Brief Report produced for **Biowise Ltd**

Provided by Walker Resource Management Ltd (WRM)

Summary Report

of ASP Bay monitoring results

1.0 INTRODUCTION

As part of an application to vary their environmental permit and in order to characterise the waste gas emissions from the ASP bays, Walker Resource Management Ltd (hereon referred to as WRM) were contracted by Biowise Ltd to carry out emissions monitoring from the ASP bays. An emissions monitoring campaign was agreed in writing with the Environment Agency prior to the monitoring being carried out. It was agreed that monitoring would be carried out on three of the five ASP bays, each of a differing age, to provide a representative sample of the emissions from the ASP bays at any one time.

Monitoring was carried out on ASP Bays 1, 3 and 4. Prior to being deposited in the bays, the material in each bay had spent one week being sanitised in the IVC tunnels. The material in Bay 1 was a total of six weeks old, that in Bay 3 was four weeks old and that in Bay 4 was two weeks old. Within the ASP Bays, fans located beneath the floor of the bays force air through the material in the bay via a series of pipes located on the floor of the bays. These fans are automatically switched on and off intermittently to the extent that over the course of a year they are on for 50% of the time and off for 50% of the time. Whilst monitoring the emissions is more straightforward when the fans are on, the Environment Agency requested that some monitoring be carried out whilst the fans were switched off. It was agreed with that the majority of the monitoring be carried out whilst the fans were on with a small amount of monitoring being carried out when the fans were switched off.

The following monitoring campaign was agreed and performed between 11th and 13th January 2022:

Table 1 - Agreed Emissions Monitoring Campaign

Location	Monitored Parameters and Number of Samples					
ASP Bay 1	Odour x 15	Odour Speciation x1	Ammonia x3	Hydrogen Sulphide x3	Total Volatile Organic Compounds x3	Top 10 Volatile Organic Compounds x3
ASP Bay 3	Odour x 15	Odour Speciation x1	Ammonia x3	Hydrogen Sulphide x3	Total Volatile Organic Compounds x3	Top 10 Volatile Organic Compounds x3
ASP Bay 4	Odour x 14*	Odour Speciation x1	Ammonia x3	Hydrogen Sulphide x3	Total Volatile Organic Compounds x3	Top 10 Volatile Organic Compounds x3

*Due to damage to one of the sample bags only 14 odour samples could be analysed.

As stated above, some monitoring was carried out whilst the fans were switched on and some when they were switched off. 12 of the 15 odour samples were taken when the fans were on and two of the three sample runs for each of the other pollutants monitored in triplicate were carried out when the fans were switched on. The odour speciation was also carried out when the fans were switched on. All other monitoring was carried out when the fans were switched off. Monitoring was carried out using a normal sampling hood whilst the fans were switched on. The hood was sealed at its base to prevent any influx of ambient air which could dilute the waste gas. Monitoring whilst the fans were off was carried out using a Lindvall Hood. Each ASP Bay has an area of 600m^2 which was split into 15 equal areas of 40m^2 from which the monitoring was carried out.

2.0 MONITORING RESULTS

2.1 ASP Bay 1

The following table presents the average monitoring results for each pollutant monitored whilst the fans were switched on:

Table 2 - ASP Bay 1 Average Monitoring Results - Fans On

Parameter	Unit	Result	Monitoring Method
Odour	ou_E/m^3	198	EN 13725
Ammonia	mg/Nm^3	1.76	EN 21877
Hydrogen Sulphide	mg/Nm^3	0.495	TS 13649
Total VOC	mg/Nm^3	0.3147	TS 13649
Top 10 VOC	mg/Nm^3	0.2043	TS 13649

The sample hood chimney velocity was below the limit of detection for pitot tube measurement. A vane anemometer was used to estimate the velocity and this was calculated to be approximately 0.044m/s at the surface of the material.

The following table presents the monitoring results for each pollutant monitored whilst the fans were switched off:

Table 3 - ASP Bay 1 Monitoring Results - Fans Off

Parameter	Unit	Result	Monitoring Method
Odour	ou_E/m^3	87	EN 13725
Ammonia	mg/Nm^3	0.363	EN 21877
Hydrogen Sulphide	mg/Nm^3	0.389	TS 13649
Total VOC	mg/Nm^3	0.580	TS 13649
Toluene	mg/Nm^3	0.3529	TS 13649

2.2 ASP Bay 3

The following table presents the average monitoring results for each pollutant monitored whilst the fans were switched on:

Table 4 - ASP Bay 3 Average Monitoring Results - Fans On

Parameter	Unit	Result	Monitoring Method
Odour	ou_E/m^3	689	EN 13725
Ammonia	mg/Nm^3	5.53	EN 21877
Hydrogen Sulphide	mg/Nm^3	0.393	TS 13649
Total VOC	mg/Nm^3	0.1757	TS 13649
Top 10 VOC	mg/Nm^3	0.2066	TS 13649

The sample hood chimney velocity was below the limit of detection for pitot tube measurement. A vane anemometer was used to estimate the velocity and this was calculated to be approximately 0.047m/s at the surface of the material.

The following table presents the monitoring results for each pollutant monitored whilst the fans were switched off:

Table 5 - ASP Bay 3 Monitoring Results - Fans Off

Parameter	Unit	Result	Monitoring Method
Odour	ou_E/m^3	248	EN 13725
Ammonia	mg/Nm^3	0.136	EN 21877
Hydrogen Sulphide	mg/Nm^3	0.381	TS 13649
Total VOC	mg/Nm^3	0.3461	TS 13649
Top 10 VOC	mg/Nm^3	0.2508	TS 13649

2.3 ASP Bay 4

The following table presents the average monitoring results for each pollutant monitored whilst the fans were switched on:

Table 6 - Bay 4 Average Monitoring Results - Fans On

Parameter	Unit	Result	Monitoring Method
Odour	ou_E/m^3	2,185	EN 13725
Ammonia	mg/Nm^3	1.09	EN 21877

Hydrogen Sulphide	mg/Nm^3	0.391	TS 13649
Total VOC	mg/Nm^3	0.748	TS 13649
Top 10 VOC	mg/Nm^3	0.2004	TS 13649

The sample hood chimney velocity was below the limit of detection for pitot tube measurement. A vane anemometer was used to estimate the velocity and this was calculated to be approximately 0.056m/s at the surface of the material.

Table 7 - ASP Bay 4 Monitoring Results - Fans Off

Parameter	Unit	Result	Monitoring Method
Odour	ou$_E$/m^3	2,139	EN 13725
Ammonia	mg/Nm^3	0.121	EN 21877
Hydrogen Sulphide	mg/Nm^3	0.391	TS 13649
Total VOC	mg/Nm^3	0.2227	TS 13649
Top 10 VOC	mg/Nm^3	0.2369	TS 13649

3.0 SUMMARY

The monitoring results that offer the clearest pattern are those from the odour monitoring. The monitoring very clearly demonstrates that the emission of odour decreases as the biological waste treatment process progresses in the ASP Bays to the point that by the end of the composting process the average odour concentration whilst the fans are on is less than $200ou_E/m^3$ from a starting position of $2{,}185ou_E/m^3$ at the start of the maturation process. The odour concentrations approximately halfway through the maturation process are less than $700ou_E/m^3$ whilst the fans are on. The emission concentrations of odour whilst the fans are switched off follow a very similar pattern although the concentrations at the middle and end of the composting process are much lower than the concentrations of their "fans-on" counterparts. The clear reduction in odour concentration during the composting process demonstrates that the ASP process is highly effective as a means of deodorising organic compost. The higher odour emission concentrations at the start of the maturation process are only short-lived. Odour modelling that has been carried out using the results of this odour monitoring demonstrates that the C98 1-hour ou_E/m^3 concentrations at all sensitive receptors are below $3ou_E/m^3$. This means that the overall significance of the odour emissions from all of the ASP Bays at the nearest sensitive receptors is negligible to slight.

It is much harder to draw a discernible pattern from the other results. This is because of how low they all are. The highest average Ammonia concentration was from Bay 3 whilst the fans were on at $5.53mg/Nm^3$. This is significantly below the BAT-AEL figure of $20mg/Nm^3$. It should be noted that the BREF for Waste Treatment states that either the BAT-AEL for Ammonia or odour concentration applies. In this instance, should the BAT-AEL for Ammonia apply, all results would be below the BAT-AEL. The highest average Total VOC emission concentration was $0.748mg/Nm^3$ from Bay 4 whilst the fans were on. Again, this is significantly below the BAT-AEL figure of $40mg/Nm^3$. Whilst there are no BAT-AEL concentrations for Hydrogen Sulphide in the BREF for Waste Treatment, the concentrations from the ASP Bays were all very low at less than $0.5mg/Nm^3$.

Therefore, in summary, the emission concentrations from all ASP bays monitored were very low, with only the odour concentration from Bay 4, which contained pre-composted material at the start of the composting process, yielding a higher emission concentration of $2{,}185ou_E/m^3$. However, it must be stressed that this emission is only short-lived as the odour emissions from material in the middle of the maturation process are significantly below the BAT-AEL. This demonstrates that the ASP process is highly effective in reducing odour emissions from the waste material during the composting process.

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