

# **Application for a Variation to EPR Permit BS6149IQ to Install Flue Gas Desulphurisation Equipment on Line 3 Cupola (A19)**

Non-Technical Summary	2
Background	3
Flue Gas Desulphurisation Details	4
Supporting Information for Form C3	5

## Non-Technical Summary

This application is for a normal variation to EPR permit BS6149IQ to include the addition of flue gas desulphurisation ("deSOx") abatement equipment on the emissions from Line 3 cupola, emission point A19. The abatement equipment is planned to be installed by ROCKWOOL following discussions with Natural Resources Wales about how the BREF limit for sulphur dioxide (in a stone wool cupola melting cement briquettes and/or slag) of 1,400mg/Nm<sup>3</sup> might be achieved.

Proposed Variations:

### 1. Amend Wording in the Introductory Note (bold text is proposed)

*"There are three production lines i.e. line 1, line 2 and line 3. Each line is served by a cupola, where the raw materials are molten at temperatures of around 1500°C. The resultant melt flows out of the cupola to spinning machines. Exhaust gases from the cupola systems of Lines 1, 2, and 3 are treated by filtration utilising fabric filtration units. **In addition to the fly ash filtration, Line 3 has a desulphurisation (deSOx) system which injects sodium bicarbonate to absorb sulphur from the exhaust gases. A second filter separates the deSOx residue for collection. Following filtration, waste gases from the cupolas are filtered and passed through afterburners to destroy carbon monoxide and hydrogen sulphide. All exhaust gases from the cupolas on lines 1, 2 and 3 are discharged to atmosphere, through release points A1, A2 and A19 respectively at a height of 75 metres above ground level. Under abnormal circumstances the waste gases can be released unabated for short periods (usually seconds, but up to a few minutes) from shorter emergency chimneys (Cupola Relief Valve), which release at 30 metres above ground level. Unabated emissions may also be released through A1, A2 and A19 when Filter Bypass is activated. Use of both Cupola Relief Valve and Filter Bypass is kept to a minimum and is designed to relieve abnormal cupola conditions.**"*

### 2. Potential to Review the Sulphur Dioxide Emission Limit Value on Line 3 Cupola (A19)

The deSOx system can reduce sulphur dioxide emissions significantly and should provide the potential to meet the BREF limit of 1,400 mg/Nm<sup>3</sup>.

### 3. New Raw Material and Waste Stream

Sodium bicarbonate will be a new material stored on site and the deSOx residue will be a new waste stream.

### 4. Additional Updates

Natural Resources Wales may wish to use this opportunity to:

- a) include additional details about permissions surrounding the return from customers of waste stone wool to site for recycling into the briquette manufacturing process
- b) review requirements surrounding emissions to surface water since the agreement of a Discharge Consent to Sewer was made with Welsh Water
- c) consolidate variations made since March 2016 into one document

## Background

The Industrial Emissions Directive was introduced in the UK in 2016 and brought into effect emission limit values set out in the EU Best Available Techniques reference (BREF) documents. The emission limit value stated in the “BREF for the Manufacture of Glass” for sulphur dioxide from stone wool cupolas melting cement briquettes and/or slag is 1,400 mg/Nm<sup>3</sup>. However, note 4 in Table 5.49 states: “When reduction of waste has a high priority over SO<sub>x</sub> emissions, higher emission values may be expected. The achievable levels should be based on a sulphur balance.”

ROCKWOOL’s permit had been varied in July 2015 and improvement condition IP18V was included. IP18V required ROCKWOOL to review the existing sulphur dioxide emission limit value of 2,500 mg/Nm<sup>3</sup>. A review was carried out and looked at the cupola feedstock, flue gas desulphurisation, use of virgin materials, recycling of waste and disposal of waste. Air Quality modelling was also completed as part of the assessment. The concluding proposal from the document is replicated below:

### Proposal

Based on the above facts and discussion, Rockwool does not believe that implementing acidic gas abatement to achieve the new permitted limit for sulphur dioxide of 1,400 mg/Nm<sup>3</sup> is the best option (for both environmental and financial reasons).

However, by optimising the proportions of current raw materials, sulphur balance calculations have shown that a limit of 2,200 mg/Nm<sup>3</sup> is achievable on both operational cupolas. This will enable Rockwool to continue recycling all its process wastes on site, minimising the impact on landfill. Actual data from 7.5 years of monitoring ambient levels of sulphur dioxide in the area have shown a negligible impact from the factory’s emissions, lending support to a limit of 2,200 mg/Nm<sup>3</sup>.

As a forward looking company, Rockwool Limited and its parent company, Rockwool Group, will continue to investigate new raw materials as they emerge onto the market and will put a particular focus on those which could reduce the sulphur burden. Rockwool will work towards achieving the 1,400 mg/Nm<sup>3</sup> limit in a stepped approach.

Excerpt from ROCKWOOL’s response to Improvement Condition IP18V

An emission limit value of 2,200 mg/Nm<sup>3</sup> for sulphur dioxide for each of the three cupolas was proposed by ROCKWOOL and agreed by Natural Resources Wales in April 2016.

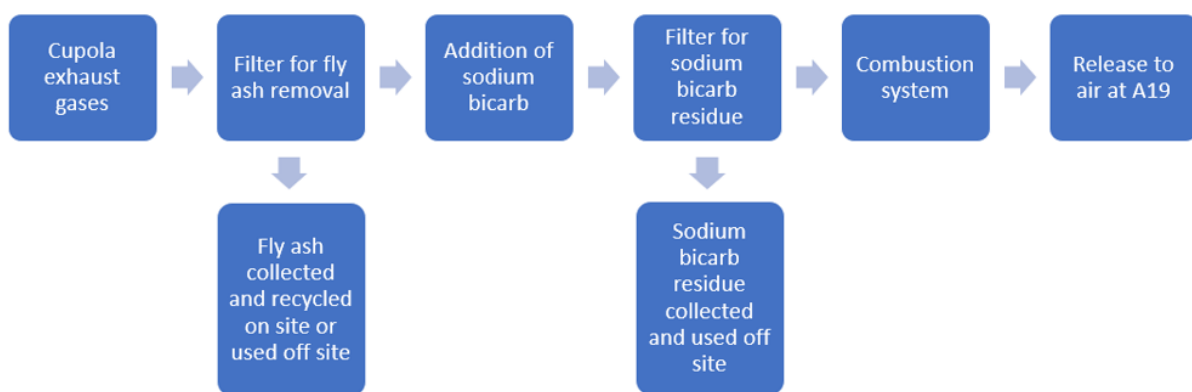
Over the past 2 years, Officers from Natural Resources Wales have indicated during discussions and meetings that ROCKWOOL should be working towards achieving the BREF emission limit value of 1,400 mg/Nm<sup>3</sup>.

There have been no significant developments in low sulphur raw materials since 2016 and the ROCKWOOL manufacturing process continues to consume waste generated on site (wool fibres and fly ash) and by-products from the local steel manufacturing industry. As such, the only viable method to achieve the 1,400 mg/Nm<sup>3</sup> limit is to install flue gas desulphurisation. Consequently, ROCKWOOL applied internally for capital investment to install abatement on the emissions from Line 3 Cupola, emission point A19.

## Flue Gas Desulphurisation Details

The ROCKWOOL Group has experience with flue gas desulphurisation abatement equipment in its factories across the world. Adsorbent materials used in the Group include lime and sodium bicarbonate. Filtration systems also vary. Some factories have one filter for both fly ash and deSOx residue while others have two separate filters. The optimal solution for the UK factory is sodium bicarbonate and a separate filter.

The premise of the deSOx system is that sodium bicarbonate is injected as a powder after the existing fly ash filter into the flue gas emission stream. The sulphur dioxide binds to the sodium bicarbonate and is removed from the mixture of gases. The solid residue is filtered by a secondary bag filter and collected. The diagram below summarises the process:



Planned flue gas desulphurisation process

The deSOx residue is enriched with sulphur, so cannot be recycled into briquettes and used to make new stone wool products. It will instead be transported off site for reuse / recycling / disposal as appropriate. Waste management contractors have been supplied with analysis of similar residue material from other ROCKWOOL factories, but recycling / disposal methods can only be confirmed once the residue generated from the Pencoed facility is analysed.

## Supporting Information for Part C3

### 3 Operating Techniques

#### 3a Technical standards

- 1) The Natural Resources Wales guidance note “How to comply with your environmental permit, Additional guidance for Combustion Activities (EPR 1.01)” page 22, states:

*“For large coal-fired plant, end-of-pipe flue gas desulphurisation (FGD), or equivalent techniques are considered appropriate measures. Removal efficiency is “the ratio of sulphur not emitted over a given period to the sulphur in the fuel over the same period”; or, the “Rate of desulphurisation”. The given period will be when the FGD plant is ‘Available’ for use and excludes start up and shutdown periods.”*

- 2) The “Best Available Techniques (BAT) Reference Document for the Manufacture of Glass (2013)”, section 6.6 Flue-gas treatment with dry sodium bicarbonate and chemical valorisation of gas treatment residues, states:

*“Sodium bicarbonate shows a high efficiency for the removal of SO<sub>x</sub> emissions (see Section 4.4.3.3); with the consequent production of a solid residue resulting from the chemical reaction between acid gases and sodium bicarbonate. The solid residue is mainly separated from the flue-gases by means of filtration systems (an ESP or a bag filter). The main components of the residue are sodium sulphate and sodium carbonate (unreacted alkaline reagent). In many cases, the solid residue can be recycled to the melting furnace, partly replacing the refining agent (in general, sodium sulphate) used in the batch formulation; however, in some cases, the residue cannot be recycled directly in the furnace.”*