APPENDIX 1.

Noise assessment of the emissions stack point at D-WEEE Plant (building), KMK Metals Recycling Ltd, performed by ENVIROCO Management Ltd, November 2011

Air Emissions testing of stack emission point from KMK Metals Recycling Ltd, performed by Odour Monitoring Ireland, December 2011.

Noise Assessment of Stack Emission Point (A2-8)

For

KMK METALS RECYCLING LTD.

CAPPINCUR INDUSTRIAL ESTATE, DAINGEAN ROAD, TULLAMORE, CO. OFFALY

November 2011

Printed on
Recycled Paper

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A: Noise Results & Charts

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1.0 INTRODUCTION

ENVIROCO Management has been commissioned by Mr. Kurt Kyck of KMK Metal Recycling Ltd, Cappincur Industrial Estate, Tullamore, Co Offaly; Waste Licence Number W0113-03 to assess the likely noise arising from a new emission point (A2-8) from the recently constructed D-WEEE Plant (building).

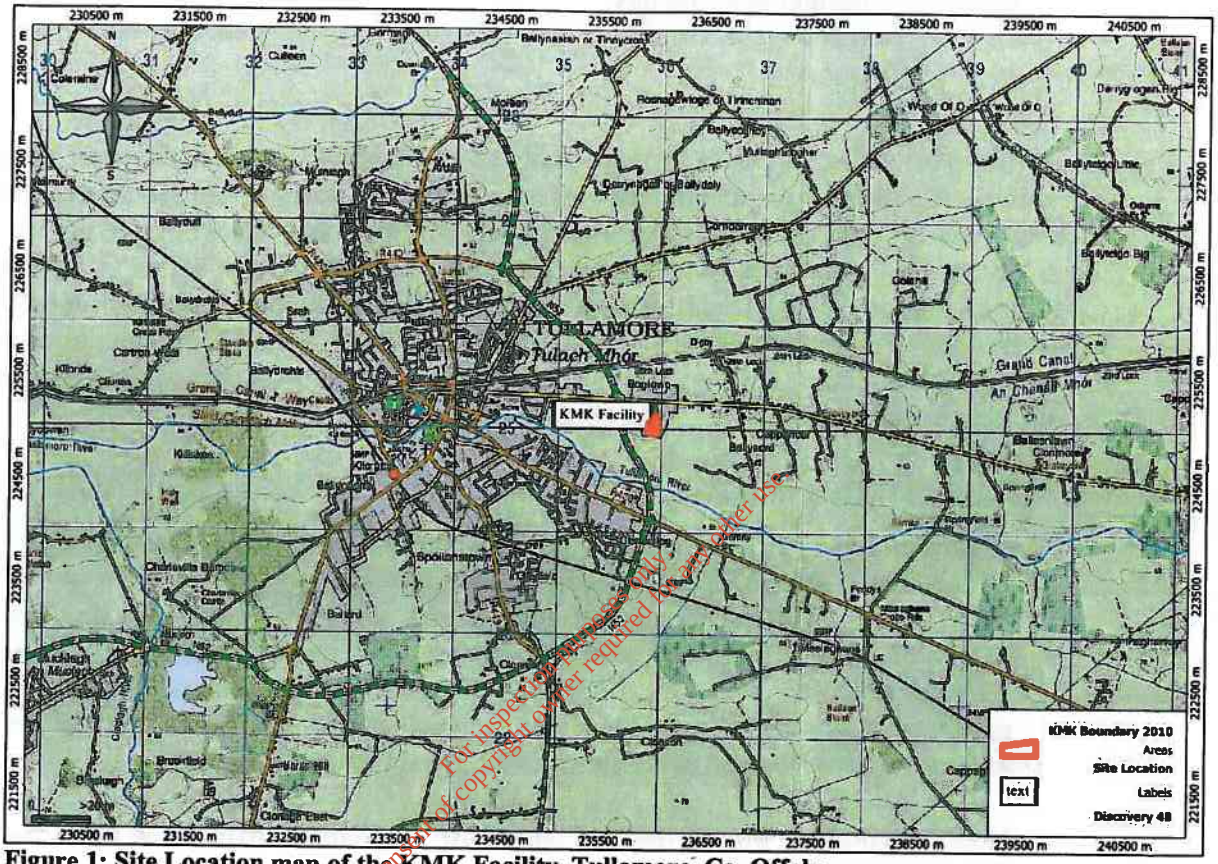


Figure 1: Site Location map of the KMK Facility, Tullamore, Co. Offaly

The KMK LTD facility is located in the Cappincur Industrial Estate towards the east of Tullamore town, off the L-02025 road to Daingean – Figure 1.0. The Cappincur Industrial Estate is dominated by enclosed industrial units, with little mobile machinery operating outside of these units.

The objectives of the environmental noise survey were to:

- Investigate the level of noise arising from the new emission point (A2-8), located to the south of the recently constructed D-WEEE Plant (building)
- Assess whether the noise levels recorded are similar to, exceed or are lower than the predicted levels for this emission point
- Evaluate whether the noise associated with the new emission point is likely to cause a nuisance to potential receptors.

1.1 ENVIRONMENTAL MONITORING

ENVIROCO Management was commissioned by KMK Metals Recycling LTD, Cappincur Industrial Estate, Tullamore, Co Offaly to carry out environmental noise monitoring at the new emission point (A2-8) from the D-WEEE Plant (Building).

Monitoring occurred on the 10th November 2011. Monitoring took place during the course of a normal working day.

2.0 NOISE SURVEY

Noise has many sources, both manmade and environmental. Noise is observer defined, as levels unacceptable to one person may be perceived as necessary or enjoyable to another. As such the monitoring of noise is primarily an observational discipline requiring a full identification of the sources of possible noise and the type of sound that is been emitted (continuous, intermittent, tonal, broad-spectrum, single source, multiple source). The Environmental Protection Agency (EPA) has adopted a noise level (as a continuous equivalent noise reading – Leq) of 55 dB(A) as an indicator of annoyance due to noise arising from industrial activity.

2.1 METHODOLOGY

Noise monitoring was carried out to the International Standard ISO 1996/1 "Acoustics – Description & measurement of environmental noise", using a Type 1 Bruel Kjaer 2250 Sound Level Meter with outdoor equipment that was fully calibrated prior to and after the monitoring event. The meter was set to Fast Response with an effective averaging time of 0.25sec during noise monitoring. All noise monitoring was 'A' weighted which attenuates low frequencies strongly so noise measuring is more specific to human hearing and environmental noise.

Noise monitoring was carried out on the 10th November 2011. The KMK facility in the Cappincur Industrial Estate does not operate over night; therefore noise monitoring was not carried out overnight. Each monitoring location is identified on the map shown in Figure 2.1.1.

Weather conditions during sampling were; bright and sunny with a light breeze changing to a moderate breeze as the morning progressed.

Table 2.1.1: Gurteen College Weather Station Report

REPORTS FROM GURTEEN WEATHER STATION						
Date	**Rainfall (mm)**	**Max Temp**	**Min Temp**	**Sunshine (hours)**	**Gusts**	**Wind speed (knots)**
10/11/2011	0.1	14.2	8.2	-	-	11

The monitoring equipment was manned throughout the sampling period and comments/notes taken to assist the interpretation and assessment of results.

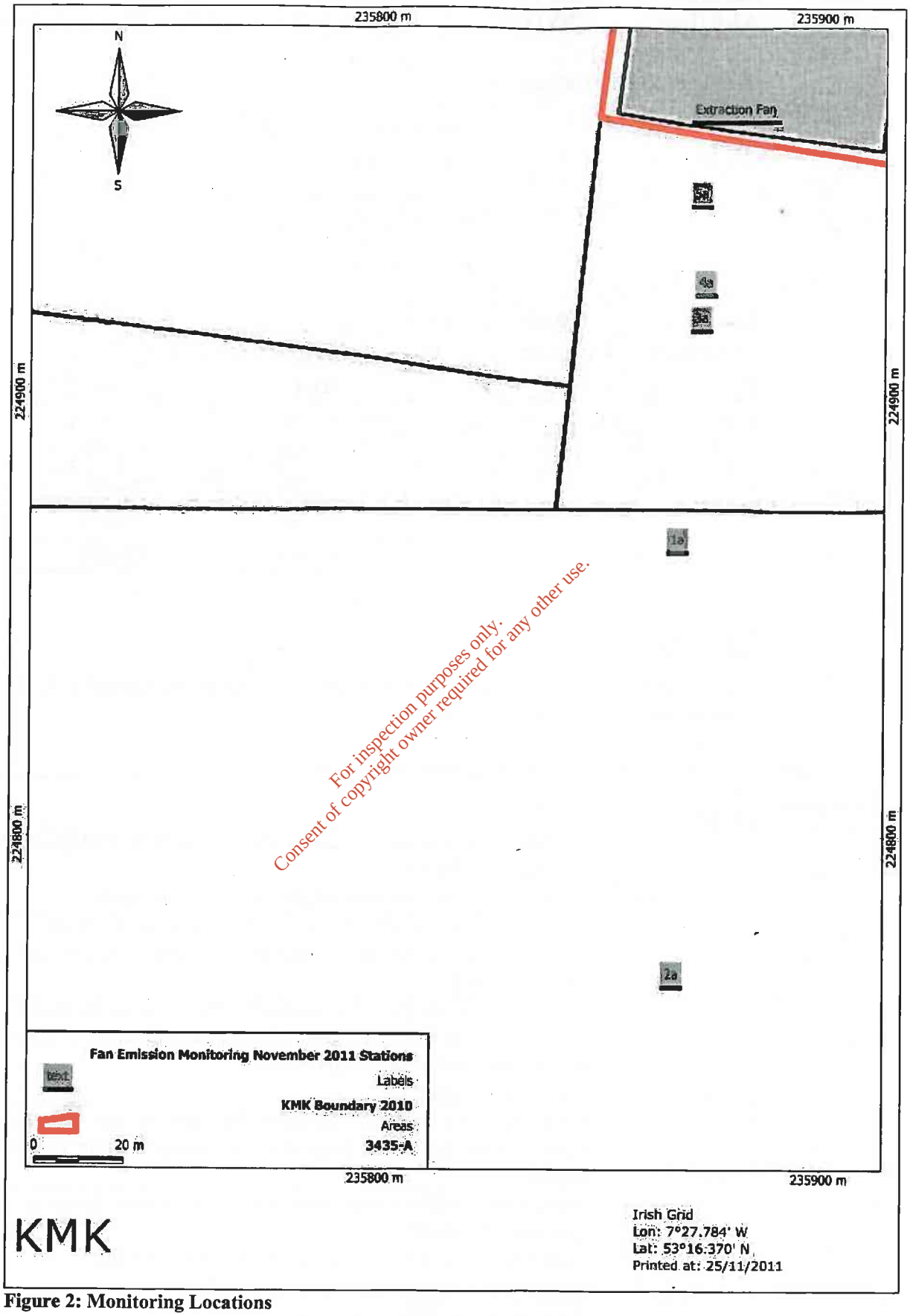


Figure 2: Monitoring Locations

Sampling was carried out at 5 locations at various distances from the emission point A2-8 (Figure 2). ENVIROCO Management staff selected these monitoring locations.

The monitoring locations were:

N1	100 meters from source
N2	200 meters from source
N3	50 meters from source
N4	40 meters from source
N5	20 meters from source

Table 2.1.2: Grid Location of Monitoring Stations

Monitoring Locations	Grid Reference (ITM)	
	Easting	Northing
N1	635807	724895
N2	635805	724796
N3	635811	724945
N4	635813	724952
N5	635812	724972

2.2 RESULTS

The complete set of noise measurement results is included in Appendix A. These are summarised and discussed below.

Table 2.2.1: Comments Recorded at Each Monitoring Station

Location	Start Time	L_{Aeq}	Comments
N1(a)	14:16	54	Audible noise sources – road traffic on the N52 Tullamore By-Pass and along the R420, Birdsong, Maniscopic forklift moving through fields
N2 (a)	14:29	54	Road Traffic on the N52 Tullamore By-Pass and the R420 Some induced wind noise audible through hedging and thistles within the field
N1(b)	14:41	54	Road traffic on the N52/Tullamore By-Pass and on the R420 Rumble audible from the 'Drum Separator' operating at the plant and on occasion reversing alarms audible Occasional dog bark's
N3(a)	14:52	57	Road Traffic on the N52/Tullamore By-Pass and the R420 Road, Rumble from the 'Drum Separator' unit audible along with reversing alarms
N4(a)	15:03	57	Drum unit audible along with reversing alarms (door is partially open into the plant) Road Traffic on the N52/Tullamore By-Pass audible Occasional 'venting' audible from the plant
N4(b)	15:14	58	Stack emission noise is audible Drum unit audible along with reversing alarms (door is partially

Location	Start Time	L_{Aeq}	Comments
			open into the plant) Road Traffic on the N52/Tullamore By-Pass audible Occasional 'venting' audible from the plant
N5(a)	16:03	54	Road Traffic from the N52/Tullamore By-pass
N5(b)	15:25	62	stack emission audible, drum audible, fall of material within drum perceptible Road Traffic audible, occasional venting occurring

2.3 DISCUSSION BROADBAND NOISE

There are currently no statutory limits for the control of environmental noise in Ireland. However, the EPA has issued a guidance note on noise emissions that states, '*Ideally, if the total noise level from all sources is taken into account, the noise level* ***at sensitive locations*** *should be kept below an L_{Aeq} value of 55dB(A) by daytime. At night, to avoid disturbance, the noise level at noise sensitive locations should not exceed a $L_{Aeq\ T}$ value of 45dB(A).*'

This assessment is concerned with the potential for impact arising from the newly developed stack emission piont, linked to the new plant installed within the building D-WEEE Plant building, to the south of the KMK Facility.

Previous prediction of the noise levels arising from this new emission point, used the listed sound pressure at 1 meter from the stack emission, and typical noise attenuation information. This table is now shown below again, along with the actual readings recorded on site during the survey conducted on the 10th November 2011.

Table 2.3.1: Comparison of Background, Recorded and Predicted Noise Values

Distance from Source (stack emission)	Sound Pressure dB(A)	Recorded L_{Aeq} (site operational)	Recorded L_{Aeq} (site not operational)
1	84	-	-
10	64	-	-
20	58	62	54
40	52	58	-
50	50	57	-
80	46	-	-
100	44	54	54
200	-	-	54

The operational sound levels within the table show higher values that predicted. This is primarily due to the relatively high ambient noise present to the south of the KMK facility. Station N1 and N2, located at 100 meters and 200 meters respectively, show similar readings for when the plant is running, not running and at notably increased distances from the plant. This would imply that the level of ambient noise, during the day within the vicinity south of the KMK facility, is 54 dB(A), L_{Aeq}. As such, all measurements close to, or below, this value, cannot be achieved, as existing ambient noise levels cannot be lowered by an activity or new source.

It is normally assessed that where ambient noise levels are relatively high, it takes a minimum of a tonal aspect or 3dB increase above the ambient for a noise source to become noticeable. Taking an ambient measurement of 54 dB(A) this requires that the new noise source either must show a tonal feature or be a minimum L_{eq} of 57dB(A) to become noticeable.

At distances of 50 meters, the recorded on site L_{eq} values show the site attenuates to 57 dB. Therefore it is likely that at distances greater than 50 meters south of the noise source, the noise arising from the stack emission's will not cause nuisance, and at greater distances will not be audible above current ambient noise levels.

Higher levels of noise are present in closer proximity to the stack emission than predicted. This is due to the following:

- The prediction was conducted based upon stack noise emission in isolation
- Monitoring recorded the stack noise emission, along with relatively high ambient noise (approximately L_{eq} of 54 dB(A)), existing facility noise and facility noise arising from within the new D-WEEE Plant (building), due to the rear roller doors been partially open.

It is understood that when the facility is fully operational, the roller doors to the rear of the plant will not be required to be left open, which will significantly reduce the level of noise audible from within the D-WEEE Plant (building).

2.4 DISCUSSION TONAL NOISE

Full page diagrams and information on the 1/3 octave analysis from the monitoring event are shown in Appendix A. This chapter is interested in the likelihood or not of a tonal noise arising from the operation of the new stack emission, erected at the KMK facility.

The acoustician notes, show that the stack emission was only audible at 2 monitoring events – N5 (b) at a distance of 20 meters from the facility, and at station N4(b) at 40 meters. Both of these stations were repeated when the stack emission noise was not audible. This gave a distinct capability to assess for tonal aspects from the new stack emission unit.

Charts 1 & 2 compare the 1/3 octave results for both stations side by side. The charts clearly show that at both (b) events – when the stack emission noise was audible, a notable peak occurred at 31.5 Hz.

Station N4(b) this peaks at 68dBZ, while at station N5(b) the peak occurs at 73 dB(Z). A distinctive decrease of nearly 6 dB with a doubling of distance from the likely sound source is present.

It is therefore likely that the new emission point has a distinctive tonal feature at 31.5Hz, which decreases with distance from the stack emission point.

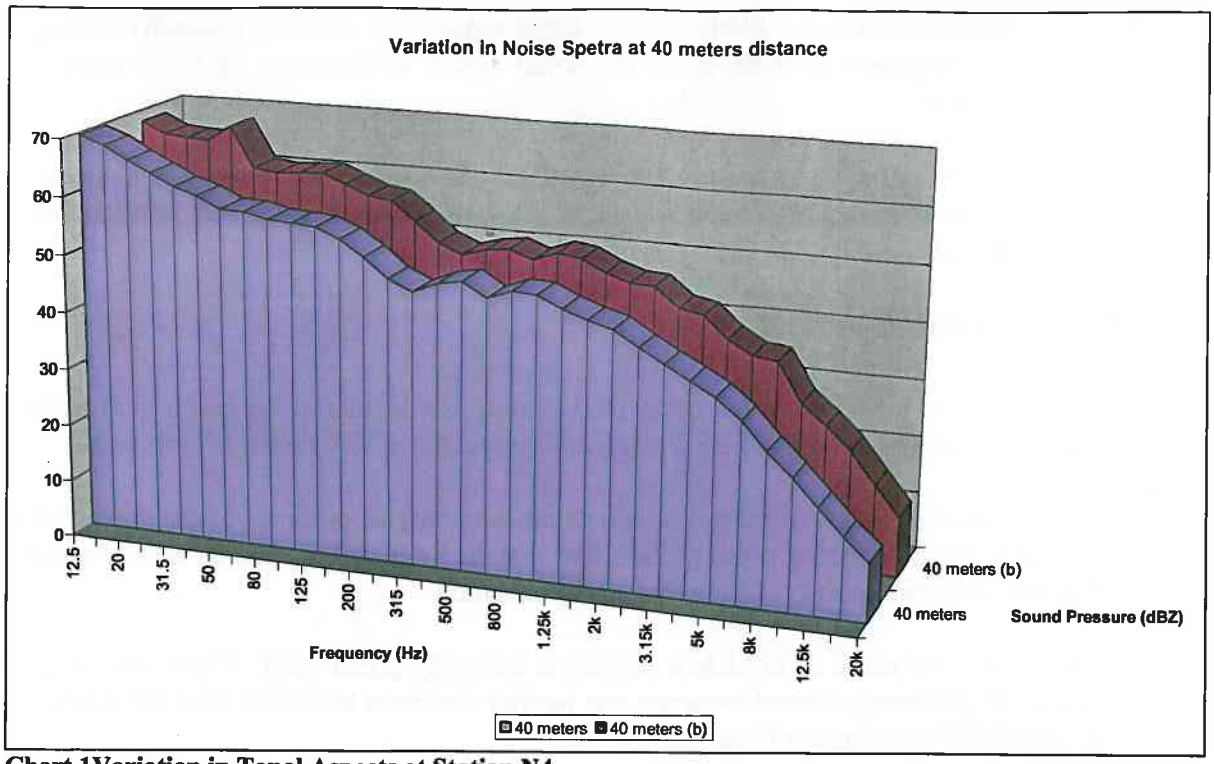


Chart 1Variation in Tonal Aspects at Station N4

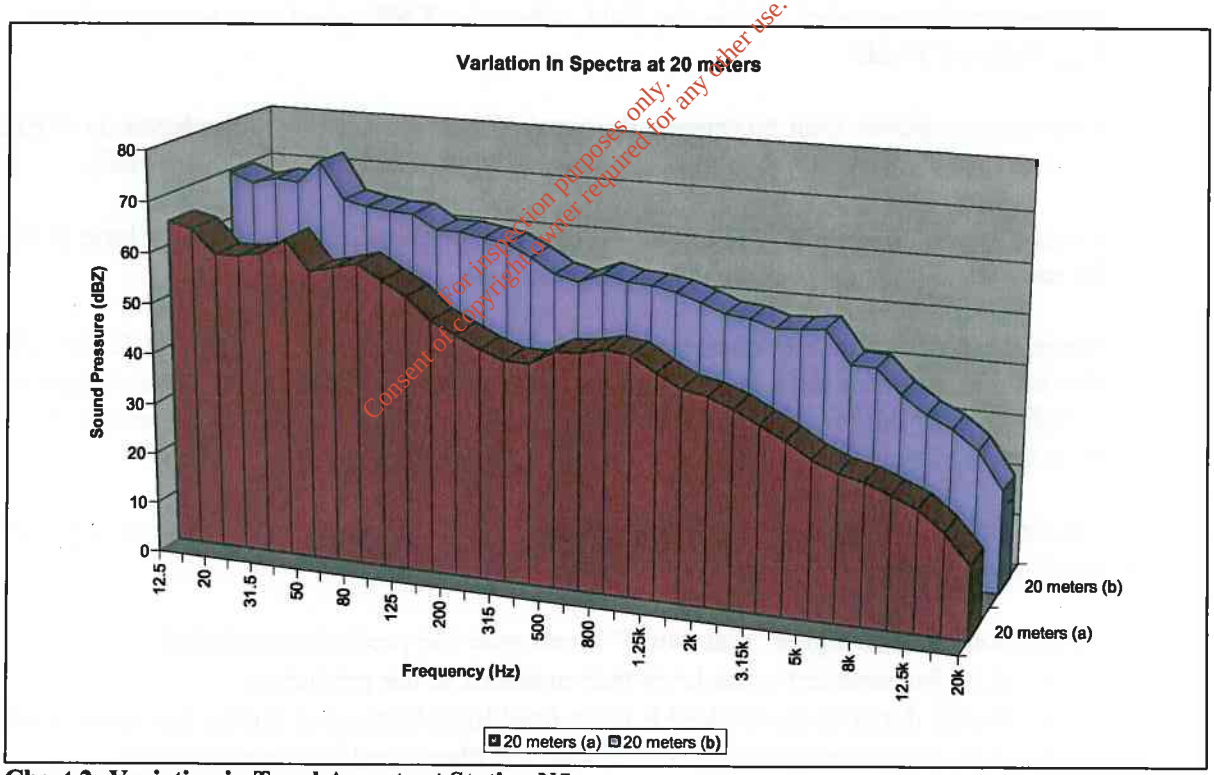


Chart 2: Variation in Tonal Aspects at Station N5

At a distance of 40 meters the tone arising from the operation of the stack emission is just perceptible as a tone (i.e. a minimum of 3dB rise above the neighbouring spectra). At a distance of 80 meters (another doubling of distance) a drop of 5 dB will bring the 31.5 Hz spectra in line with recorded values for measurements at 50 meters and 100 meters.

Therefore it is not likely that the tonal aspect will affect any sensitive receptors. The development does have a slight tonal aspect at distances up to 40 meters from the source.

No other tonal aspects are visible on the 1/3 octave data concerning stations where the stack emission was audible. No tones were recorded at higher frequencies (between 800 Hz to 20kHz).

3.0 CONCLUSIONS

ENVIROCO Management Ltd conducted a noise assessment in the green field to the south of the newly constructed D-WEEE Plant (building) at the KMK facility, Tullamore.

This monitoring was carried out to assess the accuracy of predictions conducted on the basis of a new stack emission point (A2-8) that was to be installed, and to assess whether or not this new emission point is likely to cause a nuisance.

The land to the south of the KMK facility is currently green-field. There are no dwellings or places of gathering located between the facility southern boundary and the R420 Tullamore to Geashill/Portarlington Road.

Ambient noise recorded within the field, when the KMK plant was not operational, show a L_{Aeq} value of 54 dB.

At distances greater than 50 meters, the level of noise arising from the KMK D-WEEE Plant (building) is significantly low that it is unlikely to be a nuisance (L_{Aeq} of 57 dB).

Tonal analysis of the stack emission point (A2-8), show the presence of a tone at 31.5Hz at 20 and 40 meters distance from the stack emission.

Assessment of the data concerning recorded spectral data indicate that at further distances, this tone is absorbed into the normal ambient and background acoustic environment. This correlates with the broadband noise conclusion of no likely impact at distances of 50 meters from the facility.

Levels predicted, prior to the installation of the stack emission were exceeded during the monitoring event.

The reasons for the higher 'real world' levels over the prediction included –

- A higher ambient noise level than assumed in the prediction
- Roller doors to the D-WEEE Plant (building) been open during the survey period
- Activity noise from within the D-WEEE Plant (building) been audible

From the monitoring event and an assessment of the local area to the south of the facility it is not seen that the new emission point from the D-WEEE Plant (building) will be an acoustical nuisance. There are no dwellings in proximity; there are no roads to enable dwellings to be likely built within proximity.

Appendix A

- **Noise Results & Charts**

Noise Results

Client: KMK Metals Recycling Ltd
Site: Cappincur Industrial Estate, Daingean Road, Tullamore, Co. Offaly
Monitoring Date: 10th November 2011
Sampler: Kenneth Goodwin (ENVIROCO Management Ltd)
Weather: Clear, cold, with light air
Equipment: Type 1 Bruel Kjaer 2250 SLM with wind muffler

Table 1 Noise Results

Location	L_{eq} dB(A)	L_{max} dB(A)	L_{min} dB(A)	$L_{(1)}$ dB(A)	$L_{(5)}$ dB(A)	$L_{(10)}$ dB(A)	$L_{(50)}$ dB(A)	$L_{(90)}$ dB(A)	$L_{(95)}$ dB(A)	$L_{(99)}$ dB(A)
100 meters (a)	54	60	47	59	58	57	53	50	49	48
200 meters (a)	54	63	43	60	58	57	53	48	47	46
100 meters	54	64	46	60	58	57	53	50	48	47
50 meters	57	70	52	67	60	59	56	54	54	53
40 meters (a)	57	71	52	60	59	59	57	55	55	53
40 meters (b)	58	73	53	62	60	60	58	56	56	55
20 meters (b)	62	81	48	67	65	65	62	56	54	51
20 meters (a)	68	50	88	62	57	56	53	51	51	50

Notes

Table 2 Notes Regarding Monitoring Positions

ID	Distance	Grid Ref.*		Comments
		Easting	Northing	
Extraction Stack emission	1	635813	724993	
1a	100	635807	724895	Monitored when no activity occurring
2a	200	635805	724796	Monitored when no activity occurring
1b	100	635810	724892	Activity occurring within D-WEEE Plant (Building)
3	50	635811	724945	Activity occurring within D-WEEE Plant (Building)
4a	40	635813	724952	Activity occurring within D-WEEE Plant (Building)
4b	40	635813	724952	Activity occurring within D-WEEE Plant (Building), stack emission noise audible
5a	20	635812	724972	Monitored when no activity occurring
5b	20	635812	724972	Activity occurring within D-WEEE Plant (Building), stack emission noise audible

*Grid reference are 6 figure ITM reference

Table 3 Weather Data 10th November 2011

Weather Station	Rain (mm)	Max temp (°C)	Min temp (°C)	Sun (hours)	Gust (knots)	Wind (knots)
Gurteen	0.1	14.2	8.2	-	-	11

The above data refer to the period midnight to midnight. They are provisional data and have not been quality controlled Rain is total precipitation plus deposition in mm. Max is the maximum temperature in Degrees Celsius Min is the minimum

temperature in Degrees Celsius Sun is the total sunshine in hours Gust is the highest gust of wind in knots if 34 knots or greater Wind is the mean wind speed in knots

Table 4: Weather Report from the Vantage Vue Station, based Tullamore

	Date		10/11/2011	
Start Time	10:00:00		**Finish Time**	17:00:00
Temperature	12.62		**High Temperature**	14.30
			Low Temperature	10.30
Humidity	85.91		**Dew Point**	10.28
Wind Speed	1.67		**Wind Direction**	SSE
			High Wind Speed	7.20
Wind Chill	12.40		**THW Index**	12.38
Bar	728.54			
Rain	0.20		**Rain Rate**	0.00

Wind Speed in m/s; Temperature in °C

Wind Rose from Tullamore Vantage Vue Weather Station, 10 November 2011

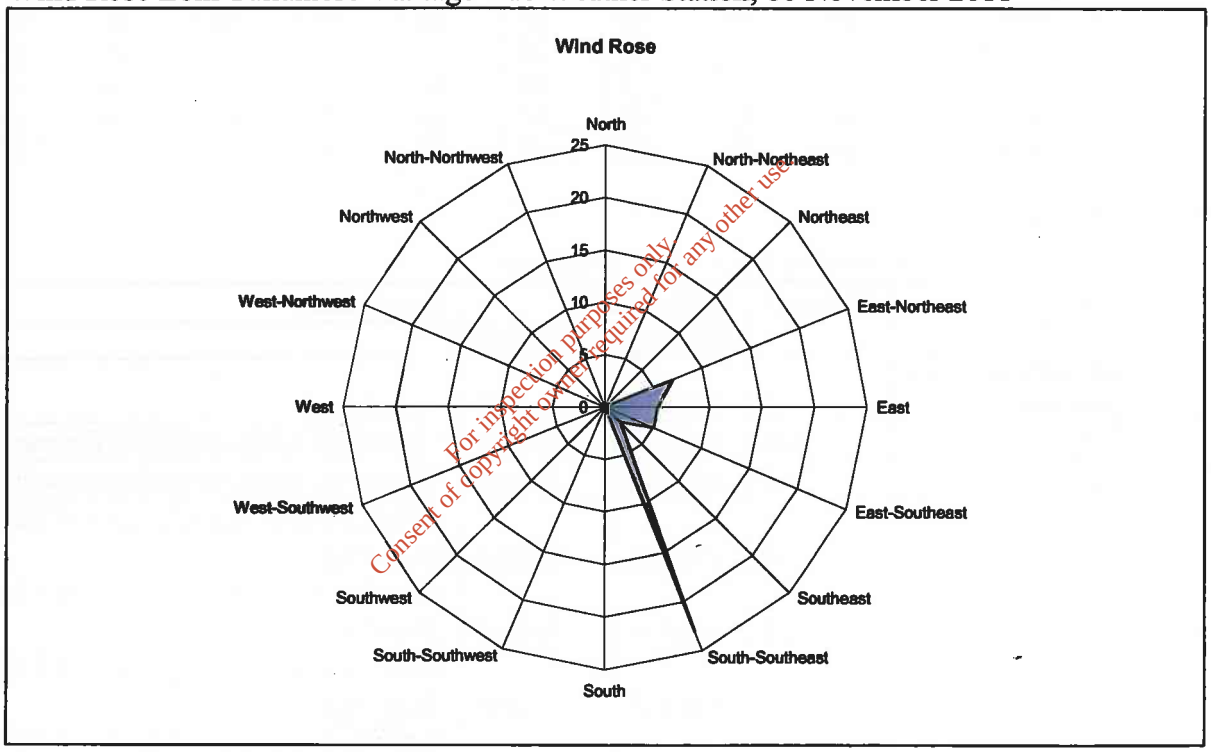
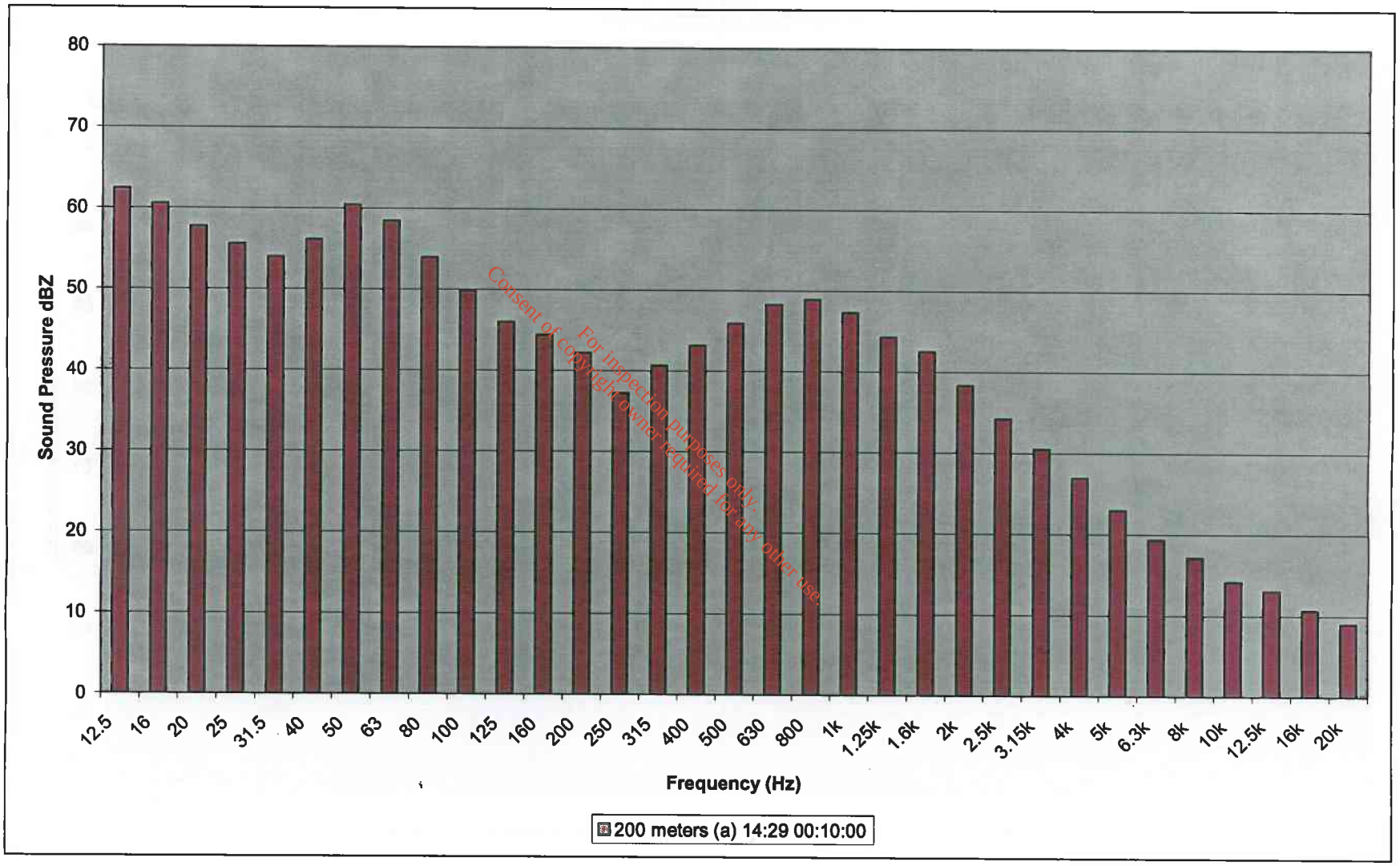


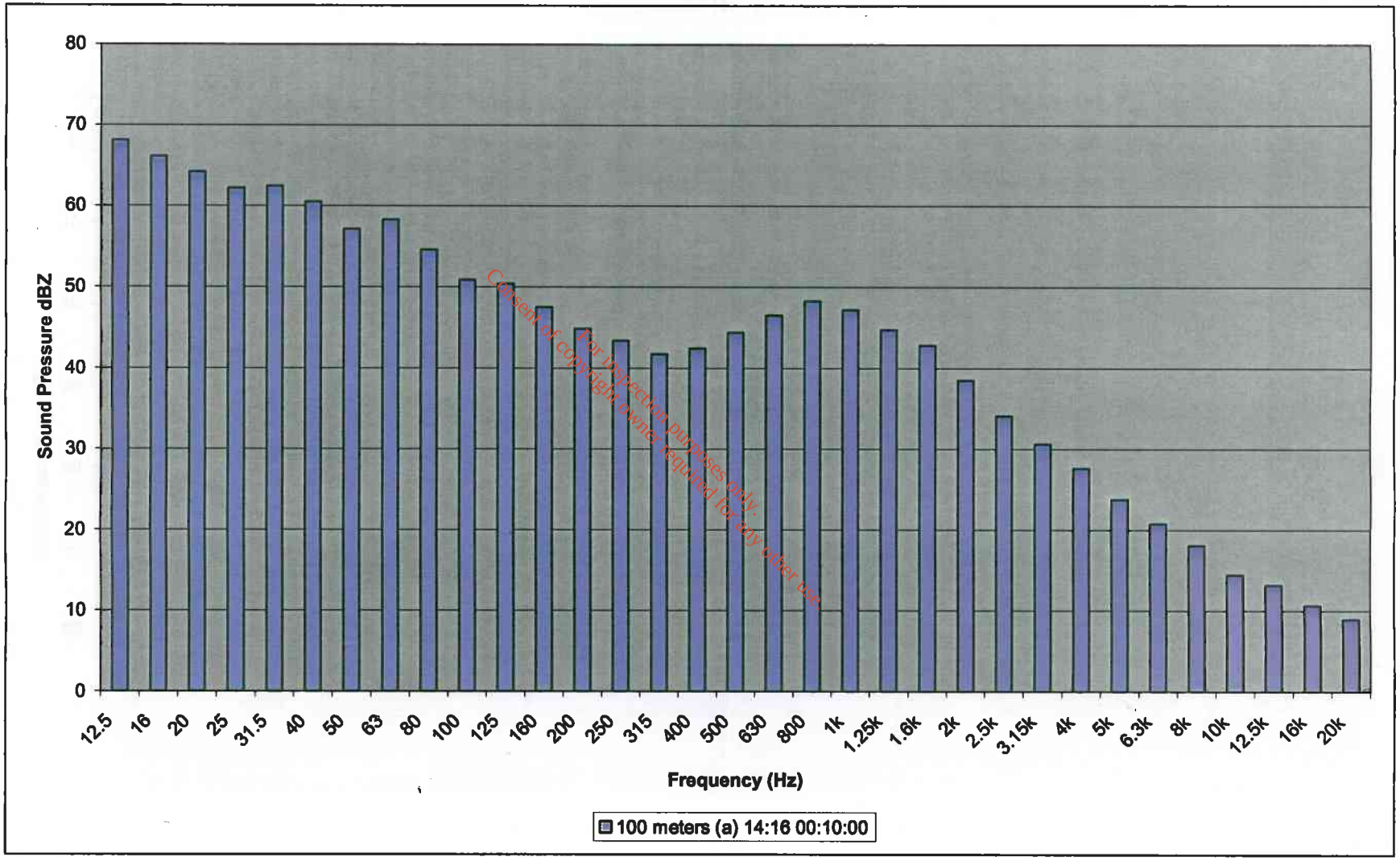
Table 5 L_{Aeq} Full Octave Analysis of Noise Measurements, taken on the 10th November 2011

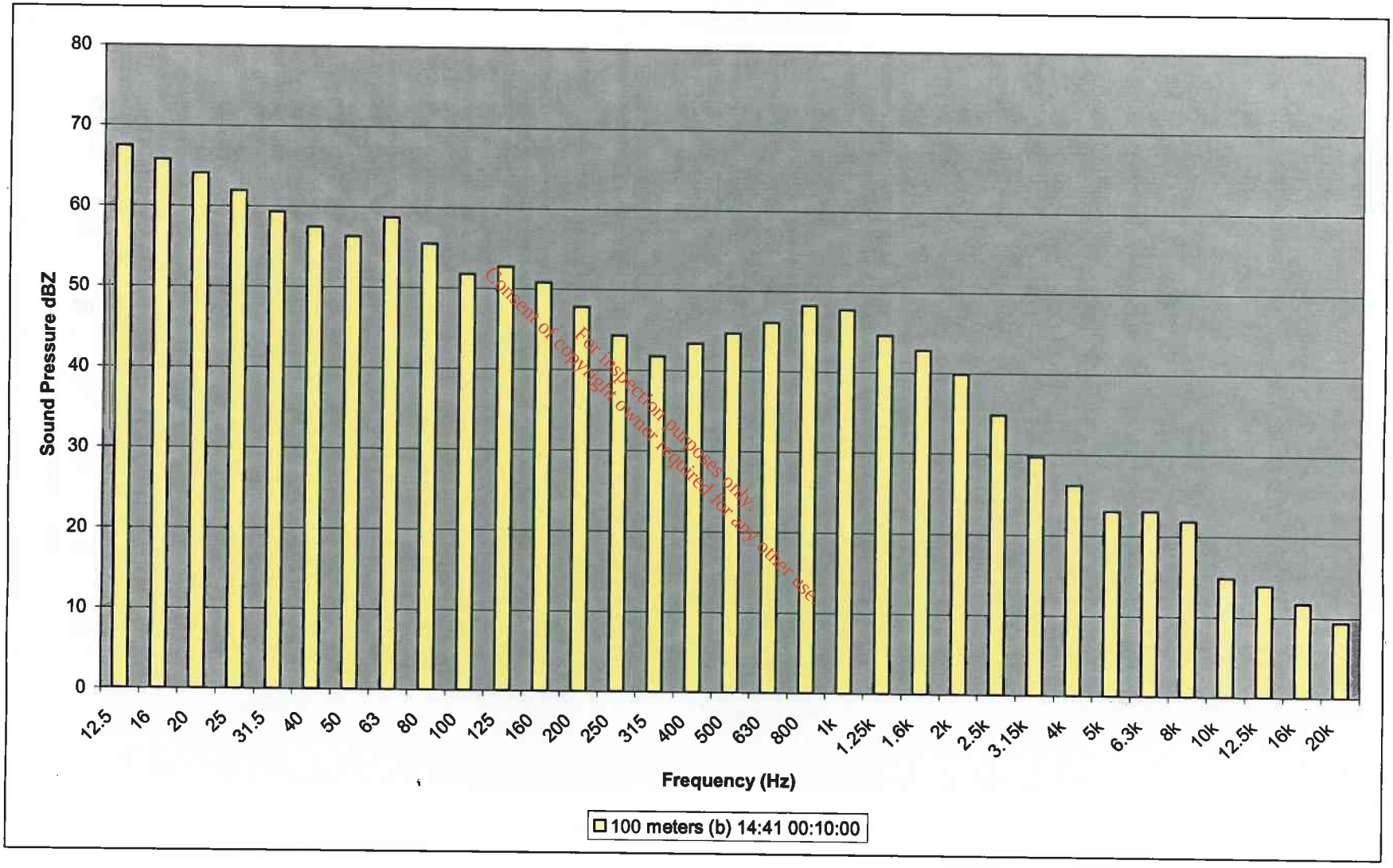
	L_{Aeq} Frequency (Hz)																		
Project Name	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**	**400**	**500**	**630**	**800**
200 meters (a)	62	61	58	56	54	56	**60**	58	54	50	46	44	42	37	41	43	46	48	49
100 meters (a)	68	66	64	62	62	60	57	58	55	51	50	47	45	43	42	42	44	46	48
100 meters (b)	67	66	64	62	59	57	56	**59**	56	52	53	51	48	44	42	43	45	46	48
50 meters	69	67	65	62	60	59	58	58	57	57	**62**	58	53	52	51	49	51	48	49
40 meters (a)	70	68	66	64	62	61	59	59	58	57	57	55	53	49	47	49	50	48	49
40 meters (b)	68	66	66	65	**68**	61	60	61	61	59	58	57	54	50	49	50	51	49	51
20 meters (a)	65	63	59	59	60	**63**	57	58	60	57	54	50	47	45	43	43	46	46	48
20 meters (b)	69	68	69	68	**73**	66	65	64	64	61	61	60	60	57	54	53	55	54	54

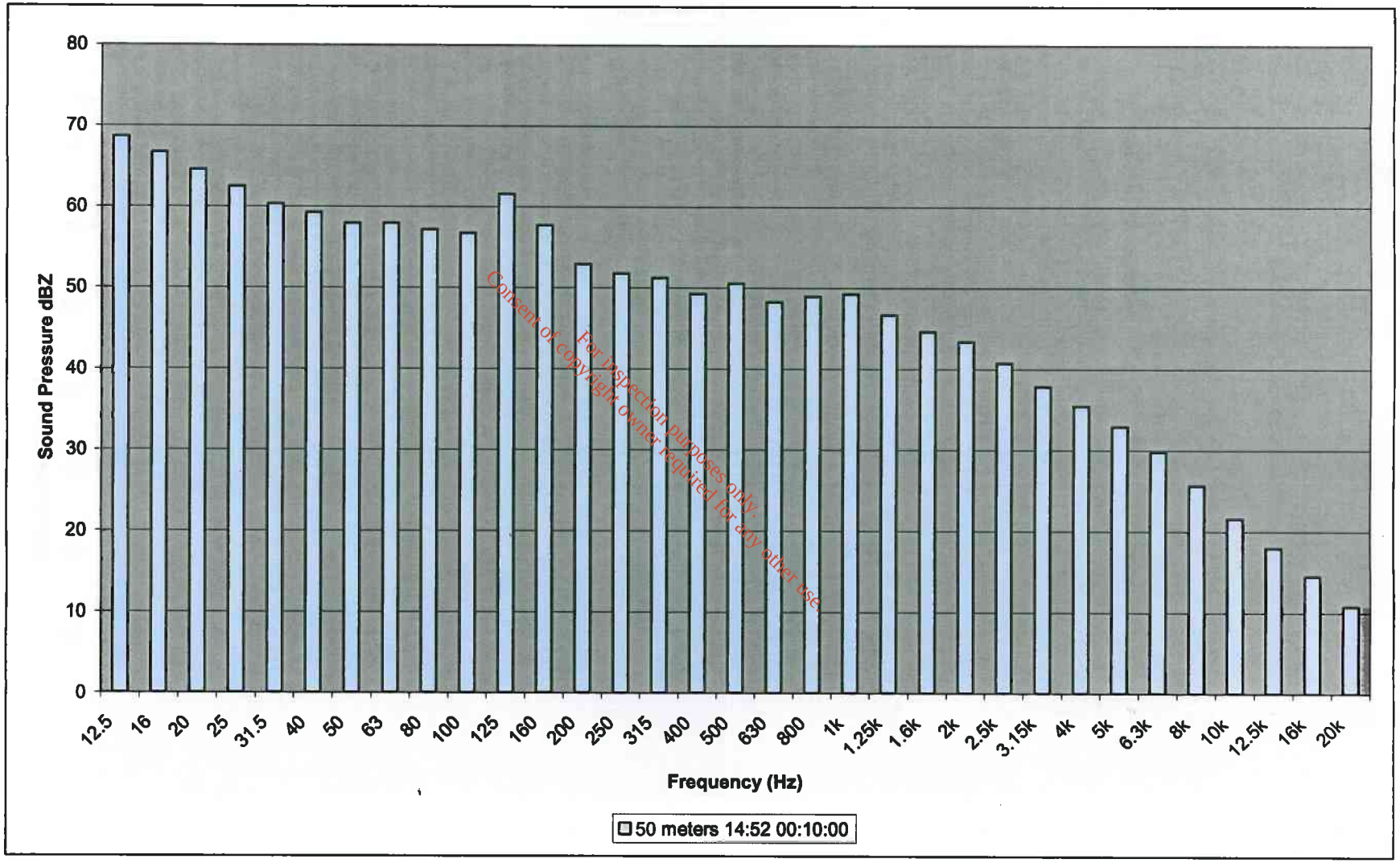
Table 5 L_{Aeq} Full Octave Analysis of Noise Measurements, taken on the 10th November 2011 (Continued)

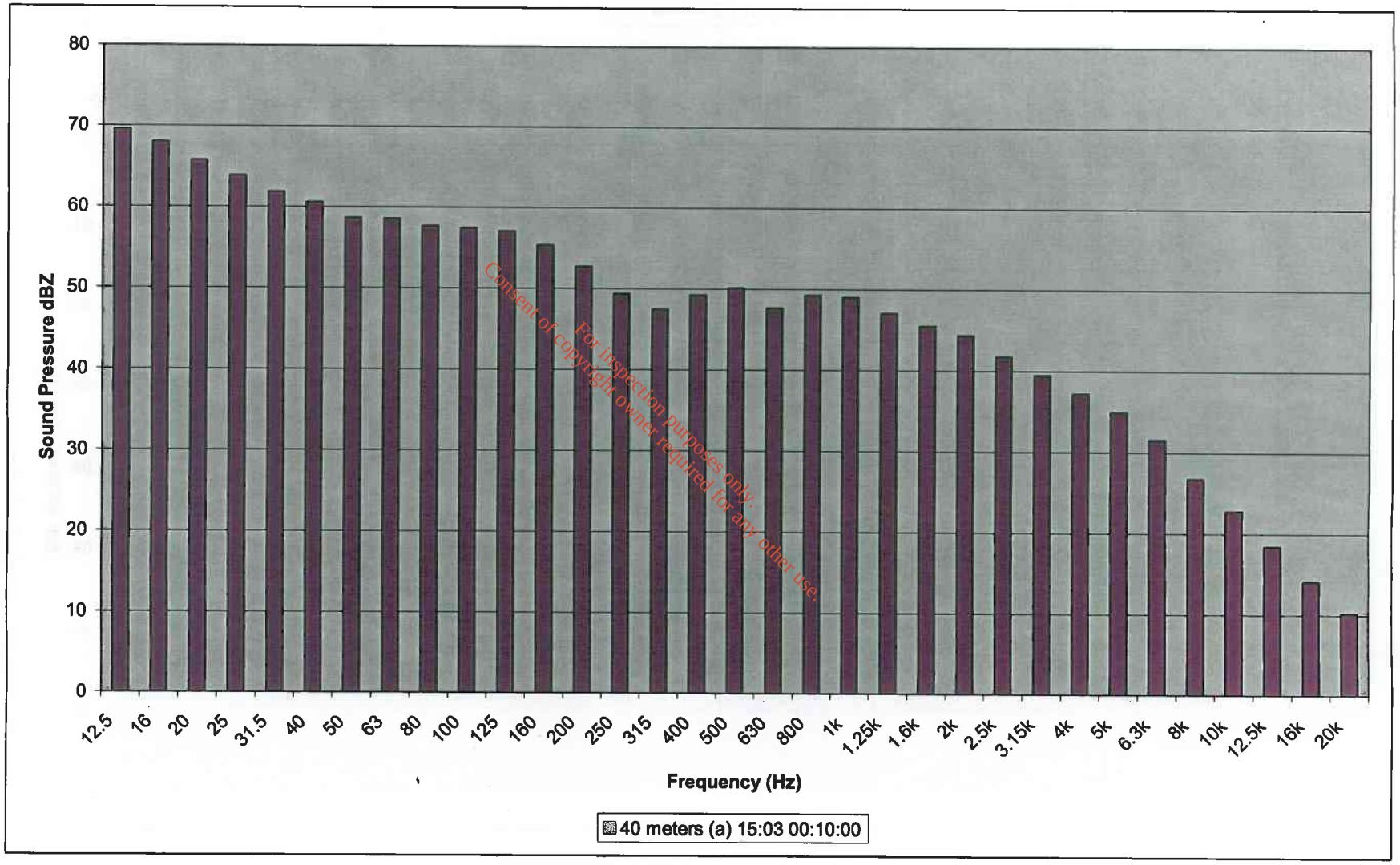
	L_{Aeq} Frequency (Hz)													
Project Name	**1k**	**1.25k**	**1.6k**	**2k**	**2.5k**	**3.15k**	**4k**	**5k**	**6.3k**	**8k**	**10k**	**12.5k**	**16k**	**20k**
200 meters (a)	47	44	42	38	34	30	27	23	19	17	14	13	11	9
100 meters (a)	47	45	43	38	34	31	28	24	21	18	14	13	11	9
100 meters (b)	48	45	43	40	35	30	26	23	23	22	15	14	12	9
50 meters	49	47	45	43	41	38	35	33	30	26	22	18	14	11
40 meters (a)	49	47	45	44	42	39	37	35	31	27	23	18	14	10
40 meters (b)	50	48	46	46	43	42	38	36	35	28	25	21	16	10
20 meters (a)	47	44	41	41	39	36	34	31	29	28	26	24	20	14
20 meters (b)	53	51	49	49	47	48	48	42	42	37	33	31	28	20

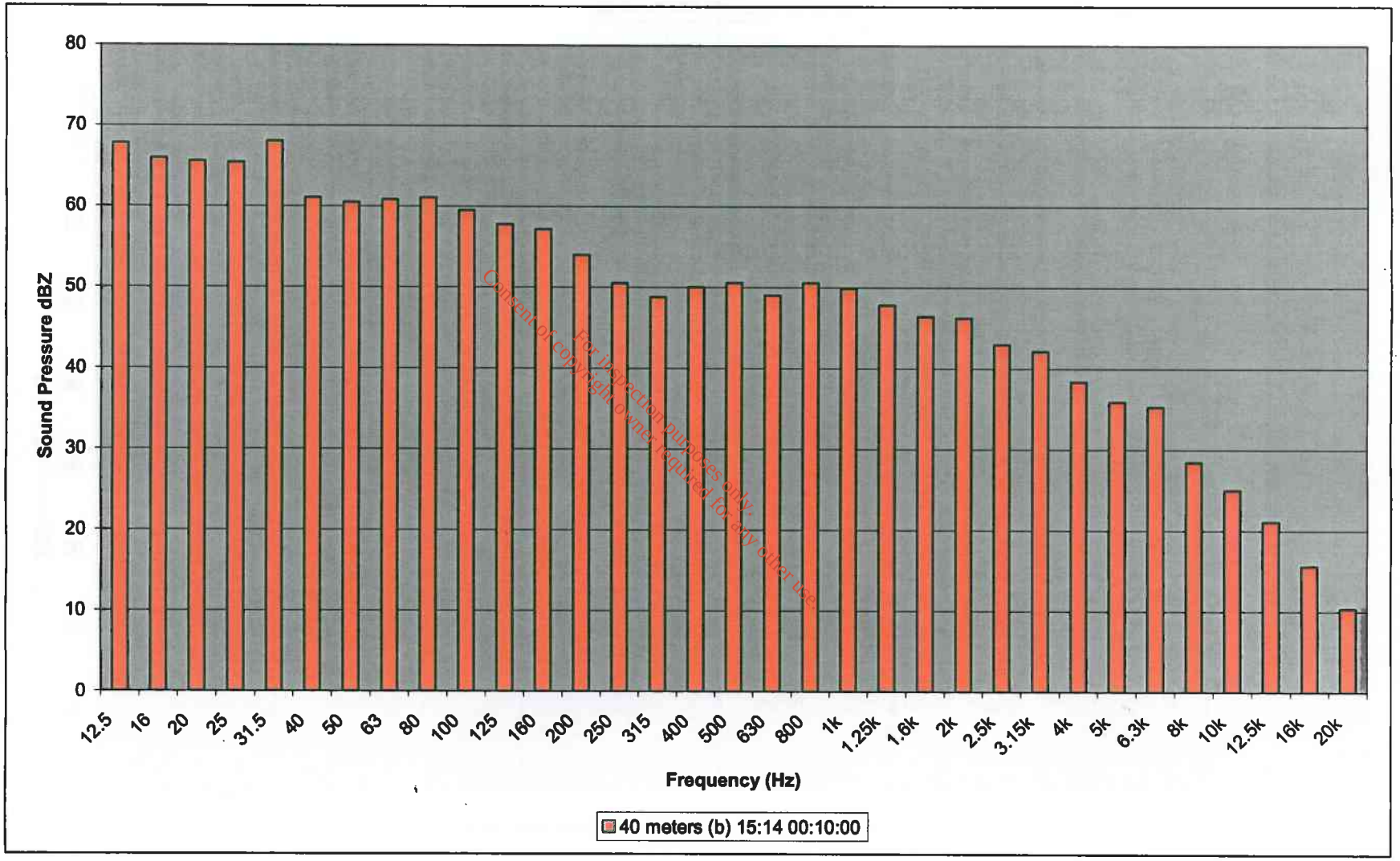


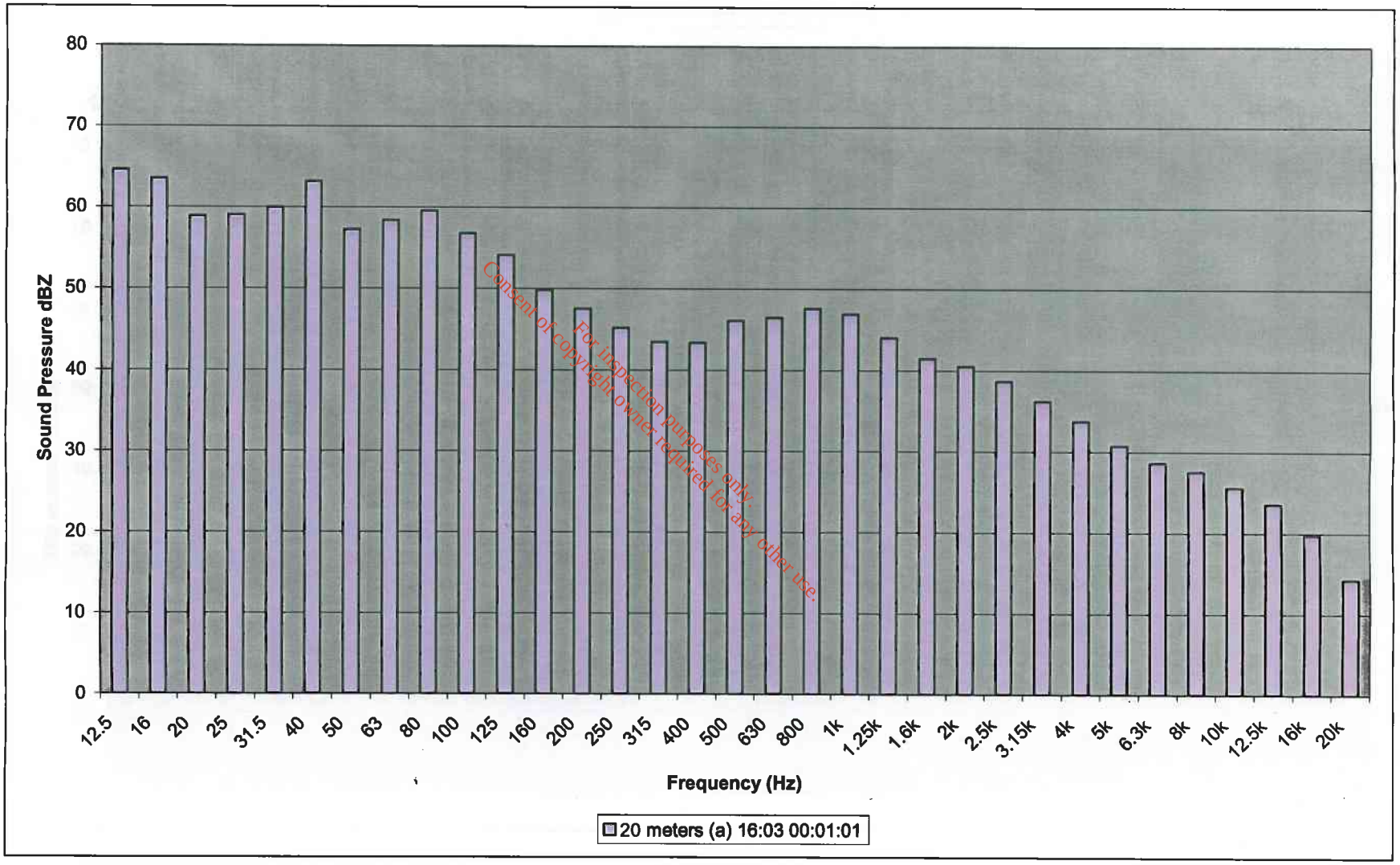


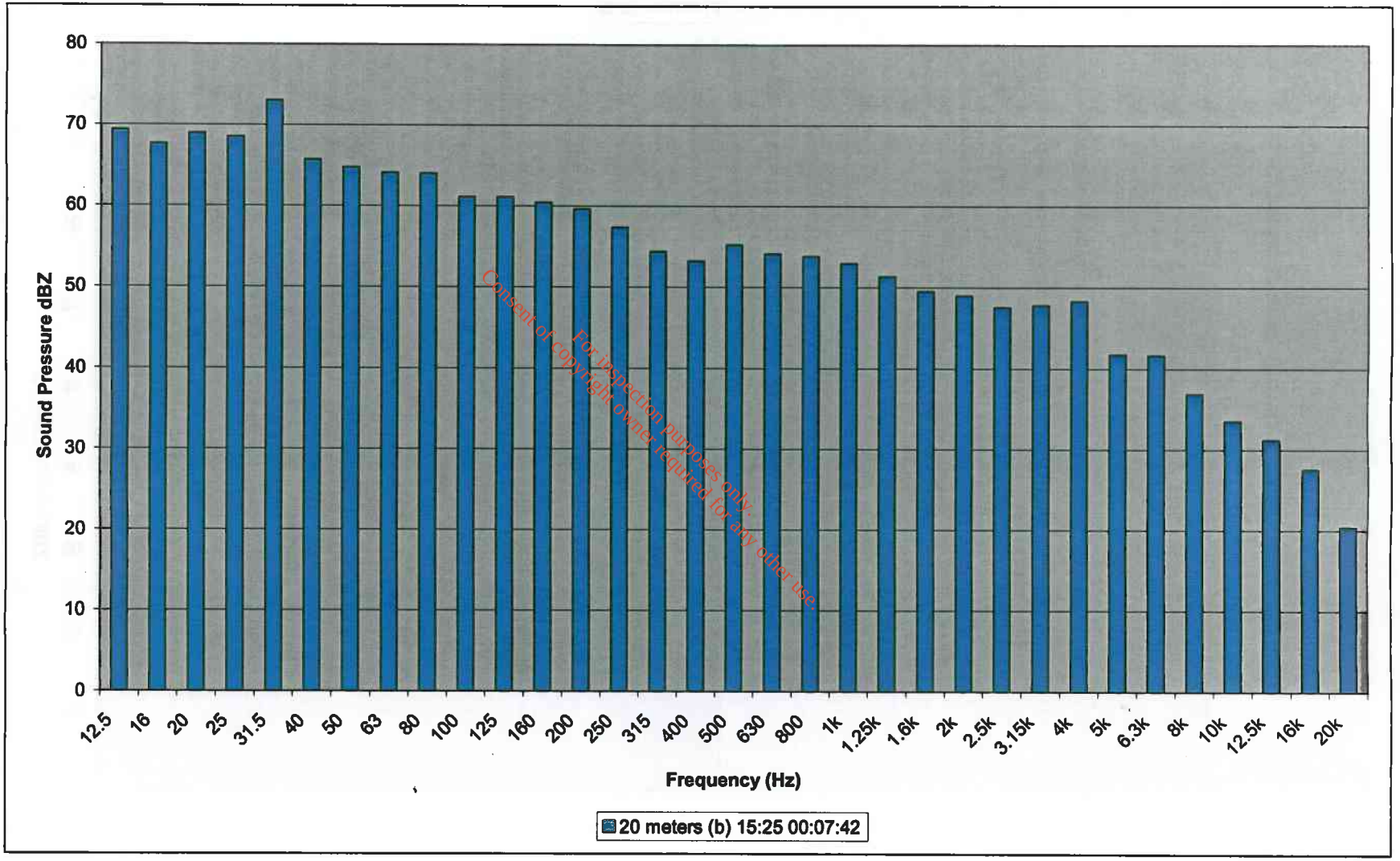


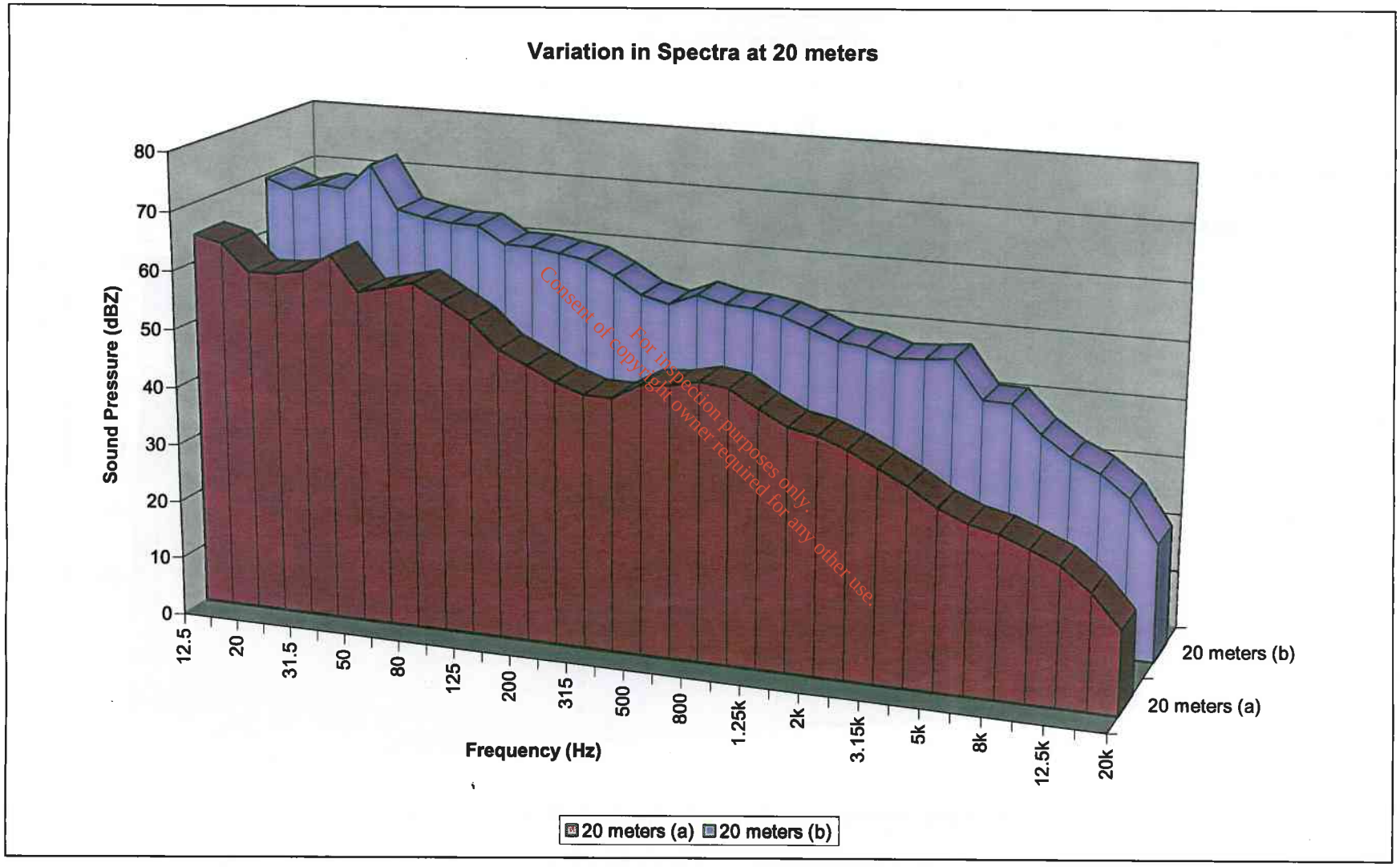


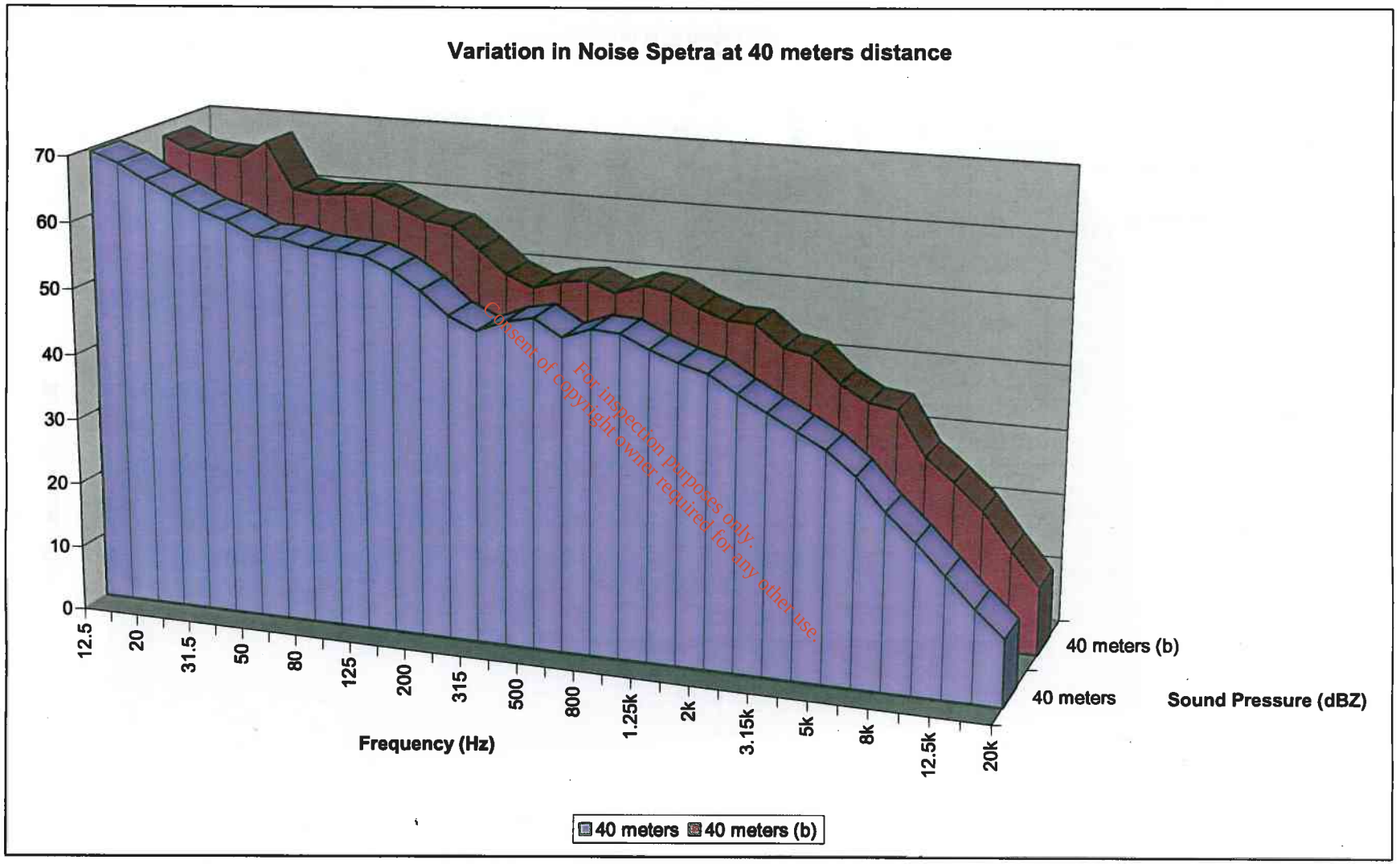












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AIR EMISSION TESTING OF STACK EMISSIONS FROM KMK METALS RECYCLING LTD, CAPPINCUR INDUSTRIAL ESTATE, DAINGEAN RD, TULLAMORE, CO. OFFALY.

PREFORMED BY ODOUR MONITORING IRELAND ON BEHALF OF ENVIROCO MANAGEMENT LTD.

PREPARED BY:	Dr. Brian Sheridan
ATTENTION:	Mr. Niall Nally
LICENCE NUMBER:	WO113-03
LICENCE HOLDER:	KMK Metals Recycling Ltd
FACILITY NAME:	KMK Metals Recycling Ltd
DATE OF MONITORING VISIT:	02nd December 2011
NAME AND ADDRESS OF CLIENT ORGANISATION:	KMK Metals Recycling Ltd, Cappincur Industrial Estate, Daingean Rd, Tullamore, Co. Offaly
NAME AND ADDRESS OF MONITORING ORGANISATION:	Odour Monitoring Ireland, Unit 32 DeGranville Court, Dublin Road, Trim, Co. Meath
DATE OF REPORTING:	13th Jan 2012 (ver.1) & 04th Feb 2012 (ver.2)
NAME AND THE FUNCTION OF THE PERSON APPROVING THE REPORT:	Dr. Brian Sheridan, Managing Partner, Odour Monitoring Ireland
REPORT NUMBER:	201245(2)
REVIEWERS:	Mr. Niall Nally

TABLE OF CONTENTS

Document Amendment Record

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201245(2)	Minor Amendments	B.A.S.	JWC	B.A.S	04/02/2012
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

ODOUR monitoring IRELAND

Signing sheet

Brian Sheridan Ph.D Eng

For and on behalf of Odour Monitoring Ireland

Executive summary

Odour Monitoring Ireland was commissioned by KMK Metals Recycling Ltd to perform an air emission test of their dust filtration system on the 02nd December 2011.

Monitoring was performed for Airflow rate, Total particulates, Moisture content and speciated metals (Particulate bound and gaseous based Metals). Particular reference was given to standard methodologies including EN13284-1, EN14385, EN13211 and EN14790.

A summary of the results are presented below.

Emission points identity	Parameter	Monitoring period and date	Periodic monitoring result	Expanded uncertainty (%)	Emission limit value	Status
Dust filtration plant – Exhaust stack	Volume flow (Nm^3/hr dry gas)	02nd Dec 2011 – 11.50AM to 12.10 PM	29,197	–	–	--
	Cd and Tl (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	<0.00052	<1.0	–	--
	Mercury (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	<0.000015	<1.0	–	--
	Lead (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	0.00512	<1.0		
	Chromium (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	0.0392	<1.0		
	Remaining metals (mg/Nm^3, dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	<0.00182	<1.0	–	--
	Total particulate matter (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	1.68	<2.0	–	--

1. Introduction

Odour Monitoring Ireland was requested by KMK Metals Recycling Ltd to perform air emission testing of their dust filtration emission points in accordance with standard European methods. The parameters listed in *Table 1.1* were monitored using the appropriate instrumentation as illustrated in *Table 1.1*.

Table 1.1. Monitored parameters and techniques for dust filtration emission point in KMK Metals Recycling Ltd.

Sample location	Parameter	AG2 Compliant	SOP	Analytical method
Exhaust dust filtration plant	Volumetric Flow Rate and temperature	Yes	2000	Pilot tube method and temperature probe-EN13284-1:2002
Exhaust dust filtration plant	Speciated Metals	Yes	2027	TCR Tecora automatic Total particulate sampling train and heated probes / impinger set-EN14385
Exhaust dust filtration plant	Mercury	Yes	2028	TCR Tecora automatic Total particulate sampling train and heated probes / impinger set-EN13211
Exhaust dust filtration plant	Water vapour	Yes	2017	Impingement – Gravimetric weight gain - EN14790:2005
Exhaust dust filtration plant	Total Particulates	Yes	2002	TCR Tecora automatic Total particulate sampling train and associated probes-EN13284-1:2002

This report presents details of this monitoring programme. This environmental monitoring was carried out by Dr. Brian Sheridan and Dr. John Casey, Odour Monitoring Ireland on the 02nd December 2011. Methodology, Results, Discussion, Conclusions and calculations are presented herein.

1.1 Plant details

The following surface plant details were noted during the study.

Company:	KMK Metals Recycling Ltd
Site:	KMK Metals Recycling Ltd
Stack:	Exhaust dust filtration plant
Sampling date:	02nd December 2011
Time sampling started:	11.50 AM
Time sampling ended:	15.30 PM
Licence Number:	WO113-03
Fuel type:	N/A
Plume appearance:	Not visible
Process:	Dust filtration from WEEE recycling / separation

1.2 Special Monitoring Requirements

There were no special monitoring requirements for this campaign.

1.3 Summary of methods

The summaries of methods are contained in *Table 1.1*.

Substance	Standard Method	Limit of Detection	Calculation Spreadsheet
Metals	EN 14385	<0.005 mg/m^3	6018
Mercury	EN 13211	<0.001 mg/m^3	6020
Flow Rates	EN 13284-1	0.80 m/s	6011

2. Monitoring Results

This section describes the results obtained through the study period.

2.1 Volumetric flow rate, temperature and stack static pressure

Sampling for airflow rate was performed in accordance with EN13284-1:2002. *Table 2.1* summarises the flow measurements from the stack and includes the stack velocity, expressed in metres per second (m s^{-1}) and volumetric airflow rates expressed in m^3 hr^{-1} at both actual and standard reference conditions of 273.15 K, 101.3 kPa (i.e. normalised temperature and pressure) on a dry gas basis.

Table 2.1. Volumetric airflow rate results for exhaust emission point from dust filter located in KMK Metals Recycling Ltd.

Stack Reference	Results Dust plant exhaust emission point
Stack diameter (m)	0.80
Average temperature (K)	286
Average airflow rate (m/s)	17.68
Area (m^2)	0.50272
Atmospheric pressure (kPa)	99.55
Average static pressure (kPa)	0.021
Standard barometric pressure (kPa)	101.30
Actual volumetric airflow rate (Am^3/hr)	31,997
Normalised volumetric airflow (Nm^3/hr)[1]	30,038
Moisture content (%)	2.80
Oxygen %	20.90
Normalised volumetric airflow rate dry (Nm^3/hr)	**29,197**
Limit value	--
Maximum pressure recorded (Pa)	255
Minimum pressure recorded (Pa)	218
Ratio b/n max and min pressure	1.169
Angle of swirl (deg) (must be less than <15)	2
Did measurement location comply with standard.	No (one port, doubled up on sampling across one plane)
Leak check pass on pitot	Yes
Dynamic pressure	>5Pa

Notes: [1] denotes normalised to 273.15 Kelvin and 101.3 kPa, with no correction for moisture content.

2.2 Results for Total particulates and metals species concentration

Flue gas analysis was performed on the exhaust emission points located on the dust filtration equipment. Total particulates and metals sampling and analysis was performed using a TCR Automatic Iso stack plus sampling train with heated probe and impinger train. The results of the testing are presented in *Table 2.2*.

Stack based concentrations have been presented at standard reference conditions of 273.15 K and 101.3 kPa, dry gas.

For Total particulates and metals sampling monitoring, the average DI% for monitoring of:

Emission point dust filtration plant was -0.21%,

This value were inside the lower and upper limit value of –ive 5% to +ive 15% in order to comply with reference standard EN13284-1:2002.

Sampling for Total particulates and Metals was performed on one sample plane. Sample points were doubled up on this single plane.

Table 2.2. Stack concentrations and emission value results from emission point dust filtration plant.

Emission Point Reference: Dust filtration plant										
Substance to be Monitored	**Emission Limit Value (see Table 7 TALuft) (kg/hr)**	**Periodic Monitoring Result (mg/Nm³, dry gas)**	**Units Reference Conditions 273 K, 101.3 kPa, dry gas**	**Uncertainty Of Measurement +/-**	**Stack Flow Rate (Nm³/hr dry gas)**	**Limit (Nm³/hr dry gas)**	**Date of Sampling**	**Sampling Start/End Times**	**Method Reference**	**Operating Status**
Particulate matter		**1.68**	mg/Nm³	<2%	29,197	-	02/12/11	11.50AM to 15.30PM	EN13284-1	---
Cadmium	0.0025	<0.00026	mg/Nm³	<1%						
Thallium	0.0025	<0.00026	mg/Nm³	<1%						
Total	–	--	mg/Nm³							
Mercury	0.0025	<0.000015	mg/Nm³	<1%					EN 13211 EN 14385	
Antimony	–	<0.00026	mg/Nm³	<1%						
Arsenic	0.0025	<0.00026	mg/Nm³	<1%						
Lead	0.025	**0.00512**	mg/Nm³	<1%						
Chromium	--	**0.0392**	mg/Nm³	<1%						
Cobalt	–	<0.00026	mg/Nm³	<1%						
Copper	–	<0.00026	mg/Nm³	<1%						
Manganese	–	<0.00026	mg/Nm³	<1%						
Nickel	0.025	<0.00026	mg/Nm³	<1%						
Vanadium	–	<0.00026	mg/Nm³	<1%						
Total	–	–	mg/Nm³	<1%						

Additional Information
Metals were tested by ICP-MS - Analysis was carried out in accredited laboratories.
The pre and post leak check were within the requirements of BS EN 13284-1 (Start – 100cc/min: End – 110 cc/min at 62 KPa).
Isokinetic conditions were -0.21% for the test
Number of ports = 1
Straight length before sample point = <5 –not in compliance
Straight length after sample point = >2 – in compliance
Sample blank = < 0.80% which is <10% ELV – Compliant
Pitot leak check = OK

Angle of Flow with regard to duct axis: <15 degrees
Differential pressure at pitot tube: >5Pa
Ratio of maximum to minimum velocity: <3:1
There was no negative flow in the stack
Moisture content of the gas: 2.80%
The temperature of stack gas was: 13 degrees C
Values in bold are the only detectable metals/dust in the air stream.

4. *Appendix I* - Sampling and analysis details

A.4.1 Location of Sampling
KMK Metals Recycling Ltd.

A.4.2 Date & Time of Sampling
02nd December 2011

A.4.3 Personnel Present During Sampling
Dr. John Casey, and Dr. Brian Sheridan Odour Monitoring Ireland, Trim, Co. Meath. MCERT Level 1 MM06743 and MM0674.

A.4.4 Instrumentation
S type pitot (OMI08) and PT100 thermocouple (OMI02);
Testo 400 handheld (OMI11) and appropriate probes.
Automatic ISOSTACK Plus TCR Tecora particulates sampling train (OMI 13).
Impinger train (OMI 14) and heated probe (OMI 09).

A.4.5 Standards
EN13284-1:2002
MID 13284-1, MCERTS Documentation, www.s-t-a.org
EN14385
EN14790:2005
EN13211

6. *Appendix II* - Quality assurance checklist

Velocity measurements:	
Were water droplets present?	No
Direction of gas flow within ± 15^0 of stack axis	Yes
Absence of swirling flow	Yes
Dynamic pressure > 5 Pa at all sampling points	Yes
Ratio of the highest to lowest dynamic pressure < 9:1.	Yes
Sampling:	
Sampling plane was correctly positioned	Yes
Area of sampling apparatus was < 10% of stack area	Yes
Sampling was from centres of equal areas	Yes
Sampling at each point not less than 3 minutes	Yes
Nozzle was facing directly upstream to within ±10^0	Yes
Leak check performed before and after each run and passed	Yes
Sampling handling:	
Minimum weight of sample collected > 0.30% of filter weights	Yes
Samples achieved stable weight	Yes
Particulate samples sent for analysis	Yes
QA procedure:	
Isokinetic data sheet completed and signed off	Yes
Report saved electronically to server	Yes
Raw data and hard copy of report filed together	Yes