Cyfoeth Naturiol Cymru Natural Resources Wales

Compliance Assessment Report

Report ID: CAR_NRW0035674

This form will report compliance with your permit as determined by an NRW officer					
Site	Barry Site EPR/BU2110IS	Permit Ref	BU2110IS		
Operator/Permit holder	Cabot Carbon Ltd				
Regime	Installations				
Date of assessment	21/05/2018	Time in	09:00	Out	17:00
Assessment type	Audit				
Parts of the permit assessed	Process controll and abatement				
Lead officer's name	Kemp, Andi				
Accompanied by					
Recipient's name/position	Paula Lloyd/ SHEQ Manager	Date issued	13/09/2019		

Section 1 – Compliance Assessment Summary

This is based on the requirements of the permit under the Environmental Permitting Regulations or the licence under the Water Resources Act 1991 as amended by the Water Act 2003. A detailed explanation is captured in "Compliance Assessment Report Detail" (Section 2) and any actions you may need to take are given in the "Action(s)" (section 4). This summary details where we believe any non-compliance with the permit has occurred, the relevant condition and how the non-compliance has been categorised using our Compliance Classification Scheme (CCS). CCS Scores can be consolidated or suspended where appropriate, to reflect the impact of some non-compliances more accurately. For more details of our CCS scheme, contact your local office.

Permit conditions and compliance summary	CCS Category	Condition(s) breached
A1 - Specified by permit	A	
B1 - Infrastructure - Engineering for prevention and control of emissions	A	
C1 - General Management - Staff competency/training	A	
C2 - General Management - Management system and operating procedures	A	
E1 - Emissions - Air	A	
G2 - Monitoring and Records, Maintenance and Reporting - Records of activity, site diary/journal/events	A	
G3 - Monitoring and Records, Maintenance and Reporting - Maintenance records	A	

KEY: See Section 5 for breach categories, suspended scores will be indicated as such.
A = Assessed or assessed in part (no evidence of non-compliance), **X** = Action only,
O = Ongoing non-compliance, not scored.

Number of breaches recorded	0	Total compliance score (see section 5 for scoring scheme)	0

If the Number of breaches recorded is greater than zero, please see Section 3 for our proposed enforcement response

Section 2 – Compliance Assessment Report Detail

This section contains a report of our findings and will usually include information on:

- The part(s) of the permit that were assessed (eg. Maintenance, training, combustion plant, etc)
- Where the type of assessment was 'Data Review' details of the report/results triggering the assessment
- Any non-compliances identified
- Any non-compliances with directly applicable legislation
- Details of any multiple non-compliances
- Information on the compliance score accrued inc.
- Details of advice given
- Any other areas of concern
- Any actions requested
- Any examples of good practice
- A reference to photos taken

Compliance Assessment Report: Cabot Carbon, Barry Silica Plant – BU2110IS; 13th September 2019

Purpose of Compliance Assessment

This CAR1 covers the following aspects of regulation under the Environmental Permit: BU2110IS:

- Burner train process control inspection – 21st May 2018
- Brief inspection 6th December 2018
- Actions from CAR1 8TH February 2019

A hazardous waste audit, carried out on 11th Sep. 201, will be written up separately.

Burner Train Process Control Inspection 21st May 2018

The reason for auditing this aspect is fourfold:

1. Permit condition 2.1.1 requires the operator to run the plant in accordance with various parts of the permit application incorporated into the permit – Operating Techniques
2. Permit conditions in section 2.4.1 require efficient use of raw materials

3. Permit condition 2.2.1.3 and Table 2.2.2 require compliance with the emission limit values stipulated

4. To gain confidence in CO emissions and whether continuous CO monitoring in accordance with the MCERTs scheme / standards is required

Additionally during a previous assessment of a submission the operator made to NRW, the control of the burner trains came up as something to further explore.

The two burner train processes, A and B, are operated differently, but with the combined objectives of maximising production efficiency and minimising emissions.

The emissions from the burner trains go via stack A1 and include CO (3500 mg/m^3 daily average); HCl (10 mg/m^3); Cl_2 (10 mg/m^3); chloromethanes (50 mg/m^3). The relationship between the concentrations of these parameters is related to the abatement methodologies used on each burner train and temperature – the key objective is to reduce chlorine and maximise HCl production for return back to Dow Silicones. Previous Improvement Conditions required assessment of various emissions abatement and pollutant relationships, therefore Cabot have considerable experience and evidence in understanding the process chemistry.

During the inspection in May 2018 the process chemistry was presented by Neil Davies (Senior Engineer), with Paula Lloyd (SHEQ Manager) in attendance. To complement this discussion, the operatives in the control room at the time of the inspection were spoken to, in terms of how they perform surveillance on and control the process, what procedures are followed, records made and alarms responded to etc. As a follow-up a number of pieces of information were requested by AK (NRW), these were: grade to grade fumed silica checklist; heat load to make load checklist; grade to grade change out of spec checklist; shift manager log – screen shot; overnight report database screen shot. These pieces of information were received on 1st may 2019 along with the process abatement descriptions, data graphs and software process control schematic.

Refer to the full Cabot response (in NRW files), but in summary this is the information Cabot supplied. The fumed silica production process burns chlorosilanes (from Dow), hydrogen and oxygen, to produce fumed silica (SiO), HCl, chlorine radicals, CO and CO_2. The two burner systems operate in two different ways to minimise chlorine release: Burner Train A – natural gas injection for abatement; Burner Train B – hydrogen injection abatement.

In summary for burner train A, the temperature control is less precise, influenced by product mix, rates and ambient conditions. The abatement reaction with the injected natural gas is temperature dependant and carried out in the range 760 deg C – 820 deg C. Too high or too low can result in different species being formed, from simple natural gas combusted, production of chlorine or production of chloromethanes and carbon monoxide. Therefore, the operators try to keep the process at a temperature slightly above the theoretical “perfect” temperature, which reduces chloromethanes and turns the chlorine radicals into HCl, but there is a CO by-product consequence. Nonetheless, based on the

information submitted by the operator (and confirmed in the relevant BRef) the compromise is this slightly elevated above perfect temperature control, reducing chlorine and chloromethanes, but production of CO. This is in part due to the older technology used in the A train burners and its water cooled system.

Burner Train B is a more modern plant and uses hydrogen injection abatement and a pressurised water cooling system, used to generate steam. The temperature profile of the product gases is more stable. Hydrogen is injected in several places, but the reaction to form HCl only takes place in a narrow temperature range. The conversion is better with hydrogen injection abatement and fewer by products are produced.

In the permit the ELV for CO is a daily average of 3500 mg/m^3, with accompanying note (2) stipulating: the monthly average shall not exceed the ELV by more than 10% once in a rolling twelve month period (3850 mg/m^3) and by not more than 50% in any one half hour period over a 24 hour period (5250 mg/m^3). Referring back to the permit Decision Document, the operators screening of CO emissions and the inclusion of the Barry Chemical Complex ambient CO monitoring exercise, led to the conclusion that the annual average CO levels were at the lower end of the range of typical UK levels and that CO releases from the site do not represent significant potential for contributing to an EAL breach – this is based on the 3500 mg/m^3 annual average ELV. Assessment of the last two years continuous monitoring of CO at A1, reveals daily averages a significant way below the 3500 mg/m^3 ELV – the latest quarterly monitoring (Jan – Mar 2019) shows averages around 2000 mg/m^3, quite often lower than this. It is reasonable then to conclude that these more recent lower emissions of CO (brought about by the Burner Train B improvements) do not represent an environmental issue. In this process (as described in the BRef covering pyrogenic silica production) CO formation is a consequence of reducing Cl_2 emissions by forming HCl, which is recovered, with the scrubbing of the tail gases with caustic soda.

On that basis, the operator raised the issue of changing the continuous CO monitor, due to age and replacement parts issues and the regulator pointed out that normally it would be expected that the operator would comply with MCERTS and BS EN 14181 CEM standard. AK has taken on board these latest results, the CO impact assessment and the abatement rationale and concluded that the monitoring requirements for CO can be changed by agreement between operator and regulator. The environment is protected, BAT is demonstrated, chlorine is abated and HCl recovery is maximised.

See email from AK to PL (Cabot) on 26th July 2019, which agrees to 6 monthly CO extractive sampling, but the CO process monitoring will be continued on a continuous basis for process control. The extractive monitoring must take place when the plant is under normal operating conditions (not start up, off line or low load), using a method recognised, e.g. refer to Table S2.8 of M2 monitoring guidance note.

This situation is further reinforced by the assessment of the control room operatives and their control over the process and the acid recovery process. This is described next.

The Standard Operating Procedures followed are based on the grade of product required. Cabot use an Aspen graphic overlay system to show real time data during production and abatement; this is supported by the main Cabot online process control system. Potential / approaching limits alert the operatives by way of the AEMS system, allowing them to take action to maintain compliance with emission limits and the manufacturing process. SOPs support the response to these alarms and the AEMS is linked into the

Environmental Dashboard. Cabot provided a number of examples of forms, screen shots etc. illustrating what is recorded, displayed and acted upon. For example the Environmental Dashboard for the burner trains and caustic scrubbing system, show real time data including: temperature, heat loads, pH (to river; into scrubber) abatement ring temperatures, mass spectrometer readings, various gaseous parameters (HCl, MeCl, Cl, CCl_4), caustic consumption, % HCl solution, sewer flow rate etc.

In particular the emissions abatement control is exercised in the control room by following handovers, grade change overs and various checklists, then responding to alarms or other operating parameters and, depending on grade, altering flow rate, burner ring configuration, temperature, hydrogen / natural gas injection, caustic flow. The mass spectrometer on the inlet to the caustic scrubber can detect residual chlorine and chloromethanes, with CO data being relayed by the CEM and shows how effective the system is abating chlorine and chloromethanes.

The Grade to Grade change checklist must be followed and filled in during the change over period and includes the following information: review recipe, grade identifier and production run times, burner condition parameters, links to on plant operatives – is product flow directed to the correct silo, signed by shift manager and a 40 min check. The Heat load to Make load checklist refers to other SOPs, and stipulates the various controller set points and temperatures, is Dow ready to receive, steam drum pressure, combustion air parameters and initial quality checks. There is also a checklist for demonstrating the grade is in specification of the recipe. In the screen shot of the Shift Manager Log, various pertinent information is handed over, grade recipes and silos are confirmed. There is an overnight report database that personnel use when coming on to shift or use during shift for the next incoming shift. This includes instructions for that shift and details the relevant work instructions. NRW cannot comment on the finer points of this information and process control system, other than to say, clearly Cabot have a system capable of holding the relevant standards, SOPs, handover instructions, recipes, recording the shift actions and various operational parameters. The system can be interrogated. This demonstrates that the operator has control over their process and the critical parameters are identified – with their justification, e.g. type of abatement and temperature / caustic control, related to the process chemistry described earlier and to the BAT Reference document.

Brief inspection 6th December 2018

This inspection was used as a catch up and general discussion on ongoing matters.

The operator discussed the chlorosilane vaporiser improvement project – occasionally, sometimes influenced by the quality of feedstock from Dow, the heavy boiling contaminants clog up the vaporiser and they need to be opened and cleaned. This causes downtime and loss of production, interferes with product quality and presents a process safety risk. A continuous recycle loop, scrubber and holding vessel were presented as an improvement being considered. There are currently no compliance issues with this area. Cabot are still considering what / how to approach this – so an update is expected in due course. The location of any such improvements would necessarily need to be near the vaporisers. AK advised the need to be cautious when excavating areas of the site for building, ensuring any groundwater installations and any other underground services are protected, along with consideration of any possible ground contamination, either caused, revealed or disturbed and waste disposal.

The operator reported issues with GRP pipe lengths coming to the end of their life. This material is used on low pressure duty, but recently UV and chemical attack has been recognised as potentially problematic. There is a GRP replacement programme being followed. A new company has been sought, who test for leaks before applying the outer wrap to the GRP line. GRP infrastructure, has across industry in the past, been subject to fit and forget, lack of proactive preventative maintenance and damage (when erecting other infrastructure etc.), so this action is welcome.

Other updates include:

- Treated silica production up at 1800 MT pa
- The link between reliability engineers advising maintenance engineers
- Root Cause Analysis flow chart provided
- Incident and event classification matrix supplied
- The Fiji process of tagging system was presented
- Capital investment and ageing plant countermeasure progress was presented

The phasing of up to name plate capacity on the treated silica plant of 3500 MT has been slower than anticipated. A future conversion to continuous processing (2021 – 22) will take the plant closer to this limit.

Cabot explained how their reliability engineers advise on the design, specification and operating envelope of infrastructure and how this is communicated to and influences the maintenance engineering department actions. The reliability engineers are also involved in root cause analysis and the monitoring of planned maintenance deviations.

The RCA procedure and incident classification matrix are linked and depending on the priority of the incident / near miss, the RCA procedure will be invoked, e.g. for a priority 3 incident / near miss, the RCA procedure is initiated; for a priority 1, either (if repeated within 3 months) it is escalated to priority 2, or it is recorded on the Intelex system. As an example of environmental priority 3 events: reportable release, emission exceedance, off site impacts etc. – these are high consequence events, irrespective of frequency. Root cause analysis is an essential element of any management system – most deviations / non-compliances will have been caused by some underlying factor, such as training not delivered, a procedure not followed etc. All priority 3 events are subject to RCA – a team is assembled; an analysis is conducted; proposals are feedback to leadership team; actions agreed; monitoring and review; acceptable performance y/n; event not repeated – these are the overall steps in Cabots RCA. Even though the specific

methodologies are not described in the flow chart (no doubt Cabot have various supporting procedures), this appears to be a thorough approach and is a topic that NRW typically assesses periodically over the life of an installation and / or after an incident.

The Fiji tagging system provides various opportunities for non-conformances to be identified and rectified, e.g. joint made according to specification, numbered tag attached > part of tag put in joint integrity box for QA technician > QA technician inspects and passes / rejects and master flange register updated > pressure / leak testing performed > final checks and lagging etc., flange put in service, final tag handed to QA technician and update master flange register. The objectives of such a procedure, as well as aligning to recognised industry practice, reduce down town by repairing first time; protect staff by preventing certain process safety risks; site competence can be measured; loss of containment reduced or eliminated.

Actions from CAR1 8TH February 2019

Four actions were raised and submissions / updates have been supplied for all.

Action 1 concerned evidence recorded when conditions were such that surface water samples could not be taken, e.g. no spills / incidents etc. Response received 1st May 2019 – no incidents, as per incident / near miss reporting database. **Action closed.**

Action 2 concerned a detailed fugitive emissions baseline review – good progress was seen during the inspection of 11th Sep. 2019 – **Action extended until 31st Jan. 2020.**

Action 3 concerned a fuller Site Closure Plan – received 23rd Jul. 2019. This plan (v2.0) is a more comprehensive document than the earlier declarations of no intention to close. All the salient points (staffing, contractors, site baseline report etc.) are all mentioned and as long as these are supported by specific detailed SOPs that are invoked at the right time, there is no reason that Cabot would operate closure, decommissioning and demolition in a manner likely to cause pollution. **Action closed.**

Action 4 concerned addressing points raised by NRW in connection with the site condition baseline correspondence assessed in CAR1 Feb. 2019. The response was received on the 23rd of July 2019. NRW accepts the response and also accepts that the current MCERTs scheme does not extend to analysing fresh groundwaters. However, the EC Communication to the Commission concerning Article 22 (IED) on Baseline Reports 2010/75/EC, does state that analysis of groundwater (and soil) should be conducted following the Member States standards, e.g. ISO 17025 – laboratory competency – as per the labs UKAS analytical schedule. There is an MCERTs Performance Standard for soil analysis. **Action closed.**

END

Cyfoeth Naturiol Cymru Natural Resources Wales	**EPR Compliance Assessment Report**	**Report ID: CAR_NRW0035674**

This form will report compliance with your permit as determined by an NRW officer

Site	Barry Site EPR/BU2110IS	Permit Ref	BU2110IS
Operator/Permit holder	Cabot Carbon Ltd	Date	21/05/2018

Section 3 – Enforcement Response

You must take immediate action to rectify any non-compliance and prevent repetition.
Non-compliance with your permit conditions constitutes an offence and can result in criminal prosecutions and/or suspension or revocation of a permit. Please read the detailed assessment in Section 2 and the steps you need to take in Section 4 below.

Other than the provision of advice and guidance, at present we do not intend to take further enforcement action in respect of the non-compliance identified above. This does not preclude us from taking enforcement action if further relevant information comes to light or advice isn't followed.

Section 4 – Action(s)

This section summarises the actions identified during the assessment along with the timescales for when they will need to be completed.

Criteria Ref.	**CCS Category**	**Action required/advised**	**Due Date**
See Section 1 above			

Section 5 – Compliance notes for the Operator

To ensure you correct actual or potential non-compliance we may

- Advise on corrective actions verbally or in writing
- Require you to take specific actions verbally or in writing
- Issue a notice
- Require you to review your procedures or management system
- Change some of the conditions of your permit
- Decide to undertake a full review of your permit

Any breach of a permit condition is an offence and we may take legal action against you

- We will normally provide advice and guidance to assist you to come back into compliance either after an offence is committed or where we consider that an offence is likely to be committed. This is without prejudice to any other enforcement response that we consider may be required.
- Enforcement action can include the issue of a formal caution, prosecution, the service of a notice and/or suspension or revocation of the permit.

See our Enforcement and Civil Sanctions guidance for further information

This report does not relieve the site operator of the responsibility to

- Ensure you comply with the conditions of the permit at all times and prevent pollution of the environment
- Ensure you comply with other legislative provisions which may apply

Non-compliance scores and categories

CCS category	Description	Score
C1	A non-compliance that could have a major environmental effect	60
C2	A non-compliance which could have a significant environmental effect	31
C3	A non-compliance which could have a minor environmental effect	4
C4	A non-compliance which has no potential environmental effect	0.1

Operational Risk Appraisal (Opra) - Compliance assessment findings may affect your Opra score and/or your charges. This score influences the resource we use to assess permit compliance.

Section 6 – General information

Data protection notice

The information on this form will be processed by the Natural Resources Wales (NRW) to fulfil its regulatory and monitoring functions and to maintain the relevant public register(s). The NRW may also use and/or disclose it in connection with:

- Offering/providing you with its literature/services relating to environmental matters
- Consulting with the public, public bodies and other organisations (eg. Health and Safety Executive, local authorities) on environmental issues
- Carrying out statistical analysis, research and development on environmental issues
- Providing public register information to enquirers
- Investigating possible breaches of environmental law
- Assessing customer service satisfaction and improving its service
- Freedom of Information Act/Environmental Regulations request

The NRW may pass it on to its agents/representatives to do these things on its behalf. You should ensure that any persons named on this form are informed of the contents of this data protection notice.

Disclosure of information

The NRW will provide a copy of this report to the public register(s). However, if you consider that any information contained in this report should not be released to the public register(s) on the grounds of commercial confidentiality, you must write to your local area office within fifteen working days of receipt of this form indicating which information it concerns and why it should not be released, giving your reasons in full.

Customer charter

What can I do if I disagree with this compliance assessment report?

If you are unable to resolve the issue with your site officer, you should firstly discuss the matter with officer's line managers using the informal appeals procedure. If you wish to raise your dispute further through our official Complaints and Commendations procedure, phone our general enquiry number 0300 065 3000 (Mon to Fri 08.00 – 18.00) and ask for the Customer Contact team or send an email to enquiries@naturalresourceswales.gov.uk. If you are still dissatisfied you can make a complaint to the Public Services Ombudsman for Wales. For advice on how to complain to the Ombudsman phone their helpline on 0845 607 0987.

Welsh Language
If you would like this form in Welsh please contact your Regulatory Officer.