Cyfoeth Naturiol Cymru
Natural Resources Wales

Compliance Assessment Report CAR_NRW0045534

Permit being assessed: BS6149IQ.

For: Pencoed Rockwool EPR/BS6149IQ, **held by:** Rockwool Ltd

At: Rockwool Ltd , Bridgend , Mid Glamorgan , CF35 6NY.

Type of assessment: Report/Data Review,

Reason: Routine.

On: 29/10/2024 between 09:00 and 17:00.

Parts of permit assessed: Emissions control, noise amenity, monitoring, reporting and emissions.

NRW Lead Officer: Antony Leakey.

Report sent to: Joanne Barry, Secretary, on 29/10/2024.

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

Part of permitted activity assessed (compliance criteria)	Assessment result	Permit condition
IR1A - Installations - Management - General Management	C3 Minor	1.1.1
IR3A - Installations - Emissions and monitoring - Emissions to water, air or land	C3 Minor	3.1.2
IR3B - Installations - Emissions and monitoring - Emissions of substances not controlled by emission limits	C3 Minor	3.2.1
IR3D - Installations - Emissions and monitoring - Noise and vibration	C3 Minor	3.4.1
IR3C - Installations - Emissions and monitoring - Odour	Assessed (A)	
IR3E - Installations - Emissions and monitoring - Monitoring	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
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
IR1A	Provide details of the RCA findings and the need for improved binder composition control and make proposals for improvements.	31/03/2025
IR3A	Review and make proposals for improvements to the reliability of the Line 3 SO2 abatement system.	31/03/2025
IR3B	Review fugitive emission controls associated with hot pit waste handling and make proposals for improvements.	31/03/2025
IR3D	Review noise control inspection and maintenance arrangements associated with all identified potential noise sources at the installation and make proposals for improvements.	31/03/2025

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.

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

Rockwool Limited
Emissions and reporting review October 2024

Summary of previous CAR action status			
Permit condition	Action summary	Due date	Action status
1.1.1	Review management of change process	Complete	Implementation audit required.
3.1.2	Review ammonia emissions control and abatement options.	31/12/24	Ongoing. First improvement condition report submitted.
3.5.5	CEMs performance	Ongoing	Ongoing – carried

	against specified CIs		forward to OMA
3.5.1	Reporting to EN 17255	Ongoing	Start up and shut down definition required.
2.3.4	Pit slag recovery	Complete	Stock removed for reprocessing
n/a	PSA carbon capture trial	Ongoing	Update on trial outcome required.
PO1	Waste acceptance criteria for the Rockfon recovery	Ongoing	Review testing and compliance requirements.

Ammonia emissions reduction

Rockwool provided responses to the actions from CAR_NRW0043365 on 1 May 2024, including a comparison of ammonia to air mass emissions for 2022 and 2023.

The comparison was based upon limited extractive monitoring of ammonia emissions and future estimates for inclusion in the response to improvement condition reference IC22V should be quantified where possible using mass balance calculations based upon emissions monitoring, operating hours, waste removals and total ammoniacal nitrogen inputs to the process. This approach to mass emissions calculations should also be adopted for reporting to the PRTR Emissions Inventory.

Action: Rockwool to provide mass balance-based ammonia emissions estimates in the next IC22V report by 31 December 2024.

CEMs reporting and data invalidation

Capture of valid emissions data is currently based upon start up and shut down criteria that may not fully reflect the process conditions that influence emissions during these transition periods. The process is currently flagged as reportable and the DAHS starts CEM data capture when flue gas temperature is >250^{o}C, oxygen is <16% and a “melting ON” signal based upon blast air damper positions is triggered.

Occasional non-compliance with ELVs (particularly NOx and CO, but also dust and SO_2) during periods of instability may legitimately be SU/SD periods and Rockwool has proposed a revision to the definition of these periods:

Start-up
When ‘blowing-in’ a cupola blast furnace a coke bed is used. In addition to the start-up coke (coke bed), the charges during the initial ignition phase include a higher proportion of coke compared to standard operation. This ensures efficient operation in the early stages of the furnace blow-in and the remainder of the furnace campaign. The additional coke is added so that the blowing-in stage can be carried out with lower blast air rates. This is needed to ensure a consistent combustion, too much blast air, too early, can result in a ‘Skew Burn’ where part of the furnace has still not been ignited, and remains cold leading to erratic furnace conditions, and the potential for the furnace to need dropping and re-lining.

During this period, the higher quantity of fuel can result in higher emissions and is not normal

operation. This period can last for between 6 to 8 hours and is followed by the first iron tapping. From this point forward, the furnace is considered to be in normal operation.

Rockwool propose that the start-up period ends after the first iron tapping and this emissions data should be excluded from the daily average value.

Shut-down

When shutting down a cupola blast furnace, the goal is to run the burden as low as possible prior to tapping out the furnace. Ideally the burden level will be run down as low as tuyere level. However, the limiting factor in the Rockwool cupola process is the flue gas temperature which limits how low the burden level can be run. During this run-down process, flue gas temperatures rise and composition within the furnace and flue gases change, and operation is abnormal.

During this period, when the burden levels drop and flue gas temperatures rise, there can be several potential adverse effects on flue gas composition. Dust levels can rise due to a lower filtration within the cupola (less burden) and flue gas velocities can increase due to less flow restriction, increasing dust loading from the furnace. Oxygen and carbon levels change within the furnace, potentially impacting other emissions. This period can last for 1.5 hours.

Rockwool propose that the shut-down period starts once the burden levels drop after the last charge is added and the emissions data from this point forward should be excluded from the daily average value.

While these criteria appear reasonable, there are downstream abatement processes, including bag filtration and an afterburner system which could control some emissions variability due to the issues described above.

The proposed definition and durations for SU/SD need further justification and Rockwool will need to demonstrate that the combustion control system for the cupola afterburner system is optimised.

The definition and durations for SU/SD will need to be made based upon verifiable technical arguments and data:

- A case will need to be made for each pollutant and the duration of SU/SD may be pollutant-specific, e.g. ordinarily dust emissions might be expected to be relatively stable if a well maintained bag filter plant is fully operational during SU/SD. Initial pre-coating of bags from “clean” might lead to higher emissions, but this should only be for a short period, not the whole of the blowing in period. Reduced blast air during SU might lead to higher CO perhaps for the duration below a cut-off point, but then NOx might be expected to be lower, unless the afterburners run hotter because of the extra CO. Mitigation may be possible by taking longer to blow in.
- During SD, the increasing flue gas velocities might be managed by reducing blast flow, although presumably this would lengthen the SD period.
- Detailed process steps descriptions, conditions and emissions trend data will be needed to justify the periods claimed for SU/SD.
- A management plan to minimise SU/SD and OTNOC emissions will need to be produced if not already available.

In the interim these criteria can be applied to CO limit non-compliance only with ELVs during these transitional operations. Consideration will also be given to applying these interim criteria to elevated NOx emissions with case-by-case justification.

Action: Rockwool to provide further justification for startup and shut down criteria proposals, including typical emissions profiles and explanation for inability of downstream abatement processes to control emissions variability during SU/SD by 31 March 2025.

Consideration has been given to the application of OTNOC provisions for the Line 3 SO_2 abatement system, similar to the abnormal operation provisions for incinerators, to address unavoidable blockages of the soda ash feed system.

There is only a daily average BAT ELV to comply with, although adoption of the EN17255 definition of a valid daily average based upon 12 valid 30-minute averages (6 hours of data specified in EN17255)) in a day may need flexibility to achieve compliance during "short" days. Precedent may also be set by the cement sector rollback/forward system to allow for start-up and shut down issues during short operating days, but a clear justification will be needed to adopt a similar approach for mineral wool production. Firstly, Rockwool should ensure that all options to improve reliability of the SO_2 abatement system have been exhausted.

Action: Rockwool to review and make proposals for improvements to the reliability of the Line 3 SO_2 abatement system by 31 March 2025.

Ambient air quality monitoring arrangements

Proposals to continue continuous SO_2 ambient air monitoring at Soar Chapel, cease diffusion tube deployment around the factory and to undertake a trial of particulate matter ambient air monitoring at Soar Chapel are accepted.

The short-term statistics for SO_2 ambient air concentrations at Soar Chapel are potentially of concern due to the relatively high levels compared to those predicted by dispersion modelling (see further assessment below). However, there are no 15-minute, 1-hour or 24-hour mean air quality standard (AQS) exceedances since Line 3 abatement was commissioned, and previous AQS exceedances are associated with calibration period capture in the historic data. This has now been rectified in the 2023 data set onwards. Tracking of air quality changes through the annual report for the installation will help to identify if existing emissions controls are sufficient.

Action: Rockwool to include short-term summary statistics for the sulphur dioxide ambient air monitoring programme in future annual reports.

To establish a better understanding of the local air quality situation Rockwool provided summary data for the last 5 years showing:

- Annual number of 15-minute mean SO_2 AQS exceedances for each year
- The maximum 15-minute mean SO_2 ambient air concentration, the date and time in

each year
- Annual number of 1-hour mean SO_2 AQS exceedances for each year
- The maximum 1-hour mean SO_2 ambient air concentration, the date and time in each year
- Annual number of 24-hour mean SO_2 AQS exceedances for each year
- The maximum 24-hour mean SO_2 ambient air concentration, the date and time in each year
- The graphical diffusion tube results for each year

Comparison of peak measured short-term ambient air concentration statistics with modelled ground level concentrations suggests that actual impacts are higher than predicted. This is on the basis that peak modelled concentrations are likely to be closer to the factory than the measurements at Soar Chapel and were based on higher pre-Bref emission limits for SO_2. Also Line 2 has not been operational during 2024.

However, it is also noted that 24-hour mean SO_2 ambient air concentration shows a reducing trend since implementation of the abatement system on Line 3 showing an overall improvement in local air quality for this pollutant. Most daily averages are also now well below the revised WHO 24-hour mean air quality guideline for SO_2 ambient air concentration of 40 $\mu g/m^3$.

Examination of emissions data indicates that unit start up or shut down may have been taking place on the days of higher ambient air concentrations and may have contributed to lower plume buoyancy and poor dispersion characteristics. The effect of local topography on the meteorological data used for the modelling may also be a factor in under-prediction of actual impacts.

Given the increased level of complaints regarding plume grounding incidents and odour/fumes (see next section) a review of operating conditions and meteorological conditions and potential mitigation measures to prevent or reduce plume grounding impacts is necessary.

Action: Rockwool to review operating conditions and meteorological conditions likely to result in and potential mitigation measures to prevent or reduce plume grounding impacts by 1 March 2025.

Complaints and incident review

Date	Release point	Pollutant	Cause/action required	Permit non-compliance
23 June 2023	n/a	Pit waste	Hot embers during deposit of waste caused on-site fire	3.2.1, cat. 3
15 February 2024	A19	SO_2	Abatement low differential pressure	3.1.2, cat. 3
1 March 2024	A19	SO_2	Abatement blockage	3.1.2, cat. 3
27 April 2024	n/a	Odour	Incident reference	n/a

			2405834 – normal operation	
29-30 May 2024	A19	CO	Start up	n/a
September 2024	n/a	Percussive noise	Worn damping rubber on briquette conveyor	3.4.1, cat. 3
6 October 2024	A19	Bluey-grey smoke	Normal operation for high fluids content product manufacture	n/a
12 October 2024	A19	Reddish brown smoke	Binder solids outside of specification	1.1.1, cat. 3

A fire in the logistics area on the night shift of 23 June 2023 (Incident reference 2304829) was caused by a plume of hot embers rising from pit waste cooling area igniting nearby finished product packaging. The fire was quickly extinguished by the fire and rescue service and all firewater contained on site. The pit waste processing area has been relocated to prevent a recurrence. Hot material is unlikely to have dispersed off site to adjacent properties due to the separation distance (200 metres or more), therefore the fugitive emission of substances not controlled by emission limits is a category 3 (minor) non-compliance with permit condition 3.2.1. However, the potential for offsite fugitive dust emissions during movement of hot pit waste is enhanced by the additional thermal buoyancy and additional measures may be necessary to control dust regardless of location of the pit waste processing area on site.

Action: Rockwool to review fugitive emission controls associated with hot pit waste handling and make proposals for improvements by 31 March 2025.

Odour reported on 27 April 2024 (Incident reference 2405834) occurred during normal operation, although process interruptions and a furnace shut down occurred which may have resulted in reduced plume buoyancy for periods of time. The wind was from Rockwool towards the location where the odour was reported, and plume grounding is known to occur. A review of dispersion characteristics from relevant stacks may identify options for improvement.

Action: See action above relating to air quality to review dispersion characteristics from relevant stacks (that may cause odour) and make proposals for improvements by 31 March 2025.

In early September 2024 a report of persistent noise at a residence off Bryngarn Road about 1 km from the centre of the Rockwool main factory site was received by NRW via the local authority environmental health team. A noise impact was substantiated on Thursday 10 October. Wind was from the N/NE, resulting in potential for focussing and a periodic percussive sound was clearly audible between 1700 and 1745h, as well as a general background drone of the factory fans, etc…, although no tonal sounds were apparent.

Indicative measurements with a sound level meter gave a short-term L_{Aeq} level of around 40 dB while the percussive sound was present, with levels falling to a background including the continuous site noise of around 35 dB(A). Taking into account the impulsivity character

corrections used to derive the rating level from British Standard 4142: 2014 + A1: 2019 (+6 dB for 'clearly perceptible' impulsivity), the inferred impact is potentially at least 10 dB above background levels and significantly adverse.

However, where a low rating level (e.g. 30 dB is 10 dB above a background sound level of 20 dB), the initial estimate of a significant adverse impact can be modified by the low rating and background sound levels.

In these circumstances NRW may accept that if BAT and all appropriate measures are being taken to minimise the impact no further action will be required or taken.

Rockwool confirmed by email on 25 October 2024 that the damping rubber at the bottom of the chute onto the RSW3 cement briquette conveyor had worn through to metal and was identified during a housekeeping noise survey on 10 October and reported to the maintenance team. A temporary repair was implemented during the briquette plant operators lunch break on 11 October, and a permanent solution was implemented during the next shutdown. The plant operated until 04:00h on 14 October before an extended shutdown until week commencing 28 October.

The exact duration of the noise impact associated with the damping rubber failure is unknown but was addressed within 24-hours and even if not completely effective, a permanent repair was implemented within 7 days suggesting that there was not an ongoing impact. The impact will have continued overnight but given the low background and rating level measured at the residence the inferred non-compliance level with permit condition 3.4.1 is category 3 due to the failure to maintain appropriate measures (damping rubber) to prevent or minimise offsite noise impact.

Action: Rockwool to review noise control inspection and maintenance arrangements associated with all identified potential noise sources at the installation and make proposals for improvements by 31 March 2025.

A noise survey was conducted on all noise sources across site over the summer. The survey report included a modelling study of the potential impact of installing different noise barriers. An implementation plan based upon cost-benefit is being produced.

Action: Rockwool to provide noise survey report and implementation proposals for improvements by 31 March 2025.

Dense plume reports were received on 6 and 12 October from a residence north of the installation. The earlier event was associated with high fluids content product manufacture which may increase plume density due to higher binder loading. Fly ash pot change over around the time may also have contributed fugitive dust emission, although this would be expected to be lower level than the main stack plume. Minimisation of fugitive emissions during this activity will need to be demonstrated. A review of periodic emissions data associated with high fluids content product manufacture may indicate if emissions are higher during these operating periods and the need for improved control of emissions.

Action: Rockwool to review fugitive emission controls associated with fly ash pot change over and make proposals for improvements by 31 March 2025.

Action: Rockwool to review periodic emissions data associated with high fluids content product manufacture, the need for improved control and make proposals for improvements by 31 March 2025.

There was a production stop on Line 3 on the morning of 12 October but no use of the emergency chimney. The binder solids were outside of specification due to a control issue with process water addition. The line restarted at 09:00 but the residual high solids binder may have resulted in the dense plume. A Route Cause Analysis (RCA) into the binder composition control to prevent a recurrence is underway.
It is not known if emissions were above the permitted ELVs because the spinning chamber monitoring is periodic rather than continuous. However, it is likely that high concentration binder will raise emissions with potential for exceedance of the ELVs with at least minor impact on air quality or visual amenity. The failure to manage process controls to minimise impact on emissions to air is a category 3 non-compliance with permit condition 1.1.1.

Action: Rockwool to provide details of the RCA findings and the need for improved binder composition control and make proposals for improvements by 31 March 2025.

Management of change (MOC) procedures, covering planned and emergency changes were scheduled for implementation in June 2024. The outline MOC process appears to be appropriate, including review and approval by the environmental department. Audit of the new MOC process at Rockwool will be undertaken at a future inspection. In the meantime, one point to consider is whether the full team review of an emergency change approval by a shift manager should be undertaken at the earliest opportunity rather than waiting for the next weekly MOC review meeting.

Emissions review

Monitoring data for Q1, Q2 and Q3 2024 have been reviewed and no breach of permit conditions was identified other than those already identified and discussed in this report.

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.

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 – Emissions to water, air or 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.

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 to 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.