Annual Environmental Report

Name: Molaisín Compost Limited

Address: Kilmolash, Cappoquin, Co Waterford

Waste Licence: W0180-01

Reporting Period: January 1st 2011 – December 31st 2011

Signed:

Fiona O'Sullivan

Summary:

Molaisín Compost Limited (Molaisín) commenced waste activities at the facility at Kilmolash, Cappoquin, Co Waterford in 2005. Molaisín operated under a Waterford County Council waste permit up to August 2010. Since August 10th Molaisín has operated under EPA Waste Licence W0245-01.

Molaisín specializes in the composting of non-hazardous industrial and sewage sludges, and other non-hazardous biodegradable materials. Molaisín will compost any biodegradable material provided it meets stringent regulatory requirements as well as Molaisín's own waste acceptance criteria.

Molaisín specialises in the recovery of biodegradable materials through the process of industrial composting. Molaisín operate the industrial composting facilities using a controlled static pile, forced aeration system. The process takes place completely indoors. The incoming wastes are mixed with dry finished compost and other dry amendments. The Molaisín method is based on a scientific enhancement of the natural composting process that creates and maintains an environment conducive to the proliferation of specific microbial populations. These microbes are responsible for biodegradation and, when provided with the right balance of moisture, temperature, and oxygen are able to affect the rapid decay of organic material.

The composting of non-hazardous industrial sludges and biosolids produces a very valuable end product from material that was previously considered a waste. The finished product adds an important micronutrient and humus-rich stable material to soil. The compost produced by Molaisín is a class 1 compost.

The attached Environmental Report covers the period 1st January 2011 to 31st December 2011.

1.0 Waste activities carried out at the facility and quantity/composition of waste received, disposed of and recovered during the reporting period:

Molaisín Compost Limited accepted waste during the reporting period for composting. Molaisín operate an industrial composting facility using a controlled static pile, forced aeration system. The process takes place completely indoors. The incoming wastes are mixed with dry finished compost and other dry amendments.

Attached are summary sheets with details of:
All wastes accepted during the year – no Animal By Products Material is accepted on site
All amendments accepted during the year
All compost moved of site during the reporting period
A weighbridge log is available with details of all loads

See Attachment 1

2.0 Emissions from the facility:

There were no emissions from the facility during the reporting period. Air is extracted from the facility through a biofiltration system. The biofilter was monitored during the reporting period both independently and by Molaisín Compost Limited and there were no emissions noted.

See Attachment 2

3.0 Resource consumption summary

Diesel Usage: 17630 litres of diesel was used during the reporting period to operate equipment in the facility.

Electricity Usage: From Electricity Bills McGill have used approximately 440,000 KwH of electricity at the facility during the reporting period.

4.0 Complaint Summary

There were ten complaints made about the facility during the reporting period. Nine of these complaints related to odour and all were reported directly to the EPA. One complaint related to a fly infestation in a dwelling in the locality, it was determined that this was not in any way related to the composting facility. Molaisín Compost followed up on all complaints and responded to the complainant, council and EPA.

5.0 Schedule of Environmental Objectives and Targets

See Attachment 3

6.0 Environmental Management Report

See Attachment 4

7.0 Noise Monitoring Report Summary

Noise monitoring was conducted on site by KD Environmental on 26th October 2011. Daytime noise levels were within the permitted day time noise level of 55dB(A) and night time noise levels were within the permitted night time noise level of 45dB(A) at all four noise measurement locations. There was no significant tonal or impulsive noise from site activities during daytime or night time noise monitoring. The full report is included in attachment 2.

See Attachment 2

8.0 Ambient Monitoring Summary

All monitoring conducted during the year is reported in Attachment 2

9.0 Emissions and results of environmental monitoring.

- Compost Analysis summary reports for metals and pathogens are attached
- Sludge Analysis Report is attached. All sludges were analysed on a quarterly basis.
- McGill conducted dust monitoring on site for four different 30 day periods during 2011. Two of these monitoring periods showed elevated reading at dust gauge 4.This was raised as an incident and a report was filed with the EPA. The high readings were due to the position of the dust gauge in the hedgerow. The gauge was moved with the agreement of the EPA and the readings for the next period were within the specified limits.
- Odour Monitoring Ireland (OMI) conducted quarterly Odour Monitoring on site. Bioaerosol and PM10 monitoring was conducted on site by OMI on 24th November 2011. The results of these visits showed that there were no significant odours or bioaerosol impacts in the vicinity of the facility and the ambient air concentration levels of PM10 were below the statutory 24-hour average ambient air concentration level of 50ug m3.
- Biofilter sampling was conducted as per the licence requirement and a summary sheet and full methodology is attached. There were no environmental concerns with the results.
- Groundwater sampling was conducted as per the licence requirement and a summary sheet is attached. There were no environmental concerns with the results.
- Surfacewater sampling was conducted as per the licence requirement and a summary sheet is attached. There were no environmental concerns with the results.

See Attachment 2

10.0 Tank and pipeline testing and inspection report

A report on pipeline testing showing that there are no leaks or spills, this report was submitted to the Agency on completion.

11.0 Reported Incidents Summary

There was one reportable incident during the reporting year. Dust results for dust gauge number 4 were higher than licence limits. Dust gauge number 4 was located in the hedgerow on the passageway leading to the facility. The dust gauges were put in place during July and September 2011 and while the three gauges surrounding the facility were within the dust limits of the licence, number 4 was outside the limits due to the amount of leaf debris, dirt, insects etc that were collected over the monitoring periods. The EPA granted permission for Dust Gauge 4 to be relocated.

12.0 Energy Efficiency audit report summary

Molaisín Compost are using an average of 70KwH electricity and 6 litres of diesel per tonne of biosolids accepted at the facility. As the energy auditing commenced in August 2010 we do not have a full historic year of data to compare this to. The results of the 2012 and 2011 audit will be compared.

13.0 Report on the assessment of the efficiency of the use of raw materials in processes and the reduction in waste generated.

Amendments for the composting process are the only raw materials used on site at Molaisín Compost Limited. The ratio of amendments to waste used during the reporting period was 0.57 tonnes amendment: 1 tonne waste, this figure is slightly higher than in 2010 but there was an increase in compost quantity used as amendment.

There was a 65% reduction in the volume of waste accepted versus compost produced.

14.0 Report on progress made and proposals being developed to minimise water demand and the volume of trade effluent discharges

There are no effluent discharges from the process or facility at Molaisín Compost. Water is not added to the process, the only water used is for the cleaning of delivery trucks and equipment to ensure that no waste is carried from the facility out onto the site. The amount of water used cannot be reduced without compromising the cleanliness of the vehicles, equipment, and the site.

15.0 Development/Infrastructural works summary

A Class 1 oil separator and silt traps will be installed on site in 2011. There are no development or infrastructural works planned for 2012.

16.0 Management and Staffing Structure

See Attachment 5

17.0 Public Information Programme

See Attachment 6

18.0 Review of Decommissioning management plan / Closure, restoration and aftercare management plan and Statement of measures in relation to Prevention of Environmental Damage and remedial Actions (Environmental Liabilities)

The Environmental Liabilities Risk Assessment and Decommissioning Plan was reviewed and it is deemed to be sufficient and require no alterations.

19.0 Summary of SOPs

MCL12-12 Sampling Procedure

This Standard Operating Procedure instructs employees on the correct method for sampling compost for pathogen and other parameters.

20.0 Review of Nuisance Controls

A daily check takes place for Vermin, Birds, Flies, Mud, Dust, Odour, Surface Water, and Biofilter Odour.

21.0 Volume of trade effluent / leachate produced and transported off site

There was no trade effluent or leachate produced on site during the reporting period.

Attachment 1

Waste Licence W0245-01
Reporting Period January 1st 2011 - 31st December 2011

Incoming Waste Material

Material	EWC Code	Quantity
Wastes from the production of alcoholic and non-alcoholic beverges	020704	296.8
Wastes from the preparation and processing of meat, fish and other foods (Non Animal By Products)	020204	1346
Wastes from the dairy products industry (Non Animal By Products)	020502	1843.58
Wastes from the production of alcoholic and non-alcoholic beverges	020705	868.18
Waste Leaves	070599	1350.48
Wastes from the MFSU of basic inorganic chemicals	070199	76.68
Wastes from the MFSU of pharmaceutical ingredients	070512	204.3
Wastes from waste water treatment plants	190805	2380.56
Wastes from preparation of waterintended for human consumption or industrial use	190902	6.16
Septic tank sludge	200304	44.3
	Total	**8417.04**

Waste Licence W0245-01
Reporting Period January 1st 2011 - 31st December 2011

Incoming Amendment

Amendment	Quantity
Mature Compost	3651
Sawdust	866.92
Woodchip	287.96
Total	**4805.88**

Waste Licence W0245-01
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Compost Removed from Site

Use	Quantity
Landfill Cover	1742.82
Amendment	98.06
Horticulture	1137.6
Total	**2978.48**

Attachment 2

dge Analysis

	Sewage Sludge	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Molybdenum	Selenium
		20		1000	750	16	300	2500		
Gill Reference	*Lab Reference*									
ter Mar 11	0360/247/03	0.0215	0.963	5.107	0.46	0.017	1.14	31.433		
geo Q1-2011	0360/247/04	<0.01	0.765	2.259	0.162	0.0179	0.1	16.445		
ppoquin Poultry Q1-2011	0360/247/06	0.0163	1.271	15.026	1.013	0.012	1.529	87.408		
&T Q1-2011	0360/247/07	0.109	5.221	25.713	22.252	0.0106	4.721	146.7		
3 Aghada Q1-2011	0360/247/08	0.018	0.895	1.921	1.607	0.017	0.993	17.904		
geo Kilkenny June 2011	0360/258/01	<0.01	0.103	2.201	0.032	<0.002	0.014	20.392		
ppoquin Poultry June 2011	0360/258/02	<0.01	0.672	11.228	0.3	0.0004	1.62	58.134		
mico June 2011	0360/258/03	<0.01	0.951	2.575	0.279	<0.0002	2.345	18.208		
sh Distillers June 2011	0360/258/04	0.158	4.139	9.075	25.681	0.0015	6.268	188.12		
MC June 2011	0360/258/05	<0.01	1.717	1.601	0.104	0.00038	0.312	4.943		
izer July 2011	0360/258/06	<0.01	1.055	6.005	0.51	0.001	1.127	32.144		
ageo Yeast June 2011	0360/258/07	<0.01	1.642	7.426	1.489	0.0029	0.485	55.286		
ppoquin Poultry Q3-2011	0360/263/03	<0.01	0.522	7.997	0.193	0.000307	0.766	41.801		
QS Q3-2011	0360/263/04	<0.01	0.67	13.089	1.515	0.0268	0.708	25.156		
ra Biosolids Q3-2011	0360/263/05	<0.01	0.361	1.764	1.833	0.203	0.397	42.651		
allow Q3-2011	0360/263/07	0.08024	2.537	30.1	5.479	0.05	4.104	85.035		
izer April 2011	0360/266/03	0.345	1.156	3.841	0.427	0.009	1.501	22.469	0.67	<0.01
ltchelstown Q3 2011	0360/266/04	1.024	3.455	59.657	10.943	0.121	3.395	177.1	0.477	0.41
fizer May 2011	0360/266/05	0.283	1.309	4.086	0.712	0.012	1.667	24.052	0.571	<0.01
harleville Q3 2011	0360/266/06	0.206	1.097	38.344	2.117	0.019	1.131	28.593	0.427	0.443
QS Q3 2011	0360/266/07	0.704	1.94	22.925	5.091	0.027	2.044	68.216	0.751	0.662
iageo Kilkenny Q3 2011	0360/266/08	0.148	0.813	3.774	0.586	0.004	0.536	16.279	0.336	<0.01
iageo Yeast Q3 2011	0360/266/09	0.1550	0.2030	1.5040	0.2800	0.0013	0.1680	27.0340	0.0960	<0.01
PM Sewerage	TWAT022691-1	<0.0001	0.0040	0.0670	0.0030	<0.0001	0.0090	0.0690	0.0020	0.0010
LS Q4-2011	0360/270/01	0.0005	0.0075	0.0470	0.0110	0.0005	0.0012	0.8240	<.005	0.0410
reenstar Q4-2011	0360/270/02	<0.01	1.7650	8.3630	31.1340	0.0060	6.1970	32.2780	1.0870	0.6810
epsi LI Q4-2011	0360/270/03	<0.01	0.5240	2.9860	0.3500	0.0100	0.3630	5.3740	0.3750	<.010
epsi Carrigaline Q4-2011	0360/270/04	<0.01	0.7810	2.3590	0.2870	0.0090	0.6290	25.3100	0.4660	<0.01
ara Q4-2011	0360/270/05	<0.01	0.0936	4.8840	0.1930	0.0002	0.3110	4.6000	0.1430	<0.01
Mallow Q4-2011	0360/270/06	0.0730	2.5360	27.7210	5.0240	0.0240	3.4330	108.1600	0.7340	1.2930
Kerry Bio Q4-2011	0360/270/07	<0.01	0.4240	3.6890	0.4200	0.0010	0.6460	17.8820	0.8870	<0.01
Countywide Drains Q4-2011	0360/270/08	<0.01	1.1200	28.0630	2.3340	0.0110	1.4460	97.0000	0.4850	0.3420

leville Q4 2011	0360/270/09	0.0410	3.0390	34.9000	5.0430	0.0170	2.2330	205.2680	0.5770	<.01
poquin Q4-2011	0360/270/10	0.0400	3.4120	7.2890	2.3240	0.0190	5.6540	30.0580	0.5720	2.2250
ygold Q4-2011	0360/270/11	<0.01	0.3420	1.4930	0.3740	<0.0002	0.1510	22.2610	0.2500	<0.01
er Oct 2011	0360/270/12	<0.01	0.9380	3.7090	0.4440	<0.0002	1.2140	22.1410	0.5980	<0.01
er Nov 2011	0360/270/13	<0.01	0.9030	3.2930	0.3820	0.0340	1.3400	18.1440	0.5970	<0.01
er Dec 2011	0360/270/14	<0.01	0.8260	3.2590	0.4910	0.0100	1.3250	17.7620	0.4940	0.4670
C Q4-2011	0360/270/15	<0.01	0.4900	1.0530	0.2250	<0.0002	0.7130	5.3900	0.1570	<0.01
raspace Q4-2011	0360/270/16	0.0010	0.0075	4.7020	0.1610	0.0002	1.7140	5.7110	0.0070	0.0020
norod Q4-2011	0360/270/17	<0.01	0.2380	3.5190	0.0708	0.0007	0.1000	143.8910	0.5590	<0.01
chelstown Q4 2011	0360/270/18	0.1250	3.4690	51.6970	7.8440	0.0920	3.2750	16.9840	0.5040	1.7520
moy Q4-2011	0360/270/19	<0.01	0.8530	11.8960	1.1500	0.0003	0.7760	48.3600	0.2750	0.5760
lburys Q4-2011	0360/279/20	<0.01	0.8610	14.8420	0.7400	0.0570	0.8270	33.3620	0.2230	0.4190

testing was completed by Euro Environmental Services, Drogheda

		Molaisín Ref:	MCL-GW1-2011	MCL-GW2-2011	MCL-GW3-2011
		Lab Ref:	52/8655	52/8656	52/8657
	Analytical Technique	Units			
1,1,1,2-Tetrachloroethane	GCMS	ug/L	<1.0	<1.0	<1.0
1,1,1 - Trichloroethane	GCMS	ug/L	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	GCMS	ug/L	<1.0	<1.0	<1.0
1,1,2 - Trichloroethane	GCMS	ug/L	<1.0	<1.0	<1.0
1,1 - Dichloroethane	GCMS	ug/L	<1.0	<1.0	<1.0
1,1 - Dichloroethane	GCMS	ug/L	<1.0	<1.0	<1.0
1,1 - Dichloropropene	GCMS	ug/L	<1.0	<1.0	<1.0
1,2,3 - Trichlorobenzene	GCMS	ug/L	<1.0	<1.0	<1.0
1,2,3 - Trichloropropane	GCMS	ug/L	<1.0	<1.0	<1.0
1,2,4 - Trichlorobenzene	GCMS	ug/L	<1.0	<1.0	<1.0
1,2,4 - Trimethylbenzene	GCMS	ug/L	<1.0	<1.0	<1.0
1,2 - Dibromo-3-chloropropane	GCMS	ug/L	<1.0	<1.0	<1.0
1,2 - Dibromoethane	GCMS	ug/L	<1.0	<1.0	<1.0
1,2 - Dichlorobenzene	GCMS	ug/L	<1.0	<1.0	<1.0
1,2 - Dichloroethane	GCMS	ug/L	<1.0	<1.0	<1.0
1,2 - Dichloropropane	GCMS	ug/L	<1.0	<1.0	<1.0
1,3,5 - Trimethylbenzene	GCMS	ug/L	<1.0	<1.0	<1.0
1,3 - Dichlorobenzene	GCMS	ug/L	<1.0	<1.0	<1.0
1,3 - Dichloropropane	GCMS	ug/L	<1.0	<1.0	<1.0
1,4 - Dichlorobenzene	GCMS	ug/L	<1.0	<1.0	<1.0
2,2 - Dichloropropane	GCMS	ug/L	<1.0	<1.0	<1.0
2 - Chlorotoluene	GCMS	ug/L	<1.0	<1.0	<1.0
4 - Chlorotoluene	GCMS	ug/L	<1.0	<1.0	<1.0
Ammonium (NH4)	ET 038 MEW	mg/l	<0.1	8.8	<0.1
Benzene	GCMS	ug/L	<1.0	<1.0	<1.0
Bromobenzene	GCMS	ug/L	<1.0	<1.0	<1.0
Bromochloromethane	GCMS	ug/L	<1.0	<1.0	<1.0
Bromodichloromethane	GCMS	ug/L	<1.0	<1.0	<1.0
Bromoform	GCMS	ug/L	<1.0	<1.0	<1.0
Bromomethane	GCMS	ug/L	<1.0	<1.0	<1.0
Carbon tetrachloride	GCMS	ug/L	<1.0	<1.0	<1.0
Chloride	ET 244 APHA	mg/l	17	16	18
Chlorobenzene	GCMS	ug/L	<1.0	<1.0	<1.0
Chloroethane	GCMS	ug/L	<1.0	<1.0	<1.0
Chloroform	GCMS	ug/L	<1.0	<1.0	<1.0
Chloromethane	GCMS	ug/L	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	GCMS	ug/L	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	GCMS	ug/L	<1.0	<1.0	<1.0
Coliforms (Total)	Filtration/Incu	No/100ml	548	2310	6500
Conductivity @ 25degC	ET 056 APHA	uS/cm	258	687	319
Dibromochloromethane	GCMS	ug/L	<1.0	<1.0	<1.0
Dibromomethane	GCMS	ug/L	<1.0	<1.0	<1.0
Dichlorodifluoromethane	GCMS	ug/L	<1.0	<1.0	<1.0
Dichloromethane	GCMS	ug/L	<1.0	<1.0	<1.0
Ethylbenzene	GCMS	ug/L	<1.0	<1.0	<1.0
Hexachlorobutadiene	GCMS	ug/L	<1.0	<1.0	<1.0
Isopropylbenzene	GCMS	ug/L	<1.0	<1.0	<1.0
Meta-xylene & Para-xylene	GCMS	ug/L	<1.0	<1.0	<1.0
n-Butylbenzene	ET235	mg/l	24.8	294.6	17.3
Nitrate (as NO3)	ET G03 Ref-I	mg/l	5.8	75.7	4.7
Total Nitrogen (as N)					

n-Propylbenzene	GCMS	ug/L	<1.0	<1.0	<1.0
Napthalene	GCMS	ug/L	<1.0	<1.0	<1.0
Ortho-Xylene	GCMS	ug/L	<1.0	<1.0	<1.0
pH	ET 124 APHA	pH Units	6.4	6.1	6.6
p-Isopropyltoluene	GCMS	ug/L	<1.0	<1.0	<1.0
sec-Butylbenzene	GCMS	ug/L	<1.0	<1.0	<1.0
SemiVolatile Organic Compounds	GCMS	ug/L			
Styrene	GCMS	ug/L	<1.0	<1.0	<1.0
tert-Butylbenzene	GCMS	ug/L	<1.0	<1.0	<1.0
Tetrachloroethene	GCMS	ug/L	<1.0	<1.0	<1.0
Toluene	GCMS	ug/L	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	GCMS	ug/L	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	GCMS	ug/L	<1.0	<1.0	<1.0
Trichloroethene	GCMS	ug/L	<1.0	<1.0	<1.0
Trichlorofluoromethane	GCMS	ug/L	<1.0	<1.0	<1.0
TVC's @22oc	Incubation @	No/ml	500	1.4x10*3	1.5x10*3
TVC's @37oc	Incubation @	No/ml	180	310	330
Vinyl Chloride	GCMS	ug/L	<1.0	<1.0	<1.0
Semi Volatile Organic Compounds					
1,2,4,5-tetrachlorobenzene	GCMS	ug/L	<0.20	<0.20	<0.20
1,2,4-trichlorobenzene	GCMS	ug/L	<0.20	<0.20	<0.20
1,2-dichorobenzene	GCMS	ug/L	<0.20	<0.20	<0.20
1,3,5-trinitrobenzene	GCMS	ug/L	<0.20	<0.20	<0.20
1,3-dichlorobenzene	GCMS	ug/L	<0.20	<0.20	<0.20
1,3-dinitrobenzene	GCMS	ug/L	<0.20	<0.20	<0.20
1,4-dichlorobenzene	GCMS	ug/L	<0.20	<0.20	<0.20
1-& 2 -naphthylamine	GCMS	ug/L	<0.20	<0.20	<0.20
2,3,4,6-tetrachlorophenol	GCMS	ug/L	<0.20	<0.20	<0.20
2,4,5-trichlorophenol	GCMS	ug/L	<0.20	<0.20	<0.20
2,4,6-trichlorophenol	GCMS	ug/L	<0.20	<0.20	<0.20
2,4-dichlorophenol	GCMS	ug/L	<0.20	<0.20	<0.20
2,4-dinitrotoluene	GCMS	ug/L	<0.20	<0.20	<0.20
2,4-xylenol	GCMS	ug/L	<0.20	<0.20	<0.20
2,6-dichlorophenol	GCMS	ug/L	<0.20	<0.20	<0.20
2,6-dinitrotoluene	GCMS	ug/L	<0.20	<0.20	<0.20
2-acetylaminofluorene	GCMS	ug/L	<0.20	<0.20	<0.20
2-chloronaphthalene	GCMS	ug/L	<0.20	<0.20	<0.20
2-chlorophenol	GCMS	ug/L	<0.20	<0.20	<0.20
2-methylnaphthalene	GCMS	ug/L	<0.20	<0.20	<0.20
2-methylpyridine	GCMS	ug/L	<0.20	<0.20	<0.20
2-nitrophenol	GCMS	ug/L	<0.20	<0.20	<0.20
3-methylcholanthrene	GCMS	ug/L	<0.20	<0.20	<0.20
3-nitroaniline	GCMS	ug/L	<0.20	<0.20	<0.20
4-aminobiphenyl	GCMS	ug/L	<0.20	<0.20	<0.20
4-bromophenylphenyl ether	GCMS	ug/L	<0.20	<0.20	<0.20
4-chloro-3-methylphenol	GCMS	ug/L	<0.20	<0.20	<0.20
4-chloroaniline	GCMS	ug/L	<0.20	<0.20	<0.20
4-chlorophenylphenylether	GCMS	ug/L	<0.20	<0.20	<0.20
4-nitroaniline	GCMS	ug/L	<0.20	<0.20	<0.20
4-nitroquinoline-1-oxide	GCMS	ug/L	<0.20	<0.20	<0.20
4-nitrosomorpholine	GCMS	ug/L	<0.20	<0.20	<0.20
5-nitro-o-toluidine	GCMS	ug/L	<0.20	<0.20	<0.20
7,12-dimethylbenz(a)-anth	GCMS	ug/L	<0.20	<0.20	<0.20
Acenaphthene	GCMS	ug/L	<0.20	<0.20	<0.20
Acenaphthylene	GCMS	ug/L	<0.20	<0.20	<0.20
Acetophenone	GCMS	ug/L	<0.20	<0.20	<0.20
Aniline	GCMS	ug/L	<0.20	<0.20	<0.20
Anthracene	GCMS	ug/L	<0.20	<0.20	<0.20
Azobenzene	GCMS	ug/L	<0.20	<0.20	<0.20

benzo(a)anthracene	GCMS	ug/L	<0.20	<0.20	<0.20
benzo(a)pyrene	GCMS	ug/L	<0.20	<0.20	<0.20
benzo(b)fluoranthene	GCMS	ug/L	<0.20	<0.20	<0.20
benzo(g,h,i)perylene	GCMS	ug/L	<0.20	<0.20	<0.20
benzo(k)fluroanthene	GCMS	ug/L	<0.20	<0.20	<0.20
benzyl alcohol	GCMS	ug/L	<0.20	<0.20	<0.20
bis(2-chloroethoxy)methan	GCMS	ug/L	<0.20	<0.20	<0.20
bis(2-chloroethyl) ether	GCMS	ug/L	<0.20	<0.20	<0.20
bis(2-chloroisopropyl)eth	GCMS	ug/L	<0.20	<0.20	<0.20
bis(2-ethylhexyl)phthalate	GCMS	ug/L	469	340	205
butyl benzyl phthalate	GCMS	ug/L	<0.20	<0.20	<0.20
carbazole	GCMS	ug/L	<0.20	<0.20	<0.20
Chrysene	GCMS	ug/L	<0.20	<0.20	<0.20
di-n-butyl phthalate	GCMS	ug/L	0.74	1.1	0.65
di-n-octyl phthalate	GCMS	ug/L	0.26	0.21	<0.20
dibenzo(a,h)anthracene	GCMS	ug/L	<0.20	<0.20	<0.20
dibenzofuran	GCMS	ug/L	<0.20	<0.20	<0.20
diethyl phthalate	GCMS	ug/L	0.53	0.7	0.34
dimethyl phthalate	GCMS	ug/L	<0.20	<0.20	<0.20
dinoseb	GCMS	ug/L	<0.20	<0.20	<0.20
diphenylamine	GCMS	ug/L	<0.20	<0.20	<0.20
ethyl methanesulfonate	GCMS	ug/L	<0.20	<0.20	<0.20
fluroanthene	GCMS	ug/L	<0.20	<0.20	<0.20
fluorine	GCMS	ug/L	<0.20	<0.20	<0.20
HCBD	GCMS	ug/L	<0.20	<0.20	<0.20
hexachloro-1-propene	GCMS	ug/L	<0.20	<0.20	<0.20
hexachlorobenzene (HCB)	GCMS	ug/L	<0.20	<0.20	<0.20
hexachlorocyclopentadiene	GCMS	ug/L	<0.20	<0.20	<0.20
hexachloroethane	GCMS	ug/L	<0.20	<0.20	<0.20
indeno(1,2,3-c,d)pyrene	GCMS	ug/L	<0.20	<0.20	<0.20
isophorone	GCMS	ug/L	<0.20	<0.20	<0.20
isosafrole	GCMS	ug/L	<0.20	<0.20	<0.20
m-cresol (3-methylphenol)	GCMS	ug/L	<0.20	<0.20	<0.20
methapyrilene-1-oxide	GCMS	ug/L	<0.20	<0.20	<0.20
methyl methanesulfonate	GCMS	ug/L	<0.20	<0.20	<0.20
N-nitrosodi-n-propylamine	GCMS	ug/L	<0.20	<0.20	<0.20
N-nitrosodibutylamine	GCMS	ug/L	<0.20	<0.20	<0.20
N-nitrosodiethylamine	GCMS	ug/L	<0.20	<0.20	<0.20
N-nitrosodimethylamine	GCMS	ug/L	<0.20	<0.20	<0.20
N-nitrosomethylethylamine	GCMS	ug/L	<0.20	<0.20	<0.20
N-nitrosopiperidine	GCMS	ug/L	<0.20	<0.20	<0.20
N-nitrosopyrrolidine	GCMS	ug/L	<0.20	<0.20	<0.20
naphthalene	GCMS	ug/L	0.37	0.27	0.29
nitrobenzene	GCMS	ug/L	<0.20	<0.20	<0.20
o-cresol (2-methylphenol)	GCMS	ug/L	<0.20	<0.20	<0.20
0-toluidine	GCMS	ug/L	<0.20	<0.20	<0.20
p-cresol (4-methylphenol)	GCMS	ug/L	<0.20	<0.20	<0.20
p-dimethylaminoazobenzene	GCMS	ug/L	<0.20	<0.20	<0.20
pentachlorobenzene	GCMS	ug/L	<0.20	<0.20	<0.20
pentachloroethane	GCMS	ug/L	<0.20	<0.20	<0.20
pentachloronitrobenzene	GCMS	ug/L	<0.20	<0.20	<0.20
pentachlorophenol	GCMS	ug/L	<0.20	<0.20	<0.20
phenacetin	GCMS	ug/L	<0.20	<0.20	<0.20
phenanthrene	GCMS	ug/L	<0.20	<0.20	<0.20
phenol	GCMS	ug/L	<0.20	<0.20	<0.20
pyrene	GCMS	ug/L	<0.20	<0.20	<0.20
pyridine	GCMS	ug/L	<0.20	<0.20	<0.20
safrole	GCMS	ug/L	<0.20	<0.20	<0.20

Dust Monitoring

McGill Reference	*Lab Reference*	*Units*	*Result*	
MCL Dust 1 March 2	0360/246/01	mg/m2/day	16.25	
MCL Dust 2 March 2	0360/246/02	mg/m2/day	266.83	
MCL Dust 3 March 2	0360/246/03	mg/m2/day	30.41	
MCL Dust 4 March 2	0360/246/04	mg/m2/day	47.71	
MCL Dust 1 Q2 2011	0360/255/01	mg/m2/day	237.48	
MCL Dust 2 Q2 2011	0360/255/02	mg/m2/day	209.69	
MCL Dust 3 Q2 2011	0360/255/03	mg/m2/day	234.86	
MCL Dust4 Q2 2011	0360/255/04	mg/m2/day	559.36	*
MCL Dust 1 Q3 2011	0360/265/01	mg/m2/day	100.13	
MCL Dust 2 Q3 2011	0360/265/02	mg/m2/day	259.5	
MCL Dust 3 Q3 2011	0360/265/03	mg/m2/day	208.12	
MCL Dust4 Q4 2011	0360/265/04	mg/m2/day	388.46	*
MCL Dust1 Q4 2011	0360/268/01	mg/m2/day	44.56	
MCL Dust2 Q4 2011	0360/268/02	mg/m2/day	50.85	
MCL Dust3 Q4 2011	0360/268/03	mg/m2/day	56.09	
MCL Dust4 Q4 2011	0360/268/04	mg/m2/day	57.67	

Dust readings are above licence limits.

All analysis was conducted by Euro Environmental Services, Drogheda

Air Monitoring at Biofilter

Date: 03rd June 2011

Materials:

GASTEC GV-100 pump
GASTEC Detector Tube no. 70L Total Mercaptans R•SH
Drager Accuro Gas Detection Pump
Drager Ammonia tubes
Drager Hydrogen Sulfide tubes

Application of the tubes

Use of these tubes for the detection of substances in air and industrial areas.

Measurement Procedure for Total Mercaptans

1. The tips were broken off a fresh detector tube in the tube breaker of the pump.
2. The tube was inserted into the pump inlet with arrow G> on the tube pointing towards pump.
3. Guide marks on pump and handle were aligned.
4. Handle was pulled out until it locked into full position.
5. After three minutes, a reading was taken.

Measurement Procedure for Ammonia and Hydrogen Sulfide

1. The tips were broken off a fresh detector tube in the tube breaker of the pump.
2. The tube was inserted into the pump inlet with arrow pointing towards pump.
3. The air was pumped for ten strokes
4. The reading was taken.

Results

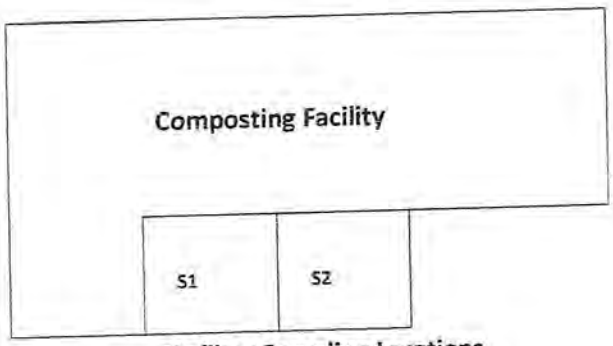
Table 1.

Sample	Ammonia NH3 (ppm)	Hydrogen Sulfide H_2S (ppm)	Total Mercaptans R•SH
S1	<5	Not detected	Not detected
S2	<5	Not detected	Not detected

Results from air sampling

Discussion

Nuisance problems such as odours are mainly caused by Ammonia, Hydrogen Sulfide and other sulfur containing compounds (mercaptans). The biofilter is responsible for cleaning air which has been extracted from the building through the extraction fans. The air was sampled directly above the surface of the biofilter areas through a cone. There was no detection of any compounds at either of the sampling points on the biofilter.



Biofilter Sampling Locations

Signed: _____

Fiona O'Sullivan
Environmental Manager

Date: 3rd June 2011

Air Monitoring at Biofilter

Date: 27th October 2011

Materials:

GASTEC GV-100 pump
GASTEC Detector Tube no. 70L Total Mercaptans R•SH
Drager Accuro Gas Detection Pump
Drager Ammonia tubes
Drager Hydrogen Sulfide tubes

Application of the tubes

Use of these tubes for the detection of substances in air and industrial areas.

Measurement Procedure for Total Mercaptans

1. The tips were broken off a fresh detector tube in the tube breaker of the pump.
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Table 1.

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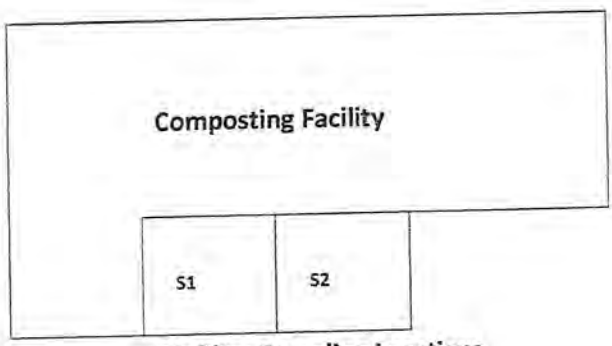
Results from air sampling

Discussion

Nuisance problems such as odours are mainly caused by Ammonia, Hydrogen Sulfide and other sulfur containing compounds (mercaptans). The biofilter is responsible for cleaning air which has been extracted from the building through the extraction fans. The air was sampled directly above the surface of the biofilter areas through a cone. There was no detection of any compounds at either of the sampling points on the biofilter.



Biofilter Sampling Locations

Signed: _____

Fiona O'Sullivan
Environmental Manager

Date: 27th October 2011

Annual Environmental Report
Reporting Period: January 1st 2011 - December 31st 2011

Compost Metal Results

	Class I Standard	Cadmium 0.7	Chromium 100	Copper 100	Lead 100	Mercury 0.5	Nickel 50	Zinc 200
	Class II Standard	1.5	150	150	150	1	75	400
McGill Reference	*Lab Reference*							
MCL - Dec 10	0360/227/02	<0.01	1.632	19.073	3.844	0.029	1.797	71.676
MCL Jan 11	0360/234/01	0.964	4.43	72.616	131.34	0.136	4.497	160.882
MCL Feb 11	0360/234/02	0.935	3.483	51.754	49.7	0.043	3.127	132.285
MCL Mar 11	0360/234/03	0.915	7.962	37.717	68.674	0.043	4.177	154.274
MCL April 2011	0360/248/01	0.32	3.326	50.641	28.51	0.017	3.784	163.446
MCL May 2011	0360/248/02	0.277	2.639	36.545	28.781	0.0373	3.163	134.79
MCL June 2011	0360/252/01	0.193	2.233	37.697	15.529	0.011	3.168	116.324
MCL July 2011	0360/257/18(S)	0.151	3.006	56.73	17.17	0.083	1.099	131.393
MCL Aug 2011	0360/257/19(S)	0.158	3.476	55.585	16.409	0.074	4.607	146.03
MCL Sept 2011	0360/263/01	0.142	3.048	58.354	17.658	0.131	4.417	140.544
MCL Oct 2011	0360/263/02	0.152	3.493	61.333	19.769	0.109	4.874	161.725
MCL Nov 2011	0360/275/01	<.01	1.351	59.676	43.196	0.195	1.791	176.53
MCL Dec 2011	0360/275/02	<0.01	1.609	66.24	53.378	0.179	2.121	225.40

All compost was tested by Euro Environmental Services, Drogheda

All compost produced on site in the reporting period was a Class 1 Compost with the exception of the December sample which is Class 2 due to the elevated zinc.

Annual Environmental Report

Waste Licence W0245-01

Reporting Period: January 1st 2011 - December 31st 2011

Surface Water Results

		Lab Reference	0360/239/01	0360/267/07
Analytical Technique	**Units**	***McGill Reference***	**MCL SW Sample 1 2011**	**MCL SW Sample 2 2011**
Colorimetry	mg/L as N	Ammonia	2.24	1.81
Electrometry	mg/L	BOD	<2	<2
Filtration/Drying @104C	mg/L	Solids (Total Suspended	<2	5

All testing was completed by Euro Environmental Services, Drogheda

Biofilter Monitoring

Colormetric Indicator Tube Testing

Results of Monitoring June 2011

Sample	Ammonia NH3 (ppm)	Hydrogen Sulfide H_2S (ppm)	Total Mercaptans R•SH
S1	<5	Not detected	Not detected
S2	<5	Not detected	Not detected

Full Monitoring Report is attached

Results of Monitoring October 2011

Sample	Ammonia NH3 (ppm)	Hydrogen Sulfide H_2S (ppm)	Total Mercaptans R•SH
S1	<5	Not detected	Not detected
S2	<5	Not detected	Not detected

Full Monitoring Report is attached

Lab Analysis

		Molaisín Reference	MCL - Biofilter 1 2011	MCL Biofilter 2 2011
		Lab Reference	0360/248/13	0360/267/01
		Units		
%	Drying at 104c	% Moisture Content	74.88	73.08
mg/Kg as N	Colorimetry	Ammonia (Solid)	5014.88	3360.05
ph Units	Electrometry	pH	6.5	7.2
no/g	Incubation @ 22c/72H	TVC's @ 22 solid	81100000	9500000
no/g	Incubation @ 37c/48H	TVC's @ 37 solid	300000	8300000

All lab analysis was conducted by Euro Environmental Services, Drogheda

Compost Pathogen Results

Lab Ref:	Result Faecal Coliforms no/100ml	Result Salmonella per 25g
0360/231/01	<1	
0360/231/02	<1	
0360/231/03	<1	
0360/231/04	<1	
0360/231/05	<1	
46/28790		Not Detected
46/28791		Not Detected
46/28792		Not Detected
46/28793		Not Detected
46/28794		Not Detected
46/28795		Not Detected
46/28796		Not Detected
46/28797		Not Detected
46/28798		Not Detected
46/28799		Not Detected
0360/238/01	<1	Not Detected
0360/238/02	<1	Not Detected
0360/238/03	<1	Not Detected
0360/238/04	<1	Not Detected
0360/238/05	<1	Not Detected
03/06/2011	100	Not Detected
03/06/2011	<1	Not Detected
03/06/2011	<1	Not Detected
03/06/2011	<1	Not Detected
03/06/2011	<1	Not Detected
03/06/2011	<1	Not Detected
03/06/2011	<1	Not Detected
03/06/2011	<1	Not Detected
03/06/2011	<1	Not Detected
03/06/2011	<1	Not Detected
0360/257/08	<1	Not Detected
0360/257/09	<1	Not Detected
0360/257/10		5 Not Detected
0360/257/11	<1	Not Detected
0360/257/12		10 Not Detected
0360/257/13	<1	Not Detected
0360/257/14	<1	Not Detected
0360/257/15	<1	Not Detected
0360/257/16	<1	Not Detected
0360/257/17	<1	Not Detected
0360/261/01		0
0360/261/02		0
0360/261/03		0 Not Detected
0360/261/04		0 Not Detected
0360/261/05		280 Not Detected
0360/261/06		0 Not Detected
0360/261/07		0 Not Detected
0360/261/08		0 Not Detected
0360/261/09		0 Not Detected
0360/261/10		0 Not Detected
0360/267/02		0
0360/267/03		0

0360/267/04	0	
0360/267/05	0	
0360/267/06	0	
52/8675		Not Detected
52/8676		Not Detected
52/8677		Not Detected
52/8678		Not Detected
52/8679		Not Detected
55/10213		Not Detected
55/10214		Not Detected
55/10215		Not Detected
55/10216		Not Detected
55/10217		Not Detected
55/10218		Not Detected
55/10219		Not Detected
55/10220		Not Detected
55/10221		Not Detected
55/10222		Not Detected

All compost was tested by Euro Environmental Services, Drogheda and Exova Cork

All compost produced on site met the Pathogen requirements of Waste Licence W0245-01

ODOUR monitoring IRELAND

ODOUR & ENVIRONMENTAL ENGINEERING CONSULTANTS

Unit 32 De Granville Court, Dublin Rd, Trim, Co. Meath

Tel: +353 46 9437922
Mobile: +353 86 8550401
E-mail: info@odourireland.com
www.odourireland.com

BIOAEROSOL AND PARTICULATE MATTER IMPACT ASSESSMENT AT MOLAISIN COMPOSTING LTD., CAPPOQUIN, CO. WATERFORD, IRELAND

PREPARED BY:	Dr. John Casey
ATTENTION:	Ms. Fiona O'Sullivan
DATE:	02nd March 2012
REPORT NUMBER:	2012121(1)
DOCUMENT VERSION:	Document version 1
REVIEWERS:	

TABLE OF CONTENTS

Document Amendment Record

Client: ***Molaisin Compost Ltd***

TITLE: Bioaerosol and Particulate matter impact assessment at Molaisin Compost Ltd, Cappoquin, Co. Waterford.

Project Number: 2012121(1)			**Document Reference:** Bioaerosol and PM_{10} impact assessment at Molaisin Compost, Cappoquin, Co. Waterford.		
2012121(1)	Document for review	B.A.S.	JMC	B.A.S	02/03/2012
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

1. Introduction and scope

1.1 Introduction

Odour Monitoring Ireland was commissioned to perform a bioaerosol and particulate matter (PM_{10}) assessment in the vicinity of the operating Molaisin composting facility located in Cappoquin, Co. Waterford. The bioaerosol impact assessment was carried out in accordance with the guidance document established by the UK Composting Association "Standardised protocol for the testing and enumeration of micro organisms". The PM_{10} assessment was carried out in accordance EN1234-1:2002. Total Mesophillic bacteria and Aspergillus *fumigatus* sampling was performed using equivalent Andersen single stage impactors. Triplicate sampling was performed at each of the three identified sampling locations within and in the vicinity of Molaisin Composting facility located at Cappoquin, Co. Waterford. Bioaerosol ambient air concentrations are within the lower range of the proposed Environment Agency assessment criterion downwind of the facility (*see Table 2.4*). Ambient air concentration levels of PM_{10} were below the statutory 24-hour average ambient air concentration level of 50 $\mu g\ m^{-3}$ at the selected monitoring location (*see Table 2.5*).

1.2 Scope of the study

The main aim of the study was:

- To enumerate the ambient air concentration of two bioaerosols groups namely: Aspergillus *fumigatus* and Total Mesophillic bacteria during operation of the composting facility at Molaisin Composting Ltd, Cappoquin, Co. Waterford.
- To ascertain ambient air concentration levels of PM_{10} in the vicinity of Molaisin Composting Facility, Cappoquin, Co. Waterford.

2. Materials and methods

This section describes in detail the materials and methods used throughout the study period.

2.1 Sampling and residential locations

Figure 2.1 and *Table 2.1* illustrates the location of the proposed site in relation to local residents. Monitoring locations were (*see Table 2.1 & Figure 2.1*):

- Upwind 50m in the vicinity of the overall waste management facility,
- Downwind 50m in the vicinity of the overall waste management facility,
- At process and boundary locations around the composting facility operation.
- Centre of main facility boundary.

This allowed for the development of bioaerosol data for the operations at Molaisin Compost Ltd, Cappoquin, Co. Waterford.

Table 2.1. Monitoring locations and parameters monitored.

Location ID	Parameter monitored	Location description
Cappo 1	Total Mesophillic bacteria and Aspergillus fumigatus	Upwind of site (approx 50m)
Cappo 2	Total Mesophillic bacteria and Aspergillus fumigatus	Downwind of site (approx 50m)
Cappo 3	Total Mesophillic bacteria and Aspergillus fumigatus	Within site downwind (approx 1 m from biofilter wall)
Cappo 4	PM_{10}	Centre of main facility boundary

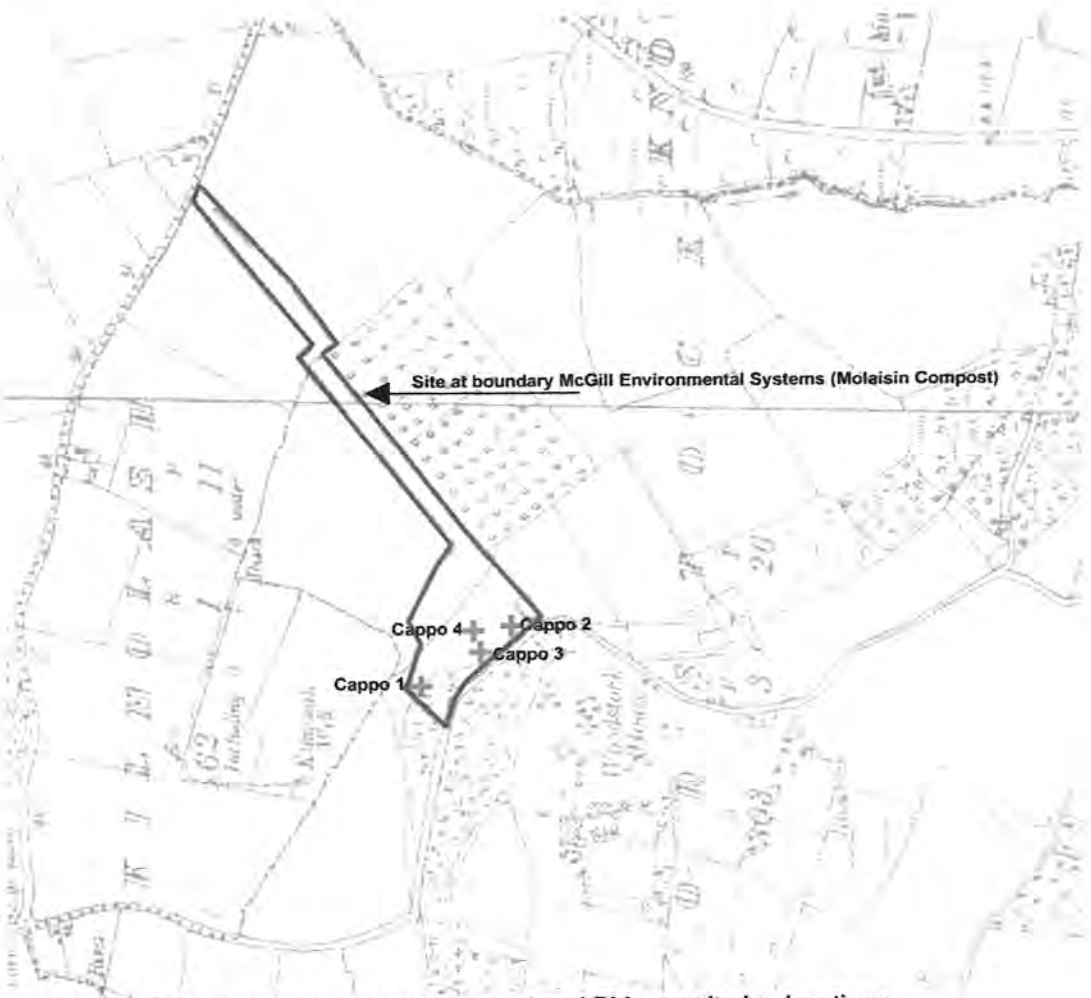


Figure 2.1. Schematic overview of Bioaerosol and PM_{10} monitoring locations.

2.2 Bioaerosols monitoring

Monitoring of bioaerosols was performed in strict accordance with available information and advice including the sources:

1. Standardised Protocol for the Sampling and Enumeration of Airborne Micro-organisms at Composting Facilities. (1999). The UK Composting Association.
2. Macher, J. (1999). Bioaerosol assessment and control. American Conference of Government Industrial Hygienists, Kemper Woods Centre, 1330 Kemper Meadow Drive, Cincinnati, OH.
3. Direct Laboratories, (formerly ADAS), Woodthorne, Wergs Road, Wolverhampton, WV6 8QT.
4. SKC Inc, 863 Valley View Road, Eighty-four, PA, 15330.

Impactor plate sampling was carried out in accordance with the document "Sampling Protocol for the Sampling and Enumeration of Airborne Micro-organisms at Composting facilities, The Composting Association, UK.

One sampling technique was employed namely:

- Biostage single stage 400 hole impactor (SKC Inc, PA)- This is a direct equivalent to the Andersen N6 single stage impactor and meets the requirements of NIOSH 0800 and NIOSH 0801 biological sampling standards (i.e. this impactor is a direct copy of the Andersen N6 impactor with added benefits including the Surelok system which prevents any air leakages. This was an inherent problem of the Andersen N6 single stage impactor).

Generally, sampling times of 10 minutes were used to assess ambient levels using the impactor plates as longer sampling times can lead to desiccation of the plate and impacted microbes.

The Biostage (i.e. Andersen N 6 equivalent impactor) was calibrated using a Bios Primary flow calibrator to a volumetric flow rate of 28.3 *litres* min^{-1} and Hi Flow 30 battery operated automatically timed pumps were used for suction airflow.

The Biostage impactors were fixed to tripods ensuring an adjustable sampling height of between 0.40 to 1.9 metres. The sampling height was fixed at 1.50 metres. Two Biostage impactors were used throughout the study period. The use of correctly designed sampling equipment ensured correct operation at all times throughout the study period.

The Irish Equine Centre (ISO 17025 accredited) tested two medias including Malt Extract Agar media (MEA) for Aspergillus *fumigatus*, and standard plate count agar (TVC) for total Mesophillic bacteria. MEA media facilitates the sporulation of Aspergillus *fumigatus*, which is used to identify the species. Sterile fresh 90mm plates were supplied by Cruinn Diagnostics accredited laboratory services and placed in sealed coolers. Fresh plates were used to eliminate the formation of a skin upon the plate upper surface (i.e. develops with age). It was thought that this may cause problems while using an impaction method (i.e. particle bounce off).

2.3. Transport of bioaerosol samples

All sampling plates during monitoring were allowed to equilibrate to ambient temperature before sampling. This allowed for the development of less harsh conditions upon impacted bioaerosols. It was also noticed that cooled plates (approximately 5^0C) formed an outer "skin" which could facilitate particle bounce. Following equilibration, it was apparent from observation, better "knitting" of impactor plates occurred. Before each sampling event, the Biostage impactors were sterilised using cotton wool and 70% iso-proponal. The impactors were autoclaved for complete sterilisation before sampling. Once sampled, all agar plates were inverted, sealed with parafilm, placed within a flexible plastic container, and neatly stacked within a mobile cooler for delivery to Irish Equine Centre laboratory located in Kill, Co. Kildare. Once received, they were incubated at the appropriate temperatures of 30^0C for Total viable counts (i.e. Mesophillic bacteria) and 37^0C for Aspergillus *fumigatus* by the laboratory technician. Results were received within 10 to 15 working days following sampling.

2.4 Particulate matter monitoring

Major sources of particulates include industrial/residential combustion and processing, energy generation, vehicular emissions and construction projects. The particulate matter created by these processes is responsible for many adverse environmental conditions including reduced visibility, contamination and soiling, but also recognised as a contributory factor to many respiratory medical conditions such as asthma, bronchitis and lung cancer. PM_{10} (Particulate Matter 10) refers to particulate matter with an aerodynamically diameter of 10 µm. Generally, such particulate matter remains in the air due to low deposition rates. It is the main particulate matter of concern in Europe and has existing air quality limits. In order to obtain ambient air PM_{10} concentration levels for the Molaisin Composting Ltd site, a battery operated gravimetric Particulate sampler (Partisol) was used. One fixed monitoring location (i.e. Cappo 4) was used to perform gravimetric monitoring over the sampling period. The monitoring locations and results are presented in *Figure 2.1* and *Table 2.4*.

PM_{10} monitoring in Ireland is limited to continuous monitoring stations operated by the Local Authorities and the Irish EPA, mainly in large urban centres. The dominant source of PM_{10} in the area appears to be HGV emissions, boilers (i.e. Home heating and Industrial heating), traffic, wind blown dust and construction activities.

2.5 Assessment criteria bioaerosols and PM_{10}

Table 2.2 and 2.3 illustrates the assessment criteria is used for comparison of monitoring results during operation to ascertain ambient bioaerosol and PM_{10} air quality in the vicinity of the Molaisin Composting Ltd, Cappoquin, Co. Waterford. Bioaerosol impact criteria are derived from those limits proposed by the UK Environmental Agency.

Table 2.2. Assessment criteria for the ambient bioaerosol air quality in the vicinity of Molaisin Compost, Cappoquin, Co. Waterford, Ireland.

Assessment criteria	Reference concentration range	Notes	Reference
Total fungi (includes Aspergillus *fumigatus*)[1]	1000 to 5,000 CFU m^{-3}	Environment Agency proposed concentration level, Reported concentration range in Swan, 2003 & Sheridan et al., 2004	McNeel et al., 1999 Wheeler et al., 2001, Swan et al., 2003 Sheridan et al., 2004
Mesophillic bacteria[1]	5,000 to 10,000 CFU m^{-3}	Environment Agency proposed concentration level, Reported concentration range in Swan, 2003 and Sheridan et al., 2004	Gorny and Dutkiewicz (2002) Wheeler et al., 2001 Swan et al., 2003 Dutch Occupational Health Association NWA 1989. Sheridan et al., 2004

Notes: [1] denotes the values of CFU m^{-3} refers to Colony Forming Unit per cubic metre of air sampled.

For PM_{10} the EU has introduced several measures to address the issue of air quality management. In 1996, Environmental Ministers agreed a Framework Directive on ambient air quality assessment and management (Council Directive 96/62/EC). As part of the measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, 1999/30/EC, has set limit values which replaced existing limit values under Directives 80/779/EEC, 82/884/EEC and 85/203/EEC in April 2001. The new directive, as relating to limit values for PM_{10}, is detailed in *Table 2.3*.

The National Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002) transpose those parts of the "Framework" Directive 92/30/EC on ambient air quality assessment and management not transposed by Environment Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The 2002 Regulations also transpose, in full, the 1st two "Daughter" Directives 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air and 2000/69/EC relating to limit values for benzene and carbon monoxide in ambient air.

Table 2.3. PM_{10} Irish and EU Ambient Air Standard SI 180 of 2011 and 1999/30/EC.

Pollutant	Regulation	Limit Type	Value
Particulate Matter as PM_{10}	2008/50/EC and SI180 of 2011	24-hour limit for protection of human health – not to be exceeded more than 35 times/year- 24 hour average	50 $\mu g/m^3$ PM_{10}
		Annual limit for protection of human health- Annual	40 $\mu g/m^3$ PM_{10}
Particulate matter as $PM_{2.5}$	2008/50/EC and SI180 of 2011	Annual limit for protection of human health- Annual	25 $\mu g/m^3$ $PM_{2.5}$

3. Results

This section presents the results obtained during the study period.

3.1 Ambient Bioaerosol air quality

Table 2.4 illustrates the results from bioaerosol air quality monitoring. Both Aspergillus *fumigatus* and Total Mesophillic bacteria were assessed on the day of sampling namely 24th November 2011.

Table 2.4. Bioaerosols concentration levels within and in the vicinity of the recycling facility.

Location ID	Average Aspergillus *fumigatus* concentration (CFU m^{-3})[1]	Average Mesophillic bacteria concentration (CFU m^{-3})[1]	Sample count[2]
Cappo 1	<20	5	6
Cappo 2	<25	42	6
Cappo 3	<134	168	6

Note: [1] denote a total of 3 blanks (2 plate and 1 impactor blanks for the monitored bioaerosol) were incorporated into the sampling exercise. All blanks were negative CFU m^{-3}.
[2] denote total number of sample counts for each parameter monitored at each location.

Table 2.4 illustrates the ambient bioaerosol air quality within and in the vicinity of the composting facility. As can be observed, Aspergillus *fumigatus* concentrations are low in close proximity and downwind of the facility. Total Mesophillic bacteria ambient air concentration levels were elevated close to the facility biofilter while downwind concentrations decreased rapidly at 50 metres of the facility boundary (see *Table 2.2*).

Following a review of literature, it is reported that concentration levels of bioaerosols in ambient environment range from 0 to 400 CFU m^{-3} for Aspergillus *fumigatus*, 0 to 15,673 CFU m^{-3} for Total fungi and 79 to 3204 CFU m^{-3} for Total bacteria. Monitoring of bioaerosols is important due to the complexities in monitoring once a facility is in operation. The main reasons for monitoring include:

- Microbes are ubiquitous in the environment and air or surface samples will always contain some bacteria or fungi.
- Microbes grow and are released at irregular intervals and depend on some sort of air turbulence to be transported from their original source.
- Bioaerosols vary greatly in size and therefore some remain in ambient air for longer periods of time in comparison to larger, heavier particles that fall quickly to the ground. This is explained with Stokes law.
- Meteorological factors such as relative humidity, temperature and wind speed greatly effect ambient air concentrations.
- Due to the variety of size and sensitivity, the sampling methodology will greatly affect the measured concentration.
- Seasonal effects can increase of decrease ambient bioaerosol concentrations.

In accordance with the assessment criteria reported in *Table 2.2*, bioaerosol concentrations levels are within the lower end of the range for Aspergillus *fumigatus* and *Total mesophillic bacteria*.

3.2 Particulate matter air quality

Table 2.5 illustrates the results from PM_{10} air quality monitoring.

Table 2.5. Average ambient PM_{10} concentrations for one fixed monitoring location at the Molaisin Compost, Cappoquin, Co. Waterford, Ireland on the 24th November 2011

Monitoring locations	Sample number	Average concentration value ($\mu g/m^3$)
Cappo 4	087446	8

PM_{10} monitoring in Ireland is limited to continuous monitoring stations operated by the Local Authorities and the Irish EPA, mainly in large urban centres. The dominant source of PM_{10} in this area would appear to be HGV emissions, boilers (i.e. Home heating and Industrial heating), traffic, wind blown dust, composting and construction activities. The average ambient PM_{10} concentrations are in the range of those monitored in other rural locations. The results presented herein demonstrate that PM_{10} air quality is good at monitoring locations Cappo 4 (i.e. Air Quality Index rating, www.epa.ie).

4. Conclusions

The following conclusions were drawn during the study:

1. The bioaerosol concentration levels were determined at each sampling location in triplicate. Three sampling locations were chosen to include upwind, downwind and within the facility boundary.
2. Currently, there are no significant bioaerosol impacts in the vicinity of Molaisin Composting facility located at Cappoquin, Co. Waterford with all reported bioaerosol ambient air concentrations within the range of the proposed bioaerosol assessment criterion.
3. Ambient air concentration levels of PM_{10} were below the statutory 24-hour average ambient air concentration level of 50 $\mu g\ m^{-3}$.

ODOUR monitoring IRELAND

ODOUR & ENVIRONMENTAL ENGINEERING CONSULTANTS

Unit 32 De Granville Court, Dublin Rd, Trim, Co. Meath

Tel: +353 46 9437922
Mobile: +353 86 8550401
E-mail: info@odourireland.com
www.odourireland.com

QTR.1 2011 - ODOUR SAMPLING AND ANALYSIS OF A BIOFILTRATION SYSTEM LOCATED IN MOLAISIN COMPOSTING LTD., CAPPOQUIN, CO. WATERFORD, IRELAND

PREPARED BY:	Dr. John Casey
ATTENTION:	Ms. Fiona O' Sullivan
DATE:	12th April 2011
REPORT NUMBER:	2011A114(1)
DOCUMENT VERSION:	Document Ver. 001
REVIEWERS:	

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DOCUMENT AMENDMENT RECORD

Client: ***McGill Environmental Ltd.***

Title: Qtr.1 2011 - Odour sampling and analysis of a biofiltration system located in Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland

Project Number: 2011A114(1)			**Document Reference:** Qtr.1 2011 - Odour sampling and analysis of a biofiltration system located in Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland		
2011A114(1)	Document for review	B.A.S.	JMC	B.A.S	12/04/2011
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

1. Introduction

Odour Monitoring Ireland was commissioned by McGill Environmental Ltd to perform monitoring of the of a bio filtration system in accordance with Schedule C of Waste licence W0245-01. The biofiltration system is located at Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland.

The biofilter is an open bed biofilter consisting of a mixed medium made up of compost, woodchip, lime, etc. The media within the biofilter bed acts as a carrier material for the mixed microbial consortium that adsorbs and degrades the influent odourous gases.

In accordance with EPA requirements contained in Waste licence 245-01, the biofilter was assessed for the following parameters:

- Odour sampling and analysis of the inlet and outlet gases,

All sampling was performed on the 08th March 2011.

2. Materials and methods

This section describes the materials and methods used throughout the study period.

2.1 Odour sampling and analysis

2.1.1 Odour sampling

In order to obtain air samples for odour 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. All odour-sampling bags were pre-conditioned and flushed with odourous air to remove any interference from the sample material.

Since the exhaust of the biofiltration systems are open beds, a hood technique was used to allow for capture of the odourous air stream to facilitate sampling. The hood was constructed from 304L SS and has a surface area of 1 m^2 which is coned down to a circular duct of 0.075 m diameter. This also facilitates the measurement of total volumetric airflow rate per m^2 of biofilter surface. The inlet of the biofiltration system was samples as a point source over a time period of 25 to 30 minutes.

In terms of the sampling regime, a total of between 2 individual sample locations were chosen randomly for each odour sample bag. The hood fixed to the surface of the biofilter bed and the presence of positively displaced air was verified through the use of a 73mm vane anemometer. A total of 3 to 4 minutes was allowed between sample acquisition to ensure in excess of 12 AC/hr within the hood before sampling commenced.

2.1.2 Olfactometry

Olfactometry using the human sense of smell is the most valid means of measuring odour (Dravniek et al, 1986) and at present is the most commonly used method to measure the concentration of odour in air (Hobbs et al, 1996). Olfactometry is carried out using an instrument called an olfactometer. Three different types of dynamic dilution olfactometers exist:

- Yes/No Olfactometer
- Forced Choice Olfactometer
- Triangular Forced Choice Olfactometer.

In the dynamic dilution olfactometer, the odour is first diluted and is then presented to a panel of screened panellists of no less than four (CEN, 2003) Panellists are previously screened to ensure that they have a normal sense of smell (Casey et al., 2003). According to the CEN standard this screening must be performed using a certified reference gas *n*-butanol. This screening is applied to eliminate anosmia (low sensitivity) and super-noses (high sensitivity). The odour analysis has to be undertaken in a low odour environment such as an air-conditioned odour free laboratory. Analysis should be performed preferably within 8 to 12 hours of sampling.

2.1.3 Odour measurement in accordance with the EN13725:2003

An ECOMA TO8 dynamic yes/no olfactometer was used throughout the measurement period to determine the odour threshold concentration of the sample air. The odour threshold concentration is defined as the dilution factor at which 50% of the panel can just detect the

odour. Only those panel members who pass screening tests with n-butanol (certified reference gas, CAS 72-36-3) and who adhered to the code of behaviour were selected as panellists for olfactometry measurements (CEN, 2003). Odour measurement was carried out in an odour free laboratory in accordance with EN13725:2003. The analyses were carried out in the laboratory of Odour Monitoring Ireland in Trim Co. Meath.

2.1.4 What is an odour unit?

The odour concentration of a gaseous sample of odourant is determined by presenting a panel of selected screened human panellists with a sample of odourous air and varying the concentration by diluting with odourless gas, in order to determine the dilution factor at the 50% detection threshold. The Z_{50} value (threshold concentration) is expressed in odour units ($Ou_E\ m^{-3}$).

The European odour unit is that amount of odourant(s) that, when evaporated into one cubic metre of neutral gas (nitrogen), at standard conditions elicits a physiological response from a panel (detection threshold) equivalent to that elicited by one European Reference Odour Mass (EROM) evaporated in one cubic meter of neutral gas at standard conditions. One EROM is that mass of a substance (n-butanol) that will elicit the Z_{50} physiological response assessed by an odour panel in accordance with this standard. *n*-Butanol is one such reference standard and is equivalent to 123µg of n-butanol evaporated in one cubic meter of neutral gas at standard conditions (CEN, 2003).

3. Results

This section discusses and describes the results obtained during the study period.

This section will present the results from the monitoring assessment.

3.1 Odour results biofilter

Table 3.1 presents the results of the testing of the biofiltration system located in Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland. As can be observed, one odour sample was taken on the inlet of the system while duplicate sampling was performed on the exhaust of the biofiltration system.

Table 3.1. Odour threshold concentrations recorded at biofiltration system.

Sample identity	Average inlet odour conc. (Ou_E/m^3)	Exhaust odour conc (Ou_E/m^3)
S1080311	-	5,362
S2080311	-	5,792
S3080311	39,721	-
Average Odour conc (Ou_E/m^3)	**39,721**	**5,577**
Average Removal Eff (%)	-	**85**

As can be observed in *Table 3.1*, the overall inlet odour concentration is 39,721 Ou_E/m^3. The average exhaust odour threshold concentration was 5,577 Ou_E/m^3 with a minimum and maximum odour threshold concentration value of 5,362 and 5,792 Ou_E/m^3 recorded on the day of monitoring. The calculated odour removal efficiency on the day of monitoring was 85%.

4. Conclusions

The following conclusions were drawn from the study:

- Odour sampling and analysis was carried out in accordance with Schedule C of Waste licence W0245-01,
- The overall inlet odour concentration is 39,721 Ou_E/m^3,
- The average exhaust odour threshold concentration was 5,577 Ou_E/m^3,
- The calculated odour removal efficiency on the day of monitoring was 85%.

5. References

1. Sheridan, B.A., Curran., T.P. and Dodd., V. (2002). Biofiltration of n butyric acid for the control of odour. Bioresource Technology, 89:22, pg 199-205, Elsevier Science, 2003.

ODOUR monitoring IRELAND

ODOUR & ENVIRONMENTAL ENGINEERING CONSULTANTS

Unit 32 De Granville Court, Dublin Rd, Trim, Co. Meath

Tel: +353 46 9437922
Mobile: +353 86 8550401
E-mail: info@odourireland.com
www.odourireland.com

QTR.3 2011 - ENVIRONMENTAL MONIORING AT MOLAISIN COMPOSTING LTD., CAPPOQUIN, CO. WATERFORD, IRELAND

PREPARED BY:	Dr. John Casey
ATTENTION:	Mr. Fiona O Sullivan
LICENCE NUMBER:	WL245-01
LICENCE HOLDER:	Molaisin Compost Limited
FACILITY NAME:	Molaisin Compost Limited
DATE OF MONITORING VISIT:	19th September 2011
NAME AND ADDRESS OF CLIENT ORGANISATION:	Kilmolash, Cappoquin, Co. Waterford
NAME AND ADDRESS OF MONITORING ORGANISATION:	Odour Monitoring Ireland, Unit 32 DeGranville Court, Dublin Road, Trim, Co. Meath
DATE OF REPORTING:	10th Oct. 2011
NAME AND THE FUNCTION OF THE PERSON APPROVING THE REPORT:	Dr. Brian Sheridan, Managing Partner, Odour Monitoring Ireland
REPORT NUMBER:	2011A317(1)
REVIEWERS:	Dr. Brian Sheridan

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DOCUMENT AMENDMENT RECORD

Client: ***McGill Environmental Ltd.***

Title: Qtr.3 2011 - Environmental monitoring at Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland

Project Number: 2011A317(1)			**Document Reference:** Qtr.3 2011 - Environmental monitoring at Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland		
2011A317(1)	Document for review	B.A.S.	JMC	B.A.S	10/10/2011
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

1. Introduction

Odour Monitoring Ireland was commissioned by McGill Environmental Ltd to perform monitoring of the of a bio filtration system in accordance with Schedule C of Waste licence W0245-01. The biofiltration system is located at Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland.

The biofilter is an open bed biofilter consisting of a mixed medium made up of compost, woodchip, lime, etc. The media within the biofilter bed acts as a carrier material for the mixed microbial consortium that adsorbs and degrades the influent odourous gases.

In accordance with EPA requirements contained in Waste licence 245-01, the biofilter was assessed for the following parameters:

- Odour sampling and analysis of the inlet and outlet gases,

All sampling was performed on the 19th September 2011.

2. Materials and methods

This section describes the materials and methods used throughout the study period.

2.1 Odour sampling and analysis

2.1.1 Odour sampling

In order to obtain air samples for odour 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. All odour-sampling bags were pre-conditioned and flushed with odourous air to remove any interference from the sample material. The device was leak tested before the commencement of sampling.

Since the exhaust of the biofiltration systems are open beds, a hood technique was used to allow for capture of the odourous air stream to facilitate sampling. The hood was constructed from 304L SS and has a surface area of 1 m^2 which is coned down to a circular duct of 0.075 m diameter. This also facilitates the measurement of total volumetric airflow rate per m^2 of biofilter surface. The inlet of the biofiltration system was samples as a point source over a time period of 25 to 30 minutes.

In terms of the sampling regime, a total of between 2 individual sample locations were chosen randomly for each odour sample bag. The hood fixed to the surface of the biofilter bed and the presence of positively displaced air was verified through the use of a 73mm vane anemometer. A total of 3 to 4 minutes was allowed between sample acquisition to ensure in excess of 12 AC/hr within the hood before sampling commenced.

2.1.2 Olfactometry

Olfactometry using the human sense of smell is the most valid means of measuring odour (Dravniek et al, 1986) and at present is the most commonly used method to measure the concentration of odour in air (Hobbs et al, 1996). Olfactometry is carried out using an instrument called an olfactometer. Three different types of dynamic dilution olfactometers exist:

- Yes/No Olfactometer
- Forced Choice Olfactometer
- Triangular Forced Choice Olfactometer.

In the dynamic dilution olfactometer, the odour is first diluted and is then presented to a panel of screened panellists of no less than four (CEN, 2003) Panellists are previously screened to ensure that they have a normal sense of smell (Casey et al., 2003). According to the CEN standard this screening must be performed using a certified reference gas *n*-butanol. This screening is applied to eliminate anosmia (low sensitivity) and super-noses (high sensitivity). The odour analysis has to be undertaken in a low odour environment such as an air-conditioned odour free laboratory. Analysis should be performed preferably within 8 to 12 hours of sampling.

2.1.3 Odour measurement in accordance with the EN13725:2003

An ECOMA TO8 dynamic yes/no olfactometer was used throughout the measurement period to determine the odour threshold concentration of the sample air. The odour threshold

concentration is defined as the dilution factor at which 50% of the panel can just detect the odour. Only those panel members who pass screening tests with n-butanol (certified reference gas, CAS 72-36-3) and who adhered to the code of behaviour were selected as panellists for olfactometry measurements (CEN, 2003). Odour measurement was carried out in an odour free laboratory in accordance with EN13725:2003. The analyses were carried out in the laboratory of Odour Monitoring Ireland in Trim Co. Meath.

2.1.4 What is an odour unit?

The odour concentration of a gaseous sample of odourant is determined by presenting a panel of selected screened human panellists with a sample of odourous air and varying the concentration by diluting with odourless gas, in order to determine the dilution factor at the 50% detection threshold. The Z_{50} value (threshold concentration) is expressed in odour units ($Ou_E\ m^{-3}$).

The European odour unit is that amount of odourant(s) that, when evaporated into one cubic metre of neutral gas (nitrogen), at standard conditions elicits a physiological response from a panel (detection threshold) equivalent to that elicited by one European Reference Odour Mass (EROM) evaporated in one cubic meter of neutral gas at standard conditions. One EROM is that mass of a substance (n-butanol) that will elicit the Z_{50} physiological response assessed by an odour panel in accordance with this standard. *n*-Butanol is one such reference standard and is equivalent to 123µg of n-butanol evaporated in one cubic meter of neutral gas at standard conditions (CEN, 2003).

3. Results

This section discusses and describes the results obtained during the study period.

This section will present the results from the monitoring assessment.

3.1 Odour results biofilter

Table 3.1 presents the results of the testing of the biofiltration system located in Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland. As can be observed, one odour sample was taken on the inlet of the system while duplicate sampling was performed on the exhaust of the biofiltration system.

Table 3.1. Odour threshold concentrations recorded at biofiltration system.

Sample identity	Average inlet odour conc. (Ou_E/m^3)	Exhaust odour conc (Ou_E/m^3)
S1190911	-	6,756
S2190911	-	6,773
S3190911	36,776	-
Average Odour conc. (Ou_E/m^3)	**36,776**	**6,765**
Average Removal Eff. (%)	**-**	**81**

As can be observed in *Table 3.1*, the overall inlet odour concentration is 36,776 Ou_E/m^3. The average exhaust odour threshold concentration was 6,765 Ou_E/m^3 recorded on the day of monitoring. The calculated odour removal efficiency on the day of monitoring was 81%.

4. Conclusions

The following conclusions were drawn from the study:

- Odour sampling and analysis was carried out in accordance with Schedule C of Waste licence W0245-01,
- The overall inlet odour concentration is 36,776 Ou_E/m^3,
- The average exhaust odour threshold concentration was 6,765 Ou_E/m^3,
- The calculated odour removal efficiency on the day of monitoring was 81%.

5. References

1. Sheridan, B.A., Curran., T.P. and Dodd., V. (2002). Biofiltration of n butyric acid for the control of odour. Bioresource Technology, 89:22, pg 199-205, Elsevier Science, 2003.

ODOUR monitoring IRELAND

ODOUR & ENVIRONMENTAL ENGINEERING CONSULTANTS

Unit 32 De Granville Court, Dublin Rd, Trim, Co. Meath

Tel: +353 46 9437922
Mobile: +353 86 8550401
E-mail: info@oduurireland.com
www.oduurireland.com

QTR.2 2011 - ENVIRONMENTAL MONIORING AT MOLAISIN COMPOSTING LTD., CAPPOQUIN, CO. WATERFORD, IRELAND

PREPARED BY:	Dr. John Casey
ATTENTION:	Ms. Fiona O' Sullivan
DATE:	25th July 2011
REPORT NUMBER:	2011A222(1)
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Client: ***McGill Environmental Ltd.***

Title: Qtr.2 2011 - Environmental monitoring at Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland

Project Number: 2011A222(1)			**Document Reference:** Qtr.1 2011 - Environmental monitoring at Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland		
2011A222(1)	Document for review	B.A.S.	JMC	B.A.S	25/07/2011
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

1. Introduction

Odour Monitoring Ireland was commissioned by McGill Environmental Ltd to perform monitoring of the of a bio filtration system in accordance with Schedule C of Waste licence W0245-01. The biofiltration system is located at Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland. In addition ambient air concentration levels of PM_{10} in the vicinity of Molaisin Composting Facility, Cappoquin, Co. Waterford were assessed

The biofilter is an open bed biofilter consisting of a mixed medium made up of compost, woodchip, lime, etc. The media within the biofilter bed acts as a carrier material for the mixed microbial consortium that adsorbs and degrades the influent odourous gases.

In accordance with EPA requirements contained in Waste licence 245-01, the biofilter was assessed for the following parameters:

- Odour sampling and analysis of the inlet and outlet gases,
- Ambient particulate matter (PM_{10}),

All sampling was performed on the 20th June 2011.

2. Materials and methods

This section describes the materials and methods used throughout the study period.

2.1 Odour sampling and analysis

2.1.1 Odour sampling

In order to obtain air samples for odour 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. All odour-sampling bags were pre-conditioned and flushed with odourous air to remove any interference from the sample material.

Since the exhaust of the biofiltration systems are open beds, a hood technique was used to allow for capture of the odourous air stream to facilitate sampling. The hood was constructed from 304L SS and has a surface area of 1 m^2 which is coned down to a circular duct of 0.075 m diameter. This also facilitates the measurement of total volumetric airflow rate per m^2 of biofilter surface. The inlet of the biofiltration system was samples as a point source over a time period of 25 to 30 minutes.

In terms of the sampling regime, a total of between 2 individual sample locations were chosen randomly for each odour sample bag. The hood fixed to the surface of the biofilter bed and the presence of positively displaced air was verified through the use of a 73mm vane anemometer. A total of 3 to 4 minutes was allowed between sample acquisition to ensure in excess of 12 AC/hr within the hood before sampling commenced.

2.1.2 Olfactometry

Olfactometry using the human sense of smell is the most valid means of measuring odour (Dravniek et al, 1986) and at present is the most commonly used method to measure the concentration of odour in air (Hobbs et al, 1996). Olfactometry is carried out using an instrument called an olfactometer. Three different types of dynamic dilution olfactometers exist:

- Yes/No Olfactometer
- Forced Choice Olfactometer
- Triangular Forced Choice Olfactometer.

In the dynamic dilution olfactometer, the odour is first diluted and is then presented to a panel of screened panellists of no less than four (CEN, 2003) Panellists are previously screened to ensure that they have a normal sense of smell (Casey et al., 2003). According to the CEN standard this screening must be performed using a certified reference gas *n*-butanol. This screening is applied to eliminate anosmia (low sensitivity) and super-noses (high sensitivity). The odour analysis has to be undertaken in a low odour environment such as an air-conditioned odour free laboratory. Analysis should be performed preferably within 8 to 12 hours of sampling.

2.1.3 Odour measurement in accordance with the EN13725:2003

An ECOMA TO8 dynamic yes/no olfactometer was used throughout the measurement period to determine the odour threshold concentration of the sample air. The odour threshold concentration is defined as the dilution factor at which 50% of the panel can just detect the

odour. Only those panel members who pass screening tests with n-butanol (certified reference gas, CAS 72-36-3) and who adhered to the code of behaviour were selected as panellists for olfactometry measurements (CEN, 2003). Odour measurement was carried out in an odour free laboratory in accordance with EN13725:2003. The analyses were carried out in the laboratory of Odour Monitoring Ireland in Trim Co. Meath.

2.1.4 What is an odour unit?

The odour concentration of a gaseous sample of odourant is determined by presenting a panel of selected screened human panellists with a sample of odourous air and varying the concentration by diluting with odourless gas, in order to determine the dilution factor at the 50% detection threshold. The Z_{50} value (threshold concentration) is expressed in odour units ($Ou_E\ m^{-3}$).

The European odour unit is that amount of odourant(s) that, when evaporated into one cubic metre of neutral gas (nitrogen), at standard conditions elicits a physiological response from a panel (detection threshold) equivalent to that elicited by one European Reference Odour Mass (EROM) evaporated in one cubic meter of neutral gas at standard conditions. One EROM is that mass of a substance (n-butanol) that will elicit the Z_{50} physiological response assessed by an odour panel in accordance with this standard. *n*-Butanol is one such reference standard and is equivalent to 123µg of n-butanol evaporated in one cubic meter of neutral gas at standard conditions (CEN, 2003).

2.2 Particulate matter monitoring

Major sources of particulates include industrial/residential combustion and processing, energy generation, vehicular emissions and construction projects. The particulate matter created by these processes is responsible for many adverse environmental conditions including reduced visibility, contamination and soiling, but also recognised as a contributory factor to many respiratory medical conditions such as asthma, bronchitis and lung cancer. PM_{10} (Particulate Matter 10) refers to particulate matter with an aerodynamically diameter of 10 µm. Generally, such particulate matter remains in the air due to low deposition rates. It is the main particulate matter of concern in Europe and has existing air quality limits. In order to obtain ambient air PM_{10} concentration levels for the Molaisin Composting Ltd site, a battery operated gravimetric Particulate sampler (Partisol) was used. One fixed monitoring location was used to perform gravimetric monitoring over the sampling period.

PM_{10} monitoring in Ireland is limited to continuous monitoring stations operated by the Local Authorities and the Irish EPA, mainly in large urban centres. The dominant source of PM_{10} in the area appears to be HGV emissions, boilers (i.e. Home heating and Industrial heating), traffic, wind blown dust and construction activities

2.3 Assessment criteria for PM_{10}

For PM_{10} the EU has introduced several measures to address the issue of air quality management. In 1996, Environmental Ministers agreed a Framework Directive on ambient air quality assessment and management (Council Directive 96/62/EC). As part of the measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, 1999/30/EC, has set limit values which replaced existing limit values under Directives 80/779/EEC, 82/884/EEC and 85/203/EEC in April 2001. The new directive, as relating to limit values for PM_{10}, is detailed in *Table 2.1.*

The National Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002) transpose those parts of the "Framework" Directive 92/30/EC on ambient air quality assessment and management not transposed by Environment Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The 2002 Regulations also transpose, in full, the 1st two "Daughter" Directives 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and

lead in ambient air and 2000/69/EC relating to limit values for benzene and carbon monoxide in ambient air.

Table 2.1. PM_{10} Irish and EU Ambient Air Standard SI 271 of 2002 and 1999/30/EC.

Particulate Matter Stage 1	1999/30/EC SI 271 of 2002	24-hour limit for protection of human health - not to be exceeded more than 35 times/year-24 hour average	50% until 2001 reducing linearly to 0% by 2005 for 1999/30/EC 30% from the date of entry into force of these Regulations, reducing on 1 January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by 1 January 2005 for SI 271 of 2002	50 $\mu g/m^3$ PM_{10}
		Annual limit for protection of human health-Annual	20% until 2001 reducing linearly to 0% by 2005 for 1999/30/EC 12% from the date of entry into force of these Regulations, reducing on 1 January 2003 and every 12 moths thereafter by equal annual percentages to reach 0% by 1 January 2005	40 $\mu g/m^3$ PM_{10}
Particulate Matter Stage 2	1999/30/EC SI 271 of 2002	24-hour limit for protection of human health - not to be exceeded more than 7 times/year-24 hour average	To be derived from data and to be equivalent to Stage 1 limit value for 1999/30/EC Not to be exceeded more than 28 times by 1 January 2006, 21 times by 1 January 2007, 14 times by 1 January 2008, 7 times by 1 January 2009 and zero times by 1 January 2010 for SI 271 of 2002	50 $\mu g/m^3$ PM_{10}
		Annual limit for protection of human health-Annual	50% until 2005 reducing linearly to 0% by 2010 for 1999/30/EC and SI 271 of 2002	20 $\mu g/m^3$ PM_{10}

3. Results

This section discusses and describes the results obtained during the study period.

This section will present the results from the monitoring assessment.

3.1 Odour results biofilter

Table 3.1 presents the results of the testing of the biofiltration system located in Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland. As can be observed, one odour sample was taken on the inlet of the system while duplicate sampling was performed on the exhaust of the biofiltration system.

Table 3.1. Odour threshold concentrations recorded at biofiltration system.

Sample identity	Average inlet odour conc. (Ou_E/m^3)	Exhaust odour conc (Ou_E/m^3)
S1200611	-	6,255
S2200611	-	6,255
S3200611	42,901	-
Average Odour conc (Ou_E/m^3)	**42,901**	**6,255**
Average Removal Eff (%)	**-**	**85**

As can be observed in *Table 3.1*, the overall inlet odour concentration is 42,901 Ou_E/m^3. The average exhaust odour threshold concentration was 6,255 Ou_E/m^3 recorded on the day of monitoring. The calculated odour removal efficiency on the day of monitoring was 85%.

3.2 Particulate matter air quality

Table 3.2 illustrates the results from PM_{10} air quality monitoring.

Table 3.2. Average ambient PM_{10} concentrations for one fixed monitoring location at the Molaisin Compost, Cappoquin, Co. Waterford, Ireland on the 20th June 2010

Monitoring locations	Sample number	Average concentration value ($\mu g/m^3$)
Location	084756	8

PM_{10} monitoring in Ireland is limited to continuous monitoring stations operated by the Local Authorities and the Irish EPA, mainly in large urban centres. The dominant source of PM_{10} in this area would appear to be HGV emissions, boilers (i.e. Home heating and Industrial heating), traffic, wind blown dust, composting and construction activities. The average ambient PM_{10} concentrations are in the range of those monitored in other rural locations. The results presented herein demonstrate that PM_{10} air quality is good at the monitoring location (i.e. Air Quality Index rating, www.epa.ie).

4. Conclusions

The following conclusions were drawn from the study:

- Odour sampling and analysis was carried out in accordance with Schedule C of Waste licence W0245-01,
- The overall inlet odour concentration is 42,901 Ou_E/m^3,
- The average exhaust odour threshold concentration was 6,255 Ou_E/m^3,
- The calculated odour removal efficiency on the day of monitoring was 85%.
- Ambient air concentration levels of PM_{10} were below the statutory 24-hour average ambient air concentration level of 50 $\mu g\ m^{-3}$.

5. References

1. Sheridan, B.A., Curran., T.P. and Dodd., V. (2002). Biofiltration of n butyric acid for the control of odour. Bioresource Technology, 89:22, pg 199-205, Elsevier Science, 2003.

ODOUR monitoring IRELAND

ODOUR & ENVIRONMENTAL ENGINEERING CONSULTANTS

Unit 32 De Granville Court, Dublin Rd, Trim, Co. Meath

Tel: +353 46 9437922
Mobile: +353 86 8550401
E-mail: info@odourireland.com
www.odourireland.com

QTR.4 2011 - ENVIRONMENTAL MONIORING AT MOLAISIN COMPOSTING LTD., CAPPOQUIN, CO. WATERFORD, IRELAND

PREPARED BY:	Dr. John Casey
ATTENTION:	Mr. Fiona O Sullivan
LICENCE NUMBER:	WL245-01
LICENCE HOLDER:	Molaisin Compost Limited
FACILITY NAME:	Molaisin Compost Limited
DATE OF MONITORING VISIT:	24th November 2011
NAME AND ADDRESS OF CLIENT ORGANISATION:	Kilmolash, Cappoquin, Co. Waterford
NAME AND ADDRESS OF MONITORING ORGANISATION:	Odour Monitoring Ireland, Unit 32 DeGranville Court, Dublin Road, Trim, Co. Meath
DATE OF REPORTING:	02nd Mar. 2012
NAME AND THE FUNCTION OF THE PERSON APPROVING THE REPORT:	Dr. Brian Sheridan, Managing Partner, Odour Monitoring Ireland
REPORT NUMBER:	2012120(1)
REVIEWERS:	Dr. Brian Sheridan

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DOCUMENT AMENDMENT RECORD

Client: ***McGill Environmental Ltd.***

Title: Qtr.4 2011 - Environmental monitoring at Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland

Project Number: 2012120(1)			**Document Reference:** Qtr.4 2011 - Environmental monitoring at Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland		
2012120(1)	Document for review	B.A.S.	JMC	B.A.S	02/03/2012
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

1. Introduction

Odour Monitoring Ireland was commissioned by McGill Environmental Ltd to perform monitoring of the of a bio filtration system in accordance with Schedule C of Waste licence W0245-01. The biofiltration system is located at Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland.

The biofilter is an open bed biofilter consisting of a mixed medium made up of compost, woodchip, lime, etc. The media within the biofilter bed acts as a carrier material for the mixed microbial consortium that adsorbs and degrades the influent odourous gases.

In accordance with EPA requirements contained in Waste licence 245-01, the biofilter was assessed for the following parameters:

- Odour sampling and analysis of the inlet and outlet gases,

All sampling was performed on the 24th November 2011.

2. Materials and methods

This section describes the materials and methods used throughout the study period.

2.1 Odour sampling and analysis

2.1.1 Odour sampling

In order to obtain air samples for odour 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 / 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. All odour-sampling bags were pre-conditioned and flushed with odourous air to remove any interference from the sample material. The device was leak tested before the commencement of sampling.

Since the exhaust of the biofiltration systems are open beds, a hood technique was used to allow for capture of the odourous air stream to facilitate sampling. The hood was constructed from 304L SS and has a surface area of 1 m^2 which is coned down to a circular duct of 0.075 m diameter. This also facilitates the measurement of total volumetric airflow rate per m^2 of biofilter surface. The inlet of the biofiltration system was samples as a point source over a time period of 25 to 30 minutes.

In terms of the sampling regime, a total of between 2 individual sample locations were chosen randomly for each odour sample bag. The hood fixed to the surface of the biofilter bed and the presence of positively displaced air was verified through the use of a 73mm vane anemometer. A total of 3 to 4 minutes was allowed between sample acquisition to ensure in excess of 12 AC/hr within the hood before sampling commenced.

2.1.2 Olfactometry

Olfactometry using the human sense of smell is the most valid means of measuring odour (Dravniek et al, 1986) and at present is the most commonly used method to measure the concentration of odour in air (Hobbs et al, 1996). Olfactometry is carried out using an instrument called an olfactometer. Three different types of dynamic dilution olfactometers exist:

- Yes/No Olfactometer
- Forced Choice Olfactometer
- Triangular Forced Choice Olfactometer.

In the dynamic dilution olfactometer, the odour is first diluted and is then presented to a panel of screened panellists of no less than four (CEN, 2003) Panellists are previously screened to ensure that they have a normal sense of smell (Casey et al., 2003). According to the CEN standard this screening must be performed using a certified reference gas *n*-butanol. This screening is applied to eliminate anosmia (low sensitivity) and super-noses (high sensitivity). The odour analysis has to be undertaken in a low odour environment such as an air-conditioned odour free laboratory. Analysis should be performed preferably within 8 to 12 hours of sampling.

2.1.3 Odour measurement in accordance with the EN13725:2003

An ECOMA TO8 dynamic yes/no olfactometer was used throughout the measurement period to determine the odour threshold concentration of the sample air. The odour threshold

concentration is defined as the dilution factor at which 50% of the panel can just detect the odour. Only those panel members who pass screening tests with n-butanol (certified reference gas, CAS 72-36-3) and who adhered to the code of behaviour were selected as panellists for olfactometry measurements (CEN, 2003). Odour measurement was carried out in an odour free laboratory in accordance with EN13725:2003. The analyses were carried out in the laboratory of Odour Monitoring Ireland in Trim Co. Meath.

2.1.4 What is an odour unit?

The odour concentration of a gaseous sample of odourant is determined by presenting a panel of selected screened human panellists with a sample of odourous air and varying the concentration by diluting with odourless gas, in order to determine the dilution factor at the 50% detection threshold. The Z_{50} value (threshold concentration) is expressed in odour units ($Ou_E\ m^{-3}$).

The European odour unit is that amount of odourant(s) that, when evaporated into one cubic metre of neutral gas (nitrogen), at standard conditions elicits a physiological response from a panel (detection threshold) equivalent to that elicited by one European Reference Odour Mass (EROM) evaporated in one cubic meter of neutral gas at standard conditions. One EROM is that mass of a substance (n-butanol) that will elicit the Z_{50} physiological response assessed by an odour panel in accordance with this standard. *n*-Butanol is one such reference standard and is equivalent to 123µg of n-butanol evaporated in one cubic meter of neutral gas at standard conditions (CEN, 2003).

3. Results

This section discusses and describes the results obtained during the study period.

This section will present the results from the monitoring assessment.

3.1 Odour results biofilter

Table 3.1 presents the results of the testing of the biofiltration system located in Molaisin Composting Ltd., Cappoquin, Co. Waterford, Ireland. As can be observed, one odour sample was taken on the inlet of the system while duplicate sampling was performed on the exhaust of the biofiltration system.

Table 3.1. Odour threshold concentrations recorded at biofiltration system.

Sample identity	Average inlet odour conc. (Ou_E/m^3)	Exhaust odour conc (Ou_E/m^3)
S1241111	-	2,896
S2241111	-	2,482
S3241111	31,526	-
Average Odour conc. (Ou_E/m^3)	**31,526**	**2,689**
Average Removal Eff. (%)	**-**	**91**

As can be observed in *Table 3.1*, the overall inlet odour concentration is 31,526 Ou_E/m^3. The average exhaust odour threshold concentration was 2,689 Ou_E/m^3 recorded on the day of monitoring. The calculated odour removal efficiency on the day of monitoring was 91%.

4. Conclusions

The following conclusions were drawn from the study:

- Odour sampling and analysis was carried out in accordance with Schedule C of Waste licence W0245-01,
- The overall inlet odour concentration is 31,526 Ou_E/m^3,
- The average exhaust odour threshold concentration was 2,689 Ou_E/m^3,
- The calculated odour removal efficiency on the day of monitoring was 91%.

5. References

1. Sheridan, B.A., Curran., T.P. and Dodd., V. (2002). Biofiltration of n butyric acid for the control of odour. Bioresource Technology, 89:22, pg 199-205, Elsevier Science, 2003.

Molaisin Compost Ltd.

Kilmolash, Cappoquin, Co. Waterford

Environmental Noise Survey

Report Date:
2nd November 2011

KD Environmental

17 Eastham Court, Bettystown, Co. Meath

Report No 2011/44/01

1.0 Introduction

KD Environmental were commissioned by Fiona O'Sullivan of McGill Environmental Ltd. to carry out a day and night time noise survey at four pre-determined noise monitoring locations at their compost facility – Molaisin Compost Ltd., to comply with Waste license W0245-01. The day and night time noise survey was carried out on 26th October 2011 by David Kelly of KD Environmental.

Molaisin Compost Ltd is situated in a rural location approximately 8km outside the town of Cappoquin, Co. Waterford. The exact site location is N 52°05.977', W 007°48.233'.

Schedule B.3 of EPA Waste license W0245-01 states that that activities on site shall not give rise to noise levels at noise sensitive locations that exceed sound pressure limits (Leq30mins) of 55 db(A) for daytime hours and 45 dB(A) for night time hours.
Condition 5.3 of EPA Waste license W0245-01 states that there shall be no clearly audible tonal or impulsive noise components from activities on site.

The EPA have recently agreed that for the purposes of noise monitoring, day time hours shall be between 8am and 6pm. Night time hours shall be between 6pm and 8am.

2.0 Duration and Measurements of Survey

The day time noise survey was carried out between 12:39 and 16:55 on 26th October 2011. The night time noise survey was carried out between 18:15 and 22:34 on 26th October 2011. The following measurements were carried out at each noise location:

- Daytime Broadband measurements $L(A)_{eq}$, $L(A)_{10}$ and $L(A)_{90}$ over a 30 minute period.
- Night time Broadband measurements $L(A)_{eq}$, $L(A)_{10}$ and $L(A)_{90}$ over a 30 minute period.
- 1:3 Octave band measurements for day time and night time noise.

3.0 Weather Conditions

Weather conditions were cold, dry and clear. There was little or no breeze with estimated wind speeds of < 5 m/sec. Temperatures during the day were approx. 10 °C during daytime readings and 7 °C during night time readings.
Weather conditions were considered to be neutral for noise monitoring.

4.0 Location of Monitoring Points

A map illustrating the 4 noise monitoring locations is included As Appendix 1 of this report. It should be noted that the site is situated in a rural location with no immediate neighbouring dwellings. The nearest Noise Sensitive Location (NSL) is a private dwelling approx. 400m from the facility.

N1
This monitoring point is located at the rear of the site. There is a private dwelling situated approx. 400m from of this location.

N2
This monitoring point is located at the left hand rear corner of the site. N2 is approx 50m from the main composting facility.

N3
N3 is located beside the on site offices at the facility, as the access road meets the main site area.

N4
N4 is located at the main entrance to the site, adjacent to a local road. It is approx. 250m from the main facility which is accessed along a gravel drive from the main gate.

5.0 Methodology

The noise survey was carried out in accordance with ISO 1996/1/2/3 – Acoustics – Description and Measurement of Environmental Noise and The Environmental Noise Survey Guidance Document issued by the EPA.

Reference was also made to the guidance note issued by the Environmental Protection Agency for the assessment of noise from licensed facilities.

Broadband measurements were analysed for 30-minute intervals. The measurement range was set at 30-100 dB during daytime and at either 30 -100 dB or 20 - 90 dB during night time readings.

1:3 octave measurements were also made during daytime and night time hours to monitor for tonal or impulsive noise.

6.0 Equipment

The meter used was a Cirrus 831C serial No. 176101 integrating sound pressure meter, with selective 1:1 or 1:3 octave band measurements. Calibrator was a Cirrus 53298, serial No. 176102.

The meter was fixed to a tripod 1.3 meters above ground level and the microphone was protected using a windshield.

7.0 Calibration

Calibration was carried out on site using an acoustic calibrator at 94dBA. The meter was calibrated before and after the day and night monitoring round with all calibration readings acceptable.
The calibrator and meter were calibrated externally by Cirrus on 30/04/2011.

8.0 Sound Level Results

Monitoring Point	Date/ Time	Sampling Interval minutes	L(A)eq	$L(A)_{10}$	$L(A)_{90}$	Audible Noise Sources
N1	26/10/2011					
	13:44	30	44.8	62.4	44.2	Daytime on site audible noise was noted from mobile plant operating at approx. 60m with the warning beeper just audible.
	19:23	30	43.9	44.6	43.6	The only audible noise during night time readings was a low hum could be heard at this point from the extraction fans 10m away.
N2	26/10/2011					
	12:41	30	45.6	47.8	39.2	Daytime on site audible noise was noted from mobile plant operating within the facility at approx. 60m with the warning beeper just audible and a waste skip arriving on a lorry at the weighbridge at approx 50m.
	18:36	30	36.5	38.6	34.2	There was no audible noise during night time reading.
N3	26/10/2011					
	14:46	30	53.1	70.6	39.8	Day time noise sources mobile plant operating at approx. 60m with the warning beeper just audible. A lorry transporting 2 containers of waste arrived at the site and was unloaded in the waste reception area.
	20:28	30	34.7	33.7	29.0	There was no audible noise during night time reading.
N4	26/10/2011					
	15:54	30	50.2	50.2	38.5	There was no audible day time noise from the facility. All audible noise was from off site sources such as traffic on the adjacent road to the site entrance at approx. 5m from the monitoring location.
	21:33	30	44.9	43.4	26.8	There was no audible noise during night time readings with traffic on the adjacent road the only noted noise.

9.0 Tonal or Impulsive Noise

Monitoring Point	Time	Tonal or Impulsive Noise from Site Activity	Comments
N1 26/10/2011	Day 14:14 Night 19:55	No No	No significant tonal or impulsive noise from site activity. Slight tonal or impulsive noise at 400Hz due to birdsong. No tonal or impulsive noise from site activity.
N2 26/10/2011	Day 13:12 Night 18:47	No No	No tonal or impulsive noise from site activity. No tonal or impulsive noise from site activity.
N3 26/10/2011	Day 15:17 Night 20:58	Yes No	No significant tonal or impulsive noise from site activity. Slight tonal or impulsive noise at 40Hz and 4kHz due to lorry with waste containers moving on site. No tonal or impulsive noise from site activity.
N4 26/10/2011	Day 16:24 Night 22:04	No No	No tonal and impulsive noise from on site activities. Off site road traffic caused some low level tonal and impulsive noise.

10.0 Interferences

Noise levels at location N4 are prone to road and farm traffic on the local road that runs adjacent to the site entrance. Birdsong is also a source of interference noise during daytime readings at all locations.
The site is located in the floor of an excavated green field site with rock wall enclosing the facility on 3 sides. Therefore perimeter walls may trap wind in some areas of the site. Sporadic changes in wind speed may cause some noise interference or cause temporary overload of the meter circuitry. This may be shown in 1:3 Octave readings. However, noise levels recorded were not significantly affected by wind.

11.0 Conclusions

Daytime noise levels were within the permitted day time noise level of 55 dB(A) at all four noise measurement locations – N1, N2, N3 and N4.

Night time noise levels were within the permitted night time noise level of 45 dB(A) at all four noise measurement locations – N1, N2, N3 and N4.

There was no significant tonal or impulsive noise from site activities during daytime and night noise monitoring.

In conclusion, activities at the Molaisin compost facility did not result in a breach of permitted noise levels during daytime or night time hours.

David Kelly
Technical Manager

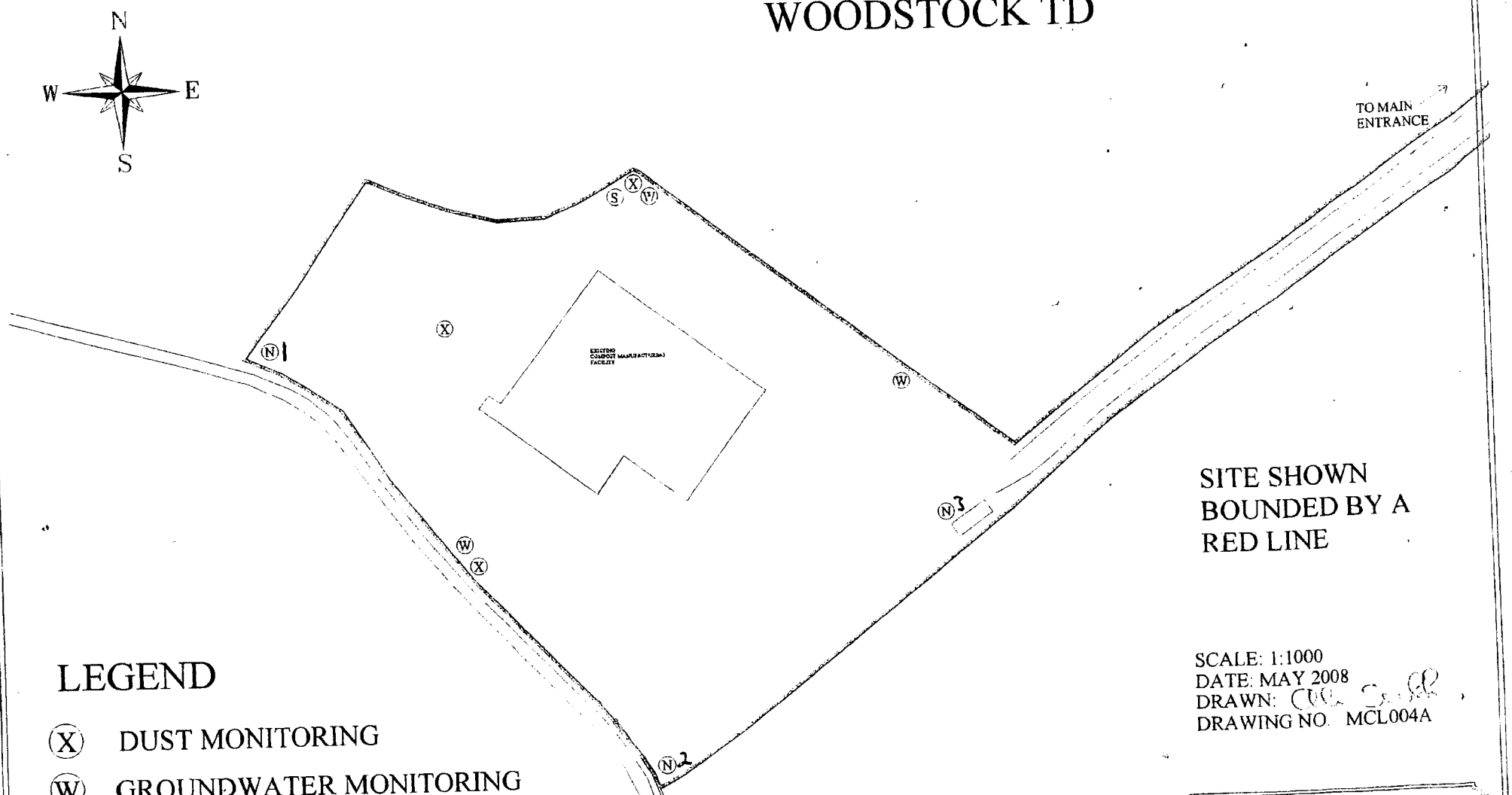
Marie Dolan
Operations Manager

2nd November 2011

Appendix 1

Maps of Noise Monitoring Locations

WOODSTOCK TD



SITE SHOWN BOUNDED BY A RED LINE

LEGEND

- (X) DUST MONITORING
- (W) GROUNDWATER MONITORING
- (S) SURFACE WATER MONITORING
- (N) NOISE MONITORING LOCATIONS

SCALE: 1:1000
DATE: MAY 2008
DRAWN:
DRAWING NO. MCL004A

TITLE: MONITORING MAP

ALAN SCUFFINS

Appendix 2

Noise Monitoring Readings

Measurement Report

Measurement Details

Date and Time:	26/10/2011 12:39
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012

Location:	Molaisin Compost

Notes:

Daytime Initial Calibration

Calibrated to:	93.7 dB dB
Calibration Offset:	-0.1 dB dB

Measurement Report

Measurement Details

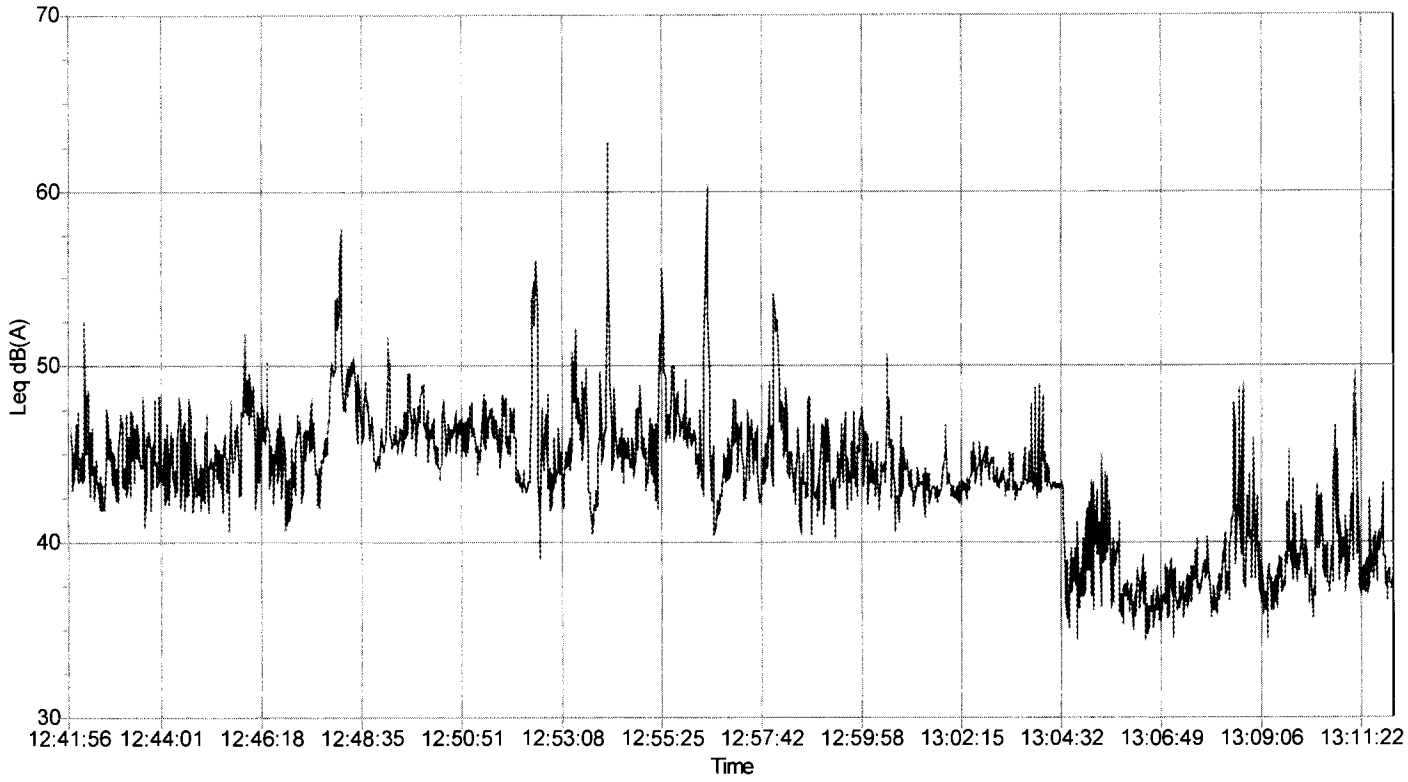
Date and Time:	26/10/2011 12:41
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:30:03 hh:mm:ss
Range:	30-100 dB
Overload:	no
Location:	Molaisin Compost N2

Notes:

Daytime Broadband

Data

Leq	45.6 dBA	L1.0	53.7 dBA
Lepd	33.5 dBA	L5.0	49.2 dBA
LAE	77.9 dBA	L10.0	47.8 dBA
LAFmax	64.3 dBA	L50.0	44.2 dBA
Peak	93.1 dBC	L90.0	39.2 dBA
		Lmin	36.2 dBA



Measurement Report

Measurement Details

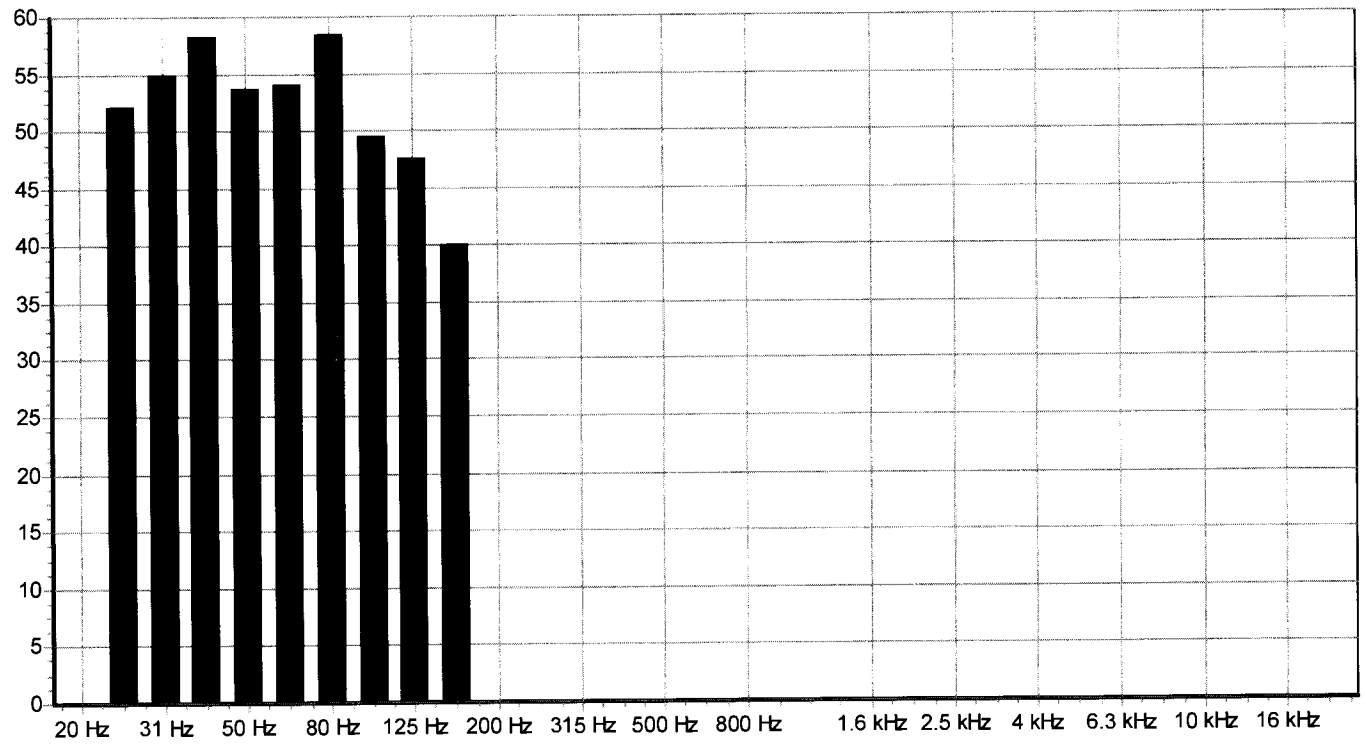
Date and Time:	26/10/2011 13:12
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:22 hh:mm:ss
Range:	30-100 dB
Location:	Molaisin Compost N2
Notes:	

Daytime 1:3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	0.0 dB	55		3.15 kHz	0.0 dB	55	
25 Hz	52.1 dB	55		315 Hz	0.0 dB	55		4 kHz	0.0 dB	55	
31 Hz	54.9 dB	55		400 Hz	0.0 dB	55		5 kHz	0.0 dB	55	
40 Hz	58.3 dB	55		500 Hz	0.0 dB	55		6.3 kHz	0.0 dB	55	
50 Hz	53.8 dB	55		630 Hz	0.0 dB	55		8 kHz	0.0 dB	55	
63 Hz	54.0 dB	55		800 Hz	0.0 dB	55		10 kHz	0.0 dB	55	
80 Hz	58.4 dB	55		1 kHz	0.0 dB	55		12.5 kHz	0.0 dB	56	
100 Hz	49.6 dB	55		1.25 kHz	0.0 dB	55		16 kHz	0.0 dB	55	
125 Hz	47.6 dB	55		1.6 kHz	0.0 dB	55		20 kHz	dB		
160 Hz	40.1 dB	55		2 kHz	0.0 dB	55					
200 Hz	0.0 dB	55		2.5 kHz	0.0 dB	56					

Band	Leq,t	Time s	Overload
LAeq	39.3 dBA	55	
LCeq	64.6 dBC	55	
LZeq	68.3 dBZ	55	



Measurement Report

Measurement Details

Date and Time:	26/10/2011 13:44
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:30:01 hh:mm:ss
Range:	30-100 dB
Overload:	no
Location:	Molaisin Compost N1

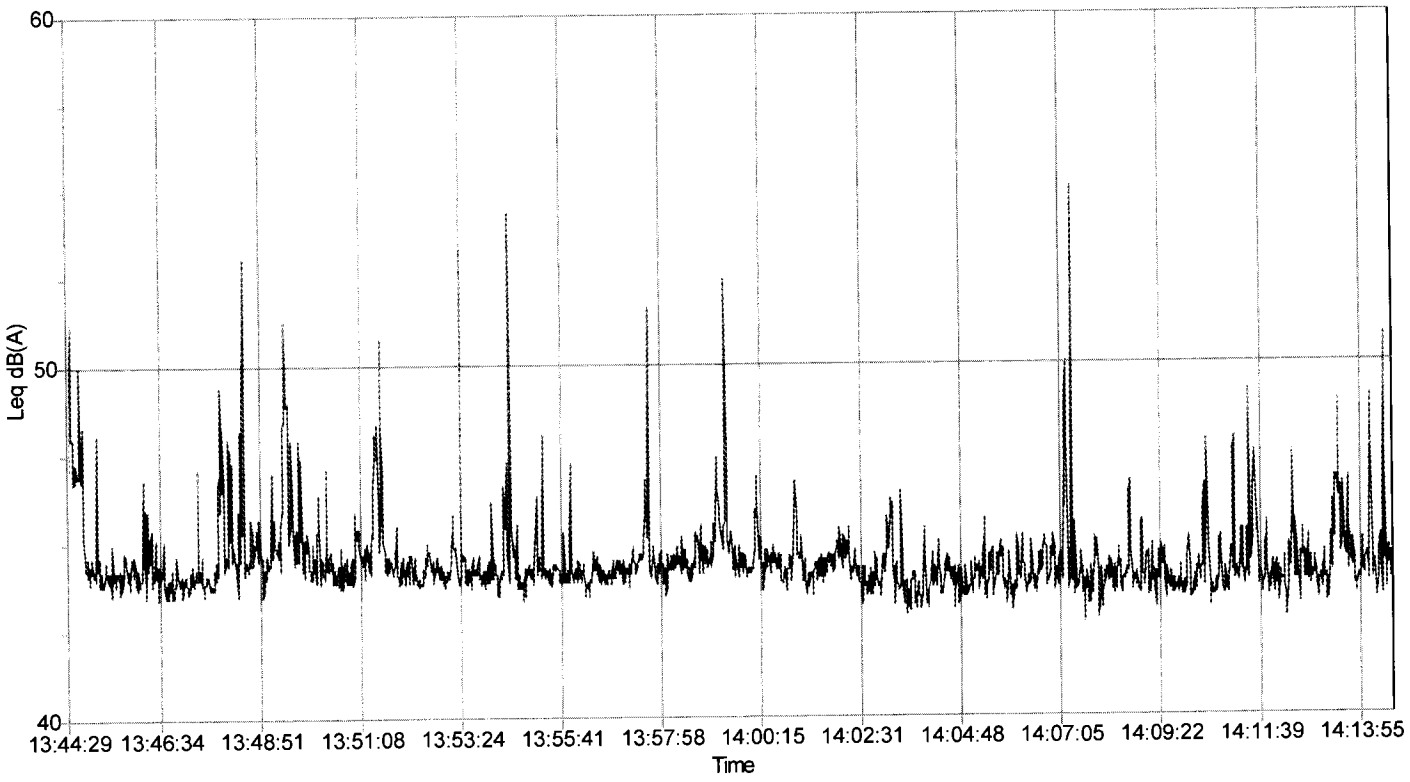
Notes:

Daytime Broadband

Data

Leq	44.8 dBA
Lepd	32.7 dBA
LAE	77.1 dBA
LAFmax	62.4 dBA
Peak	90.1 dBC

L1.0	62.4 dBA
L5.0	62.4 dBA
L10.0	62.4 dBA
L50.0	47.2 dBA
L90.0	44.2 dBA
Lmin	42.7 dBA



Measurement Report

Measurement Details

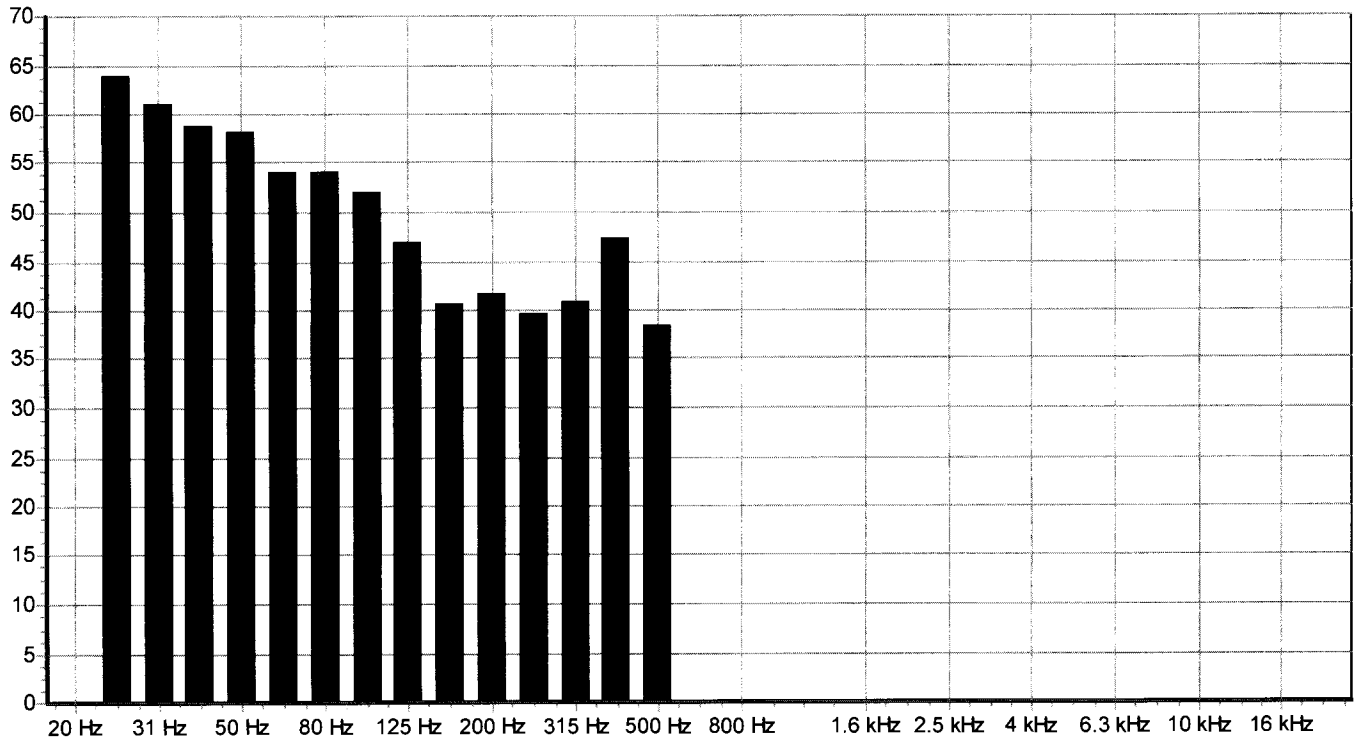
Date and Time:	26/10/2011 14:14
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:24 hh:mm:ss
Range:	30-100 dB
Location:	Molaisin Compost N1
Notes:	

Daytime 1:3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	39.6 dB	55		3.15 kHz	0.0 dB	55	
25 Hz	64.0 dB	55		315 Hz	40.8 dB	55		4 kHz	0.0 dB	55	
31 Hz	61.0 dB	55		400 Hz	47.3 dB	55		5 kHz	0.0 dB	56	
40 Hz	58.8 dB	55		500 Hz	38.3 dB	55		6.3 kHz	0.0 dB	56	
50 Hz	58.1 dB	55		630 Hz	0.0 dB	55		8 kHz	0.0 dB	56	
63 Hz	54.1 dB	55		800 Hz	0.0 dB	55		10 kHz	0.0 dB	55	
80 Hz	54.2 dB	55		1 kHz	0.0 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	52.1 dB	55		1.25 kHz	0.0 dB	55		16 kHz	0.0 dB	55	
125 Hz	46.9 dB	55		1.6 kHz	0.0 dB	55		20 kHz	dB		
160 Hz	40.6 dB	56		2 kHz	0.0 dB	55					
200 Hz	41.6 dB	55		2.5 kHz	0.0 dB	55					

Band	Leq,t	Time s	Overload
LAeq	43.9 dBA	55	
LCeq	66.8 dBC	55	
LZeq	72.2 dBZ	55	



Measurement Report

Measurement Details

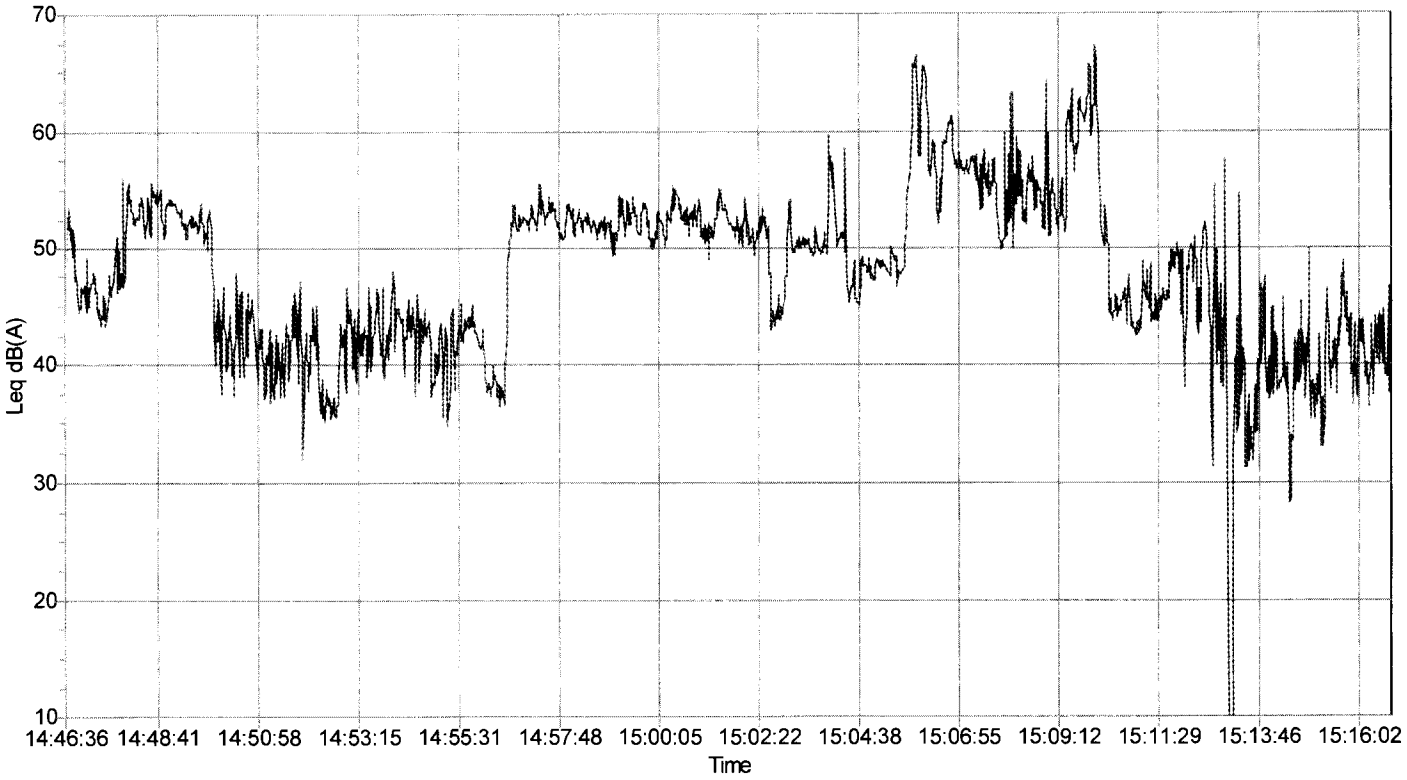
Date and Time:	26/10/2011 14:46
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:59 hh:mm:ss
Range:	30-100 dB
Overload:	no
Location:	Molaisin Compost N3

Notes:

Daytime Broadband

Data

Leq	53.1 dBA	L1.0	70.6 dBA
Lepd	41.0 dBA	L5.0	70.6 dBA
LAE	85.4 dBA	L10.0	70.6 dBA
LAFmax	70.6 dBA	L50.0	51.2 dBA
Peak	99.1 dBC	L90.0	39.8 dBA
		Lmin	34.4 dBA



Measurement Report

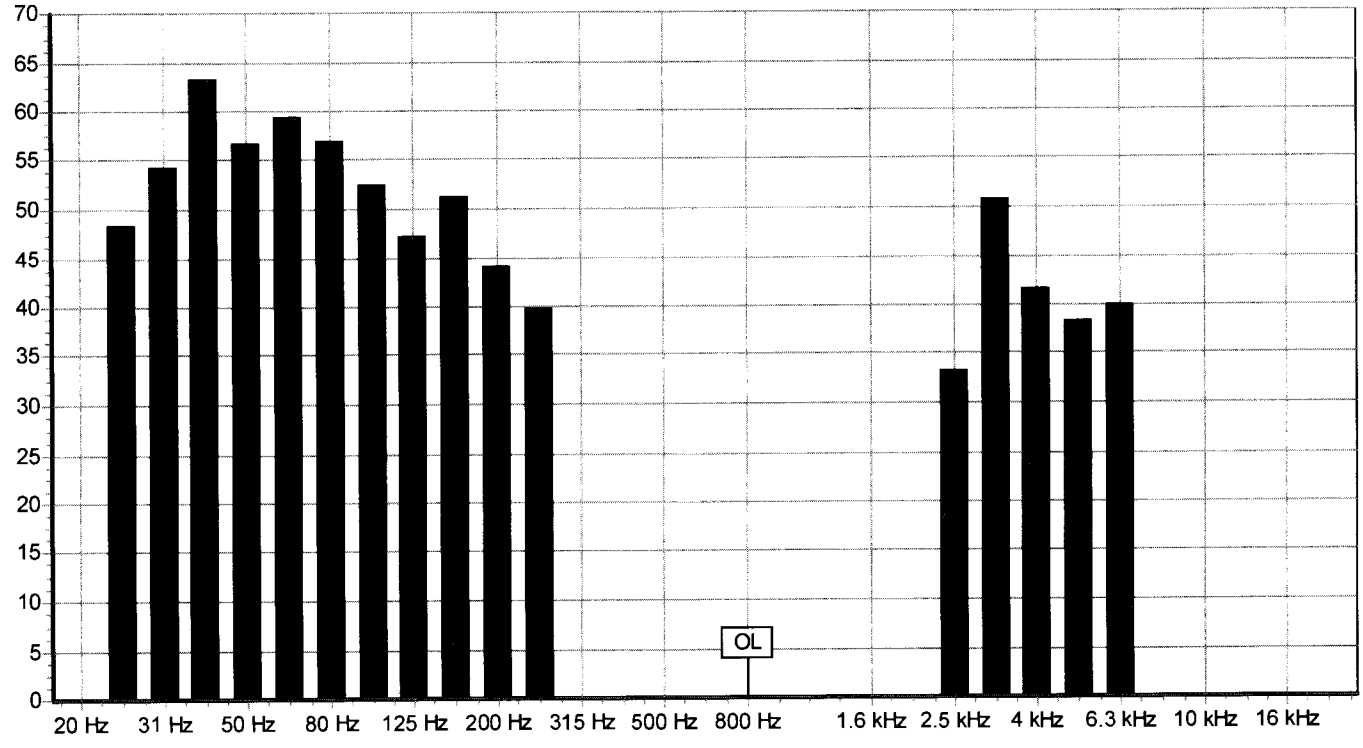
Measurement Details

Date and Time:	26/10/2011 15:17
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:20 hh:mm:ss
Range:	30-100 dB
Location:	Molaisin Compost N3
Notes:	
Daytime 1:3 Octave	

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	39.7 dB	55		3.15 kHz	50.9 dB	55	
25 Hz	48.4 dB	55		315 Hz	0.0 dB	55		4 kHz	41.6 dB	55	
31 Hz	54.3 dB	55		400 Hz	0.0 dB	55		5 kHz	38.4 dB	55	
40 Hz	63.2 dB	55		500 Hz	0.0 dB	55		6.3 kHz	40.0 dB	55	
50 Hz	56.8 dB	55		630 Hz	0.0 dB	55		8 kHz	0.0 dB	55	
63 Hz	59.5 dB	55		800 Hz	0.0 dB	55	yes	10 kHz	0.0 dB	55	
80 Hz	56.9 dB	55		1 kHz	0.0 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	52.4 dB	55		1.25 kHz	0.0 dB	55		16 kHz	0.0 dB	55	
125 Hz	47.2 dB	55		1.6 kHz	0.0 dB	55		20 kHz	dB		
160 Hz	51.2 dB	55		2 kHz	0.0 dB	55					
200 Hz	44.2 dB	55		2.5 kHz	33.2 dB	55					

Band	Leq,t	Time s	Overload
LAeq	55.7 dBA	55	
LCeq	65.5 dBC	55	
LZeq	67.9 dBZ	55	



Measurement Report

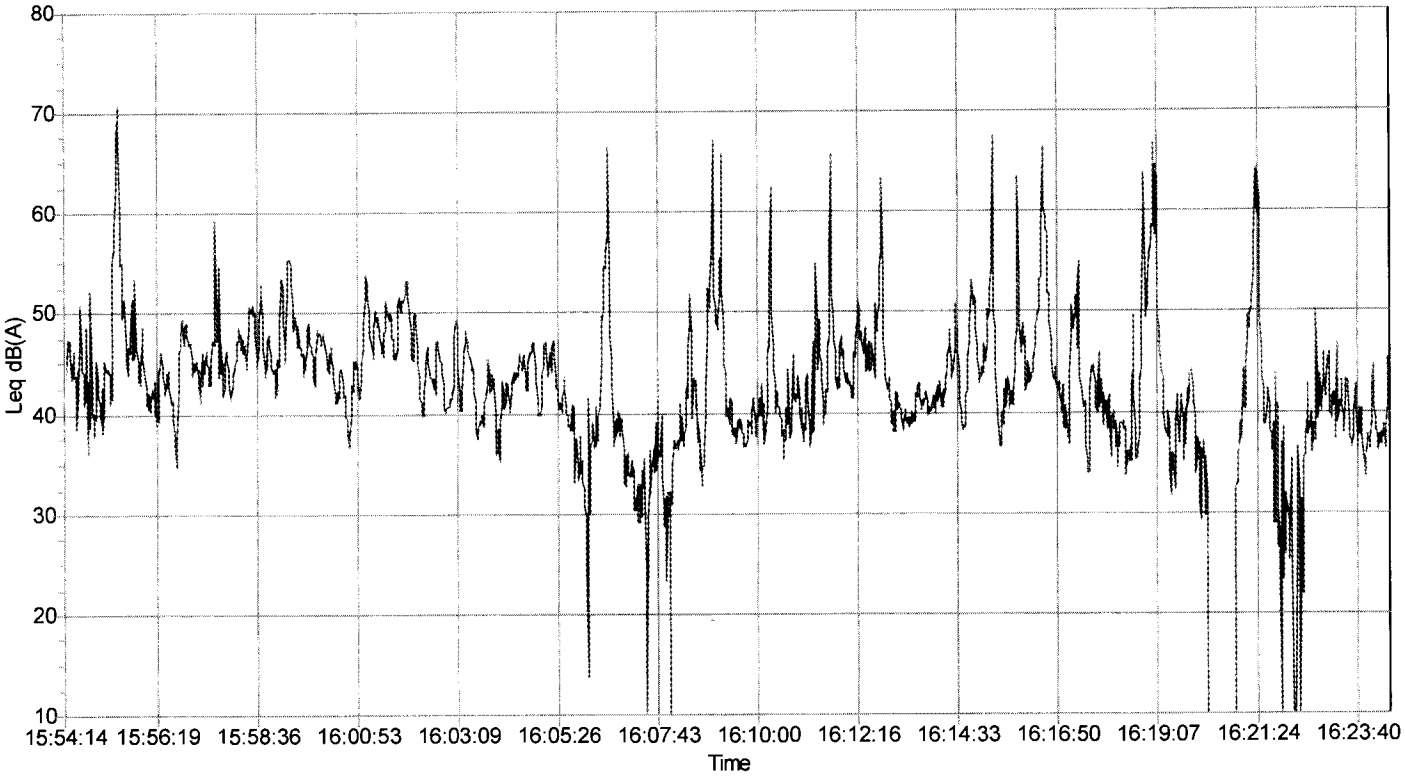
Measurement Details

Date and Time:	26/10/2011 15:54
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:30:03 hh:mm:ss
Range:	30-100 dB
Overload:	no
Location:	Molaisin Compost N4
Notes:	

Daytime Broadband

Data

Leq	50.2 dBA	L1.0	62.3 dBA
Lepd	38.1 dBA	L5.0	53.1 dBA
LAE	82.5 dBA	L10.0	50.2 dBA
LAFmax	72.6 dBA	L50.0	43.3 dBA
Peak	91.3 dBC	L90.0	38.5 dBA
		Lmin	31.1 dBA



Measurement Report

Measurement Details

Date and Time:	26/10/2011 16:24
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:22 hh:mm:ss
Range:	30-100 dB
Location:	Molaisin Compost N4

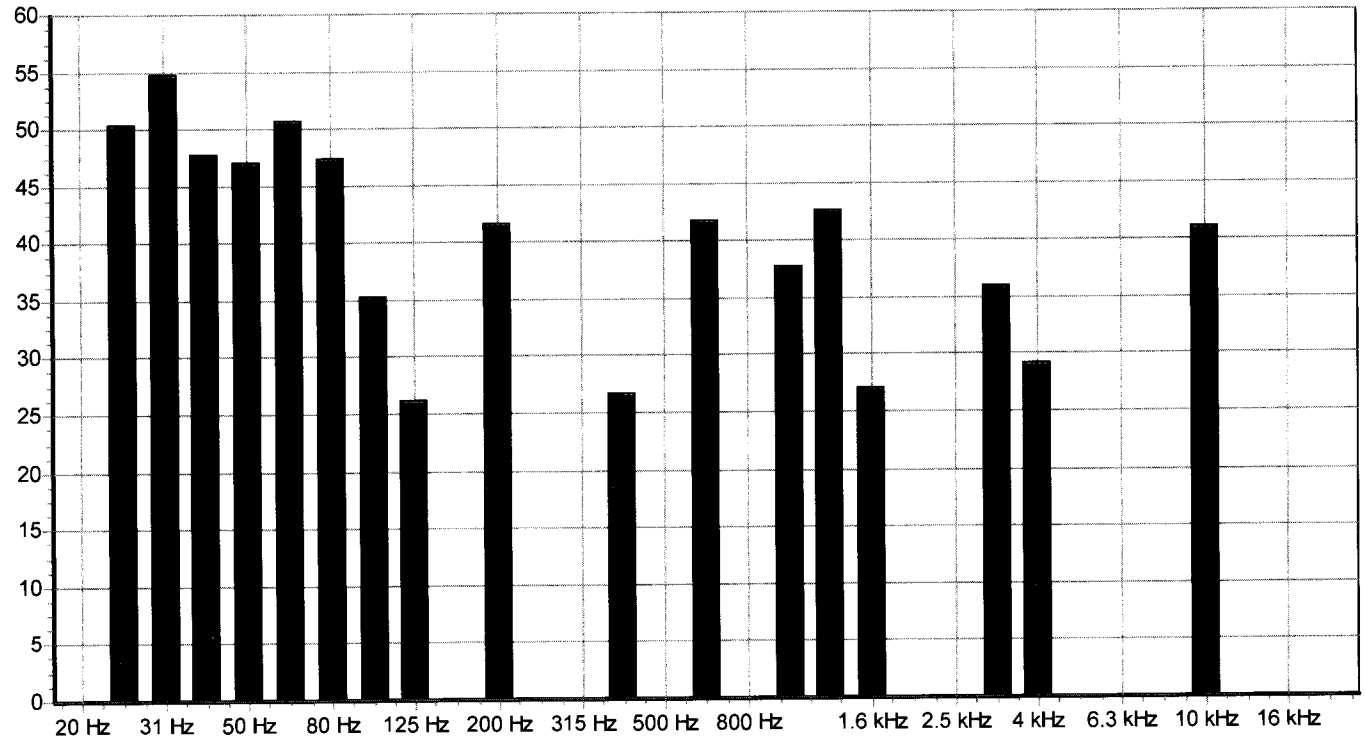
Notes:

Daytime 1:3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	0.0 dB	55		3.15 kHz	36.0 dB	55	
25 Hz	50.3 dB	55		315 Hz	0.0 dB	55		4 kHz	29.3 dB	55	
31 Hz	54.8 dB	55		400 Hz	26.8 dB	55		5 kHz	0.0 dB	55	
40 Hz	47.7 dB	55		500 Hz	0.0 dB	55		6.3 kHz	0.0 dB	55	
50 Hz	47.1 dB	55		630 Hz	41.8 dB	55		8 kHz	0.0 dB	55	
63 Hz	50.7 dB	55		800 Hz	0.0 dB	55		10 kHz	41.0 dB	55	
80 Hz	47.3 dB	56		1 kHz	37.8 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	35.4 dB	55		1.25 kHz	42.7 dB	55		16 kHz	0.0 dB	55	
125 Hz	26.2 dB	55		1.6 kHz	27.1 dB	55		20 kHz	dB		
160 Hz	0.0 dB	55		2 kHz	0.0 dB	55					
200 Hz	41.6 dB	55		2.5 kHz	0.0 dB	56					

Band	Leq,t	Time s	Overload
LAeq	57.8 dBA	55	
LCeq	63.0 dBC	55	
LZeq	69.5 dBZ	55	



Measurement Report

Measurement Details

Date and Time:	26/10/2011 16:55
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012

Location:	Molaisin Compost

Notes:

Daytime Final Calibration

Calibrated to:	93.7 dB dB
Calibration Offset:	0.3 dB dB

Measurement Report

Measurement Details

Date and Time:	26/10/2011 18:15
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012

Location:	Molaisin Compost

Notes:

Night time Initial Calibration

Calibrated to:	93.7 dB dB
Calibration Offset:	0.5 dB dB

Measurement Report

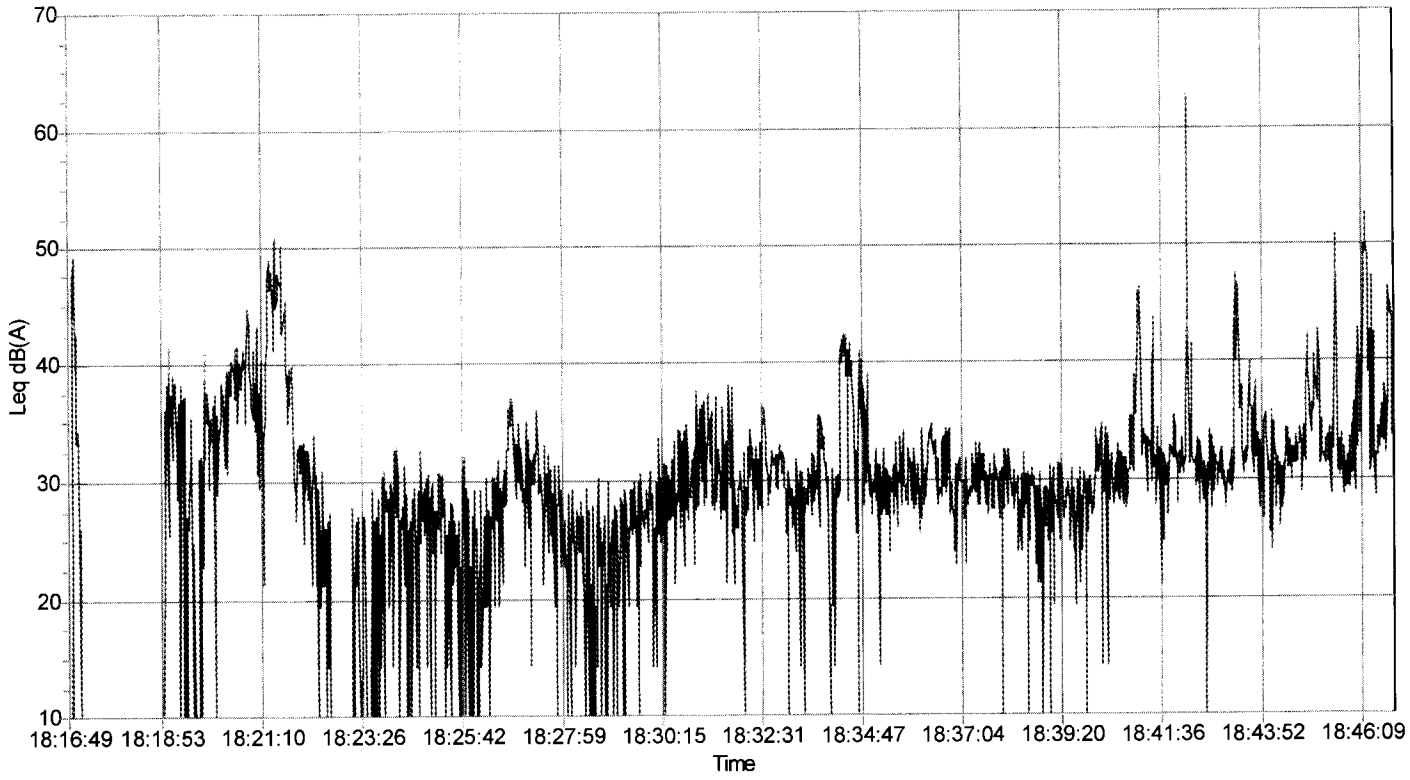
Measurement Details

Date and Time:	26/10/2011 18:16
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:30:00 hh:mm:ss
Range:	30-100 dB
Overload:	no
Location:	Molaisin Compost N2
Notes:	

Night time Broadband

Data

Leq	36.5 dBA	L1.0	47.4 dBA
Lepd	24.5 dBA	L5.0	41.6 dBA
LAE	68.9 dBA	L10.0	38.6 dBA
LAFmax	71.4 dBA	L50.0	35.6 dBA
Peak	96.1 dBC	L90.0	34.2 dBA
		Lmin	32.1 dBA



Measurement Report

Measurement Details

Date and Time:	26/10/2011 18:47
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:21 hh:mm:ss
Range:	30-100 dB
Location:	Molaisin Compost N2

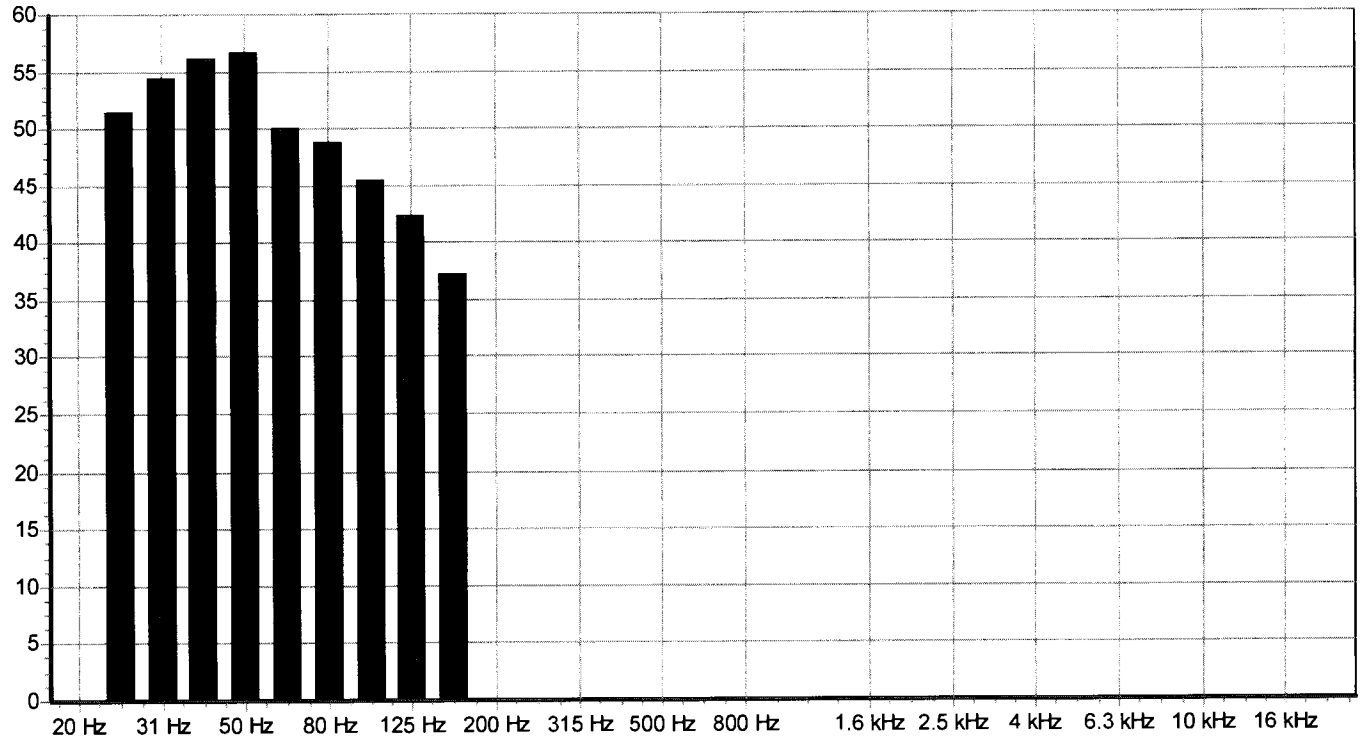
Notes:

Night time 1:3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	0.0 dB	55		3.15 kHz	0.0 dB	55	
25 Hz	51.5 dB	55		315 Hz	0.0 dB	55		4 kHz	0.0 dB	55	
31 Hz	54.4 dB	56		400 Hz	0.0 dB	55		5 kHz	0.0 dB	55	
40 Hz	56.2 dB	55		500 Hz	0.0 dB	55		6.3 kHz	0.0 dB	55	
50 Hz	56.7 dB	55		630 Hz	0.0 dB	55		8 kHz	0.0 dB	55	
63 Hz	50.1 dB	55		800 Hz	0.0 dB	55		10 kHz	0.0 dB	55	
80 Hz	48.9 dB	55		1 kHz	0.0 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	45.5 dB	55		1.25 kHz	0.0 dB	55		16 kHz	0.0 dB	55	
125 Hz	42.4 dB	55		1.6 kHz	0.0 dB	55		20 kHz	dB		
160 Hz	37.3 dB	55		2 kHz	0.0 dB	55					
200 Hz	0.0 dB	55		2.5 kHz	0.0 dB	55					

Band	Leq,t	Time s	Overload
LAeq	30.8 dBA	55	
LCeq	63.6 dBC	55	
LZeq	68.2 dBZ	55	



Measurement Report

Measurement Details

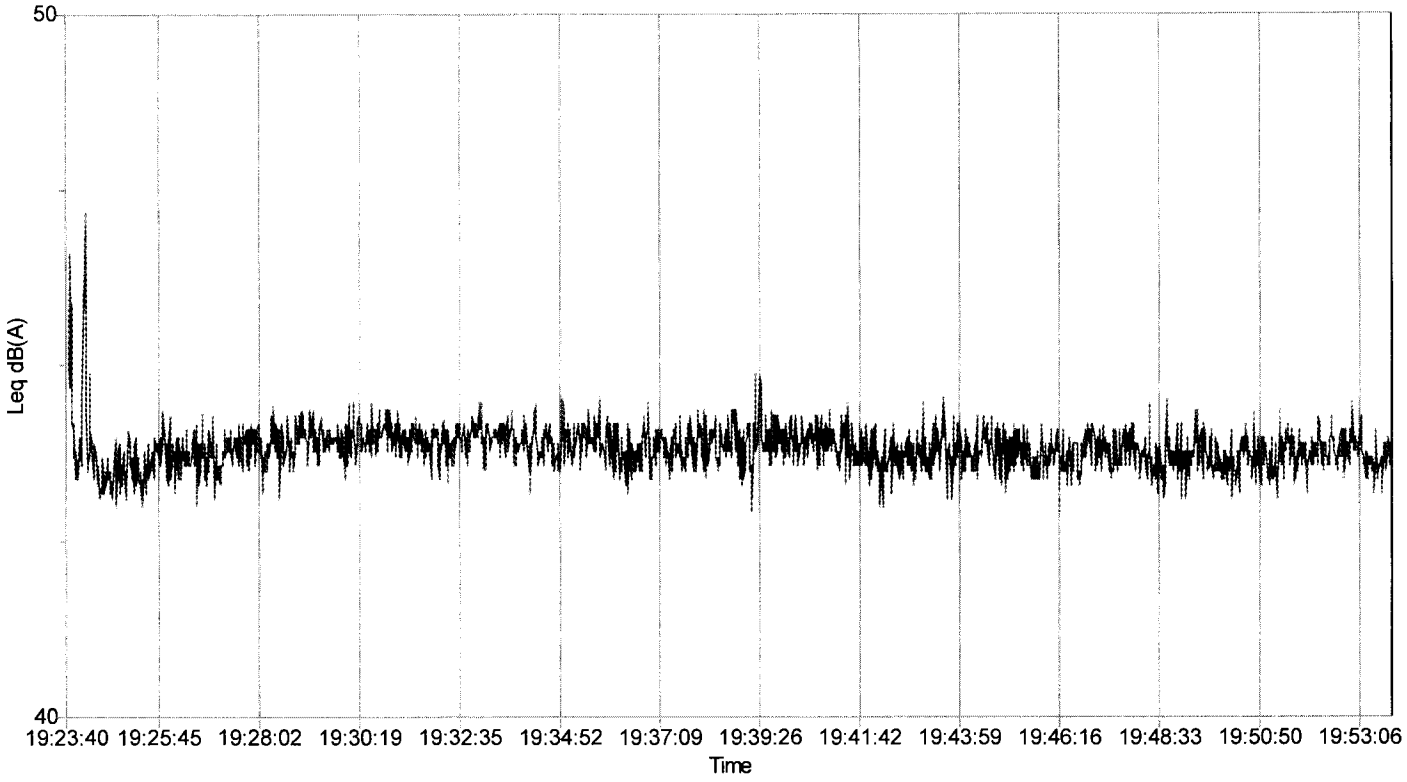
Date and Time:	26/10/2011 19:23
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:30:01 hh:mm:ss
Range:	30-100 dB
Overload:	no
Location:	Molaisin Compost N1

Notes:

Night time Broadband

Data

Leq	43.9 dBA	L1.0	45.1 dBA
Lepd	31.9 dBA	L5.0	44.7 dBA
LAE	76.3 dBA	L10.0	44.6 dBA
LAFmax	52.3 dBA	L50.0	44.1 dBA
Peak	81.2 dBC	L90.0	43.6 dBA
		Lmin	42.7 dBA



Measurement Report

Measurement Details

Date and Time:	26/10/2011 19:55
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:20 hh:mm:ss
Range:	30-100 dB
Location:	Molaisin Compost N1

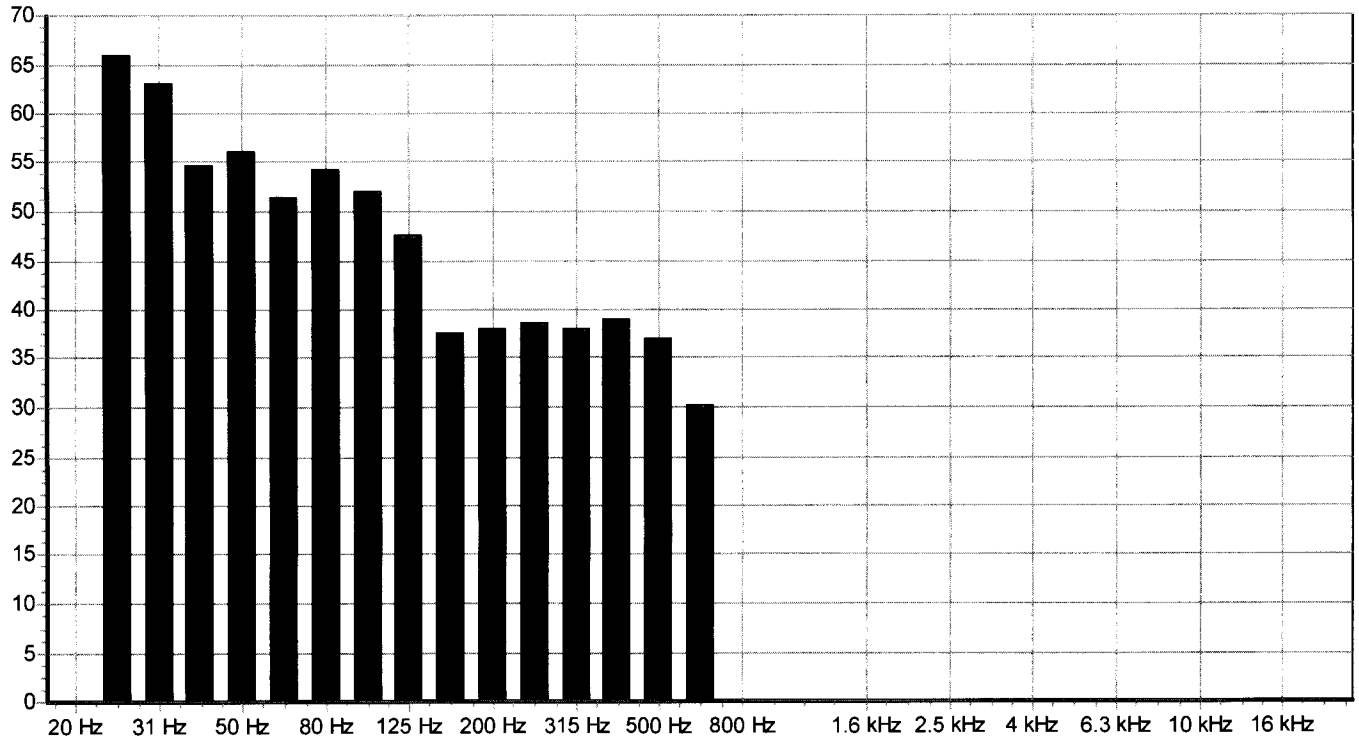
Notes:

Night time 1:3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	38.6 dB	55		3.15 kHz	0.0 dB	55	
25 Hz	66.0 dB	55		315 Hz	38.0 dB	55		4 kHz	0.0 dB	55	
31 Hz	63.0 dB	55		400 Hz	39.0 dB	55		5 kHz	0.0 dB	55	
40 Hz	54.7 dB	55		500 Hz	37.0 dB	55		6.3 kHz	0.0 dB	55	
50 Hz	56.1 dB	55		630 Hz	30.1 dB	55		8 kHz	0.0 dB	55	
63 Hz	51.4 dB	55		800 Hz	0.0 dB	55		10 kHz	0.0 dB	55	
80 Hz	54.2 dB	55		1 kHz	0.0 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	52.0 dB	55		1.25 kHz	0.0 dB	55		16 kHz	0.0 dB	55	
125 Hz	47.5 dB	55		1.6 kHz	0.0 dB	55		20 kHz	dB		
160 Hz	37.6 dB	55		2 kHz	0.0 dB	55					
200 Hz	38.0 dB	55		2.5 kHz	0.0 dB	55					

Band	Leq,t	Time s	Overload
LAeq	44.6 dBA	55	
LCeq	67.5 dBC	55	
LZeq	73.1 dBZ	55	



Measurement Report

Measurement Details

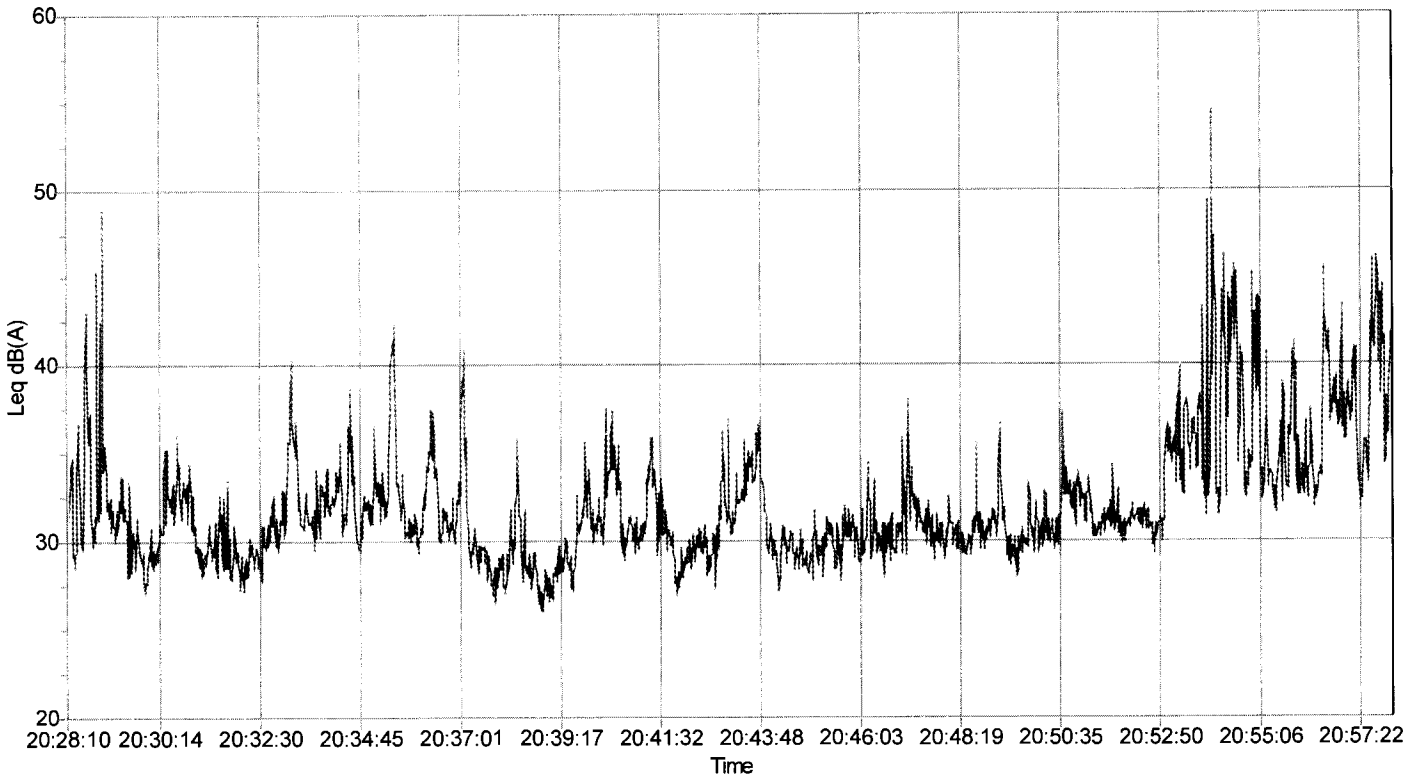
Date and Time:	26/10/2011 20:28
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:59 hh:mm:ss
Range:	20-90 dB
Overload:	no
Location:	Molaisin Compost N3

Notes:

Night time Broadband

Data

Leq	34.7 dBA	L1.0	35.2 dBA
Lepd	22.6 dBA	L5.0	34.3 dBA
LAE	67.1 dBA	L10.0	33.7 dBA
LAFmax	62.2 dBA	L50.0	31.2 dBA
Peak	90.7 dBC	L90.0	29.0 dBA
		Lmin	27.1 dBA



Measurement Report

Measurement Details

Date and Time:	26/10/2011 20:58
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:23 hh:mm:ss
Range:	20-90 dB
Location:	Molaisin Compost N3

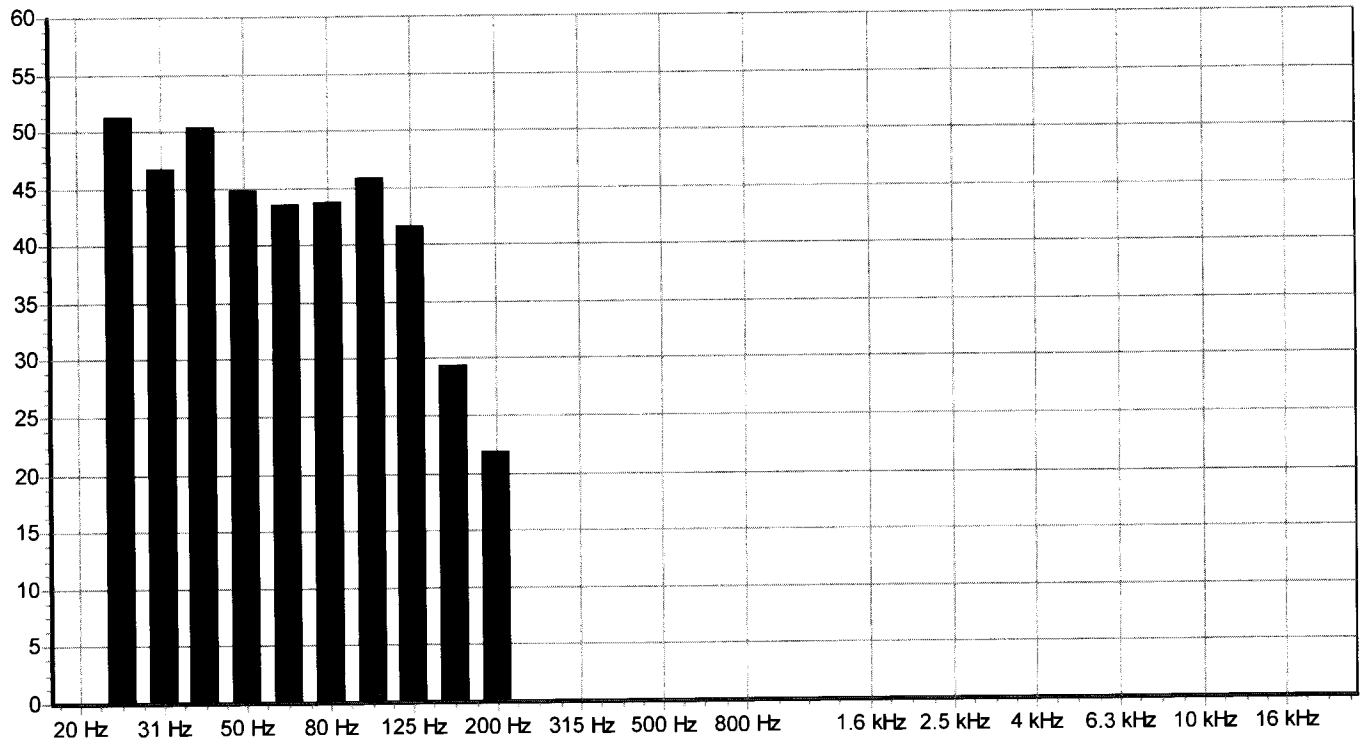
Notes:

Night time 1:3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	0.0 dB	55		3.15 kHz	0.0 dB	55	
25 Hz	51.3 dB	55		315 Hz	0.0 dB	55		4 kHz	0.0 dB	55	
31 Hz	46.7 dB	55		400 Hz	0.0 dB	55		5 kHz	0.0 dB	55	
40 Hz	50.3 dB	55		500 Hz	0.0 dB	55		6.3 kHz	0.0 dB	56	
50 Hz	44.9 dB	55		630 Hz	0.0 dB	55		8 kHz	0.0 dB	56	
63 Hz	43.6 dB	55		800 Hz	0.0 dB	55		10 kHz	0.0 dB	55	
80 Hz	43.8 dB	55		1 kHz	0.0 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	45.8 dB	55		1.25 kHz	0.0 dB	55		16 kHz	0.0 dB	55	
125 Hz	41.6 dB	56		1.6 kHz	0.0 dB	55		20 kHz	dB		
160 Hz	29.5 dB	55		2 kHz	0.0 dB	55					
200 Hz	21.9 dB	55		2.5 kHz	0.0 dB	55					

Band	Leq,t	Time s	Overload
LAeq	36.7 dBA	55	
LCeq	57.1 dBC	55	
LZeq	61.6 dBZ	55	



Measurement Report

Measurement Details

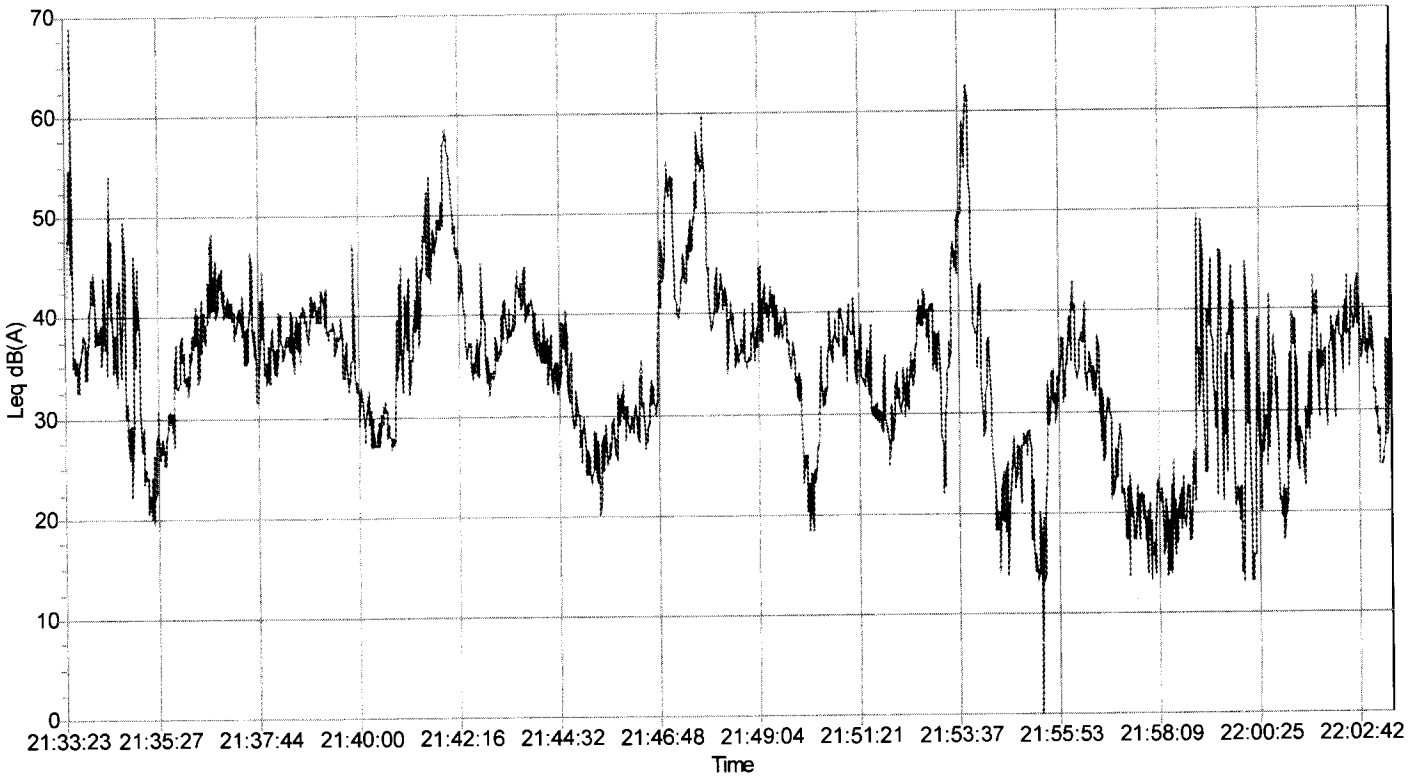
Date and Time:	26/10/2011 21:33
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:59 hh:mm:ss
Range:	20-90 dB
Overload:	no
Location:	Molaisin Compost N4

Notes:

Night time Broadband

Data

Leq	44.9 dBA	L1.0	56.4 dBA
Lepd	32.9 dBA	L5.0	47.7 dBA
LAE	77.3 dBA	L10.0	43.4 dBA
LAFmax	77.6 dBA	L50.0	35.2 dBA
Peak	99.0 dBC	L90.0	26.8 dBA
		Lmin	24.1 dBA



Measurement Report

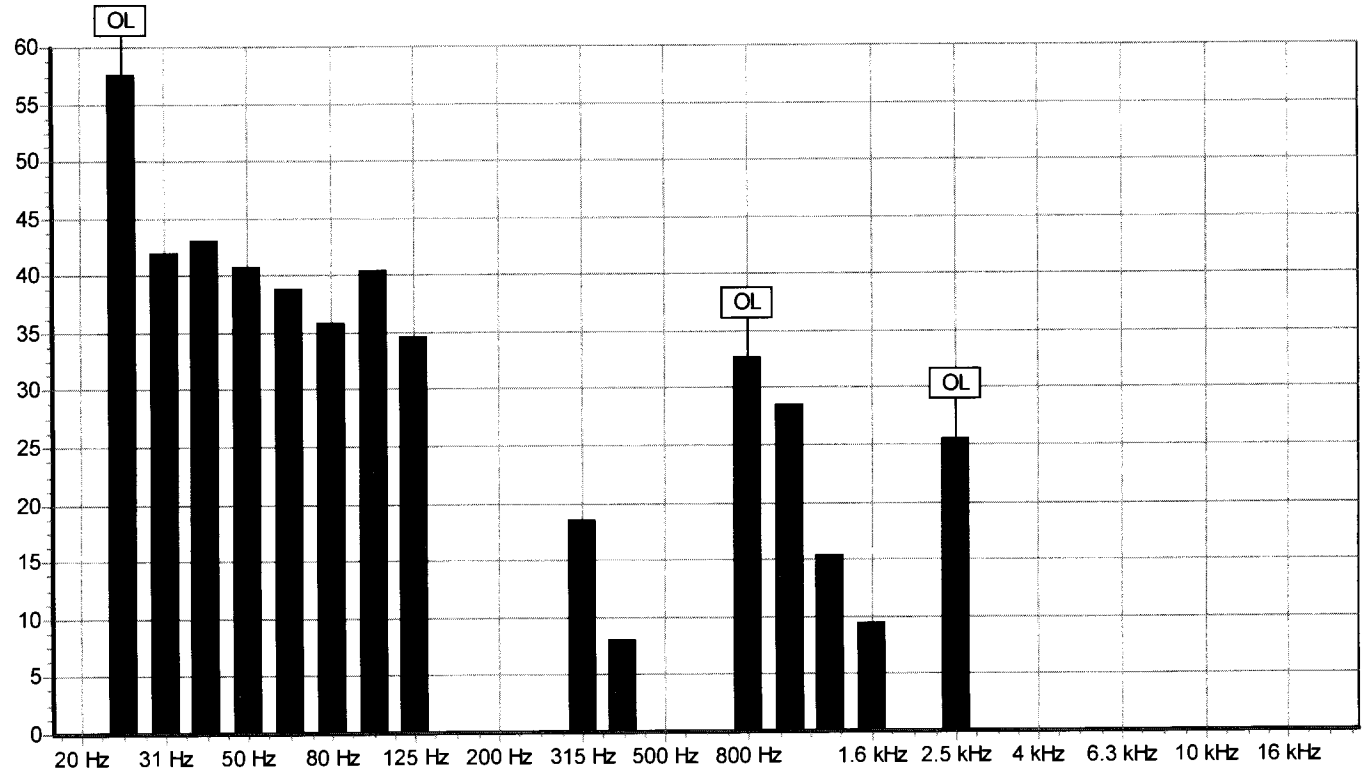
Measurement Details

Date and Time:	26/10/2011 22:04
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:22 hh:mm:ss
Range:	20-90 dB
Location:	Molaisin Compost N4
Notes:	
Night time 1:3 Octave	

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	0.0 dB	55		3.15 kHz	0.0 dB	55	
25 Hz	57.6 dB	55	yes	315 Hz	18.6 dB	55		4 kHz	0.0 dB	55	
31 Hz	41.9 dB	55		400 Hz	8.0 dB	56		5 kHz	0.0 dB	55	
40 Hz	43.0 dB	55		500 Hz	0.0 dB	55		6.3 kHz	0.0 dB	55	
50 Hz	40.8 dB	55		630 Hz	0.0 dB	55		8 kHz	0.0 dB	55	
63 Hz	38.8 dB	55		800 Hz	32.7 dB	55	yes	10 kHz	0.0 dB	55	
80 Hz	35.9 dB	55		1 kHz	28.5 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	40.4 dB	55		1.25 kHz	15.4 dB	55		16 kHz	0.0 dB	55	
125 Hz	34.6 dB	55		1.6 kHz	9.4 dB	55		20 kHz	dB		
160 Hz	0.0 dB	55		2 kHz	0.0 dB	55					
200 Hz	0.0 dB	55		2.5 kHz	25.5 dB	55	yes				

Band	Leq,t	Time s	Overload
LAeq	51.2 dBA	56	
LCeq	68.0 dBC	55	
LZeq	55.1 dBZ	55	



Attachment 3

MCL7 Objectives and Targets

Objective	Target
Biofilter Maintenance	1. Biofilter to be monitored on a weekly basis, and dug and reseeded as required
Develop written procedures	1. Standard operating procedures are in place, these need to be upgraded to include every aspect of the process
Training	1. On-going training required for all staff in updated health and safety and operational issues
Monitoring	1. Follow schedule based on licence requirements 2. List of consultants in place to conduct monitoring
Staff	1. Adequate cover if an employee is on holidays or away from the facility 2. Training in advance notification of absence
Raw Material Usage	1. Monitor Raw Material usage and analyse results 2. Put procedures in place to maximise efficiency of raw material usage
Energy Audit	1. Compare findings of 2011 audit with full year audit for 2012.

Attachment 4

MCL8 Environmental Management Programme

The responsibility of implementing the Environmental Management System lies with the appointed Environmental Team:

Fiona O'Sullivan	Environmental Manager
Lucinda Blyth	Administration Manager
Noel Lyons	General Manager
Niall Carroll	Facilities Manager
Yevgeniy Chizhikov	Factory Manager

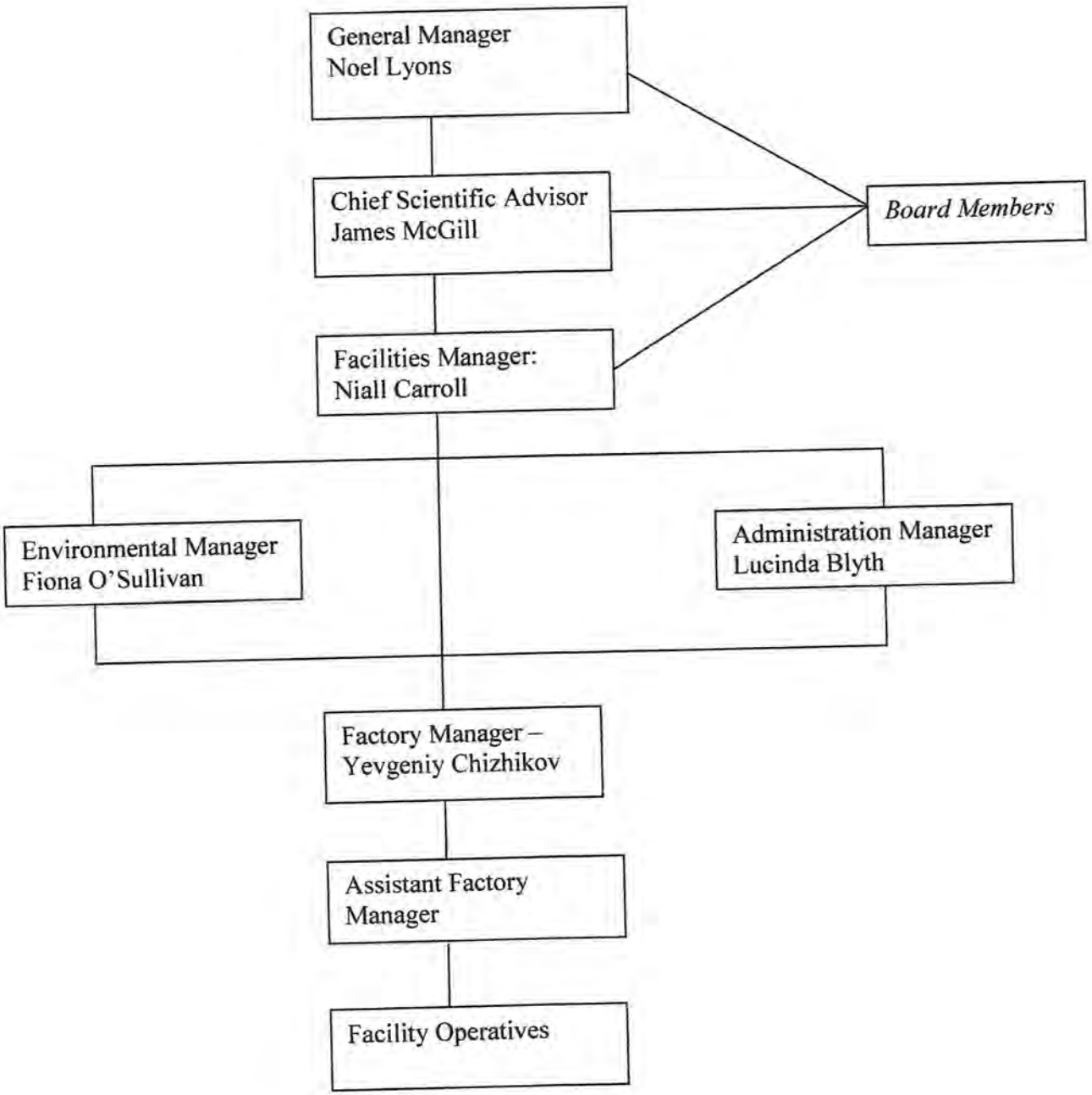
The Environmental Management Programme (EMP) for Molaisín Compost Ltd. will be updated periodically.

The EMP for Molaisín Compost Ltd. is as follows:

Environmental Management Plan	Responsibility	Target Date
Continuous Onsite Training of Operators	Fiona O'Sullivan Niall Carroll	Ongoing
Planning Permission for Extension to facility	Fiona O'Sullivan	TBA
Improve compost marketing tools	Fiona O'Sullivan	Dec 12
Implement requirements of Certification Europe Audit	Fiona O'Sullivan	Dec 12
Improve staff awareness of compost quality	Fiona O'Sullivan	Dec 12

Attachment 5

MCL5 Structure and Responsibility



Molaisín Compost Ltd. – Facility Organisational Chart

Roles and Qualifications

James H. McGill, Chief Scientific Advisor. Mr. McGill is an environmental engineer with over 30 years in the field. He qualified with a primary arts degree from Trinity College, Dublin, and went on to study science at Rutgers University, where he earned a masters degree in environmental science. He taught same and undertook environmental research at Rutgers. Mr. McGill was a founder of the McGill group of companies and has worked on major waste management and bioremediation projects in the U.S., Europe, and Asia. Jim has 25 years international experience in Environmental Engineering. He has worked on major environmental projects in the US and for the US Government overseas. He has designed industrial composting plants in North Carolina, The Philippines and Thailand. He has also worked on Bioremediation projects in Sweden. Jim is a director of Molaisín Compost Ltd.

M. Noel Lyons, General Manager. Mr. Lyons is also a founder of the McGill group and president of McGill (U.S.), with 17 years in the field of waste management. He is a graduate of the Waterford Institute of Technology and holds a certificate of supervisory management (with distinction) from the Irish Management Institute, and a certificate of technical competency in composting from the University of Maine. Noel is responsible for overall guidance and management of the company. Noel has a unique combination of technical and sales knowledge in feedstocks, composting and transportation. He has accomplished significant business results in challenging enterprise environments over the past 15 years. Noel has pioneered product marketing of compost as a revenue-producing service in North Carolina. Noel is currently splitting his time between America and Ireland. Noel is a director of Molaisín Compost Ltd.

Fiona O'Sullivan, Environmental Manager. Fiona graduated from University College Dublin with a primary Degree in Agricultural Science and a Masters Degree in Environmental Science from Sligo Institute of Technology. Fiona has extensive knowledge of waste management and planning regulations and plays a key role in the company's planning and waste permit/license applications. Fiona is responsible for ensuring environmental compliance with all regulations and permits, and monitoring incoming sludges and outgoing compost.

Duties:

- All environmental monitoring as per Planning Permissions and Waste Permit or Waste Licence
- Ensuring pre acceptance criteria are met for incoming waste
- Soil sampling
- Process control monitoring
- Product quality assurance
- Implementation of environmental management system
- Research and development
- Waste management
- Industrial and environmental compliance
- Planning Permission Applications
- Waste Permit Applications
- Health and Safety

Niall Carroll, Facilities Manager. Mr. Carroll has been with McGill (Ireland) since its start-up, managing daily operations and serving as a technical specialist serving for Ireland and U.S. plants. His expertise is in factory management with particular knowledge in machine maintenance. Niall spent three months at the McGill Composting factory in North Carolina in early 2000 where he was trained in compost plant management. He has completed courses in the United States to qualify him for position of factory manager, and to enable him to train in others for this position, including

qualifying as Compost Facility Operator and Process Engineer at the University of Winthrop in Charlotte, South Carolina. This course would be of similar level to recommended Fás course. He has also completed an intensive course in Composting in North Carolina. Niall is facilities manager of McGill Environmental Systems (Ireland) Ltd. Niall is a director of Molaisín Compost Ltd.

Yevgeniy Chizhikov, Factory Manager

Yevgeniy has been trained in all aspects of factory management by Niall Carroll. Yevgeniy has successfully completed the Fás Waste Management Course.

The factory manager is responsible for the daily operation of the composting facility. The manager can delegate responsibility to his assistant manager and jobs to the general operators; however it is his duty to oversee any delegated work, and ensure that it is completed to a satisfactory standard. The responsibilities and duties of the factory manager are detailed as follows:

- Daily operation of the composting facility and supervision of all factory staff.
- Factory operator training
- Ensuring that all vehicles entering and leaving the facility meet McGill Environmental Systems (Irl.) Ltd. requirements.
- Supervising the landspreading of compost
- Ensure that incoming biosolids have been approved by the Environmental Manager.
- Responsible for all factory staff and the delegation of work
- Responsible for health and safety in the factory
- Responsible for ensuring that incoming materials are consistent, of good quality and are suitable for composting.
- Ensuring that raw material expenditure is not overly excessive.

- Ensure that a continuous throughput of material is maintained while keeping below 1000 cubic metres of waste material on site at any one time.
- Ensuring that the factory grounds are maintained to as high a standard as possible.
- Responsible for the implementation of the Environmental Management System on site

Lucinda Blyth, Administration Manager. Lucinda has been with McGill since 2002. Among her responsibilities are office administration, human resources and record keeping. Lucinda's previous experience includes six years as Assistant to the Chairman of a Private Bank in London, several years as Administration Manager at a Strategy Consultancy based in London, Paris and Rome. Lucinda has also spent time working for a middle-eastern royal family organizing the logistics and staffing of several large palaces and houses throughout the world and a fleet of aeroplanes worldwide.

Lucinda is responsible for:

- Day to day running of the office
- Records of Biosolids / Raw Materials entering the facility
- Payroll
- Dealing with Incoming Loads from Clients - weigh in/out
- Administration and update of Company Database
- Dealing with Reporting information from the reporting database system
- Preparation of Weekly reports for Management
- Preparation of Purchase Orders to vendors
- Monthly Invoicing

Factory Operators

The duties of the factory operator include:

- knowledge of composting process, temperature range etc.
- mixing of incoming biosolids with dry amendments at the correct ratio
- ensuring that all pipes are clean prior to placing mix in bay
- correct method of filling the composting bays
- placing temperature probe in bay
- removal of finished compost from bays
- landspreading of compost / filling haulage trucks with compost
- visual inspection of quality of incoming biosolids
- response to the delivery of unacceptable materials
- visual inspection of vehicles delivering biosolids and raw materials
- cleaning of wheels and body of vehicles prior to leaving the facility
- ensuring all vehicles are covered entering and leaving the facility
- awareness of irregularities in the system, e.g. temperatures not rising correctly
- emergency response
- operation of control panel and aeration fans
- procedure for opening / closing facility at beginning and end of working day
- operation of the loader and mixing equipment
- safety procedures to be followed when operating heavy machinery, within, and outside the building
- keeping internal passageways and tipping area clear of biosolids
- maintenance of plant and machinery

Attachment 6

MCL10 Communications Procedure

1. The purpose of this procedure is to describe the methods of communication at Molaisin Compost Ltd.

2. The procedure applies to all communications, internal and external.

3. The procedure refers to:
   Waste Licence W0245-01
   Planning Permission PD.02.681

4. Internal Communication

- Management Review of EMS
- Notice Board

The organization regards verbal communication to be an important aspect due to its size.

5 External Communication

- As per Licence Notification: In the event of any incident which may result in water, soil or air pollution, the Environmental Manager shall immediately report the incident to the EPA by phone or fax and shall confirm the communication in writing within 24 hours.
- Records of external communication are kept by the Office Manager and the Environmental Manager. These records consist of letters, faxes and telephone conversations.

6 Complaints

- Complaints are handled by the Environmental Manager. Details of the complaint are recorded. Responses to complaints can be by phone or written.

7 Public programme for information

- As per Waste Licence Molaisín have put in place a programme to ensure that members of the public can obtain information concerning the environmental performance of the Permit Holder at all reasonable times.

- The facility notice board provides contact details for members of the public to arrange to meet Fiona O'Sullivan regarding all environmental reports and records.

- All documentation relating to incoming waste and loads of material being moved off site are available during the facility opening hours.

- The site is manned for enquiries during opening hours.

8 Emergency Response

- In the event of an employee sustaining a work related injury and is absent for more than three working days, a report is to be sent to the Safety Authority detailing the incident.