



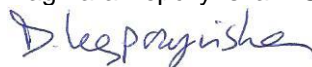
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Report: **Bioaerosol Monitoring**  
Client: Yorkshire Water Services Ltd  
Date of Site Work: 11<sup>th</sup> October 2022

Prepared for: Mr Tom Broderick  
Caldervale Sludge Treatment Facility  
Calder Vale Road  
Wakefield  
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Issued by: Dagmara Kepczynska B.Sc. (Hons)  


Issue date: 21<sup>st</sup> November 2022  
Report Ref: **114175 V1**

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## Executive Summary

Tom Broderick of Yorkshire Water Services Ltd requested that Element Materials Technology Environmental UK Limited undertake monitoring of bioaerosols at its Caldervale site in Wakefield. Monitoring was undertaken in accordance with Technical Guidance Note M9 'Environmental Monitoring of Bioaerosols at Regulated Facilities'.

Site work was undertaken by Dagmara Kepczynska on 11<sup>th</sup> October 2022.

The purpose of the bioaerosol monitoring exercise was to establish the concentration of bioaerosols being dispersed from the site to the nearest sensitive receptor.

### Monitoring Findings:

Sampling Location	Analyte	Guidance Limit (CFU/m <sup>3</sup> )	Median Concentration of Parallel Samples (CFU/m <sup>3</sup> )
Upwind	Total bacteria	1000	875
	<i>Aspergillus fumigatus</i>	500	<125
Downwind	Total bacteria	1000	<125
	<i>Aspergillus fumigatus</i>	500	<125
Downwind Left Hand Fan	Total bacteria	1000	<125
	<i>Aspergillus fumigatus</i>	500	<125
Downwind Right Hand Fan	Total bacteria	1000	<125
	<i>Aspergillus fumigatus</i>	500	<125
Sampling Point 1	Total bacteria	1000	<125
	<i>Aspergillus fumigatus</i>	500	<125
Sampling Point 2	Total bacteria	1000	<125
	<i>Aspergillus fumigatus</i>	500	<125
Sampling Point 3	Total bacteria	1000	<125
	<i>Aspergillus fumigatus</i>	500	<125
Sampling Point 4	Total bacteria	1000	<125
	<i>Aspergillus fumigatus</i>	500	<125

< Less than

CFU/m<sup>3</sup>

Colony Forming Units Per Cubic Metre

<b>Below Limit</b>	<b>Exceeds Limit</b>
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## 1. Introduction

Element Materials Technology Environmental UK Ltd was commissioned by Yorkshire Water Services Ltd to carry out a bioaerosol monitoring exercise at the Waste Water Treatment Works at their site in Caldervale, Wakefield.

The purpose of the bioaerosol monitoring exercise was to establish the concentration of bioaerosols being dispersed from the site to the nearest sensitive receptor, as part of a permit application.

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 Dagmara Kepczynska of Element Materials Technology Environmental UK Ltd on 11<sup>th</sup> October 2022.

## 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 upwind sample was taken further away from the centre of operations than recommended in the guidance. This was to ensure the sample was outside the operational area and represented a true upwind value.

Triplicate samples were carried out at each selected sampling location. Once completed, filters were transferred in a refrigerated container to the laboratory within 24 hours.

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 2 ml maximum recovery diluent. The target micro-organisms were cultured using appropriate dilutions on the following media.

Half-strength nutrient agar (1/2NA) plates were used for total mesophilic bacteria. Malt extract agar (MEA) plates were used for *Aspergillus fumigatus*.

Samples were incubated for up to seven days at 37°C (total mesophilic bacteria), and for two days at 45°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

Yorkshire Water Services Ltd operates a Waste Water Treatment Works at their site in Caldervale, Wakefield. The site currently is not required to undertake ambient air monitoring but has done so to support a permit application.

The site is not currently permitted, with an application being submitted in the near future. As such the limits used are the standard limits used by the Environment Agency (EA).

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

<b>Table 1. Environmental Parameters - Bioaerosol monitoring</b>							Job Number 114175
Site:		Caldervale, Wakefield		Site Operator		Yorkshire Water Services Ltd	
Date:		11/10/2022		Commissioning Laboratory		EMT Environmental	
				Types of materials processed on site		Waste Water	
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 (mph)	Arithmetic mean of air temperature °C	Arithmetic mean of relative humidity (%)	Prevailing weather conditions including cloud cover
Upwind	240	60	180	9	11	77	Scattered Clouds. 4/8
Downwind	60	60	0	9	11	77	Scattered Clouds. 4/8
Downwind Left Hand Fan	90	60	30	9	11	77	Scattered Clouds. 4/8
Downwind Right Hand Fan	30	60	30	9	11	77	Scattered Clouds. 4/8

#### **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 114175	
Site:		Caldervale, Wakefield			Site Operator:			Yorkshire Water Services Ltd	
Date:		11/10/2022			Commissioning Laboratory:			EMT Environmental	
Activities affecting Bioaerosol Conc <sup>n</sup>		None			Types of materials processed on site:			Waste Water	
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 <sup>3</sup> )*	Median of parallel samples (CFU/m <sup>3</sup> )	Comments
Upwind	113953 UW01 – 13	235	180	12:18 – 13:18	60	TB	875	TB: 875	-
	113953 UW02 – 14	235	180			TB	1250		
	113953 UW03 – 15	235	180			TB	250		
Upwind	113953 UW01 – 13	235	180	12:18 – 13:18	60	AF	<125	AF: <125	-
	113953 UW02 – 14	235	180			AF	<125		
	113953 UW03 – 15	235	180			AF	<125		

\* Site permit limits: Total Bacteria (TB) = 1000 CFU/m<sup>3</sup>

*Aspergillus fumigatus* (AF) = 500 CFU/m<sup>3</sup>

<b>Below permit limit</b>	<b>Exceeds permit limit</b>
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Table 3. Downwind: Bioaerosol monitoring – Estimated Concentrations of Airborne Micro-organisms								Job Number 114175	
Site:			Caldervale, Wakefield			Site Operator:		Yorkshire Water Services Ltd	
Date:			11/10/2022			Commissioning Laboratory:		EMT Environmental	
Activities affecting Bioaerosol Conc <sup>n</sup>			None			Types of materials processed on site:		Waste Water	
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 <sup>3</sup> )*	Median of parallel samples (CFU/m <sup>3</sup> )	Comments
Downwind	113953 DW01 – 16	190	0	12:30 – 13:30	60	TB	<125	TB: <125	-
	113953 DW02 – 17	190	0			TB	<125		
	113953 DW03 – 18	190	0			TB	<125		
Downwind	113953 DW01 – 16	190	0	12:30 – 13:30	60	AF	<125	AF: <125	-
	113953 DW02 – 17	190	0			AF	<125		
	113953 DW03 – 18	190	0			AF	<125		

\* Site permit limits: Total Bacteria (TB) = 1000 CFU/m<sup>3</sup>

*Aspergillus fumigatus* (AF) = 500 CFU/m<sup>3</sup>

Below permit limit	Exceeds permit limit
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Table 4. Downwind Left Hand Fan: Bioaerosol monitoring – Estimated Concentrations of Airborne Micro-organisms								Job Number 114175	
Site:		Caldervale, Wakefield			Site Operator:			Yorkshire Water Services Ltd	
Date:		11/10/2022			Commissioning Laboratory:			EMT Environmental	
Activities affecting Bioaerosol Conc <sup>n</sup>		None			Types of materials processed on site:			Waste Water	
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 <sup>3</sup> )*	Median of parallel samples (CFU/m <sup>3</sup> )	Comments
Downwind Left Hand Fan	113953 DWL01 – 19	200	30	12:25 – 13:25	60	TB	<125	TB: <125	-
	113953 DWL02 – 20	200	30			TB	<125		
	113953 DWL03 – 21	200	30			TB	<125		
Downwind Left Hand Fan	113953 DWL01 – 19	200	30	12:25 – 13:25	60	AF	<125	AF: <125	-
	113953 DWL02 – 20	200	30			AF	<125		
	113953 DWL03 – 21	200	30			AF	<125		

\* Site permit limits: Total Bacteria (TB) = 1000 CFU/m<sup>3</sup>

*Aspergillus fumigatus* (AF) = 500 CFU/m<sup>3</sup>

Below permit limit	Exceeds permit limit
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Table 5. Downwind Right Hand Fan: Bioaerosol monitoring – Estimated Concentrations of Airborne Micro-organisms								Job Number 114175	
Site:			Caldervale, Wakefield			Site Operator:		Yorkshire Water Services Ltd	
Date:			11/10/2022			Commissioning Laboratory:		EMT Environmental	
Activities affecting Bioaerosol Conc <sup>n</sup>			None			Types of materials processed on site:		Waste Water	
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 <sup>3</sup> )*	Median of parallel samples (CFU/m <sup>3</sup> )	Comments
Downwind Right Hand Fan	113953 DWR01 – 22	195	30	12:36 – 13:36	60	TB	125	TB: <125	-
	113953 DWR02 – 23	195	30			TB	<125		
	113953 DWR03 – 24	195	30			TB	<125		
Downwind Right Hand Fan	113953 DWR01 – 22	195	30	12:36 – 13:36	60	AF	<125	AF: <125	-
	113953 DWR02 – 23	195	30			AF	<125		
	113953 DWR03 – 24	195	30			AF	<125		

\* Site permit limits: Total Bacteria (TB) = 1000 CFU/m<sup>3</sup>

*Aspergillus fumigatus* (AF) = 500 CFU/m<sup>3</sup>

Below permit limit	Exceeds permit limit
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Table 6. Sample Point 1: Bioaerosol monitoring – Estimated Concentrations of Airborne Micro-organisms								Job Number 114175	
Site:			Caldervale, Wakefield			Site Operator:		Yorkshire Water Services Ltd	
Date:			11/10/2022			Commissioning Laboratory:		EMT Environmental	
Activities affecting Bioaerosol Conc <sup>n</sup>			None			Types of materials processed on site:		Waste Water	
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 <sup>3</sup> )*	Median of parallel samples (CFU/m <sup>3</sup> )	Comments
Sample Point 1	113953 ST1A – 01	150	255	10:01 -11:01	60	TB	<125	TB: <125	-
	113953 ST1B – 02	150	255			TB	<125		
	113953 ST1C – 03	150	255			TB	<125		
Sample Point 1	113953 ST1A – 01	150	255	10:01 – 11:01	60	AF	<125	AF: <125	-
	113953 ST1B – 02	150	255			AF	<125		
	113953 ST1C – 03	150	255			AF	<125		

\* Site permit limits: Total Bacteria (TB) = 1000 CFU/m<sup>3</sup>

*Aspergillus fumigatus* (AF) = 500 CFU/m<sup>3</sup>

<b>Below permit limit</b>	<b>Exceeds permit limit</b>
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Table 7. Sampling Point 2: Bioaerosol monitoring – Estimated Concentrations of Airborne Micro-organisms								Job Number 114175	
Site:		Caldervale, Wakefield			Site Operator:			Yorkshire Water Services Ltd	
Date:		11/10/2022			Commissioning Laboratory:			EMT Environmental	
Activities affecting Bioaerosol Conc <sup>n</sup>		None			Types of materials processed on site:			Waste Water	
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 <sup>3</sup> )*	Median of parallel samples (CFU/m <sup>3</sup> )	Comments
Sample Point 2	113953 ST2A – 04	140	60	09:51 – 10:51	60	TB	<125	TB: <125	-
	113953 ST2B – 05	140	60			TB	<125		
	113953 ST2C – 06	140	60			TB	<125		
Sample Point 2	113953 ST2A – 04	140	60	09:51 – 10:51	60	AF	<125	AF: <125	-
	113953 ST2B – 05	140	60			AF	<125		
	113953 ST2C – 06	140	60			AF	<125		

\* Site permit limits: Total Bacteria (TB) = 1000 CFU/m<sup>3</sup>

*Aspergillus fumigatus* (AF) = 500 CFU/m<sup>3</sup>

Below permit limit	Exceeds permit limit
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Table 8. Sample Point 3: Bioaerosol monitoring – Estimated Concentrations of Airborne Micro-organisms								Job Number 114175	
Site:		Caldervale, Wakefield			Site Operator:			Yorkshire Water Services Ltd	
Date:		11/10/2022			Commissioning Laboratory:			EMT Environmental	
Activities affecting Bioaerosol Conc <sup>n</sup>		None			Types of materials processed on site:			Waste Water	
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 <sup>3</sup> )*	Median of parallel samples (CFU/m <sup>3</sup> )	Comments
Sample Point 3	113953 ST3A – 07	220	185	10:11 – 11:11	60	TB	<125	TB: <125	-
	113953 ST3B – 08	220	185			TB	125		
	113953 ST3C – 09	220	185			TB	<125		
Sample Point 3	113953 ST3A – 07	220	185	10:11 – 11:11	60	AF	<125	AF: <125	-
	113953 ST3B – 08	220	185			AF	<125		
	113953 ST3C – 09	220	185			AF	<125		

\* Site permit limits: Total Bacteria (TB) = 1000 CFU/m<sup>3</sup>

*Aspergillus fumigatus* (AF) = 500 CFU/m<sup>3</sup>

Below permit limit	Exceeds permit limit
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Table 9. Sample Point 4: Bioaerosol monitoring – Estimated Concentrations of Airborne Micro-organisms								Job Number 114175	
Site:		Caldervale, Wakefield			Site Operator:			Yorkshire Water Services Ltd	
Date:		11/10/2022			Commissioning Laboratory:			EMT Environmental	
Activities affecting Bioaerosol Conc <sup>n</sup>		None			Types of materials processed on site:			Waste Water	
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 <sup>3</sup> )*	Median of parallel samples (CFU/m <sup>3</sup> )	Comments
Sample Point 4	113953 ST4A – 10	190	15	09:41 – 10:41	60	TB	<125	TB: <125	-
	113953 ST4B – 11	190	15			TB	<125		
	113953 ST4C – 12	190	15			TB	<125		
Sample Point 4	113953 ST4A – 10	190	15	09:41 – 10:41	60	AF	<125	AF: <125	-
	113953 ST4B – 11	190	15			AF	<125		
	113953 ST4C – 12	190	15			AF	<125		

\* Site permit limits: Total Bacteria (TB) = 1000 CFU/m<sup>3</sup>

*Aspergillus fumigatus* (AF) = 500 CFU/m<sup>3</sup>

Below permit limit	Exceeds permit limit
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<b>Table 6. Controls and Filter Counts - Bioaerosol monitoring</b>				Job Number: 114175
Site: Blackburn Meadows, Yorkshire		Date: 11/10/2022	Site Operator : Yorkshire Water Services Ltd	Commissioning Laboratory : EMT Environmental
Types of materials processed on site : Waste Water				
Location	Sample Ref Number	Microbial Type	Average Count of microorganisms (CFU/filter)	Comments
Upwind	113953 – 13	TB	6	None received
		AF	0	
Upwind	113953 – 14	TB	10	None received
		AF	0	
Upwind	113953 – 15	TB	2	None received
		AF	0	
Downwind	113953 – 16	TB	0	None received
		AF	0	
Downwind	113953 – 17	TB	0	None received
		AF	0	
Downwind	113953 – 18	TB	0	None received
		AF	0	
Downwind Left Hand Fan	113953 – 19	TB	0	None received
		AF	0	
Downwind Left Hand Fan	113953 – 20	TB	0	None received
		AF	0	
Downwind Left Hand Fan	113953 – 21	TB	0	None received
		AF	0	
Downwind Right Hand Fan	113953 – 22	TB	1	None received
		AF	0	
Downwind Right Hand Fan	113953 – 23	TB	0	None received
		AF	0	
Downwind Right Hand Fan	113953 – 24	TB	0	None received
		AF	0	



<b>Table 7. Controls and Filter Counts - Bioaerosol monitoring</b>				Job Number: 114175
Site: Blackburn Meadows, Yorkshire		Date: 11/10/2022	Site Operator : Yorkshire Water Services Ltd	Commissioning Laboratory : EMT Environmental
Types of materials processed on site : Waste Water				
Location	Sample Ref Number	Microbial Type	Average Count of microorganisms (CFU/filter)	Comments
Sample Point 1	113953 – 01	TB	0	None received
		AF	0	
Sample Point 1	113953 – 02	TB	0	None received
		AF	0	
Sample Point 1	113953 – 03	TB	0	None received
		AF	0	
Sample Point 2	113953 – 04	TB	0	None received
		AF	0	
Sample Point 2	113953 – 05	TB	0	None received
		AF	0	
Sample Point 2	113953 – 06	TB	0	None received
		AF	0	
Sample Point 3	113953 – 07	TB	0	None received
		AF	0	
Sample Point 3	113953 – 08	TB	1	None received
		AF	0	
Sample Point 3	113953 – 09	TB	0	None received
		AF	0	
Sample Point 4	113953 – 10	TB	0	None received
		AF	0	
Sample Point 4	113953 – 11	TB	0	None received
		AF	0	
Sample Point 4	113953 – 12	TB	0	None received
		AF	0	

## 5. Plan

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

<b>Bioaerosol Monitoring – Estimated Concentrations of Airborne Micro Organisms</b>		Job Number 114175	
Site	Caldervale, Wakefield	Site Operator	Yorkshire Water Services Ltd
Date	11/10/2022	Commissioning Laboratory	EMT Environmental
Types of materials processed on site	Waste Water		

Site boundary is marked on yellow. The nearest sensitive receptor is located around residential area by Park Hill Grove and West Yorkshire Storage Site.

- Bioaerosols emission sources
  - Waste Water Treatment Works





<b>Bioaerosol Monitoring – Estimated Concentrations of Airborne Micro Organisms</b>		Job Number 114175	
Site	Caldervale, Wakefield	Site Operator	Yorkshire Water Services Ltd
Date	11/10/2022	Commissioning Laboratory	EMT Environmental
Types of materials processed on site	Waste Water		





<b>Bioaerosol Monitoring – Estimated Concentrations of Airborne Micro Organisms</b>		Job Number 114175	
Site	Caldervale, Wakefield	Site Operator	Yorkshire Water Services Ltd
Date	11/10/2022	Commissioning Laboratory	EMT Environmental
Types of materials processed on site	Municipal solid waste		



## 6. Discussion

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

Whilst it is possible to replicate the sampling points, many other variables will have changed such as temperature, wind speed and wind direction. All of these parameters have an effect on monitoring results. As such the reported results are only a snapshot of the situation on site at the time of monitoring. In order to build the most accurate picture it is recommended to continue to monitor the site and to monitor on days when the prevailing wind is in a different direction. The sampling should be carried out at least quarterly to build up an idea of the characteristics of the site.

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

The median values for all collected results were below limits for both, total bacteria and *Aspergillus fumigatus* (AF).

The highest result was reported for UW 02 sample from Upwind location and was slightly above the recommended limit of 1000 cfu/m<sup>3</sup> for Total Bacteria. However, the median result from this location was still below limits for both measured parameters.

It should be noted that the fixed points were undertaken in addition to the required sampling locations at the request of Yorkshire Water.

## 7. Conclusions

Element Materials Technology Environmental UK Limited was commissioned by Yorkshire Water Services Ltd to carry out a bioaerosol monitoring exercise at the Waste Water Treatment Works at their site in Caldervale, Wakefield.

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.

The median values for all collected results were below limits for both total bacteria and *Aspergillus fumigatus* (AF).

The site would be due to be re-assessed in January 2023 assuming the standard frequency requested by the Environment Agency.

## Appendix 1. Analysis Certificates



ELE/22/22  
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Laboratory 01707 284522  
Fax 01707 285046Dagmara Kepczynska  
Element Materials Technology,  
Lawton Square,  
Delph,  
Oldham,  
OL3 5DT

Our Ref: ELE/22/22

Date: 28<sup>th</sup> October 2022**BIOAEROSOL EXPOSURE REPORT**Log No. 3573  
Sample date. 11<sup>th</sup> October 2022  
Engineer: Dagmara  
Job no.: 357829Twenty-six IOM bioaerosol exposure heads were received on 12<sup>th</sup> October 2022.  
Occupational exposure events were monitored:

Sample no.	Sample ID	Date	Volume (litres)
Bio1	S1A	11/10/2022	120
Bio2	S1B	11/10/2022	120
Bio3	S1C	11/10/2022	120
Bio4	S2A	11/10/2022	120
Bio5	S2B	11/10/2022	120
Bio6	S2C	11/10/2022	120
Bio7	S3A	11/10/2022	120
Bio8	S3B	11/10/2022	120
Bio9	S3C	11/10/2022	120
Bio10	S4A	11/10/2022	120
Bio11	S4B	11/10/2022	120
Bio12	S4C	11/10/2022	120
Bio13	UW 01	11/10/2022	120
Bio14	UW 02	11/10/2022	120
Bio15	UW 03	11/10/2022	120
Bio16	DW 01	11/10/2022	120
Bio17	DW 02	11/10/2022	120
Bio18	DW 03	11/10/2022	120
Bio19	DW LHS 01	11/10/2022	120
Bio20	DW LHS 02	11/10/2022	120
Bio21	DW LHS 03	11/10/2022	120
Bio22	DW RHS 01	11/10/2022	120

ELE/22/22  
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Hertfordshire**  
Hatfield Herts  
AL10 9AB

Bio23	DW RHS 02	11/10/2022	120
Bio24	DW RHS 03	11/10/2022	120
Bio25	Blank 01	11/10/2022	120
Bio26	Blank 02	11/10/2022	120

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 (total bacteria) and for 2 days at 44C (*Aspergillus fumigatus*).

**Results:**

**Date** 11<sup>th</sup> October 2022

**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	S1A	120	0, 0	0, 0
Bio2	S1B	120	0, 0	0, 0
Bio3	S1C	120	0, 0	0, 0
Bio4	S2A	120	0, 0	0, 0
Bio5	S2B	120	0, 0	0, 0
Bio6	S2C	120	0, 0	0, 0
Bio7	S3A	120	0, 0	0, 0
Bio8	S3B	120	1, 0	0, 0
Bio9	S3C	120	0, 0	0, 0
Bio10	S4A	120	0, 0	0, 0
Bio11	S4B	120	0, 0	0, 0
Bio12	S4C	120	0, 0	0, 0
Bio13	UW 01	120	6, 1	0, 0
Bio14	UW 02	120	10, 0	0, 0
Bio15	UW 03	120	2, 0	0, 0
Bio16	DW 01	120	0, 0	0, 0
Bio17	DW 02	120	0, 0	0, 0
Bio18	DW 03	120	0, 0	0, 0
Bio19	DW LHS 01	120	0, 0	0, 0
Bio20	DW LHS 02	120	0, 0	0, 0
Bio21	DW LHS 03	120	0, 0	0, 0
Bio22	DW RHS 01	120	1, 0	0, 0
Bio23	DW RHS 02	120	0, 0	0, 0
Bio24	DW RHS 03	120	0, 0	0, 0
Bio25	Blank 01	n/a	0, 0	0, 0
Bio26	Blank 02	n/a	0, 0	0, 0

**Table 2. Microbiological Results:**

Sample no.	Sample ID	Volume (litres)	Total Bacteria (cfu per m <sup>3</sup> )	Total <i>Aspergillus fumigatus</i> (cfu per m <sup>3</sup> )
Bio1	S1A	120	<125	<125
Bio2	S1B	120	<125	<125
Bio3	S1C	120	<125	<125
Bio4	S2A	120	<125	<125
Bio5	S2B	120	<125	<125
Bio6	S2C	120	<125	<125
Bio7	S3A	120	<125	<125
Bio8	S3B	120	125	<125
Bio9	S3C	120	<125	<125
Bio10	S4A	120	<125	<125
Bio11	S4B	120	<125	<125
Bio12	S4C	120	<125	<125
Bio13	UW 01	120	875	<125
Bio14	UW 02	120	1250	<125
Bio15	UW 03	120	250	<125
Bio16	DW 01	120	<125	<125
Bio17	DW 02	120	<125	<125
Bio18	DW 03	120	<125	<125
Bio19	DW LHS 01	120	<125	<125
Bio20	DW LHS 02	120	<125	<125
Bio21	DW LHS 03	120	<125	<125
Bio22	DW RHS 01	120	125	<125
Bio23	DW RHS 02	120	<125	<125
Bio24	DW RHS 03	120	<125	<125
Bio25	Blank 01	n/a	<15 per membrane	<15 per membrane
Bio26	Blank 02	n/a	<15 per membrane	<15 per membrane

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

BIODET



28<sup>th</sup> October 2022