are not pumped back into the system but are drummed off for offsite disposal.



Block Diagram of W420/322 Hot Oil Processes

17.7.3 W322

W322-Hot Oil Unit consists of a heater system designed to provide heat for a variety of users in W405,W406, W422, W306 and W407 buildings. The heat carrier in the system is Therminol 66 heat transfer liquid that is pumped through the heater. This system consists of a fired heater, recirculating pump with variable speed drive, expansion tank, vent condenser, drain tank, inventory cooler, one drain pump, one filling pump and tank, and a variety of users. The heater and recirculating pump are located in W322 building, the remainder in W406.

The heater is of the dual fire type with the fuel being 35 second fuel oil or Natural Gas. The primary fuel is natural gas, with the oil as back up for gas supply interruptions.

Over an extended period the Therminol will degrade (because of the high operating temperature) to form low boiling components and gases. Both the steam and low boiling components must be released from the system. This is achieved with an expansion tank. As the hot oil flows through the tank any volatiles present will separate and then flow to a condenser. The condensed vapours are drained into a drum, and the non-condensables vented to atmosphere. The Expansion tank is held under a nitrogen blanket.

17.7.4 Plant equipment and reactor conditions

Description	Equipment volume m^3	Operating pressure barg	Operating temperature ^oC	Notes Eg exotherms, catalysts etc
W960 CHP				Max. 270 te/hr steam supply Natural gas supply with distillate fuel oil back up supply. Electricity generation: 28MW. 90 te/hr demin water supply, 100te/hr deaerated water supply.

Description	Equipment volume m^3	Operating pressure barg	Operating temperature °C	Notes Eg exotherms, catalysts etc
W948 Expansion tank (4502)		8.5 to 9.5	330°C to 400°C	A constant nitrogen purge is maintained on the vent tank during normal operation to prevent the accumulation of volatile polysiloxanes. The only time the whole system needs to be vented for purging, is during charging and conditioning of the hot oil fluid
W948 Vent tank (4503)		Ambient	Ambient	This vessel is used to catch the liquid vents produced if the expansion tank pressure relief valves lift.
W948 Hot oil furnace (4501)		-10 mbarg	100°C to 450°C	20MW (thermal) vertical gas fired furnace
W420 Vent tank (403)		Atomspheric	20 to 40°C	
W420 Expansion tank (400)		2-6 barg	200-400°C	
W420 Hot oil furnace (402)		5-12barg (syltherm supply pressure)	100 – 550°C	

17.7.5 Hot Oil Process Control for Emission Minimisation

Vent Description	Continuous? Y/N	Emission Minimisation Techniques in place.
A48 W948 4501 Hot oil furnace vent	Y	The combustion products from the hot oil furnace are fed via an induced draught fan to the furnace vent stack which stands 30 metres tall. The high efficiency burners produce very low concentrations of NO_x, SO_2 and CO. Low NO_x burners are used for the furnace. A sample point is fitted to the furnace vent stack for periodic monitoring of the stack gases
W948 4502 hot oil tank vent	N	Insignificant vent. Plant run at sufficient pressure to minimise venting.
A47 W420 hot oil furnace vent	Y	The combustion products from the hot oil furnace are fed via an induced draught fan to the furnace vent stack which stands 30 metres tall. The high efficiency burners produce very low concentrations of NO_x, SO_2 and CO. Low NO_x burners are used for the furnace. A sample point is fitted to the furnace vent stack for periodic monitoring of the stack gases
W420 403 Vent tank	N	Insignificant vent.
A69	Y	Combustion gas vent only. Vent monitored periodically

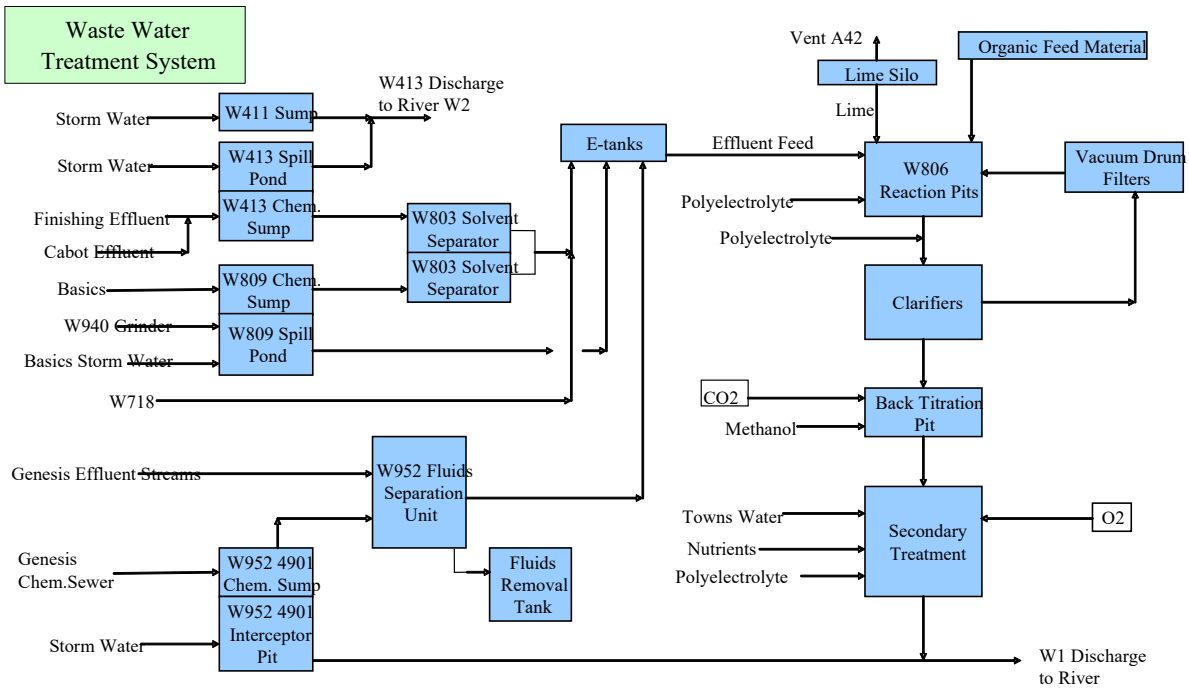
W322 103 Hot oil furnace vent		
A70 W322 hot oil vent from 1101 condenser	Y	A process water heat exchanger is used to condense out toluene and xylene, which are thermal breakdown products of Santotherm oil. The vent is located in W406 area.
A71 W322 hot oil vent from 223 santotherm vols collection tank	Y	Collection tank for condensed volatiles from 1101 condenser (see A70 above).

17.8 Site Effluent Collection and Treatment

See Figure 4. The purpose of the primary waste water treatment plant is to neutralise acidic effluent collected from the site, and to precipitate out any metal hydroxides formed. The resulting effluent is transferred to an on-site secondary treatment plant which is also owned and operated by Dow. Organic materials present in the effluent are removed by biological treatment in the secondary treatment plant.

The site's effluent is collected in two separate systems, chemical effluent and storm water. The chemical effluent consists of aqueous process waste and rainwater. The storm water system consists of rainwater and deluge or fire fighting water. Effluent is also treated from the adjacent Cabot plant.

The offices and surface areas adjacent to Cardiff Road are connected to the local towns system foul sewer. These sewers service only domestic users.



17.8.1 Site waste water collection system

17.8.1.1 W803 Solvent Separator

W803 Solvent Separator takes the process effluent from the Finishing area of the site together with that from Areas 1 & 2. The unit allows the separation of siloxanes, oils and solids from the incoming effluent, before the cleaner stream passes through the underflow/overflow weir on the discharge. Siloxanes and oils are removed from the solvent separator by an overflow mechanism, and collected in a tank, before shipment off-site for disposal. Solids arriving with the W1205/6 Quench process effluent stream will settle out within the W803 solvent separator and downstream tankage, which is periodically cleaned.

17.8.1.2 W952 Fluids Separation Unit (FSU)

W952 Fluids Separation Unit treats overhead pumped process effluent streams from Areas 3 & 4 and the W952 chemical sump. It consists of a pre-separator stage, which removes gross solids contamination, followed by three packed units arranged in parallel, which remove oils from the effluent. The provision of three units allows for two units processing effluent during peak rainfall, whilst the third is off-line for maintenance. Any oil removed from the separators is discharged into a tank for periodic collection and disposal off-site. The resulting effluent overflows into a sump from where it is pumped overhead to the E-Tank.

17.8.1.3 Equalisation (E) Tanks

The purpose of the rubber lined E tanks (4401 & 4400) is to provide surge capacity and to smooth out changes in flowrate and pH through the primary treatment process for better control of final discharge quality.

17.8.2 Primary treatment

The equalised effluent is fed by gravity discharge to the Neutralisation unit (5211). The effluent is neutralised by using lime slurry. Quicklime (calcium oxide) is fed from a 250 Ton silo (6110) to one of two lime slaker units (6100 and 5213), which slake the lime to form a lime slurry. Grit present in the calcium oxide is washed out of the lime slurry and is discharged into a skip, which is periodically sent to offsite landfill. The neutralisation section consists of three agitated cells which provide the residence time needed for the reaction of lime and effluent to occur. The lime slurry is added to the acidic effluent in the first of the neutralisation cells and the effluent is progressively brought up to a pH of 9.5. At this pH the majority of the metals and metal complexes are insoluble and precipitate out. A coagulant is added in the final neutralization cell and the effluent is then pumped to the clarifiers (5220, 300, 800). A polyelectrolyte flocculating agent is added just before the stream enters the clarifiers in order to assist the settling out of the precipitates. The precipitated sludge is then collected from the base of the clarifiers and dried using two vacuum drums (500 and 805). The clear effluent from the clarifiers overflows to the Back Titration Pit (6604) prior to flowing to SWWT (secondary treatment). The effluent is fed forward to SWWT effluent pumping station.

17.8.3 Secondary treatment

Secondary treatment, which is also owned and operated by Dow, consists of two bioreactors, preceded by a splitter box, which divides the primary effluent between the two bioreactors. The micro- organisms present reduce the organic material in the effluent thereby reducing the effluent BOD (biological oxygen demand). As the biomass digest the organics in the effluent carbon

dioxide is produced, this is absorbed into the water as carbonic acid, which reduces the pH of the final effluent.

Vapourised oxygen, from an onsite liquid oxygen tank, is piped into the base of each bioreactor to ensure the biomass remains active. The oxygen tank is owned and operated by BOC Ltd.

The effluent overflows into two clarifiers where the biomass settles out and is returned to the bio-reactors. The overflowing effluent is divided to flow through two rotary screen filters before being sampled and either discharged to the Cadoxton river or pumped to W806 effluent recycle system.

17.8.4 Plant equipment and reactor conditions

Description	Equipment volume m^3	Operating pressure barg	Operating temperature ^oC	Notes Eg exotherms, catalysts etc
Etank		Atm	Amb	Surrounded by a concrete bund capable of holding approximately 110% of the volume of the tank.
Lime silo 6110		Atm	Amb	250 ton capacity
Clarifier 6300		Atm	Amb	
Clarifier 6800		Atm	Amb	
Clarifier 5220		Atm	Amb	
Bioreactors		Atm	Amb	

17.8.5 Process Control for Emission Minimisation

Vent Description	Continuous? Y/N	Emission Minimisation Techniques in place.
Vac pump		
A42 lime storage silo bag filter	N	The bag filter element is made from polyester and can be cleaned by shaking. There is normally no visible emission of particulates. The main demand on the bag filter occurs approximately once per week when tankers offload lime into the lime silo. Operators visually check the vent during tanker offloading. If they see any signs of emissions from the vents the hopper is taken off line until the problem has been resolved. The bag filter unit is inspected during planned maintenance shutdowns on a frequency determined by operational experience.
lime slaker steam vent (a)	N	Steam vent only
lime slaker steam vent (b)	N	Steam vent only

17.8.6 Techniques versus BAT (Speciality Inorganic Chemicals BREF)

The following Best Available Techniques (BAT), as prescribed in Section 6.3.5 of the SIC BREF for silicones, are confirmed as being in place at the Dow Barry site:

For waste water treatment BAT is to:

- Dewater the sludge before disposal
- Neutralising aqueous HCl with calcium hydroxide to form calcium chloride
- Sending calcium chloride to off-site landfill for disposal
- Disposing of sludge to a hazardous landfill. Dow dispose of the sludge to a non-hazardous landfill as pollutant levels are low enough to classify the material as non- hazardous
- Reduce BOD/COD content of the water coming out of the pretreatment by applying a biological step
- Minimising the risk of accidental spills in the event of a power failure by providing adequate storage volume containment for untreated waste water.

Appendix C

IPPC Appendix 4 – The Main Activities : Section 11 Update

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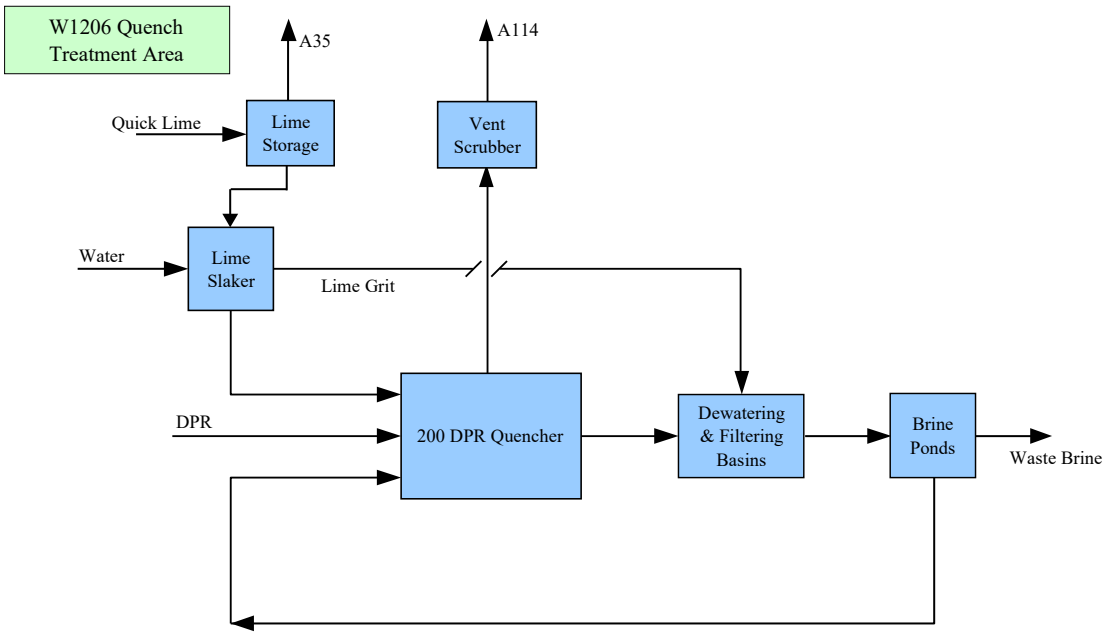
11 W1205/W1206 Basics Quench Treatment Area

The purpose of the quenching area is to de-activate, by hydrolysis, any spent bed and DPR waste material from the FBRs (W714 and W930), Rearranger (W343) and the TCS process (W348) that may be contaminated with chlorosilanes.

There are three "quench" processes performed in the quenching area. The first (W1206) quenches Direct Process Residue (DPR) (from the FBRs and TCS, or Phoenix) and the second is Spent Bed quenching (from the FBRs or TCS) in W1205. The third, also based in W1206 is catalyst quenching from the rearranger reactor.

11.1 W1206 DPR Quenching

The chlorosilane residues held in the DPR are hydrolysed or "quenched" using slaked lime to form a liquid "brine" containing solid gel. The gel is dewatered from the brine and the resulting solid is collected and sent for offsite recovery or disposal. The liquid brine currently flows to the chemical sewer and then on to W806 waste water treatment plant. See Appendix 12, Section 11, Figure 1.



Block Diagram of W1206 DPR Quench Process

The process is operated in batch mode as and when required by the fluid bed reactors or MCDS process. The DPR quench process at the facility is an enclosed quench unit, which give sufficient capacity and flexibility to process all chlorosilane residues from the fluid bed reactors.

11.1.1 W1206 Process Description

The slaked lime (calcium hydroxide) slurry used in quenching is produced by reacting quicklime (calcium oxide) with water as follows:

Calcium Oxide + Water → Calcium Hydroxide + Heat.

The resulting slaked lime is stored in a small holding tank from where it is pumped to the DPR quench tank. Quicklime is delivered to the site by road tanker and is off-loaded by pneumatic conveying to a bulk storage silo. The conveying air is expelled via a filter unit on the top of the silo.

Direct process residues are pumped int the quench processes from storage tanks in the fluid bed reactor plants. DPR is the high boiling stream containing chlorosilane residues and any unrecovered silicon fines that are produced from the distillation of crude chlorosilanes on the fluid bed plants.

The DPR quench tank vessel is used in the quenching process to carry out the neutralisation operation. Slaked lime together with well water, are contacted with the DPR in the inlet stream of the quench tank. The DPR quickly reacts with the water and the slaked lime in the quench tank to form a solid known as DPR gel. Hydrochloric acid is also formed, and this is neutralised in-situ by the slaked lime, forming a brine solution. The products of the reaction flow up through the vessel and overflow into the gel dewatering section of the process.

Two typical reactions take place inside the quench vessel:

$$\mathrm{Cl(Si)_xCl} + \mathrm{H_2O} \rightarrow \mathrm{HO\underset{R}{\overset{R}{Si}}(OSi)_yOH} + \mathrm{HCl} + \mathrm{H_2}$$

and

$$2\mathrm{HCl} + \mathrm{Ca(OH)_2} \rightarrow 2\mathrm{H_2O} + \mathrm{CaCl}$$

Separation of the solid gel from the liquid brine is performed by gravity settling in a series of two dewatering and filtering basins. The dewatered gels are then collected and taken offsite for recovery or disposal.

The filtered brine from the gel dewatering process is collected in a rubber lined pond. It can then be recycled to the quench tank during the quenching operation to supplement the well water supply. Excess brine overflows to the site chemical sewer system.

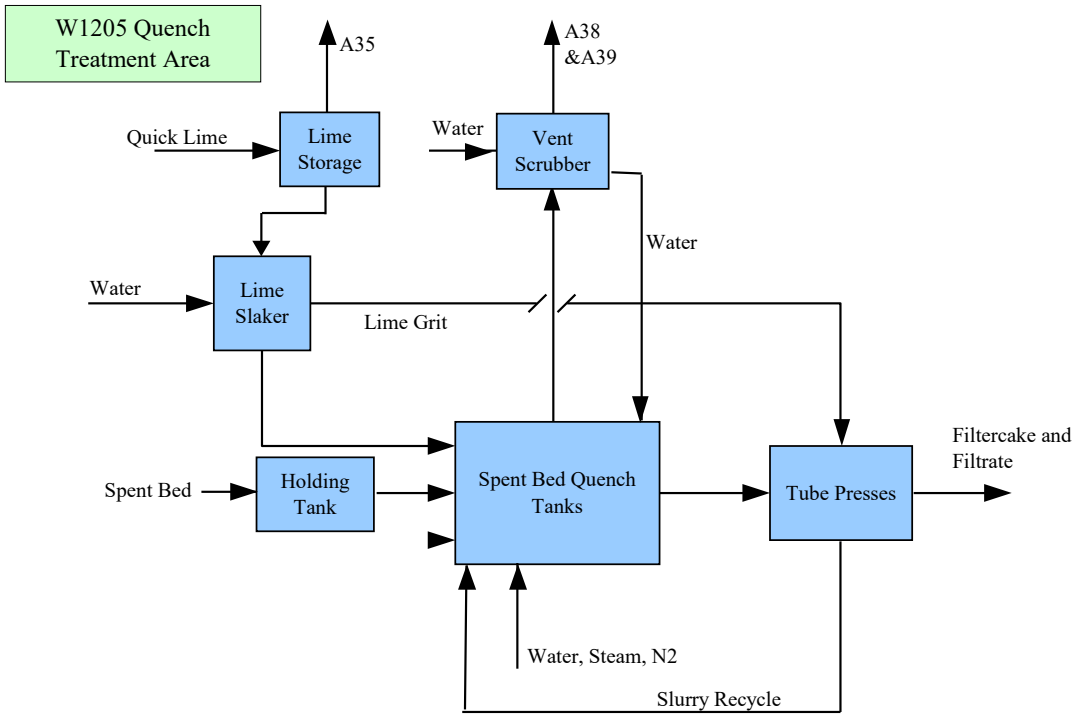
Hydrochloric acid formed in the quench tank is normally absorbed in-situ by slaked lime during the reaction. At the end of a DPR transfer, the transfer line is blown clear using nitrogen.

The enclosed quench process is designed to significantly reduce fugitive emissions associated with DPR quenching. It is designed to quench DPR gels and waste chlorosilanes. The quencher is operated at a pressure of 0.5 barg and the vent has the facility to be transferred via a condenser to W949 ERU process.

11.2 W1205 Spent bed Quenching

The spent bed quenching process, see Appendix 12, Section 11, Figure 2, neutralises currently unusable silicon metal and reaction by-products from the fluid bed reactors. This material is referred to as spent bed and consists mainly of silicon metal together with some metal, carbon, chlorosilane residues and other reaction by-products.

Spent bed is quenched using slaked lime to form a slurry. See Appendix 12, Section 11, Figure 2. The quenched spent bed is then either filtered to produce a hard cake, or occasionally dewatered under gravity. The resulting solids are currently collected for offsite recovery. Filtrate from the spent bed currently flows to the chemical sewer and then on to W806, waste water treatment plant.



Block Diagram of W1205 Spent Bed Quench Process

11.2.1 W1205 Process Description

The lime is supplied as described for W1206 above.

Spent bed, which is in the form of a dry powder, is conveyed to the quench area using nitrogen.

The spent bed quench tank is the primary vessel on the quenching process. This is an atmospheric vessel and all reaction and quenching gases are vented via a water scrubber on the outlet. The dry spent bed is initially wetted by blowing it into some residual slurry and pre-reaction lime at the base of the tank.

Admitting the dry powder via a dip pipe with a submerged end is the primary means of avoiding any solids blowover with water sprays being used in the venturi scrubber at the time of material transfer. The scrubber is also used during transfer of spent bed from the FBR plants to 703 holding tank in order to vent and scrub the nitrogen carrier gas.

The spent bed is neutralised in the quench tank with lime slurry. The reaction is exothermic with some hydrogen being produced. The quench tank is then used to store the spent bed prior to filtration or dewatering.

The reactions which take place are as follows:

$$2Si + 2H_2O \rightarrow 2SiOH + H_2$$

and

$$SiH + H_2O \rightarrow SiOH + H_2$$

The spent bed reacts with water in the presence of lime, to form a siloxane-rich hydrophobic shell around the partially hydrolysed spent bed particles, which hinders further reaction. The reaction will slowly proceed to give the following:

$$SiCl + H_2O \rightarrow SiOH + HCl$$

$$2SiOH \rightarrow SiOSi + H_2O$$

The hydrogen chloride produced is neutralised by the lime.

The spent bed tank has an external cooler which is used to cool the slurry to less than 40°C before it is filtered. The slurry is filtered to form a solid cake. The cake is collected for offsite recovery. The filtrate from the presses is sent to the chemical sewer for processing in the waste water treatment plant.

11.3 W1206 Re-arranger catalyst quench

See Appendix 12, Section 11, Figure 3. Catalyst is used in the Re-arranger reactor (RAR) at W343, to 'modify' unwanted chlorosilanes into more useful chlorosilanes. The catalyst has a finite lifetime and due to chlorosilane contamination the catalyst must be treated before disposal.

The catalyst itself is inert material, however residual chlorosilanes need to be hydrolysed before disposal. This is achieved by reacting the catalyst with lime slurry in an enclosed vessel. The water in the lime slurry hydrolyses the chlorosilanes whilst the lime reacts with the HCl produced by the hydrolysis reaction.

424 Rearranger quench tank is nitrogen blanketed. The lime supply for 424 tank is taken off the discharge of the lime pump used for spent bed quenching.

Catalyst is brought to W1206 from the RAR in a $5m^3$ mobile catalyst dump vessel. The vessel is connected up to the charging manifold and catalyst is blown into 424 tank with nitrogen. The carrier gas is vented through 438 vent scrubber. The main purpose of the vent scrubber is to remove particulates and any HCl vapours.

Once quenched, the catalyst has to be removed from the tank and de-watered prior to collection for subsequent offsite disposal. The tank is drained by gravity into a skip which is used as a crude filter. The skip contains a shallow bed of chippings and is perforated around the base to allow the filtrate to run off. The skip is kept on a pad adjacent to 424 tank and is surrounded on two sides by a low bund wall and on the other two sides by chem. sewer drains. The filtrate drains off and is treated via the effluent treatment plant.

11.4 Plant equipment and reactor conditions

Description	Equipment volume m^3	Operating pressure barg	Operating temperature ^oC	Notes E.g. exotherms, catalysts etc
Primary dewatering basins		Atmos	90-100	Sloped to promote dewatering of gels
503/603 quench tanks		0.2	90-100	Exothermic reaction, cooled by adding water as required.
424 tank – rearranger catalyst quench tank		Atmos - 2	90-100	Exothermic reaction, cooled by adding water as required
500 venturi scrubber on 503 tank		N/A	N/A	Water scrubber
5010 venturi scrubber connected to 603 tank		N/A	N/A	Water scrubber
438 scrubber on 424 tank		N/A	N/A	Water scrubber
703 spent bed intermediate storage tank		Atmos - 3.6	Amb to 100	Pyrophoric spent bed material is stored in a nitrogen rich atmosphere at positive pressure. Spent bed is transferred into & out of 703 using N_2 as a carrier gas.

11.5 Quench Processes Control for Emission Minimisation

Vent Description	Continuous? Y/N	Emission Minimisation Techniques in place.

Vent Description	Continuous? Y/N	Emission Minimisation Techniques in place.
A35 W1205 1304 Lime silo filter vent	N	The bag filter element is made from polyester and is self cleaning due to the reverse jet action of nitrogen gas, which is pulsed at a set frequency. Filter efficiency is quoted at >99.5%. There is normally no visible emission of particulates and periodic testing has confirmed that releases do not exceed BAT emission benchmarks (i.e. they are <20mg/Nm^3). The main demand on the bag filter occurs approximately once per week when tankers offload lime into the lime silo. Operators visually check the vent during tanker offloading. If they see any signs of emissions from the vents the hopper is taken off line until the problem has been resolved. The bag filter unit is inspected during planned maintenance shutdowns on a frequency determined by operational experience.
A 38, spent bed scrubber stack 503	N	503 tank is normally only used for storage of cool spent bed and abatement is not normally required. In the abnormal event that 503 tank needed to be used to either quench spend bed or to scrub 703 intermediate spent bed tank then hydrogen chloride and particulates would be abated using 502 water scrubber. Previous testing of the vent has demonstrated that the scrubber abates hydrogen chloride to levels considered BAT (i.e. <10mg/m3) but releases of particulates were above levels considered to represent BAT. However, as 503 would only be used as a back up to resolve an unusual situation and considering that the quench operation is a batch process the scrubber is deemed suitable for its purpose. If the scrubber water flowrate drops below 600kg/h the spent bed feed valve automatically closes, isolating the tank. The sprinklers are also tripped off by the tank 85% high liquid level trip to prevent the vessel over spilling, this also shuts the spent bed feed valve.
A 39, spent bed scrubber stack 603	N	Hydrogen chloride and particulates are abated using 5010 venturi scrubber. The purpose of the venturi scrubber is to contact the vent gases with water to knock out the solid particulates and absorb any HCl. If the differential pressure over the venturi increases above 110mbar (expected normal operation 20mbar) the scrubbing liquor is tripped to prevent excessive back pressure on 603 quench vessel. There is a permissive that the scrubber must be operational prior to beginning a quench, however should something fail on the scrubber the quench will be allowed to finish. The scrubber runs throughout the duration of a batch spent bed transfer and quench operation.
lime slaker steam vent	N	Batch process, not an environmentally significant vent.
A49 rearranger	N	Hydrogen chloride and particulates are abated a water

Vent Description	Continuous? Y/N	Emission Minimisation Techniques in place.
catalyst quench 424 tank		scrubber. Previous testing of the vent has demonstrated that the scrubber abates hydrogen chloride and particulates to levels considered BAT (i.e. <10mg/m3 and <20mg/m3 respectively).
A114, 200 DPR quench vent	N	This vent is unabated but releases low levels of hydrocarbons (~7g/hr) and siloxanes (~170 g/hr)

Appendix D

D1 - Non Technical summary for W405 Very Low Viscosity expansion project

D2 - Non Technical summary for W1 TOC monitoring

Appendix D1 - Non Technical summary

VLVF and Packaging Stretch project

The Barry site VLVF and packaging stretch project will enable the VLVF process to make a wider range of VLVF materials and install brand new self-contained Drum and IBC filling machines.

As part of the project scope, two product storage tanks to be installed in the dedicated space available in W404. Two new pumps are to be installed to pump the final products from their respective storage tanks to the new packaging facility in W303.

As production starts from Q2-2021 if the new tanks will not be commissioned by then, 5000 tank will be used during the interim period.

The changes in production VLVF material introduces a lower boiling material into the existing 5042 rework tank and 5000 storage tank. These tanks will therefore need to have their local vents upgraded to “Authorised release points” due the higher release rate of siloxanes. Details of this are in Appendix E – Environmental assessment.

Appendix D2 - Non Technical summary
W1 Site Final Effluent New BAT-AEL TOC (Total Organic Carbon) Permit Limit

The Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control) concluded the CWW (Common Waste Water) BREF in 2016. The BREF includes new BAT-associated emission levels (BAT-AELs), for emissions to water.

Dow Silicones has regularly reviewed options for compliance to upcoming limits with NRW in the past few years due to their complex nature. In recent Dow/NRW meetings (December 2019 and April 2020) reviews have concluded that Dow should apply for a variation to include a new TOC parameter BAT-AEL permit limit for the existing W1 authorised final effluent stream. Other relevant CWW BAT-AEL parameters will be assessed following formal publication of the WGC (Waste Gas) BREF in the next couple of years and included in the permit in due course.

The UK Interpretation Guidance and Permitting Advice on the Best Available Techniques (BAT)

3.5. TOC, COD AND TSS

Table 1: BAT-AELs for direct emissions of TOC, COD, and TSS to a receiving water body

Parameter	BAT-AEL	Conditions
Total organic carbon (TOC) (1) (2)	< 10–33 mg/l (3) (4) (5) (6)	The BAT-AEL applies if the emission exceeds 3.3 t/yr.
Chemical oxygen demand (COD) (1) (2)	< 30–100 mg/l (3) (4) (5) (6)	The BAT-AEL applies if the emission exceeds 10 t/yr.
Total suspended solids (TSS)	5.0–35 mg/l (7) (8)	The BAT-AEL applies if the emission exceeds 3.5 t/yr.

(1) No BAT-AEL applies to Biochemical oxygen demand (BOD). As an indication, the yearly average BOD_5 level in the effluent from a biological waste water treatment plant will generally be ≤20 mg/l.

(2) Either the BAT-AEL for TOC or the BAT-AEL for COD applies. TOC monitoring is the preferred option because it does not rely on the use of very toxic compounds.

(3) The lower end of the range is typically achieved when few tributary waste water streams contain organic compounds and/or the waste water mostly contains easily biodegradable organic compounds.

(4) The upper end of the range may be higher and up to 100 mg/l for TOC or up to 300 mg/l for COD, both as yearly averages, if both of the following conditions are fulfilled:
Condition A: Abatement efficiency ≥90% as a yearly average (including both pretreatment and final treatment).
Condition B: If a biological treatment is used, at least one of the following criteria is met:
- A low-loaded biological treatment step is used (i.e. ≤0.25 kg COD/kg of organic dry matter of sludge).
- Nitrification is used.

(5) The upper end of the range may not apply if all of the following conditions are fulfilled:
Condition A: Abatement efficiency ≥95% as a yearly average (including both pretreatment and final treatment).
Condition B: See Condition B in footnote (4) above.
Condition C: The influent to the final waste water treatment shows the following characteristics: TOC >2 g/l (or COD >6 g/l) as a yearly average and a high proportion of refractory organic compounds.

(6) The upper end of the range may not apply when the main pollutant load originates from the production of methylcellulose.

(7) The lower end of the range is typically achieved when using filtration (e.g. sand filtration, microfiltration, ultrafiltration, membrane bioreactor), while the upper end of the range is typically achieved when using sedimentation only.

(8) This BAT-AEL may not apply when the main pollutant load originates from the production of soda ash via the Solvay process or when it originates from the production of titanium dioxide.

This application if for an upper end TOC limit (annual average of 100mg/l) as footnote 4 conditions A and B are both met for W1 effluent stream (see Environmental Assessment appendix).

Appendix E

E1 -Environmental Assessment for W405 Very Low Viscosity expansion project

E2- Environmental Assessment for W1 final effluent TOC

Appendix E - Environmental assessment – VLVF upgrade project

The change in products to be made on the VLVF process will increase the vent release rate from 2 existing vents to make them "Authorised released points" (increase in Siloxanes vented annually).

[redacted]

[redacted]

This project will also install 2 new 160m3 tanks in W404 tank farm [redacted]

[redacted]

These tanks will be located in W404 tank farm. The tank farm is bunded and it is confirmed that the volume of the bund can still contain both 110% of the largest inventory and can contain 25% of the total tank storage inventory (including the inventory of the two new tanks).

It is not proposed that either of these local vent points would be considered an "authorized release point" due the nature of the materials contained in them and their operating conditions. Calculations have been carried out on each of these local vent points and both points are anticipated to release less than 25kg/year of siloxanes. 25kg/year is the cut off point we used for siloxanes when completing our permit application for whether a vent point should be considered authorized or not.

Calculations for each of these 4 tanks are shown below *(an H1 calculation is available at the bottom of this appendix to show the process contribution – but uses toluene as the substance so the tool would work).*

Updated information below

- Yellow highlight is expected annual venting of siloxane
- Blue highlight is project change
- Green highlight is vented composition – comprises of L2-12 & D4/D5/D6

W405 5000 1 & 1.5cSt Tank @ 30degC

- Existing tank vent, updated calculation [redacted]
- Siloxane mass per year:
  - **Expected Case = 246kg/year** [redacted]
  - Best Case = 130.59kg/year [redacted]
    Worst Case = 1287.87kg/year [redacted]
- Previously assumed 0kg/year based on low vapour pressure

W405 5042 Rework Tank

- Existing tank vent, updated calculation, all recycle streams modified to recycle via rework tank, new sample point in project scope [redacted]
- Siloxane mass per year:
  - **Expected Case = 2988kg/year** [redacted]
  - Best Case = 1068kg/ [redacted]
  - Worst Case = 4397kg/year [redacted]
  - *Note: during normal production level in 5042 is approximately level so no venting, assumed 30% based on Pi and AU data*
- Previously assumed 16.75kg/year based on only running to rework once a month for 8 hours (this assumption is not representative of how the process currently runs)
-

W404 5170 [redacted]

- New tank installed in W404 [redacted]
- Siloxane mass per year:
  - **Expected Case = 15.74kg/year** [redacted]

W404 5172 [redacted]

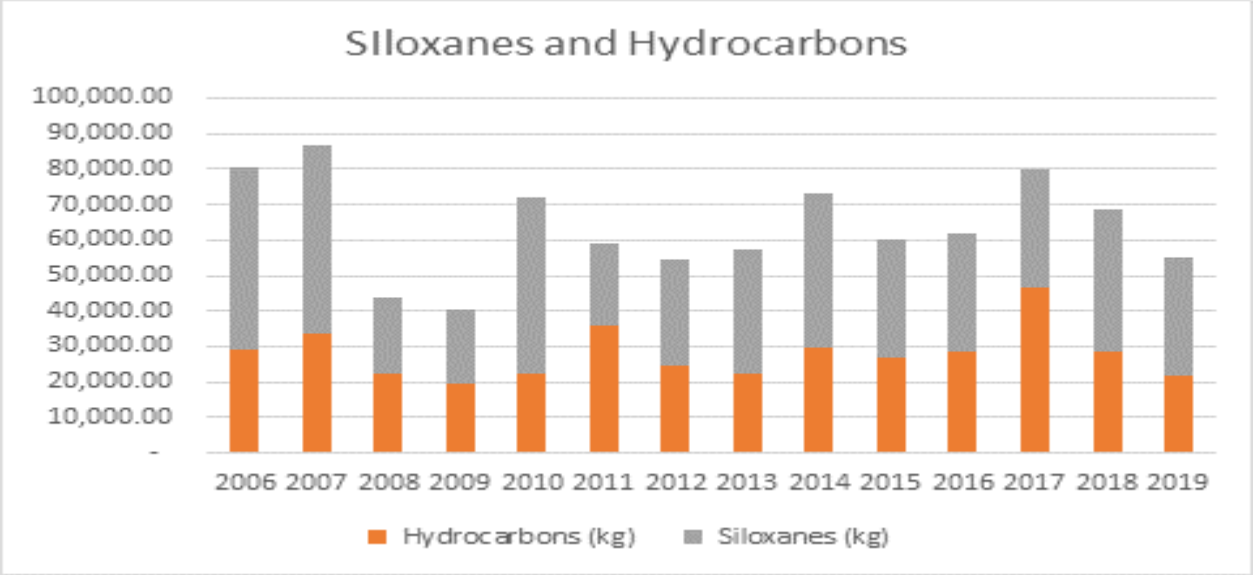
- New tank installed in W404 [redacted]
- Siloxane mass per year:
  - **Expected Case = 2.96kg/year** [redacted]

Monitoring

This project will install new vent monitoring locations to ensure that the new authorised release points A123 and A124 will be suitable for sampling as per M1. The specification for these sample points has been provided by our on site MCerts sampling qualified technician. If required, these samples can be taken quarterly, annually or as part of the commissioning of the process upgrade .

Assessment of vent changes in relation to total site air emissions

The chart below shows the quantity of hydrocarbons and siloxanes released to air from the Barry site since regulation under IPPC. The current limit has a 'bubble' permit limit of 150,000 Kg for hydrocarbons. This quantity excludes siloxanes. This limit has never been exceeded or approached.



The vent changes involved in this variation will involve a total increase in siloxane air emissions of approximately 10% (~3,200Kg). In terms of total VOC's the increase is ~6%.

The new volatile siloxanes being release from this variation are primarily linear (L2-L6) siloxanes. These substances when released to air are known to undergo oxidative chemical degradation and should ultimately be converted to silica, carbon dioxide and water (ref Organosilicon Materials, Grish Chandra, Handbook of Environmental Chemistry), all of which are naturally occurring. Atmospheric lifetimes are estimated to be short (10-30 days) and based on this VMS (Volatile Methyl Siloxanes) are not considered VOC's in the USA by the EPA.

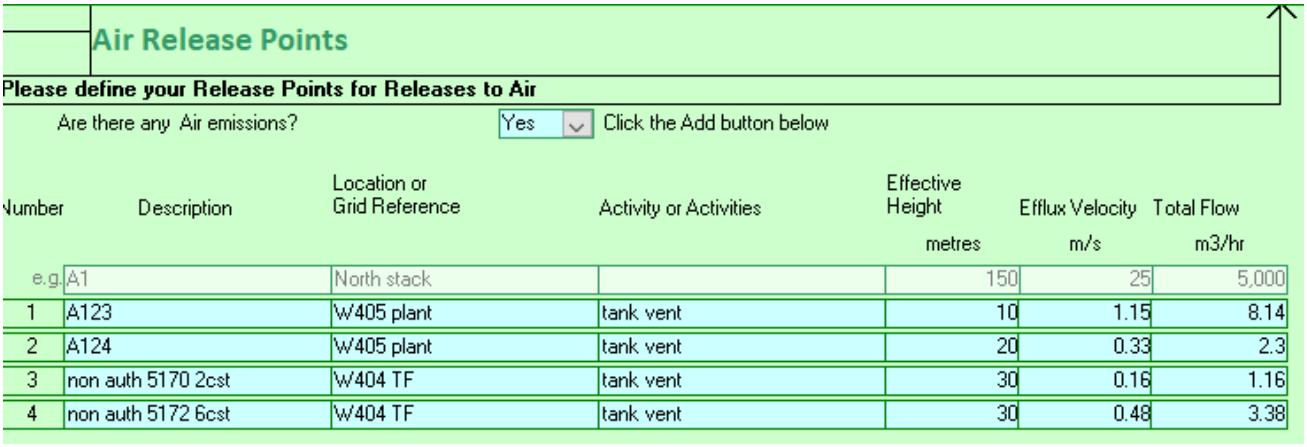
Volatile siloxanes are classified as VOC's in the upcoming European Waste Gas BREF. It is expected that releases above a set mass threshold will need to be abated. A project is being formed currently to evaluate which vents on site will need additional abatement. The new vents A123 and A124 may need to be in scope. If they are then it is likely that common solutions to treat groups of vents would be installed, which makes installing something new for these vents now suboptimal (as well as technology being unproven – see para below).

There is currently no standard or recognised abatement techniques available for mitigating volatile siloxane releases. Incineration is possible but it generates a lot of silica dust which is problematic to abate. Dow is currently progressing a project at our site in China to try to abate volatile siloxane by using a linear siloxane scrubbing system. Performance of this technique will hopefully be evaluated later this year. It is likely that the scrubbing step will help but unlikely that it can result in abatement performance required by the waste gas BREF, so further treatment is likely to also be needed (either absorption and/or incineration being most likely as further steps).

In summary the new vents increase site VOC air emissions by a relatively small percentage, but the actual impact of these releases is not deemed significant due to their fate upon release. As an interim protection measure (ahead of the EU waste gas BREF) it is suggested that the site 150,000Kg VOC bubble permit remains but is expanded to also include volatile siloxanes.

H1 Assessment (using Toluene as the substance instead of siloxanes to show the contribution)

The following screenshots are from the H1 tool using Toluene as the vented substance rather than siloxanes – this is so the calculation comes through and shows the process contribution as a result of this project

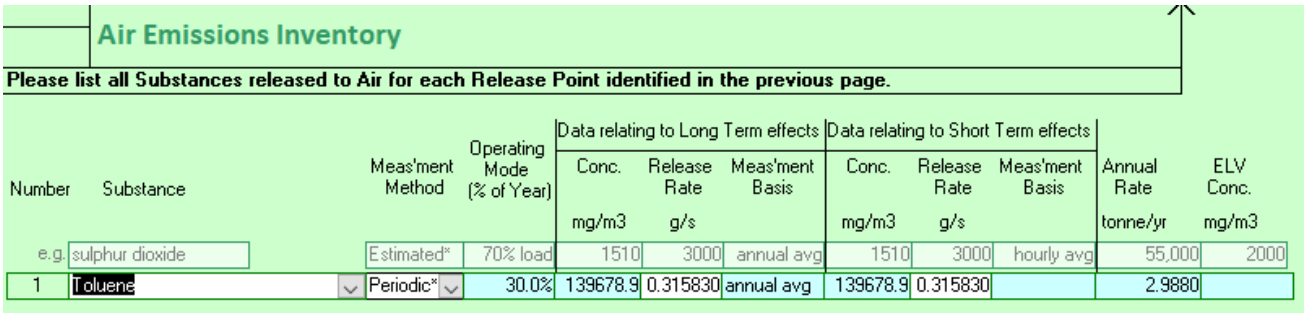


Air Release Points

Please define your Release Points for Releases to Air

Are there any Air emissions? Yes — Click the Add button below

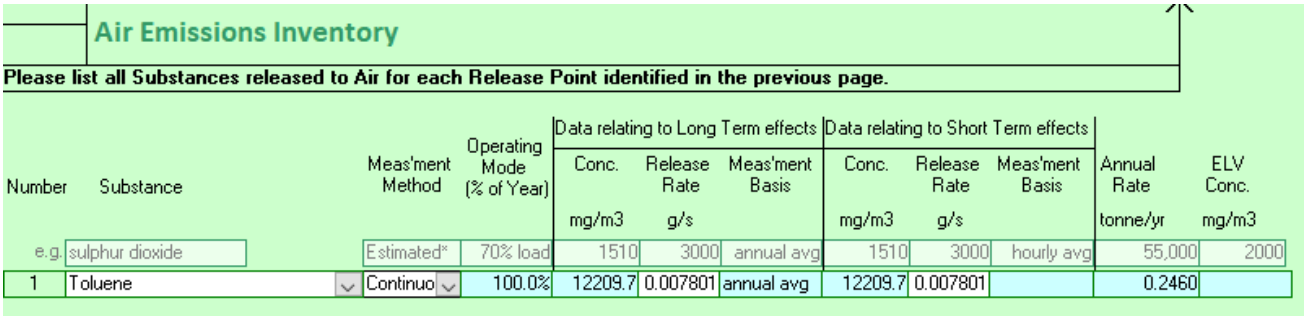
Number	Description	Location or Grid Reference	Activity or Activities	Effective Height (metres)	Efflux Velocity (m/s)	Total Flow (m3/hr)
e.g.	A1	North stack		150	25	5,000
1	A123	W405 plant	tank vent	10	1.15	8.14
2	A124	W405 plant	tank vent	20	0.33	2.3
3	non auth 5170 2cst	W404 TF	tank vent	30	0.16	1.16
4	non auth 5172 6cst	W404 TF	tank vent	30	0.48	3.38



Air Emissions Inventory

Please list all Substances released to Air for each Release Point identified in the previous page.

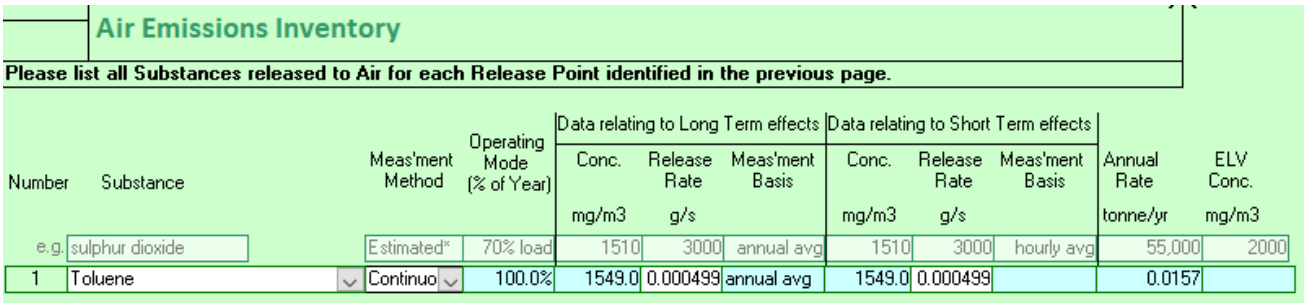
Number	Substance	Meas'ment Method	Operating Mode (% of Year)	Data relating to Long Term effects: Conc. (mg/m3)	Release Rate (g/s)	Meas'ment Basis	Data relating to Short Term effects: Conc. (mg/m3)	Release Rate (g/s)	Meas'ment Basis	Annual Rate (tonne/yr)	ELV Conc. (mg/m3)
e.g.	sulphur dioxide	Estimated*	70% load	1510	3000	annual avg	1510	3000	hourly avg	55,000	2000
1	Toluene	Periodic*	30.0%	139678.9	0.315830	annual avg	139678.9	0.315830		2.9880	



Air Emissions Inventory

Please list all Substances released to Air for each Release Point identified in the previous page.

Number	Substance	Meas'ment Method	Operating Mode (% of Year)	Data relating to Long Term effects: Conc. (mg/m3)	Release Rate (g/s)	Meas'ment Basis	Data relating to Short Term effects: Conc. (mg/m3)	Release Rate (g/s)	Meas'ment Basis	Annual Rate (tonne/yr)	ELV Conc. (mg/m3)
e.g.	sulphur dioxide	Estimated*	70% load	1510	3000	annual avg	1510	3000	hourly avg	55,000	2000
1	Toluene	Continuo	100.0%	12209.7	0.007801	annual avg	12209.7	0.007801		0.2460	



Air Emissions Inventory

Please list all Substances released to Air for each Release Point identified in the previous page.

Number	Substance	Meas'ment Method	Operating Mode (% of Year)	Data relating to Long Term effects: Conc. (mg/m3)	Release Rate (g/s)	Meas'ment Basis	Data relating to Short Term effects: Conc. (mg/m3)	Release Rate (g/s)	Meas'ment Basis	Annual Rate (tonne/yr)	ELV Conc. (mg/m3)
e.g.	sulphur dioxide	Estimated*	70% load	1510	3000	annual avg	1510	3000	hourly avg	55,000	2000
1	Toluene	Continuo	100.0%	1549.0	0.000499	annual avg	1549.0	0.000499		0.0157	

Air Emissions Inventory

Please list all Substances released to Air for each Release Point identified in the previous page.

Number	Substance	Meas'ment Method	Operating Mode (% of Year)	Data relating to Long Term effects			Data relating to Short Term effects			Annual Rate	ELV Conc.
				Conc.	Release Rate	Meas'ment Basis	Conc.	Release Rate	Meas'ment Basis		
				mg/m3	g/s		mg/m3	g/s		tonne/yr	mg/m3
e.g.	sulphur dioxide	Estimated*	70% load	1510	3000	annual avg	1510	3000	hourly avg	55,000	2000
1	Toluene	Continuo	100.0%	100.0	0.000094	annual avg	100.0	0.000094		0.0030	

Air Impacts

Calculate Process Contributions of Emissions to Air

This table estimates the Process Contribution (PC), calculated as the maximum ground level concentration for each emission listed in the inventory, according to the release point parameters input earlier. If you have more accurate data obtained through dispersion modelling, this may be entered as indicated and will be used instead of the estimated PC.

Number	Substance	Long Term			Short Term		
		EAL	PC	* Modelled PC	EAL	PC	* Modelled PC
		µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
1	Toluene	1910	10.2		8000	184	

Air Impact Screening Stage One

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.

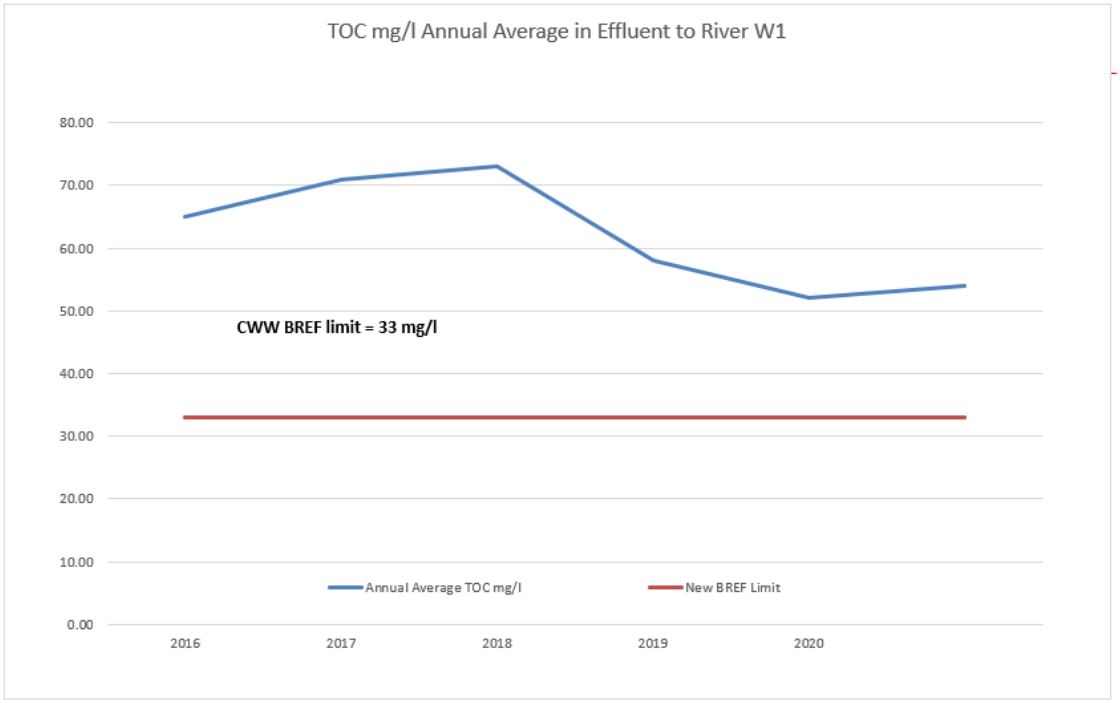
Number	Substance	Long Term EAL	Short Term EAL	Long Term			Short Term		
				PC	% PC of EAL	> 1% of EAL?	PC	% PC of EAL	> 10% of EAL?
		µg/m3	µg/m3	µg/m3	%		µg/m3	%	
1	Toluene	1,910	8,000	10.2	0.532	**No**	184	2.31	**No**

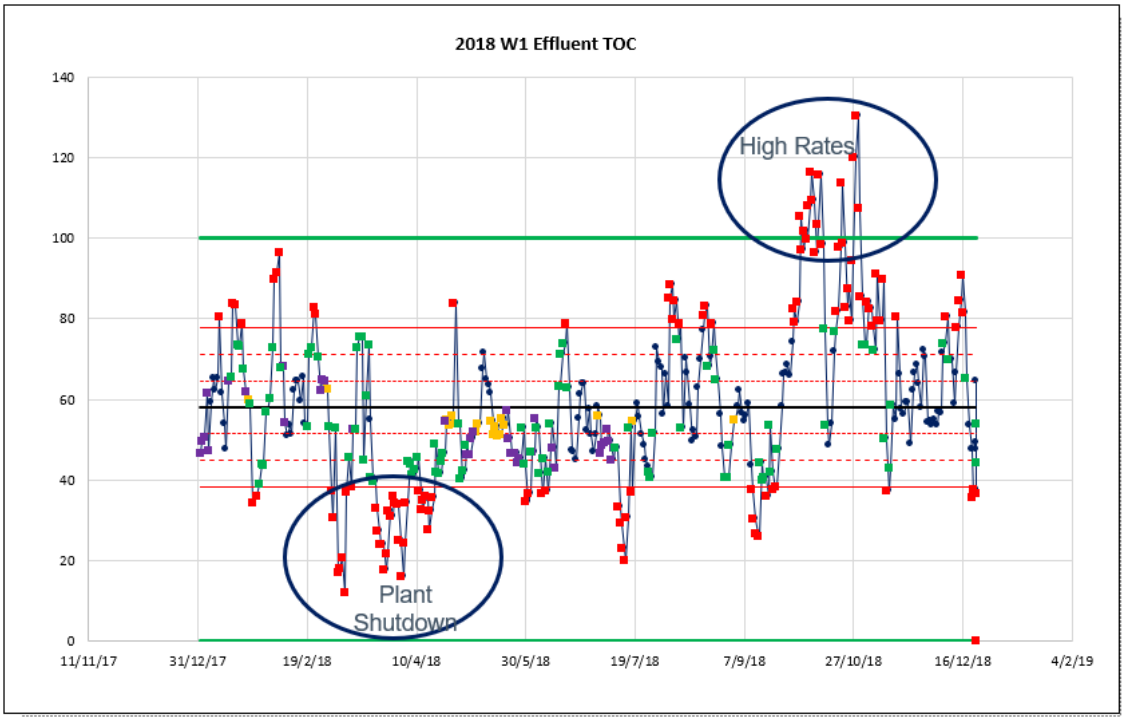
Appendix E2 - Environmental assessment - W1 TOC

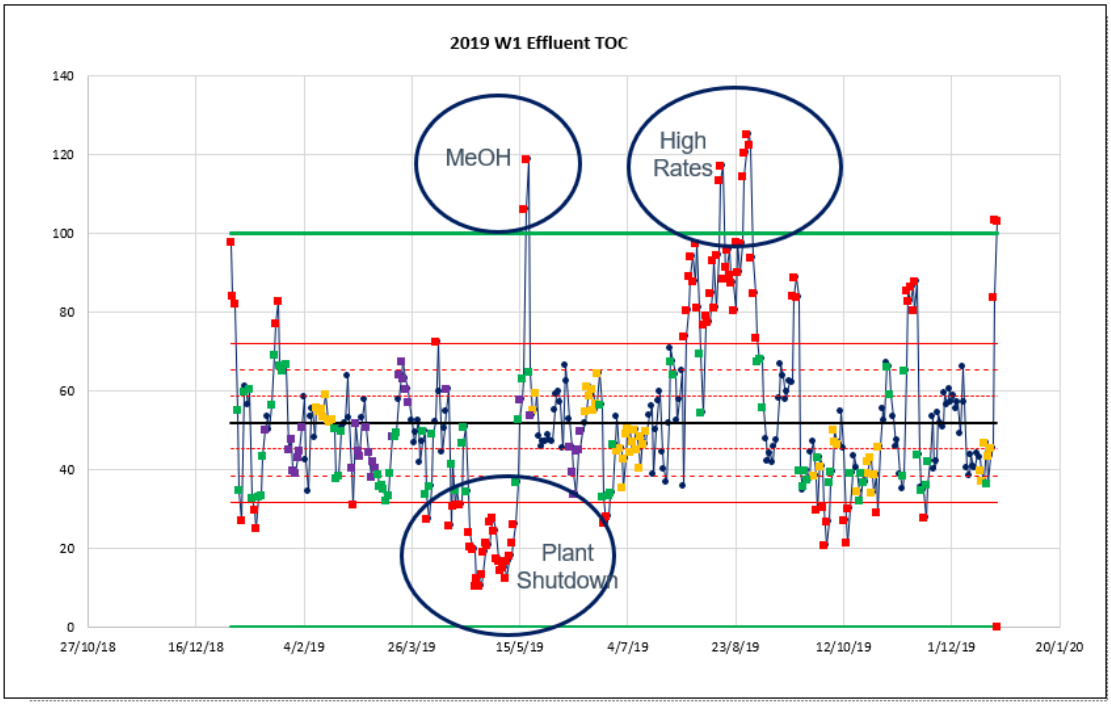
This variation application involves no actual change to W1 (final effluent) other than the introduction of a new permit limit for TOC (Total Organic Carbon).

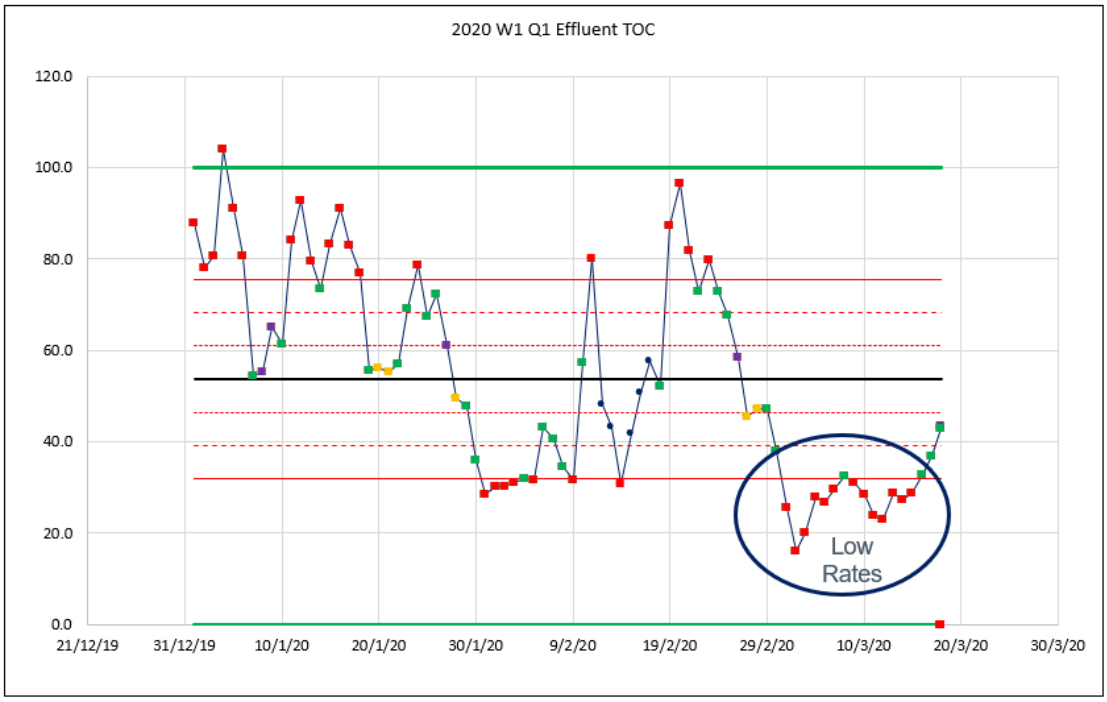
Authorised release point W1 TOC Performance

The following graphs show the TOC concentration in W1 effluent in the last few years. The graphs show that levels can vary considerably.









Summary of performance data is as follows:
2018 Average TOC in W1 = 58mg/l, with UCL of 78mg/l
2019 Average TOC in W1 = 52mg/l, with UCL of 72mg/l
2020 (Q1 2020) Average TOC in W1 = 54mg/l with UCL of 76mg/l

As mentioned in the non-technical summary Dow has justified that footnote 4 Conditions A and B are both met. The associated presentation and excel spreadsheet in provided to NRW are submitted as supporting information in this variation request. These were previously reviewed and shared with NRW, leading to tentative agreement that a higher TOC limit was justified.

Condition A Results Summary

Condition A requires ≥90% TOC abatement efficiency (yearly average) and includes both pre-treatment and final treatment. The table below shows the results for the previous 5 years with abatement efficiency >90% each year.

	% TOC Abatement
2020	
2019	93.26%
2018	94.42%
2017	93.27%
2016	93.71%
2015	94.64%

The abatement presentation includes the method and assumptions used in calculations. Further, more detailed spreadsheets are available for review.

Outline of method used

The main pre-treatment which accounts for >90% of total TOC removed is achieved using methanol stripping columns on W718 and W931 methyl chloride processes (known as MRC columns). These columns are installed to 'polish' the effluent prior to final treatment. They are not installed for economic benefit (as demonstrated in the abatement presentation). W718 MRC column was installed in 1996 (> 10 years after the plant was commissioned) and W931 MRC column installed when the plant was built in 1999. Installation of these MRC columns (and a biological water treatment plant) enabled a 99.6% reduction in methanol being discharged in the W1 site effluent stream at that time (see graph in presentation), which has since been sustained.

Filters were used to exclude bad data which occurs at very low plant operating feedrates and when columns are offline. Data excluded accounts for <5% of total data.

The MRC column bottom effluent streams (which are fed into final wastewater treatment) are routinely sampled for methanol. Using this data along with mass balance calculations for unreacted methanol and a conservative design split for TOC separation within the MRC column the total TOC, as Methanol being fed to the MRC column can be calculated.

The final effluent W1 is measured daily for methanol and for TOC in the Barry W212 laboratory. The analysis of TOC in wastewater effluent samples is by catalytic combustion and NDIR using an automated Shimadzu TOC-L analyser, W212 Determination of Total Organic Carbon in wastewater Samples. The analysis of methanol in methanol reactor streams, process water and wastewater treatment samples using an Agilent Gas Chromatograph (GC) with a Flame Ionisation Detector (FID) coupled to a MPS2 headspace autosampler to determine the methanol content, W212 GCA – Analysis of Methanol by GC-FID Headspace.

To enhance TOC monitoring Dow is investing in new on-line TOC analyser technology to measure influent to waste-water treatment and also the treated effluent stream W1. The new analysers are

expected to be online within the next 12 months. This will not replace the 24 hour composite sampling of the stream required for compliance reporting (see monitoring section below).

Knowing the feed TOC to the MRC columns and final TOC in W1 effluent (which has a 24 hour composite sampler and continuous flow meter) enabled the daily abatement efficiency to be calculated. Results were subsequently averaged for the year, as per the table above.

Condition B Summary

Nitrification is not used but the site does have a low loaded biological treatment step. This is evidenced by the fact that fresh methanol is continuously dosed into the plant in order to keep the biomass active healthy. The guidance states low loaded i.e. ≤0.25 Kg COD/Kg of organic dry matter of sludge. This implies that BOD5 levels in the effluent are ≤20 mg/l. A graph in the presentation shows that the BOD5 levels in the effluent have been <5mg/l for at least the last 8 years.

Calculations included in the presentation concluded that the effluent is at 0.276 Kg COD/Kg organic dry matter of sludge which is very close to the example number quoted. 2020 data actually shows <0.25 Kg/COD/Kg sludge at 0.209.

BAT guidance states that the most important factor is that the biological treat plant is adequately sized. Clearly the Dow process is adequately sized as we need to supplement the incoming waste water with organic material, as mentioned above. Options to get the COD/Kg sludge lower are not practical and do not make sense to do (e.g. use of our spare bioreactor to increase bioreactor volume or increase sludge age by wasting less sludge – which would increase risks that sludge may not respond quickly to a sudden increase in organic load).

To demonstrate on going compliance with this condition the feed to the bioreactor, 6604 pit is sampled from a 24 hour flow proportional composite sampler and measured daily for TOC and the Bioreactor biomass solids are sampled weekly for MLVSS in the Barry W212 laboratory. The COD is calculated from the TOC based on previous work establishing the relationship between TOC:COD of 5.2. The correlation between the two parameters is process and site specific.

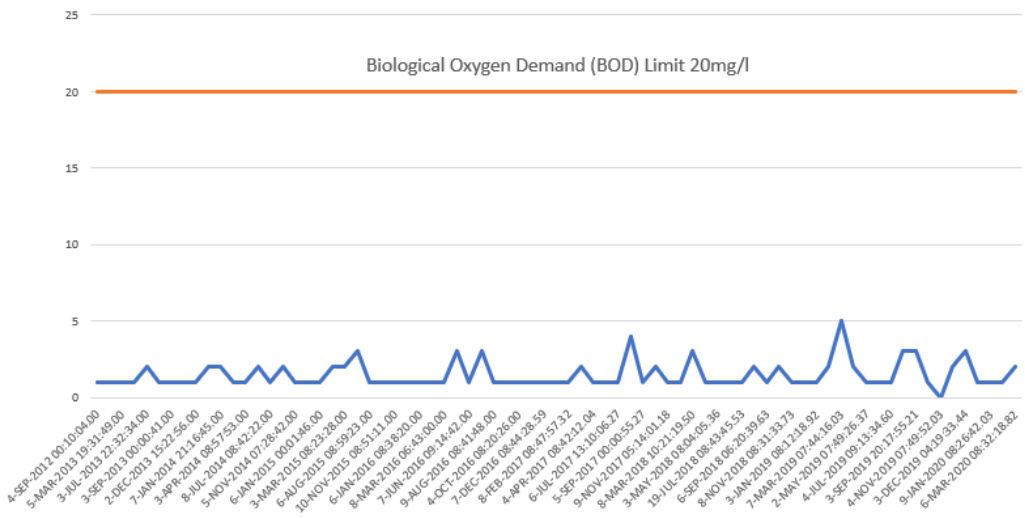
Using the following inputs, calculated inlet COD, inlet flow and mixed liquor volatile suspended solids combined with the fixed bioreactor volume the Kg COD/Kg of organic dry matter of sludge is calculated.

Condition B: A low-loaded biological treatment step is used i.e. <0.25 kg COD/kg of organic dry matter of sludge – Calculation

	Norm				
MLSS - Mixed Liquor Suspended Solids	6170	mg/L		Sensitivity Analysis	
MLVSS - Mixed Liquor Volatile Suspended Solids	3690	mg/L	Variable	4100	3900
Inlet COD	446	mg/L	Variable	400	420
Inlet Flow	250	m3/hr	Variable	225	250
Bioreactor volume	2625	m3	Fixed		
Inlet COD	112	kg/hr	Calculation		
	2676	kg/day	Calculation		
Bioreactor mass of active bugs	9686	kg	Calculation		
kg COD/kg biomass	0.276	kg COD/kg Sludge.day	Calculation	0.25	
Max allowable	0.25	kg/kg			
At min MLVSS, inlet COD	101	kg/hr			
COD concentration	404	mg/L			

*Footnotes (4) and (5) relate to installations with **high COD/TOC loads** and in particular, the COD is recalcitrant (hard). If BOD is <20 mg/l, then the remaining COD can generally be viewed as recalcitrant. Note, to set higher ELVs for COD/TOC under the footnote (4) or (5), the BOD BAT indicative emission level needs to be demonstrated.*

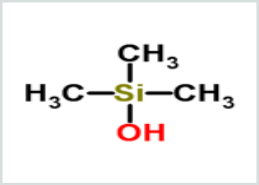
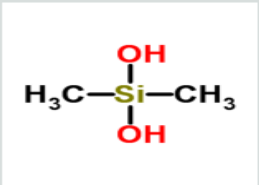
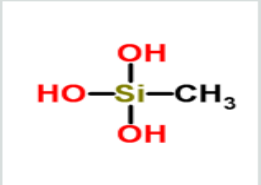
Biochemical Oxygen Demand BOD_5 2012 - 2020 Effluent SW1



It was concluded that condition B (and most certainly the intent of the condition) is currently met.

Details on TOC Content of the W1 effluent stream and Environmental Impact

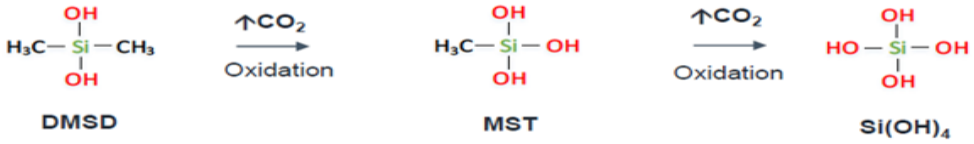
The TOC in the effluent comprises mostly of 3 silanols (plus very low levels of methanol), as follows:

Component Name	Trimethylsilanol (TMS)	Dimethylsilanediol (DMSD)	Methylsilanetriol (MST)
Structure			

Toxicology studies were carried out for the 3 main silanol species present. The reports are available for review upon request.

The conclusions of the reports were that the named silanols above are all **non-hazardous to the aquatic environment as they are not toxic or bioaccumulative in an aquatic environment**. They are relatively persistent in nature, however.

The breakdown mechanism of silanols is believed to be as follows, with the methyl group replaced by OH groups until $Si(OH)_4$, silicic acid is formed.



The final product, silicic acid, which is a hydrated form of silica, SiO_2 is a substance naturally found in the environment. It is a relatively weak acid that primarily exists in solution. Silicic acid is abundant in oceans. The surface of the ocean is undersaturated in silicic acid, containing roughly 30 ppb, and concentration increases with depth, up to 2 ppm. Rivers have closer to 4 ppm of silicic acid. Silicic acid is often a component of drinking water and is deemed relatively safe; it is not removed during water treatment.

Water Framework Directive (WFD) Impacts

A review of the WFD concluded that there are no EQS (Environmental Quality Standards) for silanols in water. Silanols are not thought to be of concern from a water quality perspective. They are relatively persistent and have low BOD (as shown earlier) and so are not thought to be of concern to oxygen depletion. It is noted through NRW meetings that the lower reaches of the Cadoxton River has been found to have low DO (Dissolved Oxygen) on a few occasions a few years ago. This appears to correlate with chloride levels.

Dow is currently carrying out monthly monitoring of the river water quality upstream and downstream of our site to evaluate if our effluent has any correlation to any future low DO results. We are primarily sampling for DOC, DO, pH, Cu, Ca, and chloride. We will also sample at low and high river flows rates combined with high and low tides to try to establish if more concentrated

chloride levels from the Dow effluent (i.e. at low flow) or tidal influence show any correlation with DO.

Early results show that DO is lower upstream of the site than compared to downstream. This is possibly due to high turbulence of the W1 effluent stream which flows down concrete steps as it enters the river. This work is also being used to gather data to assess bioavailable copper (which has been discussed with the regulator). Early indications are that the river status after the site effluent is discharged into it will be below the new WFD bioavailable copper EQS of 1ug/l using the WFDUK M-BAT tool. The presence of silanols in the effluent provides some DOC (Dissolved Organic Carbon) and the river contains high calcium levels. Both parameters appear to help reduce bioavailable copper in the M-BAT tool.

The results of the WFD assessment will be included in the full CWW BREF Regulation 61 response as part of the permit review triggered by the WGC Bref (which will invoke compliance with other Bref's including CWW). As mentioned, there is currently no evidence or theory that silanols (the main source of Dow TOC) in W1 effluent have any adverse effect on WFD goals or parameters.

Options to Mitigate TOC in the effluent

A multi-year project has been ongoing since 2014 to understand the sources of TOC and to assess if technology or reduction at source techniques can be used or installed to reduce TOC in the effluent.

In summary over 30 technologies were selected for consideration initially and these were screened down to 4 promising technologies for further investigation. These 4 credible options were then reduced down to 2 technically feasible options (oxidation and absorption). These investigations included evaluating technology to remove silanols in effluent both at the source plants but also from the final treated effluent stream. Work on the technologies followed and included laboratory scale experiments with a number of potential vendors. All oxidation technologies essentially break the silanols down to silica plus carbon dioxide and water.

Both technology options to reduce TOC in effluent streams are very expensive. Detailed costs are available but in summary costs to treat W1 effluent to reduce TOC below 33mg/l would likely cost approximately £8million capital. Operating costs (which includes significant usage of hazardous treatment materials and their associated environmental impact/safety risks to manufacture, transport and use) would then be ~ £3million per year. Individual source streams could be treated to reduce the size of the equipment, but costs would still be significant and other challenges created due to streams either being low pH and very corrosive or containing fine solids which could foul treatment systems.

For the hydrolysis/methyl chloride processes work was also carried out to sample the HCl gas stream produced by hydrolysis and fed to methyl chloride. Elimination/reduction of Si species in this stream can in theory reduce silanols generated and discharged in the methyl chloride plant effluent. The work concluded that Si species is present in small quantities but due to vapour liquid equilibria and aerosol entrainment options to minimise was deemed technically infeasible. All similar plants were compared across the corporation and they all exhibit similar performance i.e. silanols are present to a similar degree in all methyl chloride plant effluents.

Conclusion and Proposal

In summary the cost of abatement both for initial installation and subsequent operation is significant (both for single stream treatment and for final combined treatment options) and is deemed disproportionate to the relatively small environmental benefit (reduction in a non-toxic, non-bioaccumulative substance) that could be gained.

With Conditions A and B both met, as required by footnote 4 in Table 3.1. of the UK CWW guidance then BAT allows for a higher TOC limit (up to 100mg/l as an annual average).

Following data analysis of actual performance in the most recent 3 years the current upper control limit is near 80mg/l TOC. To ensure the site can robustly meet the permitted TOC limit and to allow for variations in performance due to capacity (which generates additional silanols) and other potentially unknown causes of variation, Dow Silicones proposes/requests that the upper range of the allowable limit is applied i.e. 100mg/l (annual average).

Monitoring

There will be no change in the monitoring equipment for this stream. Currently there is an MCerts refrigerated composite sampler, from which a 24 hour sample is taken and analysed in the on site laboratory.

Appendix E2 – Supplementary information for TOC

- CWW Bref Boundary and Abatement cals (PPT)
- TOC abatement Calculation (XLS)

CWW BREF – Review with NRW 29 April 2020

- Purpose: Licence to operate under CWW BREF requirements
- Desired Results:
  - Agreement that 100mg/l TOC limit will apply
  - Understanding on how conditions A and B are / can be met
- Agenda
  - Condition A TOC reduction >90%
    - Methodology and results (94-95.5% TOC reduction)
    - Historical reductions in MeOH discharges
    - Show Methanol Recovery Columns (MRCs) are installed as primary abatement and not for economic reasons (>90 year payback)
  - Condition B low loaded waste treatment plant
    - Share calculation methodology
    - Share condition B calculations and results

UK interpretation guidance: Common Waste Water and Waste Gas Treatment Management Systems (CWW)

Table 1: BAT-AELs for direct emissions of TOC to a receiving water body

Parameter	BAT-AEL (yearly average)	Conditions
Total organic carbon (TOC) (1) (2)	< 10–33 mg/l (3) (4) (5) (6)	The BAT-AEL applies if the emission exceeds 3.3 t/yr.

(3) The lower end of the range is typically achieved when few tributary waste water streams contain organic compounds and/or the waste water mostly contains easily biodegradable organic compounds.

(4) The upper end of the range may be higher and up to 100 mg/l for TOC or up to 300 mg/l for COD, both as yearly averages, if both of the following conditions are fulfilled:

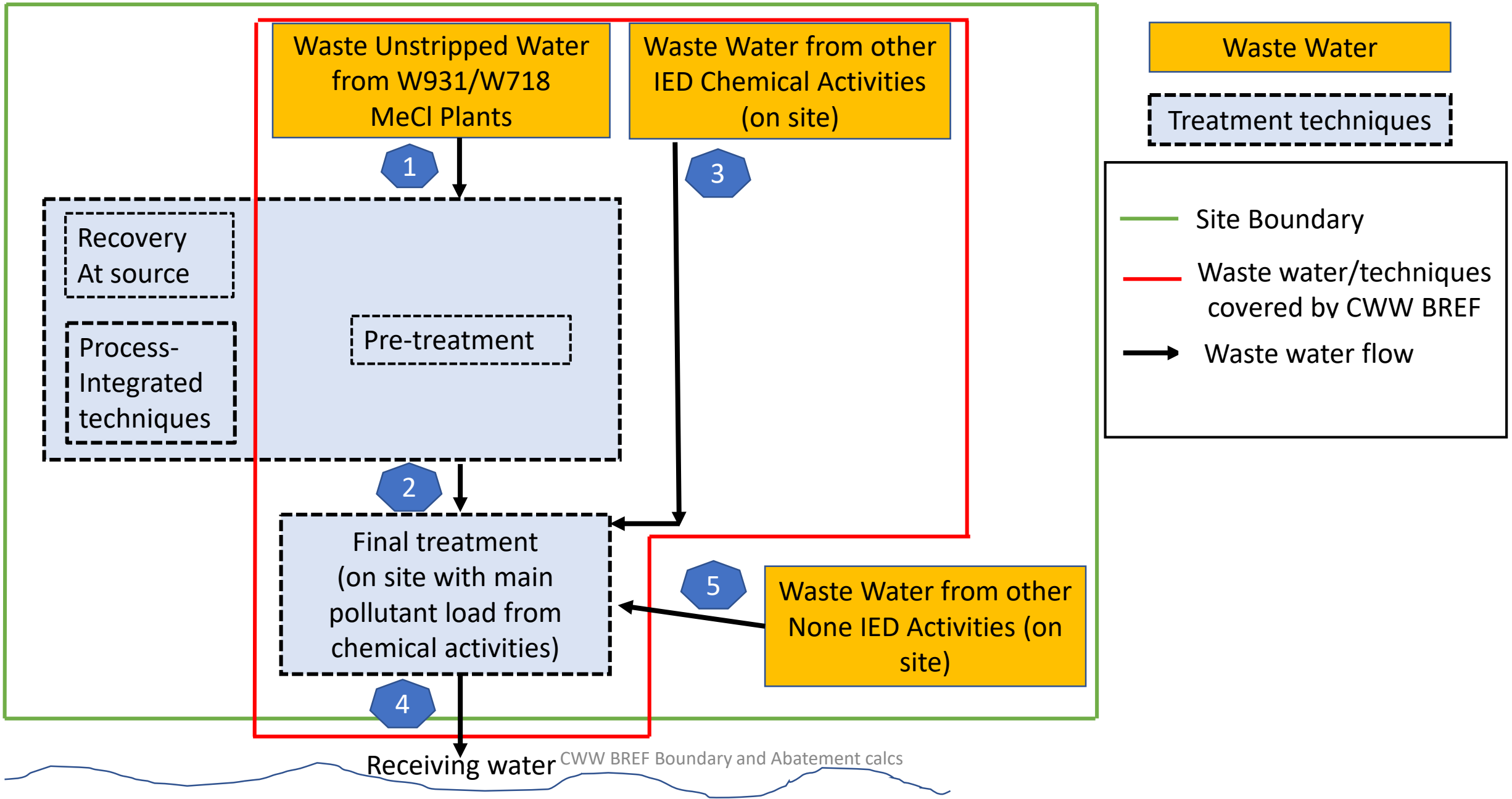
- Condition A: Abatement efficiency ≥90% as a yearly average (including both pretreatment and final treatment).
- Condition B: If a biological treatment is used, at least one of the following criteria is met:
  - A low-loaded biological treatment step is used (i.e. ≤0.25 kg COD/kg of organic dry matter of sludge). This implies that the BOD5 level in the effluent is ≤ 20 mg/l.
  - Nitrification is used.

Condition A

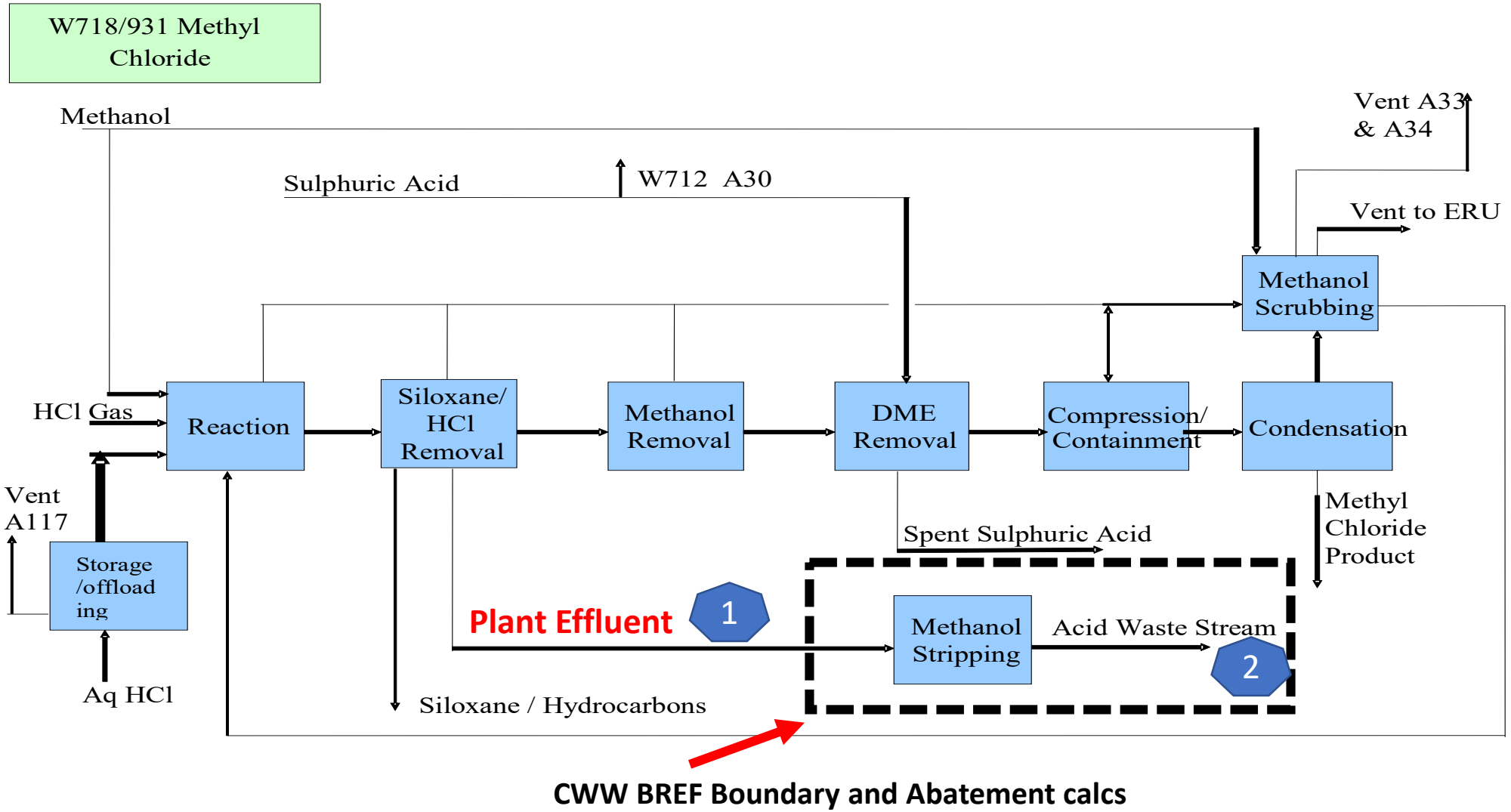
Condition A: Abatement efficiency ≥90% as a yearly average (including both pretreatment and final treatment).

TOC reduction mass balance

Dow Silicones UK Limited CWW BREF TOC Abatement Efficiency



Pre-treatment Activities – Final Methanol Stripping



Condition A – % Abatement Efficiency Calculation Initial Simple Method – MeOH stripping only

% TOC abatement = 1 - 4 / 1

This calculation includes pre-treatment abatement (MeOH stripping) and WWT TOC abatement

1 = Annual hourly average mass flow (Kg/hr) of TOC feeding 3543 column (W931) + 620 column (W718)

4 = Annual hourly average mass flow (Kg/hr) of TOC to river (W1) – currently already measured

TOC = Methanol + Silanols

1 = Annual hourly average mass flow (Kg/hr) of TOC feeding 3543 column (W931) + 620 column (W718)

$$TOC\ Feed\ 3543\ Column\ (W931) = MeOH\ Feed\ to\ 3543\ * 12/32$$

$$MeOH\ Feed\ to\ 3543 = Unreacted\ MeOH\ * 3514\ Bottom\ Split\ Frac$$

$$Unreacted\ MeOH = Total\ Rxr\ MeOH\ Feed\ - MeOH\ Converted\ to\ DME\ - MeOH\ Converted\ to\ MeCl$$

$$3514\ Bottom\ Split\ Frac\ \longrightarrow From\ Design = 0.13$$

$Total\ Rxr\ MeOH\ Feed =$ \\PIBAR\0004_0931_0000D3_W931_01:F324D3.MEAS+\\PIBAR\0004_0931_0000D3_W931_01:F291D3.MEAS

$$MeOH\ Converted\ to\ DME = \left(2 * \frac{32}{46}\right) * \backslash\backslash pibar\backslash 0004\_0931\_0000D3\_W931\_04: FF422D3.MEAS$$

$MeOH\ Converted\ to\ MeCl = \left(\frac{32}{50.5}\right) *$ (\\pibar\0004_0931_0000D3_W931_05:F511D3.PNT+\\pibar\0004_0930_0000A3_W930_07:F5005A3.MEAS)

Filter on MeOH Feed Rate to Process > 4100 kg/hr – Eliminates Other than Normal Operations

$MeCl\ Production\ Rate =$ \\pibar\0004_0931_0000D3_W931_05:F511D3.PNT+\\pibar\0004_0930_0000A3_W930_07:F5005A3.MEAS

1 = Annual hourly average mass flow (Kg/hr) of TOC feeding 3543 column (W931) + 620 column (W718)

$$TOC\ Feed\ 620\ Column\ (W718) = MeOH\ Feed\ to\ 620\ * 12/32$$

$$MeOH\ Feed\ to\ 620 = Unreacted\ MeOH\ * 512/515\ Bottom\ Split\ Frac$$

$$Unreacted\ MeOH = Total\ Rxr\ MeOH\ Feed\ - MeOH\ Converted\ to\ DME\ - MeOH\ Converted\ to\ MeCl$$

$$512/515\ Bottom\ Split\ Frac\ \longrightarrow Same\ as\ W931$$

$Total\ Rxr\ MeOH\ Feed$ = "A" Train MeOH Fed + "B" Train MeOH Fed

A" Train MeOH Fed = '\\$PIBAR$\0004_0718_0000$D0$_W718$_10:$F660D.MEAS$ +'\\PIBAR\0004_0718_0000D0_W718_10:F661D.MEAS

"B" Train MeOH Fed ='\\PIBAR\0004_0718_0000D0_W718_9:F110D.MEAS + '\\PIBAR\0004_0718_0000D0_W718_9:F111D.MEAS

$$MeOH\ Converted\ to\ DME = \left(2 * \frac{32}{46}\right) * '\backslash\backslash pibar\backslash 0004\_0718\_0000D0\_W718\_24: F832D.PNT$$

$$MeOH\ Converted\ to\ MeCl = \left(\frac{32}{50.5}\right) * MeCl\ Production\ Rate$$

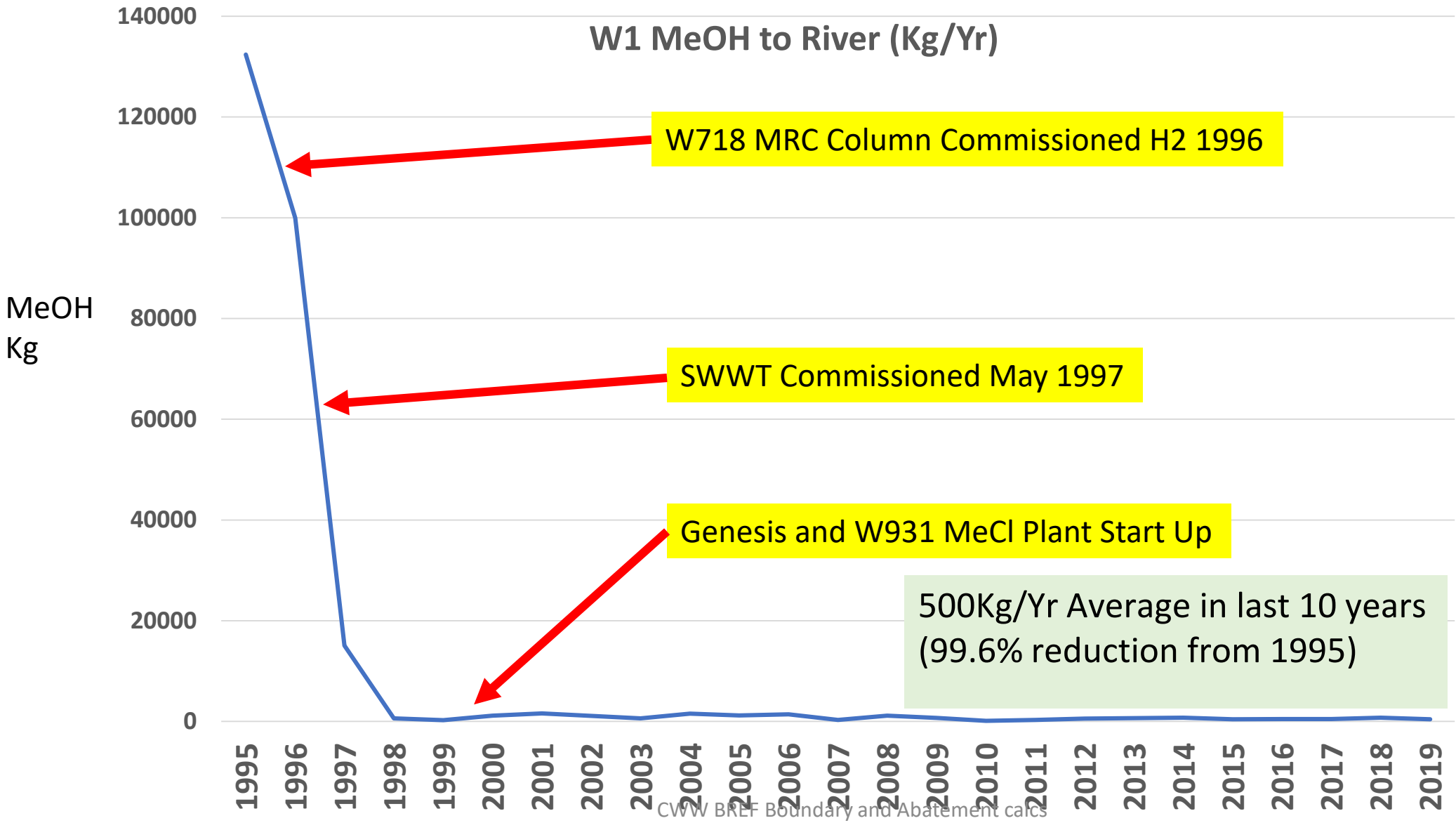
$$MeCl\ Production\ Rate = \backslash\backslash pibar\backslash 0004\_0718\_0000D0\_W718\_6: F478D.PNT$$

Filter on Train MeOH Fed (>1500 kg/hr) to Eliminate Other than Normal Operating Conditions

TOC abatement results (>90%)

	% TOC Abatement
2020	
2019	93.26%
2018	94.42%
2017	93.27%
2016	93.71%
2015	94.64%

Historical W1 MeOH (TOC) Discharged To River



MRC column economics

Following analysis shows that MRC columns are installed from an environmental, not economic, basis

Methanol Recovery Column Economics (Using current prices for comparison, and 2019/last 5 years (2015-2019) steam consumption)

Average Methanol Recovered = 2323 t/y

Value of Methanol Recovered (@ current purchase price of €216/t) = £456k

Average steam volume/value (@ current price £5.31/t) consumed by Methanol Recovery columns =

- 2019: 66070 t/y ≡ £351k/y
- 2015-2019: 70813 t/y ≡ £376k/y

Net benefit of running MRC (at current prices):

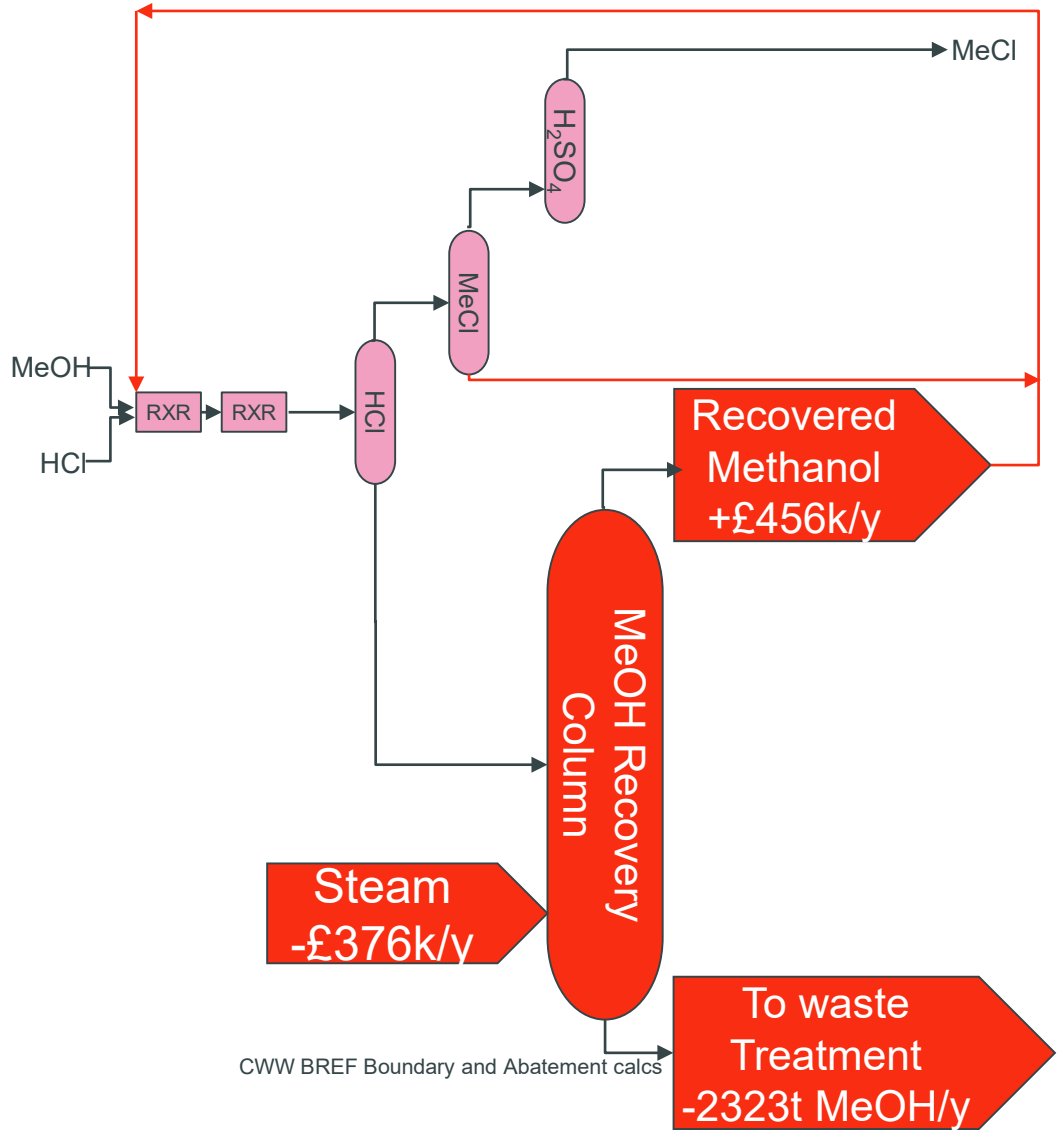
Last year 2019: -£13k/y (negative i.e. cost)

5y ave 2015-2019: £80k/y

Capital cost (based on equivalent W931 column built in 2010 with inflation factors): £7,776k

Simplistic payback: 97 years!!

NOT INSTALLED FOR ECONOMIC REASONS



CWW BREF Boundary and Abatement calcs

Conclusion Part A

- Demonstrated that we meet Part A requirements (93-94.5% TOC reduction vs 90% target)
- Annual compliance method to be discussed/agreed
- MRC is not installed for economic reasons (> 90 year payback)

Condition B

Condition B: If a biological treatment is used, at least one of the following criteria is met:

- A low-loaded biological treatment step is used (i.e. ≤0.25 kg COD/kg of organic dry matter of sludge). This implies that the BOD5 level in the effluent is ≤ 20 mg/l.

~~- Nitrification is used.~~

Condition B: A low-loaded biological treatment step is used i.e. <0.25 kg COD/kg of organic dry matter of sludge - COD and MLVSS

Sample – 6604 26/01/20	Chloride (ppm)	Sample Dilution	COD (mg/l)*
Original Sample	6818	1 in 2	1,258
		1 in 10	408
Filtered with Dionex Cartridge	910	Neat	480
		1 in 10	430
2nd Filter with Dionex Cartridge	150	Neat	467

- True “COD” without Cl interference
- 6604 pit feed to bioreactors
- TOC 86mg/l : COD 446 mg/l
  - Ratio 5.2
- COD/TOC Includes dosed MeOH required to sustain the biomass

- MLVSS impacted by sludge removed. Currently 3 tankers/wk are removed to support biomass health, sludge age & clarifier settlement
- 29/1/2020 8050mg/l MLSS, 3690mg/l MLVSS

Condition B: A low-loaded biological treatment step is used i.e. <0.25 kg COD/kg of organic dry matter of sludge – Calculation

	Norm			Sensitivity Analysis	
MLSS - Mixed Liquor Suspended Solids	6170	mg/L			
MLVSS - Mixed Liquor Volatile Suspended Solids	3690	mg/L	Variable	4100	3900
Inlet COD	446	mg/L	Variable	400	420
Inlet Flow	250	m3/hr	Variable	225	250
Bioreactor volume	2625	m3	Fixed		
Inlet COD	112	kg/hr	Calculation		
	2676	kg/day	Calculation		
Bioreactor mass of active bugs	9686	kg	Calculation		
kg COD/kg biomass	0.276	kg COD/kg Sludge.day	Calculation	0.25	
Max allowable	0.25	kg/kg			
At min MLVSS, inlet COD	101	kg/hr			
COD concentration	404	mg/L			

COD, MLVSS and Flow drive the low loaded biological treatment; Bioreactor volume is fixed
COD = MeOH dosed + MeOH from process + Silanols from process
No information on calculation basis in the guidance - 9th December 2019

Condition B: A low-loaded biological treatment step is used i.e. <0.25 kg COD/kg of organic dry matter of sludge – 2018 to 2020

- TOC – Annual average from daily 24hr composite sample
- COD – Calculated from TOC using ratio 5.2
  - Basis 6604 pit bioreactor feed 26/1/2020; contains silanols + methanol
  - Calculated DMSD & Methanol COD:TOC ratios
- MLVSS – 2018 43 data points, 2020 9 data points

Year	Annual 6604 TOC mg/l	Calculated COD mg/l	Annual Effluent Flow m3/hr	MLVSS mg/l	kg COD/kg biomass
2018	64	333	253	2995	0.257
2019	63	328	245	No data	
2020	67	348	250	3810	0.209

DMSD COD:TOC Measured	DMSD Calculated TOC	DMSD COD:TOC Theoretical	MeOH COD:TOC Theoretical
5.9	47	5.3	4.0
5.6	84	5.3	

Condition B: A low-loaded biological treatment step is used i.e. <0.25 kg COD/kg of organic dry matter of sludge

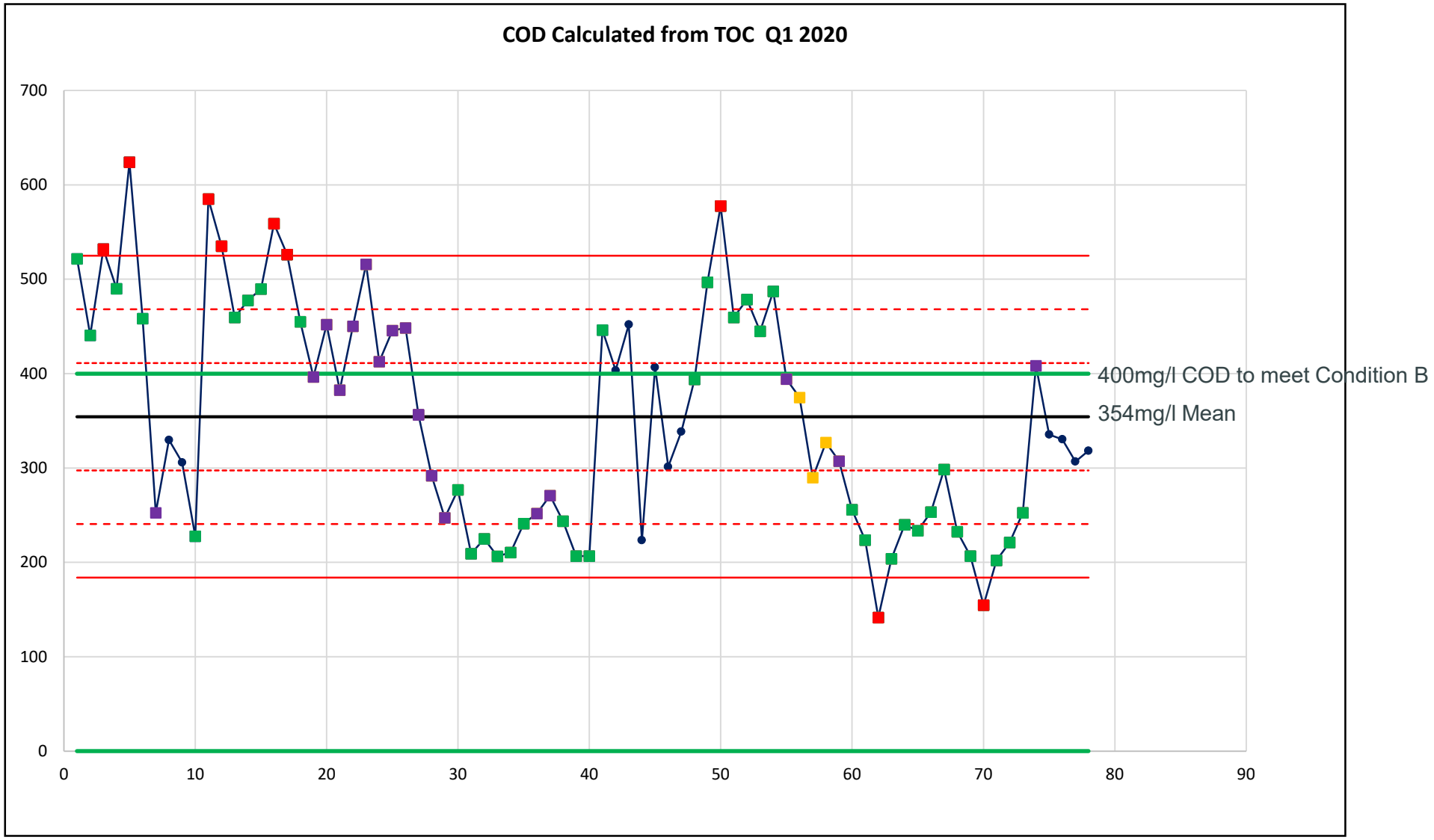
- What's more important low loaded biological treatment i.e. BOD_5 level in the effluent is ≤ 20 mg/l or meeting <0.25kg COD kg sludge limit?
- Bioreactor over sized; Low loaded biological treatment is demonstrated with MeOH dosing. At or below the 0.25kg COD limit but comfortably meeting the BOD_5 limit.
- Data monitoring for Condition B to demonstrate capability consistently below the limit using the annual average.
  - Testing / Sampling Proposal: MLVSS (weekly) / TOC surrogate for COD (daily)
  - Evaluate 6604 pit TOC to COD variation chart based on ratio; validate ratio at annual TOC average concentration

CWW – BATC - UK Interpretation Guidance 09 December 2019

101. *Footnotes (4) and (5) refer to a **low-loaded biological treatment step**. Although in many circumstances this would mean the plant is designed to have at least two biological treatment steps in sequence, with the latter step being essentially a polishing stage that promotes the nitrification process, this is not required where the waste waters can be treated easily in a single state. Therefore the important consideration is that the WWTP is adequately sized to fully treat all the incoming waste waters.*

95. *Footnotes (4) and (5) relate to installations with **high COD/TOC loads** and in particular, the COD is recalcitrant (hard). If BOD is <20 mg/l, then the remaining COD can generally be viewed as recalcitrant. Note, to set higher ELVs for COD/TOC under the footnote (4) or (5), the BOD BAT indicative emission level needs to be demonstrated. These footnotes apply to any installation that meets the criteria (compare with footnote (8)).*

Calculated COD from TOC Q1 2020



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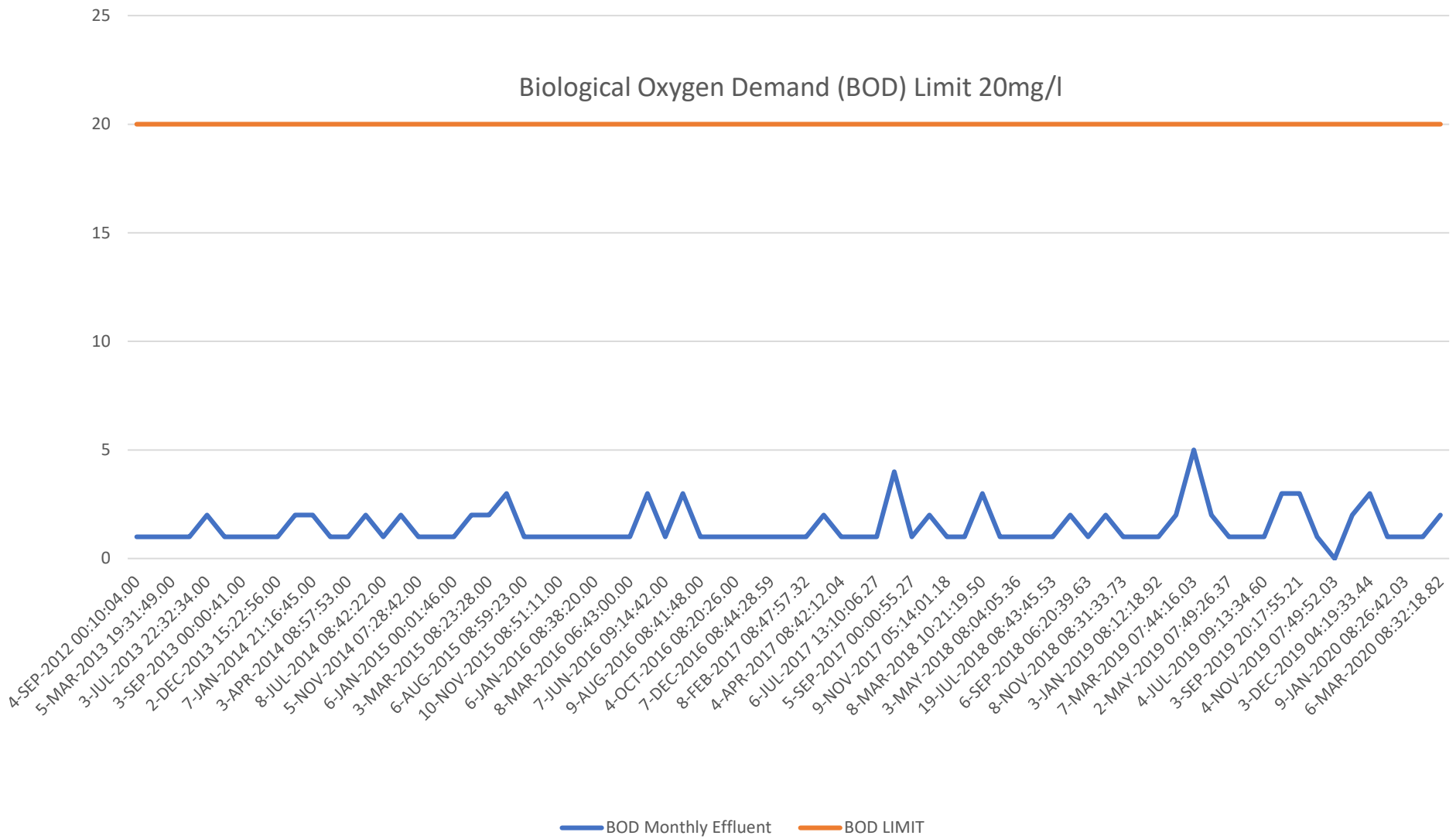
BAT-AEL BOD_5

91. *There is no BAT-AEL for **BOD_5** (footnote 1). Instead, the TWG included an indicative BAT statement. The BOD_5 measurement does not allow for any prediction on the performance within the WWTP; it only provides an indication as to whether the waste water is easily degradable to a certain rate. BOD_5 cannot be used for control purposes (as the result is not available for 5 days), however, for the purposes of defining BAT and assessing whether the set-points for other parameters used to control the process are correctly defined, BOD can and should be used for all biological WWTP. At a BOD_5 of 20 mg/l, further biological reduction is unlikely to be possible (within the accuracy of measurement).*

92. *If BOD is ≤20 mg/l as an annual average further BAT justification in relation to BOD will usually not be required. If a BOD_5 close to 20 mg/l cannot be demonstrated, the operator needs to assess what modifications may be required to the plant to reduce the load, increase the capacity, or operate more effectively. Further details and advice on the use of indicative BATc is in the DRAFT UK Cross-Cutting Interpretation Guidance and Permitting Advice on BATc document.*

([1]) No BAT-AEL applies to Biochemical oxygen demand (BOD). As an indication, the yearly average BOD_5 level in the effluent from a biological waste water treatment plant will generally be ≤20 mg/l.

Biochemical Oxygen Demand BOD_5 2012 - 2020 Effluent SW1



Condition B: A low-loaded biological treatment step is used i.e. <0.25 kg COD/kg of organic dry matter of sludge

Possible options to maintain Condition B limit, if required

- **2nd bioreactor on line** + MeOH dosing, O2, nutrients etc – achieves limit added cost with no benefit as BOD already well in compliance. 1 bioreactor already oversized is more than adequate. Cap/Op ex Capital required Op ex $300K/yr+ sludge removal analysers etc
- **MLSS increase** – remove less biomass, risk older sludge, cost saving increase O2 dosing/cost and poor clarification/solids carryover. Could assess MLVSS on 2 tankers biomass removal/wk for 1 month
- **Flow variability/decrease** to model; storm water segregation, 911 scrubber, vac drums, other water saving opportunities
- **COD Source reduction -** Treat/eliminate one silanol point source Cap/Op Ex; benefit reduced TOC

Conclusion Condition B

Demonstrated that we meet BOD_5 and at or below 0.25kg COD / kg dry sludge.

Annual compliance method to be discussed/agreed.

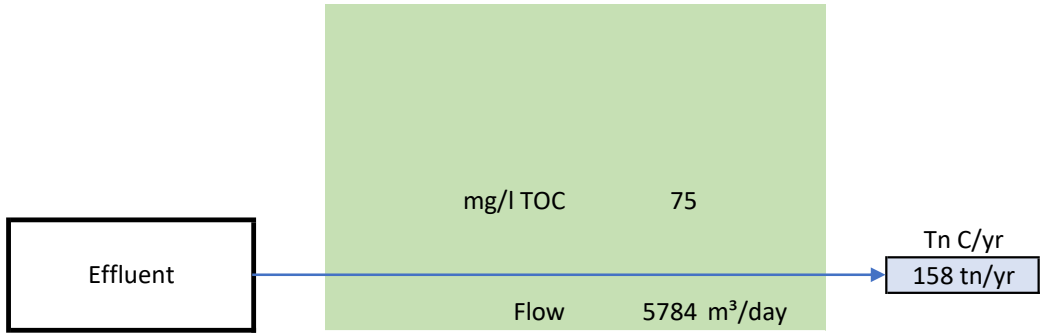
Summary

- Part A met: >90% TOC abatement
- Part B : low loaded plant demonstrated.
- Dow therefore meets criteria for higher limit of 100mg/l TOC.
- How do we proceed/gain NRW formal agreement?

Carbon removal

Notes

Concentrations in ppm Carbon TOC equivalent



Flows would be yearly average flows

	Using MeOH Filter of 4100 kg/hr		Using MeOH Filter of 1500 kg/hr on each train							More conservative method
	W931 MeOH Fed to MRC (kg/yr)	W931 TOC Fed to MRC (kg/yr)	W718 MeOH Fed to MRC (kg/yr)	W718 TOC Fed to MRC (kg/yr)	Total MeOH Fed to MRCs (kg/yr)	Annual Average Effluent TOC mg/l	Annual Effluent Flow m3	Tn C/yr	MeOH Reduction by MRCs (Tn/yr)	% TOC Abatement
2020	1031503	386814	333489	125059	125059				-33	
2019	4069057	1525896	954466	357925	357925	52	2450000	127	200	93.26%
2018	4948210	1855579	2080949	780356	780356	58	2530000	147	622	94.42%
2017	4831689	1811884	2143420	803782	803782	73	2410000	176	645	93.27%
2016	5042388	1890895	1787125	670172	670172	71	2270000	161	512	93.71%
2015	5223839	1958940	2085079	781905	781905	65	2260000	147	624	94.64%

TOC Abatement Calculation

Appendix F

A copy of the Dow Silicones UK Ltd Climate Change Agreement

27 Mar 2013
CCA Register Ref: CIA/T00209-GEN-1

Dow Corning Limited
TU Identifier: CIA/T00209

Cardiff Road
Barry
Vale of Glamorgan
CF63 2YL
Wales
brian.austin@dowcorning.com

CLIMATE CHANGE AGREEMENTS SCHEME
PROPOSED UNDERLYING AGREEMENT

Dear Haydn. B Austin

We are writing to Dow Corning Limited ("you") with the enclosed copy of your Underlying Agreement ("the agreement") for the Climate Change Agreement scheme ("the scheme") to qualify for the Climate Change Levy discount under Pt IV of Sch 6 to the Finance Act 2000 (as amended). The details below outline the Target Unit and its Agreement Identifier for your Underlying Agreement. A full list of the Facilities for your Target Unit is listed in the agreement.

Target Unit:	CIA/T00209 – Dow Corning Limited Cardiff Road Barry Vale of Glamorgan CF63 2YL Wales
Agreement Identifier:	CIA/T00209 v1

Upon review of the Underlying Agreement and the details relating to the Facilities for the Target Unit inside this agreement, you will need to confirm your acceptance. This is done by you providing assent via an email (the legally responsible person listed on the Underlying Agreement).

To provide assent, please email your acceptance referencing your TU Identifier and Agreement Identifier in the subject line confirming you would like to proceed with inclusion within the scheme. Please note that this assent must be sent from the following email address:

brian.austin@dowcorning.com

To: cca-targetunit@environment-agency.gov.uk

Environment Agency, Richard Fairclough House, Knutsford Road, Latchford, Warrington, Cheshire, WA4 1HT
Tel: 03708 506 506

Please ensure you send your email assent within 20 working days of this email. Failure to do so could risk us terminating this agreement.

IMPORTANT CLARIFICATION

We are aware that in a small number of cases, this version of the Underlying Agreement may require some changes/corrections. In order to ensure that your CCL discount is approved for 1 April you will need to return your assent to the attached version of the Underlying Agreement. If you do not assent to this version and return it unsigned with a list of corrections, any amended agreement will have a date after 1 April and facilities will be at risk of losing continuity of CCL discount.

To provide you with added assurance that your changes will be addressed and that a new updated agreement will be sent to you, we have included a form (Appendix 1 to this letter) to allow you to formally notify us of the changes or errors you believe need correcting. You can submit this form with your email assent to this agreement.

Any errors that you identify will be assessed and can be corrected during the Data Correction Window. It is not our intention to take any enforcement action for such errors. We will work with your sector association to process these amendments and issue an updated agreement to you as soon as possible.

If you require any clarification of the above, please contact your Sector Association.

Yours faithfully

CCA Team

http://www.environment-agency.gov.uk/business/topics/pollution/140070.aspx

c.c. Wayne Bajjada - wayne.bajjada@dowcorning.com, Haydn. B Austin - brian.austin@dowcorning.com

Environment Agency, Richard Fairclough House, Knutsford Road, Latchford, Warrington, Cheshire, WA4 1HT
Tel: 03708 506 506

APPENDIX 1 – Changes and error notification table

The operator should use this table below to list any errors and changes to the Underlying Agreement they are providing assent to. This will allow the Administrator to see the issues that need to be addressed by the sector/consultant and amended or initiated via the Register. The operator will still need to request this directly via the sector or their consultant and ensure these amendments are compliant.

Change/error	Facility ID	Description of change/error

Environment Agency, Richard Fairclough House, Knutsford Road, Latchford, Warrington, Cheshire, WA4 1HT
Tel: 03708 506 506

UNDERLYING CLIMATE CHANGE AGREEMENT FOR THE CHEMICALS SECTOR
Agreement Dated: 1st day of April 2013
Agreement Identifier: CIA/T00209 v1
TU Identifier: CIA/T00209

THIS AGREEMENT is made the 1st day of April 2013

BETWEEN:

(1) the Environment Agency ("the Administrator"); and

(2) the operator set out in Schedule 2 ("the Operator")

RECITALS

(A) Section 30 of and Schedule 6 to the Finance Act 2000 ("the Act") make provision for a tax known as the climate change levy ("the Levy"). The Levy is charged on the supply of taxable commodities as defined in paragraph 3 of Schedule 6 to the Finance Act 2000.

(B) Paragraphs 42(1)(ba) and 42(1)(c) of Schedule 6 to the Act provide that the amount payable by way of the Levy shall be discounted from the full rate where the supply is a reduced-rate supply. A reduced-rate supply is a taxable supply supplied to a facility specified in a certificate given by the Administrator to the Commissioners for Her Majesty's Revenue and Customs as a facility which is covered by a climate change agreement for a period specified in the certificate in accordance with paragraphs 42 to 52F of Schedule 6 to the Act.

(C) A climate change agreement is defined in paragraph 46 of Schedule 6 to the Act. It may consist of a combination of agreements that falls within paragraph 48. A combination of agreements falls within paragraph 48 if a number of conditions are satisfied. The first condition is that the combination of agreements is a combination of an umbrella agreement and an agreement that, in relation to the umbrella agreement, is an underlying agreement.

(D) This agreement is an underlying agreement in relation to an umbrella agreement, entered into for the purposes of the reduced rate of Levy. It is not intended to give rise to contractual obligations between the parties.

(E) The facility or facilities set out in Schedule 4 to this agreement are a facility or facilities to which an agreement applies.

(F) The Operator is a representative of each facility to which this agreement applies, as defined in paragraph 47(2) of Schedule 6.

AGREED TERMS

IT IS AGREED as follows:

1. INTERPRETATION

1.1 In this Agreement, unless the context otherwise requires:

"account" means the account in the Register of a sector association or an operator;

"agreement" means an umbrella agreement or an underlying agreement;

"base year" in respect of a target unit which does not include a greenfield facility means a 12 month period agreed between an operator and the administrator, ending prior to the date of an underlying agreement, for which data is supplied by an operator to the administrator prior to the operator entering into the underlying agreement;

"base year" in respect of a target unit which does include a greenfield facility means the 12 month period starting on the date of an underlying agreement";

"buy-out fee" means the fee calculated in accordance with Rule 7;

"certification period" means, any of the following periods:

(a) 1st April 2013 to 30th June 2015;

(b) 1st July 2015 to 30th June 2017;

(c) 1st July 2017 to 30th June 2019;

(d) 1st July 2019 to 30th June 2021; or

(e) 1st July 2021 to 31st March 2023;

"charges" means charges due to the Administrator under the charging scheme;

"charging scheme" means the Climate Change Agreements Charges Scheme 2012 made by the Administrator or any replacement or revision of that charging scheme;

"emissions" means the total emissions in tCO_2 equivalent for a target period;

"EU ETS Directive" means Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emissions allowance trading within the Community and amending Council Directive 96/61/EC, as amended from time to time;[1]

"facility" means a facility within the meaning of paragraph 50(2) to (6) of Schedule 6 to the Act;

"facility number" means the unique identification number of a facility set out in schedule 6 of this Agreement;

"greenfield facility" means a facility which started to carry out the process by virtue of which it is a facility within the meaning of paragraph 50 of Schedule 6 during the 12 month period ending on the date the operator applies for the facility to be covered by an agreement"

"Novem ratio target" has the meaning set out in the technical annex;

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[1] *OJ No L 275, 25.10.03, p 32. The Directive was amended by European Parliament and Council Directives 2004/101/EC (OJ No. L 338, 13.11.2004, p 18), 2008/101/EC (OJ No L 8, 13.1.2009, p 3) and 2009/29/EC (OJ No L 140, 5.6.2009, p 63), and by Regulation (EC) No 219/2009 of the European Parliament and of the Council (OJ No L 87, 31.3.2009, p 109).

"operator" means, as the context requires, either:

a) the party to this Agreement other than the Administrator; or

b) a party to an underlying agreement other than the Administrator;

"personal information" means:

a) the address of the registered office of the sector association or operator;

b) the name, address and email address of:

i) in the case of a sector association, a person who can be contacted in respect of the sector association;

ii) in the case of an Operator, the responsible person; and

c) the name, address and email address of a person who can be contacted in respect of the facility or each facility covered by an agreement;

"the Register" means the electronic system established and operated by the Administrator for the administration of agreements;

"the Regulations" means the Climate Change Agreements (Administration) Regulations 2012 S.I. 2012/1976;

"responsible person" means an individual who is legally authorised by the Operator to enter as the Operator's agent into an underlying agreement, to agree any amendments to an underlying agreement, and to accept service of notices on behalf of the Operator;

"Rule or Rules" means the Rules for the Operation of Climate Change Agreements or any of them set out in Schedule 1 to this Agreement as varied from time to time;

"Schedule 6" means Schedule 6 to the Finance Act 2000;

"sector" means the sector consisting of facilities which are covered by the same umbrella agreement;

"sector association" means the sector association set out in Schedule 3;

"sector commitment" means the commitment set out in Schedule 5 of the umbrella agreement, as varied from time to time;

"surplus" means the amount by which the emissions have fallen below the target for any target period;

"target" means the percentage improvement in energy efficiency or carbon efficiency from the base year applicable to the target unit, set out in Schedule 6 to this Agreement, as varied from time to time;

"target period" means any of the following periods:

a) 1st January 2013 to 31st December 2014;

b) 1st January 2015 to 31st December 2016;

c) 1st January 2017 to 31st December 2018; or

d) 1st January 2019 to 31st December 2020;

"target unit" means the facility or group of facilities to which this Agreement applies;

"tCO_2 equivalent" means tonnes of carbon dioxide equivalent;

"technical annex" means the technical annex dated 6 March 2013 and published by the Administrator or the Secretary of State, available via the Administrator's website;

"throughput" means the measure of production, or factor related to production, used to determine the relationship between the amount of energy used by the target unit and the levels of activity of the target unit, as set out in Schedule 6 of this agreement;

"the Tribunal" means the First-tier Tribunal established under the Tribunal Courts and Enforcement Act 2007[2];

"umbrella agreement" means an agreement that is an umbrella agreement for the purposes of paragraph 48 of Schedule 6 to the Act;

"underlying agreement" means, as the context requires, either:

a) this Agreement; or

b) an agreement that is an underlying agreement for the purposes of paragraph 48 of Schedule 6 to the Act.

1.2 Other words and expressions used in this Agreement have the same meaning as they bear in Schedule 6 to the Finance Act 2000 or the Regulations.

2. FACILITIES TO WHICH THIS AGREEMENT APPLIES

2.1 This Agreement applies to the facility or facilities set out in Schedule 5 to this Agreement which carry out some or all of the activities set out in Schedule 4 to this Agreement.

3. TARGET

3.1 The target is set out in Schedule 6 to this Agreement, as varied from time to time.

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[2] Appeals are assigned to the General Regulatory Chamber of the First-tier Tribunal by virtue of article 3(a) of the First-tier Tribunal and Upper Tribunal (Chambers) Order 2010 (S.I. 2010/2655). The Tribunal Procedure (First-tier Tribunal) (General Regulatory Chamber) Rules 2009 (S.I. 2009/1976) sets out procedural rules relating to such appeals.

3.2 Whether the target has been met must be determined in accordance with Rule 6.

3.3 The Secretary of State may carry out a review of the sector commitment during 2016 for the target periods 1st January 2017 to 31st December 2018 and 1st January 2019 to 31st December 2020. The target may be varied to take account of the review in accordance with the procedure set out in Rule 12.

3.4 The target may also be varied in accordance with Rules 6, 9, 10 and 11.

4. THE RULES

4.1 Schedule 1 to this Agreement which sets out the Rules for the operation of Climate Change Agreements has effect.

4.2 The Operator agrees to comply with the Rules.

5. DURATION AND TERMINATION OF THIS AGREEMENT

5.1 Subject to clause 5.2 below, this Agreement comes into force on 1 April 2013 or the date on which it is made, if later, and ends on 31 March 2023.

5.2 This Agreement may be terminated before 31 March 2023:

5.2.1 at any time by a notice served by the Operator giving at least 20 working days notice served on the Administrator; or

5.2.2 in accordance with the Regulations.

6. VARIATION OF AGREEMENT

6.1 Subject to clauses, 6.2 and 6.3 below, this Agreement may be varied at any time if agreed between the Administrator and the Operator.

6.2 The facilities to which this Agreement applies may be varied in accordance with Rules 9 and 10.

6.3 This Agreement may be varied by the Administrator at any time to take account of changes to the terms specified in the Regulations.

7. AUTHORITY

7.1 The Operator warrants that it has the power to enter into this Agreement and is authorised and has obtained all necessary approvals to enter into this Agreement on behalf of the included facilities and the responsible person warrants that he or she is authorised to sign this Agreement on behalf of the operator.

Signed on behalf of the Environment Agency	Signed by the responsible person on behalf of the Operator
	……
CCA Manager	Haydn. B Austin Site Manager brian.austin@dowcorning.com

SCHEDULE 1

RULES FOR THE OPERATION OF CLIMATE CHANGE AGREEMENTS

1. OBLIGATIONS OF A SECTOR ASSOCIATION AND OF AN OPERATOR

1.1 An Operator and a Sector Association must:

1.1.1 supply such information to the Administrator as the Administrator may request in connection with an agreement, by the date specified in the request;

1.1.2 notify the Administrator of any changes to its personal information within 20 working days of the change;

1.1.3 co-operate with any person appointed by the Administrator to undertake an independent audit of information provided to the Administrator; and

1.1.4 comply with the provisions of the charging scheme. If a charge remains unpaid after the date on which it is due, it may be recovered by the Administrator as a civil debt.

2. OBLIGATIONS OF A SECTOR ASSOCIATION

2.1 Following the setting of the sector commitment by the Secretary of State, or following a variation of the sector commitment under Rule 12.1, a Sector Association must distribute the sector commitment between each target unit under the umbrella agreement.

3. OBLIGATIONS OF AN OPERATOR

3.1 An Operator must:

3.1.1 notify the Administrator and the Sector Association within 20 working days of the date when the Operator has reason to believe that a facility covered by an underlying agreement may not be eligible for inclusion in the underlying agreement;

3.1.2 notify the Administrator within 20 working days of becoming aware of any structural change or other change set out in the technical annex which may give rise to a variation to the target in accordance with Rule 11;

3.1.3 notify the Administrator within 20 working days of discovering any error in the data provided to the Administrator for the base year;

3.1.4 provide to the Administrator on or before 1st May following the end of a target period such information as has been requested by the Administrator in order to determine whether progress towards meeting the target is, or is likely to be, taken to be satisfactory;

3.1.5 provide any other information requested at any time by the Administrator by the date specified in the request to enable the Administrator to determine that:

(a) the target has been met; or

(b) the Operator is complying with the terms of the underlying agreement;

3.1.6 notify the Administrator within 5 working days of the Operator or a facility in a target unit becoming a firm in difficulty, within the meaning of the European Commission Guidelines on State Aid for Rescuing and Restructuring Firms in Difficulty (2004/C 244/02);

3.1.7 provide the responsible person with full authority to carry out his or her functions, including authorisation to accept on behalf of the Operator the service of any notice; and

3.1.8 provide a current UK postal address and an operational email address of the responsible person for service of any notice.

3.2 If the Administrator enters into an underlying agreement before a target has been agreed, conditional upon the Operator providing sufficient information within a specified period in order to set the target for the target unit, the Operator must supply any data requested by the Administrator within the period specified by the Administrator on energy use and throughput of the target unit.

4. OPERATION OF THE REGISTER

4.1 Subject to Rules 4.2 and 4.3, to the extent possible, a Sector Association and an Operator must communicate with the Administrator using the Register.

4.2 Until a Sector Association and an Operator have been notified by the Administrator that the Operator is able to operate an account on its own behalf, an Operator must provide all information to the Sector Association to comply with the obligations of an Operator under an underlying agreement. The Sector Association must then operate the register on behalf of the Operator to provide the information to the Administrator.

4.3 After receiving notification from the Administrator that an Operator is able to operate an account on its own behalf, an Operator must notify the Administrator if it wishes to access its account directly to comply with its obligations under an underlying agreement. If an Operator makes such notification, the Operator must then operate the Register on its own behalf in order to comply with its obligations under an underlying agreement. If an Operator does not make such notification, the Operator must continue to provide all information to the Sector Association to comply with the obligations of an Operator under an underlying agreement and the Sector Association must continue to operate the register on behalf of the Operator to provide information to the Administrator.

5. CERTIFICATION OF A FACILITY

5.1 The Administrator must certify that a facility is covered by an agreement from the signing of an underlying agreement to the end of the certification period in which the underlying agreement is signed.

5.2 The Administrator must certify that a facility is covered by an agreement for any certification period other than the certification period in which the underlying agreement is signed, where it appears to the Administrator that progress made in the immediately preceding certification period, whether under the underlying agreement or under any previous underlying agreement, towards meeting targets set for the target unit is, or is likely to be, satisfactory.

5.3 For the purposes of this Rule, progress made in the immediately preceding certification period towards meeting targets set for the target unit is, or is likely to be satisfactory only where condition 1 and condition 2 are satisfied.

5.4 Condition 1 is that:

5.4.1 the target set for the target unit for the relevant target period is met, in accordance with Rule 6; or

5.4.2 if the target set for the target unit has not been met, the target unit has paid the buy-out fee in accordance with Rule 7.

5.5 Condition 2 is that obligations imposed under or by virtue of regulations made for the purpose of implementing the EU ETS Directive have been complied with in respect of each facility comprising the target unit.

5.6 If:

5.6.1 a target unit has failed to meet its target in accordance with Rule 6 and the Operator has failed to pay the buy-out fee in accordance with Rule 7;

5.6.2 obligations imposed under or by virtue of regulations made for the purpose of implementing the EU ETS Directive have not been complied with in respect of any facility in a target unit; or

5.6.3 the underlying agreement or umbrella agreement is terminated in accordance with Regulation 17(1)(2), or (3) or Regulation 18,

the Administrator must not certify that the facility or facilities comprising the target unit are covered by an agreement or, where a certificate has been issued, the Administrator must vary the certificate in accordance with paragraph 45 of Schedule 6.

5.7 If:

5.7.1 a facility is not or ceases to be eligible for inclusion in an agreement; or

5.7.2 a facility is excluded from an underlying agreement under Rule 10;

the Administrator must not certify that the facility is covered by an agreement or, where a certificate has been issued, the Administrator must vary the certificate in accordance with paragraph 45 of Schedule 6.

5.8 If the information supplied to the Administrator is insufficient to determine whether:

5.8.1 the target for the target period has been met; or

5.8.2 obligations imposed under or by virtue of regulations made for the purpose of implementing the EU ETS Directive have been complied with in respect of each facility comprising the target unit;

the Administrator may refuse to certify that the facility or facilities are covered by an agreement or, where a certificate has been issued, the Administrator may vary that certificate in accordance with paragraph 45 of Schedule 6.

5.9 Subject to Rule 5.10, if the Administrator does not certify a facility or varies a certificate that has been issued, the Administrator must serve a decision notice on the Sector Association and the Operator of the facility setting out the reasons for the decision, unless a notice of termination has already been served.

5.10 The Administrator is not required to serve a decision notice where a facility has been certified under this Rule and it is subsequently discovered that the target unit for the relevant target period had not been met because of an error in the information originally supplied to the Administrator provided that:

5.10.1 the Sector Association and the Operator have satisfied the Administrator that the error was unintentional; and

5.10.2 the Operator has paid any buy-out fee in accordance with Rule 7.

6. MEETING THE TARGET

6.1 A target unit meets its target for the purpose of Rule 5 if it meets or exceeds the percentage improvement in energy efficiency or carbon efficiency from the base year set out in Schedule 6 to the underlying agreement.

6.2 The Administrator must determine whether the target has been met in accordance with the principles, methodologies and procedures set out in the technical annex.

6.3 An Operator must notify the Administrator on or before 31st January in the year following the end of a target period of any circumstances which may give rise to an adjustment to the target for the previous target period, as set out in the technical annex.

6.4 If an Operator makes a notification under Rule 6.3, the Administrator may adjust the previous target in accordance with the principles, methodologies and calculations set out in the technical annex and must serve a notice on the Operator, setting out:

6.4.1 whether or not it had decided to vary the target; and

6.4.2 any revised target (as varied) for the target unit.

7. BUY-OUT MECHANISM

7.1 If the administrator finds that the target unit has failed to meet its targets:

7.1.1 at any time in the period beginning with 1st May in the year following the end of a target period and ending immediately before the first day of the next certification period; or

7.1.2 at any other time,

the obligation to make progress towards meeting targets may instead be satisfied by the payment to the administrator of a fee in accordance with Rule 7.2.

7.2 If Rule 7.1 applies, the administrator must serve a notice on the Operator containing the following information:

7.2.1 that the target unit has failed to meet its target;

7.2.2 the fee to be paid, calculated in accordance with Rule 7.3 or Rule 7.4;

7.2.3 the date by which the fee must be paid, determined in accordance with Rule 7.5 or Rule 7.6;

7.2.4 to whom the fee must be paid;

7.2.5 how the fee is to be paid; and

7.2.6 that failure to pay the fee in accordance with the notice will result in the issue of a variation certificate in accordance with paragraph 45 of Schedule 6.

7.3 If Rule 7.1.1 applies, the amount of the fee is:

£12 × (W – S)

where W in units of tCO_2 equivalent represents the amount by which the emissions for the target period exceed the target and S in units of tCO_2 equivalent represents any surplus.

7.4 If Rule 7.1.2 applies, the amount of the fee is:

£12 × W

where W in units of tCO_2 equivalent represents the amount by which the emissions for the target period exceed the target.

7.5 If Rule 7.1.1 applies, the fee must be paid on or before 1st July in the year in which the target unit is found to have failed to meet its targets.

7.6 If Rule 7.1.2 applies, the fee must be paid within 30 working days beginning with the date of the notice.

7.7 Payment of the fee is deemed to have been made when the person to whom the fee must be paid as specified in the notice receives full cleared funds.

7.8 For the purposes of calculating the buy-out fee under this Rule and for calculating the amount of any surplus, the Administrator must calculate the difference between the target for the target period and the actual performance achieved during the target period, where the target and the actual performance achieved are expressed in the same units, and convert any difference between the two into a quantity of carbon dioxide equivalent, expressed in units of tCO_2 equivalent, using the principles, methodologies and calculations set out in the technical annex.

8. SURPLUS

8.1 If a facility is excluded from a target unit, the Operator must determine how any surplus should be distributed between the facilities that have been excluded from the target unit and the facilities remaining in the target unit and must notify the Administrator of the redistribution within 20 working days of the facility being excluded from the target unit.

8.2 If an Operator fails to notify the Administrator of the redistribution in accordance with Rule 8.1 any surplus remains with the facilities remaining in the target unit.

8.3 If facilities join a target unit, any surplus attributable to those joining facilities may be used by the target unit as a whole.

9. VARIATION BY INCLUSION OF ADDITIONAL FACILITIES

9.1 A facility which is not already included in another umbrella agreement is eligible at any time to be considered for inclusion in an umbrella agreement where:

9.1.1 it is a facility within the meaning of paragraph 50 of Schedule 6; and

9.1.2 it is a facility undertaking the activities set out in Schedule 3 to an umbrella agreement.

9.2 A facility which is not already included in another underlying agreement is eligible at any time to be considered for inclusion in an underlying agreement where:

9.2.1 it is a facility within the meaning of paragraph 50 of Schedule 6;

9.2.2 it is a facility undertaking the activities set out in Schedule 3 to an umbrella agreement; and

9.2.3 it has the same operator as the operator of the underlying agreement under which it will be included, as set out in the technical annex.

9.3 A facility which is already included in another underlying agreement is eligible to be considered for inclusion in a different underlying agreement on or before 30 September 2013 where:

9.3.1 it is a facility within the meaning of paragraph 50 of Schedule 6;

9.3.2 it is a facility undertaking the activities set out in Schedule 3 to an umbrella agreement; and

9.3.3 it has the same operator as the operator of the underlying agreement under which it will be included, as set out in the technical annex.

9.4 A facility which is already included in another underlying agreement is eligible to be considered for inclusion in a different underlying agreement on or after 1 October 2013 where:

9.4.1 it is a facility within the meaning of paragraph 50 of Schedule 6;

9.4.2 it is a facility undertaking the activities set out in Schedule 3 to an umbrella agreement;

9.4.3 it has the same operator as the operator of the underlying agreement under which it will be included, as set out in the technical annex; and

9.4.4 there has been a change of operator of the facility.

9.5 An additional facility cannot be added to an umbrella agreement or an underlying agreement:

9.5.1 during the final target period under the umbrella agreement or the underlying agreement; or

9.5.2 during the last two months of a target period.

9.6 The administrator may vary the target of a target unit to take account of the inclusion of additional facilities following the principles, methodologies and calculations set out in the technical annex.

9.7 If a Sector Association wishes to add an additional facility to an umbrella agreement or an Operator wishes to add an additional facility to an underlying agreement the Sector Association or the Operator must notify the Administrator not less than two months before the commencement of the next target period setting out:

9.7.1 the name of the Operator of the facility;

9.7.2 the address of the facility;

9.7.3 a description of the facility;

9.7.4 such information as will enable the Administrator to reach a decision on establishing eligibility of the facility, as requested by the Administrator; and

9.7.5 such information as will enable the Administrator to determine the revised target for the target unit, as requested by the Administrator.

9.8 If the Administrator receives a notification under Rule 9.4, the Administrator must serve a notice on the Operator, copied to the Sector Association:

9.8.1 consenting to include the additional facility in an umbrella agreement or an underlying agreement and setting out whether or not it has decided to vary the target, and if so, the revised target (as varied) for the target unit;

9.8.2 refusing consent to include the facility in an umbrella agreement or an underlying agreement, giving reasons for the decision; or

9.8.3 requesting such further information as is required in order to establish eligibility of the facility or reach a decision on the target for the facility.

10. VARIATION BY EXCLUSION OF FACILITIES

10.1 If a Sector Association or an Operator wishes to exclude a facility, or part of it, from an umbrella agreement or an underlying agreement, it must notify the Administrator of the proposed exclusion, setting out:

10.1.1 the name of the Operator of the facility;

10.1.2 the facility number, or a description of the part that is to be excluded; and

10.1.3 the reason for the exclusion.

10.2 If:

10.2.1 a Sector Association or an Operator has notified the Administrator that it wishes to exclude a facility under Rule 10.1; or

10.2.2 the Administrator has terminated an agreement so far as it relates to an individual facility under Regulation 17(4),

the Administrator may vary the target to take account of the exclusion or termination following the principles, methodologies and calculations set out in the technical annex, and may request such information from the Sector Association or the Operator as it requires in order to determine the revised target.

10.3 If the Administrator decides to vary or not to vary the target under Rule 10.2, it must serve a notice on the Operator, copied to the Sector Association, setting out whether or not it has decided to vary the target, and if so the revised target (as varied) for the target unit.

11. VARIATION OF TARGETS IN OTHER CIRCUMSTANCES

11.1 The Administrator may vary the target to take account of:

11.1.1 any structural changes or other changes to the target unit which the Operator must notify to the Administrator under Rule 3.1.2;

11.1.2 any errors in the data provided to the Administrator for the base year; or

11.1.3 in respect of a target unit which has a Novem ratio target, the removal of a product produced in the target period which was produced in the base year.

following the principles, methodologies and calculations set out in the technical annex.

11.2 The Administrator may request any information of a Sector Association or an Operator as it requires in order to determine the revised target under Rule 11.1.

11.3 If the Administrator decides to vary or not to vary a target under Rule 11.1, it must serve a notice on the Operator, copied to the Sector Association, setting out:

11.3.1 whether or not it has decided to vary the target; and

11.3.2 any revised target (as varied) for the target unit.

12. VARIATION OF SECTOR COMMITMENT FOLLOWING A REVIEW

12.1 The sector commitment may be reviewed by the Secretary of State during 2016 for the target periods from 1 January 2017 to 31 December 2018 and from 1 January 2019 to 31 December 2020.

12.2 If the Sector Association and the Secretary of State agree on a variation to the sector commitment following a review, the Secretary of State may issue a direction to the Administrator that the sector commitment must be varied and then the Administrator must serve a variation notice on the Sector Association.

12.3 The variation notice must state:

12.3.1 the agreed variation; and

12.3.2 the date from which the agreed variation will take effect.

12.4 The Sector Association must, within 20 working days of receipt of a variation notice, serve notice on the Administrator setting out the proposed distribution of the revised sector commitment between each target unit under the umbrella agreement.

12.5 The Administrator must:

12.5.1 agree to the proposed distribution and vary the targets of each target unit accordingly;

12.5.2 request further information in relation to the proposed distribution; or

12.5.3 refuse the proposed distribution and propose an alternative distribution, giving reasons for the decision.

12.6 If the Sector Association and the Secretary of State fail to agree on a variation of the sector commitment, either party may refer any dispute as to matters of fact to an adjudicator for adjudication, in accordance with the procedure set out in guidance published by the Secretary of State.

12.7 The adjudicator must, on the basis of representations provided to the adjudicator and any additional information considered necessary by the adjudicator, make a finding on the disputed questions of fact and notify the parties of that finding.

12.8 The adjudicator's finding on a disputed question of fact shall be binding on the parties but it shall be for the Secretary of State and the Sector Association to agree, in the light of that finding, what variations to the sector commitment are required.

12.9 If the Secretary of State and the Sector Association fail to agree on the variation to the sector commitment, the Administrator may terminate the agreement in accordance with Regulation 18.

13. RIGHT OF APPEAL

13.1 If the Administrator:

13.1.1 decides not to certify a facility or to vary a certificate which has been issued;

13.1.2 serves a notice imposing a buy-out fee under Rule 7 upon determining that a target unit has failed to meet its target; or

13.1.3 decides to vary or not to vary the target for a target unit,

the Operator may appeal to the Tribunal against the decision.

13.2 In respect of an Operator which enters into an agreement after 1 April 2013, the Operator may appeal to the Tribunal against the target that has been set for the target unit by the Administrator.

13.3 For the purposes of Rule 13.2, the date on which notice of the decision is deemed to have been sent to the Operator is the later of the date the agreement is entered into or the date the Administrator sends notice to the Operator of the target for the target unit.

13.4 The grounds on which an Operator may appeal under Rule 13.1 and 13.2 are:

13.4.1 that the decision was based on an error of fact;

13.4.2 that the decision was wrong in law;

13.4.3 that the decision was unreasonable;

13.4.4 any other reason.

13.5 The bringing of an appeal suspends the effect of the decision pending final determination by the Tribunal of the appeal or its withdrawal.

13.6 On determining an appeal under these Rules the Tribunal must either:

13.6.1 affirm the decision;

13.6.2 quash the decision; or

13.6.3 vary the decision.

14. RECORDS AND INFORMATION

14.1 A Sector Association and an Operator must retain records of all information required to be supplied to the Administrator under these Rules.

14.2 In particular, an Operator must retain:

14.2.1 sufficient records to allow the Administrator to verify whether a target unit has met its target, including sufficient records to allow the accurate verification of throughput and annual consumption of energy of a target unit; and

14.2.2 records of energy saving actions and measures implemented during each target period.

14.3 A Sector Association and an Operator must make all records which it is required to retain under these Rules available for inspection by the Administrator or a person appointed by the Administrator and must provide copies of such records in response to a request by the date specified in the request.

14.4 All records required to be retained under these Rules must be retained throughout the duration of an agreement and for a period of four years following the termination of an agreement.

15. PUBLICATION AND DISCLOSURE OF INFORMATION

15.1 The Administrator must publish such information as required under the Regulations.

15.2 In respect of the disclosure of information other than disclosure of information required to be published under the Regulations, information supplied by a Sector Association or an Operator to the Administrator or the Secretary of State, to any agent of the Administrator or the Secretary of State, or to any person appointed by the Administrator or Secretary of State to carry out an independent audit, may be disclosed without the consent of the Sector Association or Operator, where such disclosure is:

15.2.1 by the Administrator to the Secretary of State, for any purpose connected with the functions of the Secretary of State;

15.2.2 by the Secretary of State to the Administrator, for any purpose connected with the functions of the Administrator;

15.2.3 to a relevant authority, for any purpose connected with the functions of the relevant authority;

15.2.4 to any person appointed by the Administrator or the Secretary of State to carry out an independent audit;

15.2.5 to an adjudicator appointed under these Rules;

15.2.6 to any person appointed by the Administrator or the Secretary of State to act as agent, consultant, adviser or contractor to the Administrator or the Secretary of State, in connection with the functions of the Administrator of the Secretary of State;

15.2.7 necessary for the purpose of or in connection with any legal proceedings, including the obtaining of legal advice;

15.2.8 required to comply with any Act of Parliament or subordinate legislation made under an Act of Parliament, including requests made under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004; or

15.2.9 required to meet any obligation to the European Union.

15.3 A relevant authority referred to in this Rule means:

15.3.1 either House of Parliament including any committee of either or both Houses;

15.3.2 any Government department;

15.3.3 the European Commission;

15.3.4 the Committee on Climate Change;

15.3.5 the Commissioners of Her Majesty's Revenue and Customs;

15.3.6 a person or body prescribed by or appointed under Part I of the Environmental Protection Act 1990 or regulations made under section 2

of the Pollution Prevention and Control Act 1999 or any corresponding legislation for Northern Ireland;

15.3.7 any regulator appointed under section 54 of the Competition Act 1998; or

15.3.8 any other public body, regulatory agency or government advisory body, where in the absolute discretion of the Administrator or the Secretary of State, as appropriate, the Administrator or Secretary of State considers that it would be obliged to disclose such information in response to a request for information under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004, if such a request were made.

16. COLLECTION OF CHARGES

16.1 A Sector Association may request the consent of the Administrator to collect charges due from Operators to the Administrator in respect of facilities under the charging scheme.

16.2 If a Sector Association wishes to collect charges due from an Operator to the Administrator under the charging scheme, the Sector Association may serve a notice in writing on the Administrator by the last working day in February in the calendar year in which the charges fall due.

16.3 A notice served under Rule 16.2 must specify the facilities in respect of which the Sector Association intends to collect charges, being not fewer than 50% of the facilities covered by an umbrella agreement.

16.4 Following receipt of the notice, the Administrator must:

16.4.1 consent to the Sector Association collecting charges; or

16.4.2 refuse consent to the Sector Association collecting charges, giving reasons for the decision.

16.5 If the Administrator consents to the Sector Association collecting charges the Sector Association must:

16.5.1 itemise charges separately in any invoices that it issues in respect of charges;

16.5.2 collect and remit all charges collected to the Administrator without deduction or set off by the last working day in September in each year;

16.5.3 prepare an annual report to the Administrator by the last working day in October in the year in which it has collected charges setting out which Operators it has collected charges from and which Operators have failed to pay charges due to the Sector Association.

16.6 A Sector Association must not actively pursue any outstanding charges after the last working day in September in any year in which they fall due. If a Sector

Association receives charges after this date the Sector Association must accept the payment and remit this to the Environment Agency along with information identifying the Operator making the payment.

16.7 If a Sector Association fails to comply with any of its obligations under this Rule the Administrator may serve a notice on the Sector Association that consent to the Sector Association continuing to collect charges is withdrawn at the expiry of 20 working days from the date of the notice.

17. SERVICE OF NOTICES

17.1 Any notice served under these Rules must be in writing and may be served by sending it by post or electronically.

17.2 The address for the service of all notices on the Administrator is:

Postal: Environment Agency
Lutra House
Dodd Way, Off Seedlee Road
Walton Summit, Bamber Bridge,
Preston, Lancs
PR5 8BCX

Electronic: CCA-operations@environment-agency.gov.uk

17.3 The address for the service of all notices on the Sector Association is the address of the person set out in Schedule 2 to the umbrella agreement.

17.4 The address for the service of all notices on the Operator is the address of the responsible person.

SCHEDULE 2

THE OPERATOR

Dow Corning Limited

Whose address for service of all notices under this Agreement is
By post:
Cardiff Road
Barry
Vale of Glamorgan
CF63 2YL
Wales

Administrative contact
MR. Wayne Bajjada

Electronically:
wayne.bajjada@dowcorning.com

SCHEDULE 3

THE SECTOR ASSOCIATION

CIABATA Limited

Whose address for service of all notices under this Agreement is
By post:
Chemical Industries Association
Kings Buildings, Smith Square
London
SW1P 3JJ
England

Sector Contact
MR. Nick Sturgeon

Electronically:
sturgeonn@cia.org.uk

THE UMBRELLA AGREEMENT

The Agreement dated 01 Apr 2013 made between the Administrator and the Sector Association.

SCHEDULE 4

ACTIVITIES UNDERTAKEN BY A FACILITY FALLING WITHIN THE SECTOR

A facility belongs to the chemical sector if it is a facility which is used for:
(a) manufacturing organic or inorganic chemicals, chemical fertilisers, plant health products, biocides, pharmaceutical products or explosives;
(b) a manufacturing activity involving carbon disulphide or ammonia (but not ammonia used as a refrigerant);
(c) an activity involving chemical processing;
(d) it produces potassium chloride from Sylvinite (potassium chloride) ore containing a mixture of potassium chloride, sodium chloride, clay and anhydrite, by sub-surface mining followed by separation and purification from the other constituents through a process of crushing/grinding, froth flotation and depending on the specific product, drying and compacting, followed by grading prior to dispatch; high grade soluble product is also obtained by the recrystallisation of KCl from supersaturated brine: or it produces potassium, sodium, magnesium and/or calcium salts from Polyhalite ore by a process of crushing/grinding, leaching, acid reaction, precipitation, evaporation, crystallisation and drying; or
(e) any other activity of a description which CIABATA and the Secretary of State have agreed is suitable for inclusion in the chemical sector.

SCHEDULE 5

FACILITIES TO WHICH THIS AGREEMENT APPLIES

Facility Identifier	Site Name & Address	EU ETS identification (NAP number)
CIA/F00223	Dow Corning Limited Cardiff Road, Barry, Vale of Glamorgan, CF63 2YL, Wales	ETSP3106EA, GB-EA-ETCO2-0184

SCHEDULE 6

TARGET UNIT TARGET

The primary energy consumption of the target unit shall be given in the following units:

GJ

The primary energy consumption of the target unit in the agreed base year was (number of units):

224,026.92

The targets are Novem in Energy:

TU Identifier	Target period	Target (percentage reduction from base year)
CIA/T00209	1 January 2013 to 31 December 2014	7.8%
	1 January 2015 to 31 December 2016	10.7%

	1 January 2017 to 31 December 2018	10.8%
	1 January 2019 to 31 December 2020	12.4%

SCHEDULE 7

VALUE OF FINANCIAL PENALTY

134,549 GBP
See technical guidance.

Appendix G

IPPC drawing B1.3.1 – highlighting new air release points

Elastomers
Fluids
Basics Area 1
Basics Area 2
Genesis Area 4
Genesis Area 3
Speciality Polymeres
Basics Area 5
Basics Storage Area
Pumping Station
W1
W2
REED BEDS
CAR PARK
COMPOUND
CONTRACTORS PORTACABINS
LECKWITH ENGINEERING CONTRACTOR COMPOUND
SOCIAL CLUB
CAR PARK W504
VISITORS CAR PARK
CANTEEN W110
W601 ENGINEERING COMPLEX
W502 WEIGHBRIDGE
F/W STORAGE TANKS
W914 WEIGH BRIDGE
W602 WELDING BAY
W603 WASHDOWN FACILITY
W911 COOLING TOWERS
W910 CONTROL ROOM
W916 WAREHOUSE
W209 BOILER HOUSE
W204 WAREHOUSE & STORES
W115 RUBBERS UNIT
W204 MILL ROOM
W203 F/LIFT GARAGE
W274 FITTING SHOP
PUMP HOUSE
W304 WHITE HOUSE
TANKER PARKING
B.E.R.T GARAGE
W303 WAREHOUSE
TANK FARM
W403 WAREHOUSE
W404 TANK FARM
W405 VLVF
W410 WAREHOUSE
NITROGEN PLANT
W337 FIREWATER RESERVOIR
W423 SILICONE STORE
W809 SPILLPOND
W804 A POND
SOLVENT SEPARATOR
E TANKS
CLARIFIER
COMPOUND
W821 CONTROL ROOM
W920 HYDROLISYS
W930 FBR
W931 MeCl
W941 DISTILLATION
W948 HOT OIL
W949 ERU
W943 E/I
AREA 52 FSU
INTERCEPTOR PIT
HYDROGEN AREA
NITROGEN PLANT
NATIONAL POWER LEASED LAND
EFFLUENT STORAGE TANK
BIO REACTION TANK
SETTLEMENT TANK
CIVIL
SCAFFOLD
W953 WASTE MANAGEMENT AREA
E/I
A1
A2
A3
A8/A9
A10
A11
A12
A13
A14
A15
A16
A17
A18
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A109
A110
A111/A120
A112
A113
A114
A115
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A122
A123
A124

Appendix H

Appendix 4 – The Main Activities – Index showing revisions and change control log

Appendix H – Main Activities Appendix 4 Contents and Change History

Appendix 4

Contents

Note: Equipment volumes and detailed Process Flow Diagrams are claimed confidential material and are located in Part 5 of the Application

Change control log

Section	Revision no	Reason for revision	Date
9	1	Updated information on Alternative modes of opertation	Nov 2005
2	1	MCDS added	Jan 2006
2	2	Information on MCDS updated	Mar 2009
10	1	Planned installation of Caustic scrubber unit on ERU	Oct 2009
9	2	V004 – W806 Tertiary scrubber installation – new vent point - A115	Nov 2009
10	2	Updated information on installation of Caustic scrubber unit on ERU	Apr 2010
15	1	Planned installation of Hot oil unit in W115 gum rig (Letter 31st March 2010)	June 2010
5	1	V005 – Installation of second separator on W922 – new vent point – A116	Nov 2010
6	1	V005 – Installation of Aqueous HCl offloading – new vent point A117	Nov 2010
15	2	Updated information on installation of Hot oil unit on W115 gum rig	Jan 2011
11	1	Removal of Medusa, A114 added as per V003 and updated details due to installation of new water scrubber on W1205 spent bed quench	Feb 2011
14	1	V006 – Ethylene replacement project phase 1 - additional equipment and mode of operation	Dec 2011
16	1	V006 – Construction of new process W405 - VLVF	Dec 2011
14	2	V008 – 714 cold trap installed W308 decommissioned W309 ethylene removal W307 update section for redundant processes	2016 HLG
13	1	V008 - W414 tanker bay vent installed	2016 HLG
17	1	V008 - W342 cooling tower installed	2015 HLG
2	3	V008 - W714 new reactor installed W930 catalyst charging unit	2016 HLG
9	3	V008 - WWT scrubber replacement WWT removal of tertiary scrubber	2016 HLG
1	1	V008 - W424 new bucket elevator	2016 HLG
10	3	V008 - W949 reduced residence time on ERU	2016

			HLG
15	3	V008 - W204/5 increased production W115 removal of catalyst unit	2016 HLG
11	2	V008 - W1205 removal of 400 quencher	2016 HLG
11	2	V010 – 1307 decommissioning – removal of A	2020 JMS
16	3	V010 – VLVF expansion – new vents A123 and A124	2020 JMS
17	2	V010 – TOC at W1	2020 JMS
15	4	V010 – Update due to W205 extension	2020 JMS
3	1	V010 – Update due to change of fridge unit	2020 JMS

Appendix I

ISO14001 certificate, ODMS Overview and LRQA letter

bsi.

By Royal Charter

Certificate of Registration

ENVIRONMENTAL MANAGEMENT SYSTEM - ISO 14001:2015

This is to certify that:

Dow Corning Corporation
2200 West Salzburg Road
Midland
Michigan
48686
USA

Holds Certificate No: **EMS 96453**

and operates an Environmental Management System which complies with the requirements of ISO 14001:2015 for the following scope:

The Environmental Management System of Dow Corning, for management of environmental risks associated with all global business processes for the marketing, developing, manufacturing, and supply of silicon-based and complementary products and services.

For and on behalf of BSI:

Carlos Pitanga, SVP, System Certification and Compliance

Original Registration Date: 2005-10-10
Latest Revision Date: 2017-11-20

Effective Date: 2017-11-29
Expiry Date: 2020-11-28

...making excellence a habit.™

ODMS (Operating Discipline Mgmt. System) Overview

01.02 Introduction, Scope, and Applicability

What is Operating Discipline?

The Operating Discipline Management System (ODMS) is the company's comprehensive corporate management system that integrates the management systems for Manufacturing, Quality, Environmental, Health and Safety.

The ODMS contains numbered elements describing Dow policies, requirements, and processes. The ODMS will link to global procedures and templates that are managed by functional/expertise centers. The document structure of the ODMS is described in further detail in section 04.00.

Scope and Applicability

Dow policies and requirements as well as current ISO 9001, *Automotive Quality System requirement*s (TS/ISO 16949), Good Manufacturing Practices, ISO 14001 and Responsible Care® requirements are included in the ODMS.

The following table documents the general applicability of each element of the ODMS to organizations within The Dow Chemical Company.

The policies, requirements and processes contained in each of these elements must be followed by the people within these organizations. Section 5.0 (Common Management System) requirements apply to any activity intended to achieve compliance with this management system.

Additional details for applicability of each individual requirement are available.

An Applicability Tool is available that will guide each organization to determine exactly which ODMS requirements apply.

Note: *ODMS is now aligned with ISO 9001:2015. Automotive Quality System requirements (ISO/TS 16949:2009) are not included at this time because this standard remains in alignment with ISO 9001:2008.*

Organization	Applicable Elements of ODMS
Operations (Manufacturing & Engineering and all of Logistics)	All elements, excluding requirements in *italics.*
The entire company, including subsidiary and joint venture companies over which Dow has management control (Note: this supports Dow certification to Responsible Care)	Sections 1-6 for EH&S application, (Excluding requirements in *italics*). • A list of the minimum EH&S requirements that apply to ALL ORGANIZATIONS is available. • A list of the minimum EH&S requirements that apply to EVERY DOW EMPLOYEE is available. • Other EH&S requirements may apply depending upon your organizations activities, roles, equipment, function and other factors.
The entire company, including subsidiary and joint venture companies over which Dow has management control	Quality system components in Sections 1 – 8, will apply to all organizations where product quality or service quality are impacted.
Dow organizations certified to ISO-9001	Operations: all elements Portions of related functions supporting certifications: applicable elements 1-5 , 7, excluding requirements in *italics.*
Dow organizations certified to ISO-14001	Operations: all elements,

	Portions of related functions supporting certifications: applicable elements 1-6
Dow organizations required to meet Good Manufacturing Practices.	All cGMP Level 3 Global Standards in Section 1-8.

Selected elements apply to any other organization which endorses and chooses to implement those selected elements based upon the organization's own policies.

02.00 References

External References

The following are key external references upon which the ODMS is based (and fully meets):

Reference	Location/ How to Access
Active Pharmaceutical Ingredients (Q7A) cGMP Requirements	http://ehs.intranet.dow.com/virtual/documents/EHS/public_ehsap/GMP/GMP Guidance/Approved/Q7A API GMPs/Q7A GMP.PDF
ISO-9001:2015 Quality Management System International Organization for Standardization (ISO)	http://www.iso.ch/ http://qualitysys.intranet.dow.com/ISO/Publications.asp
ISO-14001:2015 Environmental Standard - American National Standard ANSI/ISO and International Organization for Standardization (ISO)	http://www.ansi.org/ http://www.iso.ch/ http://qualitysys.intranet.dow.com/ISO/Publications.asp http://ehs.intranet.dow.com/library/standards/iso/Tools.htm
IATF 16949:2016, Quality Management System for automotive production and relevant service part organizations	http://www.aiag.org/ http://www.iatfglobaloversight.org/oem-requirements/customer-specific-requirements/ http://qualitysys.intranet.dow.com/ISO_Publication.htm
RC101.04 Responsible Care* RCMS Technical Specification Version 04 (May, 2013)	http://responsiblecare.americanchemistry.com/
Joint IPEC - PQG Good Manufacturing Practices Guide for Pharmaceutical Excipients 2006	http://ehs.intranet.dow.com/virtual/documents/EHS/public_ehsap/GMP/GMP Guidance/Approved/IPEC Excipient GMPs/ipec pqg gmp guide.pdf
NSF/IPEC/ANSI 363-2014	file://usnt17/public_ehsap/GMP/GMP Guidance/Approved/IPEC Excipient GMPs/ASNI 363.pdf
Indirect Food Additive GMP Guidelines, Dow Guidance	http://ehs.intranet.dow.com/virtual/documents/EHS/public_ehsap/GMP/GMP Guidance/Approved/Indirect GMPs/Indirect Food Additive GMP Guidelines.doc
Cosmetic Ingredients GMP	http://odms.intranet.dow.com/ME/ODMS/07_quality/cgmp/CI/ME_ODMS_07_cGMP_CI.asp

Verification of Compliance to External Standards

A document audit report is conducted annually by Dow's external ISO Registrar to evaluate compliance to the external management system standards that Dow subscribes to. The latest report,is presented in the following table:

External Standard	Document-Audit Report
ISO 9001:2015 IATF 16949:2016 ISO 14001:2015 OHSAS 18001:2007	2019 ODMS Document Audit - DOW RESTRICTED 2019 Compliance Letter for External Distribution
Responsible Care Management System, RCMS 101.04: April 2018	RCMS:2018 Certificate (Reverse Side)

04.00 L1 ODMS System Policy & Requirements

Policy

Dow's management system must be documented, implemented and maintained to:

- ensure compliance
- achieve objectives and targets
- improve performance
- achieve business and company success

A. Requirements

1. Executive Owners must
    a. Establish the ODMS.
    b. Approve:
        i. 1.01 Table of Contents
        ii. 1.02 Introduction and Scope
        iii. 1.03 Quality Introduction and Scope.
        iv. 1.04 Scope and Application
        v. 1.05 Ownership
        vi. 1.10 Policy Summary
    c. Assign owners for all sections and elements of the ODMS.
2. Section/Element Owners must appoint the Global ODMS Leader.
3. The Global ODMS Leader must:
    a. Define and fill the roles necessary to manage and deploy the ODMS.
    b. Ensure the ODMS is current, accessible, and effective.
4. For each assigned element, Section/Element Owners (or designees) must:
    a. Appoint a Global Expert Partner (GEP) to manage the technical content..
    b. Review and approve the content of L1, L2, L3S and designated L3 documents.
5. For each assigned element, Global Expert Partners must:
    a. Establish and lead a Subject Matter Review Team (SMART) to effectively manage the technical content.
    b. Review and approve the content of all L3 documents not designated as needing owner approval.

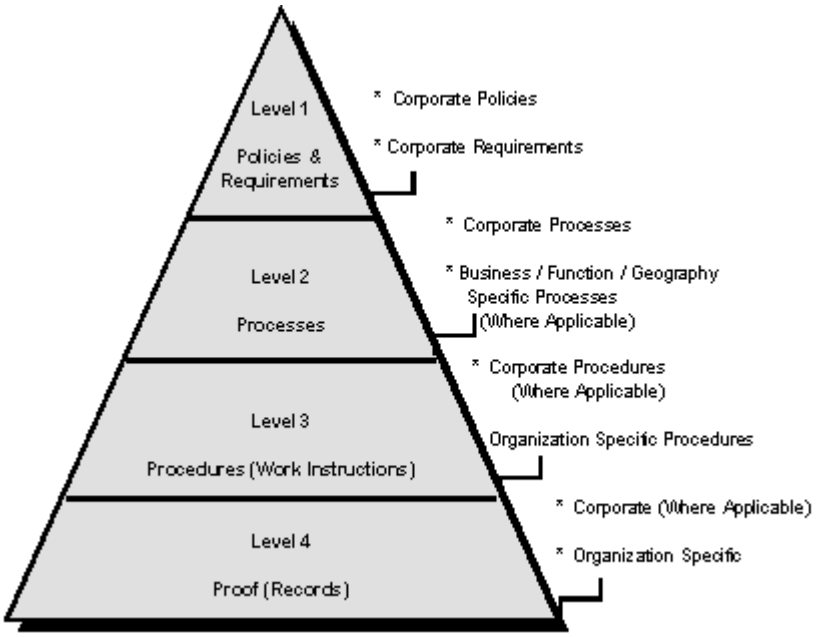
04.00 L2(b) ODMS System Process - Document Structure

Introduction

This process document outlines the corporate document structure of the Operating Discipline Management System (ODMS). Refer to 4.0 L2a ODMS System - Responsibilities for roles, responsibilities, review and approval descriptions.

ODMS Document System Model

The following information summarizes the ODMS document system model :



06.00 Responsible Care® (EH&S)

Dow's EH&S Policy:

At Dow, protecting people and the environment will be part of everything we do and every decision we make. Each employee has a responsibility in ensuring that our products and operations meet applicable government or Dow standards, whichever is more stringent.

Our goal is to eliminate all injuries, prevent adverse environmental and health impacts, reduce wastes and emissions and promote resource conservation at every stage of the life cycle of our products. We will report our progress and be responsive to the public.

06.00 Responsible Care (EH&S) System
6.01 Community Awareness and Outreach
6.02 Distribution and Logistics
6.03 EH&S Engineering Design and Control
6.04 Emergency Preparedness and Response
6.05 Employee Health and Safety
6.06 External Manufacturing
6.07 Pollution Prevention
6.08 Process Safety
6.09 Product Stewardship
6.10 Security

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USA

December 10, 2019

The Dow Chemical Company
Julie Wright, Global Quality System Work Process Leader
Midland, MI

Re: The Dow Chemical Company's Operating Management System Discipline System

This letter is written in support of The Dow Chemical Company's efforts to externally communicate its commitment to Occupational Health and Safety, Environmental and Quality Management Systems.

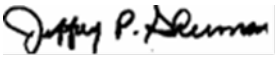
On November 8 and December 4, 2019 LRQA (Lloyd's Register Quality Assurance Inc) carried out assessments of Dow's ODMS documentation. This was undertaken by evaluating how the requirements ISO 9001:2015, ISO 14001:2015, IATF 16949:2016, and OHSAS 18001:2007 have been addressed. It was concluded that the ODMS manuals had incorporated and also satisfied the requirements of the listed standards and provided direction for conformance at the operational level.

Given LRQA's understanding of Dow's ODMS system; its application to the various Dow business units, which has been evaluated by LRQA assessments and resulting certifications, it is reasonable to anticipate Dow's commitment and plans for certification goals will be achieved within the organization's planned implementation.

Feel free to show this letter to any party interested in your Safety, Environmental and Quality management systems, and your status and plans for certification.

Please contact me if you have any questions.

Regards,



Jeffrey Sherman
Aerospace Technical Manager - Americas
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Houston, TX 77077 USA
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Appendix J

Request for confidentiality

Appenix J - Request for confidentiality

Please can we request confidentiality for the contents of Appendix E1 and E2.

Dow has disclosure guidelines which aim to protect the company's position with respect to intellectual property and also commercially sensitive information. We therefore need to retain non public disclosure of certain key aspects of our operations from our competitors.
The operating details involved in the VLVF process are commercially sensitive. The detailed analysis and details of plant operation included in the TOC assessment are also commercially sensitive.