



Bioaerosol Sampling Report 2020

FCC Environment

Bryn Lane IVC (Phase 1)

6th August 2020

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Approval Sheet

Customer: FCC Environment

Site: Bryn Lane IVC,
Wrexham Recycling Park,
Bryn Lane, Wrexham
LL13 9UT

Project title: Bioaerosols Sampling

Project Manager: I. Castezubi

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Issue	Status	Date	Prepared By	Signature	Date
1	Final	27/08/2020	T. Ross		26/08/2020
			Approved By	Signature	Date
			A. Hammersley		27/08/2020

Foreword

enital has used its best endeavours, experience and expertise to provide a meaningful, accurate and relevant representation of the works carried out. The works were based on a defined programme and scope of works and terms and conditions agreed with the Client.

enital cannot accept responsibility to any parties whatsoever, following the issue of this report, for any matters arising which may be considered outside the agreed scope of works.

This report is issued solely to the Client. enital does not accept any responsibility to any third parties to whom this report may be circulated, in part or in full, and any such parties rely on the contents at their own risk.

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Scope of Work

enital was tasked with providing Bioaerosol monitoring for FCC Environment at Bryn Lane IVC (Phase 1) located within Wrexham Recycling Park, Bryn Lane, LL13 9UT.

Due to the potential health risks posed by the facility to nearby receptors, the testing was conducted to assess the amount of airborne bioaerosols being generated by the site that is released into the local environment. The monitoring is to ensure that this exposure is below the industry standard threshold set by the Environmental Agency.

Due to the complex layout and proximity of the site facility an agreement has been made between the regulator Natural Resources Wales (NRW) and FCC Environment Ltd. This is an amendment to the standards by the Environment Agency Technical Guidance Note (Monitoring) M9 to produce a modified site strategy.

FCC agree with NRW that the nearest sensitive receptor to the composting operation for sampling will be the Council Yard & Offices, which are approximately 70-80m from the emission stack.

The work was carried out on 6th August 2020. This document is a presentation of the resulting data.

Background

The bioaerosol monitoring was specifically undertaken to enumerate the quantity of micro-organisms that can be cultured from representative samples of ambient air, collected at pre-determined monitoring points in the locality of the site.

The monitoring was undertaken in accordance with Environment Agency Technical Guidance Note (Monitoring) M9 – Environmental monitoring of bioaerosols at regulated facilities – July 2018.

Pre-prepared agar sample plates for *Aspergillus fumigatus*, mesophilic micro-organisms (bacteria) were directly impacted with ambient air using an Andersen sampler at the four selected sampling locations.

In the UK no statutory limits have been set for ambient concentrations of bioaerosols. However, as per the Environmental Agency Technical Guidance Note M17, guideline levels have been set for acceptable levels at sensitive receptors as the following:

- Total bacteria: 1000 cfu/m³
- *Aspergillus Fumigatus*: 500 cfu/m³

Sampling Locations

The sampling locations were determined to achieve:

- One sampling location directly upwind of the centre of the IVC facility.
- One location directly downwind of the IVC facility.
- One location at the nearest sensitive receptor, being the HWRC facility.

Equipment

The equipment used is as follows:

- Continuous operation mobile weather station (wind speed, direction, temperature, humidity) and tripod
- Digital stopwatch
- GPS device
- 3 x single-stage Andersen samplers
- 3 x tripods
- 3 x hemicylindrical baffles
- 3 x stoppers for Andersen samplers
- 3 x fully charged vacuum pumps (individual capacity of at least 35l per min) and connecting tubing
- Rotameter to fit vacuum pump
- Agar plates – variety dependent on required test
- 2 x sealable airtight sterile plastic containers
- Cool box with ice packs for transport
- 70% v/v aqueous solution / wipes of ethanol or industrial methylated spirits cleaning solution or other suitable disinfectants

Agar

The types of Agar used were:

-Mesophilic micro-organisms: (Total Viable Count [TVC]) – Half Strength Nutrient Agar (also known as 93's – white in colour)

-*Aspergillus Fumigatus* / Total Fungi: (colony-forming unit [cfu]) – Malt Extract Agar (also known as 94's – light yellow in colour)

The impacted agar plates were subsequently delivered to a specialist laboratory within 24 hours via a cool box with ice packs where they were cultured and enumerated.

Cleaning of Sampling Equipment

All parts of the sampling equipment that were in contact with the samples, work surfaces or storage containers were cleaned with a 70% aqueous solution or wipes of ethanol or methylated spirits, or other suitable disinfectants prior to use. Equipment was completely dried, through air drying before the sampling exercise was commenced.

On completion of cleaning the Andersen single-stage samplers, a stopper was placed in the cone entrance to stop any contamination occurring before the sampling event.

Setup and Operation of Sampling Equipment

- The pumps were Pre-run for a specified time at the required flow rate of 28.3l/min ($\pm 2\%$). This pump test was undertaken once before the start of the monitoring exercise.
- The Andersen single-stage samplers were mounted on to the tripods securely at a height of 1.5-1.8m above ground and the baffles were fitted on the tripod to form a rear shield when aligned to the desired sampling direction.
- The vacuum pump was connected to the rotameter using an appropriate length and diameter of the tubing. Using the rotameter, the flow rate was adjusted to ensure it is running at a constant flow of 28.3l/min ($\pm 2\%$) for each pump.
- On completion of the pump test, the tubing from the dry gas flow meters was disconnected from the rotameter then connected to the inlet on the corresponding Andersen single-stage sampler.
- Fresh sample plates were installed in turn by removing the lid and being placed within the Andersen single-stage sampler
- The stoppers in the inlet of the Andersen single-stage samplers were removed.
- When the Andersen single-stage samplers were fitted with plates the vacuum pumps were activated and the start time recorded on the stopwatch. All pumps were switched on/off at the same time or at a maximum interval of up to 10% of the total run time.
- When the sample duration was completed the pumps were stopped and the finish time recorded.
- The plates were carefully removed ensuring that no contact was made with the exposed agar surface,
- The dish cover was replaced on to the plate and secured with masking tape.
- Each plate was placed into an individual plastic bag and sealed.
- The plates were stored in an upright, protective and cooled container and transported to the laboratory within 24 hours.

- Control blank samples were taken at the site. The steps stated above were adhered to however the sample pump was not switched on. One of each sample media was inserted within the Andersen single-stage samplers, left in for the same period of sampling time, then packaged.
- Field blank samples were taken. The sample media were placed in re-sealable packaging without being opened.

The impacted agar plates were subsequently delivered to a specialist laboratory via a cool box with an ice pack. The analysis took place within 24 hours from sample collection.

Presentation of Data

The following pages consist of meteorological conditions found on site, a presentation of the estimated concentrations of airborne micro-organisms, a plan displaying sample locations and the laboratory data.

Bioaerosol Monitoring Field Sampling Report

Site: Bryn Lane IVC

Site Operator: FCC Environment

Date: 6th August 2020

Start Time: 08:30

Finish Time: 12:30

Monitoring Technician ID: I.Castezubi, A.Hammersley, A.Lovell

Meteorological Monitoring Summary

Parameter	Wind Direction	Wind Speed (m/s)	Pressure (mb)	Temperature (°C)	Cloud Cover (0-8)
Start	SSE	2.68	1016	20	6
Finish	SSE	2.68	1015	22	6

Site Description

FCC Bryn Lane IVC facility is situated inside an industrial estate as part of Wrexham Recycling Park located on Bryn Lane, Wrexham.

The IVC facility was fully operational during the sampling period and operating under normal conditions. The nearest sensitive receptor is the Wrexham Household Waste Recycling Centre situated approximately 300m from the IVC facility.

Field Sampling Comments

Samples were taken at an upwind, downwind location and at a sensitive receptor (HWRC) (see enclosed annotated image Bryn Lane IVC BioA study 06.08.2020) using Andersen samplers. Ambient air samples were collected by the technique of direct impaction, where a known quantity of air was directed onto an agar plate. The agar samples were then cultured and counted by a specialist laboratory. The count result provides a quantification of the potential health risks posed by the facility to nearby receptors. It was noted that a transient waste odour was present at all three locations during monitoring.

Upwind location: The upwind sample was located on the site boundary south of the IVC facility, placed on a grass area near to the electrical switch. It was noted that tall trees and vegetation were present near to this sample location.

Downwind location: The downwind location was placed on a grass verge north of the IVC facility next to the car park and haulage road. It was noted during monitoring that hedges and vegetation were near to this sample location.

Sensitive Receptor Location: The sensitive receptor location was placed on a grass verge beside the haulage road running past the boundary of the HWRC. Regular traffic passed this location with a total of fifteen vehicles passing during monitoring.

Deviations from methods

The locations were assessed to take into account the effect of features and obstructions which may impact the effectiveness of the monitoring. The sampling locations were restricted to where safe physical access was possible along with being legally accessible. (See enclosed annotated image "Bryn Lane IVC Aerial plan 06/08/2020").

Sampling locations were determined in agreement to the modified sampling strategy as agreed by the NRW regulator and FCC.

Field Sampling Record

Ambient Sampling: Estimated concentration of bioaerosols								
Site: Bryn Lane IVC (Phase 1) Sampling Date: 06/08/2020 Estimated Mass of Materials: Unknown Activities affecting the concentration of Bioaerosols: IVC activities, biofilter stack					Site Operator: FCC Environment Monitoring Contractor: Enital Type of Materials Processed on Site: Green Waste and Compost Site Activity: Normal IVC operations			
Location and grid reference	Sample reference number	Distance from centre of active area (m)	Difference in bearing between location of samplers and mean direction wind blows to (°)	Sampling start/end times (HH:MM)	Concentration of bioaerosols (CFU/m ³)	Concentration of bioaerosols (CFU/m ³)	Median of samples (CFU/m ³)	
					Total Count (TVC)	Aspergillus Fumigatus (YM)	TVC	YM
Upwind (1) SJ 38643 49897	UW001BIOAEM. Upwind location on grassy area south of IVC biofilters.	73m	137.5°	11:06 – 11:11	140	-	203	14
				11:06 – 11:11	-	14		
				11:18 – 11:23	203	-		
				11:18 – 11:23	-	14		
				11:28 – 11:33	364	-		
				11:28 – 11:33	-	7		

FCC, Bryn Lane IVC (Phase 1) Environmental Bioaerosols Report 2020

Location and grid reference	Sample reference number	Distance from centre of active area (m)	Difference in bearing between location of samplers and mean direction wind blows to (°)	Sampling start/end times (HH:MM)	Concentration of bioaerosols (CFU/m³) Total Count (TVC)	Concentration of bioaerosols (CFU/m³) Aspergillus Fumigatus (YM)	Median of samples (CFU/m³)	
							TVC	YM
Downwind (2) SJ 38688 50035	DW002BIOAEM. Downwind location on grassy verge next to car park and haulage road.	82m	7.5°	11:06 – 11:11	231	-	259	126
				11:06 – 11:11	-	84		
				11:18 – 11:23	259	-		
				11:18 – 11:23	-	126		
				11:28 – 11:33	280	-		
				11:28 – 11:33	-	161		
Sensitive Receptor (3) SJ 38756 50048	SR003BIOAEM. Sensitive receptor location on boundary of HWRC.	118m	-306.5°	11:06 – 11:11	364	-	469	140
				11:06 – 11:11	-	91		
				11:18 – 11:23	469	-		
				11:18 – 11:23	-	266		
				11:28 – 11:33	840	-		
				11:28 – 11:33	-	140		

	Sample reference number	Distance from centre of active area (m)	Difference in bearing between location of samplers and mean direction wind blows to (°)	Sampling start/end times (HH:MM)	Concentration of bioaerosols (CFU/m ³)	Concentration of bioaerosols (CFU/m ³)	Median of samples (CFU/m ³)	
					Total Count (TVC)	Aspergillus Fumigatus (YM)	TVC	YM
Control	ControlBIOAEM At same location as Upwind	N/A	N/A	N/A	15	-	N/A	
					-	< 1		
Field	FieldBIOAEM. Not removed from package. For QA/QC	N/A	N/A	N/A	< 1	-	N/A	
					-	< 1		

Field Sample Results

The median is routinely used for statistics and probability theory as the results are less likely to be skewed by extremely high or low values that are not representative of the data set. The median is located by finding the middle value by evenly separating the data set. The sensitive receptor median results have been calculated and are presented within this table. The process contribution has been calculated by subtracting the upwind median value from the downwind median value. The process contribution shows the input the activity of the site has on the ambient bioaerosols concentrations. In the table below the process contribution is shown alongside the median result for the sensitive receptor.

Process Contribution Results				
Sample type	Upwind median results	Downwind median highest results	Process Contribution	Sensitive Receptor
Total Bacteria viable Count (TVC)	203	259	56	469
Aspergillus fumigatus (YM)	14	126	101	140

Summary of Analytical Results

The above reports indicate that at the time of sampling:

1. Mesophilic micro-organisms - Total Viable Count (TVC) shows higher readings at the downwind location compared to the upwind location.
2. Aspergillus readings were detected at upwind, downwind and sensitive receptor sample locations.
3. Upwind location median results remained below the industry standard threshold values of 1000cfu/m³ for Total Bacteria.
4. Downwind location median process contribution results remained below the industry standard threshold values of 1000cfu/m³ for Total Bacteria.
5. Sensitive receptor location median results remained below the industry standard threshold values of 1000cfu/m³ for Total Bacteria.
6. Upwind location median results remained below the industry standard threshold values of 500cfu/m³ for Aspergillus Fumigatus.
7. Downwind location median process contribution results remained below the industry standard threshold values of 500cfu/m³ for Aspergillus Fumigatus.
8. Sensitive receptor location median results remained below the industry standard threshold values of 500cfu/m³ for Aspergillus Fumigatus.
9. Control and Field blanks for QA/QC did not show any evidence of contamination.

Appendices

Appendix A - Aerial Plan



FCC Environment, Bryn Lane IVC (Phase 1), Bioaerosol Survey 06/08/2020
Aerial Plan Showing Bioaerosol Sample Locations



Appendix B – Meteorological Conditions

METEOROLOGICAL CONDITIONS

SITE:	Bryn Lane IVC (Phase 1)	SITE OPERATOR:	FCC Environment				
SAMPLING DATE:	06/08/2020	COMMISSIONING LABORATORY:	Southern Microbiological Services				
ESTIMATED MASS OF MATERIALS:	unknown	TYPE OF MATERIALS PROCESSED ON SITE:	Compost and green waste				
Location	Sample Reference Number	Bearing of samplers from boundary of operational area or turning/ screening operation (° from true north) - GPS	Mean direction the wind blows to during the sampling period (° from true north)	Difference in bearing between location of samples from boundary/ source and mean direction wind blows to (°)	Mean wind speed during sampling (m/s)	Arithmetic mean of air temperature (°C)	Arithmetic mean of relative humidity (%)
Upwind	UW001BIOAEM	200 SJ 38643 49897	337.5	137.5	2.68	20	72
Downwind	DW002BIOAEM	345 SJ 38688 50035	337.5	7.5	2.68	20	72
Sensitive Receptor	SR003BIOAEM	31 SJ 38756 50048	337.5	-306.5	2.68	20	72

Appendix C - Photograph sheet

MONITORING PHOTOGRAPH RECORD

Site: FCC Bryn Lane IVC

Title: Bryn Lane Phase 1 Env Bioa

Ref: BL060820

Date: 06/08/2020

Carried Out By: AH / AL / IC



Upwind location 1 – Position of the upwind sampler facing the IVC facility



Upwind location 1 – Position of the upwind sampler facing away from the IVC facility



Downwind location 2 – Position of the downwind sampler, looking towards IVC facility



Downwind location 2 – Position of the downwind sampler, looking away from the IVC facility



Sensitive Receptor location 3 – Position of the downwind sampler, looking towards the IVC facility



Sensitive Receptor location 3 – Position of the downwind sampler, looking away from the IVC facility



Appendix D – Laboratory Certificate



SOUTHERN MICROBIOLOGICAL SERVICES LTD

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TEST REPORT

**Enitial Anderson Plates - PO:91402 - Site: Bry Lane Phase 1 IVC - Date
Sampled: 06/08/2020**

Report Reference: 1200801126

Date Reported: 11 August 2020

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SMS Reference	Date Tested	Sample Code	Sample Details	Ltrs of Air filtered	Further Details 2	TVC cfu/m3 (2 day pr	Asp fumigatus cfu/m3
1200807595	07/08/20	UW001BIOAE M (93.)	---	140	---	140 cfu/m3	
1200807596	07/08/20	UW001BIOAE M (94.)	---	140	---		14 cfu/m3
1200807597	07/08/20	UW001BIOAE M (93.A)	---	140	---	203 cfu/m3	
1200807598	07/08/20	UW001BIOAE M (94.A)	---	140	---		14 cfu/m3
1200807599	07/08/20	UW001BIOAE M (93.B)	---	140	---	364 cfu/m3	
1200807600	07/08/20	UW001BIOAE M (94.B)	---	140	---		7 cfu/m3

**Enitial Anderson Plates - PO:91402 - Site: Bry Lane Phase 1 IVC - Date
Sampled: 06/08/2020**

Report Reference: 1200801126

Date Reported: 11 August 2020

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<u>SMS Reference</u>	<u>Date Tested</u>	<u>Sample Code</u>	<u>Sample Details</u>	<u>Ltrs of Air filtered</u>	<u>Further Details 2</u>	<u>TVC cfu/m3 (2 day pr</u>	<u>Asp fumigatus cfu/m3</u>
1200807601	07/08/20	DW002BIOAE M (93.)	---	140	---	231 cfu/m3	
1200807602	07/08/20	DW002BIOAE M (94.)	---	140	---		84 cfu/m3
1200807603	07/08/20	DW002BIOAE M (93.A)	---	140	---	259 cfu/m3	
1200807604	07/08/20	DW002BIOAE M (94.A)	---	140	---		126 cfu/m3
1200807605	07/08/20	DW002BIOAE M (93.B)	---	140	---	280 cfu/m3	
1200807606	07/08/20	DW002BIOAE M (94.B)	---	140	---		161 cfu/m3
1200807607	07/08/20	SR003BIOAE M (93.)	---	140	---	364 cfu/m3	
1200807608	07/08/20	SR003BIOAE M (94.)	---	140	---		91 cfu/m3
1200807609	07/08/20	SR003BIOAE M (93.A)	---	140	---	469 cfu/m3	
1200807610	07/08/20	SR003BIOAE M (94.A)	---	140	---		266 cfu/m3
1200807611	07/08/20	SR003BIOAE M (93.B)	---	140	---	840 cfu/m3	
1200807612	07/08/20	SR003BIOAE M (94.B)	---	140	---		140 cfu/m3

Enitial Anderson Plates - PO:91402 - Site: Bry Lane Phase 1 IVC - Date
Sampled: 06/08/2020

Report Reference: 1200801126

Date Reported: 11 August 2020

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<u>SMS Reference</u>	<u>Date Tested</u>	<u>Sample Code</u>	<u>Sample Details</u>	<u>Ltrs of Air filtered</u>	<u>Further Details 2</u>	<u>TVC cfu/m3 (2 day pr</u>	<u>Asp fumigatus cfu/m3</u>

Unless otherwise indicated, all samples were received in good condition, tests were performed at the above address and results apply to the sample as received. Date tested equals date received.

Where there is a greater than 40% difference in bacterial duplicates, these are genuine results.



Carol Macready

Technical Administration Manager

*

Tests marked with a * in this report are not included in the UKAS Accreditation Schedule for our laboratory



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TEST REPORT

**Enital Anderson Plates Controls - PO:91402 - Site: Bry Lane Phase 1 IVC - Date
Sampled: 06/08/2020**

Report Reference: 1200801127

Date Reported: 11 August 2020

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<u>SMS Reference</u>	<u>Date Tested</u>	<u>Sample Code</u>	<u>Sample Details</u>	<u>Ltrs of Air filtered</u>	<u>Further Details 2</u>	<u>TVC/plate</u>	<u>Asp. Fumigatus Plate</u>
1200807613	07/08/20	_CONTROLBI OAEM (93-C)	---	---	---	15 cfu / plate	
1200807614	07/08/20	_CONTROLBI OAEM (94-C)	---	---	---		< 1 cfu / plate
1200807615	07/08/20	_FIELDBIOAE M (93-C)	---	---	---	< 1 cfu / plate	
1200807616	07/08/20	_FIELDBIOAE M (94-C)	---	---	---		< 1 cfu / plate

Enitial Anderson Plates Controls - PO:91402 - Site: Bry Lane Phase 1 IVC - Date
Sampled: 06/08/2020

Report Reference: 1200801127

Date Reported: 11 August 2020

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<u>SMS Reference</u>	<u>Date Tested</u>	<u>Sample Code</u>	<u>Sample Details</u>	<u>Ltrs of Air filtered</u>	<u>Further Details 2</u>	<u>TVC/plate</u>	<u>Asp. Fumigatus Plate</u>

Unless otherwise indicated, all samples were received in good condition, tests were performed at the above address and results apply to the sample as received. Date tested equals date received.



Carol Macready

Technical Administration Manager