

## Sterling Chemical Malta Ltd.

Noise & Vibration Monitoring

**Report Date: Monday, 7 July 2014**

### Introduction

A monitoring exercise for workplace noise and vibration was performed at Sterling Chemical Malta Ltd of HF51, Hal Far Industrial Estate, Birzebbugia, BBG 3000, Malta. Noise monitoring was carried out following standard methodology BS 4142:1997, whereas vibration monitoring was carried out following standard methodology BS 6472-1:2008.

The protection of workers from risks to their health and safety arising or likely to arise from exposure to noise, and in particular the risk to hearing, is covered by Directive 2003/10/EC, which has been transposed into local legislation as L.N. 158 of 2006. The exposure limit value is set at 87 dB(A).

Unlike noise, vibrations do not pose risks to the health and safety of workers. The need for measuring vibration levels is more important for an architectural point of view since excessive vibrations may, in the long run, lead to structural damage.

The sound level meter and seismograph used in this exercise were duly calibrated. The respective calibration certificates are attached at the end of this covering report. The sampling details are listed in Table 1 below. Maps of the plant denoting the respective sampling locations are also attached with this report.

**Table 1:** Sampling Details

| <b>Sample Nº</b> | <b>Test</b>       | <b>Location</b>                 | <b>Remarks</b>                  | <b>Sampling Date</b> | <b>Time ON</b> | <b>Time OFF</b> |
|------------------|-------------------|---------------------------------|---------------------------------|----------------------|----------------|-----------------|
| 1                | Noise             | Laboratory                      | Fume Cupboard ON, Sonicator ON  | 24/06/2014           | 08.57          | 09.07           |
| 2                | Noise             | Laboratory                      | Fume Cupboard ON, Sonicator OFF | 24/06/2014           | 09.08          | 09.18           |
| 3                | Noise             | Pilot Production (Ground Floor) | -                               | 24/06/2014           | 09.23          | 09.33           |
| 4                | Noise & Vibration | Pilot Production (1st Floor)    | -                               | 24/06/2014           | 09.37          | 09.47           |
| 5                | Noise             | Sampling Room                   | -                               | 24/06/2014           | 10.01          | 10.11           |
| 6                | Noise             | Outside, opposite Sampling Room | -                               | 24/06/2014           | 10.12          | 10.22           |
| 7                | Noise             | Outside, opposite Boiler Room   | -                               | 24/06/2014           | 10.27          | 10.37           |
| 8                | Noise & Vibration | Fire Pump Room                  | Electric Motor                  | 24/06/2014           | 10.49          | 10.59           |
| 9                | Noise & Vibration | Fire Pump Room                  | Diesel Motor                    | 24/06/2014           | 11.01          | 11.11           |
| 10               | Noise             | Boiler Room                     | -                               | 24/06/2014           | 11.19          | 11.29           |
| 11               | Noise & Vibration | Utility Plant Area              | Only 1 functioning pump         | 24/06/2014           | 11.33          | 11.43           |
| 12               | Noise             | R&D Laboratory                  | -                               | 24/06/2014           | 11.47          | 11.57           |

## Results

The noise and vibration plots downloaded from the respective instruments are attached with this covering report. The 10-minute averaged-out results obtained are outlined in Table 2 below.

**Table 2: Results**

| Sample Nº | Test      | Result | Units |
|-----------|-----------|--------|-------|
| 1         | Noise     | 73.7   | dB(A) |
| 2         | Noise     | 61.0   | dB(A) |
| 3         | Noise     | 70.6   | dB(A) |
| 4         | Noise     | 73.4   | dB(A) |
|           | Vibration | 1.30   | mm/s  |
| 5         | Noise     | 77.7   | dB(A) |
| 6         | Noise     | 72.5   | dB(A) |
| 7         | Noise     | 72.6   | dB(A) |
| 8         | Noise     | 104.0  | dB(A) |
|           | Vibration | 0.23   | mm/s  |
| 9         | Noise     | 108.9  | dB(A) |
|           | Vibration | 115.71 | mm/s  |
| 10        | Noise     | 76.2   | dB(A) |
| 11        | Noise     | 86.8   | dB(A) |
|           | Vibration | 1.22   | mm/s  |
| 12        | Noise     | 61.5   | dB(A) |

Exceedance of the 87 dB(A) noise level threshold occurred in the Fire Pump Room, during both monitoring instances. Noise levels during operation of the diesel motor (sample 9) were even higher than during operation of the electric motor (sample 8). Both levels are considerably higher than the limit value, and hence it is necessary that any personnel entering the area must wear appropriate noise cancelling earphones. Appropriate signage should be set up besides the entrance.

The noise level at the Utility Plant Area (sample 11) was just below the limit value. It must be pointed out that only 1 pump was operational during monitoring, and hence with the operation of the second one (which was non-functional at the time of monitoring), the noise levels are bound to increase. The Noise Directive also lists an 'exposure action value' of 85 dB(A). Only the result at this monitoring point exceeded this action value. Therefore, although the limit value of 87 dB(A) was not exceeded, action measures must still be implemented. Appropriate signage should be set up besides the entrance, and the use of noise cancelling earphones is strongly recommended.

Vibration levels at sample points 4, 8 and 11 were quite low and in the norm for this kind of industrial activity. On the other hand, the result at sample point 9 is considerably high. However, upon examination of the seismograph plot, the result seems to be skewed by a single data point. Therefore, it is likely that this recorded vibration is due to an extraneous factor rather than the general vibration caused by the diesel motor's operation.

### Conclusion

Results have shown that noise levels at the Fire Pump Room are excessively high, during operation of either the Electric or the Diesel Motors. Noise abatement measures should be employed, and any personnel entering the area must wear the appropriate protective equipment. Noise levels at the Utility Plant Area are currently borderline with the limit value, and are bound to increase upon proper full operation. The same recommendations made for the Fire Pump Room apply.

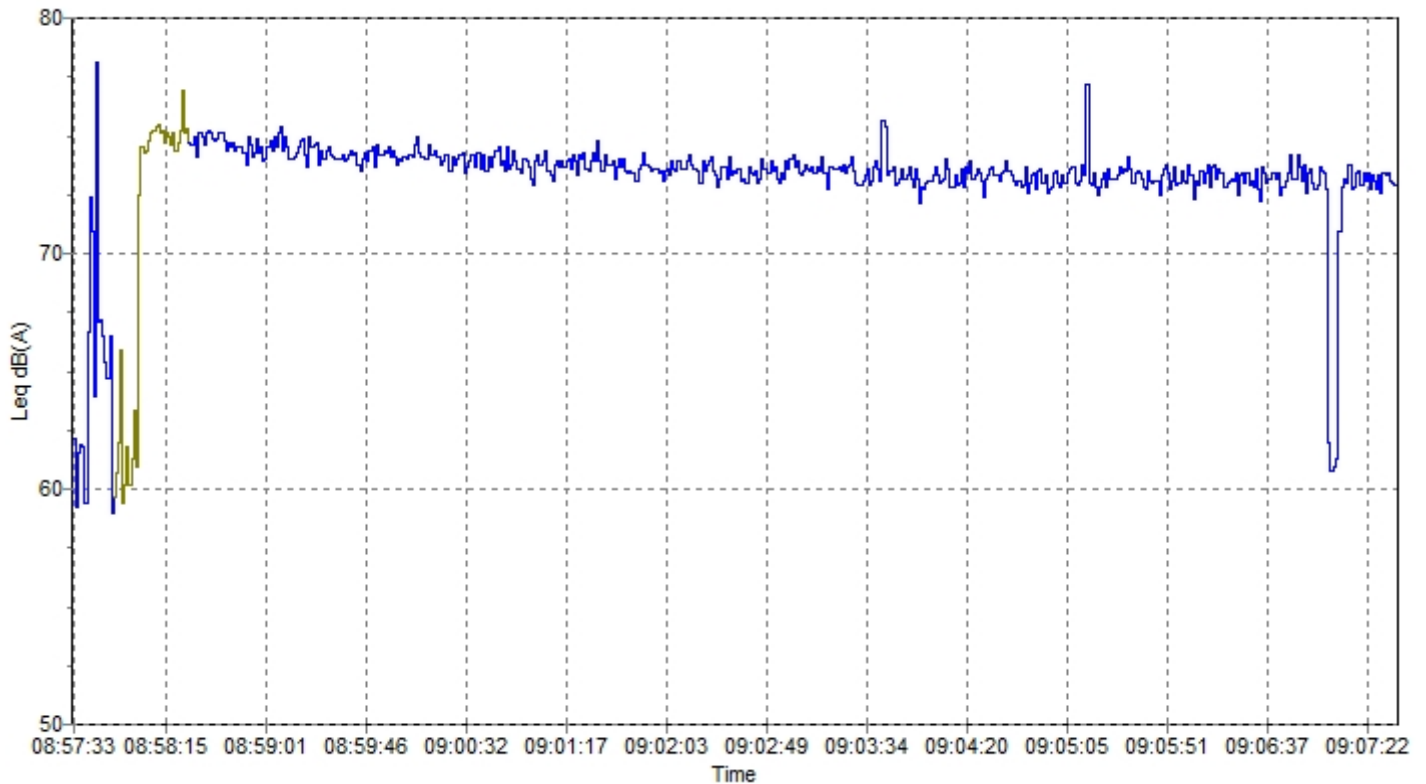
# Measurement Report

## Measurement Details

Date and Time: 24/06/2014 08:57  
Sound Level Meter: Cirrus Research plc  
Recalibration Due: 30/09/2014  
Run Duration: 00:09:27 hh:mm:ss  
Range: 40-110 dB  
Overload: no  
Location: Laboratory  
Notes:  
Fume cupboard ON, Sonicator ON

## Data

|        |           |       |          |
|--------|-----------|-------|----------|
| Leq    | 73.7 dBA  | L1.0  | 75.7 dBA |
| Lepd   | 56.6 dBA  | L10.0 | 74.8 dBA |
| LAE    | 101.0 dBA | L50.0 | 73.8 dBA |
| LAFmax | 83.5 dBA  | L90.0 | 72.8 dBA |
| Peak   | 101.0 dBC | L95.0 | 72.2 dBA |
|        |           | Lmin  | 58.2 dBA |



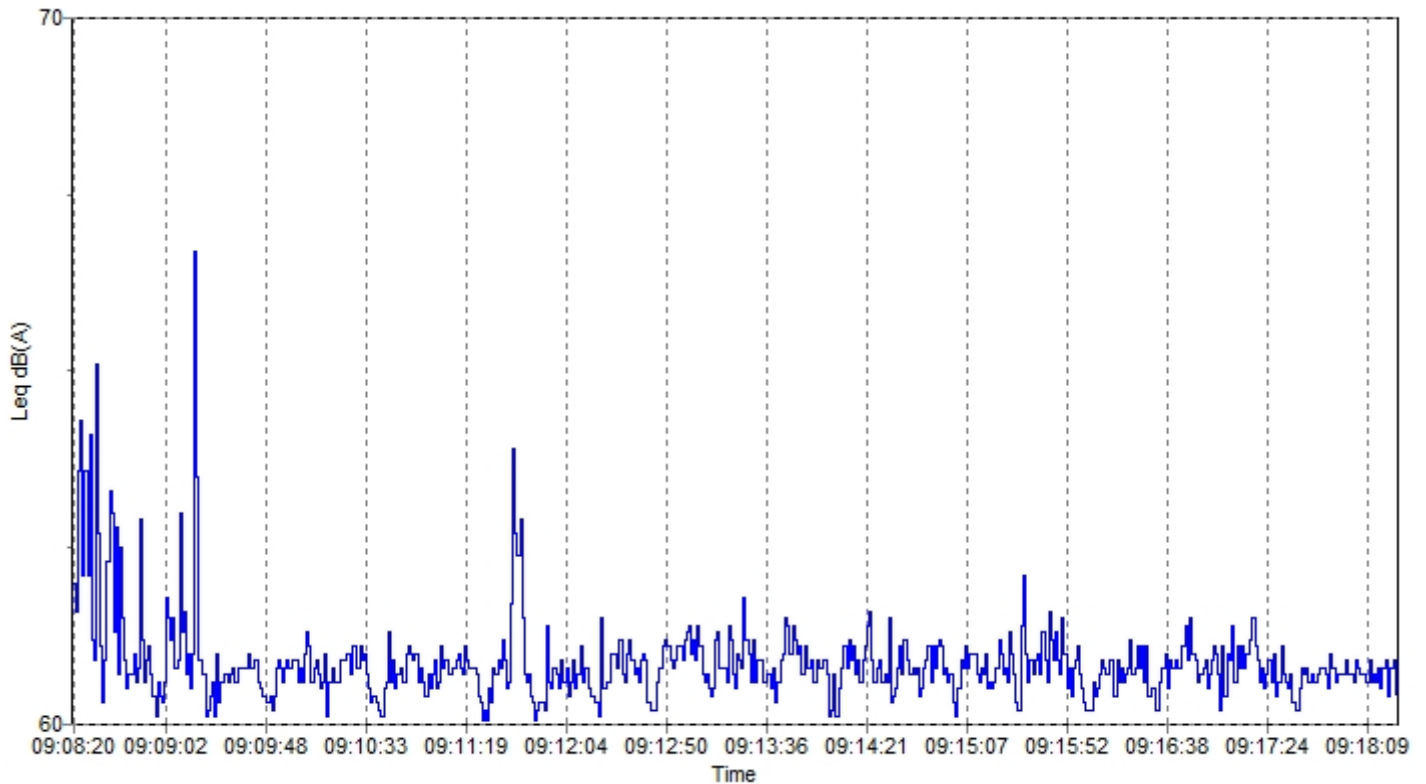
# Measurement Report

## Measurement Details

Date and Time: 24/06/2014 09:08  
Sound Level Meter: Cirrus Research plc  
Recalibration Due: 30/09/2014  
Run Duration: 00:10:00 hh:mm:ss  
Range: 40-110 dB  
Overload: no  
Location: Laboratory  
Notes:  
Fume cupboard ON, Sonicator OFF

## Data

|        |          |       |          |
|--------|----------|-------|----------|
| Leq    | 61.0 dBA | L1.0  | 63.6 dBA |
| Lepd   | 44.2 dBA | L10.0 | 61.5 dBA |
| LAE    | 88.6 dBA | L50.0 | 61.0 dBA |
| LAFmax | 72.8 dBA | L90.0 | 60.5 dBA |
| Peak   | 92.1 dBC | L95.0 | 60.4 dBA |
|        |          | Lmin  | 59.6 dBA |



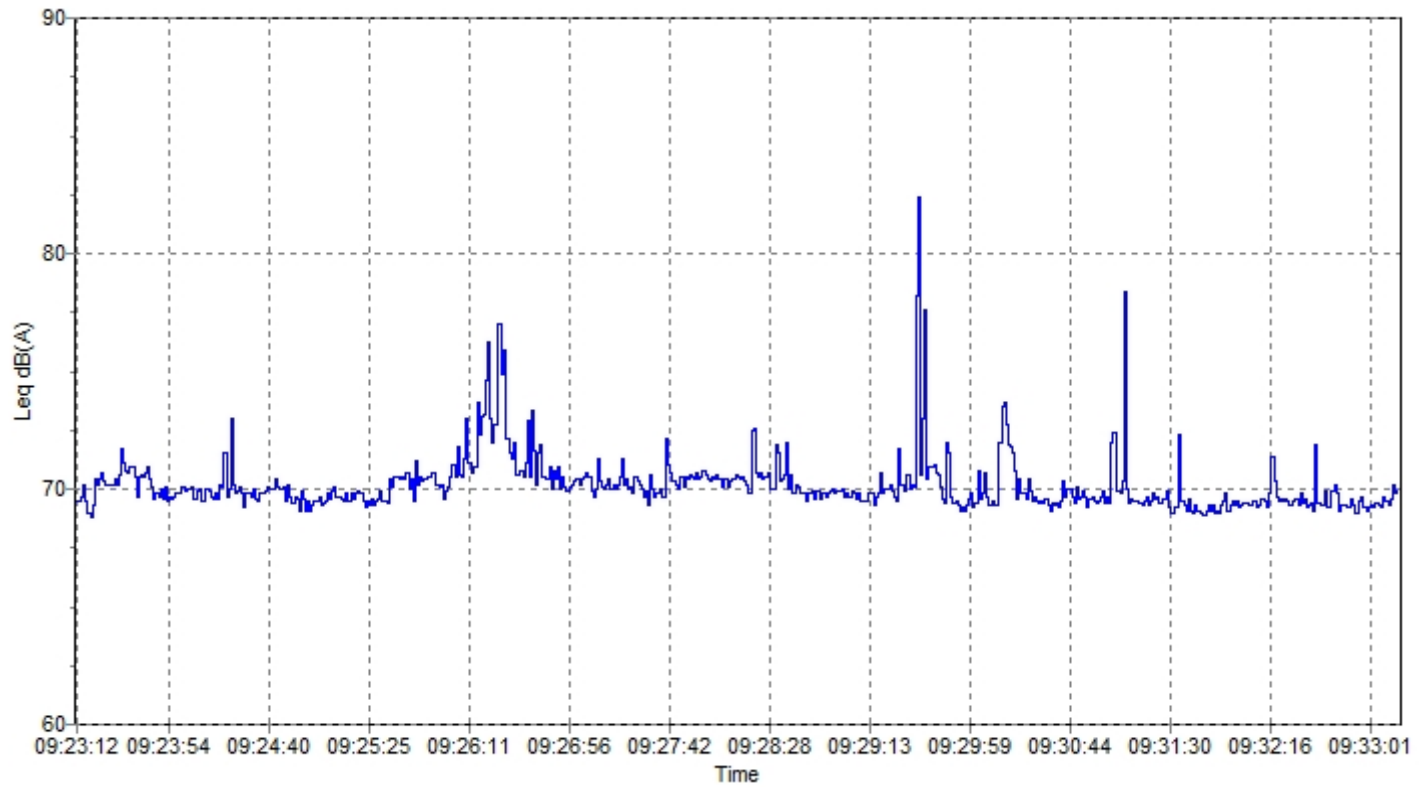
# Measurement Report

## Measurement Details

Date and Time: 24/06/2014 09:23  
Sound Level Meter: Cirrus Research plc  
Recalibration Due: 30/09/2014  
Run Duration: 00:10:00 hh:mm:ss  
Range: 40-110 dB  
Overload: no  
Location: Pilot Production  
Notes:  
Ground Floor

## Data

|        |           |       |          |
|--------|-----------|-------|----------|
| Leq    | 70.6 dBA  | L1.0  | 75.1 dBA |
| Lepd   | 53.8 dBA  | L10.0 | 71.3 dBA |
| LAE    | 98.2 dBA  | L50.0 | 70.1 dBA |
| LAFmax | 86.8 dBA  | L90.0 | 69.4 dBA |
| Peak   | 104.0 dBC | L95.0 | 69.2 dBA |
|        |           | Lmin  | 68.3 dBA |



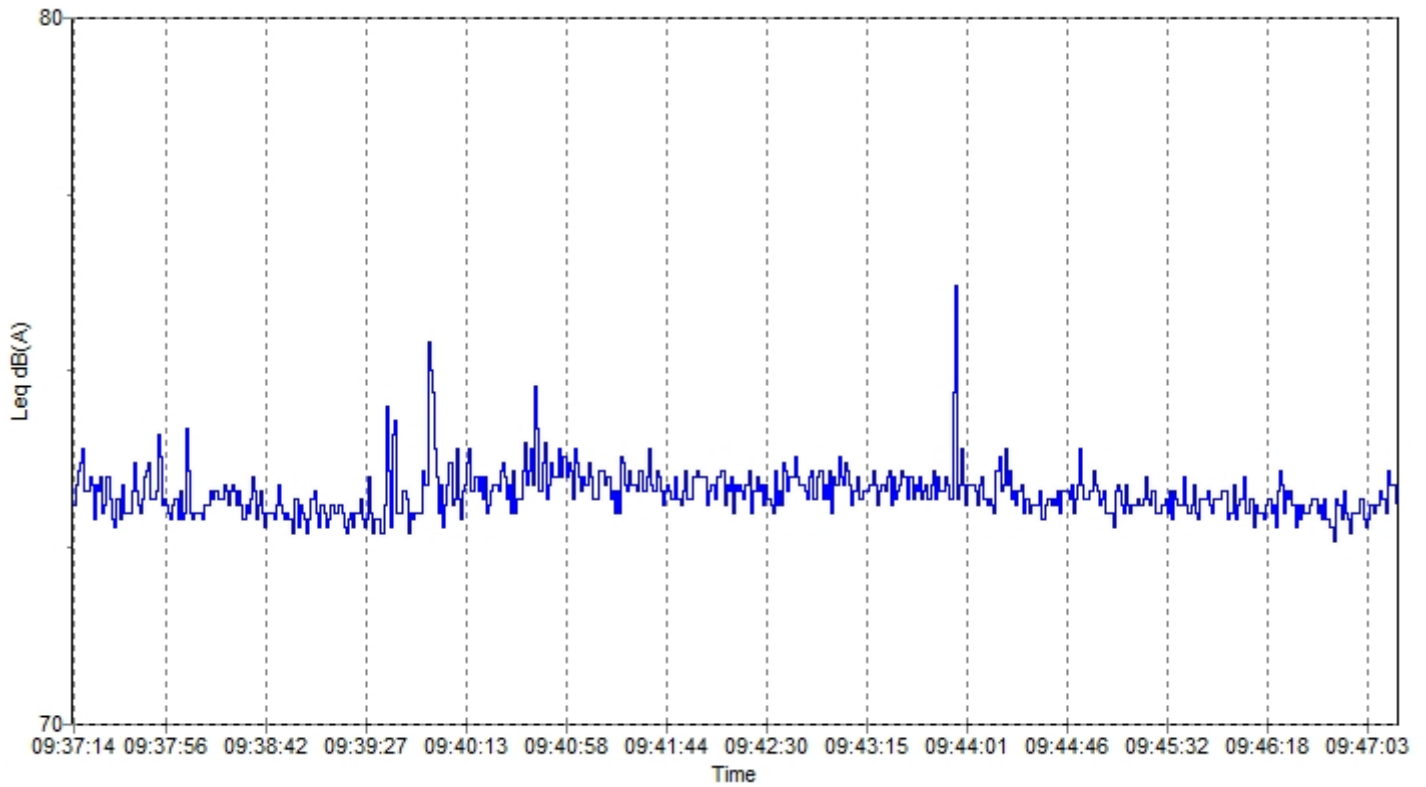
# Measurement Report

## Measurement Details

Date and Time: 24/06/2014 09:37  
Sound Level Meter: Cirrus Research plc  
Recalibration Due: 30/09/2014  
Run Duration: 00:10:00 hh:mm:ss  
Range: 40-110 dB  
Overload: no  
Location: Pilot Production  
Notes:  
1st Floor

## Data

|        |           |       |          |
|--------|-----------|-------|----------|
| Leq    | 73.4 dBA  | L1.0  | 74.8 dBA |
| Lepd   | 56.6 dBA  | L10.0 | 74.1 dBA |
| LAE    | 101.0 dBA | L50.0 | 73.5 dBA |
| LAFmax | 79.1 dBA  | L90.0 | 72.9 dBA |
| Peak   | 96.2 dBC  | L95.0 | 72.8 dBA |
|        |           | Lmin  | 72.0 dBA |

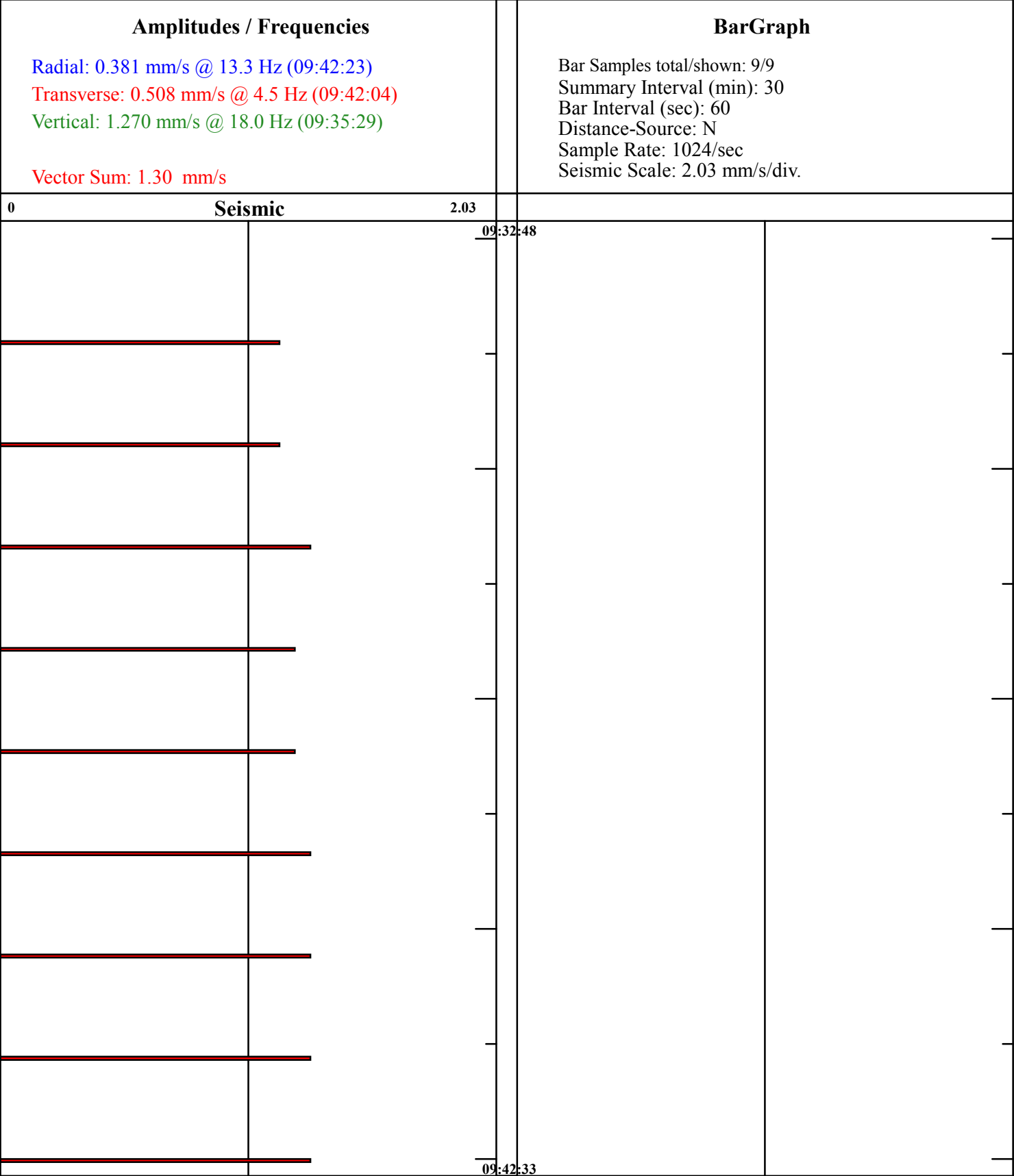




# Measurement Report

**Company:**  
**Location:** Pilot Production 1st Floor  
**Operator:**  
**Notes:**

**24/06/2014 at 09:32:48 Event # 41**  
End Time: 09:42:33 (00.16 hr)  
Graph: 11734



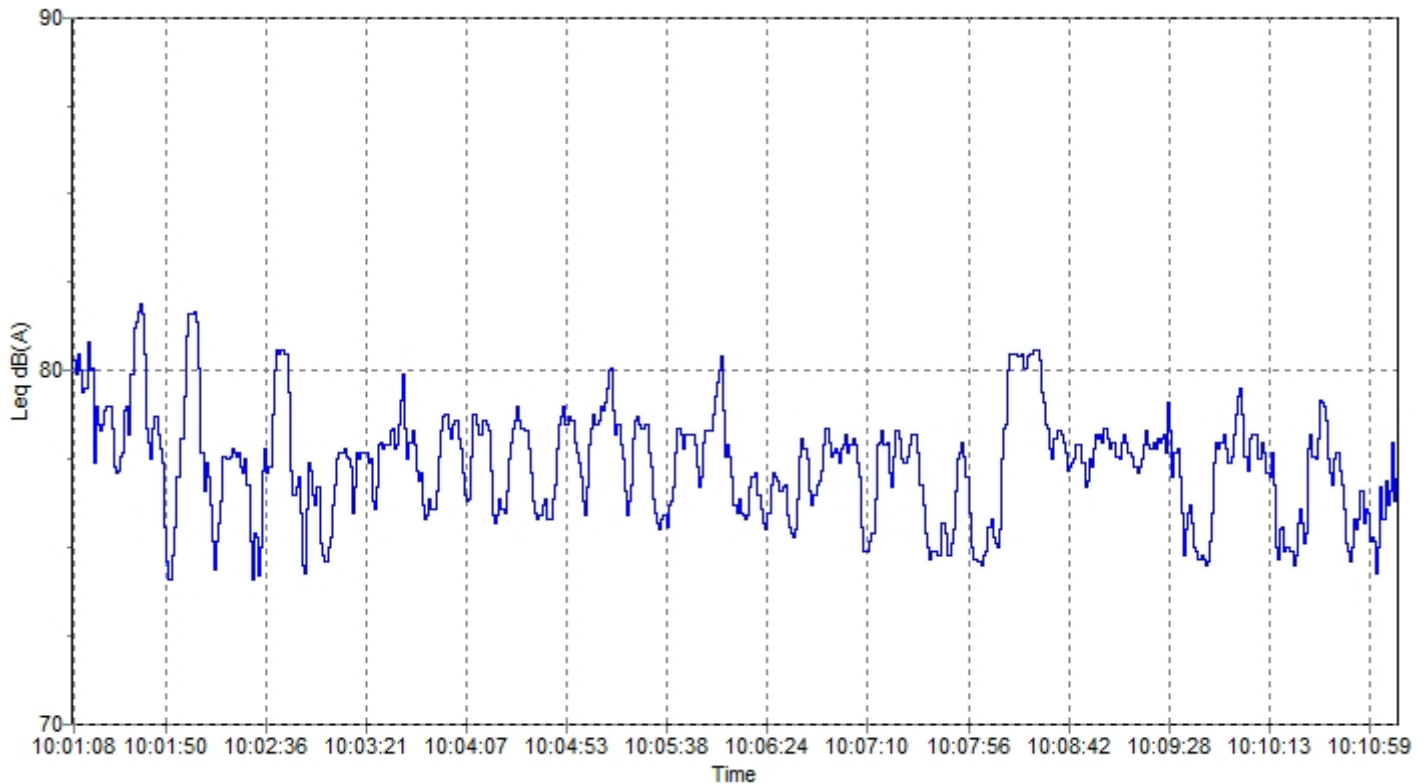
# Measurement Report

## Measurement Details

Date and Time: 24/06/2014 10:01  
Sound Level Meter: Cirrus Research plc  
Recalibration Due: 30/09/2014  
Run Duration: 00:10:00 hh:mm:ss  
Range: 40-110 dB  
Overload: no  
Location: Sampling Room  
Notes:

## Data

|        |           |       |          |
|--------|-----------|-------|----------|
| Leq    | 77.7 dBA  | L1.0  | 81.7 dBA |
| Lepd   | 60.9 dBA  | L10.0 | 79.4 dBA |
| LAE    | 105.3 dBA | L50.0 | 77.8 dBA |
| LAFmax | 82.3 dBA  | L90.0 | 75.3 dBA |
| Peak   | 95.9 dBC  | L95.0 | 75.0 dBA |
|        |           | Lmin  | 73.9 dBA |



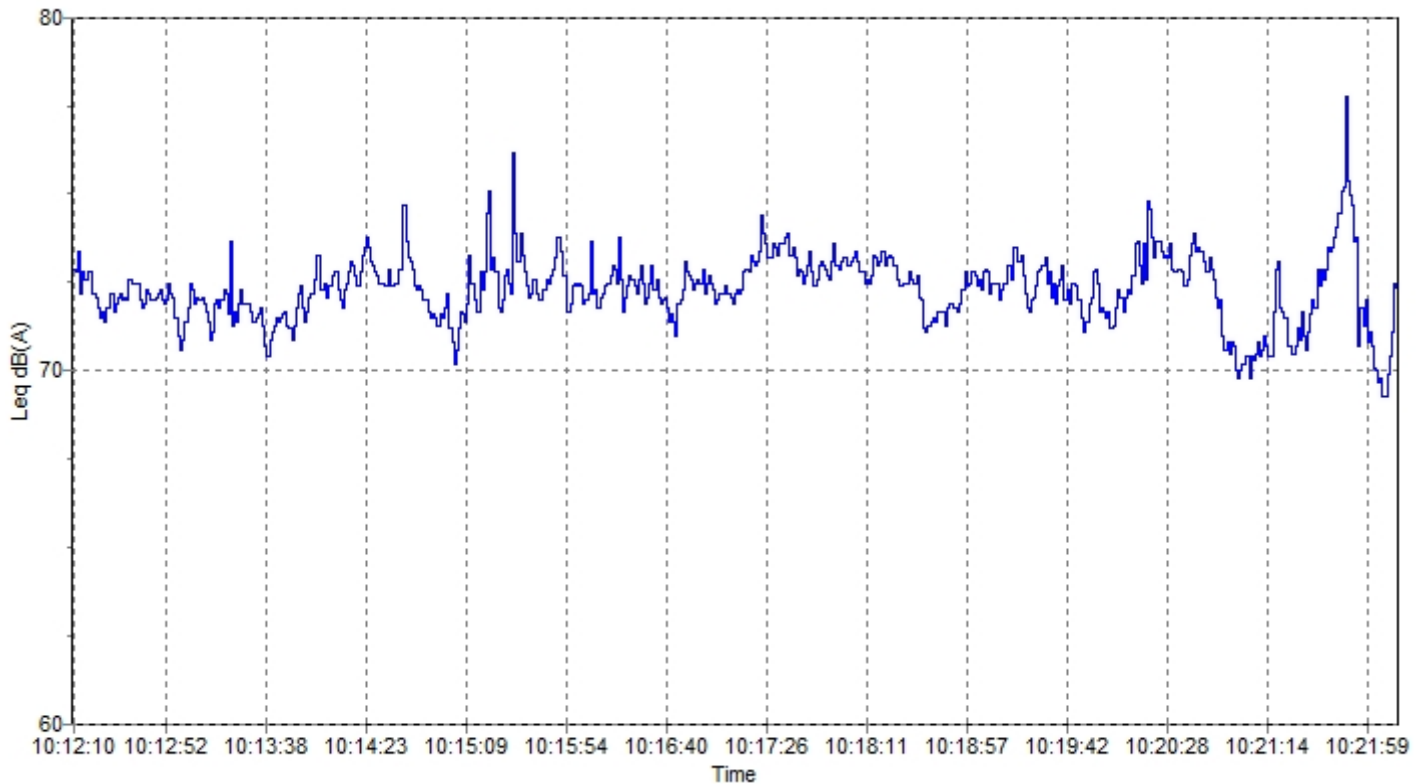
# Measurement Report

## Measurement Details

Date and Time: 24/06/2014 10:12  
Sound Level Meter: Cirrus Research plc  
Recalibration Due: 30/09/2014  
Run Duration: 00:09:59 hh:mm:ss  
Range: 40-110 dB  
Overload: no  
Location: Outside, opposite Sampling Room  
Notes:

## Data

|        |           |       |          |
|--------|-----------|-------|----------|
| Leq    | 72.5 dBA  | L1.0  | 75.4 dBA |
| Lepd   | 55.7 dBA  | L10.0 | 73.7 dBA |
| LAE    | 100.1 dBA | L50.0 | 72.6 dBA |
| LAFmax | 81.4 dBA  | L90.0 | 71.4 dBA |
| Peak   | 103.6 dBC | L95.0 | 70.8 dBA |
|        |           | Lmin  | 69.2 dBA |



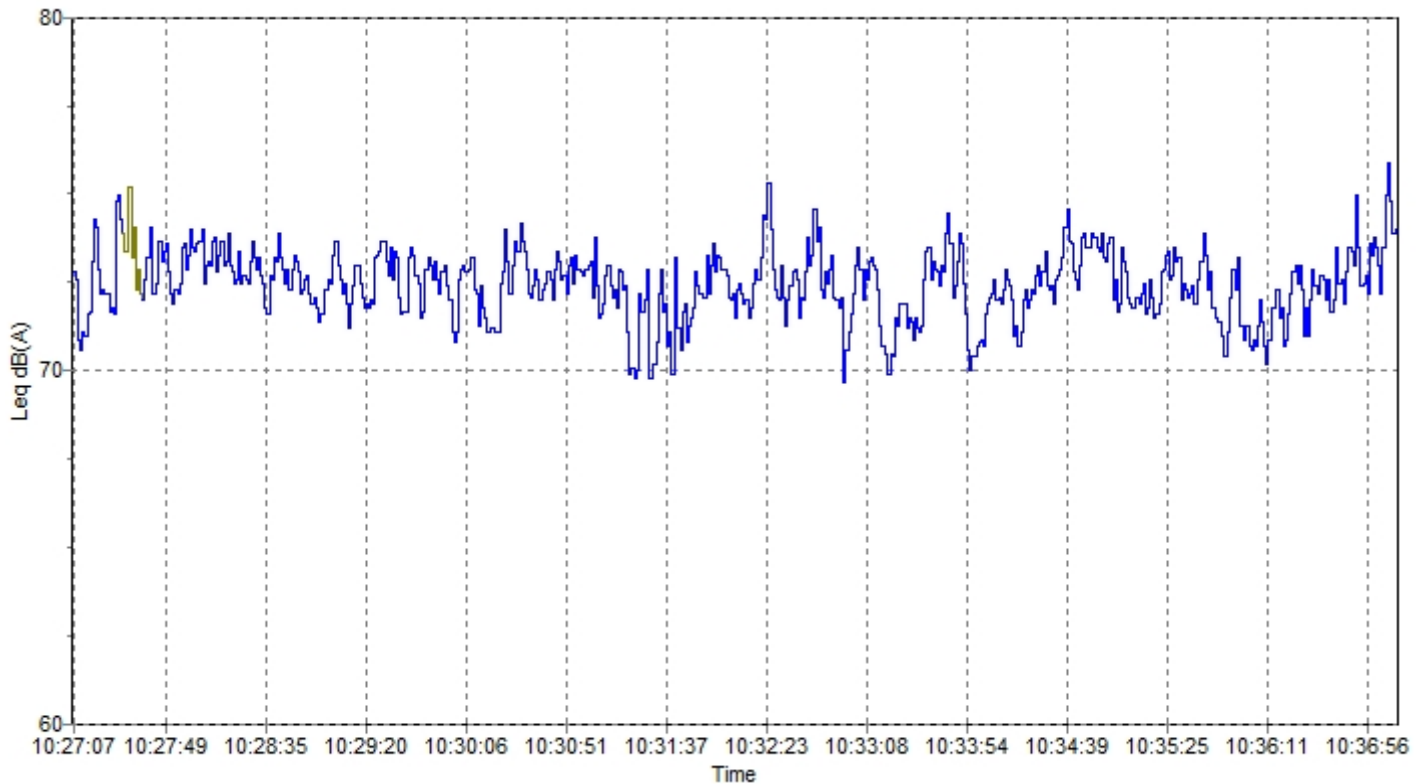
# Measurement Report

## Measurement Details

Date and Time: 24/06/2014 10:27  
Sound Level Meter: Cirrus Research plc  
Recalibration Due: 30/09/2014  
Run Duration: 00:09:51 hh:mm:ss  
Range: 40-110 dB  
Overload: no  
Location: Outside, opposite Boiler Room  
Notes:

## Data

|        |           |       |          |
|--------|-----------|-------|----------|
| Leq    | 72.6 dBA  | L1.0  | 75.2 dBA |
| Lepd   | 55.7 dBA  | L10.0 | 73.9 dBA |
| LAE    | 100.1 dBA | L50.0 | 72.7 dBA |
| LAFmax | 78.6 dBA  | L90.0 | 71.3 dBA |
| Peak   | 94.9 dBC  | L95.0 | 70.8 dBA |
|        |           | Lmin  | 69.2 dBA |



# Measurement Report

## Measurement Details

Date and Time: 24/06/2014 10:49  
Sound Level Meter: Cirrus Research plc  
Recalibration Due: 30/09/2014  
Run Duration: 00:10:00 hh:mm:ss  
Range: 40-110 dB  
Overload: no  
Location: Fire Pump Room - Location 8

Notes:  
Electric Motor

## Data

|        |           |       |           |
|--------|-----------|-------|-----------|
| Leq    | 104.0 dBA | L1.0  | 106.0 dBA |
| Lepd   | 87.2 dBA  | L10.0 | 105.3 dBA |
| LAE    | 131.6 dBA | L50.0 | 104.0 dBA |
| LAFmax | 106.3 dBA | L90.0 | 101.0 dBA |
| Peak   | 119.2 dBC | L95.0 | 100.5 dBA |
|        |           | Lmin  | 96.9 dBA  |



|   |  |   |  |
|---|--|---|--|
| <b>Company:</b><br><b>Location: Fire Pump Room</b><br><b>Operator:</b><br><b>Notes: Electric Motor</b>  |  | <b>24/06/2014 at 10:45:15 Event # 43</b><br>End Time: 10:55:08 (00.16 hr)<br>Graph: 11734   |  |
| <b>Amplitudes / Frequencies</b><br><br>Radial: 0.127 mm/s @ 7.0 Hz (10:53:13)<br>Transverse: 0.127 mm/s @ 0.3 Hz (10:54:18)<br>Vertical: 0.191 mm/s @ 3.2 Hz (10:46:44)<br><br>Vector Sum: .23 mm/s |  | <b>BarGraph</b><br><br>Bar Samples total/shown: 9/9<br>Summary Interval (min): 30<br>Bar Interval (sec): 60<br>Distance-Source: N<br>Sample Rate: 1024/sec<br>Seismic Scale: 2.03 mm/s/div. |  |
| <b>0 Seismic 2.03</b>   |  |   |  |
|   |  |   |  |

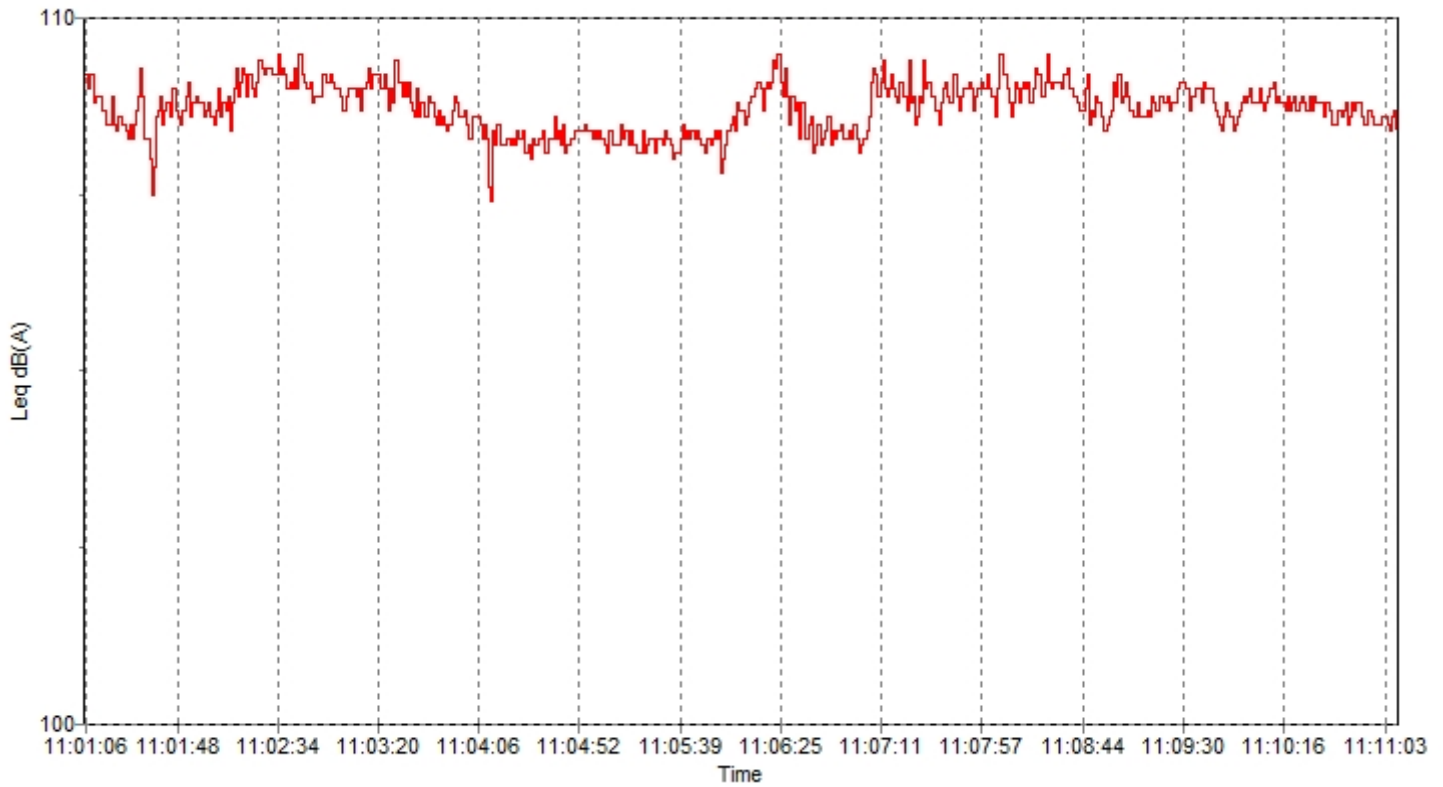
# Measurement Report

## Measurement Details

Date and Time: 24/06/2014 11:01  
Sound Level Meter: Cirrus Research plc  
Recalibration Due: 30/09/2014  
Run Duration: 00:09:59 hh:mm:ss  
Range: 40-110 dB  
Overload: yes  
Location: Fire Pump Room  
Notes:  
Diesel Motor

## Data

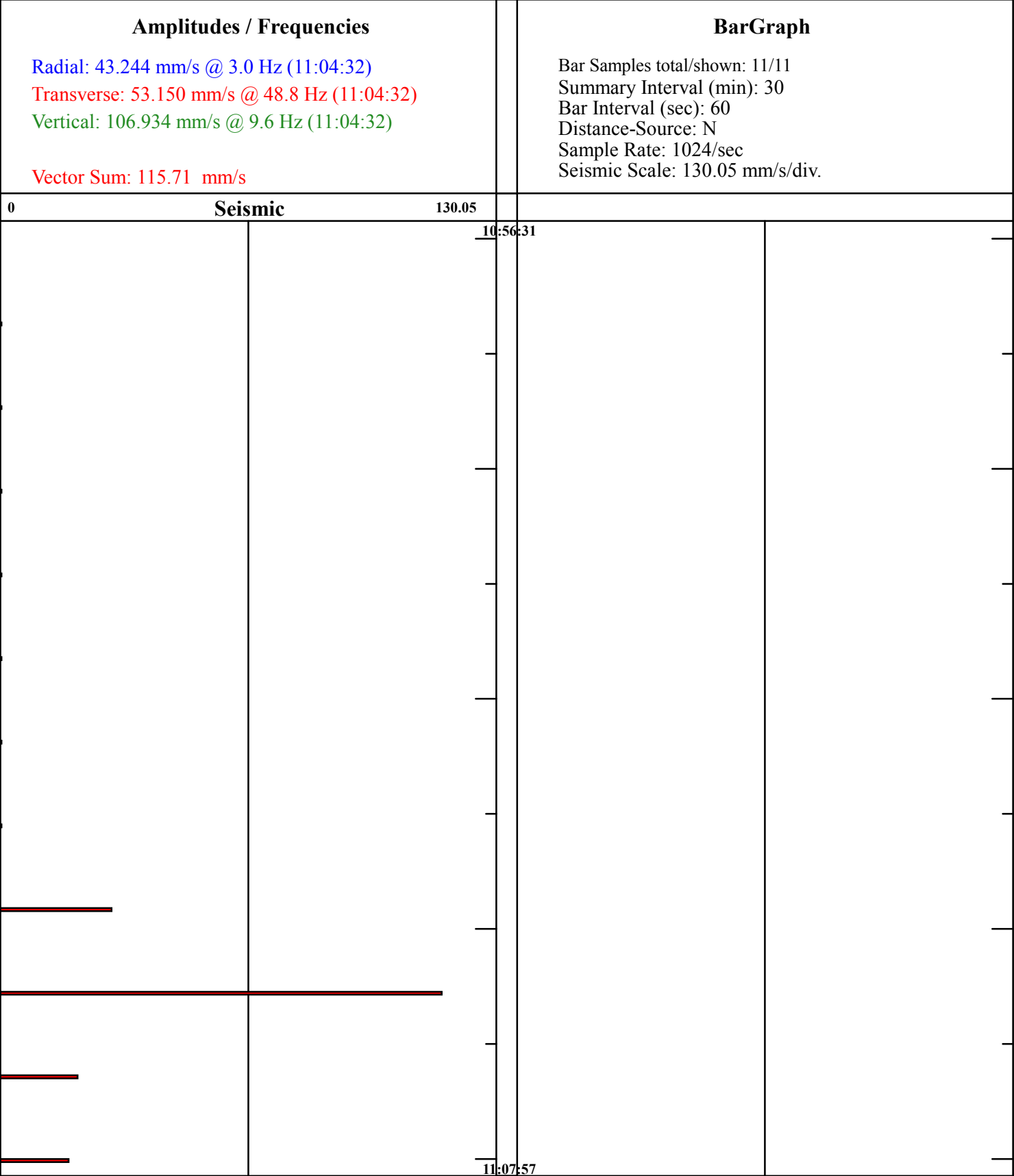
|        |           |       |           |
|--------|-----------|-------|-----------|
| Leq    | 108.9 dBA | L1.0  | 110.0 dBA |
| Lepd   | 92.0 dBA  | L10.0 | 109.7 dBA |
| LAE    | 136.4 dBA | L50.0 | 109.2 dBA |
| LAFmax | 110.4 dBA | L90.0 | 108.6 dBA |
| Peak   | 120.3 dBC | L95.0 | 108.5 dBA |
|        |           | Lmin  | 106.7 dBA |



# Measurement Report

**Company:**  
**Location:** Fire Pump Room  
**Operator:**  
**Notes:** Diesel Motor

**24/06/2014 at 10:56:31 Event # 45**  
End Time: 11:07:57 (00.19 hr)  
Graph: 11734





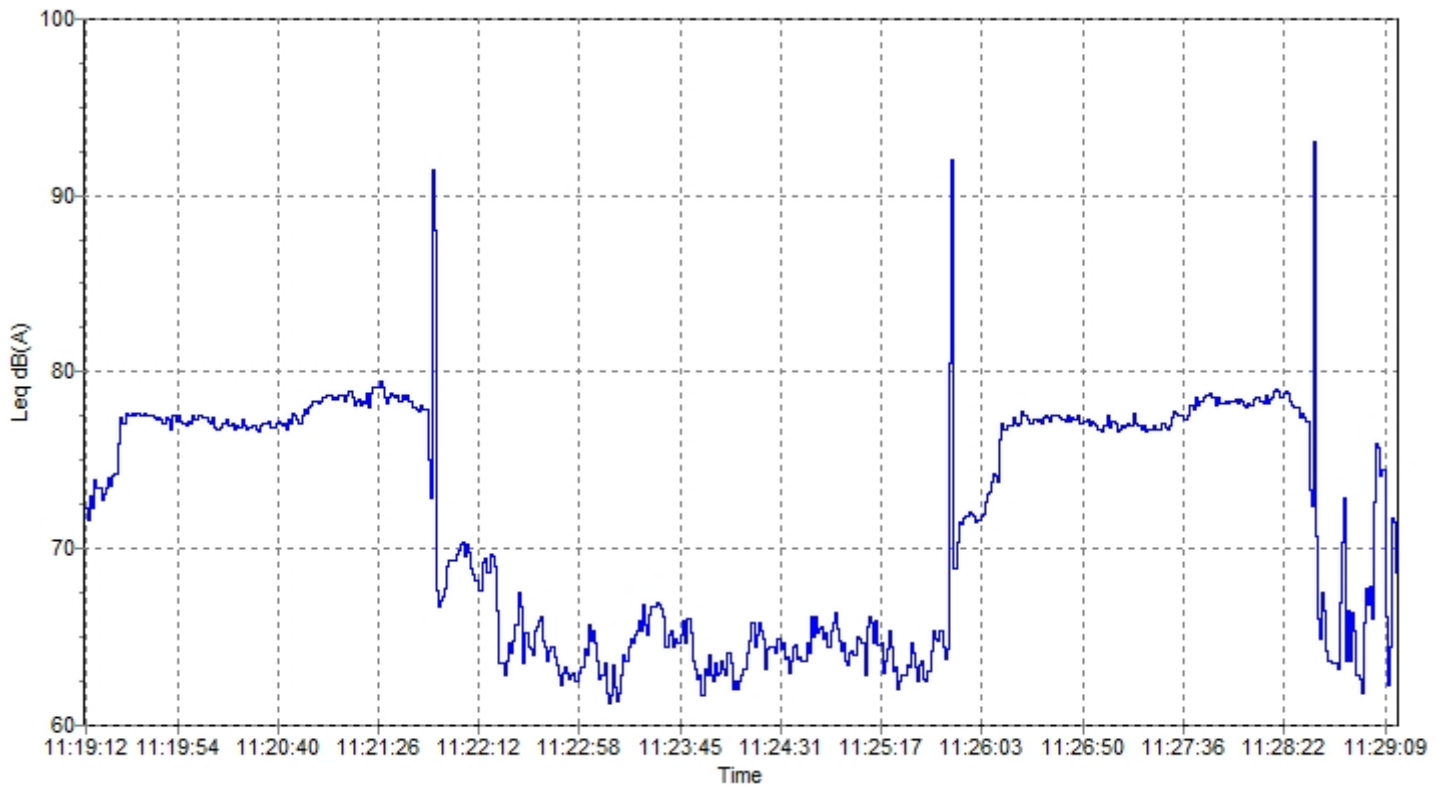
# Measurement Report

## Measurement Details

Date and Time: 24/06/2014 11:19  
Sound Level Meter: Cirrus Research plc  
Recalibration Due: 30/09/2014  
Run Duration: 00:10:00 hh:mm:ss  
Range: 40-110 dB  
Overload: no  
Location: Boiler Room

## Data

|        |           |       |          |
|--------|-----------|-------|----------|
| Leq    | 76.2 dBA  | L1.0  | 79.4 dBA |
| Lepd   | 59.4 dBA  | L10.0 | 78.6 dBA |
| LAE    | 103.8 dBA | L50.0 | 73.9 dBA |
| LAFmax | 97.7 dBA  | L90.0 | 63.5 dBA |
| Peak   | 110.0 dBC | L95.0 | 62.8 dBA |
|        |           | Lmin  | 60.4 dBA |



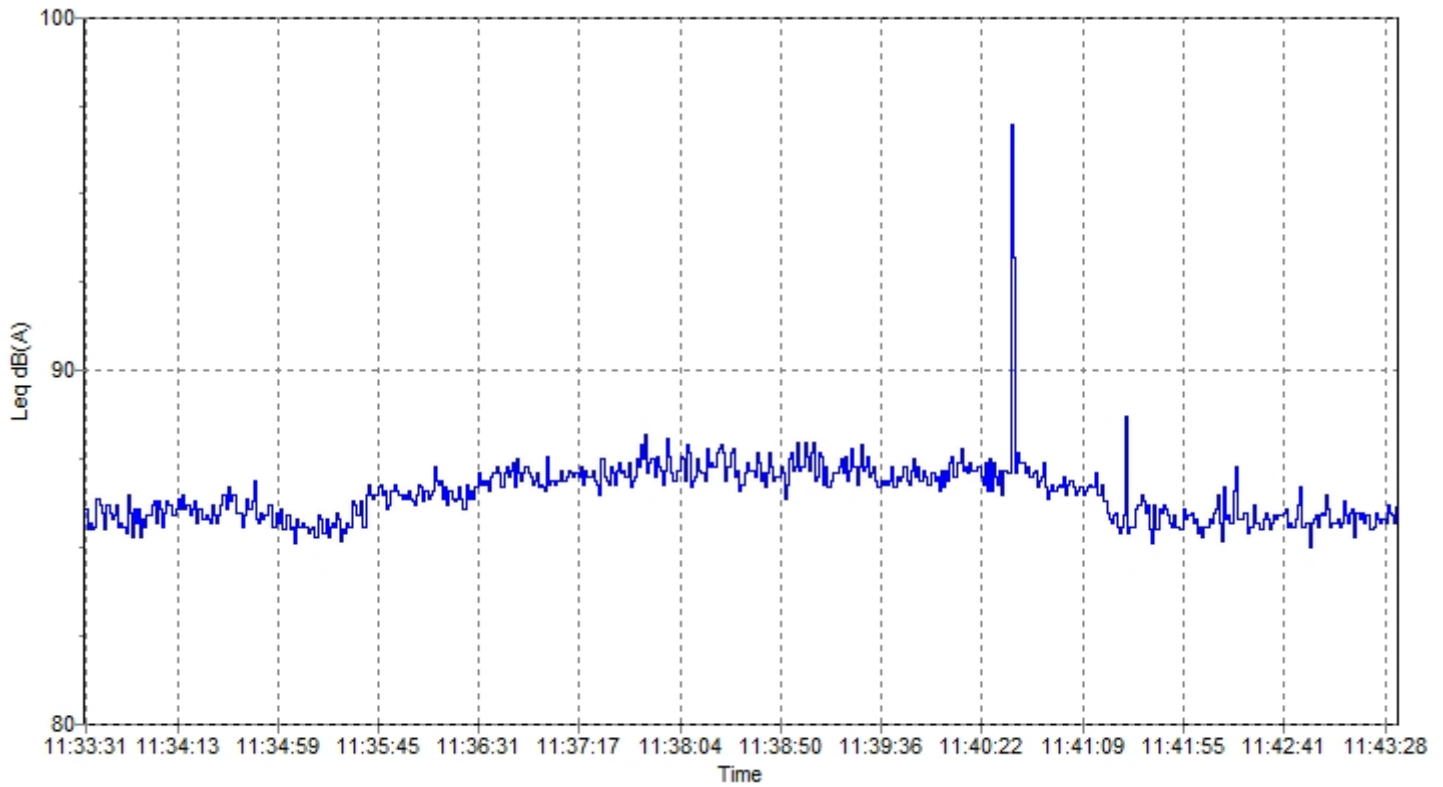
# Measurement Report

## Measurement Details

Date and Time: 24/06/2014 11:33  
Sound Level Meter: Cirrus Research plc  
Recalibration Due: 30/09/2014  
Run Duration: 00:09:59 hh:mm:ss  
Range: 40-110 dB  
Overload: no  
Location: Utility Plant Area  
Notes:  
Only 1 functioning pump

## Data

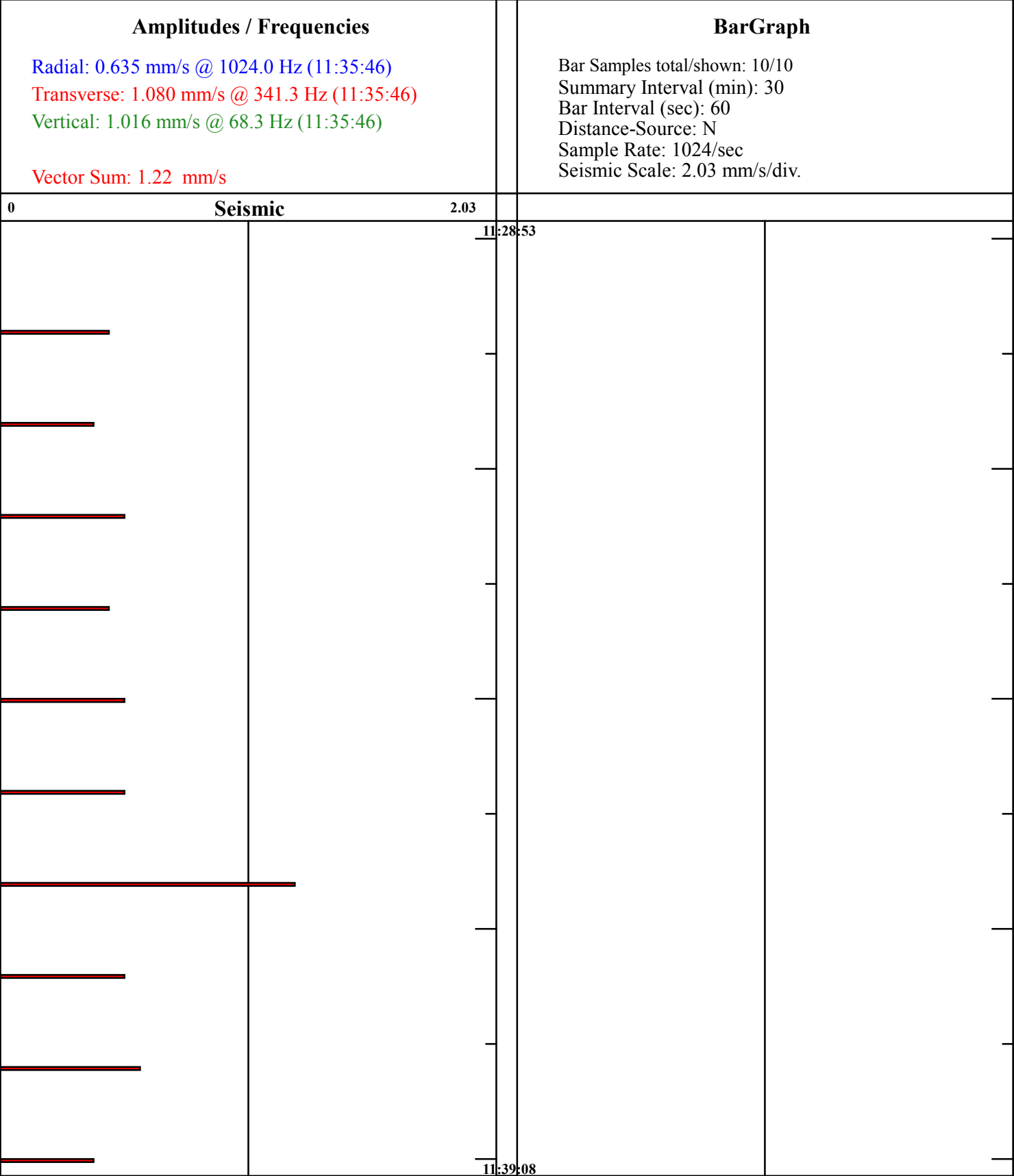
|        |           |       |          |
|--------|-----------|-------|----------|
| Leq    | 86.8 dBA  | L1.0  | 88.4 dBA |
| Lepd   | 69.9 dBA  | L10.0 | 87.7 dBA |
| LAE    | 114.3 dBA | L50.0 | 86.7 dBA |
| LAFmax | 99.2 dBA  | L90.0 | 85.7 dBA |
| Peak   | 111.0 dBC | L95.0 | 85.5 dBA |
|        |           | Lmin  | 84.7 dBA |



# Measurement Report

**Company:**  
**Location:** Utility Plant  
**Operator:**  
**Notes:** 1 Functioning Pump

**24/06/2014 at 11:28:53 Event # 47**  
End Time: 11:39:08 (00.17 hr)  
Graph: 11734



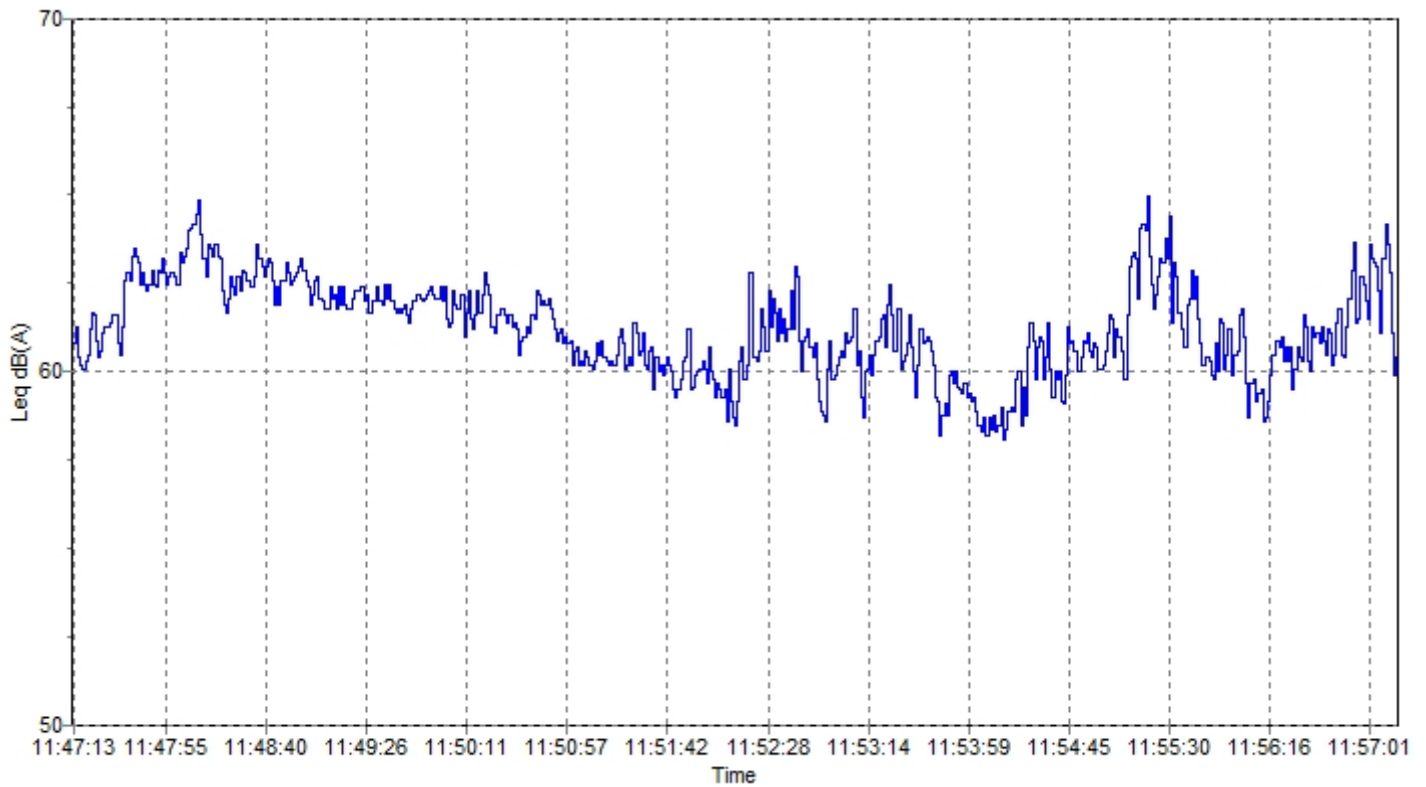
# Measurement Report

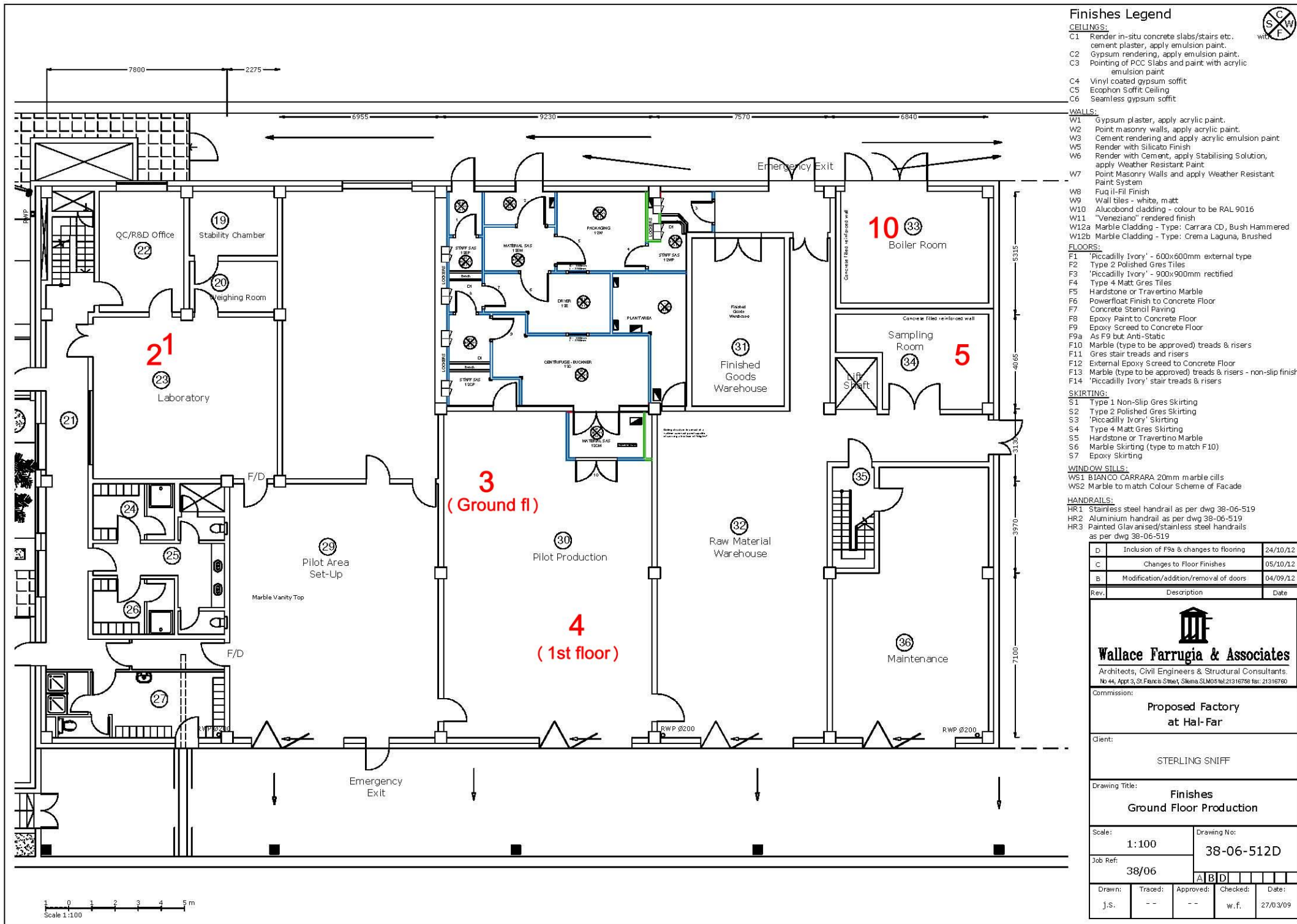
## Measurement Details

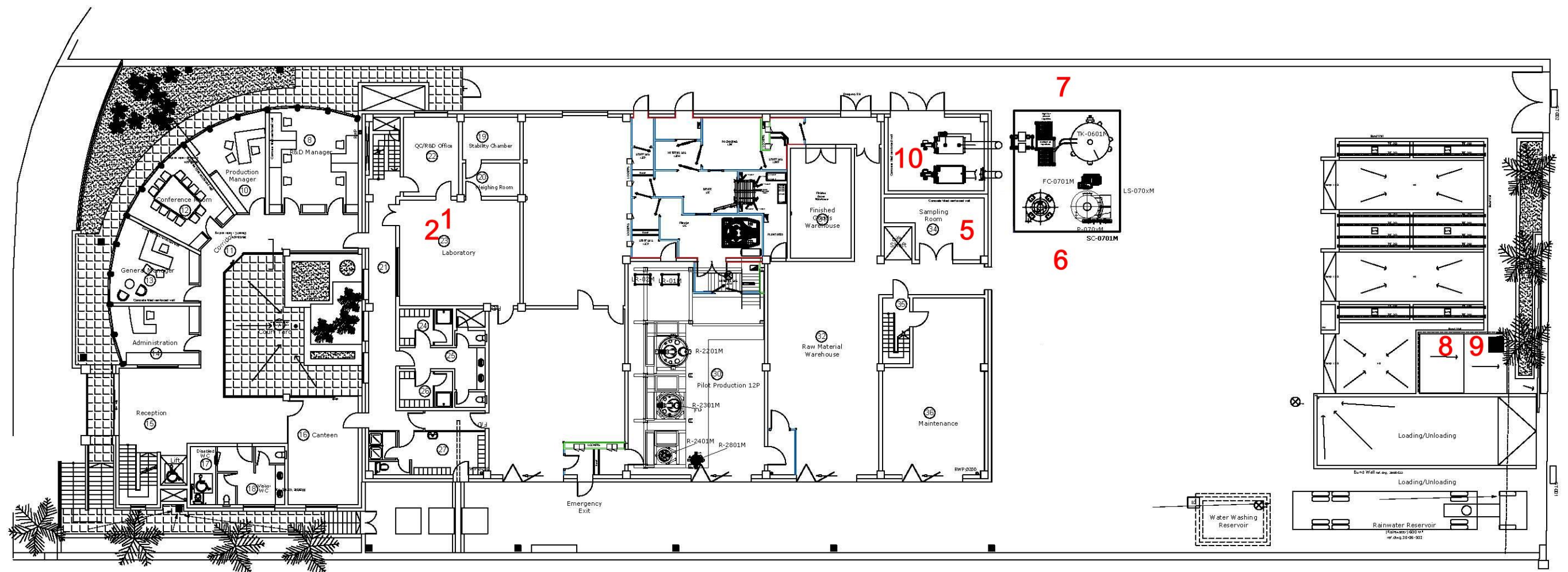
Date and Time: 24/06/2014 11:47  
Sound Level Meter: Cirrus Research plc  
Recalibration Due: 30/09/2014  
Run Duration: 00:10:00 hh:mm:ss  
Range: 40-110 dB  
Overload: no  
Location: R&D Laboratory

## Data

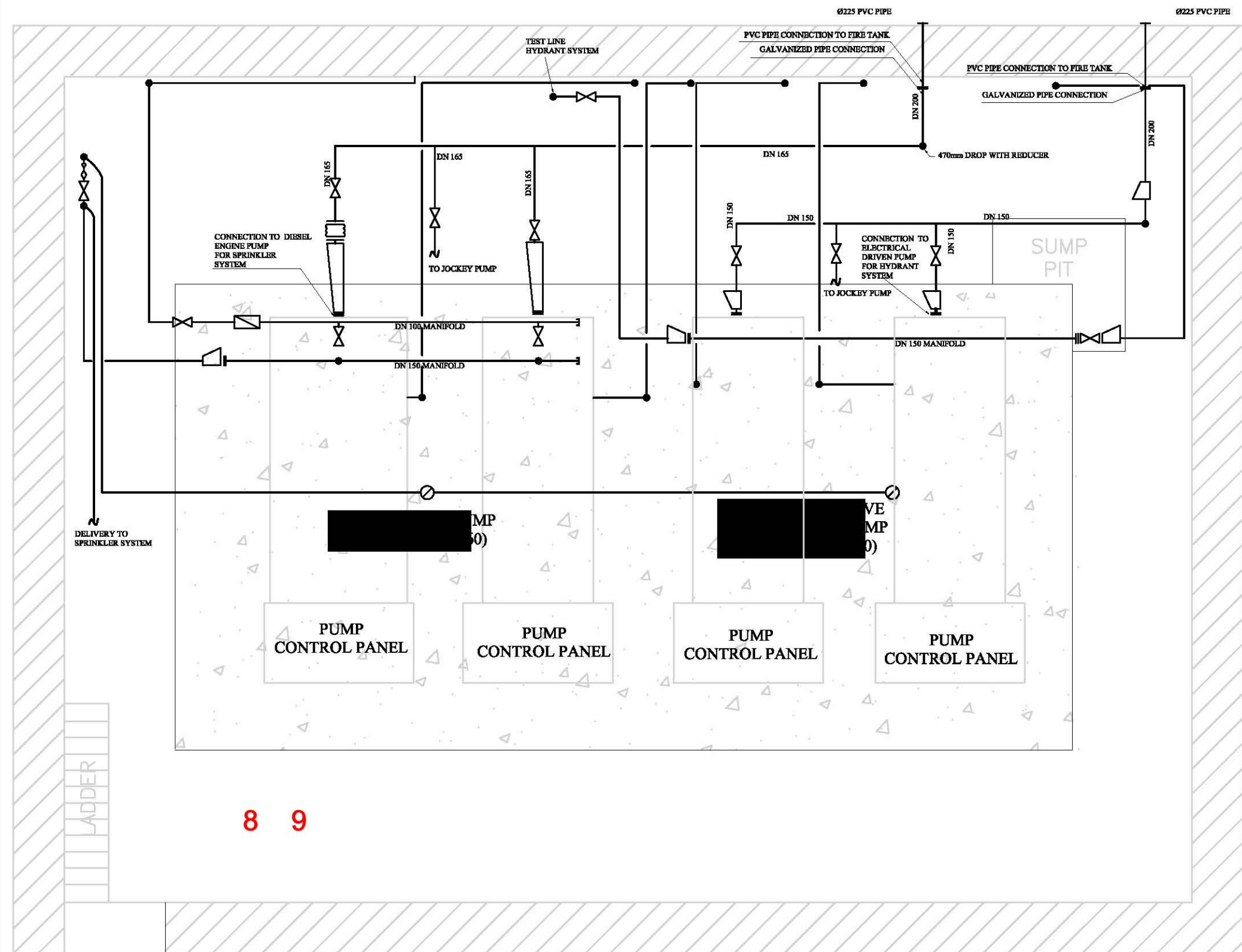
|        |          |       |          |
|--------|----------|-------|----------|
| Leq    | 61.5 dBA | L1.0  | 64.6 dBA |
| Lepd   | 44.7 dBA | L10.0 | 63.1 dBA |
| LAE    | 89.0 dBA | L50.0 | 61.3 dBA |
| LAFmax | 67.4 dBA | L90.0 | 59.5 dBA |
| Peak   | 89.2 dBC | L95.0 | 59.0 dBA |
|        |          | Lmin  | 55.4 dBA |











**LEGEND:FOR FIRE PUMP ROOM:**

- ISOLATING VALVE
- FLEXIBLE JOINT
- ECCENTRIC REDUCER (INSTALLED TOP FLAT)
- FIRE FIGHTING PIPEWORK CHANGE IN LEVEL
- FLANGED CONNECTION
- FLOW METER

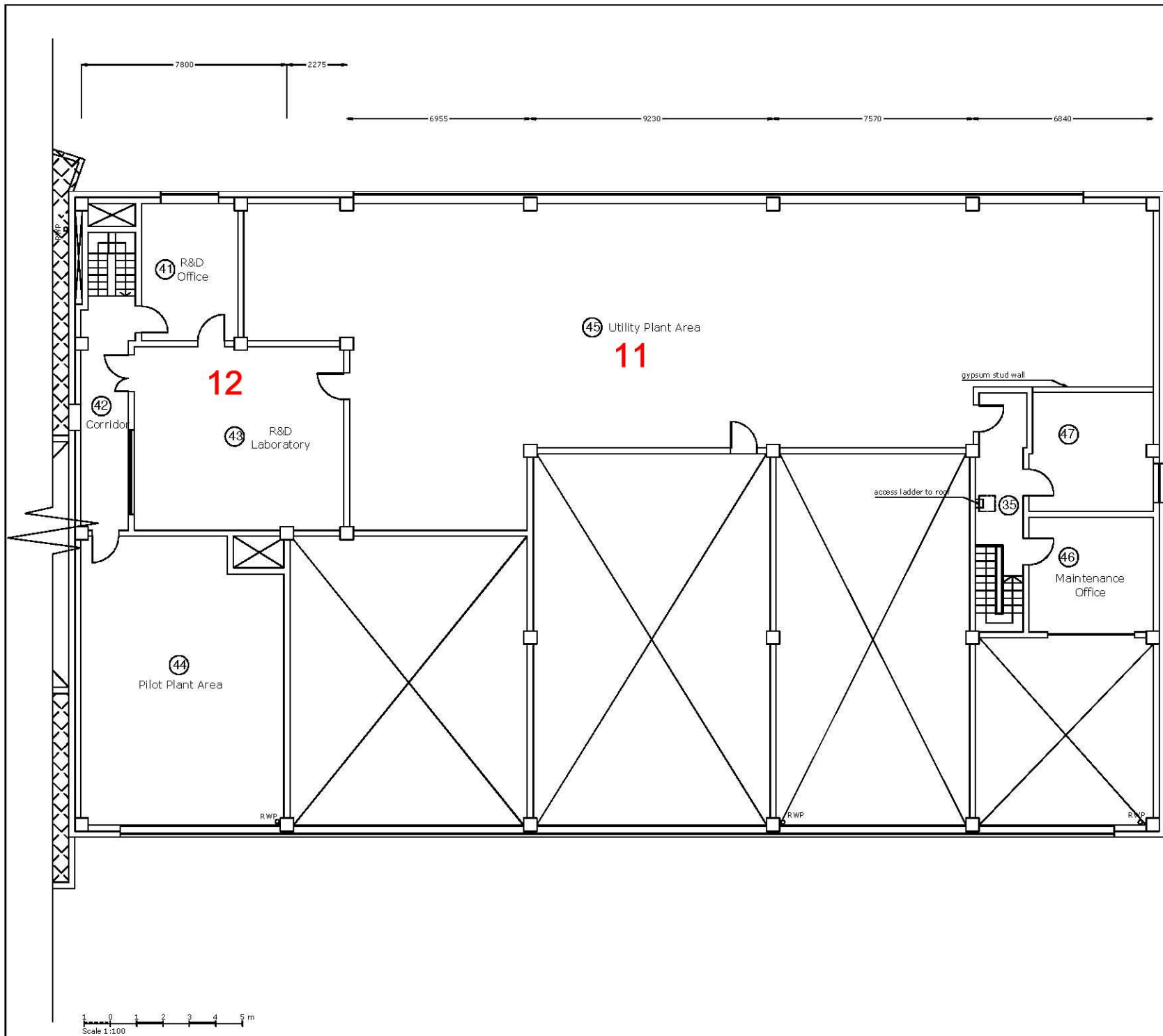
**NOTES**

1. FINISHED LEVEL OF PUMP PLINTH SHALL BE LEVEL WITH SUCTION LINE (225MM) CENTER LINE .
2. VENTILATION ARRANGEMENTS TO BE ADDED IN SUBSEQUENT REVISIONS FOLLOWING ADDITIONAL CLARIFICATIONS.
3. FOR CONNECTION PIPE WORK SEE DRAWING S047/12/FF-010.

| Rev. no | Date | Modification | Drawn | Checked |
|---------|------|--------------|-------|---------|
|         |      |              |       |         |

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 (+356) 21484358  
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 FAX: (+356) 21484077

|                                    |   |
|------------------------------------|---|
| JOB TITLE:                         | STERLING S.N.I.F.F – HAL FAR            |
| JOB NO.:                           | 15239                                   |
| DRAWING TITLE:                     | FIRE FIGHTING<br>PUMP ROOM BUIDERS WORK |
| DETAILED DESIGN DRAWING ISSUED BY: | ALBERTA                                 |
| INSTALLATION DRAWING               |   |
| DESIGNED BY: SANDRO ATTARD         | SCALE: 1 : 20 (A3)                      |
| DRAWN BY: JOSEPH VISHAL            | DATE: 28 FEB 13                         |
| CHECKED BY: SANDRO ATTARD          | DRAWING NO.: S047/13/FF-D01             |
|                                    | REV: 0                                  |



# Finishes Legend

## CEILING:

- C1 Render in-situ concrete slabs/stairs etc. cement plaster, apply emulsion paint.
- C2 Gypsum rendering, apply emulsion paint.
- C3 Pointing of PCC Slabs and paint with acrylic emulsion paint
- C4 Vinyl coated gypsum soffit
- C5 Ecophon Soffit Ceiling
- C6 Seamless gypsum soffit

## WALLS:

- W1 Gypsum plaster, apply acrylic paint.
- W2 Point masonry walls, apply acrylic paint.
- W3 Cement rendering and apply acrylic emulsion paint
- W5 Render with Silicato Finish
- W6 Render with Cement, apply Stabilising Solution, apply Weather Resistant Paint
- W7 Point Masonry Walls and apply Weather Resistant Paint System
- W8 Full-Fill Finish
- W9 Wall tiles - white, matt
- W10 Alucobond cladding - colour to be RAL 9016
- W11 "Veneziano" rendered finish
- W12a Marble Cladding - Type: Carrara CD, Bush Hammered
- W12b Marble Cladding - Type: Crema Laguna, Brushed

## FLOORS:

- F1 'Piccadilly Ivory' - 600x600mm external type
- F2 Type 2 Polished Gres Tiles
- F3 'Piccadilly Ivory' - 900x900mm rectified
- F4 Type 4 Matt Gres Tiles
- F5 Hardstone or Travertino Marble
- F6 Powerfloat Finish to Concrete Floor
- F7 Concrete Stencil Paving
- F8 Epoxy Paint to Concrete Floor
- F9 Epoxy Screed to Concrete Floor
- F9a As F9 but Anti-Static
- F10 Marble (type to be approved) treads & risers
- F11 Gres stair treads and risers
- F12 External Epoxy Screed to Concrete Floor
- F13 Marble (type to be approved) treads & risers - non-slip finish
- F14 'Piccadilly Ivory' stair treads & risers

## SKIRTING:

- S1 Type 1 Non-Slip Gres Skirting
- S2 Type 2 Polished Gres Skirting
- S3 'Piccadilly Ivory' Skirting
- S4 Type 4 Matt Gres Skirting
- S5 Hardstone or Travertino Marble
- S6 Marble Skirting (type to match F10)
- S7 Epoxy Skirting

## WINDOW SILLS:

- WS1 BIANCO CARRARA 20mm marble cills
- WS2 Marble to match Colour Scheme of Facade

## HANDRAILS:

- HR1 Stainless steel handrail as per dwg 38-06-519
- HR2 Aluminium handrail as per dwg 38-06-519
- HR3 Painted Galvanised/stainless steel handrails as per dwg 38-06-519

|      |                           |          |
|------|---------------------------|----------|
| C    | Changes to Floor Finishes | 05/10/12 |
| B    |                           | 26/09/12 |
| A    |                           | 16/05/11 |
| Rev. | Description               | Date     |

  
**Wallace Farrugia & Associates**  
Architects, Civil Engineers & Structural Consultants  
No 44, Apt 3, St Francis Street, Sliema SLM06 tel:21316758 fax: 21316760

|                |          |   |            |
|----------------|----------|---|------------|
| Commission:    |          | Proposed Factory<br>at Hal-Far          |            |
| Client:        |          | STERLING SNIFF                          |            |
| Drawing Title: |          | Finishes Layout<br>Level 2 - Production |            |
| Scale:         | 1:100    | Drawing No:                             | 38-06-514C |
| Job Ref:       | 38/06    | A B C D E F                             |            |
| Drawn:         | j.S.     | Traced:                                 | --         |
| Approved:      | --       | Checked:                                | w.f.       |
| Date:          | 27/03/09 |   |            |



# Certificate of Calibration



## Equipment Details

Instrument Manufacturer Cirrus Research plc  
Instrument Type CR:811C  
Description Sound Level Meter  
Serial Number D20097FD

## Calibration Procedure

The instrument detailed above has been calibrated to the publish test and calibration data as detailed in the instrument hand book, using the techniques recommended in the latest revisions of the International Standards IEC 61672-1:2002, IEC 60651:1979, IEC 60804:2001, IEC 61260:1995, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983, ANSI S1.11-1986 and ANSI S1.43-1997 where applicable.

Sound Level Meters: All Calibration procedures were carried out by substituting the microphone capsule with a suitable electrical signal, apart from the final acoustic calibration.

## Calibration Traceability

The equipment detailed above was calibrated against the calibration laboratory standards held by Cirrus Research plc. These are traceable to International Standards (A.0.6). The standards are:

|                  |         |               |         |                  |        |
|------------------|---------|---------------|---------|------------------|--------|
| Microphone Type  | B&K4180 | Serial Number | 1893453 | Calibration Ref. | S 6009 |
| Pistonphone Type | B&K4220 | Serial Number | 613843  | Calibration Ref. | S 5964 |

Calibrated by

*T. A. Goodwin*

Calibration Date

24 September 2013

Calibration Certificate Number

210983

This Calibration Certificate is valid for 12 months from the date above.

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[www.accudata.co.uk](http://www.accudata.co.uk)

Reg. No. 04332744

## Certificate of Calibration

Certificate #: ACC101311735

Date of Calibration: 24<sup>th</sup> October 2013

**Client:** Terracore  
**Model description:** Nomis Mini-SuperGraph Seismograph  
**Serial Number:** 117345

| Axis | Calibration Level | Accuracy of Calibration | Calibration Frequency |
|------|-------------------|-------------------------|-----------------------|
| R    | 10.0mm/s          | ±5%                     | 30Hz                  |
| V    | 10.0mm/s          | ±5%                     | 30Hz                  |
| T    | 10.0mm/s          | ±5%                     | 30Hz                  |

### Instrumentation used:

| Make/Model                               | Serial Number | Reference      |
|--|---------------|----------------|
| Fluke 111 Multi-meter                    | 81430100      | Cal Ref: A2221 |
| DJB Accelerometer A/20/TN                | 8418          | Cal Ref: A2222 |
| DJB VT-1 Velocity Meter                  | 0228          | Cal Ref: A2223 |
| GenRad 1562-A Acoustic Calibrator        | 20652         | Cal Ref: A2224 |
| Gearing & Watson V20 Shaker              | 08/A6Q/20995  | N/A            |
| Gearing & Watson 30 Watt Power Amplifier | 08/A6Q/23167  | N/A            |
| GW Instek Function Generator             | GFG-8216A     | N/A            |
| Kenwood CS-4025 Oscilloscope             | 4110066       | Cal Ref: A2225 |

The calibrated instrumentation is traceable to National Standards

Calibration Certified by: *A. Maslin*