URS

Environmental Permit Variation Supporting Information

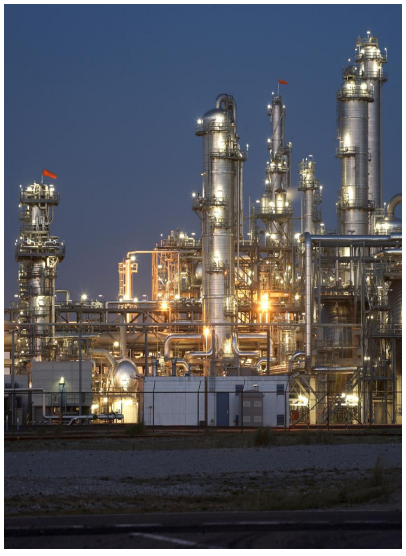
Final Report

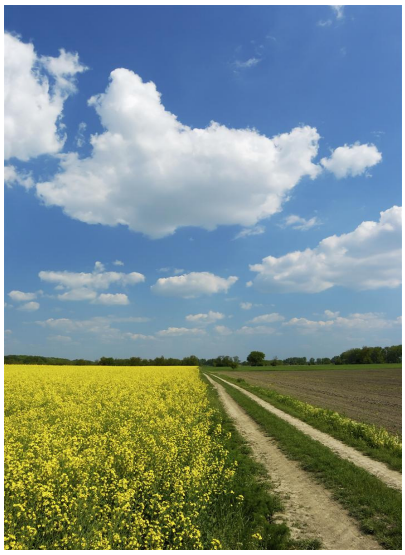
28th November 2014

47071569 - LERP001

Prepared for:
Cabot Carbon Limited

UNITED KINGDOM & IRELAND





REVISION SCHEDULE					
Rev	**Date**	**Details**	**Prepared by**	**Reviewed by**	**Approved by**
1	28th November 2014	Final Report	Mark Webb Associate	Bob Hudson Technical Director	Mark Webb Associate

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Unless otherwise stated in this Report, the assessments made assume that the sites and facilities will continue to be used for their current purpose without significant changes.

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1 NON-TECHNICAL SUMMARY

This report represents an application to Natural Resources Wales (NRW) for a Standard Variation under the Environmental Permitting (England & Wales) Regulations 2010 (EPR), as amended, to Environmental Permit number BU2110IS (dated 31st March 2006).

Cabot Carbon Limited operates a fumed amorphous silica (silicon dioxide) plant at Barry, South Wales. The application for variation of the Environmental Permit concerns the silica treatment plant, which is listed as a directly associated activity to the main production process and is a small operation when compared to the installation overall.

This variation incorporates an increase in the nameplate capacity of the treated silica plant from the existing 1,700 metric tonnes (MT) per annum to 3,500 metric tonnes per year.

The proposed capacity increase is to be introduced in a phased manner with Phase 1 of the project increasing capacity to 2,200MT in 2015 and Phase 2 increasing capacity to 3,500MT by 2018. This variation covers both phases of the project.

The proposed changes relate to an increase in throughput of the treated silica process, which is to be achieved by a combination of technology conversion, minor plant improvements, operational adjustments and extended operating hours. Additional [redacted] storage is also to be provided to handle the increased rate of production from the reaction plant, and this additional equipment is identical to that already installed on site.

Additional emissions from the process will be released to atmosphere through a new emission point A24.

Additional emissions abatement equipment is proposed to control emissions of particulate, formaldehyde and siloxanes generated within the process, which will consist of the following techniques.

- Particulate abatement is in the form of bag filters, which are designed to control discharges of particulates to less than 10mg/m³ and are therefore considered to represent BAT for the installation.
- Formaldehyde and siloxanes abatement is provided in the form of water scrubbing, which is applied to the air extracted from the reactor surge tank and again is considered BAT for the process.
- [redacted]

The existing finished product silo (reference TK20) will be replaced by a the new spilt silo for finished product storage (reference TK-20 / TK-120) which will be of equivalent overall capacity to the existing silo. The replacement silo will be installed with a particulate abatement filter identical to the existing abatement filtration system on TK20 (filter reference TF47). The emissions to atmosphere from this emission point are not anticipated to change as a result of the replacement of the silo.

The emissions associated with the plant upgrade have been assessed using the EPR H1 impact assessment tool and also additional dispersion modelling. These assessments have demonstrated that the proposed plant changes are not predicted to lead to any significant environmental impacts.

No changes to other areas of the installation are proposed, except as submitted with this variation application.

Emission points to water, management techniques, waste handling, recovery and disposal, accident management, decommissioning and installation issues remain unchanged under this variation application.

The proposed changes will all be within the existing installation boundary so no additional site condition (soil and groundwater sampling and analysis) information is required.

In line with Environmental Permitting guidance, the proposed changes are considered to represent a Standard Variation to the permitted operations, as practical tests have shown that there will be no significant effects on human beings or the environment.

It is considered that given the nature of the processes and the substances handled at the site and by managing environmental responsibilities in a systematic and effective way, the variation to operations at the installation do not give rise to any significant environmental concerns.

It should be noted that the compound ‘silica’ which is mentioned throughout this report shall be taken to mean ‘fumed amorphous silica’.

2 INTRODUCTION

Cabot Carbon Limited (Cabot) operates an installation for the production of fumed amorphous silica (silicon dioxide) at its site located at Sully Moors Road, Barry (the "site"). These activities are regulated under the Environmental Permitting Regulations 2010, as amended, and the site holds an Environmental Permit (Permit Number BU2110IS).

2.1 Applicant Details

Applicant

Cabot Carbon Limited

Installation Name

Barry Silicon Based Manufacturing Installation

Installation Address
Cabot Carbon Limited,
Sully Moors Road
Sully
Vale of Glamorgan
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Registered Office Address

Cabot Carbon Limited
Sully Moors Road
Vale of Glamorgan
CF64 5RP

Company Registration Number

462857

2.2 Reason for the Application

This report represents an application to Natural Resources Wales (NRW) for a Standard Variation under the Environmental Permitting Regulations (England & Wales) Regulations 2010 (EPR), as amended, to the Cabot Carbon Limited (Cabot) Environmental Permit number BU2110IS (dated 31st March 2006) in respect of an upgrade project known as the Barry Treated Silica Expansion Project (the project).

The project incorporates a proposed change in operations with some minor supporting development at the Barry site to increase the throughput of the existing treated silica process.

3 THE INSTALLATION

3.1 Scheduled Activities

The existing Environmental Permit covers the prescribed activities and directly associated activities as presented in Table 3.1.

TABLE 3.1 : ACTIVITIES CURRENTLY AUTHORISED UNDER THE PERMIT

Activity listed in Schedule 1 of the Environmental Permitting Regulations	Description of the Specified Activity	Limits of Specified Activity
Section 4.2 A (1) (a) (v)	Producing inorganic chemicals such as non-metals, metal oxides, metal carbonyls or other inorganic compounds such as calcium carbide, silicon, silicon carbide, titanium dioxide	'A' train chlorosilane burner and associated plant. 'B' train chlorosilane burner and associated plant. This definition covers the entire fumed silica production plant, including but not limited to, receipt and storage of raw materials, chlorosilane vaporisers, calciners, chlorine abatement plant, acid recovery plant, refrigeration plant, cooling system, utilities, all storage, warehousing and packaging and despatch of finished products, and emission of non-combustion gases.
Section 1.2 A (1) (b)	Reforming natural gas	Natural gas steam reformer for hydrogen production. Receipt of fuel to production and storage of hydrogen, associated cooling system, steam recovery and emission of combustion gases.
Section 5.3 A (1)(c)(ii)	Disposal of non-hazardous waste in a facility with a capacity of more than 50 tonnes per day by physico-chemical treatment.	Katalco (Hydecat) effluent treatment unit. Effluent (process wastewater) pre-treatment plant.
Directly Associated Activity	Treated silica production	Treatment of fumed silica with silicone (polydimethylsiloxane), product storage and bagging, and emissions from the process.
Directly Associated Activity	Gas fired steam generation plant, <20MWth input	Production of steam for site and emission of combustion gases.
Directly Associated Activity	Storage tank farm	Storage of caustic (NaOH), hydrochloric acid (HCl) and waste water.

TABLE 3.1 : ACTIVITIES CURRENTLY AUTHORISED UNDER THE PERMIT		
Activity listed in Schedule 1 of the Environmental Permitting Regulations	**Description of the Specified Activity**	**Limits of Specified Activity**
Directly Associated Activity	Water demineralisation and softening plant	Production of demineralised and softened water for site boilers and production process.
Directly Associated Activity	Cooling water system	Provision of water for cooling, including water treatment process.
Directly Associated Activity	Waste storage and disposal	Storage of hazardous and non-hazardous waste for off-site disposal.
Directly Associated Activity	Effluent drainage system	Surface water run-off from the site, effluent transfer to Dow Corning and discharge to sewer.

3.2 Proposed Changes

The proposed changes to the site operations will not lead to any new scheduled activities being undertaken at the installation. The new plant, equipment and proposed operational changes all fall within the existing activity definitions.

The primary change is an increase in the nameplate capacity of the treated silica plant from the existing 1,700 metric tonnes (MT) per annum to 3,500 metric tonnes per annum.

The proposed capacity increase is to be introduced in a phased manner with Phase 1 of the project increasing capacity to 2,200MT in 2015 and Phase 2 increasing capacity to 3,500MT by 2018. This variation covers both phases of the project.

Phase 1 will relate to the modification of operations on the D65 reactor (reactor 3) and the installation of additional product finishing plant and associated equipment.

Phase 2 will relate to the modification of the D63 and D64 reactors (reactors 1 and 2) and associated equipment.

The proposed changes relate to an increase in throughput of the treated silica process, which is to be achieved by a combination of technology conversion, minor plant improvements, operational adjustments and extended operating hours. Additional [redacted] storage is also to be provided to handle the increased rate of production from the reaction plant. There will be no increase in the raw materials storage inventory as part of the plant changes.

No changes to other areas of the installation are proposed, except as submitted with this variation application. Emission points to water, management techniques, waste handling, recovery and disposal, accident management, decommissioning and installation issues remain unchanged under this variation application

3.3 Other Changes

3.3.1 Site Details

The proposed variation to the site Environmental Permit will not lead to any change in the defined installation boundary, with all changes occurring within the existing installation boundary and the manufacturing operations.

The site location is shown in Figure A1 in Appendix A.

The site layout plan is presented in Figure A2 in Appendix A.

3.3.2 Site Condition Assessment

A revision to the site condition assessment is not required in support of this variation as the proposed changes will all occur within the existing installation boundary.

3.3.3 Environmental Risk Assessment – Soil and Groundwater

The project is not anticipated to lead to the introduction of any new or additional relevant hazardous substances as defined under the Industrial Emissions Directive (IED).

The proposed changes will lead to an increased throughput at the installation, using the existing bulk and raw materials storage arrangements, but the additional throughput will be managed by more frequent scheduling of deliveries and export of end product.

Hence, the risk to soil and groundwater associated with the proposed changes is unchanged from that associated with existing operations and defined in the existing site report.

3.4 Substantial Change

In accordance with EA Regulatory Guidance Note EPR8, a Substantial Change is defined as a change in operation, which in the Regulator's opinion may have significant effects on human beings or the environment.

The practical tests outlined in Appendix A of EPR8 have been applied to assess if the proposed change in operation is substantial or not, and have indicated that the proposed variation does not present a Substantial Change. Consequently this application is made as a Standard Variation application.

The results of the practical tests are summarised in Table 3.2.

TABLE 3.2 - DETERMNING SUBSTANTIAL CHANGE	
Test Criteria	**Result and Comments**
Releases of Polluting Substances and Ambient Concentrations of Polluting Substances as a Result of Releases	Additional emissions sources arising from the process are all routed via appropriate abatement systems to a new emission point A24 which is close proximity to the existing A13 emission point. The increase in emissions due to the proposed changes has been calculated based on the existing operation stack analysis and design specifications of the abatement measures applied. The revised emission levels do not exceed the current permitted release rate. The emissions to air associated with the proposed changes have also been assessed using the H1 assessment tool and dispersion modelling and are not predicted to give rise to significant impacts at ground level. The addition of the new plant will increase the flow of aqueous effluent discharges from the silica treatment plant to the adjacent Dow Corning Ltd (DCL). The proposed emissions will be within the existing agreed effluent discharge limits. Hence the proposed changes are not considered to result in a Substantial Change to point source emissions to water or sewer.
Releases of Substances to Groundwater	There are no point source releases of substances to groundwater. Accidental fugitive releases are prevented and controlled as part of the Site Protection and Monitoring Programme (i.e. the defined control measures).
Accumulation of Released Substances in the Environment	As substances such as heavy metals or persistent organic compounds (such as dioxins or hexachlorobenzene) are not introduced or released from the proposed changes, it is not considered that there is potential for accumulation of such substances as a result of the installation activities.
Releases of “Special Substances” – The Precautionary Principle	It is not considered that there are well-founded concerns as to the existence, or extent of risks to human health or the environment, arising from the release of the substances emitted from the installation.
Energy Efficiency and Releases of Greenhouse Gases	There will be an increased absolute energy usage ,which is anticipated to be on a pro-rata basis in line with increased production. It is not considered that there will be significant increases in releases of greenhouse gases arising from the energy use or energy sources used at the installation.
Releases of Substances that Deplete the Ozone Layer	It is not anticipated that the proposed changes within the installation will result in the increased use or release of ozone depleting substances (ODS).
Releases of Substances Causing Low Level Ozone Formation	It is not anticipated that the proposed changes within the installation will result in the increased use or release of substances with the potential to cause low-level ozone formation.
Effects of Releases on Visual Amenity	It is not anticipated that the proposed changes within the installation will result in the appearance of a dispersed plume of pollution or other visual effects of polluting emissions.

TABLE 3.2 - DETERMNING SUBSTANTIAL CHANGE	
Test Criteria	**Result and Comments**
Odour Effects of Releases	Formaldehyde is recognised to be potentially odorous, with a reported odour threshold of 0.49 mg/m³. The existing plant has operated since 2008 with no significant odour impacts. The proposed changes to the plant replicate the existing systems with the main formaldehyde source being abated using a water scrubber prior to release to atmosphere. The lesser formaldehyde source ([redacted] off-gas filter TF-161) is at concentrations which are not anticipated to lead to significant offsite odour impacts. Emissions from the identical TF 38 source have been previously monitored with an average concentration of 5.52 mg/m³ and a maximum concentration of 9.53 mg/m³. Dispersion modelling of total formaldehyde emissions from the installation presented in Section 6 identified a maximum ground level contribution of 0.10 µg/m³ which is well below the odour detection threshold for Formaldehyde of 180µg/m³ as a 50th percentile[1] The proposed changes are unlikely to result in the introduction of any odour related concerns.
Increased Likelihood or Consequences of Accidents	The installation's existing systems for identifying, assessing and minimising the environmental risks associated with the installation and the hazards of potential accidents have been applied to the proposed changes and any requirement for amendment to site training and maintenance practices identified and implemented. Detailed review of the proposed changes has identified that the changes are not anticipated to lead to any significant additional accident risk.
Increases in Production of Waste	The proposed changes to the process are not anticipated to lead to any significant alteration in the waste arisings per tonne of product at the site.
Heat	There are no anticipated changes to the level of waste heat arising from the installation as a result of the proposed changes.
Noise and Vibration	The installation of new equipment will be designed to specific noise specifications, either via equipment maximum noise level specification or the provision of acoustic enclosures (if required) so as to prevent any offsite noise nuisance. The installation of new equipment is not considered to have an impact on emissions of noise or vibration from the silica treatment plant.
Effects on Sensitive Receptors	Assessment of the potential environmental impacts associated with the proposed plant changes has identified that no significant impacts are anticipated at sensitive receptors through releases to air. There are no direct discharges to either water or land, so no impact on sensitive receptors is predicted via this pathway.
Environmental Impact Assessment (EIA)	The site is not required to submit an Environmental Impact Assessment (EIA) to the Local Planning Authority for the new equipment installation.

[1] Air Quality Guidelines – Second Edition - WHO Regional Office for Europe, Copenhagen, Denmark, 2001

4 OPERATING TECHNIQUES

4.1 Raw Materials

4.1.1 Raw Materials Storage and Use

All raw materials used in the process will be stored in the existing installation raw materials and bulk storage vessels and buildings, as defined in the existing permit and permit application information.

No additional raw materials are proposed as part of this variation and no increase in the inventory of raw materials is proposed as part of this variation. The increased demand for raw materials due to the increase in process throughput will lead to more frequent deliveries of raw materials to the site. Equally, there will be increased vehicle movements associated with the export of product off site, but no additional product storage.

4.2 Site Specific Processes, Activities or Operations

[redacted]

The changes proposed to the plant can be grouped into four discrete aspects:

1) Installation of additional PDMS oil and silica feed systems to each of the existing reactors.

2) Installing new product finishing units to process the increased product throughput that will be manufactured by reactor 3; which will comprise a [redacted] and finished product storage silo. This will be introduced in Phase 1 of the project. This will consequently free up processing capacity in the existing product finishing equipment, thus allowing increased throughput in reactors 1 and 2 to be processed in the existing finishing units, as part of Phase 2 of the plant upgrade.

3) Additional emissions control systems. [redacted] new wet chemical scrubber column prior to venting to atmosphere through the new A24 vent stack.

   There will also be an additional vent line from the [redacted] off gas filter and this will vent to atmosphere through the new A24 vent stack.

   To allow the plant to be partially shut down, e.g. for maintenance, the emissions from reactor 3 that currently flow via reactor vent filter TF122 and wet chemical scrubber T16 (currently routed to A13) will also be diverted from the existing A13 vent stack to the new A24 vent stack.

   These changes will allow reactor 3 (D65) to be operated or shut down independently from reactors 1 and 2 (D63 / D64).

4) Increase in reaction line flexibility. This involves the installation of a product transfer line to allow interconnection between reactor 3 and the existing surge tank TK-24. [redacted]

The proposed amendments will also involve the installation of a number of additional pumps, pipework and associated control systems.

No other changes to the existing process are proposed.

4.2.1 Process Feed Systems

The new feed systems will provide an additional route by which to feed silica and PDMS oil into the reactors, thus allowing greater flexibility in the operation of the plant and the ability to alter the operation of the reactor to achieve higher annual throughput.

The following changes are proposed under Phase 1 of the project:

- Silica will be transferred from the existing storage silo (TK26) using a new silica transfer pump (P199) [redacted]
- PDMS oil will be transferred from the existing tote arrangement into a new PDMS buffer tank (TK-122). The PDMS is transferred from this new tank to the process using a new circulation pump (P91) and heater (E154). It should be noted that the PDMS transfer system incorporates a recirculation system re-circulating oil back to the feed side of the pump.
- [redacted]

Phase 2 of the project will see similar changes applied to Reactors 1 and 2.

4.2.2 New Product Finishing Units

A new product finishing system will be installed to process the materials produced by reactor 3 as part of Phase 1 of the plant upgrade. This product finishing system and finished product storage is identical to that currently installed in the existing treated silica plant and will consist of the following additional equipment:

- Surge Tank (TK-118);
- [redacted]
- Product Cyclone (TC-15);
- Off gas filter (TF-161);
- Silica Transfer Pump (P-202); and
- Replace the existing silo TK-20 with a new split silo with the same total volume, so the production from D65 can be stored separately to the production from D63/64 reactors.

The installation of this additional product finishing line will allow flexibility in the processing of product leaving the reactors, and will allow increased quantities of product to be manufactured.

[redacted]

It should be recognised that formaldehyde is produced in the reactor from the thermal breakdown of the PDMS. Consequently formaldehyde is present in the reactor vapour and the void space of the silica discharged from the reactor. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

4.2.3 Emissions Abatement

The installation of the additional new product finishing units will lead to the introduction of two (2) new emissions sources, and these are the emissions from the Surge Tank (TK-118) and the emissions from the [redacted] filter (TF-161).

The emissions from the surge tank (TK-118) pass through a new surge tank filter (TF-179) for control of emissions of particulates before being transferred to Scrubber Column (T-110) for abatement of formaldehyde and siloxanes using water scrubbing. The scrubber is connected to the existing scrubber sump and the filter and scrubber column are identical to those installed to treat emissions from the existing plant.

[redacted] This arrangement is identical to that installed on the existing plant. This then vents directly to atmosphere via emission point A24.

[redacted]

The use of bag filters and wet scrubbers to abate the particulate emissions, in conjunction with effective inspection and maintenance programmes means that potential particulate releases from the treated silica plant do not represent a significant environmental impact.

For this reason it was agreed with the Environment Agency (now Natural Resources Wales) in pre-application discussions for the original IPPC Permit application[2] that particulate emissions would be screened out of the emissions inventory and impact assessment on the basis of triviality.

[2] IPPC Permit Application Cabot Carbon Ltd, Final Rev0, dated July 2005

The proposed changes to particulate releases are minor and therefore it is considered that the same position applies.

Particulate emissions have therefore not been assessed further in this report.

To allow the plant to be partially shut down, e.g. for maintenance, the emissions from reactor 3 which flow to reactor vent filter TF-122 and wet chemical scrubber T-16 (currently routed to release point A13) will also be diverted from the existing A13 vent stack to the new A24 vent stack.

The above changes allow reactor 3 (D65) to be operated or shut down independently from reactors 1 and 2 (D63 / D64).

The new A24 vent stack will be installed adjacent to the existing A13 vent stack (within 0.5m) and will be of identical height and discharge velocity and temperature.

The new spilt silo for finished product storage (TK-20 / TK-120) will be a direct replacement for the existing TK-20 silo and will be installed with a particulate abatement filter identical to the existing filtration system on TK-20 (i.e. filter TF-47). This is not considered to represent a new emission point to atmosphere, but an alteration to an existing system.

4.3 Plant Operational Controls

The changes proposed to the plant have been selected to allow an increase in the overall throughput of the treated silica process. This is to be achieved by a combination of the installation of new equipment and minor plant improvements, as detailed in Section 4.2, along with a technology conversion, which will require a range of minor operational adjustments.

The overall output of these changes will increase the overall annual operating time of the reactors, thus achieving increased plant throughput. It should be noted, that the upgrade has also retained the option to operate the plant in its existing configuration if required.

The control of the process operations will be provided by the existing site control systems, which will be upgraded to incorporate the new items of equipment installed as part of this upgrade.

Safety trips and interlocks will be in accordance with IEC61511 *Functional Safety – Safety Instrumented Systems for the Process Industry Sector*.

The full details of these interlocks will be developed as part of the detailed design of the process.

4.4 BAT Comparison Summary

The installation's prescribed activities fall within the content of the following European and UK Regulatory Guidance documents, with regard to the specification of appropriate BAT definitions and appropriate Emission Limit Values (ELV's), for the site operations:

- EU Integrated Pollution Prevention and Control Reference Document on Best Available Techniques for the Manufacture of Large Volume Inorganic Chemicals – Solids and Others Industry, August 2007, (EU BREF); and
- EPR 4.03: The Inorganic Chemicals Sector, March 2009.

The proposed controls, to minimise emissions from the proposed activity, and a comparison against the main requirements of BAT, as defined in technical guidance are summarised in Table 4.1.

TABLE 4.1 – COMPARISON OF PROPOSED ACTIVITY AGAINST BAT AS DEFINED IN GUIDANCE	
BAT Requirement	**Additional Information / Description**
Control Of Particulate Emissions: • Surge tank filter (TF-179) • [redacted] off-gas filter (TF-161) • Storage silo vent filter (TF-47)	The use of fabric filters is recognised as BAT for this activity. The proposed filters are anticipated to achieve particulate emission levels of below 10mg/Nm³, which is in line with the defined BAT emission limits.
Abatement of emissions of Formaldehyde and Siloxanes: • Scrubber Column (T-110)	Wet chemical scrubbing is recognised as BAT for this activity.
Abatement of emissions of Formaldehyde and Siloxanes: • [redacted] off-gas vent	The concentrations of Formaldehyde / Siloxanes in the [redacted] vent air are considerably lower than those from the reactor surge tank. The environmental benefits which could be achieved by additional treatment of this emission source (e.g. by use of water scrubbing) is far outweighed by the costs to implement and operate the abatement systems. The environmental impacts associated with the process emission from the treated silica plant incorporating the proposed changes have been assessed and no significant environmental impact has been identified. The proposed abatement measures are therefore considered to represent BAT for this duty.

5 EMISSIONS

5.1 Point Source Emissions

5.1.1 Air

The proposed changes to the plant will lead to the addition of one further emission point to air (release point A24).

The additional process vent (A24) will receive emissions from the new product finishing equipment for reaction line 3. The details of the release points to air associated with the Treated Silica process are provided in Table 5.1. The items specified in bold and italics are the new or altered emissions associated with the proposed changes detailed in this variation.

The location of these release points is detailed in Figure 6.2.

Release point A13 is a common release point for all existing emissions to air from the Treated Silica process and the emissions from release point A13 can be divided into two (2) primary feed streams, which combine at the exit point from the stack prior to final release to atmosphere.

Stream 1 is discharged via an 8" inner flue, which is located centrally within a 14" outer flue within vent stack A13 and both flues are then fitted with a reducer to achieve a discharge velocity of 15m/s. A similar arrangement is proposed for the new release point A24.

A13 and A24 will discharge at the same height and velocity and are to be located within 0.5m of each other.

For the purposes of the H1 calculations and the atmospheric dispersion modelling assessment, the emissions from release point A13 and A24 have been considered to represent a single mixed emission stream in view of their close proximity, and the vent characteristics modelled reflect the combined mass emissions from A13 and A24.

TABLE 5.1 : RELEASE POINTS TO AIR

Release Point Reference	Description	Potential Releases	Control Measures Employed	Indicative BAT
A11	Silica Feed tank (TK-21)	Particulates	Bag Filter (TF-45)	Yes
	Silica Feed tank (TK-27)	Particulates	Bag Filter (TF-152)	Yes
A13 Stream 1	Reactor 1	Formaldehyde, carbon monoxide, siloxanes and particulates	Bag Filter (TF-44), Wet Scrubber 1 (T-15)	Yes
	Reactor 2	Formaldehyde, carbon monoxide, siloxanes and particulates	Bag Filter (TF-121), Wet Scrubber 2 (T-14)	Yes
	Surge Tank (TK-24)	Formaldehyde, carbon monoxide, siloxanes and particulates	Bag Filter (TF-54), Wet Scrubber 4 (T-17)	Yes

TABLE 5.1 : RELEASE POINTS TO AIR				
Release Point Reference	**Description**	**Potential Releases**	**Control Measures Employed**	**Indicative BAT**
A13 Stream 2	[redacted] Off-gas	Formaldehyde, carbon monoxide, siloxanes and particulates	Bag Filter (TF-38)	Yes
A24 Stream 1	Reactor 3	Formaldehyde, carbon monoxide, siloxanes and particulates	Bag Filter (TF-122), Wet Scrubber 3 (T-16)	Yes
	New Surge Tank (TK-118)	Formaldehyde, carbon monoxide, siloxanes and particulates	***New Bag Filter (TF-179), New Wet Scrubber 5 (T-110)***	Yes
A24 Stream 2	[redacted] ***Off-gas***	Formaldehyde, carbon monoxide, siloxanes and particulates	***New Bag Filter (TF-161)***	Yes
A12	New Split Product Silo (TK20/120)	Particulate	Bag Filter (TF-47)	Yes

Table 5.2 presents the final release point characteristics for emission points A13 and A24.

TABLE 5.2 : FINAL RELEASE POINTS TO AIR				
Release Point Reference	**Description**	**Location and grid reference**	**Height (m)**	**Diameter (m)**
A13	Existing Treated Silica Plant Process vent	314243 168804	14.5	0.15
A24	Additional Treated Silica Plant Process vent	314244 168804	14.5	0.15

Table 5.3 summarises the predicted maximum emissions from each release point.

TABLE 5.3: POINT SOURCE EMISSIONS TO AIR								
Ref.	**Source**	**Release Height (m)**	**Stack Diameter (m)**	**Volume Flux (Nm^3/hr)**	**Temp (°C)**	**Substance**	**Emission Conc^n (mg/m^3)**	**Release Rate (g/s)**
A13	Treated Silica Plant Process vent (existing)	14.5	0.15m – to achieve >15m/s release velocity	1,044	Ambient	Formaldehyde	Mean 5.33 Peak 9.19	0.00155 0.00265
						Siloxanes	Mean 108.3 Peak 111.8	0.0314 0.0324
						CO	Mean 358 Peak 519	0.1038 0.1505
A24	***Treated Silica Plant Process vent (new)***	14.5	0.15m – to achieve >15m/s release velocity	973	Ambient	Formaldehyde	Mean 5.93 Peak 10.1	0.00160 0.00273
						Siloxanes	Mean 85.13 Peak 87.9	0.0163 0.0168
						CO	Mean 305 Peak 392	0.082 0.106

Note: Concentrations are expressed in milligrammes per normal cubic metre of air (mg/Nm^3), standardised to 273K, 101.3kPa.

5.1.2 Trade Effluent

Effluent from the process (scrubbers) will be fed into the existing effluent transfer system, which pumps the effluent to the Dow Corning site for subsequent treatment in the Dow Corning effluent treatment plant.

The existing transfer of effluent to Dow Corning is subject to a commercial agreement between Dow Corning and Cabot, which provides specifications to which the effluent that is transferred must comply.

The additional effluent associated with the alterations to the treated silica plant will lead to additional effluent volumes of effluents of similar compositions to those currently transferred, however the volumes and composition of the total effluent stream will be within the specification permissible under the agreement with Dow Corning.

Consequently no significant impact on the Dow Corning effluent treatment plant is anticipated.

5.1.3 Controlled Waters

There are no additional point source releases to water from the plant expansion.

5.1.4 Sewerage Undertaker

There are no additional point source releases to trade sewer from the plant expansion.

5.1.5 Land (Soil & Groundwater)

There are no additional point source releases to land from the plant expansion.

6 ENVIRONMENTAL IMPACT ASSESSMENT

6.1 Point Source Emissions to Air

6.1.1 Air Quality Standards / Environmental Assessment Levels

The following Environmental Assessment Levels (EAL's) have been used in assessing the potential environmental impacts of the plant upgrade.

TABLE 6.1 – ENVIRONMENTAL ASSESSMENT LEVELS

Pollutant	Long term EAL µg/m³	Short term EAL µg/m³
Formaldehyde (CH_2O)	5	100
Siloxanes	108	3,240
Carbon Monoxide (CO)	N/A	10,000

6.1.1.1 *Derivation of EAL for Siloxanes*

Cyclic or linear polydimethylsiloxanes have no formal legislative limits or EALs.

A review of available toxicological information for this group of substances has identified no adverse effect levels, based on inhalation studies, that can be tentatively used to define EALs (using accepted methods for the use of uncertainty factors in such circumstances).

The derived EALs have therefore been based on published toxicological studies reported by the European Chemicals Bureau, and reviewed by the Johnson Space Centre Toxicology Group for D3 and D4. Incidentally, the derived "No Observed Adverse Effect Level" (NOAEL) for D4 is the same as that quoted in the Environment Agency's draft 'Environmental Risk Assessment Report: Octamethylcyclotetrasiloxane'.

The use of uncertainty factors has been intentionally precautionary given the limited toxicological information available and the exceedence of such derived EALs does not necessarily mean that unacceptable health impact is likely.

Short-term siloxane EALs have been derived by applying a factor of 30 to the long-term EALs, in accordance with the derivation method highlighted in the EPR H1 guidance. In the absence of further data, the site emissions of total siloxanes have been conservatively assessed against the more stringent D5 derived EAL.

Table 6.2 presents the derived siloxane EALs and the concentrations are expressed in micrograms per cubic metre of air (µg/m^3).

TABLE 6.2 SILOXANE DERIVED EAL CRITERIA				
Pollutant	**No Observed Adverse Effect Level (NOAEL)**	**Adjustment from NOAEL to EAL**	**Long term EAL µg/m³**	**Short term EAL µg/m³**
D3	100 parts per million (ppm) based on reversible respiratory injury	• x4 to convert exposure from 6 hours/day to 24 hours/day • x10 for intraspecies variation • x10 for interspecies variation • x10 for limitations in the dataset and sub-chronic study	230	6,900
D4	300 ppm based on reversible effects on liver	• x5.6 to convert to 24 hour exposure • x10 for intraspecies variation • x10 for interspecies variation • x10 for limitations in the dataset and sub-chronic study	640	19,200
D5	40 ppm based on statistically significant increase in uterine tumours	• x5.6 to convert to 24 hour exposure • x10 for intraspecies variation • x10 for interspecies variation • x10 for limitations in the dataset	108	3,240

6.1.2 Ambient Concentrations

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

6.1.2.1 *Formaldehyde*

Ambient concentrations of formaldehyde are not routinely monitored; however, the final report on DETR contract EPG 1/3/155 - A Pilot Study of Formaldehyde Monitoring in Ambient Air[3] states:

"There are few data available on background concentrations of formaldehyde in ambient air but a recent unpublished review suggested that such data as are available indicate an average annual level of about 1.5 µg/m³. This value ranges between 0.71 and 2.59 µg/m³ for

[3] Final Report on DETR contract EPG 1/3/155 - A Pilot Study of Formaldehyde Monitoring in Ambient Air W Bell, N Davies, D Butterfield, K Blakley, K Lancaster, P Quincey and M Henderson July 2000. (http://uk-air.defra.gov.uk/assets/documents/reports/empire/formal_npl/form_main.pdf)

the ten months in which measurements were made, with the highest being observed in the summer months."

In light of the above research, a conservative approach has been applied to the assessment, with the ambient concentration for formaldehyde taken to be 2.59 µg/m³.

6.1.2.2 *Siloxanes*

Ambient concentrations of siloxanes are not routinely monitored. For the purposes of this assessment, ambient concentrations of siloxanes have been assumed to be zero.

6.1.3 EPR H1 Impact Assessment

An initial assessment of the potential impacts associated with the emissions to atmosphere, arising from the proposed changes to the installation, has been reviewed using Environment Agency (EA) Horizontal Guidance Note H1 screening tool (Appendix B to this Report).

The H1 assessment provided the following results:

TABLE 6.3 RESULTS OF AIR IMPACT SCREENING IN H1 SOFTWARE

Substance	Long-Term Impacts				Short-Term Impacts			
	EAL µg/m³	PC µg/m³	PC/EAL %	>1% of EAL	EAL µg/m³	PC µg/m³	PC/EAL %	>10% of EAL
Formaldehyde	5	0.467	9.3%	**YES**	1003	21.0	21.0%	**YES**
Siloxanes	108	7.06	6.5%	**YES**	3,240	192	5.9%	**NO**
Carbon Monoxide	-	27.6	-	**N/A**	10,000	1000	10.0%	**YES**

Substance	Long-Term Impacts						
	Ambient Conc (AC) µg/m³	EAL µg/m³	PC µg/m³	PEC (PC + AC) µg/m³	PEC/EAL %	>70% of EAL	Requirement for Detailed Modelling
Formaldehyde	2.59	5	0.467	3.06	61.2%	**NO**	**NO**
Siloxanes	0	108	7.06	7.06	6.5%	**NO**	**NO**
Carbon Monoxide	155	-	27.6	27.6	N/A	**N/A**	**NO**

Substance	Short-Term Impacts						
	Ambient Conc (AC) µg/m³	EAL µg/m³	Headroom (EAL – (2*AC)) µg/m³	PC µg/m³	PC / headroom %	>20% of Headroom	Requirement for Detailed Modelling
Formaldehyde	2.59	100	94.82	21.0	22.2%	**YES**	**YES**
Siloxanes	0	3,240	3,240	192	5.93%	**NO**	**NO**
Carbon Monoxide	155	10,000	9690	1000	10.4%	**NO**	**NO**

An assessment of the Predicted Environmental Concentration (PEC) against the EAL, including consideration of background air quality for both long and short term impacts, has identified that the emissions of siloxanes and carbon monoxide are not anticipated to lead to significant environmental impact and do not require additional review using atmospheric dispersion modelling.

However, the emissions of formaldehyde could not be screened out using the H1 assessment tool and further assessment of potential impacts was required.

6.1.4 Detailed Assessment of Potential Impacts

Dispersion modelling has been used to assess the impact of emissions on the environment by calculating the predicted ground level concentrations arising from the emissions to atmosphere.

The worst-case concentrations can then be compared with the appropriate EALs to determine whether releases from the installation are likely to cause a significant impact on the receiving environment.

The dispersion model that has been employed is the new generation model ADMS5, which has been developed by CERC for UK regulatory use, and which is approved by the regulator for such purposes.

In view of release points A13 and A24 being within 0.5m or each other, releasing at the same temperature and velocity, and containing the same pollutant species, a single point source emission to atmosphere has been included within the ADMS dispersion model; which reflects the combined emissions from release points A13 and A24.

The model input data used in the assessment is presented in Table 6.4.

TABLE 6.4: POINT SOURCE EMISSIONS TO AIR

Ref.	Source	Release Height (m)	Stack Diameter (m)	Volume Flux (Nm^3/hr)	Temp (°C)	Substance	Emission Conc^{n} (mg/m^3)	Release Rate (g/s)
A13 + A24	Treated Silica Plant Process vents. Both stacks.	14.5	0.218 - to reflect 15m/s release velocity from each stack.	2,017	Ambient	Formaldehyde	Mean 5.62 Peak 9.63	0.0031 0.0054
						Siloxanes	Mean 85.1 Peak 87.9	0.0477 0.0492
						CO	Mean 332 Peak 458	0.19 0.26
						Particulate	<10	

ADMS can calculate ground level concentrations of a particular pollutant over a grid of receptor points, and/or at specified sensitive receptor points (such as a school or residential housing).

A 1 km² Cartesian grid of receptors (i.e. 20 m distance between receptors) was selected for the assessment, as well as specified receptor points of important habitat sites.

Habitat sites of international importance have also been identified within a 15 km radius of the installation, and Sites of Special Scientific Interest (SSSI) within a 5 km radius, as detailed in Table 6.5**.**

TABLE 6.5 HABITAT SITES IDENTIFIED WITHIN 15KM OF THE INSTALLATION			
Name	**Receptor Type**	**Grid Reference (approx)**	**Distance from Installation**
Severn Estuary (part)	SAC, SPA, Ramsar, SSSI	318950, 168150	5.5 km east
Cog Moors	SSSI	315850, 169450	2.0 km northeast
Cosmeston Lakes	SSSI	317350, 169350	3.0 km east-northeast
Hayes Point, Bendricks Rock	SSSI	313850, 167150	1.7 km southwest
Sully Island	SSSI	316850, 166950	4.2 km southeast
Pysgodlyn Mawr, Welsh St. Donats	SSSI	316750, 167650	3.5 km southeast

6.1.4.1 *Meteorology*

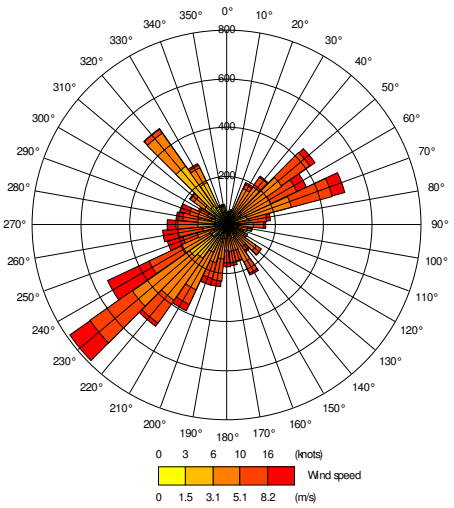
The dispersion of emissions from a point source is largely dependent on atmospheric stability and turbulent mixing in the atmosphere, which in turn are dependent on wind speed and direction, ambient temperature, cloud cover and the friction created by buildings and local terrain.

Actual measured hourly-sequential meteorological data is available for input into dispersion models, and it is important to select data as representative as possible for the site that is modelled. This is usually achieved by selecting a meteorological station as close to the site as possible, although other stations may be used if the local terrain and conditions vary considerably or if the station does not provide sufficient data.

Guidance on hourly modelling recommends using at least four years of meteorological data, in order to account for yearly variations in weather patterns. In addition, it is recommended that the most recent meteorological data be used, as this is likely to be the most representative of current climate conditions. The meteorological site used was Cardiff Airport, located approximately 8 km west of the site. The assessment used meteorological data from 2001 to 2005; as used in the previous modelling assessments undertaken for the site.

An example wind rose for Cardiff Airport for the year 2002 is presented in Figure 6.1and demonstrates that the predominant wind direction is south-westerly (i.e. blowing towards the northeast).

Figure 6.1: Wind Rose, Cardiff Airport Meteorological Station, 2002



6.1.4.2 *Building and Terrain Effects*

Another variable that can have a significant effect on the dispersion of emissions from sources is the presence of buildings or structures near to the emission points. The wind field can become entrained into the wake of buildings, which causes the wind to be directed to ground level more rapidly than in the absence of a building. If an emission is entrained into this deviated wind field, this can give rise to elevated ground-level concentrations. Building effects are typically considered where a structure of height greater than 40% of the stack height is situated within 8 to 10 stack heights of the emissions source.

Site plans were reviewed in order to identify any buildings with the potential to affect dispersion from the emission sources. These have been simplified for the purposes of modelling and the location and dimensions of buildings incorporated into the model are shown in Table 6.6.

TABLE 6.6 BUILDINGS INCORPORATED INTO THE MODELLING ASSESSMENT

Building	Grid Reference (x,y)		Height (m)	Length (m)	Width (m)	Angle
Process building	314149	168860	25	40	25	340
Silos	314224	168876	40	10	10	340
The Roost	314265	168814	10	35	25	70
Un-Named	314218	168843	9	33	21	65

A plan showing the buildings used in the ADMS simulations is shown in Figure 6.2.

Figure 6.2: Visualisation of ADMS input

The installation is situated in an industrial site, with the typical structure height being approximately 10m. A surface roughness of 0.5m has been selected to represent the local area.

Site-specific terrain data has not been used in the model, as typically terrain data will only have a marked effect on predicted concentrations where hills with gradient of more than 1 in 10 are present in the vicinity of the source.

6.1.4.3 *Model Results*

A summary of the predicted worst case impacts for the proposed plant expansion, as identified in the detailed atmospheric dispersion modelling assessment, are summarised in Table 6.7.

Isopleth maps for predicted hourly mean and annual average ground level concentrations of formalehyde are presented in Figures 6.3 and 6.4.

The modelling results show that there are no predicted significant off site air quality impacts.

TABLE 6.7 DISPERSION MODEL RESULTS							
Pollutant	**Measured as**			**PC ($\mu g/m^3$)**			
Formaldehyde (CH_2O)	Maximum 1 hour average			3.03			
	Mean annual average			0.10			
Substance	**Long-Term Impacts**						
	Ambient Conc (AC) $\mu g/m^3$	**EAL $\mu g/m^3$**	**Modelled Maximum PC $\mu g/m^3$**	**PEC (PC + AC) $\mu g/m^3$**	**PEC/EAL %**	**>70% of EAL**	**Risk of Exceedence Of EAL**
Formaldehyde	2.59	5	0.10	2.69	53.8%	**NO**	**NO**
Substance	**Short-Term Impacts**						
	Ambient Conc (AC) $\mu g/m^3$	**EAL $\mu g/m^3$**	**Headroom (EAL – (2*AC)) $\mu g/m^3$**	**Modelled Maximum PC $\mu g/m^3$**	**PC / headroom %**	**>20% of Headroom**	**Risk of Exceedence Of EAL**
Formaldehyde	2.59	100	94.82	3.03	3.2%	**NO**	**NO**

EAL – Environmental Assessment Level
AC – Ambient Contribution
PC – Process Contribution
PEC – Predicted Environmental Concentration

Figure 6.3 – Predicted Ground Level Concentrations of Formaldehyde – 1 Hour Average

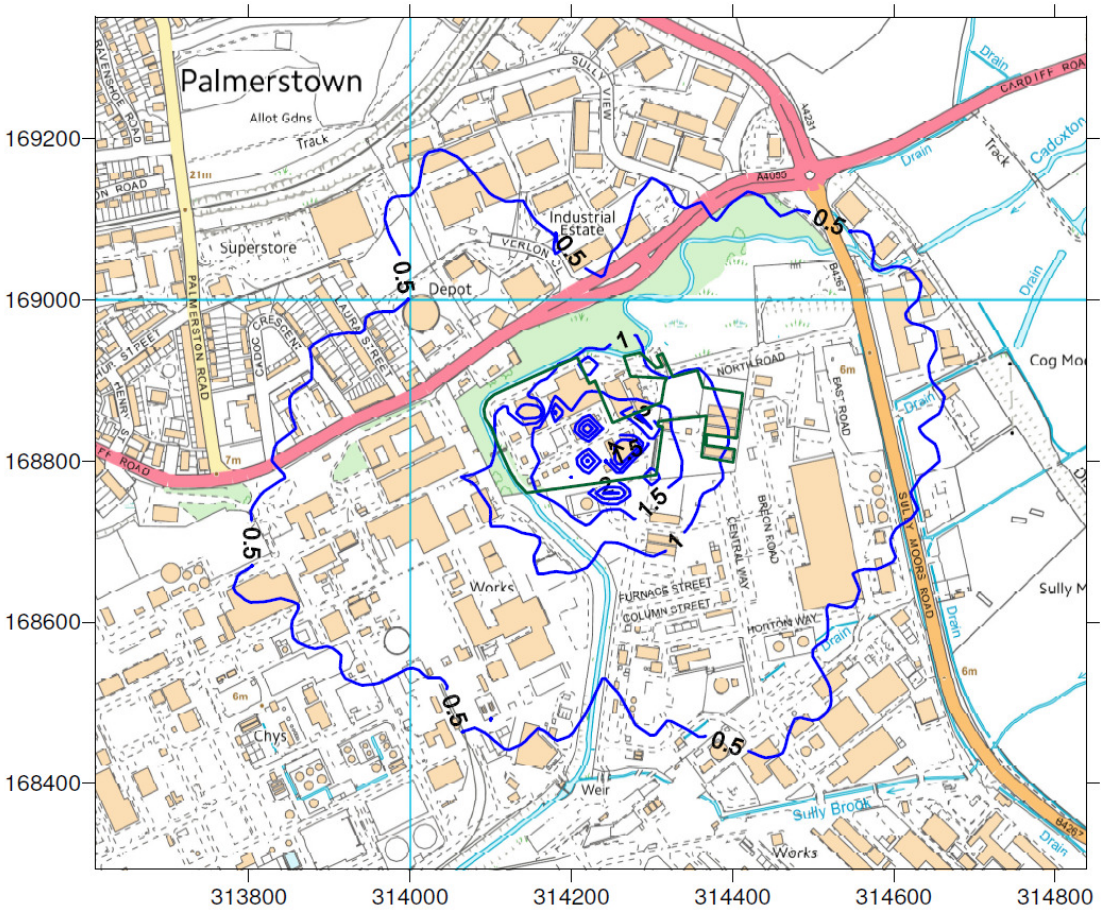
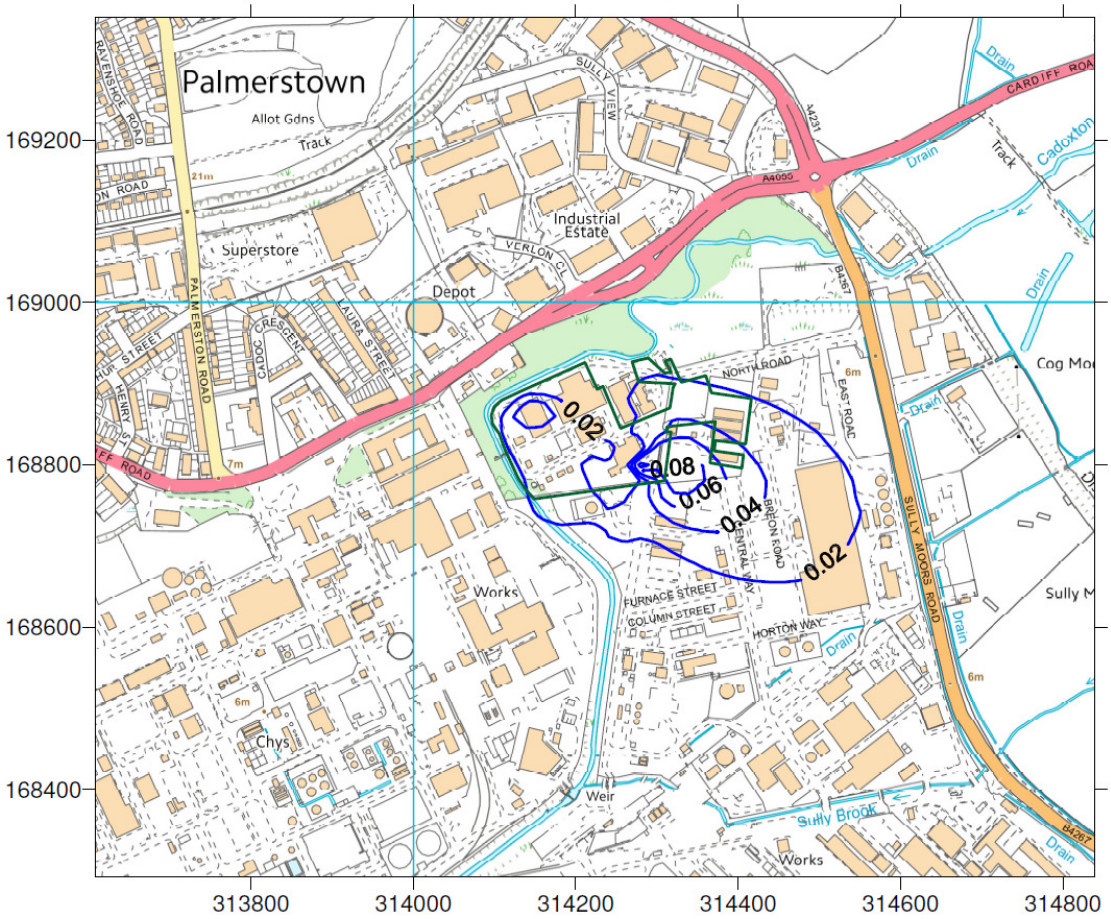


Figure 6.4 – Predicted Ground Level Concentrations of Formaldehyde – Annual Average



6.2 Point Source Emissions Direct to Controlled Waters

There are no point source emissions direct to controlled waters from the plant expansion.

6.3 Emissions to Trade Sewer

There are no point source emissions direct to trade sewer from the plant expansion.

6.4 Emissions to Dow Corning

The increase in volume of aqueous emissions transferred to the Dow Corning Effluent Treatment plant will remain within the existing agreement specifications between Cabot and Dow Corning. Cabot has discussed the proposed changed with Dow Corning and no detrimental impacts on the operation of their effluent treatment plant are envisaged.

6.5 Emissions to Land (Soil & Groundwater)

There are no point source emissions to land, and hence soil and groundwater, from the plant expansion.

6.6 Fugitive Emissions

No significant fugitive emissions are anticipated as a result of the plant expansion.

6.7 Dust

All potential sources of dust emissions from the process are released to atmosphere via appropriately designed particulate filtration units, so as to achieve an emission of <10mg/m^3. Certain sources are also subsequently treated using a wet scrubber which achieves further abatement of particulate emissions.

The use of bag filters and wet scrubbers to abate the particulate emissions, in conjunction with effective inspection and maintenance programmes means that potential particulate releases from the treated silica plant do not represent a significant environmental impact.

For this reason it was agreed with the Environment Agency (now Natural Resources Wales) in pre-application discussions for the original IPPC Permit application that particulate emissions would be screened out of the emissions inventory and impact assessment on the basis of triviality.

The proposed changes to particulate releases associated with this variation are minor and therefore it is considered that the same position applies.

6.8 Odour

It is not anticipated that the proposed changes will lead to any odour impacts, i.e. nuisance complaints.

6.9 Noise and Vibration

The plant expansion consists of operations and equipment which are similar in nature to the activities currently undertaken on site.

All new equipment will be specified to meet specific noise criteria for both operator protection The installation of new equipment will be designed to meet specific noise specifications, either via equipment maximum noise level specification or the provision of acoustic enclosures (if required) so as to prevent any offsite noise nuisance. The operation of the new plant is not anticipated to lead to any significant additional noise sources and impacts.

6.10 Visual Impacts, e.g. steam / condensate plumes

The proposed changes will not lead to any significant visual impact and no visible plumes are anticipated.

7 MONITORING

7.1 Emissions to Controlled Waters and Trade Sewer

Not Applicable.

7.2 Emissions to Air

The site will continue to monitor the emissions from the process in accordance with the monitoring requirements specified in the Environmental Permit.

Emissions monitoring for Emission Point A13 will remain unchanged.

It is proposed that emissions monitoring for emission point A24 will be the same as for A13, i.e. each of the two (2) separate streams making up the total emission to atmosphere will be independently monitored. The proposed monitoring for emission point A24 is presented in Table 7.1.

The monitoring methods to be used will be as previously agreed with the regulator and as included in Table 2.2.2 of the Permit.

As a result of the proposed plant alterations and at the request of NRW, a revised emission limit value for the combined formaldehyde emissions from A13 and A24 is proposed to replace the existing permit ELV for emission point A13 of 150g/hour as presented in Table 2.2.2 of the permit.

Environment Agency guidance note EPR4.03[4] indicates that VOC benchmark concentrations should apply where the Total Class A mass emission rate exceeds 100 g/h. Formaldehyde is a Class A VOC, and the total formaldehyde emissions from the treated silica plant via emission points A13 and A24 combined are not anticipated to exceed 100g/h, therefore the emission benchmark vales for Class A VOC's should not be applied.

It is therefore proposed that a mass emission limit of 100 g/hour be applied to the combined emissions from A13 and A24.

TABLE 7.1: PROPOSED EMISSIONS MONITORING AND EMISSION LIMIT VALUES

Emission Point	Parameter	Limit (including Reference Period)	Monitoring Frequency	Monitoring Method
A13	Formaldehyde	100 g/hour Combined mass emission from A13 and A24	6 monthly	BS EN13649, US EPA M18 ASTM D6348-03 (FTIR)
A24	Formaldehyde		6 monthly	BS EN13649, US EPA M18 ASTM D6348-03 (FTIR)

[4] How to comply with your environmental permit – Additional guidance for: The Inorganic Chemicals Sector (EPR4.03) - Environment Agency - March 2009

7.3 Process Variables

No changes are proposed to the monitoring and control of the process.

7.4 Periodic Monitoring

No off-site periodic monitoring of emissions is proposed.

7.5 Soil and Groundwater

The existing site SPMP will continue to provide periodic monitoring of soil and groundwater.

No changes to this are warranted as a result of the proposed process changes.

8 RESOURCE EFFICIENCY AND CLIMATE CHANGE

8.1 Energy Use

The proposed changes are anticipated to lead to a pro-rata increase in energy use in line with the increase in production.

An estimated 1,800MWh/year of additional electricity will be used to supply electric heating, fans, compressors, pumps etc.

The site is anticipated to continue to operate at approximately 1200kWh per metric tonne of treated silica produced.

Table 8.1 provides an overview of the existing energy use for the installation and anticipated increase in the overall energy use following the plant expansion.

TABLE 8.1: PRIMARY ENERGY CONSUMPTION – EXISTING AND PROPOSED CHANGES

Energy Source	Additional Annual Site Energy Use	Additional Primary Energy Use	% Increase in Total Supply
Electricity[1] (National Grid)	1,800 MWh	4,680 MWh	11%

[1]For electricity from the public supply a factor of 2.6 has been used to convert from delivered to primary energy (ref: EA Permitting Guidance H2 – Energy Efficiency)

Environmental emissions associated with the additional electricity use in the treated silica plant, after the introduction of the modifications, are presented in Table 8.2 based on the emissions factors for fuels provided in Section 3 of Horizontal Guidance Note H2.

TABLE 8.2: CO2 EMISSIONS ASSOCIATED WITH PRIMARY ENERGY USE

Energy Source	Additional Primary energy Usage	Emission Factor kg CO_2 / MWh	Additional Annual CO_2 Emissions (tonnes)
Electricity (National Grid)	4,680 MWh	166	777

8.2 Energy Efficiency

8.2.1 Measures to Minimise Energy Use

The changes to the treated silica plant have considered energy efficiency opportunities wherever possible, with all new pumps, drives fans etc. being selected to ensure that they are of an energy efficient design for the duty they are required to perform.

All new equipment will also be installed with insulation to reduce heat loss where appropriate. The energy use data presented in Section 8.1 presents a worst case energy use for the plant following the implementation of the changes. The site anticipates that further energy savings will be achieved as a result of the more efficient management and operation of the main process.

8.2.2 Energy Management Plan

The energy efficiency of the plant will be reviewed during initial operation and any further opportunities for improvement identified, this will then be fed into the sites existing Energy Management Plan.

8.3 Efficient Use of Raw Materials and Water

The process changes are not anticipated to lead to any significant changes in the raw material usage per tonne of product manufactured.

The proposed changes will see the introduction of an additional water scrubbing column for the abatement of emissions from a new surge tank (TK-118). This will lead to the use of an additional 2,240m³/year (280 kg/hour) of water. This equates to an increase in the sites overall water usage of 1.5%. This water is used on a once through basis in the scrubber.

The site has investigated the possibility of installing a scrubber water recycling system with a scrub liquor purge.

With the existing once through water system the calculated level of formaldehyde in the vapour space above the waste water at 25℃ is around about 1 ppm. This is slightly above the odour threshold, but below the short term (15 minute) Workplace Exposure Limit (WEL) of 2 ppm.

Recycling a portion of the water would increase the levels of formaldehyde in the waste water and this will lead to a corresponding increase in the formaldehyde concentrations in the vapour space above it.

The reaction of formaldehyde in water to produce methylene glycol cannot be guaranteed to occur quickly enough to ensure that the formaldehyde concentrations in the tank vent air remain below the WEL.

The vent from the scrubber water tank is a combined vent and tank overflow and hence must be located at ground level. The vent is located in an area that frequently visited by the operations team as part of their plant inspections, and hence there is the potential for the workforce to be exposed to the emissions from the tank vent.

Therefore to avoid the increased risk of personnel exposure to formaldehyde at concentrations above the short term WEL it is proposed that the existing and new scrubbers will remain on a once through system. It is on thus basis that this is considered to be representative of BAT for this activity.

8.4 Avoidance, Recovery and Disposal of Wastes

The proposed changes to the process are not anticipated to lead to any significant alteration in the waste arising per tonne of product at the site.

9 MANAGEMENT TECHNIQUES

9.1 Management Systems

The plant expansion will not lead to any changes in the Cabot site management systems.

The equipment installed as part of the plant expansion will be managed in accordance with the existing operating systems as detailed in the original permit application for the installation. Specific operational procedures and controls will be developed for the new plant to reflect any requirements specific to the new equipment.

9.2 Environmental Risk Management

The proposed changes are not anticipated to lead to any significant alteration in the sites environmental risk profile.

The only changes of note are:

- An increased number of deliveries of PDMS Oil and an increased number of handling and movement activities undertaken by the site. These will be managed in accordance with the existing and established site procedures, so no significant increased risk of a loss of containment is envisaged.

- Presence of an additional PDMS buffer tank (TK-122) within the PDMS storage area. The bunding arrangements in this area have been reviewed to ensure that the bunding provides the required capacity of containment when including the new tank. No additional significant environmental risk is anticipated.

The proposed alterations to the plant have been subject to Cabot's rigorous process safety management systems which include HAZID, HAZOP, design safety reviews and SIF assessments. These all include consideration of potential environmental risks. No significant items of concern were identified by these processes.

10 PLANNING PERMISSION / EIA

The proposed changes do not require submission of an EIA.

APPENDIX A FIGURES

A1 – SITE LOCATION MAP

A2 – SITE LAYOUT PLAN

A3 – PROCESS FLOW DIAGRAM

APPENDIX B H1 ENVIRONMENTAL SCREENING ASSESSMENT