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ENVIRONMENTAL MONITORING OF AT DREHID WASTE MANAGEMENT FACILITY, DREHID, KILLINAGH UPPER, CO. KILDARE. Round 1 2022

PERFORMED BY ODOUR MONITORING IRELAND ON BEHALF OF BORD NA MONA

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ATTENTION:	Ms. Phoebe Dillane
LICENCE NUMBER:	W0201-03
LICENCE HOLDER:	Bord Na Mona
FACILITY NAME:	Drehid Composting Facility
DATE OF MONITORING VISIT:	29nd Jun. 2022
NAME AND ADDRESS OF CLIENT ORGANISATION:	Drehid Composting Facility, Killinagh Upper, Co. Kilare
NAME AND ADDRESS OF MONITORING ORGANISATION:	Odour Monitoring Ireland, Unit 32 DeGranville Court, Dublin Road, Trim, Co. Meath
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NAME AND THE FUNCTION OF THE PERSON APPROVING THE REPORT:	Dr. Brian Sheridan, Managing Partner, Odour Monitoring Ireland
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1. Introduction and scope

1.1 Introduction

Odour Monitoring Ireland was commissioned by Bord Na Mona to perform hydrogen sulphide, ammonia and mercaptan testing of the exhaust treated air from the biofiltration system in the composting facility located in Drehid, Co. Kildare. The monitoring scope included:

- Inlet and exhaust Ammonia, Hydrogen sulphide and Mercaptans sampling and analysis of the exhaust treated air from the biofiltration system.
- Total viable counts, moisture content and pH of biofilter media.
- Flowrate measurement

All materials in contact with the inlet sample air stream were either stainless steel, Teflon or Nalophan. Hydrogen sulphide (Jerome Meter), Ammonia (CMS analyser) and Mercaptans (CMS analyser) sampling and analysis was performed indirectly with a Jerome meter and a Drager CMS analyser.

Materials and methods, results and discussion and conclusions are presented within the document.

1.1 Scope of the work

The main objectives of this study include:

- Inlet & Exhaust Ammonia, Hydrogen sulphide and Mercaptans sampling and analysis from the biofiltration systems,
- Total viable counts, moisture content and pH of biofilter media,
- Flowrate measurement

2. Materials and methods

This section describes the materials and methods used throughout the monitoring on the 29th Jun. 2022.

2.1 Hydrogen sulphide sampling and analysis

H_2S is commonly associated with composting operations. It is used as an indicator gas for the assessment of significant odour nuisance in the vicinity of such operations. The Jerome 631-X utilises a patented gold film sensor. The sensor's selectivity to hydrogen sulphide eliminates interferences from sulphur dioxide, carbon dioxide, carbon monoxide, and water vapour. When the sample button is pressed, an internal pump draws air into the instrument. Any hydrogen sulphide in the sample is adsorbed by the sensor, which registers a proportional change in electrical resistance. The hydrogen sulphide concentration is displayed on the LCD, where it remains until the next sample is taken.

In order to obtain air samples for air assessment, a static sampling method was used where air samples were collected in 40 to 60 litre pre-conditioned Nalophan^{NA} bags using a vacuum sampling device over a 15-minute period. The sampler operates on the 'lung principle', whereby the air is removed from a rigid container around the bag by a battery powered SKC vacuum pump at a rate of 4 *l* min^{-1}. This caused the bag to fill through a stainless steel and PTFE tube whose inlet is placed in ambient air, with the volume of sample equal to the volume of air evacuated from the rigid container. Triplicate H_2S measurement was performed on each sampling bag. The sampling bag was directly sampled for H_2S concentration in order to assess the exhaust concentration from the outlet/ inlet of the biofilter. The Jerome metre is the only instrument capable of measurement H_2S in real time over the measurement range 3 ppb to 50 ppm in 1 ppb increments.

2.2 Ammonia, Mercaptans sampling and analysis

In order to obtain air samples for Ammonia, methyl and butyl mercaptan assessment, an active sampling method was used where air samples were directly collected into a specific sampling system. The system is based on Dräger's 60+ years of dry chemical reaction technology used in Dräger-Tubes®. The CMS advanced electronics and sampling system delivers accuracies of +/- 4 to 10% of measured values for most gases and vapours. CMS does not require gas calibration. All measurement and calibration information are stored on a bar code on the CMS Chip. An electronics and leak check are performed before each measurement so you are assured of accurate readings every time.

2.3 Media pH and Moisture sampling and analysis

For media total viable counts, pH and moisture analysis, samples were taken at two different bed depths within the biofiltration system. pH analysis was performed by sample medium washing in neutral deionised water which was subsequently filtered for particulate. The sample was tested for pH using a glass pH probe. Samples for medium moisture content was determined by weighing the raw sample for total weight and then again following repetitive drying until no weight change was observed in a oven at 105 ^{0}C for up to a 72 hour period. Sample reweighing occurred every 24 hr period. The total weight difference allowed for calculation of % moisture content in a W/W basis.

2.4 Flowrate measurement

Using a calibrated L/S type pitot manometer, the volumetric airflow rate of air that passes through the biofiltration system was determined in accordance with ISO EN16911:2013. This allowed for the determination of physical operational parameters such current air treatment capacity.

3. Results

This section will present the results from the monitoring assessment.

3.1 Ammonia, Hydrogen sulphide and Mercaptans results biofilter

The biofiltration system located in Drehid composting facility is made up of a mona shell bed medium.

Table 3.1 and 3.2 presents the results of the testing of the biofiltration system located in Drehid Composting facility. As can be observed sampling was performed on the inlet and exhaust of the biofiltration system for Hydrogen sulphide, Ammonia and Mercaptans.

Table 3.1. Compound specific concentrations recorded from biofiltration system – biofilter 1.

Sample identity	Inlet air stream conc. mg/m^3	Exhaust air stream conc. mg/m^3	ELV's IED Licence W0201-03
Hydrogen sulphide	<0.004	<0.004	<5 mg/m^3
Ammonia	15.5	0.9	<50 mg/m^3
Total Mercaptans	<1.5	<1.5	<5 mg/m^3

Table 3.2. Compound specific concentrations recorded from biofiltration system – biofilter 2.

Sample identity	Inlet air stream conc. mg/m^3	Exhaust air stream conc. mg/m^3	ELV's IED Licence W0201-03
Hydrogen sulphide	<0.004	<0.004	<5 mg/m^3
Ammonia	12.1	0.7	<50 mg/m^3
Total Mercaptans	<1.5	<1.5	<5 mg/m^3

As can be observed in *Table 3.1 & 3.2*, the exhaust concentrations of Hydrogen sulphide, Ammonia and Total Mercaptans were in compliance with the licence limits contained in IED W0201-03.

3.3 Media microbial, pH and moisture content analysis results

Table 3.3. MC, pH, TVC recorded from biofiltration system – biofilter 1.

Sample identity	Units	Results
Moisture Content	%	16.5
pH	pH units	7.8
TVC	cfu/g	2.5×10^5

Table 3.4. MC, pH, TVC recorded from biofiltration system – biofilter 2.

Sample identity	Units	Results
Moisture Content	%	18.2
pH	pH units	7.7
TVC	cfu/g	2.5×10^5

3.4 Volumetric flowrate and exhaust temperature results.

Table 3.5. Volumetric flowrate and exhaust temperature results.

Sampling points	Average temp. (degrees)	Total flow (m^3/hr)
Biofilter 1 & 2	37.5	31,420

4. Conclusions

The following conclusions are drawn from the study:

1. The exhaust concentrations of Hydrogen sulphide, Ammonia and Total Mercaptans were in compliance with the licence limits contained in IED licence W0201--03.