

BIOGEN POWER LIMITED

**PROPOSED BIOGEN BARRY FACILITY
- BASELINE NOISE ASSESMENT**

June 2008

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Prepared for
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1 INTRODUCTION

1.1 Background

1.1.1 Parsons Brinkerhoff has been commissioned to undertake an Environmental Impact Assessment of the proposed Biogen Power Barry Facility.

1.1.2 As part of the assessment, and in order to build a picture of how the new facility will affect the noise climate in the area, PB has undertaken a baseline noise assessment to quantify the existing noise levels at the nearest noise sensitive receptors. This report details the approach and the findings.

1.2 Site Description

1.2.1 The site proposed for the Barry facility lies on Atlantic Road. In the Dock area of the town the site is approximately 200m-300m from the sea to the south. The site is bordered by other industrial activities. To the northeast (up the coast) industrial developments stretch for 2Km or so, ending in farm land.

1.2.2 The only residential noise sensitive receptors that may be affected by any change in the noise climate caused by the proposed development lie to the southwest, west and northwest of the proposed site. There is also a SSSI near the proposed site.

1.2.3 Apart from the existing industrial activity noise sources in the area include:

- A railway line running diagonally, between the docks area and the residential and commercial centre of the town, southwest to the northeast.
- Local traffic and other activity noise from the residential and commercial centre of Barry.
- Noise from shipping in the Bristol Channel.

1.3 Legislative Guidance

1.3.1 The guidance on the assessment of noise within TAN 11^[1] has been adhered too. TAN 11 outlines the key considerations to be taken into account when assessing the impact of a new development on the local noise climate.

1.3.2 The method detailed in BS 7445-1:2003^[2] and BS 7445-3:1991^[3], were followed during the surveys undertaken. BS 7445 defines and prescribes best practice during the recording and reporting of environmental noise. It is inherently applied in all instances when making environmental noise measurements.

2 METHODOLOGY

2.1 General

2.1.1 A noise survey has been conducted to quantify the existing ambient noise levels in the vicinity of the proposed site. A short term sampling method (spot measurements) was undertaken at the nearest Noise Sensitive Receptors (NSR's) to the proposed site. Measurements were taken during the daytime, evening and night-time periods.

2.1.2 A glossary of acoustics terminology is provided in Appendix A.

2.2 Noise Sensitive Receptors

2.2.1 There is a SSSI near the proposed site however it is only considered to contain invertebrates which are not sensitive to noise. The SSSI has therefore not been considered as one of the noise sensitive receptors.

2.2.2 The following residential locations have been identified as potential Noise Sensitive Receptors (NSR's) representative of the nearest locations that could be affected by the proposed scheme:

- A** Corner St. Marys Avenue & Dock View Road, CF63 4LT
- B** Dyfrig Street, CF62 5TW
- C** Bendrick Road, CF63 3RT
- D** Y Rhodfa, CF63 4BB

2.2.3 Exact measurement locations and coordinates are presented in Appendix B.

2.3 Monitoring

2.3.1 All noise monitoring was conducted in accordance with the guidance set out in BS 7445:2003. Measurements were made using Class 1 Integrating-Averaging Sound Level Meters as defined in IEC 61672:2003^[4]. Meters were calibrated and checked before and after each measurement period, with no change in level noted. The calibration certificates for the meters used are provided in Appendix D, which also shows the serial numbers of all the equipment used. Microphones were placed 1.2 - 1.5m above the ground, and at least 1.5m from any acoustically reflective surface. Meters were set to a fast response time for all measurements.

2.3.2 Measurements took place on typical weekdays between the: 29th May 2008 and the 3rd June 2008. Weather conditions were conducive to successful monitoring; with wind speeds less than 5ms⁻¹. Roads were dry, and there was no rain at the time of measurement. The ambient temperature was between 18 and 20°C during the daytime, reducing to 15°C during the night-time period.

2.3.3 The site engineer was Chris Borak of PB.

3 SURVEYS UNDERTAKEN

3.1 Spot Measurements

3.1.1 Measurements were taken at the monitoring locations listed in 2.2.1. The measurement sampling time for each of the periods was as follows:

- Daytime (1100 – 1700) – 15 Minutes (3 x 5 minutes)
- Evening (1900 – 2300) - 10 Minutes (2 x 5 minutes)
- Night-time (1200 – 0500) – 5 Minutes

3.1.2 Two sets of measurements were taken during the day and night time periods with at least 2 hours between repeat measurements.

3.1.3 The following statistical parameters were recorded in third octave bands, L_{A10} , L_{A90} , L_{Amax} , L_{Amin} , L_{Aeq} .

4 BASELINE RESULTS

4.1 Measured Levels

4.1.1 The full set of results for the spot measurements are shown in the Noise Monitoring Forms in Appendix C. A summary of the lowest measurements taken at each of the locations are presented in Table 1.

Location	Day		Evening		Night	
	L_{Aeq} (dB)	L_{A90} (dB)	L_{Aeq} (dB)	L_{A90} (dB)	L_{Aeq} (dB)	L_{A90} (dB)
A	61.8	49.3	50.6	49.4	35.9	29.7
B	49.3	45.2	47.9	44.8	36.2	30.7
C	48.2	43.1	43.5	41	40.8	38.5
D	50.6	46.8	46.9	44.8	36.1	28.5

Table 1: Baseline Noise Measurements

4.2 Subjective Impressions of the Noise Climate

4.2.1 **Location A** – Regular local road traffic noise from Dockview Road was dominant during the day. Noise from the railway line was occasionally audible at all times of day. Activity noise from pedestrians could be heard from the street at all times.

4.2.2 **Location B** - Distant traffic from Ffordd y Mileniwm (north) was audible during the day. Industrial noise from the dock area was also audible during the day – mainly HGV and tipper truck movements. Some shipping noise was also present.

4.2.3 **Location C** – Industrial noise from the dock area (west) made the largest contribution to the ambient noise levels at all times of day. This consisted of mainly HGV and tipper truck movements during the day with some continuous low frequency noise. During the evening and at night only the continuous low frequency noise persisted.

PROPOSED BIOGEN BARRY FACILITY – BASELINE NOISE ASSESMENT

4.2.4 **Location D** – HGV movements could be heard coming from the dock area, and from the southwest, during the day. Road traffic noise from the main road could be heard during the day and evening when some aircraft noise could also be heard on occasion. Seagulls' made a considerable contribution to the ambient noise levels at all times.

5 REFERENCES

- 1 TAN 11: 1997 "TECHNICAL ADVICE NOTE 11 - NOISE", PLANNING GUIDANCE WALES
- 2 BS 7445-1: 2003 "DESCRIPTION AND MEASUREMENT OF ENVIRONMENTAL NOISE: GUIDE TO QUANTITIES AND PROCEDURES", BSI
- 3 BS 7445-3: 1991 "DESCRIPTION AND MEASUREMENT OF ENVIRONMENTAL NOISE: GUIDE TO APPLICATION TO NOISE LIMITS ", BSI
- 4 IEC 61672:2003 "ELECTROACOUSTICS - SOUND LEVEL METERS", BSI

APPENDIX A

GLOSSARY OF TERMS

**PROPOSED BIOGEN BARRY FACILITY –
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Decibel (dB)	<p>The decibel scale is used in relation to sound because it is a logarithmic rather than a linear scale. The decibel scale compares the level of a sound relative to another. The human ear can detect a wide range of sound pressures, typically between 2×10^{-5} and 200 Pa, so the logarithmic scale is used to quantify these levels using a more manageable range of values.</p>
Sound Pressure Level (SPL)	<p>The Sound Pressure Level has units of decibels, and compares the level of a sound to the smallest sound pressure generally perceptible by the human ear, or the reference pressure. It is defined as follows:</p> $\text{SPL (dB)} = 20 \text{ Log}_{10}(P/P_{\text{ref}}) \quad \text{where } P = \text{Sound Pressure (in Pa)}$ $P_{\text{ref}} = \text{Reference Pressure } 2 \times 10^{-5} \text{ Pa}$ <p>An SPL of 0dB suggests the Sound Pressure is equal to the reference pressure. This is known as the <i>threshold of hearing</i>.</p> <p>An SPL of 140dB represents the <i>threshold of pain</i>.</p>
Loudness	<p>The loudness of a sound is subjective, and differs from person to person. The human ear perceives loudness in a logarithmic fashion, hence the suitability of the decibel scale. Generally, a perceived doubling or halving of loudness will correspond to an increase or decrease in SPL of 10dB. Note that a doubling of sound energy corresponds to an increase in SPL of only 3dB.</p>
A-Weighting	<p>The human ear can detect a wide range of frequencies, from 20Hz to 20kHz, but it is more sensitive to some frequencies than others. Generally, the ear is most sensitive to frequencies in the range 1 to 4 kHz. The A-weighting is a filter that can be applied to measured results at varying frequencies, to mimic the frequency response of the human ear, and therefore better represent the likely perceived loudness of the sound. SPL readings with the A-weighting applied are represented in dB(A).</p>
Equivalent Continuous Level ($L_{\text{eq,T}}$)	<p>The Equivalent Continuous Level represents a theoretical continuous sound, over a stated time period, T, which contains the same amount of energy as a number of sound events occurring within that time, or a source that fluctuates in level.</p> <p>For example, a noise source with an SPL of 80 dB(A) operating for two hours during an eight-hour working day, has an equivalent A-weighted continuous level over eight hours of 74 dB, or $L_{\text{Aeq,8hrs}} = 74 \text{ dB}$.</p> <p>The time period over which the L_{eq} is calculated should always be stated.</p>
Maximum Sound Level (L_{max})	<p>The maximum sound level, L_{max} (or L_{Amax} if A-weighted) is the highest SPL that occurs during a given event or time period.</p>
Minimum Sound Level (L_{min})	<p>Similarly, the minimum sound level, L_{min} (or L_{Amin} if A-weighted) is the lowest SPL that occurs during a given event or time period.</p>
L_{90} or L_{A90} and other percentile measures	<p>This represents the SPL which is exceeded 90% of the time, expressed in dB or dB(A). L_{A90} is used to quantify background noise levels (see below). Other percentiles exist and are used for various types of noise assessment. These include L_{01}, L_{10}, L_{50}, L_{99}.</p>

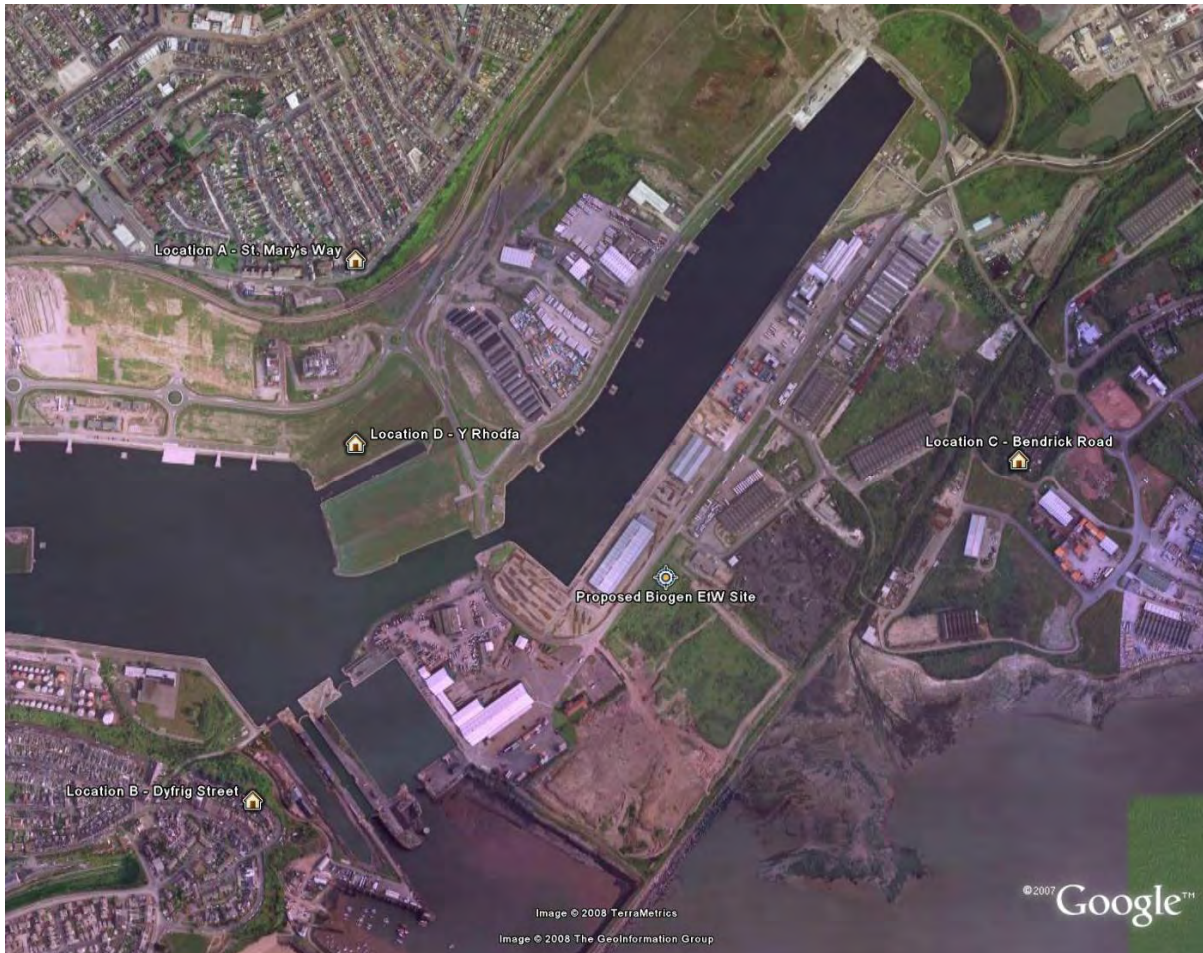
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Noise	A noise can be described as an unwanted sound. Noise can cause nuisance.
Ambient Noise	The totally encompassing sound in a given situation, at a given time, including noises from any source in any direction.
Background Noise	This is defined as the L_{A90} of the residual noise.
Noise Sensitive Receptors (NSR's)	Any identified receptor likely to be affected by noise. These are generally human receptors, which may include residential dwellings, work places, schools, hospitals, and recreational spaces.
Octave	In reference to the frequency of a sound, an octave describes the difference between a given frequency and that which is double that frequency, e.g. 125Hz to 500Hz, or 4kHz to 8kHz.
Octave/Third Octave Bands	A sound made up of more than one frequency can be described using a frequency spectrum, which shows the relative magnitude of the different frequencies within it. The possible range of frequencies is continuous, but can be split up into discrete bands, often an octave or third-octave in width. Each octave band is referred to by its centre frequency, generally 63Hz, 125Hz, 250Hz, 500Hz, 1kHz etc.

APPENDIX B

MEASUREMENT LOCATIONS AND MAP

**PROPOSED BIOGEN BARRY FACILITY –
BASELINE NOISE ASSESMENT**



Location	Address	GPS Coordinates
A	Corner St. Mary's Avenue and Dockview road, CF63 3RG	51.402823, -3.262393
B	No.11, Dyfrig Street, CF62 5TW	51.394582, -3.264903
C	No.4, Bendrick Road, CF63 3RE	51.399778, -3.246195
D	Y Rhodfa, CF63 4BB	51.400030, -3.263752

APPENDIX C

**NOISE MONITORING FORMS AND SITE
PHOTOGRAPHS**

Noise Monitoring Form



Project: Biogen Barry	Job No.: FSE97027C
Location: A	Date: 03/06/2008

Equipment: Rion NA-28	Engineer: Chris Borak
Pre-Calibration Level: 93.9 dB	General Weather Description: No rain, Some cloud cover, High Humidity
Post-Calibration Level: 93.9 dB	

Measurement Period				Weather			Statistical Noise Levels / dB(A)					Description of Audible Noise
Date	Start	Elapsed	End	Speed (m/s)	Wind Direction from	Temp (°C)	L _{max}	L _{min}	L _{eq}	L ₁₀	L ₉₀	
29/05/2008	14:40	00:05	14:45	1.6	N	19	73.4	47.8	61.8	66.3	49.9	Regular local traffic from Dockview road
29/05/2008	14:45	00:05	14:50	1.6	N	19	91.9	46.4	66.5	68.3	52.6	Bird Noise
29/05/2008	14:50	00:05	14:55	1.6	N	19	74.3	47.1	62.1	65.9	50.0	Trains on railway track.
29/05/2008	16:30	00:05	16:35	1.6	N	19	75.3	47.1	63.1	67.3	50.5	Regular local traffic from Dockview road
29/05/2008	16:35	00:05	16:40	1.6	N	19	79.2	47.2	64.9	68.3	49.3	Bird Noise
29/05/2008	16:40	00:05	16:45	1.6	N	19	80.0	48.7	65.0	68.5	51.5	Trains on railway track.
29/05/2008	21:00	00:05	19:45	0.5	N	18	84.5	50.6	67.0	68.5	54.4	Traffic flows lower than day time but still the dominant
29/05/2008	21:05	00:05	19:50	0.5	N	18	75.2	47.3	63.2	67.6	51.2	noise source.
03/06/2008	01:10	00:05	01:15	0.5	N	15	67.6	31.4	43.9	46.9	34.2	Occasional local traffic. Some activity in building and on street.
03/06/2008	03:40	00:05	03:45	0.5	N	15	64.4	31.2	35.9	39.3	29.7	

Noise Monitoring Form



Project: Biogen Barry	Job No.: FSE97027C
Location: B	Date: 03/06/2008

Equipment: Rion NA-28	Engineer: Chris Borak
Pre-Calibration Level: 93.9 dB	General Weather Description: No rain, Some cloud cover, High Humidity
Post-Calibration Level: 93.9 dB	

Measurement Period				Weather			Statistical Noise Levels / dB(A)					Description of Audible Noise
Date	Start	Elapsed	End	Speed	Wind Direction	Temp (°C)	L _{max}	L _{min}	L _{eq}	L ₁₀	L ₉₀	
29/05/2008	13:30	00:05	13:35	1.6	N	20	69.5	45.0	51.3	52.7	46.5	Distant Traffic from the north, bird song
29/05/2008	13:35	00:05	13:40	1.6	N	20	75.0	43.5	55.5	51.3	45.2	Some distant shipping noise.
29/05/2008	13:40	00:05	13:45	1.6	N	20	67.3	44.0	51.6	53.7	46.3	HGV movements and tipper trucks (industrial) from northeast.
29/05/2008	15:30	00:05	15:35	1.6	N	19	72.4	44.2	49.3	50.1	46.0	Distant Traffic from the north, bird song
29/05/2008	15:35	00:05	15:40	1.6	N	19	74.6	43.6	49.9	49.4	45.3	Some distant shipping noise.
29/05/2008	15:40	00:05	15:45	1.6	N	19	74.2	44.2	53.4	50.2	46.2	HGV movements and tipper trucks (industrial) from northeast.
29/05/2008	19:00	00:05	19:05	0.5	N	18	71.1	41.7	50.9	49.8	44.8	Distant traffic.
29/05/2008	19:05	00:05	19:10	0.5	N	18	59.7	43.1	48.0	49.2	45.0	Distant traffic.
03/06/2008	01:20	00:05	01:25	0.5	N	15	61.8	28.9	36.2	36.6	30.7	Seaguls, very distant road traffic noise.
03/06/2008	03:50	00:05	03:55	0.5	N	15	56.0	27.0	36.8	35.5	31.5	

Noise Monitoring Form



Project: Biogen Barry	Job No.: FSE97027C
Location: C	Date: 03/06/2008

Equipment: Rion NA-28	Engineer: Chris Borak
Pre-Calibration Level: 93.9 dB	General Weather Description: No rain, Some cloud cover, High Humidity
Post-Calibration Level: 93.9 dB	

Measurement Period				Weather			Statistical Noise Levels / dB(A)					Description of Audible Noise
Date	Start	Elapsed	End	Speed (m/s)	Wind Direction from	Temp (°C)	L _{max}	L _{min}	L _{eq}	L ₁₀	L ₉₀	
29/05/2008	14:00	00:05	14:05	1.6	N	19	66.8	45.3	50.5	52.6	46.9	Some wind noise in trees, distant chain saw (south),
29/05/2008	14:05	00:05	14:10	1.6	N	19	64.4	45.0	49.8	52.2	46.5	Low frequency industrial hum from dock area,
29/05/2008	14:10	00:05	14:15	1.6	N	19	58.9	44.4	48.2	50.5	45.5	large vehicle and tipper truck movements from dock area.
29/05/2008	16:00	00:05	16:05	1.6	N	19	66.0	41.5	52.8	57.8	43.1	Local Traffic, distant chain saw (south),
29/05/2008	16:05	00:05	16:10	1.6	N	19	64.3	41.6	48.6	52.0	43.4	Low frequency industrial hum from dock area,
29/05/2008	16:10	00:05	16:15	1.6	N	19	66.4	42.8	52.6	55.7	45.4	large vehicle and tipper truck movements from dock area.
30/05/2008	19:00	00:05	19:05	0.5	N	18	65.9	39.7	49.3	52.2	41.6	Owl hooting, other birds,
30/05/2008	19:05	00:05	19:10	0.5	N	18	55.1	39.1	44.5	47.5	41.0	distant road traffic noise.
03/06/2008	01:30	00:05	01:35	0.5	N	15	58.9	36.5	40.8	41.8	38.5	Wind in trees, some local road traffic noise,
03/06/2008	04:00	00:05	04:05	0.5	N	15	58.2	37.5	41.3	43.2	49.1	Industrial noise to the west.

Noise Monitoring Form



Project: Biogen Barry	Job No.: FSE97027C
Location: D	Date: 03/06/2008

Equipment: Rion NA-28	Engineer: Chris Borak
Pre-Calibration Level: 93.9 dB	General Weather Description: No rain, Some cloud cover, High Humidity
Post-Calibration Level: 93.9 dB	

Measurement Period				Weather			Statistical Noise Levels / dB(A)					Description of Audible Noise
Date	Start	Elapsed	End	Speed (m/s)	Wind Direction from	Temp (°C)	L _{max}	L _{min}	L _{eq}	L ₁₀	L ₉₀	
29/05/2008	12:45	00:05	12:50	1.6	N	19	60.8	45.3	51.7	54.3	47.6	HGV movements from depo to the southwest, bird song, regular road traffic noise from the main road (north), dog walkers, Continuous loud bird noise, aircraft noise.
29/05/2008	12:50	00:05	12:55	1.6	N	19	64.5	43.5	52.6	55.3	47.3	
29/05/2008	12:55	00:05	13:00	1.6	N	19	60.5	45.0	50.9	52.9	48.0	HGV movements from depo to the southwest, bird song, regular road traffic noise from the main road (north), dog walkers, Continuous loud bird noise, aircraft noise.
29/05/2008	15:00	00:05	15:05	1.6	N	19	70.7	44.2	50.6	52.3	46.8	
29/05/2008	15:05	00:05	15:10	1.6	N	19	66.1	44.1	52.2	53.8	47.8	Local road traffic noise, voices of fishermen, bird noise.
29/05/2008	15:10	00:05	15:15	1.6	N	19	59.4	44.3	51.7	54.0	48.0	
29/05/2008	19:25	00:05	19:45	0.5	N	18	59.5	43.8	50.3	52.5	46.0	Seaguls, Lapping of the sea.
29/05/2008	19:30	00:05	19:50	0.5	N	18	61.0	43.3	50.6	53.0	46.2	
03/06/2008	01:40	00:05	01:45	0.5	N	15	58.7	26.4	36.1	38.1	28.5	
03/06/2008	04:10	00:05	04:15	0.5	N	15	60.2	26.3	36.9	37.8	30.0	

**PROPOSED BIOGEN BARRY FACILITY –
BASELINE NOISE ASSESMENT**



Location A



Location D



Location B



Location C

APPENDIX D

CALIBRATION CERTIFICATES



CERTIFICATE OF CALIBRATION

Certificate Number CAL010817
Date of Issue 31st January 2008
Customer Parson Brinkerhoff

Description of Instrument Including Manufacturer / Supplier
Sound Level Meter Rion NA-28 Sound Level Analyser [Serial No. 01070573] with Rion NH-23 preamplifier [Serial No.70589] and Rion UC-59 Microphone [Serial No.00367] fitted with a WS-10 foam windshield.

The instrument conforms to Class 1 of BS EN 61672-1:2003

The instrument was running Version 1.60 Firmware

Associated Calibrator Rion NC-74 [Serial No.35173440] with ½" adaptor type NC-74-002 fitted. This calibrator was calibrated by ANV Measurement Systems on 30/01/2008 [Certificate No. CAL010816]

Date of Calibration 30/01/2008.

Test Procedure ANV/CAL/SLM/001
Calibration Results currently at Issue 2
Test procedures in accordance with BS EN 61672-3:2006
NOTE: Test 10.1 (Self Generated Noise with Microphone Installed) omitted.

Test Engineer Andy Jones

APPROVED SIGNATORY 
Les Jephson / Mike Breslin

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL

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✉ info@noise-and-vibration.co.uk 🌐 www.noise-and-vibration.co.uk

ACOUSTICS NOISE AND VIBRATION LIMITED. REGISTERED IN ENGLAND No. 3549028. REGISTERED OFFICE AS ABOVE.

CERTIFICATE OF CALIBRATION



CERTIFICATE NO. CAL010817
DATE OF ISSUE 31/01 /2008.

Information relating to the operation and adjustment of the sound level meter were obtained from the data contained in the Rion Instruction Manual 50490 and associated Technical Notes 50860. Additional information relating to measurement uncertainties required by clause 11.3 has been provided by the Rion European Office and is available for inspection upon request.

Results

Tests on the Sound Level Meter were principally performed on the Main Channel. Limited tests were also performed using the Sub-Channel.

When the Acoustic Calibrator supplied with the instrument was applied the Sound Level Meter initially read 94.0dB (A). No adjustment was made to the meter.

The environmental conditions at the start and end of the calibration were within the specified range for calibration and were noted to be as follows:

Conditions	Measured Value at Start	Measured Value at End
Atmospheric Pressure	101.8 kPa	101.7 kPa
Temperature	23.7 °C	23.8 °C
Relative Humidity	33.1 %	30.5 %

The self generated noise levels of the instrument with the microphone replaced by the electrical input device were as follows:

11.1 dB(A);
14.0 dB(C); and
21.2 dB(Z).

These measured levels were within the specified limits defined within the instruction manual.

The sound level meter submitted for testing has successfully completed the Class 1 Periodic tests of BS EN 61672, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about the conformance of the sound level meter to the full requirements of BS EN 61672-1:2003 because evidence was not publically available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements of BS EN 61672-1:2003 and because the periodic tests of BS EN 61672-3:2006 only cover a limited subset of the specifications in BS EN 61672-1:2003. No information on the uncertainty of measurement, required by 11.7 of IEC 61672-3:2006, of the adjustment data given in the instruction manual or obtained from the manufacturer of the Sound Level Meter, or the manufacturer of the Microphone, or the manufacturer of the multi-frequency Sound Calibrator was published in the instruction manual or made available by the manufacturer or supplier. The uncertainty of measurement of the adjustment data has therefore been assumed to be numerically zero for the purpose of this periodic test. If these uncertainties are not actually zero, there is a possibility that the frequency response of the Sound Level Meter may not conform to the requirements of IEC 61672-1:2002.

CERTIFICATE OF CALIBRATION



CERTIFICATE NO. CAL010817
DATE OF ISSUE 31/01 /2008.

No information on the uncertainty of measurement, required by 11.7 of IEC 61672-3:2006, of the adjustment data given in the instruction manual or obtained from the manufacturer of the Sound Level Meter, or the manufacturer of the Microphone, or the manufacturer of the multi-frequency Sound Calibrator was published in the instruction manual or made available by the manufacturer or supplier. The uncertainty of measurement of the adjustment data has therefore been assumed to be numerically zero for the purpose of this periodic test. If these uncertainties are not actually zero, there is a possibility that the frequency response of the Sound Level Meter may not conform to the requirements of IEC 61672-1:2002.

The total expanded measurement uncertainties associated with the calibration equipment and procedures is based on a standard uncertainty multiplied by a coverage factor $k=2$ to provide a confidence of approximately 95% in the results. The assessment of uncertainty has been carried out in accordance with national and international guidance upon the calculation of uncertainties in metrology.

Notes

1. The wind screen correction on the instrument was set to *on* and the diffuse field correction set to *off* for the duration of the calibration.
2. The tests were conducted principally on the main channel, with a limited number of tests conducted for the sub channel. The Peak C sound level measurements were carried out for the sub channel as they are only available on this channel.



CERTIFICATE OF CALIBRATION

Certificate Number CAL010816
Date of Issue 31st January 2008
Customer Parson Brinkerhoff

Description of Instrument

Calibrator Rion NC-74 [Serial No.35173440]
with 1/2" adaptor type NC-74-002 fitted.

Date of Calibration 30/01/2008.

Test Procedure ANV/CAL/SLM/003
Calibration Results currently at Issue 1
Test procedures in accordance with BS EN 60942: 2003 (Annex B)

Test Engineer Chazz Gill

APPROVED SIGNATORY 
Les Jephson / Mike Breslin

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL

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ACOUSTICS NOISE AND VIBRATION LIMITED. REGISTERED IN ENGLAND No. 3549028. REGISTERED OFFICE AS ABOVE.

CERTIFICATE OF CALIBRATION



CERTIFICATE NO. CAL010816
DATE OF ISSUE 31/01/2008.

Results

The sound pressure level generated in its half inch configuration was measured using a Rion UC-53A microphone with its protective grid in position.

The environmental conditions at the start and end of the calibration were within the specified range for calibration and were noted to be as follows:

Conditions	Measured Value at Start	Measured Value at End
Atmospheric Pressure	101.7 kPa	101.7 kPa
Temperature	24.3 °C	24.8 °C
Relative Humidity	30.4 %	30.1 %

The mean level of the calibrator output was **94.08 ± 0.32dB**.

The fundamental frequency of the sound output was **1002.6Hz 0.3 %** and its total distortion was **1.59 ± 0.02%**.

The Sound Calibrator has been shown to conform to the Class 1 requirements for periodic testing, described in Annex B of IEC 60942: 2003 for the sound pressure level and frequency stated, for the environmental conditions under which the tests were performed. However, as public evidence was not available, from a testing organisation responsible for pattern approval, to demonstrate that the model of sound calibrator conformed to the requirements for pattern evaluation described in Annex A of IEC 60942: 2003, no general statement or conclusion can be made about conformance of the Sound Calibrator to the requirements of IEC 60942: 2003.

The total expanded measurement uncertainties associated with the calibration equipment and procedures is based on a standard uncertainty multiplied by a coverage factor $k=2$ to provide a confidence of approximately 95% in the results. The assessment of uncertainty has been carried out in accordance with national and international guidance upon the calculation of uncertainties in metrology.

Notes

1. The manufacturer states that the instrument compensates for the effects of atmospheric pressure (96 – 106 kPa ± 0.03 dB).
2. The Sound Calibrator has not been adjusted.



CERTIFICATE OF CALIBRATION

Certificate Number CAL040803
Date of Issue 02/04/2008
Customer Parsons Brinckerhoff Ltd

Description of Instrument

Calibrator Rion NC-74 [Serial No. 01020510]
With ½" adaptor type NC-74-002 fitted.

Date of Calibration 02/04/2008.

Test Procedure ANV/CAL/SLM/003
Calibration Results currently at Issue 1
Test procedures in accordance with BS EN 60942: 2003 (Annex B)

Test Engineer Amrat Patel

APPROVED SIGNATORY

Les Jephson / Mike Breslin

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ACOUSTICS NOISE AND VIBRATION LIMITED. REGISTERED IN ENGLAND NO. 3549028. REGISTERED OFFICE AS ABOVE.

CERTIFICATE OF CALIBRATION



CERTIFICATE NO. CAL040803.
DATE OF ISSUE 02/04/2008.

Results

The sound pressure level generated in its half inch configuration was measured using a Rion UC-53A microphone with its protective grid in position.

The environmental conditions at the start and end of the calibration were within the specified range for calibration and were noted to be as follows:

Conditions	Measured Value at Start	Measured Value at End
Atmospheric Pressure	101.4 kPa	101.4 kPa
Temperature	21.5 °C	21.7 °C
Relative Humidity	35.0 %	34.8 %

The mean level of the calibrator output was **93.97 ± 0.29 dB**.

The fundamental frequency of the sound output was **1001.1 Hz ± 0.1%** and its total distortion was **1.22 ± 0.02%**.

The Sound Calibrator has been shown to conform to the Class 1 requirements for periodic testing, described in Annex B of IEC 60942: 2003 for the sound pressure level and frequency stated, for the environmental conditions under which the tests were performed. However, as public evidence was not available, from a testing organisation responsible for pattern approval, to demonstrate that the model of sound calibrator conformed to the requirements for pattern evaluation described in Annex A of IEC 60942: 2003, no general statement or conclusion can be made about conformance of the Sound Calibrator to the requirements of IEC 60942: 2003.

The total expanded measurement uncertainties associated with the calibration equipment and procedures is based on a standard uncertainty multiplied by a coverage factor $k=2$ to provide a confidence of approximately 95% in the results. The assessment of uncertainty has been carried out in accordance with national and international guidance upon the calculation of uncertainties in metrology.

Notes

1. The manufacturer states that the instrument compensates for the effects of atmospheric pressure (96 – 106 kPa ± 0.03 dB).
2. The Sound Calibrator has not been adjusted