



My Reference: 2021/FCC/Bryn Lane/001
Environmental Permit Reference: EPR/BB3436RA

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Sent by email

13st July 2021

Proposal to mothball the acid scrubber at the Wrexham Recycling Park Phase 2 MBT facility (Environmental Permit reference BB3436RA)

Dear Rebecca,

Further to our recent correspondence on the above-mentioned subject, I am writing on behalf of FCC Environment with a proposal to mothball the acid scrubber unit within the air treatment system at their Bryn Lane MBT facility.

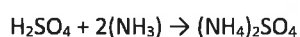
FCC Environment wish to mothball the acid scrubber unit on a trial basis as an *appropriate measure* under environmental permit Condition 1.3. *Efficient use of raw materials* and Condition 1.4. *Avoidance, recovery and disposal of wastes produced by the activities*.

Background

The design function of the acid scrubber unit is to remove any gaseous ammonia present within the facility's extracted airstream, prior to that airstream being humidified and treated in the biofilter before being released as an emission to air.

When the facility was being conceptualised prior to its construction in 2015/2016, the design parameters for the air treatment system allowed for wastes with a certain level of organic loading. When organic waste is treated biologically it yields gaseous ammonia among other gases. Gaseous ammonia has a characteristic smell and as such has the potential to cause annoyance. While the levels of ammonia to be generated by the waste were not considered significant to warrant targeted treatment, the plant design review process concluded that an acid scrubber would be incorporated into the plant design to remove gaseous ammonia should it be required.

The operation of the acid scrubber unit is carried out using sulphuric acid (H₂SO₄). Within the scrubber, the airstream is directed through a media that is circulated with a diluted sulphuric acid wash water. Any gaseous ammonia present in the airstream is converted to ammonium sulphate ((NH₄)₂SO₄) in a dissolved state as per the following reaction:



Once a sufficient ammonium sulphate concentration is created in the wash water as determined by its electrical conductivity, the scrubber discharge the solution to a storage vessel prior to removal offsite.

Findings

Since the facility became operational in 2016 the organic content of the wastes received has been lower than what was provisioned for at the design stage. Accordingly, the lower organic content of the wastes received has meant that the generation of gaseous ammonia has been largely absent from the treatment process, and because of this absence the chemical reaction in the acid dosing unit has only operated at a very low reaction rate.

Since the facility has been operational FCC's operational team has monitored the performance of the scrubber closely. It has been apparent from the outset that the consumption of sulphuric acid has been substantially lower than allowed for in the design specification. The cause of this is due to the very low levels of gaseous ammonia in the airstream entering the acid scrubber. The low levels of gaseous ammonia are due to the low organic content of the waste received at the facility. This has meant that the acid scrubber unit has been functionally redundant since the facility has been operational.

To evidence that the airstream lacked gaseous ammonia, several sampling exercises have been conducted by an MCERTS-accredited emissions contractor on behalf of FCC. The results of the sampling exercises are presented in the table below.

Sample date	Gaseous ammonia concentration (mg/m ³)	Analytical uncertainty
January 2020	0.64	+/- 0.65
January 2021	4.2	+/- 0.63
March 2021	0.83	+/- 0.21

The operational conditions within the facility were carefully considered when undertaking the monitoring and reflect typical operations, including waste composition, tonnage of waste in the biological stage, phase (duration) of the biological stage, this ensured that the conditions during the sampling exercises could be considered representative. All process parameters during all the monitoring exercises were within normal ranges.

A review of the putrescible content of the waste stream processed at the facility has found that it varies by just a few percent month-to-month, therefore it is considered that as long as the waste composition continues without a substantial and noticeable increase in putrescible content the gaseous ammonia concentrations observed in the test exercises are representative i.e., <5 mg/m³ and most likely <1 mg/m³.

To help put the measured levels in context, the Health and Safety Executive (HSE) short-term (15 min) and long term (8 hour) occupational exposure limit for gaseous ammonia is 18 mg/m³ and 25 mg/m³ respectively. In the context of odour impact, the reported odour threshold for ammonia is between 0.02-39.6 mg/m³ and annoyance threshold at 72 mg/m³.

The ammonia concentrations measured during the three exercises are both below the upper threshold BAT air emissions level (BAT- AEL) for ammonia, which is 20 mg/m³.

The ammonia concentrations measured are not significant enough to cause any negative effect on the overall odour abatement performance of the biofilter if the acid scrubber was removed. This view is based on the abatement performance observed at directly comparable biofilters elsewhere, including the Phase 1 IVC biofilter, and from published literature.

Environmental benefits

The storage of sulphuric acid by its nature is a health and safety and environmental hazard. Mothballing the system would remove a significant hazard from the facility. One of the standards of the updated BReF requires operators to reduce risk and practice resource efficiency and waste minimisation. We believe the proposed change falls into this category.

Regulatory principles

Two of the conditions of the current Environmental Permit requires FCC to take 'appropriate measures to ensure that raw materials ... are used efficiently in the activities' and to 'review...whether there are



suitable alternative materials that could resource environmental impact of improve the efficiency of water material...use' (Condition 1.3) and avoid the generation of wastes produced by the activities (Condition 1.4). We believe that mothballing the acid scrubber, based on the evidence above, would meet these requirements.

In summary, on account of the relatively low organic content of the wastes being received at the facility, the level of gaseous ammonia generated by the MBT treatment process the treatment is very low to the extent that the acid scrubber only operates at a near negligible rate. The residual levels of gaseous ammonia observed in the sampling exercises can be easily treated within the biofilter unit. By mothballing the dosing system, FCC would be significantly reducing the health and safety and environmental risks posed by sulphuric acid storage and would comply with a number of environmental permit conditions regarding the efficient use of raw materials and the avoidance of waste production.

Proposal

It is proposed that the acid scrubber and the associated acid warehousing and acid envelope, which includes the sulphuric acid and ammonium sulphate tanks, dosing system, pumps, pipework and monitoring systems, should be mothballed on a 2-year trial basis. It is proposed that the humidification stage of the scrubber remains operational to remove entrained dust and to maximise moisture content in the air flow to the biofilter.

During the trial period FCC would continue to closely monitor weekly waste inputs and review the results of the emissions to air monitoring (with specific regard to odour and TVOC emissions). It is also proposed that ammonia is sampled every 6-months from the airstream entering the air abatement system to confirm that levels of gaseous ammonia remain low.

Should FCC observe a significant rise in the organic content of the waste inputs, combined with elevated levels of gaseous ammonia entering the abatement system and a significant rise in the odour/TVOC emissions from the abatement system, FCC will look to re-commission the acid dosing system.

If all waste composition, operational parameters and emissions monitoring data do not show any reduction in performance over the next 2 years, the mothballing of the acid scrubber will become permanent, and the Technical Standards/Odour Management Plan formally revised by way of a formal submission to amend the environmental permit.

We trust that this proposal is clear and sufficient in scope to allow NRW to consider the proposed mothballing of the acid scrubber on a trial basis.

All analytical reports can be provided on request.

Should you wish to discuss the matter further, please don't hesitate to contact me at your convenience on 07738 056451 or at d.sandrof@btinternet.com.

Regards,

Dan Sandrof