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Report: **Bioaerosol Monitoring**
Client: Blackmore Vale Farm Cream Ltd.
Date of Site Work: 9th December 2024

Prepared for: Paula Boulton
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Wincombe Lane,
Shaftsbury
Dorset
SP7 8QD

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A handwritten signature in black ink, appearing to be 'Rob Jones', written over a horizontal line.

Issued by: Alistair Begg, B.Sc (Hons), AFOH
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Executive Summary

Paula Boulton of Blackmore Vale Farm Cream Ltd., requested that Element Materials Technology Environmental UK Limited undertake monitoring of bioaerosols at its Shaftsbury site. Monitoring was undertaken in accordance with Technical Guidance Note M9 'Environmental Monitoring of Bioaerosols at Regulated Facilities'.

Site work was undertaken by Alistair on 9th December 2024.

The purpose of the bioaerosol monitoring exercise was to establish the amount of bioaerosols being dispersed from the site to the nearest sensitive receptor, as part of the company's program of compliance with the following health, safety and environmental legislation, to obtain a EPR permit.

Monitoring Findings:

Sampling Location	Analyte	Permit Limit (CFU/m ³)	Median Concentration of Parallel Samples (CFU/m ³)
Upwind	Total bacteria	1000	<625*
	<i>Aspergillus fumigatus</i>	500	<125*
Downwind	Total bacteria	1000	<125
	<i>Aspergillus fumigatus</i>	500	<125
Downwind Right-Hand Fan	Total bacteria	1000	<125
	<i>Aspergillus fumigatus</i>	500	<125
Downwind Left-Hand Fan	Total bacteria	1000	125
	<i>Aspergillus fumigatus</i>	500	<125

< Less than
• Mean average for upwind samples

CFU/m³ Colony Forming Units Per Cubic Metre

Below Permit Limit	Exceeds Permit Limit
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1. Introduction

Element Materials Technology Environmental UK Ltd was commissioned by Blackmore Vale Farm Cream Ltd. to carry out a bioaerosol monitoring exercise at the anaerobic digester at their site in Shaftsbury, Dorset.

The purpose of the bioaerosol monitoring exercise was to establish the amount of bioaerosols being dispersed from the site to the nearest sensitive receptor, as part of a permit application to the Environment Agency. Monitoring was undertaken in accordance with Technical Guidance Note M9 'Environmental Monitoring of Bioaerosols at Regulated Facilities'. This report details the survey methodology and results on the monitoring of all locations.

Site work was undertaken by Alistair Begg of Element Materials Technology Environmental UK Ltd on 9th December 2024.

2. Measurement Methodology

Measurements were carried out in accordance with parameters specified in Technical Guidance Note M9 'Environmental Monitoring of Bioaerosols at Regulated Facilities'. Of the methods suggested in the protocol, the filter method was utilised in this project.

On site calibration checks were performed on the pumps used and were found to be within the permitted tolerance of the standard. For all measurements the sample head was located 1.5 metres above ground level. The wind strength was strong, caused by storm Darragh with strong gusts from a North Easterly direction.

Downwind samples were taken from the edge of the site boundary, with no option to extend distance. As such the distances for the downwind, downwind right and downwind left were all 30 metres. This is closer to the operational area that stated in M9 due to site boundary restrictions and no option to extend these distances.

Triplicate samples were carried out at each selected sampling location. Once completed, filters were transferred to the laboratory.

The IOM heads containing a polycarbonate filter were used to determine the bioaerosol exposure under the test conditions. Upon arrival at the laboratory the bioaerosols impacted on each filter were recovered in 3 ml maximum recovery diluent. The target micro-organisms were cultured using appropriate dilutions on the following media.

Meteorological conditions were monitored throughout the sampling exercise using a portable weather station.

Nutrient agar (NA) plates were used for total mesophilic bacteria. Malt extract agar (MEA) plates were used for *Aspergillus fumigatus*.

Samples were incubated for two days at 37°C (total mesophilic bacteria), and for two days at 44°C (*Aspergillus fumigatus*).

The laboratory retained information regarding each sample. Dates and times of preparation, incubation times, batch numbers, personnel responsible, storage medium and incubator temperature were all recorded.

3. Site Information

Blackmore Vale Farm Cream Ltd. operates a dairy product production at their site in Shaftsbury, Dorset. The site is located just off Wincombe Lane, on a private road for entry to the site. There is a number of houses being built or being resided in already in the Northwest to West of the site. Refer to plans in Section 5 for a map of the local area and a map of the sampling locations on the day of the survey.

The site was operation normally on the day of sampling, with lorries coming in and out delivering and collecting goods. The OCU was operational during the day.

The nearest sensitive receptor (NSR) was 220 m due west from the centre of operational area from the anaerobic digester. This NSR is a residential estate.

As part of a permit application from the Environmental Agency, the following limits have been set:

Parameter	Threshold limit (CFU/m ³)
Total bacteria (TB)	1000
<i>Aspergillus fumigatus</i> (AF)	500

Table 1. Environmental Parameters - Bioaerosol monitoring							Job Number: 117212
Site:		Shaftsbury, Dorset		Site Operator		Blackmore Vale Farm Cream Ltd.	
Date:		9 th December 2024		Commissioning Laboratory		EMT Environmental	
Estimated Mass of Materials:				Types of materials processed on site		Food production	
Location	Bearing of samplers from boundary of operational area (degrees °)	Mean direction the wind blows to during the sampling period (degrees °)	Difference in bearing between location of samplers from boundary and mean direction wind blows to (degrees °)	Mean wind speed (ms ⁻¹)	Arithmetic mean of air temperature °C	Arithmetic mean of relative humidity (%)	Prevailing weather conditions including cloud cover
Upwind	45	45	0	9	6	73	Gray and overcast with strong winds, 7/8
Downwind	225	45	180	9	6	73	
Downwind Right-Hand Fan	255	45	210	9	6	73	
Downwind Left-Hand Fan	195	45	150	9	6	73	

4. Measurement Results

The results for measurements undertaken at all locations are shown within a number of standardised tables on the following pages:

Table 2. Upwind: Bioaerosol monitoring – Estimated Concentrations of Airborne Micro-organisms								Job Number 117212	
Site:		Shaftsbury, Dorset			Site Operator:			Blackmore Vale Farm Cream Ltd.	
Date:		9 th December 2024			Commissioning Laboratory:			EMT Environmental	
Activities affecting Bioaerosol Conc ⁿ		None			Types of materials processed on site:			Food production	
Location	Sample REF	Distance from centre of operational area (m)	Difference in bearing between location of samplers from boundary and mean direction wind blows to (degrees °)	Sampling Times	Sampling duration (mins)	Microbial Type	Calculated concentration of airborne microorganisms (CFU/m ³)*	Mean of parallel samples (CFU/m ³)	Comments
Upwind	117212-UP01	50	0	10:49-11:49	60	TB	<125	TB: <625	See Section 6
	117212-UP02	50	0			TB	1250		
	117212-UP03	50	0			TB	500		
Upwind	117212-UP01	50	0	10:49-11:49	60	AF	<125	AF: <125	-
	117212-UP02	50	0			AF	<125		
	117212-UP03	50	0			AF	<125		

* Site permit limits: Total Bacteria (TB) = 1000 CFU/m³ *Aspergillus fumigatus* (AF) = 500 CFU/m³

Below permit limit	Exceeds permit limit
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Table 3. Downwind: Bioaerosol monitoring – Estimated Concentrations of Airborne Micro-organisms								Job Number 117212	
Site:		Shaftsbury, Dorset			Site Operator:			Blackmore Vale Farm Cream Ltd.	
Date:		9 th December 2024			Commissioning Laboratory:			EMT Environmental	
Activities affecting Bioaerosol Conc ⁿ		None			Types of materials processed on site:			Food production	
Location	Sample REF	Distance from centre of operational area (m)	Difference in bearing between location of samplers from boundary and mean direction wind blows to (degrees °)	Sampling Times	Sampling duration (mins)	Microbial Type	Calculated concentration of airborne microorganisms (CFU/m ³) *	Median of parallel samples (CFU/m ³)	Comments
Downwind	117212-DW01	30	180	10:56-11:56	60	TB	<125	TB: <125	-
	117212-DW02	30	180			TB	<125		
	117212-DW03	30	180			TB	125		
Downwind	117212-DW01	30	180	10:56-11:56	60	AF	<125	AF: <125	-
	117212-DW02	30	180			AF	<125		
	117212-DW03	30	180			AF	<125		

* Site permit limits: Total Bacteria (TB) = 1000 CFU/m³ *Aspergillus fumigatus* (AF) = 500 CFU/m³

Below permit limit	Exceeds permit limit
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Table 4. Downwind Right-Hand Fan: Bioaerosol monitoring – Estimated Concentrations of Airborne Micro-organisms								Job Number 117212	
Site:		Shaftsbury, Dorset			Site Operator:			Blackmore Vale Farm Cream Ltd.	
Date:		9 th December 2024			Commissioning Laboratory:			EMT Environmental	
Activities affecting Bioaerosol Conc ⁿ		None			Types of materials processed on site:			Food production	
Location	Sample REF	Distance from centre of operational area (m)	Difference in bearing between location of samplers from boundary and mean direction wind blows to (degrees °)	Sampling Times	Sampling duration (mins)	Microbial Type	Calculated concentration of airborne microorganisms (CFU/m ³) *	Median of parallel samples (CFU/m ³)	Comments
Downwind Right-Hand Fan	117212-DWR01	30	210	11:04-12:04	60	TB	<125	TB: <125	-
	117212-DWR02	30	210			TB	<125		
	117212-DWR03	30	210			TB	<125		
Downwind Right-Hand Fan	117212-DWR01	30	210	11:04-12:04	60	AF	<125	AF: <125	-
	117212-DWR02	30	210			AF	<125		
	117212-DWR03	30	210			AF	<125		

* Site permit limits: Total Bacteria (TB) = 1000 CFU/m³ *Aspergillus fumigatus* (AF) = 500 CFU/m³

Below permit limit	Exceeds permit limit
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Table 5. Downwind Left-Hand Fan: Bioaerosol monitoring – Estimated Concentrations of Airborne Micro-organisms								Job Number 117212	
Site:			Shaftsbury, Dorset		Site Operator:			Blackmore Vale Farm Cream Ltd.	
Date:			9 th December 2024		Commissioning Laboratory:			EMT Environmental	
Activities affecting Bioaerosol Conc ⁿ			None		Types of materials processed on site:			Food production	
Location	Sample REF	Distance from centre of operational area (m)	Difference in bearing between location of samplers from boundary and mean direction wind blows to (degrees °)	Sampling Times	Sampling duration (mins)	Microbial Type	Calculated concentration of airborne microorganisms (CFU/m ³)*	Median of parallel samples (CFU/m ³)	Comments
Downwind Left-Hand Fan	117212-DWL01	30	150	11:00-12:00	60	TB	<125	TB: <125	-
	117212-DWL02	30	150			TB	125		
	117212-DWL03	30	150			TB	<125		
Downwind Left-Hand Fan	117212-DWL01	30	150	11:00-12:00	60	AF	<125	AF: <125	-
	117212-DWL02	30	150			AF	<125		
	117212-DWL03	30	150			AF	<125		

* Site permit limits: Total Bacteria (TB) = 1000 CFU/m³ *Aspergillus fumigatus* (AF) = 500 CFU/m³

Below permit limit	Exceeds permit limit
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Table 6. Controls and Filter Counts - Bioaerosol monitoring				Job Number: 117212
Site: Shaftsbury, Dorset		Date: 9 th December 2024	Site Operator: Blackmore Vale Farm Cream Ltd.	Commissioning Laboratory: EMT Environmental
Types of materials processed on site: Food Production				
Location	Sample Ref Number	Microbial Type	Average Count of microorganisms (CFU/filter)	Comments
Upwind	117212- UP01	TB	0,0	None received
		AF	0,0	
Upwind	117212- UP02	TB	4,6	None received
		AF	0,0	
Upwind	117212- UP03	TB	2,0	None received
		AF	0,0	
Downwind	117212- DW01	TB	0,0	None received
		AF	0,0	
Downwind	117212- DW02	TB	1,0	None received
		AF	0,0	
Downwind	117212- DW03	TB	1,0	None received
		AF	0,0	
Downwind Left-Hand Fan	117212- DWL01	TB	1,0	None received
		AF	0,0	
Downwind Left-Hand Fan	117212- DWL02	TB	1,0	None received
		AF	0,0	
Downwind Left-Hand Fan	117212- DWL03	TB	1,0	None received
		AF	0,0	
Downwind Right-Hand Fan	117212- DWR01	TB	0,0	None received
		AF	0,0	
Downwind Right-Hand Fan	117212- DWR02	TB	0,0	None received
		AF	0,0	
Downwind Right-Hand Fan	117212- DWR03	TB	0,0	None received
		AF	0,0	

5. Plan

A standard map is shown on the next page. The operational boundary of the site is shown in red, and the sample points are shown and labelled.

Bioaerosol Monitoring – Estimated Concentrations of Airborne Micro Organisms		Job Number 117212	
Site	Shaftsbury, Dorset	Site Operator	Blackmore Vale Farm Cream Ltd.
Date	9 th December 2024	Commissioning Laboratory	EMT Environmental
Types of materials processed on site	Food production		



Figure 1- Site boundary marked in red. Operational area marked in blue. NSR in green.

Bioaerosol Monitoring – Estimated Concentrations of Airborne Micro Organisms		Job Number: 117212	
Site	Shaftsbury, Dorset	Site Operator	Blackmore Vale Farm Cream Ltd.
Date	9th December 2024	Commissioning Laboratory	EMT Environmental
Types of materials processed on site	Food production		



Figure 2- Sample locations.

6. Discussion

Samples for this monitoring were collected using the filter option of the guidance document M9.

The wind direction was mostly North Westerly, but some directional. The site was fully operational during the monitoring and there was no rainfall during the monitoring.

Whilst it is possible to replicate the sampling points, many other variables will have changed such as temperature, wind speed and wind direction. As such this monitoring is only a snapshot of the situation on site, not a complete picture. The sampling should be carried out at least quarterly to build up an idea of the characteristics of the site.

For UP02 result for total bacteria, the result were high, but due to the other two samples within the upwind section the results were acceptable. Due to the strong winds throughout the sampling period there may have been dirt being dislodged from fields to the northeast of the site which may have contaminated to the higher result.

There were no nearby activities observed which could adversely impact the results.

All results for total bacteria and *Aspergillus fumigatus* (AF) were below the limits for median values.

7. Conclusions

Element Materials Technology Environmental UK Limited was commissioned by Blackmore Vale Farm Cream LTD. to carry out a bioaerosol monitoring exercise at their site in Shaftsbury, Dorset.

Measurements were carried out in accordance with parameters specified in Technical Guidance Note M9 'Environmental monitoring of bioaerosols at regulated facilities'. Of the methods suggested in the protocol, the filter method was utilised in this project.

Results for samples at all locations indicated individual results were below the threshold reference value of 1000 cfu/m³ for mesophilic bacteria. Results for samples analysed for *Aspergillus fumigatus* indicated individual results were below the threshold reference value of 500 cfu/m³ at all locations.

The site is due to be re-assessed as per required, assuming the standard frequency requested by the Environment Agency, or at intervals based on the permit conditions.

Appendix 1. Analysis Certificates

ELE/24/71
Issue no.1University of
Hertfordshire
Hatfield Herts
AL10 9AB**Biodet**Direct line 01707 284545
Laboratory 01707 284522
Fax 01707 285046Alistair Begg
Element Materials Technology,
C5-C6 Emery Court,
The Embankment Business Park,
Heaton Mersey,
Stockport SK4 3GL

Our Ref: ELE/24/71

Date: 20th December 2024**BIOAEROSOL EXPOSURE REPORT**Log No. 4830
Sample date. 9th December 2024
Engineer: Alistair Begg
Job no.: 117212Fourteen IOM bioaerosol exposure heads were received on 10th December 2024.
Occupational exposure events were monitored:

Sample no.	Sample ID	Date	Volume (litres)
Bio1	UW01	9 th December 2024	120
Bio2	UW02	9 th December 2024	120
Bio3	UW03	9 th December 2024	120
Bio4	DW01	9 th December 2024	120
Bio5	DW02	9 th December 2024	120
Bio6	DW03	9 th December 2024	120
Bio7	DWL01	9 th December 2024	120
Bio8	DWL02	9 th December 2024	120
Bio9	DWL03	9 th December 2024	120
Bio10	DWR01	9 th December 2024	120
Bio11	DWR02	9 th December 2024	120
Bio12	DWR03	9 th December 2024	120
Bio13	Blank01	9 th December 2024	n/a
Bio14	Blank02	9 th December 2024	n/a

The IOM heads containing a polycarbonate filter were used to determine the bioaerosol exposure under the test conditions. Upon arrival at the laboratory the bioaerosols impacted on each filter were recovered in 3 ml maximum recovery diluent. The target micro-organisms were cultured using appropriate dilutions on the following media.

Nutrient agar (NA) agar plates were used for total bacteria.
Malt extract agar (MEA) agar plates were used for *Aspergillus fumigatus*.

The samples were incubated for 2 days at 37C (mesophilic bacteria) and for 2 days at 44C (*Aspergillus fumigatus*).

Results:

Site 117212
Date 9th December 2024
Comments: All polycarbonate filters and filter heads were in good condition.

Table 1. Microbiological Culture Plate Data:

Sample no.	Sample ID	Volume (litres)	Total Bacteria (cfu per plate)	Total <i>Aspergillus fumigatus</i> (cfu per plate)
Bio1	UW01	120	0, 0	0, 0
Bio2	UW02	120	4, 6	0, 0
Bio3	UW03	120	2, 0	0, 0
Bio4	DW01	120	0, 0	0, 0
Bio5	DW02	120	0, 0	0, 0
Bio6	DW03	120	1, 0	0, 0
Bio7	DWL01	120	0, 0	0, 0
Bio8	DWL02	120	1, 0	0, 0
Bio9	DWL03	120	0, 0	0, 0
Bio10	DWR01	120	0, 0	0, 0
Bio11	DWR02	120	0, 0	0, 0
Bio12	DWR03	120	0, 0	0, 0
Bio13	Blank01	N/A	0, 0	0, 0
Bio14	Blank02	N/A	0, 0	0, 0

Table 2. Microbiological Results:

Sample no.	Sample ID	Volume (litres)	Mesophilic Bacteria (cfu per m ³)	Total <i>Aspergillus fumigatus</i> (cfu per m ³)
Bio1	UW01	120	<125	<125
Bio2	UW02	120	1250	<125
Bio3	UW03	120	500	<125
Bio4	DW01	120	<125	<125
Bio5	DW02	120	<125	<125
Bio6	DW03	120	125	<125
Bio7	DWL01	120	<125	<125
Bio8	DWL02	120	125	<125
Bio9	DWL03	120	<125	<125
Bio10	DWR01	120	<125	<125
Bio11	DWR02	120	<125	<125
Bio12	DWR03	120	<125	<125
Bio13	Blank01	N/A	<15 per membrane	<15 per membrane
Bio14	Blank02	N/A	<15 per membrane	<15 per membrane

Exposure results are expressed as total micro-organisms per cubic metre collected during the exposure time.



Richard Smith
DIRECTOR OF BIODET

20th December 2024