KNAUFINSULATION

Natural Resources Wales
Chester Road
Buckley
Flintshire
CH7 3AJ

Attention of: Alison Soper – Regulatory Officer PPC/RSR

21st February 2014

Dear Mrs Soper

Re: Annual Emissions Monitoring Review for 2013 - Permit Number: EPR/BR9383ID/V005

Please find enclosed the annual interpretive review of the emissions monitoring data for 2013 as required by Section 4.2.2 (a) of the Permit.

I trust this information is satisfactory, however, please do not hesitate to contact me should you require any further information.

Yours sincerely

C. Hensley

Claire Hensley
Environmental Manager

BS EN ISO 9002: 1994
FM01268 QS604/ FS31608
EM12162

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Introduction

This document is submitted to meet the requirement of section 4.2.2 (a) of the EPR Permit that is for an annual *'review of the results of the monitoring and assessment carried out in accordance with the Permit including an interpretive review of that data'.*

Manual Extractive Monitoring

Annual and six monthly monitoring was undertaken, by the prescribed methods, and reported as per the Permit requirements for Emission Points A, C, D, F and G.

Annual monitoring for Emission Point A Cupola Furnace Main Stack, comprises single measurements for Particulate, Sulphur Dioxide, Nitrogen Oxides and Carbon Monoxide for calibration checks on the CEMs.

Table 1: CEMS and Manual Monitoring Comparison

Parameter	Manual Sampling mg/Nm^3 @ $8\%O_2$	Comparable CEMs Data mg/Nm^3 @ $8\%O_2$
Total Particulate	0.85	0.04
Sulphur Dioxide	1348	1175
Nitrogen Oxides as NO_x	166	168
Carbon Monoxide	10	7

The manual results, as identified in *Table 1,* compare reasonably with the CEMs data, averaged over the same time periods, with the exception of total particulate, where the CEMs data generally shows an underestimation in comparison to the manual value. However, the results for both the manual sampling and CEMs data for all parameters are below emission limit values.

Manual monitoring for dioxins (a single measurement) is undertaken annually on Emission Point A in addition to chlorides (as HCl), fluoride, hydrogen sulphide, Group 1 and Group 2 Metals, which are measured in triplicate. The results recorded for these parameters are consistently low by comparison and consistently below their respective emission limit values, where applicable.

For Emission Point C Mainline Forming Stack, there is a six monthly monitoring requirement to determine, by triplicate measurement, Particulate, Volatile Organic Compounds (as Carbon) (VOCs), Ammonia, Formaldehyde, Phenol and Amines. The first monitoring visit undertaken in April 2013 recorded results below the emission limit values for all the parameters with the exception of VOCs, which recorded results in excess of the $50mg/m^3$ emission limit on two (Run 2 and Run 3) out of the three runs with respective values of $62.6mg/Nm^3$ and $127.5mg/Nm^3$ (uncertainty data subtracted from each measure value as per condition 3.1.4). This VOC breach was thought to be due to a poor control of binder application. A re-test for VOCs, by triplicate measurement, was undertaken in July 2013, the results showed emissions to be within the permitted limits.

The second monitoring visit for Emission Point C, undertaken in October 2013, recorded results in excess of emission limit values for particulate ($53.4mg/Nm^3$ with the uncertainty deleted) and VOCs ($60.1\ mg/Nm^3$ and $68.8\ mg/Nm^3$ with the uncertainty deleted). At the time of notifying the emissions breach to NRW, it was thought that there had also been a breach of the ammonia limit; however following subtraction of the uncertainty data, the measured result was within the permitted limit. A re-test for particulates, VOCs and ammonia (to ensure compliance), by triplicate measurement, was

undertaken in December 2013; all results showed emissions to be within the permitted limits.

For Emission Points D, F and G, there is an annual monitoring requirement to determine, by triplicate measurement, Particulate, VOC as C, Ammonia, Formaldehyde, Phenol and Amines. There are no permit limits applied to Emission Point "D" Binder Plant Local Exhaust Ventilation; however, the monitoring results are considered to be low (<2 mg/Nm^3 for amines, formaldehyde, phenol, and particulate and an average of 6.07mg/Nm^3 for VOCs and 65.67mg/Nm^3, uncertainty deleted) and the results are considerably lower to the 2012 annual data for these parameters.

With respect to Emission Point F Mainline Oven Oxidiser, all of the parameters returned results considerably lower than the permitted emission limit values. During 2012 a considerable amount of work was undertaken to improve the performance of the curing oven and its abatement which is reflected in the much reduced emissions which have also been reported in 2013.

For Emission Point G Mainline Cooling Zone, the higher levels of particulate (maximum concentration of 22mg/Nm^3, uncertainty deleted) and ammonia (maximum concentration of 38mg/Nm^3)=, uncertainty deleted) reported in 2012 identified the need for increased routine cleaning and maintenance of the cooling zone. Following cleaning and maintenance works, a re-test was carried out on the cooling zone at the end of January 2013, which showed an apparent improvement in emissions as the ammonia results were within the permitted limits and the particulate result of 11.54 mg/Nm^3 (uncertainty deleted), whilst still in exceedance of the permitted emission limit value was considerably lower to the maximum recorded result in 2012. A further re-test in March 2013 again showed a breach of the particulate limit and the annual monitoring in November 2013 showed breaches of both the particulate and ammonia limits. Investigations of the process operation and emissions abatement for this release point have shown that the abatement is not adequate to control emissions since the increase in production. Improvement work is planned to resolve this for which, a detailed proposal will be submitted to NRW for review, however, in the interim, continual cleaning and maintenance works have been undertaken to maintain the lowest emission levels as possible.

Continuous Emissions Monitoring (CEMs)

A differential optical attenuation spectroscopy (DOAS) system, working in both infrared and ultraviolet light, is employed for direct measurement of Carbon Monoxide, Oxides of Nitrogen and Oxides of Sulphur with Particulate monitoring by triboelectric probe. To enable continuous correction to the required conditions of NTP at 8% oxygen and dry gas the equipment monitors Hydrogen Sulphide, Oxygen, temperature, barometric pressure and also flowrate to enable mass emission calculations. The equipment is serviced and calibrated, by technicians from the equipment suppliers, every six months using certified gases for the gas calibrations. The CEMs equipment is generally reliable, giving relatively little down time with low data loss, however, if this occurs, every effort is made to restore normal operation as quickly as is practical and if there is delay, then some means is pursued to produce a best estimate of emissions so that compliance with limits may be demonstrated in addition to the manual extractive sampling.

The CEMs data for Emission Point A Cupola Stack After Oxidiser are reported quarterly in monthly summaries as required by the Permit. The validated data demonstrates compliance with the limits, enables reporting of un-authorised releases and the calculation of period averaged concentration data and mass emission values.

Storm Water & Effluent Water

For storm water, the concentrations of Suspended Solids, pH and Chemical Oxygen Demand (COD) are measured on a six monthly basis as required by the Permit from each of the six release points referenced as L1 to L6 that are discharging. Two of the release points (L1 and L2) are normally kept closed by penstock valves as surface water which drains to these points are known to contain relatively high levels of COD and suspended solids and thus, no storm water sampling is undertaken from these release points when closed.

During 2013, the storm water sampling was undertaken during the Months of May and October from four (L3 to L6) of the six release points and samples were analysed by an independent, UKAS accredited laboratory. The Permit does not impose any limits on the discharge of the stated parameters, however, the analytical results for both monitoring periods are generally within the expected ranges normally seen for storm water discharges from the site. The results for COD ranged between <7mg/l (October 2013) and 79.3mg/l (May 2013); pH results ranged between 6.77 (May 2013) and 7.82 (October 2013); and suspended solids from < 2mg/l (May 2013) to 40mg/l (October 2013).

Releases to sewer are the result of having an excess of water within the site's containment and process washwater system, which may have result from water level control failure, spillage, frost damage and/or periods of excessive rainfall (most often). In 2013 there were thirteen episodes of discharging effluent water to sewer totalling 1058m^3. During each episode of pumping effluent water to sewer, a representative sample of the water being discharged is obtained and analysed by an independent, UKAS accredited laboratory, for Total Phenolic, Formaldehyde, Fluoride, Ammonia, pH, COD, Suspended Solids and Oil and Grease as per the Permit requirements. In addition, the analysis of metals (mercury, copper, zinc, cadmium, lead, arsenic, total chromium, nickel and iron) is also undertaken for the purpose of reporting the plant's Annual Returns. The flow rate is monitored continuously during the discharge by a calibrated V-notch meter and the measurements are used to control the flow within permitted limits.

The Permit does not impose any limits on the discharge of the stated determinands but the site holds a consent from Welsh Water for the discharge of effluent water, that has set discharge limits for pH (between pH6 – 10); suspended solids (1000mg/l) and COD (8000mg/l). The volume consent is 60m^3 per day with a maximum flowrate of 2.5m^3 per hour as per the Permit limit. The levels of consent for the stated parameters will form part of a review with Welsh Water in the future.

In 2013, all samples recorded pH and COD concentrations below the respective limits; only one sample (recovered during the second episode of pumping in January) recorded a suspended solids concentration (1680mg/l) in excess of the discharge limit.

Boundary Monitoring

Six monthly upwind and downwind boundary monitoring was undertaken for Phenol, Ammonia and Formaldehyde in accordance with the Permit requirement. All recorded measurements for upwind and downwind monitoring on both occasions were not detected above the analytical detection limits, which the exception of a formaldehyde result (0.0044mg/Nm^3) recorded for the upwind monitoring during the second monitoring period. However, this value is significantly below the odour threshold and also significantly below any recognised health and safety exposure level. Therefore the process does not give rise to odour problems nor does it pose any health risk from these materials.

Measurement of dust levels on the eastern boundary of the site is carried out to BS 1747: Part 5 using a directional dust flux gauge and the measurements are evaluated every two weeks, as agreed with the Regulatory Authority, to ensure that the equipment is not overwhelmed by occasional heavy rainfall.

The results for 2013 are generally below 1000 mg/m^2 per day. A maximum spike of 1,276 mg/m^2 per day was recorded from Head 2 (Raw Materials) however, the average deposition rate from this direction is 316mg/m^2per day, thus indicating that releases are limited.

Annual Mass Emissions

Mass emissions of the substances monitored in the process operation are calculated from a combination of the measured concentrations with the flowrates and the operating time for each part of the process. Weighting is applied in the forming process calculations in order to take account of the different products made and the fairly wide range of product binder contents, as the binder content of the product being made is known to strongly influence the emissions of binder related substances. The total mass for each substance in each month is calculated by adding together the contributions from the parts of the process that are monitored. All of these calculations have been previously agreed with the Regulatory Inspectors who regulate the site. The results of these calculations are reported as part of the annual reporting requirement of the Permit and are also used as a part of the work performed to enable the Annual Pollution Inventory reporting.

The results of the calculations show that the mass emissions are strongly dependent upon operating time and material throughput in the process. Mass emissions of total particulate remain at a similar level through the year with any decrease caused by a decreased product output. This is also influenced by the proportion of Ecose and Phenolic binders employed and the quantity of binder applied to the individual products. The mass of CO_2 emission increases with the increased process throughput and there also appears to be a reasonable correlation with sulphur emissions which might be expected as both of these substances mainly result from the combustion of coke. Levels of NO_x emissions also generally follow the material throughput in the year. The other major emission is VOCs and the level of VOC emission is mainly determined by the binder content in the products together with the levels of dust suppressant and wetting agents used. The masses of the other substances released tend to be relatively small with the mass of phenol and formaldehyde in particular being reduced by Ecose product manufacture.

Conclusion

Process emissions are monitored in accordance with the Permit requirements and show that the controls and abatement normally result in the emissions being maintained within permitted limits. Where there are problems with un-authorised emissions, equipment breakdown and/or other unforeseen situations, every effort is made to ensure the plant regains compliance as soon as is possible within practical timescales.

C. Hensley
Environmental Manager