Cyfoeth Naturiol Cymru Natural Resources Wales

Compliance Assessment Report

Report ID: CAR_NRW0034906

This form will report compliance with your permit as determined by an NRW officer					
Site	Newport Steam Reforming Plant	Permit Ref	VP3736EF		
Operator/Permit holder	The BOC Group Limited				
Regime	Installations				
Date of assessment	10/07/2018 - 27/03/2019	Time in	10:00	Out	14:00
Assessment type	Report/Data Review				
Parts of the permit assessed	Annual submissions, monitoring and maintenance				
Lead officer's name	Kemp, Andi				
Accompanied by					
Recipient's name/position	Rob Warren/ Regional SHEQ Manager	Date issued	02/04/2019		

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	
G1 - Monitoring and Records, Maintenance and Reporting - Monitoring of emissions and environment	A	
G3 - Monitoring and Records, Maintenance and Reporting - Maintenance records	A	
G4 - Monitoring and Records, Maintenance and Reporting - Reporting and notification to Natural Resources Wales	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 Form: B.O.C. Newport (Eastman) Satellite – EPR/VP3736EF

27TH March 2019

Purpose of Compliance Assessment

This compliance assessment report (CAR1) covers the following activities:

- Annual monitoring data – reformer flue gas and vent gas header – conditions 3.1.1, 3.1.2, 3.3.1, 3.3.3 and 4.2.3
- Annual performance parameters – hydrogen production, water and energy usage – condition 4.2.2
- Annual report – review of monitoring data – condition 4.2.2
- Inspection of maintenance system and procedures, Margam 10th July 2018

Annual Monitoring Data

The operator has two authorised emission points, reformer flue gas stack and vent gas header. The former has permit emission limit values (ELV) for nitrogen dioxide (NOx) and carbon monoxide (CO), the latter requires monitoring of hydrogen, CO and methane, but no limits are set for this point. Both points require annual spot samples, with the method stipulated in the permit and a condition relating to the requirement for regulatory monitoring to be conducted within the MCerts scheme.

Recommendation 1 27th Mar. 2019: *The operator should periodically review the competency of the monitoring contractors, the equipment used (if portable analysers) – covered by MCerts and the accreditation to ISO 17025, of the laboratory carrying out the analysis. Allied to this is to ensure that monitoring guidance document M2 is consulted with regard to the most up to date monitoring methods*

and or alternatives to the reference method. Typically the regulator will examine this when conducting an OMA audit and so the operator should refer to the OMA scheme and guidance for operators.

Data for 15th June 2017 submitted by the operator shows the reformer stack as compliant and insignificant emissions via the vent gas header. For 2018, monitoring was conducted on 2nd Aug and 9th Aug. 2018 and again showed compliance with both ELVs and the vent header gases as trivial except hydrogen.

Action 1 27th Mar. 2019: *Operator to provide additional information on the vent gas header result of 599000ppm (59.9%) hydrogen from 9th Aug. 2018; what would cause this high result and if this relates to a malfunction of the process.* **Due: 31st May 2019.**

Annual Performance Parameters

The site are required to report total hydrogen produced and water and energy used.

2017 data – Hydrogen = 269 tonnes; energy = 7639.49 MWH; water = 2621 m^3.

2018 data – Hydrogen = 370 tonnes; energy = 7038.46 MWH; water = 2938 m^3.

Commentary on the results from the operator states that increased hydrogen production due to customer demand has led to higher water usage. There was also an explanation for the incorrect natural gas used figure used in 2016 data. NRW has no further comment to make on these submissions other than it appears (as would typically be expected) that there are efficiencies gained when the site is producing more hydrogen.

Annual Report

Permit condition 4.2.2 requires the performance parameters mentioned above to be reported, along with a review of the monitoring data. With only one emission point and two parameters monitored annually, there is no need for detailed trend analysis, although this data, in addition to being within the ELVs, can shed light on the overall plant performance. The operator has provided some narrative for 2017 and 2018.

The main point to be taken from the submission is that work in 2017 to improve steam raising efficiency and improve the turn down ratio (defined by the operator as the minimum load the plant can run on without losing stability) is a reduction in NOx emissions. Increasing the minimum turn down ratio means the plant can run stable at increasingly lower loads, *while maintaining reformer temperatures, tube*

loadings, steam production and stable firebox conditions with efficient excess oxygen – this text taken from an email from RW (BOC), which included a Linde Group Plant Load Control document, which described the feed forward control logic used to make plant adjustments ahead of potential deviations.

Inspection of Maintenance System and Procedures, Margam 10th July 2018

The purpose of this inspection, which took the form of a meeting with relevant BOC personnel at the Margam site, was to explore site records in regard to identification of critical environmental kit, planned preventative maintenance, shut downs, reliability, staff competency. This inspection will provide information that will feed into future on site (i.e. Newport satellite site) inspections whilst maintenance is actually taking place. This assessment is made in terms of compliance with the EPR permit and therefore focusses on elements that involve protection of the environment, energy, resource use, waste, BAT standards. This type of assessment may acknowledge that a component (e.g. a vessel or pipework) is made to an expected standard and of typical materials of construction, maintained as expected and operated within its capability, with the outcome being to confirm environmental protection or application of Best Available Technology. It will not however, confirm or address every aspect, in terms of underwriting the suitability in all engineering senses, of any particular component.

In attendance from BOC were Adrian Hayman (Area Operations Manager), Rob warren (Regional SHEQ Adviser) and Chris Jenkins (Plant Manager, Satellites). Documentation seen on the day and copies of which were forwarded by email by RW were: BOC presentation on structures and maintenance philosophy; The Linde Group, About Plant Maintenance; The Linde Group, Hydrogen Plant Written Schemes; BOC, Pipeline Maintenance; The Linde Group, Pressure Systems Safety Regulations – Generic examination Intervals and Scopes; The Linde Group, Spring Loaded Pressure Relief Valves PSV-1. The regulator will consult various guidance and standards, such as the relevant sections of the BAT Reference documents (BRefs), Sector Guidance Notes, How to Comply With Your Environmental Permit and other (where relevant) guidance on more specific aspects, such as EEMUA (tanks, pipelines) and CIRIA (bunds and secondary containment).

The sensible place to start is the BOC presentation provided by and run through by RW. This gives an overview of structures, maintenance philosophy and targets / major breakdowns and turn arounds and safety. The first underpinning aspect is that the Margam site (which has oversight of the Newport satellite) was due an ISO 14001 certification audit in 2018.

Action 2 27th Mar. 2019: *Operator to provide a copy of the ISO 14001 registration certificate for Margam.* **Due: 31st May 2019.**

In previous CAR1 forms the regulator accepted that an overarching EMS for Margam would cover the Newport satellite site in terms of permit condition 1.1.1(a) and the format and content of the EMS is likely to be assessed in future inspections by NRW.

In 2018 the Newport (Eastman) satellite was overhauled and mandatory work under the pressure systems regulations was carried out as per the 36 month schedule. Structural changes to the organisation were

summarised and include: new appointments in senior positions for engineering and process safety and a new UK SHEQ structure. It is noted that the Regional SHEQ Managers / Advisors report direct to the Head of SHEQ UK – separate reporting lines for SHEQ personnel compared to the site production / operations (reporting to overall Plant Manager) usually provides for a more robust model of delivery of improvements and maintaining of environmental compliance. Roles and responsibilities were also summarised and include: compliance with legislation, process safety, audit support, training and competency assessment, implementing and developing best practice and challenging performance. BOC / the Linde Group have access to a global resource of technology, experience, equipment and data libraries.

The BOC maintenance philosophy is based upon operating experience, statutory requirements / legislation, manufacturers recommendations, industry guidelines / ACOPs. This is typical practice and sometimes a hierarchy is evident, based on legal requirements, company standards and industry wide technical standards and experience. The actual maintenance interventions derived from these overarching drivers are then based on either time based, conditional based or run to defect and the various site procedures for carrying out these are categorised as: mandatory; preventative; written schemes of examination (WES); 6 weekly PWI inspections; weekly logs and routine checks. Major plant turnarounds (TAR) are also part of the overall maintenance programme and typically are several of the previous categories being carried out together at a time interval defined by several drivers already mentioned.

The various documents submitted by the operator in support of confirming their competence and management systems approach to maintenance include reference to:

- Global company wide approach to maintenance including:
    - Following best practice
    - Cost of downtime usually outweigh maintenance costs
    - Development of a robust equipment management strategy
    - Promoting plant reliability

Before deciding on the overall strategy (time based, conditional, run to failure, design out) the operator examines the various external factors affecting plant reliability and maintenance:

- Critical plant
- Available technology
- Experience of staff and staff training
- Library of failure mode
- Plant location specifics
- Spares
- Stage in overall plant lifecycle

Some pertinent points covered about condition based monitoring methods include: vibration, oil analysis, acoustic, visual, thickness testing, leak and strength pressure testing, cathodic protection and various other methods. With time based, the criteria are based on: calendar, operational time or number of cycles. The Design Out philosophy aims to reduce the need for maintenance in the first place and designing out potential failure mechanisms, e.g. change in materials of construction. The operator uses an Enterprise Asset Management System (EAM) which brings together a number of strands in the

maintenance philosophy: materials management, procurement, finance, HR etc. The operators' internal standard requires the plant management (and other groups) to track and record all repairs and maintenance activities, use the system to provide maintenance performance and cost data, maintenance history, scheduling.

The operator, in their document *Establishing and Managing a Maintenance Programme,* starts to provide additional detail about the three main types (condition, time and corrective), with the stipulation that run to failure / breakdown is only permissible with low risk assets, e.g. light bulbs. The guidance covers creating an asset record, enter maintenance programme, scheduling maintenance, recording maintenance activities and monitoring performance over time. The roles and responsibilities are also stipulated, e.g. Reliability Engineer establishes the maintenance strategy and the Plant manager will ensure the programme is carried out. The design personnel also play a vital part. The system requires critical kit to be identified and the asset and the configuration are linked back to accurate, up to date P&IDs. When recording the maintenance the operative must ensure that the starting and post maintenance condition is recorded, along with the actual work details, recording replacement equipment (e.g. pumps, new gasket specification) and updating maintenance system with these records. The operator may also record other details such as what cleaning took place, whether the procedure needs revising in some way and they should upload to the system items such as photographs, certificates etc.

To illustrate how some of the above points are actually implemented, the regulator makes reference to these documents submitted by the operator: *Pipeline Maintenance; Hydrogen Plant Written Schemes; Pressure Systems Safety Regulations – Generic Examination Intervals and Scopes; Spring Loaded Pressure Relief Valves PSV-1.*

The key things mentioned include: adherence to the BOC standard; checking the proximity of electricity to fuel gases, combustibles near oxygen, pipelines used as support for other plant. Visual inspection of the surface for corrosion, especially the likely areas for corrosion and pipelines must be marked up clearly. Leakage should be identified from components such as valves, flanged joints, connections, hoses etc. Emergency valves must be accessible to normal operation. Maintenance deadlines must be met. The document on pipelines mentions major accident hazard scenarios and emergency testing. There are detailed sections on walking the lines and what to look for, e.g. line drawings match what is on the ground, encroachment of structures and developments and leaks etc. Cathodic protection and emergency shut off valves are also included in detail. The records to be used are included and there is a procedure for revalidating the pipeline.

As the hydrogen plant is covered by the Pressure Safety Regulations a formal Written Scheme of Examination is produced. Reference to the document submitted by the operator revels that UKAS accredited third parties carry out approval inspections for certain equipment associated with the waste heat boiler pressurised side of the process and that BOC or UATP inspector for other parts. The operators document makes reference to the part of the PPSR Generic Examination and Scopes document that is relevant for a particular component. The WES mentioned in the previous document provides for defined maintenance intervals, in accordance with in scope pressure system regulations equipment and postponement to only occur under the defined circumstances. The intervals are based on RBI or Authoritative Technical Reviews, with extension only considered if sufficient data on a safety case has been gathered. The Design Authority must endorse the WSE and time interval. Some of the components covered and timescales include: pipelines – 180 m revalidation; routine pipeline inspection – 6 m; pipeline emergency shut off valves - 12 m; pressure relief valves for hydrogen process plant – 48 m; direct fired

steam boiler – 14 and 60 m (by UKAS third party); bulk cryogenic storage tank – 12 m and 240 m; hydrogen reformer tubes – 36 m. Each one of these maintenance intervals is linked to a BOC group wide procedure, e.g. for the pressure relief valve = PSV-1.

Looking at the PSV-1 procedure, the main points for NRW are: overall application of the procedure to any spring loaded pressure relief valves; entering activities on a spreadsheet for performance data gathering and analysis; recording maintenance activity on the stipulated test record sheet – site examinations; depressurising system ahead of work; blanking off openings after removal; checking valve siting for obvious signs of corrosion; check the condition of the valve; checking pressure rating calibration; assigning tag number to P&ID.

Action 3 27th Mar. 2019: *Operator to provide evidence from standards or regulations that explains the 48 month interval for pressure relief valves (hydrogen process plant).* **Due: 31st May 2019.**

The last document examined to confirm part of the overall maintenance programme, was a design Specification sheet for a pressure relief valve. The relevant settings and operating parameters are included along with manufacturer, company approval sign off and reference numbers for the specification sheet.

Having carried out this desk based review of the maintenance philosophy and associated documentary evidence, in the form of written policy, standards, procedures, record sheets, specification sheets etc., the regulator is confident that the operators management of maintenance is BAT for EPR.

To further test the operators' systems the desk based meeting considered pulling certain records ad hoc from the company system. In this case the system was probed for a particular pressure relief valve. The SAP system was navigated through the following menu > Newport satellite > component > compressors > PSVs > PSV 9103 (this was the component associated with the specification sheet seen) > planned maintenance history record. This showed what had been done, when and by who: due May 2018, completed earlier during March 2018 shutdown. This item also appeared on the forward look list: IP24. As already described a technical authority in BOC authorises the WSE and an approved contractor, in this case Severn Unival carries out the maintenance – a glance at their website reveals that this company are part of the Severn Glocon Group PLC – they state that they have 30 years of experience in valve design, operation, performance and reliability.

A brief discussion about BOC site personnel and maintenance competence provided verbal evidence, backed up by records, that time served engineers or apprentices are developed through a system called Traccess, i.e. a development and training record. This is embedded into the Integrated Management System, where job description, training records, induction, job title and job description are held.

As stated earlier the evidence gathered so far is sufficient to demonstrate BAT for maintenance for the Newport satellite plant. NRW will now conduct an inspection to assess some of the implementation of the policies and procedures relating to maintenance and how things are carried out on the ground.

END.

Cyfoeth Naturiol Cymru Natural Resources Wales	**EPR Compliance Assessment Report**	**Report ID: CAR_NRW0034906**

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

Site	Newport Steam Reforming Plant	Permit Ref	VP3736EF
Operator/Permit holder	The BOC Group Limited	Date	10/07/2018

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.