

Compliance Assessment Report CAR_NRW0052055

Permit being assessed: JP3632ZH.

For: Barry CHP , **held by:** Dow Silicones UK Limited

At: Wimborne Road - Dock 2, Barry, Vale of Glamorgan, CF63 3DH.

Type of assessment: Site Inspection,

Reason: Routine.

On: 15/04/2026 between 09:00 and 17:00.

Parts of permit assessed: 1.1.1(a) and 3.1.2 and 2.3.2 and 3.6. and 4.2.2.

NRW Lead Officer: Geraint Harris, accompanied by Regina Simmons.

Report sent to: Environmental Manager, Environmental Manager, on 05/06/2026.

1. Summary of our findings (full details in section 4)

Part of permitted activity assessed (compliance criteria)	Assessment result	Permit condition
IR3A(2) - Installations - Emissions and monitoring - Emissions to air	Action only (X)	
IR2C - Installations - Operations - Operating techniques	Action only (X)	
IR3H - Installations - Emissions and monitoring - Monitoring for the purposes of the Industrial Emissions Directive (includes LCP)	Action only (X)	
IR1A - Installations - Management - General Management	Action only (X)	
IR1A - Installations - Management - General Management	Action only (X)	
IR4B - Installations - Information - Reporting	Assessed (A)	

Result types are explained in more detail in the 'Important Information' section below.

Total non-compliances recorded	Total non-compliance score
0	0

How we use the non-compliance score to calculate your annual fee is explained in the 'Important Information' section below.

2. What action is required?

Criteria	Action needed	Complete by
IR3A(2)	Action 1: Dow is therefore requested to provide a revised calculation and an updated reported figure for 2025. Given that the plant operates solely on natural gas, emissions of SO ₂ would be expected to be low but not zero, and this should be reflected in the reported data. Due 06th July 2026.	06/07/2026
IR2C	Action 2: Dow is therefore required to provide evidence confirming that the correct oxygen reference conditions are applied within Envirosoft, for example through a system screenshot similar to that discussed during the audit and copied below, showing the configured oxygen correction parameters. Due 06th July 2026.	06/07/2026
IR3H	Action 3: Dow is therefore requested to confirm the number of invalid days during 2025, including: - the total number of invalid hours, - the number of days exceeding the “more than three invalid hours” threshold, and - a breakdown of the causes (e.g. CEMS maintenance, malfunction).	06/07/2026
IR1A	Action 4: Dow shall undertake a review of the maintenance strategy for critical combustion control equipment on Unit FB, including air dampers and actuators, and provide NRW with: - details of current inspection and maintenance frequencies; - findings from the review into why the failure was not identified prior to the incident; and - any actions implemented to strengthen preventative maintenance and asset management controls.	06/07/2026
IR1A	Action 5: Dow shall provide NRW with details of the risk assessment, operational procedures and contingency planning in place for managing steam demand during periods of reduced combustion plant availability (including maintenance and fault scenarios). This should include: - assessment of high-load operation of Unit FB; - any operational limits, safeguards or interlocks in place; and - how loss of boiler redundancy is managed within the site’s management system.	06/07/2026

Compliance criteria codes are listed in the ‘Important information’ section below.

3. What will happen next?

Any non-compliance we have identified and recorded on this form is an offence. It can result in criminal prosecution and/or suspension or revocation of your permit.

You are non-compliant with your permit.

We are currently considering taking enforcement action against you for the non-compliance recorded above. We will contact you in due course.

4. Details of our assessment

Dow CHP

A site visit was undertaken on the 15th of April 2026 and the following points were discussed.

1. LCP Surrender

Dow have formally submitted a normal permit variation application to remove three high-pressure boilers and associated plant from the existing LCP permit.

Following these changes, the remaining combustion plant will fall within the scope of the Medium Combustion Plant (MCP) regime. Dow therefore intend to:

- Downgrade the permit from LCP to MCP, and
- Remove the current 1,500-hour annual operating limit applied to the remaining two 24 MW boilers.

An update was provided by Dow regarding the status of the LCP surrender process. Dow confirmed that the process remains ongoing. There were no issues identified during the visit. However, Dow indicated that the LCP may need to remain operational for a few additional months beyond the originally planned timeline. Given the current length of the permitting queue, it is anticipated that this minor extension will not have a material impact on the permit.

2. Sulphur and Dust Annual Emissions

The permit requires that emissions of sulphur dioxide (SO₂) and dust from the LCP (emission points A1–A5) are determined “6-monthly by calculation” rather than by continuous monitoring. In addition, Dow is required to report total annual emissions to air (tonnes) of SO₂ and dust for each LCP under the annual reporting requirements (Table S4.3) using the IED AR1 methodology.

For gas-fired plant, this typically involves calculating SO₂ emissions from the fuel sulphur content and annual thermal input, in accordance with the Electricity Supply Industry IED Compliance Protocol (Table L2-6, page 183), rather than direct measurement. On this basis, while dust emissions from natural gas combustion may reasonably be reported as zero, SO₂ emissions would normally be expected to be non-zero, albeit low.

Dow has reported zero SO₂ emissions in its IED AR1 submission for the previous reporting year. Given the requirement to calculate emissions based on fuel use, and the reported annual energy input (e.g. 2250.6 TJ), this result appears inconsistent with standard calculation approaches.

Action 1: Dow is therefore requested to provide a revised calculation and an updated reported figure for 2025. Given that the plant operates solely on natural gas, emissions of SO₂ would be expected to be low but not zero, and this should be reflected in the reported data. **Due 06th July 2026.**

3. Oxygen Correction Factors

Dow was required to demonstrate that emissions reported from the CHP plant are corrected to the appropriate reference conditions (oxygen, temperature, pressure and moisture) in line with the IED Compliance Protocol.

During the site meeting, this was discussed with Dow in relation to the operation of their CEMS and associated data handling systems. The following points were confirmed:

- The system uses dry extractive sampling, which is standard for gas turbine plant and consistent with the JEP IED Compliance Protocol.
- Report outputs confirm that measurements are presented on a dry basis.
- For gas turbine CEMS measuring NO_x, CO and O₂ on a dry basis, the JEP IED Compliance Protocol does not require flue gas pressure measurement, as pressure is only needed for dust monitoring, wet gas correction or flow calculations, none of which apply in this case.
- Similarly, temperature measurement is not required where it is not part of the correction chain. For NO_x and CO measurements corrected using oxygen only (on a dry basis), temperature is not used in the correction and is therefore not required.

Dow attempted to demonstrate the oxygen correction inputs within the Envirosoft system during the meeting, however they were unable to access the relevant data at that time and indicated that support from Envirosoft may be required.

There is no reason to suspect that the correction approach is incorrect, and it was noted that data from Dow's PI system (which applies an independent oxygen correction) correlates well with the Envirosoft outputs. However, it has been approximately eight years since this aspect was last verified by the regulator.

Action 2: Dow is therefore required to provide evidence confirming that the correct oxygen reference conditions are applied within Envirosoft, for example through a system screenshot similar to that discussed during the audit and copied below, showing the configured oxygen correction parameters.

Due 06th July 2026.

2018 example:

The image displays three side-by-side screenshots of the CEMSuite configuration software interface. Each screenshot shows a configuration window for a specific unit: Unit a, Unit b, and Unit FB. The interface includes a top navigation bar with tabs for 'About', 'Group information', and 'Characteristics'. Below the navigation bar, there are input fields for 'Username' and 'Password'. The main configuration area is divided into several sections: 'Parameter sets for group', 'Selected parameter set', and 'Normalisation'. The 'Parameter sets for group' section contains a table with columns 'Type', 'Name', and 'Comments'. The 'Selected parameter set' section shows the 'Name' and 'Comments' of the selected parameter set. The 'Normalisation' section contains a table with columns 'Active?', 'Ref.', and 'Unit', listing parameters like Temperature, Oxygen, Pressure, and H2O.

Type	Name	Comments
1	Default	Default

Type	Name	Comments
2	Default	Default

Type	Name	Comments
3	Default	Default

Parameter	Active ?	Ref.
Temperature	False	0
Oxygen	True	15
Pressure	False	1013
H2O	False	0

Parameter	Active ?	Ref.
Temperature	False	0
Oxygen	True	15
Pressure	False	1013
H2O	False	0

Parameter	Active ?	Ref.
Temperature	False	0
Oxygen	True	3
Pressure	False	101
H2O	False	0

4. DAHS data integrity and audit trail

Where a Data Acquisition and Handling System (DAHS) allows for manual data corrections, it is expected that the original data remains unchanged, with any amendments clearly recorded through an audit trail of retrospective edits.

This was discussed with Dow during the site visit on the 15th April 2026. Dow explained and demonstrated how emissions data are transferred from the Envirosoft system and how data integrity is maintained throughout the process.

Based on the demonstration provided, there is no scope within the system for manual modification of original emissions data, and therefore no requirement for retrospective correction logs in this case. The arrangements in place appear to maintain the integrity of the original monitored data through to reporting.

5. CEMS data availability and invalid day assessment

The IED requires that any calendar day in which more than three hourly average values are invalid,

during normal operation, due to malfunction or maintenance of the CEMS, shall be treated as an invalid day for ELV compliance purposes.

During the site visit on the 15th April 2026, Dow confirmed that it had previously been agreed with NRW that invalid days would be reported by exception, i.e. only where the number of invalid days exceeds the reporting threshold (10 days per year), in line with permit condition requirements. However, for regulatory assurance purposes, NRW requires a clearer understanding of data availability performance for the most recent reporting year (2025).

Action 3: Dow is therefore requested to confirm the number of invalid days during 2025, including:

- the total number of invalid hours,
- the number of days exceeding the “more than three invalid hours” threshold, and
- a breakdown of the causes (e.g. CEMS maintenance, malfunction).

Due 06th July 2026.

Quarterly Monitoring

Q1

NRW received Dow’s Q1 (January to March 2026) monitoring returns within the required reporting timescale. During this period, on the 23rd March 2026, Dow notified NRW via submission of a CEM3 form that the Annual Surveillance Tests (ASTs) for NO_x had failed at emission points A1 and A3. Emission point A2 was not tested due to plant availability constraints.

The Q1 monitoring returns reported no ELV exceedances. However, given the failure of the ASTs, the reliability of the reported NO_x emissions data for this period is uncertain. The AST failure indicates that the CEMS is not currently demonstrating compliance with EN 14181 requirements, representing a potential non-compliance with permit conditions relating to monitoring and calibration, pending confirmation following root cause investigation.

EN 14181 requires that, where calibration validity tests fail, the causes shall be identified and rectified, and new parallel measurements carried out in accordance with QAL2 within six months. Where necessary, the CEMS must be maintained or adjusted prior to recalibration. However, additional QAL2 measurements may not be feasible due to the time constraints associated with the planned removal of the CEMS in the coming months as part of wider site changes.

In this context, it is essential that the root cause of the observed bias is fully understood and evidenced. In particular, establishing the cause of the calibration failure is necessary to assess the validity and reliability of emissions data reported since the last QAL2 exercise. Without this understanding, there remains uncertainty as to whether previously reported data is representative of actual stack emissions.

Follow-up queries have therefore been issued to Dow to understand the potential causes of the AST failures, including matters relating to:

- sampling location,
- sampling line configuration, and
- operational load conditions at the time of testing.

The outcome of this investigation will be assessed separately. These failed ASTs will therefore be addressed in a subsequent CAR Form, once sufficient information has been provided Dow to determine the root cause and any implications for data validity.

Schedule 5 Part B's

Dow submitted the required Schedule 5 Part B notifications for the carbon monoxide (CO) exceedances at emission point A2 (Unit FB) on the 31st December 2025, in accordance with the action specified within the Compliance Assessment Report CAR_NRW0050087. Permit condition 3.1.2 requires that emission limit values (ELVs) specified in Schedule 3 are not exceeded, including the daily mean CO limit of 110 mg/m³ for the A2 high-pressure boiler. Both the 31st May 2025 and the 21st August 2025 incidents constituted category 3 non-compliances and were captured in car foms CAR_NRW0050087 and CAR_NRW0049276.

For the 31st May 2025 incident, the exceedance was associated with instability in air flow during otherwise steady operation of the unit. Dow's subsequent investigation identified that a sticking air damper mechanism was the root cause, which led to oscillating airflow and corresponding fluctuations in burner CO levels. The instability resulted in elevated CO emissions, which have been addressed in CAR_NRW0049276. Dow attempted to stabilise conditions; however, these efforts were unsuccessful, and the unit was subsequently shut down, resulting in an immediate reduction in emissions. The unit was taken offline to allow maintenance to be undertaken, during which the faulty mechanism was serviced and the piston replaced due to a detected leak. These actions resolved the issue, and the unit remained offline until the necessary maintenance was completed. Although the exceedance occurred over a relatively short period, the unit operated for more than six hours within the 24-hour period, resulting in a breach of the daily mean ELV.

In accordance with NRW guidance on compliance assessment, regulatory officers are required not only to record the immediate breach but also to identify and assess the underlying root cause of the non-compliance. In this case, the identified mechanical failure indicates a potential issue with plant maintenance and inspection regimes. Permit condition 1.1.1 requires Dow to manage and operate activities in accordance with a written management system that identifies and minimises risks of pollution arising from operations, maintenance, incidents and non-conformances. While the immediate cause has been rectified, further investigation is therefore warranted to assess whether maintenance schedules, inspection procedures, and asset management arrangements were sufficient to prevent or minimise the likelihood of this failure.

Action 4: Dow shall undertake a review of the maintenance strategy for critical combustion control equipment on Unit FB, including air dampers and actuators, and provide NRW with:

- details of current inspection and maintenance frequencies;
- findings from the review into why the failure was not identified prior to the incident; and
- any actions implemented to strengthen preventative maintenance and asset management controls.

Action response due 06th July 2026.

The 21st August 2025 exceedance has been more fully detailed within the submitted Schedule 5 Part B. The daily mean CO concentration was reported as 129 mg/m³, exceeding the ELV of 110 mg/m³. The incident occurred during a ramp-up in operation to meet site steam demand, during which air flow increased but burner oxygen levels reduced, leading to fluctuations in combustion conditions and elevated CO emissions.

Dow identified that this event took place under atypical operating conditions, as Unit A was offline for statutory maintenance and both smaller boilers were unavailable due to faults (one due to valve failure and the other following a trip). As a result, Units B and FB were required to supply the entire site steam demand. Consequently, Unit FB ramped up beyond its normal operating range, exposing suboptimal combustion tuning at higher loads and contributing to the exceedance.

In response to the incident, Dow has proposed operational measures to prevent recurrence. Specifically, they have committed to ensuring that at least one smaller boiler remains available during maintenance activities on a main boiler. This will avoid the need to operate Unit FB outside its normal operating envelope and is intended to reduce the likelihood of combustion instability and associated CO exceedances during periods of high demand.

The immediate cause of the exceedance was poor combustion performance during high-load operation, driven by reduced burner oxygen and unstable air-to-fuel ratios during ramp-up. The underlying root cause was the operation of Unit FB outside its normal operating envelope due to site-wide plant configuration constraints, resulting from the unavailability of other boilers. This led to Unit FB operating at higher loads where combustion tuning was suboptimal, exposing limitations in performance under these conditions.

In accordance with permit condition 1.1.1, Dow is required to operate the installation using a management system that identifies and minimises risks of pollution arising from operations, maintenance and abnormal situations. The operation of Unit FB at elevated loads under these conditions is considered reasonably foreseeable, particularly during periods of planned maintenance and reduced plant availability. The need to redistribute load and meet site steam demand under such scenarios is inherent to plant operation and should therefore be accounted for within operational planning, plant design, and the site management system.

The exceedance indicates that the risks associated with operating Unit FB outside its normal tuning range were not fully identified or mitigated. This suggests a gap in the assessment of abnormal operating scenarios, contingency planning, and operational controls, contrary to the requirements of permit condition 1.1.1.

In particular, it is unclear:

- why high-load operation of Unit FB had not been assessed and optimised (or constrained) in advance;
- why no operational limits, safeguards or interlocks were in place to prevent operation beyond stable combustion conditions; and
- why the loss of boiler redundancy during maintenance and fault conditions was not adequately risk assessed within the site's management system.

These points indicate that, while the immediate operational cause has been addressed, further review is required to ensure that foreseeable operating scenarios are fully understood, controlled, and managed to prevent recurrence.

While the information provided suggests a potential gap in the assessment and management of foreseeable operating scenarios, further information is required to determine whether this represents a breach of permit condition 1.1.1. Therefore, the following action has been raised to obtain additional evidence prior to making a determination on root cause non-compliance.

Action 5: Dow shall provide NRW with details of the risk assessment, operational procedures and contingency planning in place for managing steam demand during periods of reduced combustion plant availability (including maintenance and fault scenarios). This should include:

- assessment of high-load operation of Unit FB;
- any operational limits, safeguards or interlocks in place; and
- how loss of boiler redundancy is managed within the site's management system.

Action response due 06th July 2026.

Annual Report

NRW received Dow's annual report in line with permit condition 4.2.2, providing a review of environmental performance for 2025, including monitoring data, operational context and an interpretive assessment of emissions.

The report confirms that, emissions performance was generally compliant throughout the reporting period. NO_x emissions remained consistently within permit limits across all monitored units, demonstrating stable long-term performance. CO emissions were also largely compliant, although three short-term exceedances of the daily mean limit were recorded during the year, associated with operational issues.

Fuel consumption and associated CO₂ emissions were slightly higher than in the previous year, primarily due to increased electricity export during 2025. Despite this increase, overall plant efficiency remained consistent with operational expectations, with variations in heat and electrical efficiency reflecting changes in plant configuration and availability of turbines throughout the year.

In summary, the report demonstrates that emissions are effectively controlled, monitoring

arrangements are appropriately implemented, with only minor deviations from permit limits. This report has been accepted.

End.

If you have any queries about this report, or to discuss completion of any actions, please contact the NRW Officer named above.

Important information

Legal status of this report

Your permit is issued to you under the Environmental Permitting Regulations. You have a responsibility to comply with the conditions of your permit and prevent pollution/harm of the environment. You must also ensure that you comply with any other relevant legislation that may apply to your site's operations.

This report explains the findings of our assessment and any action you are required to take. We categorise non-compliance using our guidance for assessing non-compliance at regulated sites.

When we find potential non-compliance/s we will normally give you advice on how to maintain compliance.

To correct non-compliance, we may:

- require you to take specific actions
- issue a notice
- review the conditions of your permit.

Any advice and guidance we give will be without prejudice to any other enforcement response that we consider may be required.

Assessment results and non-compliance categories (used in section 1):

Assessment result	Description
Assessed (A)	Assessed or assessed in part, no evidence of non-compliance found
Action only (X)	Action required for the permit condition assessed to avoid non-compliance. No non-compliance scored at this time
Ongoing (O)	Ongoing non-compliance, not scored

Non-compliance category	Description	Score
C1 Major	Potential to have a major, serious, persistent and/or extensive impact or effect on the environment, people and/or property	60
C2 Significant	Potential to have a significant impact or effect on the environment, people and/or property	31
C3 Minor	Potential to have a minor or minimal impact or effect on the environment, people and/or property	4
C4 No environmental impact	Non-compliance at a regulated site that cannot foreseeably have any impact on the environment, people and/or property	0.1

How we use assessment scores

The number and severity of non-compliances recorded in a year will affect your annual subsistence fee the following year. A non-compliance factor is added to your site's Operator Performance Risk Appraisal (OPRA) score when we calculate your fee to reflect the additional resource we use to assess permit compliance.

If your assessment result in Section 1 is suspended, what does this mean?

In line with our guidance, we may suspend scores for up to six months to allow time for remedial action to be taken. Suspended scores will be re-instated if the action is not completed.

Full list of Industry compliance criteria (used in section 1 and 2):**1. Management**

- IR1A – General management
- IR1B – Finance (only applicable to Landfill)
- IR1C – Energy efficiency
- IR1D - Efficient use of raw materials
- IR1E - Avoidance, recovery and disposal of wastes produced by the activities
- IR1F - Multiple operator installations

2. Operations

- IR2A – Permitted activities
- IR2B – The site
- IR2C – Operating techniques
- IR2D – Technical requirements
- IR2E – Improvement programme
- IR2F – Pre-operational conditions
- IR2G – Landfill engineering (only applicable to Landfill)
- IR2H – Waste acceptance (only applicable to Landfill)
- IR2I – Leachate levels (only applicable to Landfill)
- IR2J – Closure and aftercare (only applicable to Landfill)
- IR2K – Landfill gas management (only applicable to Landfill)

3. Emission and Monitoring

- IR3A(1) – Emissions to water
- IR3A(2) – Emissions to air
- IR3A(3) – Emissions to land
- IR3B – Emissions of substances not controlled by emission limits
- IR3C – Odour
- IR3D – Noise and vibration
- IR3E – Monitoring
- IR3F – Pests
- IR3G – Air quality management plans
- IR3H – Monitoring for the purposes of the Industrial Emissions Directive (this heading includes Large Combustion Plants)
- IR3I – Fire

4. Information

- IR4A – Records
- IR4B – Reporting
- IR4C – Notification

Enforcement response

Any non-compliance with a permit condition is an offence and we may take legal action against you. Action we take can include prosecution, serving a notice on you and/or suspension or revocation of your permit. See our Enforcement and Sanctions Guidance for further information.

Data protection notice

You should make sure that anyone named in this report knows that the information it contains will be processed by Natural Resources Wales to fulfil its regulatory and monitoring functions and to maintain the relevant public register(s).

We may also use and/or disclose the report in connection with:

- offering or providing you with our literature or services relating to environmental matters
- consulting with the public, public bodies and other organisations (e.g. 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 our service
- Freedom of Information Act or Environmental Information Regulations requests.

We may also pass it on to our agents or representatives to do these things on our behalf.

Disclosure of information – this report will be available to view on-line

If you think this report contains commercially confidential information that should not be placed on our public register, you must contact your local Natural Resources Wales office within **fifteen working days** of receiving this report, using the contact details in the accompanying email or letter. You must give a full explanation of why it should not be added to our public register, including specifying which information is commercially confidential. We will assess your request and respond to you within twenty working days to let you know if we agree to your request.

Disputing the Content of this Compliance Assessment Report Form

If you disagree with the content of this Compliance Assessment Report form, you should submit your concerns, in writing, to the regulating officer who issued it within **15 working days** of its issue. This will be treated as a **Stage 1 review**.

If you are not satisfied with the outcome of the stage 1 review, you may request a **Stage 2 appeal**. This request must be submitted **within 21 working days** of receiving the response from the stage 1 review.

Further details on our review and appeal process are available at: [Natural Resources Wales / Appeal a regulatory decision from Natural Resources Wales](#)

Concerns Not Related to the Content of this Compliance Assessment Report Form

If your concerns do not relate to the content of the Compliance Assessment Report form, you should first attempt to resolve the issue with the regulating officer or their line manager.

If the issue remains unresolved, please contact our **Customer Contact Team**:

- **Telephone:** 0300 065 3000 (Monday to Friday, 09:00–17:00)
- **Email:** enquiries@naturalresourceswales.gov.uk

They will provide details on how to escalate your concerns through our **Complaints and Commendations procedure**.

If you are dissatisfied with our response, you may contact the **Public Services Ombudsman for Wales**:

- **Telephone:** 0300 790 0203
- **Email:** ask@ombudsman.wales

Welsh Language Standards

We are committed to establishing Natural Resources Wales as a naturally bilingual organisation. We will provide compliance reports in your preferred language.