

Compliance Assessment Report CAR_NRW0038379

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 carried out: Report/Data Review, Reason: Routine.
On 26/05/2021.

Parts of permit assessed: Emissions control, waste, noise and emissions

NRW Lead Officer: Antony Leakey, accompanied by Geraint Harris.

Report sent to: Judith Sartor, Environmental Specialist on 11/06/2021.

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

Part of permitted activity assessed (criteria)	Assessment result	Permit condition
C2 - General Management - Management system and operating procedures	C3 Minor	1.1.1
E3 - Emissions - Surface water	C3 Minor	3.1.2
C2 - General Management - Management system and operating procedures	C3 Minor	1.1.1
E3 - Emissions - Surface water	C3 Minor	3.1.2
B4 - Infrastructure - Containment of stored materials	Assessed (A)	
D2 - Incident Management - Accidents, emergency and incident planning	Assessed (A)	
E1 - Emissions - Air	Assessed (A)	
E2 - Emissions - Land and groundwater	Assessed (A)	
E5 - Emissions - Waste	Assessed (A)	
F2 - Amenity - Noise	Assessed (A)	
G4 - Monitoring and Records, Maintenance and Reporting - Reporting and notification to Natural Resources Wales	Assessed (A)	

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

Total number of non-compliances recorded	Total non-compliance score
4	16

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
C2	Inspection of the failed valves, identify and review inspection and maintenance of any other similar valves.	30/09/2021

Criteria	Action needed	Complete by
E3	Inspection of the failed valves, identify and review inspection and maintenance of any other similar valves.	30/09/2021
C2	Implement the comprehensive range of process improvements set out in the RCI report covering the events. Additionally, improved resourcing and dedicated management leadership has been provided to ensure resilience of this critical area of site operations.	31/12/2021
E3	Implement the comprehensive range of process improvements set out in the RCI report covering the events. Additionally, improved resourcing and dedicated management leadership has been provided to ensure resilience of this critical area of site operations.	31/12/2021

Action 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.

At this time, we are issuing you with a warning for the non-compliance recorded above. Warnings may influence future enforcement response for continued or further non-compliance.

This statement does not stop us from taking additional enforcement action if further relevant information comes to light or offences continue.

4. Details of our assessment

Dow Silicones UK Ltd reporting and compliance assessment review - 26/5/21

W413 low pH storm water discharge

During a containment escalation event in January 2021 (see below) when loss of the WWTP and coincident heavy rainfall resulted in effluent storage capacity reaching critical levels, low pH storm water was inadvertently discharged into the River Cadoxton via release point W2 below the permitted limit of pH 6. Zinc concentration was also elevated above the maximum permitted level.

Dilution and buffering calculations indicate that the low pH discharge will not have had a significant impact on river pH and it is noted that the river was tide-locked for some of the period, which would represent a worst case situation. A short-term increase in zinc concentration would not be expected to result in significant impact. The incident is therefore considered to be a minor category 3 breach of permit condition 3.1.2.

Root cause investigation has identified passing isolation penstock valves allowing acidic process effluent to leak from the abnormally flooded chemical sewer into W413 spill pond as the cause. An offline continuous sampling pump meant that a detection measure was not

operational during the discharge, although procedures allowed for this eventuality and spot sampling was taking place to check on discharge water quality. This resulted in early detection of the issue. The valves were not subject to a planned maintenance schedule and this oversight is critical given the importance of isolation of the acidic chemical sewer from the storm water during normal operating conditions as well as during upset conditions such as this. There is no potential for more significant impact in this case given that full containment would still be achieved in the event of a major loss of process inventory. The failure to maintain the isolation valves is therefore a minor category 3 non-compliance with permit condition 1.1.1.

Inspection of the failed valves is yet to take place and Dow should also identify and review inspection and maintenance of any other similar valves.

ACTION: Dow Silicones to provide an update at next compliance meeting.

Wastewater treatment failure

A series of problems since January into March 2021 has resulted on repeated non-compliance with the copper emission limit for the effluent discharge at release point W1.

An assessment of bioavailability in the receiving water (Cadoxton) using the Water Framework Directive Metals Bioavailability Tool (M-BAT) has shown that the bioavailable copper concentration would not have exceeded the environmental quality standard for copper. This was verified using M-BAT and the monitoring data provided, along with sensitivity to measured independent parameters such as pH, DOC and calcium concentrations. It is also noted that site shut down could be initiated if discharges might result in EQS failure in the river. The incident is therefore considered to be a minor category 3 breach of permit condition 3.1.2.

Multiple causes were attributed to the loss of control of copper removal, the primary issues being potential loss of and accumulation and carryover of process solids in the effluent system, bioreactor mixing and pH control failure. These issues are being addressed through a comprehensive range of process improvements set out in the RCI report covering the events. Additionally, improved resourcing and dedicated management leadership has been provided to ensure resilience of this critical area of site operations. The historic failure to provide sufficient management oversight to prevent deterioration of WWT performance is therefore a minor category 3 non-compliance with permit condition 1.1.1.

ACTION: Dow Silicones to provide an update on RCI improvements progress at next compliance meeting.

Secondary and tertiary containment

The WWT plant issues described above coincided with a period of heavy rainfall in early January 2021 and consequently the site containment systems started to fill as process effluent accumulated. Dow followed escalation procedures and shut down operations in order to maintain safe secondary and tertiary containment margins.

Site containment was maintained, although as noted above contaminated surface water was discharged for a short period and headroom was limited before the WWT plant restarted.

The predicted COMAH event containment volumes for the site are considered to be representative, although it is possible to predict a higher potential volume based upon the combined inventory of W810 tank farm and water application rates during a major incident involving W810 at up to 3 m³/tonne of product, giving around 10,000 m³ of containment required.

Secondary and tertiary containment guidance (CIRIA C736, section 4.3.3, p.43) recommends that rainfall containment capacity should be allowed for the preceding day, the duration of the worst credible incident (COMAH event) and a further 8 days, after which it is assumed that arrangements are able to be put in place to export waste water either by tanker, pumped transfer to additional temporary storage and/or resumed WWTP processing. Note that the rainfall data provided in CIRIA may not be representative of current and future high intensity and duration rainfall events. However, the event corresponded with exceptional rainfall rates associated with Storm Christoph when up to 50 mm of rain fell during the 3-day period 18-20 January 2021 in the Vale of Glamorgan area (Met Office data) suggesting that the site containment resilience to rainfall is close to the requirements set out in the guidance, but this assumes that some discharge of clean storm water is able to take place, which may not be possible during a major incident. The need for additional capacity and/or resilience to rainfall accumulation will be examined further under COMAH regime.

Nevertheless, recent assessment of the COMAH safety report indicates that most major accident scenarios are controlled to risk levels in the broadly acceptable or tolerable if ALARP region without reliance upon secondary and tertiary containment indicating that the potential for a significant concurrent need to rely upon the compromised containment systems is very unlikely.

On this basis and, aside from the exacerbating issues associated with WWT resilience, release of storm water for discharge and isolation valve inspection and maintenance noted above, the Dow containment design and escalation procedures were effective and minimised the risk of containment being overwhelmed.

A final consideration relating to use of the E-tank bunds as part of the site tertiary containment strategy has implications for groundwater protection if the E-tank foundation bases are permeable. In this case only uncontaminated water was stored in the bund, but if the need arose to store contaminated water discharge to groundwater could occur. This aspect will need to be examined further.

ACTION: Dow Silicones to provide commentary on management of wastewater type to be stored in E-tank bunds at next compliance meeting.

WGC Bref

Improvements have been identified that will assist compliance with volatile silicone emissions reductions. These include replacement of D4 for seal flushing on W920 with less volatile D5, elimination of the start up vent on the W931 methyl chloride plant and diversion of tank farm vents to the FBR rather than to MEVA/ERU.

The timescale for chemical sector permit reviews is now uncertain because the new UK BAT implementation process will need to be established first.

Cadoxton WFD failure

Dow has undertaken river sampling to investigate the low DO (dissolved oxygen) in the river close to the tidal outfall and potential linkage to the high chloride levels in the Dow effluent. Sampling analysis by the site QA lab has not shown a correlation between DO and salinity, although periods of tidal locking may not have been included in the sample set. Further sampling with reference to the tidal state is proposed.

ACTION: Dow Silicones to provide an update at next compliance meeting.

Hazardous waste audit follow-up

Some shot blasting wastes have been identified with zinc concentrations up to 9800 mg/kg, well above the hazardous waste threshold. Dow now propose to consign all shot blasting wastes as hazardous. Segregation of non-hazardous and hazardous wastes should be practiced whenever possible, however NRW recognises that accumulation of wastes of similar type but with differing compositions may preclude this. Dow should attempt to segregate and characterise discrete waste streams where possible so that separate appropriate disposal or recovery can be achieved.

A report on E-tank solids is to be provided when available. Historic data should be available in LIMS.

ACTION: Dow Silicones to provide details of E-tank waste composition records.

EMS/ISO14001 certification lapse

The site EMS is now largely aligned with the Dow global Operation Discipline Management System (ODMS). The ODMS approach to environmental aspects management will be examined at a future inspection.

W941 Reboiler condition

Implications of the reboiler service-side corrosion have been taken forward as a COMAH intervention issue by the competent authority.

Noise control

In-house noise survey has identified several tonal sources with potential for offsite impact, including a new source (oxygenator) introduced to improve aeration at the WWTP. The latter suggests that management of change procedures in relation to control of noise impacts are not sufficiently robust.

Initial ranking and prioritisation work have suggested some sources for improvement. This good initial work should be formalised and a plan for tackling the dominant offsite noise sources produced.

The latest consultant's report also identifies Dow sources to be dominating the soundscape at some locations with night-time levels at up to 50 dB(A) and indicative background less

than 40 dB(A) suggesting potential for adverse impact. However, it is noted that most measurements were undertaken when wind speeds were in excess of 5 m/s with temperatures below 4°C and this is likely to influence the measured sound levels.

ACTION: Dow Silicones to rank and prioritise noise sources with offsite impact for improvement, review management of change process for considering noise impacts and provide an update at the next compliance meeting.

Air quality data investigation

Examination of potential sulphuric acid mist and hydrogen chloride source terms suggest that these are unlikely to be significant enough to influence the AQ monitors.

NRW will review the potential for cumulative influences of emissions of acid gases and fumed silica from adjacent operations before closing the investigation. Consideration will also be given to the potential for cooling tower plumes to contribute to high condensed moisture levels in the vicinity of the AQ monitors.

Eel Regulation Compliance

Self-cleaning intake suction screens or filters are not suitable for deployment at Barry due to the type of abstraction pumps used (submersed).

Upgrading to compliant screening will ultimately be required when any major abstraction system upgrade/replacement works are undertaken. In the meantime, NRW will consider the potential for use of seasonal abstraction controls to limit eel impacts.

Groundwater monitoring data review

Dow reported that borehole A2D is showing a reducing concentration trend which may be attributable to the landfill capping works. This will be kept under review.

W307 manufacture of 2-6991 (Dimethyl Methyl (2-Phenylpropyl) Siloxane)

A brief overview of the process changes introduced with this change was provided. Catalyst neutralisation with ammonia uses only 0.5 kg per batch and so is expected to be trivial in emissions terms. A replacement condenser is installed to minimise siloxane releases, and these are reported quarterly for release point A85. Variability of emissions from this vent is noted in the annual report, although the 2020 result is low.

Monitoring returns and notification review

Annual report for 2020 and monitoring data for Q1 and Q2 2021 has been reviewed.

No non-compliance with permit conditions other than those already addressed above were identified.

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 only relating to the activity assessment
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.

What are suspended scores?

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 and Waste action criteria (used in section 1 and 2):

A: Permitted activities

- A1 Specified by permit

B: Infrastructure

- B1 Infrastructure – Engineering for prevention and control of emissions
- B2 Infrastructure – Closure and decommissioning
- B3 Infrastructure – Site drainage engineering (clean and foul)
- B4 Infrastructure – Containment of stored materials
- B5 Infrastructure – Plant and equipment

C: General management

- C1 General management – Staff competency/training
- C2 General management – Management system and operating procedures
- C3 General management – Materials acceptance
- C4 General management – Storage, handling, labelling and segregation

D: Incident management

- D1 Incident management – Site security
- D2 Incident management – Accidents, emergency and incident planning

E: Emissions

- E1 Emissions – Air
- E2 Emissions – Land and groundwater
- E3 Emissions – Surface water
- E4 Emissions – Sewer
- E5 Emissions – Waste

F: Amenity

- F1 Amenity – Odour
- F2 Amenity – Noise
- F3 Amenity – Dust/fibres/particulates and litter
- F4 Amenity – Pests/birds and scavengers
- F5 Amenity – Deposits on road

G: Monitoring and records, maintenance and reporting

- G1 Monitoring and records, maintenance and reporting – Monitoring of emissions and environment
- G2 Monitoring and records, maintenance and reporting – Records of activity, site diary/journal/events
- G3 Monitoring and records, maintenance and reporting – Maintenance records
- G4 Monitoring and records, maintenance and reporting – Reporting and notification to Natural Resources Wales

H: Resources efficiency

- H1 Resource efficiency – Efficient use of raw materials
- H2 Resource efficiency – Energy efficiency

Enforcement response

Any permit condition non-compliance 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 20 working days to let you know if we agree to your request.

What do I do if I disagree with the report or have a complaint?

If you disagree with this compliance assessment report, you should contact the lead officer without delay to discuss your concerns.

If you are unable to resolve the issue with the lead officer or their line manager you should contact our Customer Contact team on 0300 065 3000 (Monday to Friday 08:00 – 18:00), or email enquiries@naturalresourceswales.gov.uk for details of how to raise your dispute further through our Complaints and Commendations procedure.

If you are dissatisfied with our response, you can contact the Public Services Ombudsman for Wales by phone on 0300 7900203 or by email at 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.