Olfasense UK Ltd, Unit 7 Anglo office park, Bristol BS15 1NT
Tel: 01225 868 869
Email: uk@olfasense.com
www.olfasense.com

MCERTS ammonia monitoring of 1 No. Biofilter serving Phase 1 IVC at FCC Environment, Wrexham

Permit Number
Phase 1 IVC - EAWML100079

Client
FCC Environment

Installation/Site
FCC Environment, Bryn Lane, Wrexham Industrial Estate

Date of Monitoring
30/04/2026

Type of Monitoring
Ammonia monitoring

Report Reference/Version
FCCE26C_MCERTS REPORT_NH3_02

Date of Report Issue
10/06/2026

Author
Alex Cotton - MM24 1845 - Level 1 -

Approved by
Alex Claridge-Ingham - MM21 1614 - Level 2 - TE3 & TE4 -

Copyright and Non-Disclosure Notice
The contents and layout of this report are subject to copyright owned by Olfasense UK Ltd (©Olfasense UK Limited 2026) save to the extent that copyright has been legally assigned by us to another party or is used by Olfasense UK Ltd under licence. To the extent that we own the copyright in this report, it may not be copied or used without our prior written agreement for any purpose other than the purpose indicated in this report.
The methodology (if any) contained in this report is provided to you in confidence and must not be disclosed or copied to third parties without the prior written agreement of Olfasense UK Ltd. Disclosure of that information may constitute an actionable breach of confidence or may otherwise prejudice our commercial interests.

Table of Contents

Executive Summary

Monitoring Objectives	3
Monitoring Results	4
Monitoring Dates & Times	5
Monitoring & Analytical Methods	5
Operational Details at Time of Sampling	6

Appendix 1

Monitoring Personnel	7
Equipment	7
Photos / Diagrams	8
Flow Criteria Measurements	9

Appendix 2

Results	10

Appendix 3

Uncertainty and combined uncertainty	11

Overall Aim of Monitoring Campaign

FCC Environment (FCC) have commissioned Olfasense UK to undertake MCERTS accredited ammonia testing of 1 No. biofilter Odour Control Unit (OCU) serving the Phase 1 - in-Vessel Composting (IVC) Process at their Wrexham facility

Target Parameters

The target parameters were as follows:
- Ammonia

Special Requirements

No special requirements.

Concentration

Emission Point	Parameter	Units	Result	Relative expanded uncertainty 95% (K=2)*
Phase 1 Biofilter: Inlet	Ammonia	mg/m^3	4.65	0.093
Phase 1 Biofilter: Outlet	Ammonia	mg/m^3	<0.45	0.094

*Uncertainties are percentages of the reported value presented as decimals.

Emission Rate

Emission Point	Parameter	Units	Result	Relative expanded uncertainty 95% (K=2)*
Phase 1 Biofilter: Inlet	Ammonia	mg/s	42.30	0.258
Phase 1 Biofilter: Outlet	Ammonia	mg/s	<8.30	0.102

*Uncertainties are percentages of the reported value presented as decimals.

Physical Parameters

Emission Point	Actual volumetric airflow [m^3/s]	Volumetric Airflow [Nm^3/s] 273K 101.3 kPa	Volumetric Airflow at DGM conditions [Nm^3/s]	Temperature [°C]
Phase 1 Biofilter: Inlet	9.9	9.1	9.0	23.4
Phase 1 Biofilter: Outlet	19.7	18.5	18.2	19.5

Reference Conditions

Parameter	Parameter	Standard conditions
Ammonia	BS EN ISO 21877:2019	101.3 kPa, 273K, dry basis

Emission Limit Value

Emission Point	Units	Emission Limit Value
Phase 1 Biofilter	mg/m^3	N/A

Monitoring Date & Times

Emission Point	Parameter	Date	Times of sampling		Duration [HH:MM]
			Start	Finish	
Phase 1 Biofilter: Inlet	Ammonia	30/04/2026	13:14	13:44	00:30
Phase 1 Biofilter: Outlet	Ammonia	30/04/2026	13:59	14:30	00:31

Analysis Date & Start Times

Emission Point	Parameter	Date	Start time of analysis
Phase 1 Biofilter: Inlet	Ammonia	19/05/2026	N/A
Phase 1 Biofilter: Outlet	Ammonia	19/05/2026	N/A

General Information

Monitoring				Analysis			
Parameter	Standard	MCERTS #	UKAS lab #	Technique	UKAS lab #	LLOD*	Units
Ammonia	BS EN ISO 21877:2019	2430	2430	Ion Chromatography	0605	0.1	µg/ml

*Lower limit of detection

Analysis Laboratories

Laboratory	Parameter	Accreditation and number
RPS Group	Ammonia	UKAS laboratory 0605

Operational Details at Time of Sampling

Phase 1 Biofilter

Parameter	Value
Continuous/batch process	Continuous
Amount of batch sampled (if applicable)	N/A
Process status	Normal
Feedstock (if applicable)	IVC Extraction Airstream
Normal load/throughput of plant	Approx annual tonnage 18,000T
Abatement system used	Biofilter
Fuel used (if applicable)	N/A
Details from operator's CEMS (if applicable)	N/A

Monitoring Deviations

Parameter	Sampling location	Deviation
Velocity - BS EN ISO 16911	Phase 1 Biofilter: Inlet & Outlet	Sampling could not be undertaken in a section of duct which was straight within 5 Dh upstream and 2 Dh downstream of sample ports.
		Only 1 sample line was available for flow measurement.
		Flow swirl angle of > 15 degrees.
Ammonia - BS EN ISO 21877	Phase 1 Biofilter: Inlet	Absorber efficiency of >95% could not be met due to the second absorber being <0.1 (<LOD). Therefore, a true absorption efficiency cannot be calculated.
	Phase 1 Biofilter: Outlet	A true absorption efficiency cannot be calculated due to both impingers being <0.1 (LOD), due to this the absorber efficiency passes.

Monitoring Personnel

Position	Name	MCERTS Accreditation	MCERTS Number	Technical Endorsements
Sampling Manager	Alex Claridge-Ingham	Level 2	MM21 1614	TE3, TE4
Monitoring Technician	Matthew Chadwick	Trainee	MM25 1924	N/A

Methods and Technical Procedures Used

Parameter	Standard	Technical Procedure
Volume Flow Rate	BS EN ISO 16911-1: 2013	QD19
Ammonia	BS EN ISO 21877:2019	QD25

Sampling Equipment

Description	I.D
Toughbook	TB26
Temperature meter + temperature probe	TEMP111
Pitot tube	PT16
Micromanometer	FLOW13
Humidity probe	GM58
Barometer	BAR07
Balance	BAL04
Stop watch	STOP05
Theidman control unit	ISO31
Dry gas meter	ISO34
Isokinetic probe	N/A
Calibration weights	ISO35, ISO36
High flow rate pump	ISO31

Instrumental Analysers

Description	I.D
TESTO350 flue gas analyser (oxygen)	GM112

Miscellaneous Items

Description	I.D
Transport temperature logger	GM81 & GM118
Gas alert monitors	N/A

PHASE 1 BIOFILTER: INLET



PHASE 1 BIOFILTER: OUTLET



Flow Criteria Measurements - Summary

Parameter	Units	Emission Point	
		Phase 1 Biofilter: Inlet	Phase 1 Biofilter: Outlet
Duct diameter	m	1.45	1.35
Cross-sectional area	m^2	1.65	1.43
Average gas temperature	°C	23.4	19.5
Average gas pressure	Pa	21.0	112.5
Average static pressure	Pa	-127.7	36.0
Pitot tube coefficient	-	1.013	1.013
Gas velocity	m/s	6.0	13.8
Actual volume flow rate	m^3/s	9.9	19.7
Standardised volume flow rate [273K, 101.3kPa]	Nm^3/s	9.1	18.5
Standardised volume flow rate [293K, 101.3kPa]	Nm^3/s	9.8	19.8
Water content	%	1.2	1.4
Relative humidity	%	97.8	99.9
Oxygen	%	20.99	20.88
Average ambient temp	°C	21.9	21.9
Average barometric pressure	hPa	1018.3	1018.3

Flow Criteria Measurements - Average Velocity [Pa]

Traverse Point	Emission Point					
	Phase 1 Biofilter: Inlet			Phase 1 Biofilter: Outlet		
	Distance [m]	Traverse 1	Traverse 2	Distance [m]	Traverse 1	Traverse 2
1	0.06	23.0	-	0.06	90.8	-
2	0.14	23.4	-	0.13	114.4	-
3	0.21	23.2	-	0.20	110.7	-
4	0.32	23.1	-	0.30	118.8	-
5	0.43	23.8	-	0.40	108.4	-
6	0.63	20.9	-	0.58	106.5	-
7	0.82	20.6	-	0.77	122.7	-
8	1.02	21.0	-	0.95	113.7	-
9	1.13	18.4	-	1.05	104.3	-
10	1.24	18.4	-	1.15	99.4	-
11	1.31	17.6	-	1.22	115.9	-
12	1.39	18.4	-	1.29	144.9	-

Ammonia Results

Impinger ID	Date of analysis	NH_3 analysis result (mg/l)	Impinger vol (L)	Volume sampled (m^3) [Ref 273K, 101.3 kPa]	NH_3 Concentration (mg/m^3)	NH_3 Emission Rate (mg/s)
FCCE26C_INLET_IMP 1	19/05/2026	2.3	210	0.10	4.46	40.55
FCCE26C_INLET_IMP 2	19/05/2026	<0.1	208		<0.19	<1.75
FCCE26C_OUTLET_IMP 1	19/05/2026	<0.1	210	0.09	<0.22	<4.16
FCCE26C_OUTLET_IMP 2	19/05/2026	<0.1	209		<0.22	<4.14
FCCE26C_INLET_BLANK	19/05/2026	<0.1	415	0.10	<0.38	<3.48
FCCE26C_OUTLET_BLANK	19/05/2026	<0.1	419	0.09	<0.45	<8.30

Details of Analysis

Parameter	Laboratory	UKAS lab #	Analysis standard	Date of Analysis	Reference Odourant
Ammonia	RPS	0605	BS EN 21877:2019	19/05/2026	N/A

The uncertainty values quoted below have been calculated based upon a confidence interval of 95%.

Uncertainty Sources

Quantifiable Sources of Uncertainty	Non-quantifiable Sources of Uncertainty
Uncertainty of measurement of the volume flow.	Uncertainty associated with the representation of the sample in a temporal sense.
Uncertainty of ammonia impinger sample collection and analysis	Uncertainty associated with the conservation of the sample during transportation and storage.

Airflow Velocity >5m/s

Measurement	Device	*Uncertainty	Source
Gas velocity measurement	Micromanometer	0.015	Manufacturers specification
	Pitot tube	0.05	Calibration uncertainty
Gas density calculation	Testo 350 combustion analyser	0.02	Manufacturer's specification
	Thermocouple	0.016	In-house measurement
	Barometer	0.01	In-house measurement
	Micromanometer	0.015	Manufacturer's specification
Cross-sectional area A (determined from measurement of diameter)	Tape measure	0.01	In-house measurement
	Thermocouple	0.016	In-house measurement
Correction to reference conditions	Barometer	0.01	In-house measurement
	Micromanometer	0.015	Manufacturer's specification
	Thermocouple	0.016	In-house measurement

*Uncertainties are percentages of the reported value presented as decimals.

Ammonia Impinger uncertainty

Components of uncertainty calculations

All of the below calculations and values are taken from a worked example including previous and standard data to create a quantifiable uncertainty for the BS EN 21877 method of sampling. The uncertainty values above for concentration and emission rate use the true values from each source.

Performance characteristic	Relative standard uncertainty*
Volume of absorption solution	$\frac{u(V_S)}{(V_S)} = 0.008$
Gas volume sampled	$\frac{u(V_m)}{(V_m)} = 0.013$
Temperature at the gas volume meter	$\frac{u(T_m)}{(T_m)} = 0.0028$
Absolute pressure at gas volume meter	$\frac{u(P_{rel})}{(P_m)} = 0.0000116$
Atmospheric pressure	$\frac{u(P_{atm})}{(P_m)} = 0.0017$
Concentration in the absorption solution	$\frac{u(\beta_s)}{(\beta_s)} = 0.0445$

*Uncertainties are percentages of the reported value presented as decimals.

Ion Chromatography Analysis

Measurement	Non expanded Uncertainty*	Source
Ion chromatography analysis	0.0445	Provided by RPS Groups

*Uncertainties are percentages of the reported value presented as decimals.

Combined uncertainty for concentration

The following calculation is used to calculate the overall combined uncertainty for ammonia sampling.

$$\frac{u^2(c_m)}{(c_m)^2} = \frac{u^2(\beta_s)}{(\beta_s)^2} + \frac{u^2(v_s)}{(v_s)^2} + \frac{u^2(V_m)}{(V_m)^2} + \frac{u^2(T_m)}{(T_m)^2} + \frac{u^2(p_{rel})}{(p_{rel}+p_{atm})^2} + \frac{u^2(p_{atm})}{(p_{rel}+p_{atm})^2}$$

Source of uncertainty	*Relative standard uncertainty
Combined relative standard uncertainty of result	0.047
**Expanded combined relative uncertainty of result 95%	0.108

*Uncertainties are percentages of the reported value presented as decimals.