

Biodet

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Our Ref: GBEDS/14/Q2

Date: 9th July 2014

BIOAEROSOL MONITORING REPORT

Log No. 1219

BIOAEROSOL MONITORING REPORT FROM GROWING BEDS, RAVENS DEN

Sampling performed 2 July 2014

The composing site at **Growing Beds, Ravensden** was visited on 2 July 2014.

Sampling for the enumeration of airborne micro-organisms was undertaken by Richard Smith of Biodet following so far as reasonably practicable, the Standardised Protocol for the Monitoring of Bioaerosols at Open Composting Facilities (Association for Organic Recycling (AfOR), 2009).

All sampling was carried out on a normal working day whilst operational activities were taking place, which are detailed in Appendix 1: Site data during sampling. The prevailing weather conditions (wind direction, wind speed, temperature and humidity) were recorded at the time of sampling.

On-site activity (turning, screening etc.) was recorded.

Sampling Points

Sampling points were chosen to correspond with the criteria of the AfOR Protocol (see page 3: Plan of Site, for further details on the positions):

1. Upwind of the composting activities at approximately 25 metres from the operational boundary, south-south-west (196° from north) of the centre of the site operations.
2. Downwind of composting activities at approximately 290 metres from the operational boundary, north-north-east (26° from north) of the site operations.

3. Nearest Receptor* at approximately 300 metres from the operational boundary, south-south-west (193° from north) of the screening operation.

* *A sensitive receptor is defined as 'any building, structure or installation in which at least one person normally lives or works, other than a building, structure or installation within the same ownership or control as the operator / owner of the composting facility.'* - Standardised Protocol for the Sampling and Enumeration of Airborne Microorganisms at Composting Facilities: [The Composting Association]

In the case of Growing Beds, the nearest sensitive receptor was determined to be the cottages and farm to the south-west of the site.

The sample points are indicated on the site map (page 3).

Samples were taken at a height of 1.5 metre, using SKC IOM bioaerosol sampling heads at 2.0 litres per minute.

The recovered membranes were tested for mesophilic bacteria and for *Aspergillus fumigatus*. Nutrient agar (NA) was used to culture mesophilic bacteria and the plates were incubated for 7 days at 37 C.

Malt extract agar (MEA) was used to culture *Aspergillus fumigatus* and the plates were incubated for 2 days at 41 C.

Tests were performed in triplicate at each sampling point.

Identification of *Aspergillus fumigatus* was performed by microscopy.

Results:

| Site | Growing Beds, Ravensden |
|-----------------|----------------------------------------|
| Date of visit: | 2-July-2014 |
| Operator: | R. Smith |
| Wind Direction: | South-south-westerly |
| Wind Speed: | 4-7 mph |
| Operation: | Shredding, screening & site operations |

Weather:

- Dry and sunny.
- Temperature ranged from 25.8 C to 28.9 C, the average was 27.3°C.
- Relative humidity ranged from 34.0 % to 45.6 %, the average was 36.6%.
- Wind speed ranged from 4 m/s to 7 m/s, the average was 5.5 m/s.
- Wind direction was on average from the south-south-west (196° from north).

Growing Beds Plan: 2 July 2014



Microbiological Results:

| Site: Growing Beds, Ravensden Date: 2 July 2014 | | | Site Operator: Mark Evans Commissioning Lab: Biodet, University of Hertfordshire Materials processed on site: Green waste | | | | | |
|------------------------------------------------------------------|----------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|----------------|----------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------|
| Location | Sample ref no. | Distance from site operation (m) | Sampling times (hh:min:ss) | Sampling volume (litres) | Microbial type | Calculated concentration of airborne micro organisms (CFU/m ³) | Arithmetic mean of parallel samples (CFU/m ³) | Comments relating to activities |
| Upwind | U1 | 125 | 12:00-12:45 | 90 | MB | 670 | 730 | Screening, shredding & site operations. |
| Upwind | U2 | 125 | 12:00-12:45 | 90 | MB | 520 | | |
| Upwind | U3 | 125 | 12:00-12:45 | 90 | MB | 1000 | | |
| Upwind | U1 | 125 | 12:00-12:45 | 90 | AF | <200 | 0 | Screening, shredding & site operations. |
| Upwind | U2 | 125 | 12:00-12:45 | 90 | AF | <200 | | |
| Upwind | U3 | 125 | 12:00-12:45 | 90 | AF | <200 | | |
| Downwind | D1 | 336 | 13:15-14:00 | 90 | MB | 800 | 400 | Screening, shredding & site operations. |
| Downwind | D2 | 336 | 13:15-14:00 | 90 | MB | 200 | | |
| Downwind | D3 | 336 | 13:15-14:00 | 90 | MB | 200 | | |

| | | | | | | | | |
|-------------|----|-----|-------------|----|----|------|------|-----------------------------------------|
| Downwind | D1 | 336 | 13:15-14:00 | 90 | AF | <200 | 0 | Screening, shredding & site operations. |
| Downwind | D2 | 336 | 13:15-14:00 | 90 | AF | <200 | | |
| Downwind | D3 | 336 | 13:15-14:00 | 90 | AF | <200 | | |
| S. receptor | S1 | 426 | 14:15-15:00 | 90 | MB | 2300 | 2430 | Screening, shredding & site operations. |
| S. receptor | S2 | 426 | 14:15-15:00 | 90 | MB | 2200 | | |
| S. receptor | S3 | 426 | 14:15-15:00 | 90 | MB | 2800 | | |
| S. receptor | S1 | 426 | 14:15-15:00 | 90 | AF | <200 | 0 | Screening, shredding & site operations. |
| S. receptor | S2 | 426 | 14:15-15:00 | 90 | AF | <200 | | |
| S. receptor | S3 | 426 | 14:15-15:00 | 90 | AF | <200 | | |

MB = Mesophilic bacteria, AF = *Aspergillus fumigatus*

Controls:

| Site: Growing Beds, Ravensden Date: 2 July 2014 | | | | Site Operator: Mark Evans Commissioning Lab: Biodet, University of Hertfordshire Materials processed on site: Green waste | | | |
|------------------------------------------------------------------|----------------|---------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------|---------------------------------------------------|
| Location | Sample ref no. | Distance from shredding operation (m) | Sampling times (hh:min:ss) | Sampling volume (litres) | Microbial type | Calculated concentration of airborne micro organisms (CFU/membrane) | Comments relating to activities |
| Control 1 | C1 | n/a | n/a | n/a | MB | <15 | Membrane loaded on-site but no air passed through |
| Control 1 | C1 | n/a | n/a | n/a | AF | <15 | Membrane loaded on-site but no air passed through |

Environmental conditions:

| Site: Growing Beds, Ravensden | | Site Operator: Mark Evans | |
|-------------------------------------------------|----------------------|---------------------------------------------------------------|-----------------------|
| Date: 2 July 2014 | | Commissioning Lab: Biodet, University of Hertfordshire | |
| Materials processed on site: Green waste | | | |
| Time | Temperature C | Relative humidity % | Wind speed mph |
| 12:00 | 26.1 | 35.3 | 4-5 |
| 12:05 | 26.7 | 35.4 | 4-5 |
| 12:10 | 26.8 | 35.3 | 4-5 |
| 12:15 | 26.1 | 38.0 | 4-5 |
| 12:20 | 26.4 | 37.9 | 4-5 |
| 12:25 | 26.7 | 38.2 | 4-5 |
| 12:30 | 26.8 | 38.7 | 4-5 |
| 12:35 | 26.1 | 38.5 | 4-5 |
| 12:40 | 26.8 | 38.7 | 4-5 |
| 12:45 | 26.4 | 37.8 | 4-5 |
| 12:50 | 26.3 | 36.3 | 4-5 |
| 12:55 | 25.8 | 37.4 | 4-5 |
| 13:15 | 28.8 | 35.1 | 4-6 |
| 13:20 | 28.8 | 34.5 | 4-6 |
| 13:25 | 28.9 | 33.9 | 4-6 |
| 13:30 | 28.4 | 33.8 | 4-6 |
| 13:35 | 28.6 | 34.9 | 4-6 |
| 13:40 | 28.1 | 35.0 | 4-6 |
| 13:45 | 28.8 | 34.1 | 4-6 |
| 13:50 | 28.9 | 34.0 | 4-6 |
| 13:55 | 28.6 | 34.5 | 4-6 |
| 14:00 | 28.2 | 34.6 | 5-7 |
| 14:05 | 26.7 | 34.9 | 5-7 |
| 14:10 | 26.8 | 34.0 | 5-7 |

| | | | |
|--------------|------|------|-----|
| 14:15 | 26.1 | 35.0 | 5-7 |
| 14:20 | 26.4 | 35.2 | 5-7 |
| 14:25 | 28.2 | 37.5 | 5-7 |
| 14:30 | 27.7 | 37.4 | 5-7 |
| 14:35 | 27.9 | 39.3 | 5-7 |
| 14:40 | 27.5 | 42.6 | 5-7 |
| 14:45 | 25.9 | 45.6 | 5-7 |
| 14:50 | 27.2 | 35.9 | 5-7 |
| 14:55 | 27.7 | 38.3 | 5-7 |
| 15:00 | 27.2 | 37.1 | 5-7 |

Comments:

Bacteria and fungi occur naturally and are commonly present in the air. Concentrations are highly variable, but background levels of micro-organisms do not normally exceed 1,000 cfu/m³ (colony forming units per cubic metre).

Environment Agency guidance levels of 1,000 cfu/m³ for bacteria and 500 cfu/m³ for fungi have been used within this report, when assessing the concentrations of bioaerosols.

Upwind position

A. fumigatus spp were not detected at the upwind position.

Mesophilic bacteria levels were isolated from the upwind position during the sampling period (730 cfu/m³); and concentrations were therefore within the 1000 cfu/m³ EA reference level.

Results may well have been influenced by the movement of vehicles on an adjacent dusty road.

Downwind

A. fumigatus spp were not detected at the downwind position.

Mesophilic bacteria were isolated from the downwind position (400 cfu/m³) and results are low in comparison to levels measured at the upwind sampling position. Concentrations were also below the 1,000 cfu/m³ EA reference level.

Nearest Receptor

A. fumigatus spp were not detected at the sensitive receptor position.

Mesophilic bacteria results were elevated at the nearest receptor position (2430 cfu/m³) and were above the 1,000 cfu/m³ EA reference level. These results are also likely to have been impacted by vehicular movements and the adjacent farm operations.



9th July 2014

R. SMITH

DATE

DIRECTOR OF BIODET