

Compliance Assessment Report CAR_NRW0050816

Permit being assessed: BR9685IX.

For: Barry Silicone Plant, **held by:** Dow Silicones UK Limited

At: Cardiff Road, Barry, Vale of Glamorgan, CF63 2YL.

Type of assessment: Report/Data Review,

Reason: Other.

On: 24/11/2025 between 09:00 and 16:00.

Parts of permit assessed: 1.1.1 and 3.2.1 and 4.2.3 and 3.1.2 and 1.2 and 1.3 and 1.4. and 4.3.1(b) .

NRW Lead Officer: Geraint Harris.

Report sent to: Environmental Manager, Environmental Manager, on 23/02/2026.

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

Part of permitted activity assessed (compliance criteria)	Assessment result	Permit condition
IR3B - Installations - Emissions and monitoring - Emissions of substances not controlled by emission limits	C2 Significant	3.2.1
IR1A - Installations - Management - General Management	C2 Significant	1.1.1(a)
IR1C - Installations - Management - Energy Efficiency	Assessed (A)	
IR1D - Installations - Management - Efficient use of raw materials	Assessed (A)	
IR1E - Installations - Management - Avoidance, recovery and disposal of wastes produced by the activities	Assessed (A)	
IR3A(1) - Installations - Emissions and monitoring - Emissions to water	Assessed (A)	
IR3A(2) - Installations - Emissions and monitoring - Emissions to air	Assessed (A)	
IR4B - Installations - Information - Reporting	Assessed (A)	
IR4C - Installations - Information - Notification	Assessed (A)	

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

Total non-compliances recorded	Total non-compliance score
2	62

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
IR3B	To ensure the failure mechanism cannot re emerge, Dow has installed piping spec valves fitted with locking plates, removing the need for operators to remove the valve handle during isolation, one of the key contributors to loosening of the stem packing arrangement and the creation of a leak path in the failed valve. In addition, Dow has eliminated several sections of small bore tubing, reducing connection points and overall leak risk, and has remade all joints in the modified section of the system. A multidisciplinary inspection and testing programme was completed before the system was returned to service, and a regularised inspection regime has been put in place for ongoing assurance.	Already completed
IR1A	Develop a functioning system to identify, track, and escalate lower impact EH&S bad actors. Dow must undertake a formal review of the fire protection and siting arrangements for the stored spare cylinders located near the main distillation plant. Although the in service cylinders are protected by a fire wall due to their proximity to the chlorosilane pump set, the spare cylinders are positioned close to an area where a contained pool fire could occur within the plant footprint.	31/03/2026

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

Hydrogen Chloride Release

On the 4th November 2025 at 14:41, a release of anhydrous hydrogen chloride (HCl) occurred at the W941 facility. The incident resulted from the failure of the instrument-tubing isolation valve connected to the East Bay HCl cylinder. An alarm was raised at 14:42, triggering the site's emergency

response protocol. Emergency personnel responded promptly and deployed fire-water scrubbing systems, both upwind and downwind, to mitigate the effects of the release. The leak continued until 15:11, when the emergency response team successfully isolated the affected cylinder and brought the release to an end.

The W941 process uses high-purity anhydrous HCl to feed the reactor catalyst bed. The system operates with these HCL cylinders being changed approximately every 3–4 weeks under a duty/standby arrangement. The East Bay cylinder involved in the incident had been newly connected on the 17th of October 2025. Dow’s average consumption rate of, combined with the 100kg remaining in the cylinder after the incident, led to the calculation that 129kg of HCl had been released over a 29-minute period. One contractor located downwind underwent a precautionary medical assessment; no treatment was required. The plant was subsequently shut down pending investigation, and both RIDDOR and Schedule 5 notifications were submitted in accordance with regulatory requirements.

Dow’s dispersion modelling assumed a 129 kg release over 29 minutes and did not account for the mitigating effects of the fire-water curtains, and is therefore conservative. For context, the Short-Term Exposure Limit (STEL) for HCl is 5 ppm over 15 minutes, while the Immediately Dangerous to Life and Health (IDLH) threshold is 45 ppm over 30 minutes. Modelled impacts remained within the site boundary, and although the contractor bay opposite the cooling system was downwind during the release, this area is typically occupied only around 10% of the time, except during maintenance activities.

NRW considers the release of hydrogen chloride (HCl) from the valve to be a fugitive emission; permit condition 3.2.1 is therefore the most applicable condition.

To determine a breach, NRW assesses:

1. **Whether an emission occurred** – Dow’s investigation confirms a release of HCl did occur.
2. **Whether the operator had implemented all appropriate measures prior to the incident** – assessed below.
3. **Whether the emission caused pollution** – Under Part 1, Section 2 of the Environmental Permitting (England & Wales) Regulations 2016, “pollution” means any emission arising from human activity which may be harmful to human health or the environment, or cause offence to a human sense. Given HCl’s toxic and corrosive properties and the fact the release occurred in an area routinely occupied by employees and contractors, NRW considers the threshold of “may be harmful to human health” is clearly met. The “pollution” limb is therefore satisfied.

Consequently, NRW’s determination turns on whether all appropriate measures to prevent or minimise fugitive emissions of HCl were implemented and maintained prior to the incident.

Dow’s routine practice of removing the valve handle during cylinder changes directly compromised the valve stem sealing arrangement and created a progressive leak path that would not have occurred under normal design-intended use. Dow’s internal investigation confirms that repeated handle removal may have loosened the gland nut and degraded the integrity of the valve stem packing arrangement, contributing to the formation of a leak path. Further indication of this failure mode comes from the investigation of the west-bay valve. Although the handle was in place when received, the

stem-retaining nut was found not to be fully tight, and staining consistent with early leakage was observed. The strip-down report notes that this component may have been previously removed for IOES reasons, as seen on the east-bay arrangement. However, no leak test was conducted because the as-received condition might not reliably represent the valve's in-service state, and any test would have been inconclusive. Despite these limitations, the findings are consistent with the early stages of the same degradation mechanism observed on the failed valve, supporting NRW's view that the failure mode was progressive, foreseeable and linked to operational practices.

The three-piece construction of the Swagelok tubing-specification valve incorporated encapsulated fasteners that created hidden corrosion sites which could not be detected through visual inspection. The failure mechanism was accelerated by the use of Monel K500 fasteners, a material with significantly lower resistance to chloride-rich acidic environments than the Hastelloy-C valve body. Once minor stem leakage occurred, acidic condensate accumulated inside the concealed fastener cavity, leading to severe and accelerated corrosion of the retaining stud. This design susceptibility, coupled with the mismatch in corrosion resistance, made the valve vulnerable to the exact failure mode that occurred, demonstrating that it did not represent an "appropriate measure" for toxic gas containment.

The three-piece construction of the Swagelok tubing-specification valve incorporated encapsulated fasteners that created hidden corrosion sites which could not be detected through visual inspection. The failure mechanism was accelerated by the use of Monel K500 body fasteners, a material with significantly lower resistance to chloride-rich acidic environments than the Hastelloy-C valve body. Once minor stem leakage occurred, acidic condensate accumulated inside the concealed fastener cavity, leading to severe and accelerated corrosion of the retaining stud. During NRW's post-incident site visit, Dow explained that they likely could not have used Hastelloy-C fasteners in place of Monel because Hastelloy-C components can "feel" tight even when they are not fully tightened, increasing the likelihood that a gland or fastener could become loose without detection by operators. For this reason, Monel was selected for the fasteners despite its significantly lower resistance to chloride-rich acidic environments compared with the Hastelloy-C valve body. Dow also confirmed that the supplier would not retrofit the Monel fasteners with Hastelloy-C alternatives, indicating that this was due to design constraints rather than cost considerations. Taken together, these factors show an inherent design susceptibility, exacerbated by material mismatch, tightening uncertainty, and encapsulated fasteners that left the valve vulnerable to the failure mode observed. Accordingly, this valve configuration did not represent an appropriate measure for containing a high-hazard toxic gas such as anhydrous HC

Dow's inspection and maintenance regime was also inadequate for detecting or preventing the developing failure. The system relied on routine three-monthly visual inspections, even though such inspections could not identify corrosion hidden behind the valve body sleeve or detect loosening of the gland nut caused by routine handle removal. The West bay standby valve, which had only been in service for approximately half the duration of the failed valve, also showed evidence of early deterioration. The strip-down report identified green staining on the encapsulated lower fastener, Verdigris associated with chloride-driven corrosion, in a location that could not have been detected during routine visual inspection due to the enclosed design of the fastener cavity. The presence of early corrosion in the concealed fastener region is consistent with the same progressive degradation

mechanism observed on the failed valve. These findings indicate that the corrosion mechanism was progressive, foreseeable, and would likely have been detectable had more robust inspection methods been in place. Furthermore, despite a history of minor leaks dating back several years, Dow did not enhance inspection frequency, introduce targeted leak-detection monitoring, or escalate the issue through a formal “bad actor” process.

Dow has since installed such HCL detectors, implicitly recognising this as a previous gap in control. Combined with the absence of condition monitoring on safety-critical components, the detection arrangements were insufficient for a system containing high-pressure, highly toxic gas.

Finally, Dow’s management systems did not ensure that operational, engineering and EH&S risks were adequately controlled. Their own root-cause analysis identifies that standards, Most Effective Technology (MET) requirements and design specifications were not adequate or not implemented. Additionally, there was no functioning management system to identify and escalate lower-impact but repetitive EH&S issues, despite several historical leaks on both the East and West bay systems. Only following the incident did Dow conduct a full site audit of similar valves and replace the tubing-specification valve with a piping-specification design featuring a locking plate, demonstrating that more robust and reasonably practicable measures were available prior to the incident but were not implemented.

Collectively, these deficiencies demonstrate that Dow had not implemented all appropriate measures to prevent or minimise fugitive emissions of HCl. The failure was foreseeable, progressive and preventable, and was ultimately rooted in a combination of unsuitable equipment design, unsafe operational practices, ineffective inspection and monitoring, and insufficient management oversight. In this case, an emission of HCl clearly occurred, Dow had not implemented all appropriate measures prior to the incident, and the emission met the definition of “pollution” under the Environmental Permitting (England & Wales) Regulations 2016, as it may have been harmful to human health. Accordingly, all three elements of permit condition 3.2.1 have been satisfied, and NRW therefore considers this to constitute a breach of permit condition 3.2.1.

Assessment of Severity – Category 2 Non-Compliance

To determine the severity of the non-compliance, NRW must consider the reasonably foreseeable impact of the breach on people, the environment, and property. While the actual harm was minimal in this instance, the assessment must consider what could realistically have occurred under slightly different conditions.

Several credible scenarios demonstrate that a more significant human health impact was reasonably foreseeable. Given these factors, it is reasonably foreseeable that significant injury or a significant effect on human health could have occurred to employees or contractors working in or near the W941 plant. Had personnel been present in the immediate vicinity of the release point, they could have sustained serious respiratory harm due to the acute corrosive nature of HCl gas.

Based on Dow’s assessment, approximately 129–130 kg of hydrogen chloride (HCl) vapour was released during a 29-minute loss-of-containment event. As accurately as possible, Dow used the CHEF model and accounted for auto-refrigeration, the rapid cooling of the gas as it depressurises. Because this cooling reduces vapour-phase release rates, Dow modelled the discharge at both the ambient

temperature at the time (14 °C) and at 0.1 °C, representing the temperature of the vapour immediately after depressurisation. From these inputs, Dow derived a representative average release rate of 0.07347 kg/s at 15 °C, which they consider to be the most realistic reflection of the actual release behaviour.

Acute Exposure Guideline Levels (AEGLs) provide a standardised framework for interpreting short-term chemical exposures:

- **AEGL-1 (1.8 ppm, 10 min):** noticeable irritation but not disabling
- **AEGL-2 (22 ppm, 10 min):** potential for serious or long-lasting adverse health effects, or impaired ability to escape
- **AEGL-3 (100 ppm, 10 min):** potentially life-threatening effects or death

Conservatism of CHEF and ALOHA Modelling Tools

Both CHEF and ALOHA are widely recognised to be conservative modelling tools, designed to ensure that emergency planners and regulators do not underestimate the potential consequences of an environmental release. Their conservative tendencies include:

- simplifying terrain and dispersion assumptions;
- using upper-bound or “safe-side” parameters;
- overpredicting concentration envelopes relative to more complex dispersion models.

As such, the outputs should be considered credible worst-case estimates, not precise predictions of actual downwind concentrations.

It is important to note, however, that modelling with CHEF and ALOHA inherently represents a worst-case scenario. These models do not account for the mitigating effect of the site’s firewater system, which activated within four minutes of the release and would have suppressed, absorbed, or otherwise reduced the effective dispersion of HCl vapour.

CHEF Dispersion Modelling – Actual Release

Modelling conducted using the CHEF dispersion tool produced the following downwind concentrations for the ~130 kg release:

- 10 ppm (visible cloud threshold): 284 m
- AEGL-1 (1.8 ppm): 669 m
- AEGL-2 (22 ppm): 191 m
- AEGL-3 (100 ppm): 90 m

ALOHA Dispersion Modelling – Actual Release

ALOHA modelling of the same 3.25 mm aperture at 128 kg over 29 minutes produced the following distances:

- AEGL-1: 892 m
- AEGL-2: 240 m
- AEGL-3: 109 m

ALOHA did not output a 10 ppm distance for these temperature-run scenarios.

Visibility of the HCl Cloud

Hydrogen chloride readily forms a dense white aerosol cloud when mixed with atmospheric moisture. The concentration at which this becomes visually perceptible is approximately 10 ppm. Therefore, the 284 m 10 ppm distance predicted for the actual release provides an important basis for interpreting eyewitness observations. This is consistent with reports of a white cloud drifting toward and into the contractors' car park, aligning with the predicted visibility envelope.

Assessment of Potential (Worst-Case) Impacts

To fully consider both actual and reasonably foreseeable potential impacts, NRW undertook additional modelling covering realistic worst-case scenarios. A 7.00 mm aperture was selected to represent a credible full-bore loss of containment, and three source terms were assessed:

1. A 29-minute release, consistent with the duration of the actual event;
2. A 341 kg release, representing Dow's estimate of the remaining cylinder inventory at the time of the incident;
3. A 600 kg release, representing the maximum possible inventory of a full cylinder.

These scenarios provide the required upper-bound assessment of potential off-site consequences.

CHEF Full-Bore Scenarios (7.00 mm Aperture)

Scenario	10 pp m	AEGL-1	AEGL-2	AEGL-3
341 kg over 17.41 min	598 m	1411 m	404 m	189 m
600 kg over 30.63 min	598 m	1411 m	404 m	189 m

These results show that a full-bore loss of containment would have produced a plume almost twice the visible extent of the actual event, and AEGL-1 concentrations extending well beyond 1.4 km.

ALOHA Temperature-Sensitivity – Full-Bore 600 kg

Across 0–30 °C release temperatures, ALOHA predicted:

- AEGL-1: 1900–2000 m

- AEGL-2: 509–536 m
- AEGL-3: 229–240 m

ALOHA Temperature-Sensitivity – Full-Bore 341 kg

Across the same temperature sweep:

- AEGL-1: 1900–2000 m
- AEGL-2: 509–536 m
- AEGL-3: 229–240 m

Conclusion

The dispersion modelling demonstrates that the actual 129–130 kg HCl release over 29 minutes generated a visible vapour plume to approximately 284 m, with AEGL-1 concentrations extending to 669–892 m under the most conservative ALOHA predictions. Under southerly wind conditions, the nearest public receptor lies approximately 430 m from the release point. In an unmitigated scenario, it is therefore possible that low-level (AEGL-1) concentrations could have reached this area.

In reality, firewater curtains were deployed within approximately 4 minutes, both upwind and downwind. This would have significantly reduced airborne concentrations by dissolving HCl into the water and suppressing plume travel. Neither CHEF nor ALOHA accounts for this mitigation, meaning the model outputs represent worst-case, unmitigated predictions. It is therefore unlikely that offsite receptors experienced AEGL-1 concentrations during the incident.

Only one on-site individual required precautionary medical assessment, with no injury or treatment required, consistent with short-term exposure well below harmful thresholds once mitigation was in place.

When considering a reasonably foreseeable worst case, including a full-bore release, the modelling shows that although AEGL-1 concentrations could extend significantly offsite under unmitigated conditions, AEGL-2 and AEGL-3 concentrations remain predominantly onsite, and the release rate in any full-bore scenario would naturally decline due to loss of cylinder pressure and auto-refrigeration. The early activation of firewater curtains would again provide significant additional mitigation, reducing both concentration and travel distance of the plume.

Taking all evidence into account, the conservative nature of the models, the rapid emergency response, the limited actual harm, and the reasonably foreseeable potential for more serious consequences, NRW considers this incident to meet the criteria for a Category 2 (Significant) non-compliance. Although actual impacts were minor, the event presented a credible and foreseeable potential for significant injury to onsite personnel under slightly different conditions, particularly in the early stage of the release before firewater application. These mitigations prevented a more serious outcome, but the underlying risk profile justifies Category 2 classification.

Although the actual consequences of the incident were limited, the breach of permit condition 3.2.1 is established on all three counts: an emission occurred, appropriate measures were not fully

implemented, and the emission constituted pollution. When considering the reasonably foreseeable consequences, it is clear that the release of a highly toxic substance such as HCl could have caused significant injury to workers under realistic alternative conditions. **Accordingly, NRW is issuing a Category 2 non-compliance against permit condition 3.2.1.**

Management system Failure

Permit condition 1.1.1(a) requires the operator to manage and operate the activities *in accordance with a written management system that identifies and minimises risks of pollution*, including those arising from operations, maintenance, accidents, incidents and non-conformances. Dow's management system did not identify or minimise pollution risks associated with HCl cylinder isolation valves. Non-standard isolation practice (routine handle removal) compromised stem sealing; the selected three-piece tubing-spec valve with encapsulated Monel fasteners was vulnerable to hidden corrosion in the presence of acidic condensate; inspection relied on visual checks that cannot detect concealed deterioration; "bad actor" escalation for repeated minor leaks was absent.

These management system deficiencies created a significant and reasonably foreseeable risk of pollution, which materialised as a 129 kg fugitive HCl emission requiring emergency intervention. The event had the potential to be more serious had conditions been different, for example, if the HCl cylinder had been full or if workers had been present in the immediate downwind area at the time of release.

NRW are required to identify and assess the root cause of any permit breach and to categorise the root-cause non-compliance on its own merits; importantly, its potential impact *must not be lower* than that of the originating breach. In this case, the failure of the operator's management system to prevent, detect or escalate foreseeable degradation mechanisms and operational deviations is the underlying cause that enabled the fugitive HCl emission.

NRW therefore determines that the operator was not managing and operating the activities in accordance with a written management system that identified and minimised pollution risks associated with the HCl cylinder/valve assemblies and related operations. These failings represent a **Category 2 (Significant)** non-compliance with **permit condition 1.1.1(a)**.

Measures Already taken

Following the incident, Dow has implemented a range of engineering modifications that directly address the technical causes of the valve failure. The original instrument tubing-specification assembly has been removed and replaced with piping-specification valves and connections, as far upstream as practicable. This upgrade eliminates the previous three-piece tubing-spec valve configuration and the associated concealed fastener cavity that allowed acidic condensate to accumulate and corrode the Monel retaining stud, ultimately leading to loss of integrity.

To ensure the failure mechanism cannot re-emerge, Dow has installed piping-spec valves fitted with locking plates, removing the need for operators to remove the valve handle during isolation, one of the key contributors to loosening of the stem-packing arrangement and the creation of a leak path in the failed valve. In addition, Dow has eliminated several sections of small-bore tubing, reducing connection points and overall leak risk, and has remade all joints in the modified section of the system.

A multidisciplinary inspection and testing programme was completed before the system was returned to service, and a regularised inspection regime has been put in place for ongoing assurance.

Dow has also undertaken further risk-reduction measure by installing additional local HCl analysers at each cylinder station to improve early detection of any loss of containment and to prevent a recurrence arising from undetected progressive deterioration.

It is acknowledged that the valves now installed represent a compromise from the “full-specification” solution, which would be a single-piece, bellows-sealed stainless-steel valve, consistent with the rest of the plant. These were not installed due to a 14-week lead time and because the facility is scheduled for closure, meaning Dow does not plan to retrofit bellows-sealed valves prior to shutdown. Nonetheless, the selected stainless-steel three-piece flanged ball valves, combined with the removal of tubing sections, the use of a locking-plate mechanism, and enhanced detection measures, represent a substantial improvement over the previous design and adequately remove the failure path identified in the investigation in the context of the plant’s remaining operational life.

At the next compliance visit NRW would like to:

1. Assess whether Dow has established a functioning system to identify, track, and escalate lower impact EH&S bad actors.
2. Discuss the progress of Dow’s analysis of historical leak references to identify other bad actors.
3. Dow must undertake a formal review of the fire protection and siting arrangements for the stored spare cylinders located near the main distillation plant. Although the in-service cylinders are protected by a fire wall due to their proximity to the chlorosilane pump set, the spare cylinders are positioned close to an area where a contained pool fire could occur within the plant footprint.

The assessment should:

- Evaluate whether the spare cylinders are sufficiently protected from heat flux or flame impingement arising from a potential pool fire scenario.
- Consider that foam pourers are designed to protect the main plant, which benefits from pressure-relief provisions, whereas the stored spare cylinders do not have equivalent protection or pressure-relief capacity.
- Review whether repositioning, shielding, improved separation distances, or additional passive/active fire protection measures are reasonably practicable.
- Document the conclusions, risk assessment, and any resulting engineering or procedural controls.

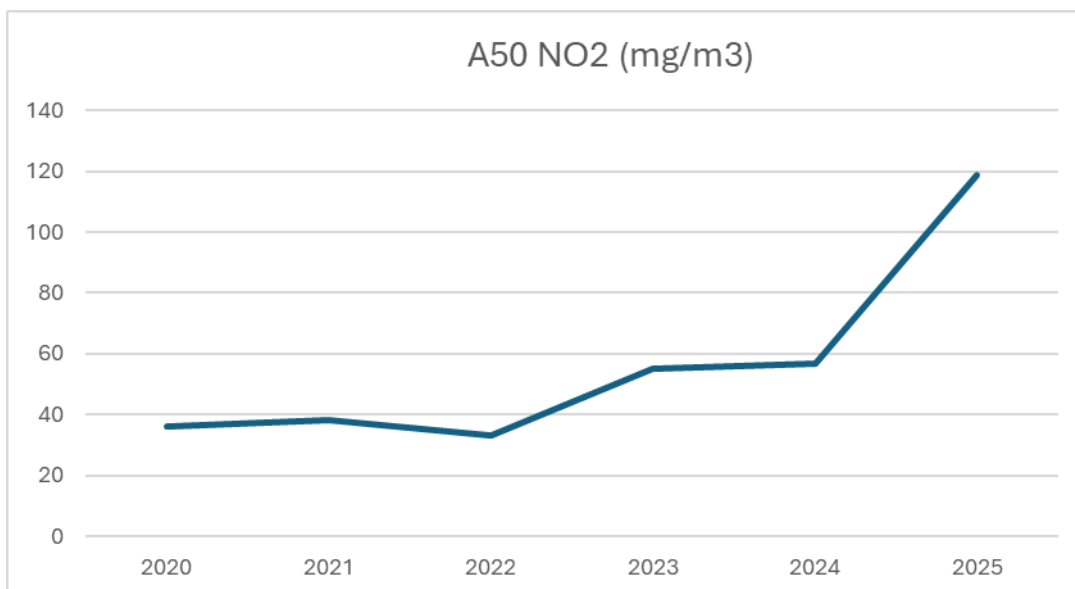
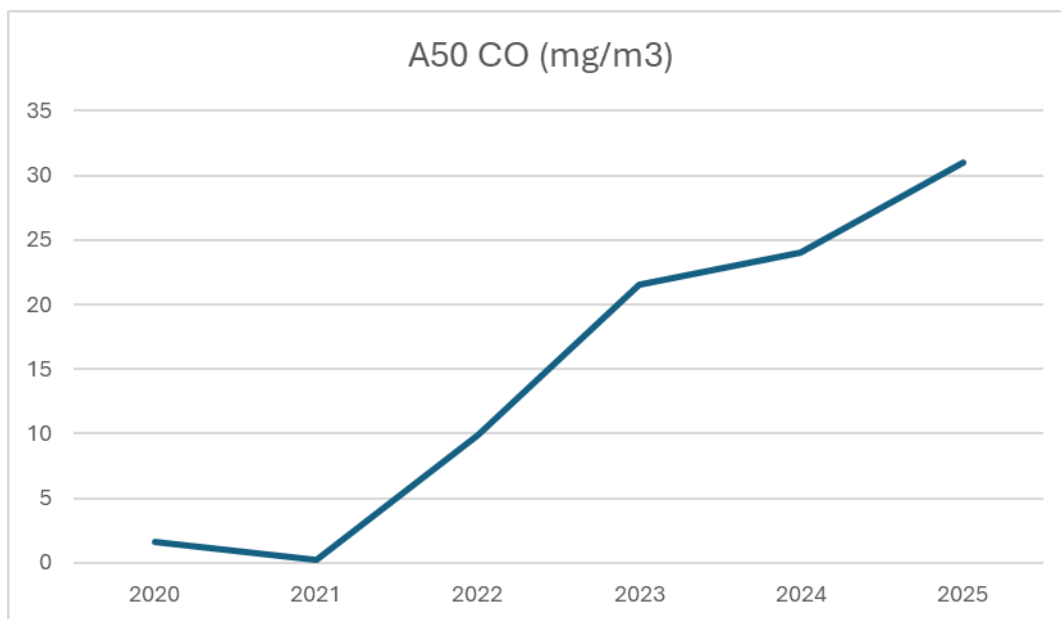
Dow should provide evidence of this review and any implemented improvements at the next compliance meeting.

Q4 and Annual Returns

Both returns were received on time, and all monitoring results were found to be within their respective compliance limits. The A50 emission point, which is connected to the W957 Hydrogen Plant vent via

the 19 m stack, continues to operate within the permitted emission limit values for both carbon monoxide (CO) and oxides of nitrogen (as NO₂).

However, despite remaining compliant, the data show a gradual upward trend in emissions from A50 over the past five years. This emerging pattern will be raised and discussed in detail at the next compliance meeting, with a view to understanding the underlying causes and considering whether any operational, maintenance, or process-related adjustments may be warranted.



Energy Usage

Over the period 2019 to 2025, total primary energy consumption at the installation shows a modest

downward trend, falling by approximately 6.7%, from 1,009,657 MWh in 2019 to 942,558 MWh in 2025. Total CO₂ emissions follow a similar pattern, decreasing by around 4.7% over the same timeframe, from 187,789 t to 179,037 t. Despite these reductions, the changes year-to-year are not linear; the site experienced its highest total energy demand in 2020, followed by a significant reduction in 2021, with a later rebound in 2023, before settling again at lower levels through 2024–2025. These fluctuations likely reflect operational variability rather than systematic efficiency or decarbonisation measures.

The overall energy mix has remained relatively stable, with steam consistently representing the largest share of primary energy input. Steam accounted for approximately 55.5% of total primary energy in 2019, declining only slightly to 53.8% by 2025. Over the same period, electricity increased from 35.5% to 36.4%, while natural gas rose from 9.0% to 9.8%, indicating only minor shifts in dependence on different energy carriers. These small redistributions in the energy mix have had limited influence on overall carbon performance, as reflected in the carbon-intensity metric, which remains relatively constant across the dataset, rising only slightly from 0.186 tCO₂/MWh in 2019 to 0.190tCO₂/MWh in 2025. This stability suggests that reductions in total CO₂ emissions are primarily linked to lower energy demand, rather than changes in fuel composition or improved process efficiency.

Overall, the data indicate a general downward trajectory in energy consumption and CO₂ emissions, but without evidence of a sustained improvement in underlying efficiency. The year-to-year variations and the relatively flat carbon intensity suggest that external factors, such as production levels, plant availability, or operational mode changes, are likely the main drivers of the observed reductions rather than efficiency-driven carbon reductions.

Water Usage

Dow's annual returns do not provide sufficient detail on water consumption associated with specific plant operations, making it difficult for NRW to determine whether the observed increase in water usage in any one year is linked to increased production or other operational causes. Under the permit, Dow must take appropriate measures to ensure that raw materials and water are used efficiently.

The source mix is stable and dominated by Biglis well water, which typically supplies approximately 70–75% of the site's total water each year. River abstraction (Cadoxton) has progressively declined to zero in recent years: from 43,995 m³ (2019) and 61,033 m³ (2020) to 0 m³ in 2023–2025. Dow notes that Biglis volumes include the supply to the CHP.

Over the period, total water usage decreased by approximately 12%, from 2,191,407 m³ in 2019 to 1,925,825 m³ in 2025. The profile is non-linear: after a modest reduction in 2020 (2,101,565 m³), usage fell sharply in 2021 (1,885,454 m³), remained low in 2022 (1,881,334 m³), then spiked in 2024 (2,172,628 m³) before easing again in 2025 (1,925,825 m³). This suggests that operational factors are likely driving year-to-year variability rather than efficiency changes.

The following CAR Form action was put to Dow in early 2025. CAR_NRW0046354 Action 4: Please review your previous water usage and current operations to identify opportunities to improve the usage of water onsite. Please report your findings to NRW by the 30th of June 2025.

Since the action was set, Dow has undertaken significant operational changes, including the

commencement of decommissioning activities within the Basics area of the site. These works have created substantial resource constraints, which Dow states limited their ability to complete the action in full. However, Dow has provided the following information:

- Water-meter data has been collected, and increases were identified on specific meters.
- Resource limitations prevented a full investigation, particularly within the Basics area due to decommissioning work.
- Monthly water-bill trending did not show any persistent or unexplained anomalies.
- The increase in water usage during 2024 coincided with the prolonged operation of temporary water sprays at the SWWT, used to suppress floating biomass during a period of operational difficulty.
- Reported water usage for 2025 has returned to levels consistent with the 2021–2023 baseline.

Given the substantial ongoing changes to the site configuration and operations over the coming years, it would be reasonable to pause further work on this action until there is clarity on the final operational footprint and water-use profile of the Barry site post-decommissioning. At that point, a more meaningful and proportionate assessment of water efficiency opportunities can be undertaken.

Waste

Overall waste generation at the installation has shown a steady downward trajectory across the past 6 years, with some year-to-year variability likely linked to operational activity. Total waste (disposal + recovery) decreased from 38,051 t in 2019 to 23,252 t in 2025, representing an overall reduction of approximately 39%. While the pattern is not linear, the general trend indicates a significant reduction in waste arisings over the six-year period.

Both hazardous and non-hazardous wastes have fallen in absolute terms. Hazardous waste dropped from 29,715 t (2019) to 20,695 t (2025), while non-hazardous waste decreased from 8,371 t (2019) to 2,557 t (2025). The proportion of waste sent for recovery has generally remained high throughout the period. For example, in 2025, recovery routes accounted for 16,218 t, compared with 7,034 t sent for disposal. This continues the long-standing pattern seen in earlier years, such as 2019, where recovery also exceeded disposal, indicating that the site continues to prioritise diversion from landfill and incineration where possible. The gradual decline in hazardous incineration tonnages (e.g., mixed incineration, solvent streams, etc.) suggests shifts in production or upstream minimisation rather than changes in waste treatment strategy. Overall, waste trends point to a continued movement toward lower waste intensity, reduced reliance on disposal routes, and more consistent recovery outcomes.

CAR NRW0050040 Outstanding Actions:

Bondstrand Chem Sewer

The most recent COMAH competent authority inspection report, undertaken on the 24th of April, states “*Drainage inspection by CCTV report has been undertaken across most of the network, with limited gaps at the valve pits and adjoining pipes in W712 loading bay/pump area, and the frequency for some sections is quite low (>10 years). Some erosion of Bondstrand lining is indicated in one*

section and manhole C812 close to W809 spill pond had a full circumferential pipe fracture defect recorded in 2013. A patch repair was carried out in 2016 and follow-up inspection is required to ensure that no ground/groundwater contamination has occurred. This aspect will be followed up as an EPR16 matter.” An additional ad hoc inspection of the Bondstrand chem sewer drainage pipework was recommended to ensure that deterioration of some lower-grade sections was not accelerating. An action was given to Dow to undertake a follow-up inspection to ascertain if there has been any ground/groundwater contamination in the immediate area.

During the site inspection on 16th October 2025, the Bondstrand chemical sewer drainage pipework was discussed. Dow representatives confirmed that a follow-up inspection was completed in 2022 and explained that the area is subject to a three-year inspection cycle, which will remain in place until the basic train is decommissioned. They also stated that the likelihood of ground or groundwater contamination in the immediate area is very low, as the area is used solely for containment and there have been no spills or loss of inventory.

Action 1: Please provide a copy of the inspection report for 2022. **Due 31st December 2025.**

A detailed report had been sent by Dow. The report contained information on various sections, manhole to manhole and are dated over many different years, with the most recent sections being 2022. The 2013 report that identified the full circumferential pipe fracture defect between manhole C812 close to W809 spill pond and the chem sewer was included. However, no follow up report of this area was included. Dow have recently submitted a work request to ATEC to clean and survey that section. An update will be requested at the next compliance meeting.

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.