soundtesting.co.uk Ltd

Environmental Noise & Vibration Report

221A Belsize Road
London
NW6 4AA

Date of Survey: Monday 10th until Tuesday 11th September 2012

Date of Report: Thursday 20th September 2012

Reference: 4937

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Contents

Appendices
Aerial View
Measured Noise Data

1.0. General Information

1.1. Site Address	221 Belsize Road London NW6 4AA
1.2. Client Instructing Test	Mr. Ali Yazdiha 29 Dolis Avenue London N3 1DA
1.3. Survey Consultant	J Howell BSc (Hons) Acoustics MIOA
1.4. Date of Survey	Monday 10th until Tuesday 11th September 2012

	Name	Position	Signature	Date
Prepared by:	R Calvert	Acoustic Consultant		20/09/2012
For and on behalf of: Sound Testing.Co.Uk Ltd				

Revision No.	Date	Description	Prepared by
0	20/09/2012	Draft	RC
1	21/09/2012	Final	RC

2.0. Introduction

Soundtesting.co.uk Ltd has been instructed by Mr. Ali Yazdiha to carry out the following for the conversion of an existing property into residential dwellings. The proposal is to extend the existing single storey building with an additional 2 floors to have an apartment on each floor.

The noise survey follows on from the refusal of a planning application. The planning application was refused on a number of grounds, including the potential noise and vibration at the site.

2.1. An Environmental Noise Assessment

We have carried out an environmental noise assessment at the above site with noise levels measured externally over a typical weekday 24hr period.

This report will state the measured noise level and refer to guidance contained within PPG24 for the suitable Noise Exposure Category, BS8233:1999 and WHO Community Noise Guidelines for recommended internal noise levels.

2.2. Measurement of Vibration

We have carried out a measurement and assessment of the ground borne vibration from any nearby vibration sources. Measurement will be of the VDVb/d with the transducer mechanically fixed to a large solid structure on the existing premises.

Measurements and conclusions will follow guidance contained within BS 6472-1:2008.

3.0. Assumptions

a) All suggested specifications require a good level of workmanship and for materials to be installed as the manufacture intends. Any poor workmanship may lead to weaknesses in the sound attenuation provided by the building façade.

b) The noise and vibration levels measured on site at the time of the survey are typical of the site.

4.0. Criteria
The criteria listed below are taken from associated relevant guidance documents, all of which should be considered in assessing the noise impact on the proposed development.

4.1. PPG24
PPG24 provides the following guidance to allocate a site into any one of four Noise Exposure Categories (NECs).

Noise Levels[0] Corresponding To The Noise Exposure Categories For New Dwellings $L_{Aeq,T}$ dB				
	Noise Exposure Category			
Noise Source	A	B	C	D
road traffic				
07.00 - 23.00	<55	55 - 63	63 - 72	>72
23.00 - 07.00[1]	<45	45 - 57	57 - 66	>66
rail traffic				
07.00 - 23.00	<55	55 - 66	66 - 74	>74
23.00 - 07.00[1]	<45	45 - 59	59 - 66	>66
air traffic[2]				
07.00 - 23.00	<57	57 - 66	66 - 72	>72
23.00 - 07.00[1]	<48	48 - 57	57 - 66	>66
mixed sources[3]				
07.00 - 23.00	<55	55 - 63	63 - 72	>72
23.00 - 07.00[1]	<45	45 - 57	57 - 66	>66

[1]**Night-time noise levels (23.00 - 07.00):** sites where individual noise events regularly exceed 82 dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8h}$ (except where the $L_{Aeq,8h}$ already puts the site in NEC D).

Figure 1 – Extract from PPG24

4.2. BS 8233:1999 Sound Insulation and Noise Reduction for Buildings
BS 8233:1999 Sound Insulation and Noise Reduction for Buildings – Code of Practice suggests the following noise levels:-

Criterion	Typical Situation	Design Range $L_{Aeq,T}$ dB	
		Good	Reasonable
Reasonable Resting / Sleeping Conditions	Living rooms	30	40
Reasonable Resting / Sleeping Conditions	Bedrooms*	30	35
Reasonable Speech or Telephone Communications	Toilets	45	55
Reasonable Speech or Telephone Communications	Kitchen	45	55

Figure 2 – (ref: BS8233:1999)

*For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB *L*Amax.

4.3. WHO Community Noise Guidelines

A summary of the guidance noise levels can be found below;

Specific Environment	Critical health effect(s)	LAeq (dB)	Time base (hours)	LAFmax (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Figure 3 – Summary of WHO Community Noise Guidelines

4.4. BS6472-1:2008 Guide to evaluation of human exposure to vibration in buildings

See below vibration dose value ranges which might result in various probabilities of adverse comment within residential buildings.

Place and time	Low probability of adverse comment $m.s^{-1.75}$	Adverse comment possible $m.s^{-1.75}$	Adverse comment probable $m.s^{-1.75}$
Residential Buildings 8hr night	0.2 - 0.4	0.4 - 0.8	0.8 - 1.6
Residential Buildings 16hr day	0.1 - 0.2	0.2 - 0.4	0.4 - 0.8

Figure 4 – Summary of vibration annoyance (Ref: BS6472-1:2008)

4.5. Criteria Summary

PPG24 provides guidance to assign the site into the correct NEC, this will be allocated upon the highest attained NEC, based upon measured day and night time noise.

BS8233:1999 and WHO Community Noise Guidelines provide similar guidance relating to internal noise levels within living spaces as well as external spaces. WHO goes on to suggest maximum noise levels outside bedroom windows when required to be open for ventilation purposes.

BS6472-1:2008 provides guidance on the likelihood of adverse comment for differing vibration ranges for both day and night. It should be noted that any value below the lowest vibration range would suggest that adverse comment is not expected.

5.0. Site Description
An aerial view of the site can be found in appendix 1, with relevant locations marked.

The site is a small section of land in the north west of central London. A single storey furniture shop occupied the site at the time of the noise and vibration survey. The site is flanked by a single carriage way road and a railway line.

To the north of the site is Belsize Road, a single carriage way road with a 30mph speed limit. The road is of average width and has a number of junctions, bends and a zebra crossing which all aid keeping vehicle speed low. The road was used infrequently by cars and LGVs (light goods vehicles). Belsize Road has a mix of residential, commercial, pubs and restaurants and retail.

To the south east and south is a main railway line and Kilburn High Road Railway Station, which is part of the London Overground railway network. A number of railway lines run close to the site as seen in appendix 1.

To the south west is A5 – Kilburn High Road, a busy main route in and out of central London, leading directly to the M1 Motorway. Kilburn High Road is used by all types of traffic 24hours-a-day, 5days-a-week. High traffic volumes ensure vehicle speed is low, and ensuring noise is minimised, Kilburn High Road is approximately 500m from the site.

The site has frequent over flying aircraft.

6.0. Noise & Vibration Measurement Procedure

6.1. Survey Equipment Used

B&K 2260 Sound Level Meter S/N: 2466959
B&K UA1404 Outdoor Microphone Enclosure
Calibration level before: 94.1dB
Calibration level after: 94.1dB

B&K 4231 Dual Level Calibrator S/N: 2528207

Vibrock V901 Digital Seismograph S/N: 1284
VDV Transducer

6.2. Weather Conditions

The weather was generally fine with light wind (0-1m/s), rain fell occasionally leaving the ground damp at times. Temperature remained around 15°C during the day and fell to 10°C.

6.3. Acoustic Noise Procedure

A 24 hour noise level measurement was carried out with the microphone protruding from the 1st floor level of the south eastern facade overlooking the railway line, the microphone was positioned to be 0.7m from the building facade, and therefore a 3dB facade correction will be applied to the measured noise levels.

The sound level meter was set to record L_{A10}, L_{Aeq} and $L_{A,\,Max\,(fast\,\&\,slow)}$ as well as full spectrum analysis in order to indentify any tonal characteristics of the noise. The external noise level was measured from 15:05 on Monday 10th September until 15:20 on Tuesday 11th September 2012 with a short break in measurements between 08:45 and 12:00 due to instrument power difficulties, the break in measurements is not though to affect the overall outcome of the report.

6.4. Vibration Measurement Procedure

The VDV transducer was placed on the solid concrete floor base of the existing building approximately 3m from the railway line. The transducer was attached to the concrete floor base by use of a car body filler type putty which was allowed to harden prior to the commencement of measurements.

Measurements were carried out tri-axially with weighted VDVb/d measured every 30s between 15:10 on Monday 10th September until 15:15 on Tuesday 11th September 2012.

7.0. Measured Noise & Vibration Levels

The following noise levels have been measured as described above, no corrections have been applied.

Position Description	Measurement Duration	L_{Aeq} (dB)	$L_{AF(max)}$ (dB)
External Noise South Eastern Facade – Daytime	16hr	70.0	-
External Noise South Eastern Facade – Night time	8hr	67.3	94.1

Figure 5 – Measured Noise Levels

The $L_{AF,Max}$ measured during the night time (23:00-07:00) externally on the south eastern facade, has been analysed. It is noted that the measured $L_{AF,Max}$ exceeds 88dB 11 times over the night time period. For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10–15 times per night (Vallet & Vernet 1991)..."
(Ref: Section 3.4 http://www.ruidos.org/Noise/WHO_Noise_guidelines_3.html)"

Position Description	Measurement Duration	VDV_{d} $m.s^{-1.75}$	VDV_{b} $m.s^{-1.75}$	VDV_{d} $m.s^{-1.75}$
Vibration – Daytime	16hr	0.026	0.097	0.026
Vibration – Night time	8hr	0.022	0.080	0.022

Figure 6 – Measured Vibration Levels

A full data set of the measured noise levels has been provided in appendix 2 vibration data is available on request.

8.0. Results Analysis

As discussed, a 3dB facade correction will be subtracted from the measured noise levels. It is generally regarded that internal daytime noise levels should be achieved in living rooms and internal night time noise levels achieved in bedrooms. In addition to this, the noise level at ground floor and 2nd floor windows will vary from the measured noise level.

Further attenuation will be applied to windows facing north west, away from the railway line. Attenuation has been underestimated to be 10dB. Using the above analysis, we can provide the following predicted noise levels for each window type.

Window Description			LAeq (dB)	LAF,Max (dB)
Facing	Level	Window Type		
South East	Ground Floor	Living Room	69	-
South East	Ground Floor	Bedroom	66.3	87
South East	1st Floor	Living Room	67	-
South East	1st Floor	Bedroom	64.3	85
South East	2nd Floor	Living Room	65	-
South East	2nd Floor	Bedroom	61.3	82
North West	Ground Floor	Living Room	59	-
North West	Ground Floor	Bedroom	56.3	77
North West	1st Floor	Living Room	57	-
North West	1st Floor	Bedroom	54.3	75
North West	2nd Floor	Living Room	55	-
North West	2nd Floor	Bedroom	51.3	72

Figure 7 – Predicted noise levels for window types and locations.

The measured vibration levels over a 16hr day and 8hr night suggest that adverse comment is not expected.

9.0. Fenestration Recommendations
So as to achieve BS8233:1999 internal noise levels the following attenuation would be required to be provided by the building facade;

Window Description			BS8233:1999 'Good'	BS8233:1999 'Reasonable'
Facing	Level	Window Type		
South East	Ground Floor	Living Room	39	29
South East	Ground Floor	Bedroom	42	42
South East	1st Floor	Living Room	37	27
South East	1st Floor	Bedroom	40	40
South East	2nd Floor	Living Room	35	25
South East	2nd Floor	Bedroom	38	38
North West	Ground Floor	Living Room	29	19
North West	Ground Floor	Bedroom	32	32
North West	1st Floor	Living Room	27	17
North West	1st Floor	Bedroom	30	30
North West	2nd Floor	Living Room	25	15
North West	2nd Floor	Bedroom	28	18

Figure 8 – Additional Fenestration Attenuation Required

On all south eastern facing windows we would suggest the installation of 6mm secondary glazing with a 150mm void and a 6mm outer glazing panel. This can be achieved using a standard 6/12/4 double glazed unit, to achieve the required thermal regulations. A 6mm secondary glazing panel should be installed, leaving a minimum 150mm void from the exterior windows. Ventilation should be provided with the use of Greenwoods MA3051 through wall acoustic trickle vent to provide adequate ventilation.

On all north western facing windows we would suggest the installation of standard 4/12/4 double glazing with Greenwoods AWV39 through wall vent to provide adequate ventilation.

It is imperative that a high level of workmanship is used upon the installation of windows and window frames, small gaps or unfilled holes will cause severe loss of the potential sound attenuation of the above specification.

10.0. Conclusions

A noise assessment survey has been carried out by Soundtesting.co.uk Ltd for Mr Ali Yazdiha.

Noise and vibration levels have been measured as described over a 24hr period.

Recommendations have been made for the installation of glazing and ventilation.

Our calculations have shown that internal noise levels provided in BS8233:1999 'good' will be achieved in internal living spaces should our recommended fenestration be installed.

BS6472-1:2008 suggests that adverse comment with relation to vibration is not expected.

11.0. References

1. The Little Red Book of Acoustics – R. Watson & O Downey
2. www.google.co.uk/maps
3. BS 8233:1999 Sound Insulation and Noise Reduction for Buildings
4. BRE Building Envelope Insulation Calculator
5. PPG24


Priory Tavern
Priory Tavern
Belsize
Lorton House
Jaffe Porter Crosstick
Conexions Hair and Beauty Salon
Lola Rose Jewellers
Belsize Rd
Providence House
Lola Rose
Kilburn Priory
London Staff Bureau
Kinetic
Venice Services
Kilburn High Rd
Priory
Philip House

Site Address: 221 Belsize Road, London. NW6 4AA

Start Date (dd/mm/yyyy)	Start time (hh:mm:ss)	LAeq (dB)	LASmax (dB)	LAFmax (dB)	LAF90 (dB)	LAF10 (dB)
10/09/2012	15:05:22	66.6	81.0	82.0	56.4	62.9
10/09/2012	15:10:00	72.1	85.2	87.2	52.9	75.6
10/09/2012	15:15:00	71.9	85.8	87.7	50.4	72.2
10/09/2012	15:20:00	68.9	81.8	83.8	49.8	71.5
10/09/2012	15:25:00	66.4	81.0	82.1	49.8	64.6
10/09/2012	15:30:00	68.8	83.0	85.2	50.4	70.6
10/09/2012	15:35:00	68.3	84.3	86.8	50.8	68.8
10/09/2012	15:40:00	66.0	79.4	83.1	50.1	69.2
10/09/2012	15:45:00	69.6	83.1	84.7	50.3	72.9
10/09/2012	15:50:00	67.0	83.5	85.7	49.4	56.1
10/09/2012	15:55:00	67.6	82.8	85.4	48.9	71.0
10/09/2012	16:00:00	67.7	82.5	84.6	49.6	68.5
10/09/2012	16:05:00	70.2	84.3	86.2	51.6	70.7
10/09/2012	16:10:00	72.2	84.8	86.8	49.3	77.1
10/09/2012	16:15:00	69.1	82.5	83.7	48.2	70.5
10/09/2012	16:20:00	64.4	78.3	81.4	49.6	68.3
10/09/2012	16:25:00	72.1	85.3	87.8	49.8	76.8
10/09/2012	16:30:00	70.2	84.6	85.8	47.4	70.1
10/09/2012	16:35:00	72.2	84.5	86.8	50.0	71.6
10/09/2012	16:40:00	65.0	77.1	80.0	47.5	68.4
10/09/2012	16:45:00	69.0	81.6	82.7	48.9	69.7
10/09/2012	16:50:00	63.7	80.5	81.4	49.8	55.7
10/09/2012	16:55:00	69.0	84.2	86.4	49.5	63.1
10/09/2012	17:00:00	73.2	88.8	89.9	51.7	76.5
10/09/2012	17:05:00	74.3	85.5	88.5	49.4	79.3
10/09/2012	17:10:00	70.8	84.8	86.7	48.4	64.5
10/09/2012	17:15:00	70.3	87.1	88.8	48.8	68.3
10/09/2012	17:20:00	69.6	83.1	85.8	48.6	68.5
10/09/2012	17:25:00	70.6	85.3	87.5	49.5	70.1
10/09/2012	17:30:00	72.3	85.4	88.1	49.2	74.8
10/09/2012	17:35:00	70.8	85.2	87.1	48.0	65.9
10/09/2012	17:40:00	66.5	81.3	85.4	48.5	69.2
10/09/2012	17:45:00	73.3	85.2	87.1	49.9	79.3
10/09/2012	17:50:00	67.9	82.9	86.3	48.7	57.5
10/09/2012	17:55:00	68.0	85.4	87.4	48.7	58.7
10/09/2012	18:00:00	66.6	79.4	82.0	48.6	69.4
10/09/2012	18:05:00	72.6	85.2	87.1	50.2	78.3
10/09/2012	18:10:00	69.4	84.6	85.6	47.7	64.9
10/09/2012	18:15:00	72.7	85.3	87.7	48.8	78.1
10/09/2012	18:20:00	67.0	82.9	84.6	49.6	66.8
10/09/2012	18:25:00	71.4	84.0	85.6	48.7	76.7
10/09/2012	18:30:00	66.6	78.9	80.0	48.7	71.9
10/09/2012	18:35:00	71.9	83.4	84.9	49.8	77.7
10/09/2012	18:40:00	69.2	85.5	87.9	49.1	62.0
10/09/2012	18:45:00	70.9	84.9	87.6	48.8	71.2
10/09/2012	18:50:00	66.5	82.8	83.6	48.2	55.7
10/09/2012	18:55:00	69.7	86.2	87.9	47.0	67.7

10/09/2012	19:00:00	72.5	84.3	86.1	50.6	77.1
10/09/2012	19:05:00	74.6	87.9	90.0	48.3	79.3
10/09/2012	19:10:00	64.7	75.3	77.4	49.3	71.2
10/09/2012	19:15:52	69.5	79.7	81.3	49.3	76.0
10/09/2012	19:20:00	65.9	78.9	80.9	47.9	67.3
10/09/2012	19:25:00	71.4	84.4	86.9	47.8	74.6
10/09/2012	19:30:00	61.0	78.1	79.0	47.5	56.5
10/09/2012	19:35:00	71.7	85.2	87.1	48.1	71.3
10/09/2012	19:40:00	68.9	81.9	84.2	47.4	70.6
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10/09/2012	19:55:00	68.1	84.0	86.2	47.2	65.9
10/09/2012	20:00:00	65.9	83.9	85.2	48.2	53.4
10/09/2012	20:05:00	67.2	80.8	82.5	48.2	69.5
10/09/2012	20:10:00	68.9	82.5	84.7	48.7	70.3
10/09/2012	20:15:00	73.4	86.1	87.5	47.4	78.4
10/09/2012	20:20:00	62.8	77.3	78.2	47.9	65.8
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10/09/2012	20:30:00	71.4	85.4	87.2	46.9	77.4
10/09/2012	20:35:00	69.8	85.0	87.4	45.9	65.4
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10/09/2012	21:05:00	75.5	88.8	90.0	46.5	81.2
10/09/2012	21:10:00	64.6	78.6	80.0	45.5	62.8
10/09/2012	21:15:00	69.8	83.1	84.9	45.7	71.2
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10/09/2012	21:25:00	61.3	78.1	78.7	46.5	54.5
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10/09/2012	22:00:00	63.1	79.0	82.9	46.4	63.2
10/09/2012	22:05:00	69.5	83.1	84.3	46.1	69.8
10/09/2012	22:10:00	70.5	87.7	89.2	44.5	74.8
10/09/2012	22:15:00	67.8	84.4	86.7	46.9	62.4
10/09/2012	22:20:00	64.7	78.3	80.5	44.9	64.7
10/09/2012	22:25:00	69.7	84.5	87.3	45.0	75.4
10/09/2012	22:30:00	62.3	75.6	77.9	45.8	68.3
10/09/2012	22:35:00	68.1	83.4	85.4	44.9	61.4
10/09/2012	22:40:00	74.3	88.8	91.1	46.2	77.8
10/09/2012	22:45:00	71.0	83.5	85.2	46.1	68.2
10/09/2012	22:50:00	56.7	73.1	75.3	43.7	53.7
10/09/2012	22:55:00	68.1	84.9	87.1	45.7	62.4
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10/09/2012	23:35:00	69.0	84.7	86.8	44.6	58.9
10/09/2012	23:40:00	74.6	89.3	90.4	43.3	63.0
10/09/2012	23:45:00	69.6	82.5	83.6	44.5	69.9
10/09/2012	23:50:00	68.7	82.6	84.4	43.9	74.2
10/09/2012	23:55:00	74.0	89.2	90.4	44.4	62.0
11/09/2012	00:00:00	62.5	76.4	78.9	47.1	65.3
11/09/2012	00:05:00	66.3	82.0	84.1	45.7	59.9
11/09/2012	00:10:00	52.2	69.0	71.5	45.0	50.5
11/09/2012	00:15:00	74.0	87.9	90.1	45.9	76.9
11/09/2012	00:20:00	68.1	83.3	88.7	45.4	62.5
11/09/2012	00:25:00	63.8	79.7	82.5	44.5	52.3
11/09/2012	00:30:00	70.0	82.2	85.8	44.2	75.8
11/09/2012	00:35:00	46.8	52.1	52.9	43.2	49.2
11/09/2012	00:40:00	71.9	85.7	87.7	43.1	63.9
11/09/2012	00:45:00	65.6	83.1	84.8	42.6	50.3
11/09/2012	00:50:00	72.3	87.9	89.7	42.6	58.8
11/09/2012	00:55:00	65.6	81.6	85.8	42.6	49.9
11/09/2012	01:00:00	44.2	49.7	51.7	41.0	46.4
11/09/2012	01:05:00	46.7	55.9	58.9	41.6	49.2
11/09/2012	01:10:00	66.6	78.3	79.5	41.4	73.3
11/09/2012	01:15:00	44.9	51.6	56.4	40.2	47.8
11/09/2012	01:20:00	68.5	85.5	87.5	41.1	49.0
11/09/2012	01:25:00	43.4	51.6	55.0	40.4	45.8
11/09/2012	01:30:00	43.2	48.8	50.3	40.4	46.1
11/09/2012	01:35:00	61.7	81.7	84.4	40.8	46.0
11/09/2012	01:40:00	72.2	87.5	88.8	42.3	55.5
11/09/2012	01:45:00	49.4	61.3	67.4	41.4	53.1
11/09/2012	01:50:00	43.1	49.9	51.3	40.0	45.7
11/09/2012	01:55:00	44.6	53.5	54.7	39.7	47.8
11/09/2012	02:00:00	43.4	52.0	53.8	39.5	46.0
11/09/2012	02:05:00	72.5	87.7	89.1	40.3	61.9
11/09/2012	02:10:00	66.8	80.1	81.3	40.6	62.4
11/09/2012	02:15:00	44.5	50.5	52.8	40.0	47.5
11/09/2012	02:20:00	43.8	51.0	52.9	39.6	46.9
11/09/2012	02:25:00	50.1	64.2	67.3	41.5	52.1
11/09/2012	02:30:00	43.7	52.4	55.6	39.4	47.2
11/09/2012	02:35:00	42.6	48.4	51.5	38.9	45.3
11/09/2012	02:40:00	45.8	53.4	57.9	41.4	48.3
11/09/2012	02:45:00	43.6	48.2	49.1	40.3	46.1
11/09/2012	02:50:00	44.9	55.9	59.0	39.2	47.1
11/09/2012	02:55:00	42.7	50.7	52.6	38.7	46.2
11/09/2012	03:00:00	41.7	48.6	51.3	38.9	44.4
11/09/2012	03:05:00	43.7	50.0	51.5	40.1	46.1
11/09/2012	03:10:00	45.3	55.3	59.0	39.6	47.7
11/09/2012	03:15:00	68.7	86.0	88.0	39.0	48.1

11/09/2012	03:20:00	72.5	85.9	87.2	41.2	78.1
11/09/2012	03:25:00	44.1	54.5	56.0	38.9	47.5
11/09/2012	03:30:00	42.8	48.6	49.5	39.3	45.6
11/09/2012	03:35:00	65.3	81.8	84.2	39.4	49.0
11/09/2012	03:40:00	74.3	88.6	90.5	40.8	65.7
11/09/2012	03:45:00	43.6	55.4	56.2	38.2	46.8
11/09/2012	03:50:00	42.1	48.8	50.0	38.5	44.8
11/09/2012	03:55:00	71.9	88.9	90.5	38.9	50.5
11/09/2012	04:00:00	71.2	84.3	85.7	41.8	76.8
11/09/2012	04:05:00	45.8	54.7	56.0	40.0	48.9
11/09/2012	04:10:00	68.5	82.1	83.0	39.0	53.2
11/09/2012	04:15:00	45.0	53.5	55.5	40.0	47.7
11/09/2012	04:20:00	43.2	51.5	52.9	38.1	46.7
11/09/2012	04:25:00	60.6	79.8	81.8	40.3	47.7
11/09/2012	04:30:00	68.8	82.0	84.7	38.2	55.7
11/09/2012	04:35:00	44.3	50.5	51.3	39.8	47.2
11/09/2012	04:40:00	44.9	51.3	53.4	40.2	48.3
11/09/2012	04:45:00	64.8	80.6	82.0	39.3	49.1
11/09/2012	04:50:00	63.9	81.2	82.3	38.2	47.4
11/09/2012	04:55:00	56.8	80.9	81.8	39.5	46.4
11/09/2012	05:00:00	63.6	82.0	83.3	39.7	49.2
11/09/2012	05:05:00	64.2	81.7	83.9	40.1	60.1
11/09/2012	05:10:00	63.3	81.8	83.5	42.8	51.8
11/09/2012	05:15:00	44.3	50.1	51.7	40.0	47.3
11/09/2012	05:20:00	63.6	81.7	83.3	40.0	48.9
11/09/2012	05:25:00	64.2	81.5	84.5	40.3	62.9
11/09/2012	05:30:00	69.5	83.8	86.8	41.9	72.0
11/09/2012	05:35:00	74.2	86.9	88.7	41.2	80.1
11/09/2012	05:40:00	67.7	81.6	82.5	45.2	68.3
11/09/2012	05:45:00	58.2	76.5	80.1	43.9	58.8
11/09/2012	05:50:00	62.5	80.7	82.6	43.2	51.1
11/09/2012	05:55:00	61.2	76.8	78.9	46.9	60.9
11/09/2012	06:00:00	62.2	81.4	83.5	42.7	50.1
11/09/2012	06:05:00	70.4	84.7	87.3	44.4	71.6
11/09/2012	06:10:00	75.9	92.7	94.1	43.3	73.6
11/09/2012	06:15:00	61.2	77.2	78.0	43.5	54.2
11/09/2012	06:20:00	68.4	81.5	86.5	44.1	66.0
11/09/2012	06:25:00	68.1	84.6	87.4	44.4	63.4
11/09/2012	06:30:00	65.0	82.8	84.6	45.2	53.2
11/09/2012	06:35:00	68.9	84.8	86.5	46.2	54.6
11/09/2012	06:40:00	67.8	83.0	85.5	44.4	63.5
11/09/2012	06:45:00	68.8	82.1	83.6	45.4	64.4
11/09/2012	06:50:00	57.1	74.2	76.9	45.1	53.5
11/09/2012	06:55:00	68.7	85.1	87.1	45.4	57.6
11/09/2012	07:00:00	68.0	84.5	86.1	47.6	71.7
11/09/2012	07:05:00	72.4	84.3	86.2	47.4	78.0
11/09/2012	07:10:00	68.9	83.6	84.7	44.6	68.2
11/09/2012	07:15:00	67.7	83.8	85.3	46.8	60.1
11/09/2012	07:20:00	67.9	81.9	83.1	48.2	67.8
11/09/2012	07:25:00	70.6	84.9	87.0	48.9	69.4

11/09/2012	07:30:00	68.7	84.4	86.7	49.3	63.0
11/09/2012	07:35:00	72.1	88.3	89.8	49.3	64.6
11/09/2012	07:40:00	69.3	81.3	83.3	50.1	71.8
11/09/2012	07:45:00	67.1	83.1	84.6	47.7	57.3
11/09/2012	07:50:00	69.2	83.0	84.7	47.3	73.1
11/09/2012	07:55:00	66.5	83.5	85.7	47.7	66.3
11/09/2012	08:00:00	70.4	83.9	85.5	48.8	73.0
11/09/2012	08:05:00	68.2	82.7	84.7	49.4	59.6
11/09/2012	08:10:00	69.7	82.5	84.7	50.1	75.6
11/09/2012	08:15:00	67.0	81.2	82.2	48.5	61.9
11/09/2012	08:20:00	69.7	82.4	84.5	49.1	74.0
11/09/2012	08:25:00	70.2	84.7	86.9	53.0	69.2
11/09/2012	08:30:00	75.8	90.2	91.9	53.8	80.3
11/09/2012	08:35:00	71.5	85.9	87.7	48.3	67.4
11/09/2012	08:40:00	70.7	82.2	84.2	58.5	73.6
11/09/2012	08:45:00	68.9	83.1	84.7	51.8	64.9
11/09/2012	11:58:41	51.5	60.6	67.1	45.9	54.0
11/09/2012	12:00:00	69.6	82.8	83.9	48.9	71.5
11/09/2012	12:05:00	68.8	83.4	86.2	48.9	65.1
11/09/2012	12:10:00	67.8	82.4	84.1	48.7	62.8
11/09/2012	12:15:00	73.5	87.1	88.9	50.8	77.7
11/09/2012	12:20:00	66.9	83.0	85.1	47.9	64.4
11/09/2012	12:25:00	69.4	83.6	85.5	48.2	65.5
11/09/2012	12:30:00	64.7	81.3	83.5	49.0	57.6
11/09/2012	12:35:00	67.5	83.2	85.9	47.3	64.8
11/09/2012	12:40:00	67.7	83.1	86.7	49.1	68.4
11/09/2012	12:45:00	73.4	86.9	89.3	48.3	77.2
11/09/2012	12:50:00	65.8	80.2	81.2	47.3	58.1
11/09/2012	12:55:00	66.8	84.2	86.5	48.1	66.9
11/09/2012	13:00:00	68.4	82.4	83.7	47.8	71.8
11/09/2012	13:05:00	69.4	83.4	86.2	48.3	74.9
11/09/2012	13:10:00	73.3	86.9	88.6	48.0	78.9
11/09/2012	13:15:00	67.2	81.7	83.9	47.8	69.0
11/09/2012	13:20:00	66.2	83.1	86.1	47.3	65.4
11/09/2012	13:25:00	70.0	83.8	86.3	50.4	72.6
11/09/2012	13:30:00	69.7	84.9	85.9	45.9	69.4
11/09/2012	13:35:00	69.8	84.2	86.6	47.1	75.9
11/09/2012	13:40:00	72.0	85.9	87.6	49.4	74.7
11/09/2012	13:45:00	67.9	83.3	85.5	48.9	59.1
11/09/2012	13:50:00	69.4	83.6	86.1	49.0	68.9
11/09/2012	13:55:00	66.6	84.3	87.0	49.3	59.0
11/09/2012	14:00:00	66.3	82.5	84.4	47.8	66.5
11/09/2012	14:05:00	69.1	83.2	86.0	46.4	74.4
11/09/2012	14:10:00	68.4	80.8	82.8	49.0	69.2
11/09/2012	14:15:00	73.3	85.3	87.4	50.1	79.5
11/09/2012	14:20:00	71.9	84.0	85.9	50.0	76.8
11/09/2012	14:25:00	66.7	84.4	87.2	47.1	55.1
11/09/2012	14:30:00	65.5	81.4	83.6	46.8	55.7
11/09/2012	14:35:00	70.8	84.0	86.9	47.9	74.9
11/09/2012	14:40:00	66.9	84.2	86.0	46.6	64.8

11/09/2012	14:45:00	68.9	84.5	86.0	46.3	60.8
11/09/2012	14:50:00	63.9	81.1	81.8	46.4	52.8
11/09/2012	14:55:00	65.9	84.0	87.0	46.3	63.9
11/09/2012	15:00:00	66.8	82.3	84.9	46.6	64.8
11/09/2012	15:05:00	68.7	84.3	86.0	45.8	59.1
11/09/2012	15:10:00	68.1	82.6	85.3	48.4	65.6
11/09/2012	15:15:00	75.4	87.0	88.3	51.1	80.4