

CALGA SAND QUARRY
COMPLIANCE NOISE MONITORING

ACOUSTICS AND AIR

REPORT NO. 01127-E
VERSION A

WILKINSON  MURRAY

CALGA SAND QUARRY

COMPLIANCE NOISE MONITORING

REPORT NO. 01127-E
VERSION A

OCTOBER 2006

PREPARED FOR

ROCLA PTY LTD
72 ORCHARDLEIGH STREET
GUILDFORD NSW 2161

Wilkinson Murray Pty Limited

ABN 41 192 548 112 • Level 2, 123 Willoughby Road, Crows Nest NSW 2065, Australia • **Asian Office: Hong Kong**
t +61 2 9437 4611 • f +61 2 9437 4393 • e acoustics@wilkinsonmurray.com.au • w www.wilkinsonmurray.com.au

TABLE OF CONTENTS

	Page
1 INTRODUCTION	1
2 UNATTENDED NOISE MONITORING	1
3 OPERATIONAL NOISE CRITERIA	3
4 ASSESSMENT OF NOISE LEVELS	4
4.1 CN-1 Gazzana Residence	4
4.2 CN-2 King Residence	4
4.3 CN-3 Kashouli Residence	5
4.4 CN-4 Townsend Residence	5
5 CONCLUSION	6
APPENDIX A – Glossary of Terms	
APPENDIX B – Noise Measurement Results	

1 INTRODUCTION

This report summarises the results of the yearly unattended noise monitoring carried out in accordance with Condition 3(7) of Development Consent DA 94-4-2004. The Noise Monitoring Program (NMP) prepared by R.W. Corkery & Co. Pty. Ltd summarises all relevant criteria, monitoring locations, and frequency / timing of monitoring.

2 UNATTENDED NOISE MONITORING

Unattended noise monitoring was conducted over a nine day period from Monday, 16 until Wednesday, 25 October 2006. Measurements were made at each of the following locations (shown in Figure 2-1):

- CN-1 Gazzana Residence
- CN-2 King Residence
- CN-3 Kashouli Residence
- CN-4 Townsend Residence

The noise monitoring equipment used for these measurements consisted of environmental noise loggers set to A-weighted, fast response continuously monitoring over 15-minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The logger determines L_{A1} , L_{A10} , L_{A90} and L_{Aeq} levels of the existing noise environment (see Appendix A). The L_{A1} , L_{A10} and L_{A90} levels are the levels exceeded for 1%, 10% and 90% of the sample time respectively. The L_{A1} is indicative of maximum noise levels due to individual noise events such as the occasional pass-by of a heavy vehicle. The L_{A90} level is normally taken as the background noise level. The L_{Aeq} level is the Equivalent Continuous Sound Level and has the same sound energy average over the sampling period as the actual noise environment with its fluctuating sound levels.

All measured noise levels obtained from the unattended monitoring equipment are graphically summarised in Appendix B.

During the survey, all activities complied with the opening hours set in the NMP.

Figure 2-1 Noise Monitoring Locations

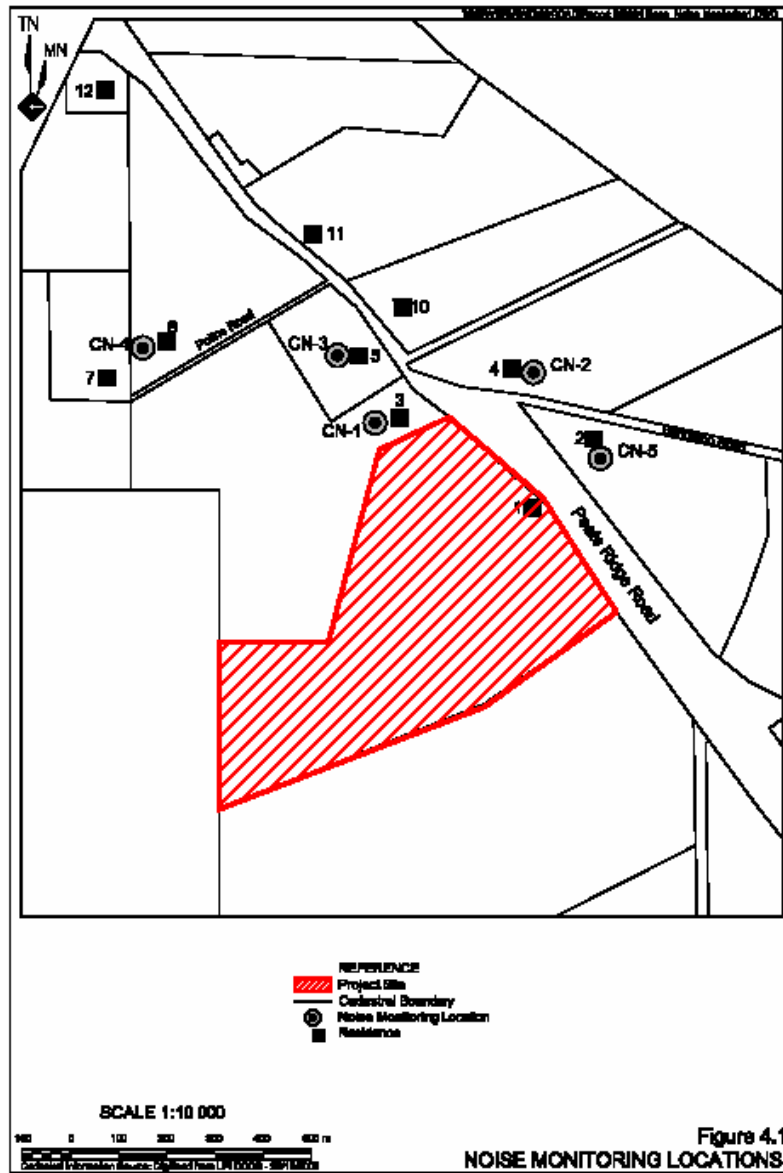


Figure 4.1
NOISE MONITORING LOCATIONS

3 OPERATIONAL NOISE CRITERIA

The Noise Monitoring Program presents noise criteria for the operation of plant or equipment on the premises as required by the DEC licence. It states that noise levels emanating from the premises must not exceed day, evening, and night criteria when measured within 30m of the residences or noise sensitive areas. The daytime and evening operational noise are assessed as $L_{Aeq,15min}$ noise levels. Night time operational noise is assessed as a $L_{A1,1min}$ noise levels.

Table 3-1 summarises the relevant noise criteria.

Table 3-1 Operational Noise Criteria

Location	Criteria		
	Day	Evening	Night Time
	$L_{Aeq,15min}$ (dBA)	$L_{Aeq,15min}$ (dBA)	$L_{A1,1min}$ (dBA)
CN-1	41	35	35
CN-2	40	35	35
CN-3	39	35	35
CN-4	35	35	35

Since environmental noise loggers are only capable of recording L_{A1} noise levels over a 15-minute period as opposed to a one minute period, night time operational noise was assessed using $L_{A1,15min}$ noise descriptor. However, L_{A1} noise levels can differ considerably when assessed over a one minute or a 15-minute period, and for this reason it is believed the unattended noise monitoring survey is more appropriate for assessing operational noise during the daytime and evening periods.

Table 3-2 Operating Hours

Activity	Day	Time
Extraction and processing	Monday – Friday	7.00am to 6.00pm
	Saturday	7.00am to 4.00pm
	Sunday & Public Holidays	Nil
Delivery and Distribution	Monday – Friday	5.00am to 10.00pm
	Saturday	5.00am to 4.00pm
	Sunday and Public Holidays	Nil
Maintenance (if inaudible at neighbouring residences)	Anytime	Anytime

Note: Construction activities, such as the construction of the acoustic barrier, shall only be carried out between 7.00am to 6.00pm Monday to Friday, and 8.00am to 1.00pm on Saturdays. No construction activities are to be undertaken on Sundays or Public Holidays.

4 ASSESSMENT OF NOISE LEVELS

4.1 CN-1 Gazzana Residence

At the Gazzana Residence, noise results show $L_{Aeq,15min}$ noise levels typically ranging 50-60dBA during the day and 45-55dBA in the evening period. The measured $L_{A1,15min}$ noise levels during the night typically range 50-70dBA.

Site observations showed that measured noise levels were likely affected by extraneous noises such as traffic passing on Peats Ridge Road as well as natural noises associated with birds, trees, insects and frogs. Local farming activities might also have contributed to the captured noise levels. Quarry activities were noted to be barely audible by the Wilkinson Murray staff during both site visits.

In addition, an attended measurement was done at the Gazzana Residence during collection of the unattended noise monitoring equipment on Wednesday, 25 October 2006. The measured $L_{Aeq,15min}$ noise level was established 55dBA and was due to traffic on Peats Ridge Road. The $L_{Aeq,15min}$ noise level due to quarry operations was estimated at approximately 28dBA.

The graphical representation of the measured noise data show that the measured levels do not fluctuate at the starting and finishing hours of quarry operations as expected if they were dominated by noise associated with quarry activities. In addition, no difference exists between noise results measured on Sunday and the rest of the week. For this reason, it is possible to conclude that measurement results during day, evening and night time periods were affected by extraneous noises associated with the natural environment surrounding the receiver and traffic on Peats Ridge Road.

In summary, the measurements during this survey indicate that the noise conditions are complied with at the Gazzana Residence.

4.2 CN-2 King Residence

At the King Residence, noise results show $L_{Aeq,15min}$ noise levels typically ranging 40-50dBA during the day and 40-45dBA in the evening period. The measured $L_{A1,15min}$ noise levels during the night typically range 50-65dBA.

Site observations showed that measured noise levels were likely affected by extraneous noises such as traffic passing on Peats Ridge Road as well as natural noises associated with birds, trees, insects and frogs. Local farming activities might also have contributed to the captured noise levels. Quarry activities were noted as being inaudible by the Wilkinson Murray staff during both site visits.

In addition, a quick attended measurement was conducted at the King Residence during collection of the unattended noise monitoring equipment on Wednesday, 25 October 2006. The measured $L_{Aeq,15min}$ noise level was established 43dBA and was due to traffic on Peats Ridge Road. It was established that quarry operations did not contribute to the measured $L_{Aeq,15min}$ level (i.e. <40dBA).

The graphical representation of the noise results obtained also show that the measured levels do not fluctuate at the starting and finishing hours of quarry operations as expected if they were dominated by noise associated with quarry activities. In addition, no difference exists between noise results measured on Sunday and the rest of the week. For this reason, it is possible to conclude that measurement results during day, evening and night time periods were affected by extraneous noises associated with the natural environment surrounding the receiver and traffic on Peats Ridge Road.

In summary, the measurements during this survey indicate that the noise conditions are complied with at the King Residence.

4.3 CN-3 Kashouli Residence

At the Kashouli Residence, noise results show $L_{Aeq,15min}$ noise levels typically ranging between 45-55dBA during the day and 45-50dBA in the evening period. The measured $L_{A1,15min}$ noise levels during the night typically range between 50-65dBA.

Site observations showed that measured noise levels were likely affected by extraneous noises such as traffic passing on Peats Ridge Road as well as natural noises associated with birds, trees, insects and frogs. Local farming activities might also have contributed to the captured noise levels. Quarry activities were noted inaudible by the Wilkinson Murray representative during both site visits.

In addition, an attended measurement was done at the Kashouli Residence during collection of the unattended noise monitoring equipment on Wednesday, 25 October 2006. The measured $L_{Aeq,15min}$ noise level was measured to be 50dBA and was due to traffic on Peats Ridge Road. It was established that quarry operations did not contribute to the measured $L_{Aeq,15min}$ level (i.e. <39dBA).

The graphical representation of the noise results obtained also show that the measured levels do not fluctuate at the starting and finishing hours of quarry operations as expected if they were dominated by noise associated with quarry activities. In addition, no difference exists between noise results measured on Sunday and the rest of the week. For this reason, it is possible to conclude that measurement results during day, evening and night time periods were affected by extraneous noises associated with the natural environment surrounding the receiver and traffic on Peats Ridge Road.

In summary, the measurements during this survey indicate that the noise conditions are complied with at the Kashouli Residence.

4.4 CN-4 Townsend Residence

At the Townsend Residence, noise results show $L_{Aeq,15min}$ noise levels typically ranging 40-55dBA during the day and 35-45dBA in the evening period. The measured $L_{A1,15min}$ noise levels during the night typically range 45-65dBA.

Site observations showed that measured noise levels were likely affected by extraneous noises such as traffic passing on Peats Ridge Road as well as natural noises associated with birds, trees, insects and frogs. Local farming activities might also have contributed to the measured noise levels. Quarry activities were noted as being inaudible by the Wilkinson Murray staff during both site visits.

In addition, an attended measurement was done at the Townsend Residence during collection of the unattended noise monitoring equipment on Wednesday, 25 October 2006. The measured $L_{Aeq,15min}$ noise level was measured to be 38dBA and was due to distant traffic and nearby birds. It was established that quarry operations did not contribute to the measured $L_{Aeq,15min}$ level (i.e. <35dBA).

The graphical representation of the noise results obtained also show that the measured levels do not fluctuate at the starting and finishing hours of quarry operations as expected if they were dominated by noise associated with quarry activities. In addition, no difference exists between noise results measured on Sunday and the rest of the week. For this reason, it is possible to conclude that measurement results during day, evening and night time periods were affected by extraneous noises associated with the natural environment surrounding the receiver and traffic on Peats Ridge Road.

In summary, the measurements during this survey indicate that the noise conditions are complied with at the Townsend Residence.

5 CONCLUSION

A compliance noise monitoring survey was conducted during October 2006. the results of the survey indicated that noise emissions from the Calga Sand Quarry plant were within the limits set in the Noise Monitoring Program at all of the monitored residences.

Note

All materials specified by Wilkinson Murray Pty Limited have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose.

Quality Assurance

We are committed to and have implemented AS/NZS ISO 9001:2000 "Quality Management Systems – Requirements". This management system has been externally certified and Licence No. QEC 13457 has been issued.

AAAC

This firm is a member firm of the Association of Australian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

Version	Status	Date	Prepared by	Checked by
A	Final	7/12/2006	Roman Haverkamp	John Wassermann

APPENDIX A
GLOSSARY OF TERMS



GLOSSARY

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph overleaf, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

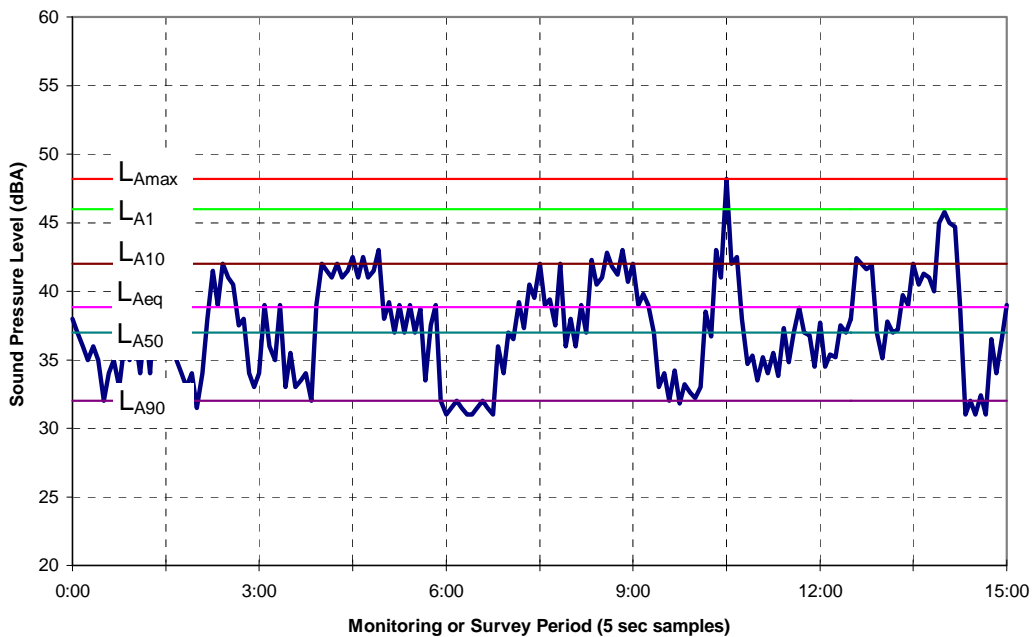
L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

L_{A50} – The L_{A50} level is the noise level which is exceeded for 50% of the sample period. During the sample period, the noise level is below the L_{A50} level for 50% of the time.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

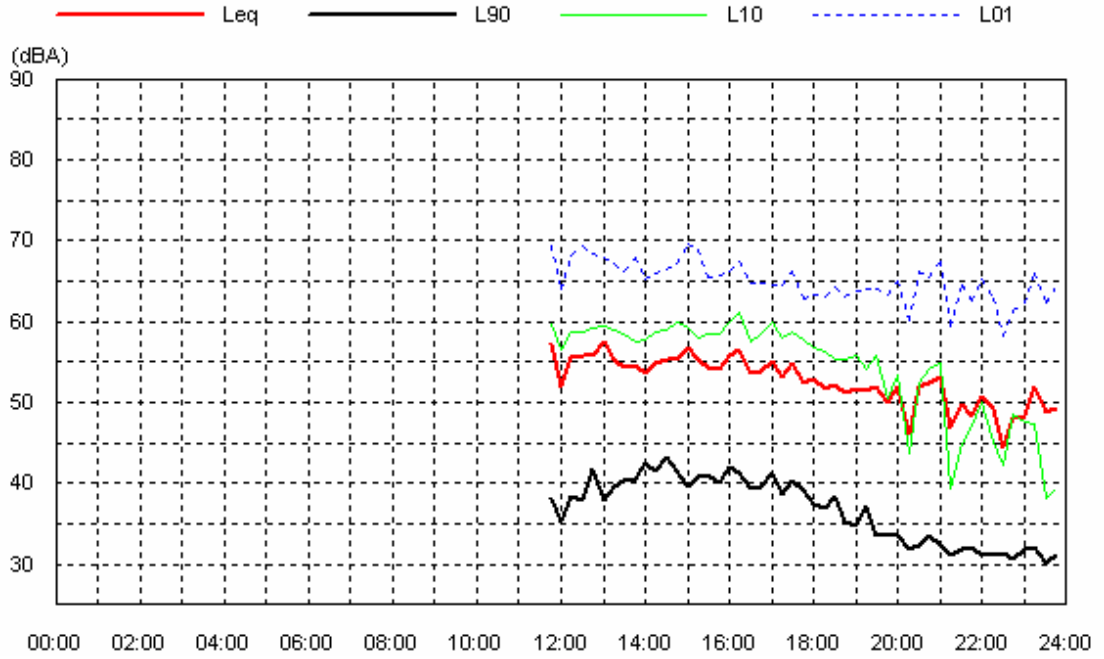


APPENDIX B

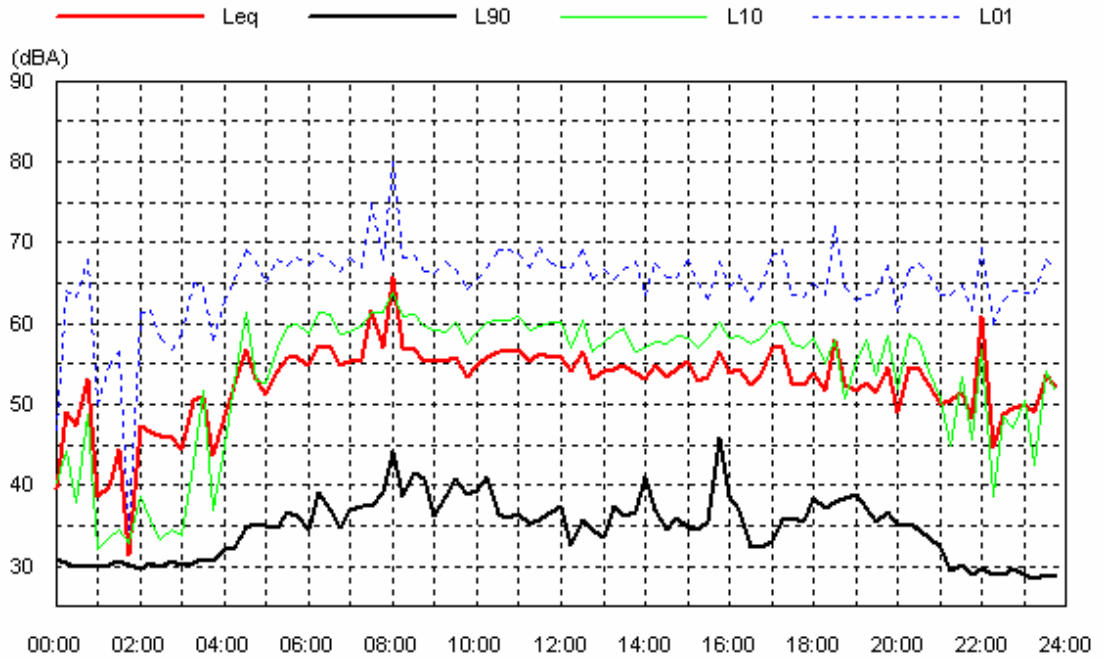
NOISE MEASUREMENT RESULTS

Location: CN-1 Gazzana Residence

Mon 16 Oct 06

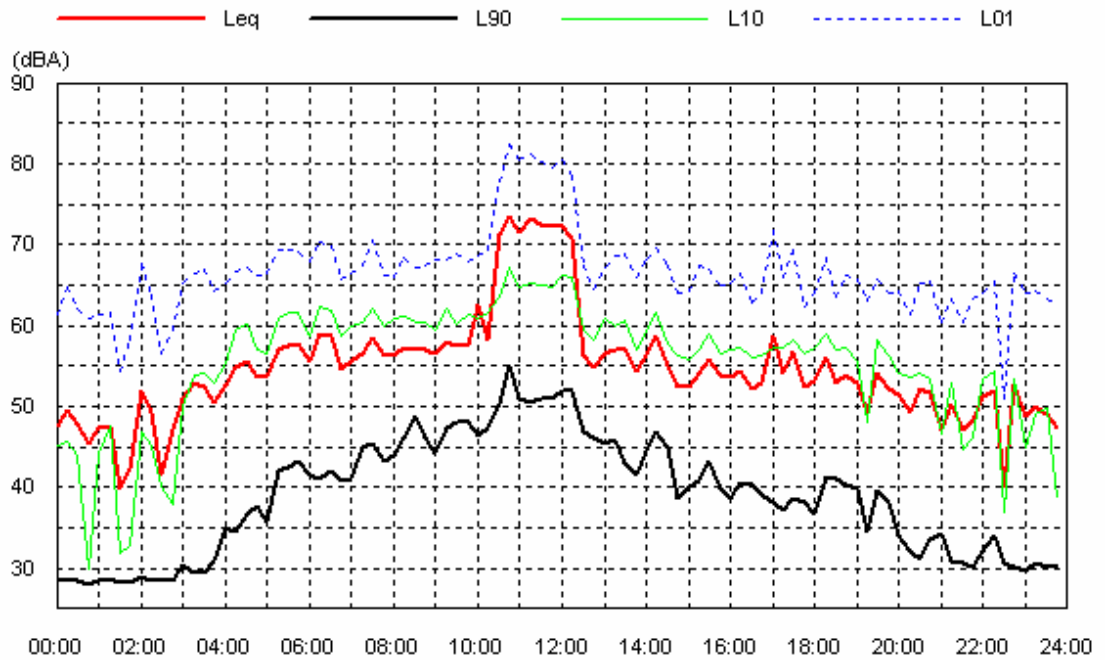


Tue 17 Oct 06

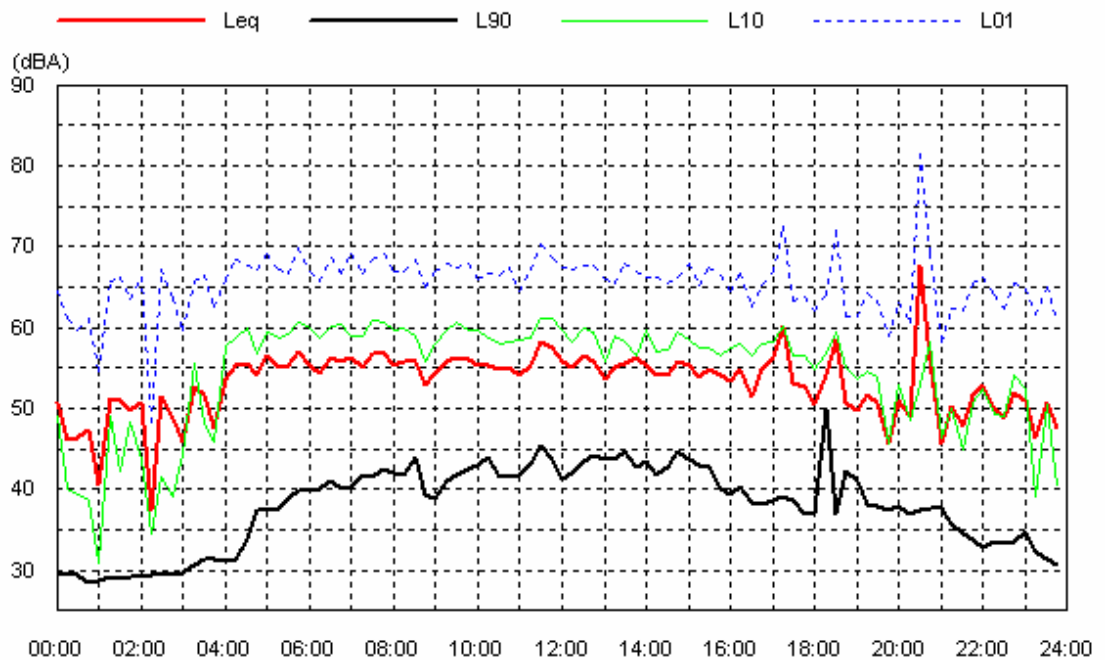


Location: CN-1 Gazzana Residence

Wed 18 Oct 06

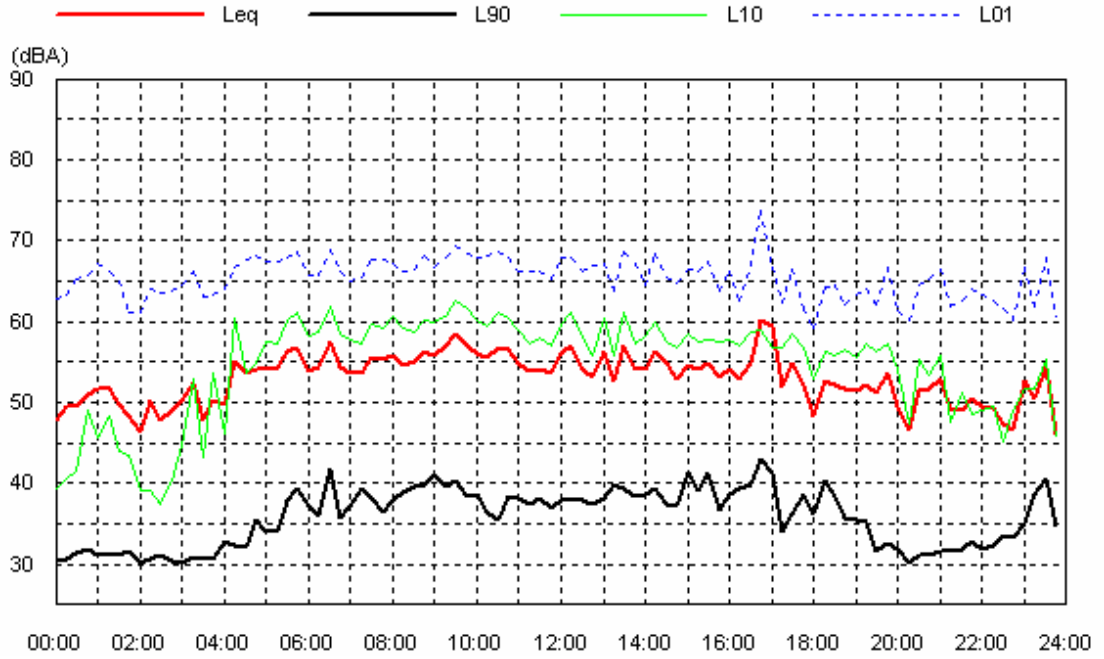


Thu 19 Oct 06

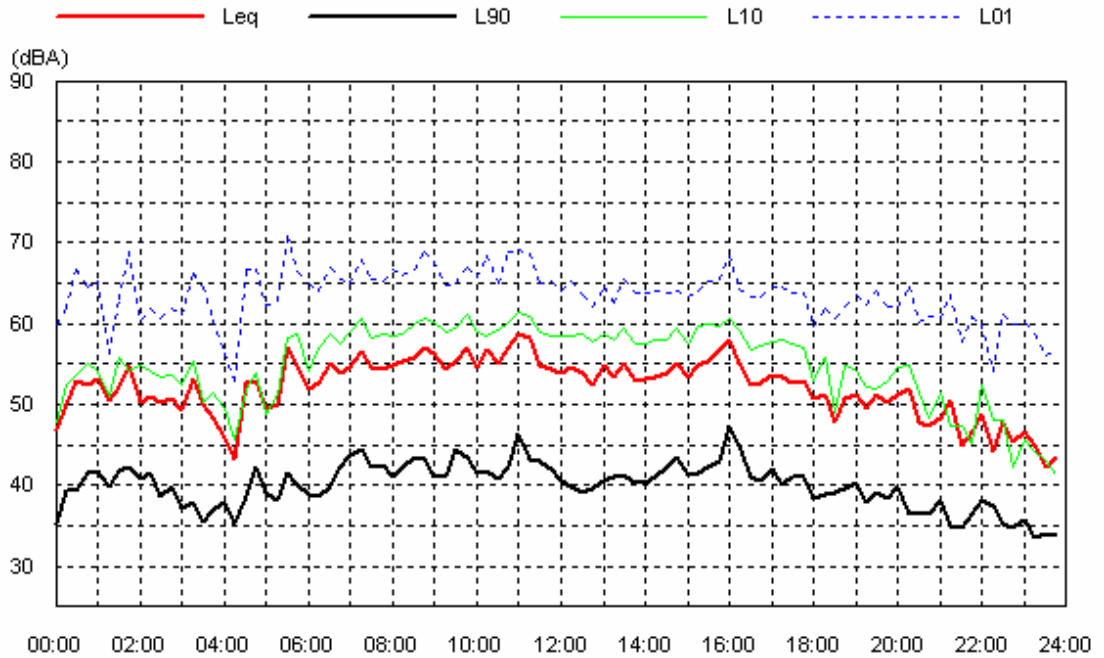


Location: CN-1 Gazzana Residence

Fri 20 Oct 06

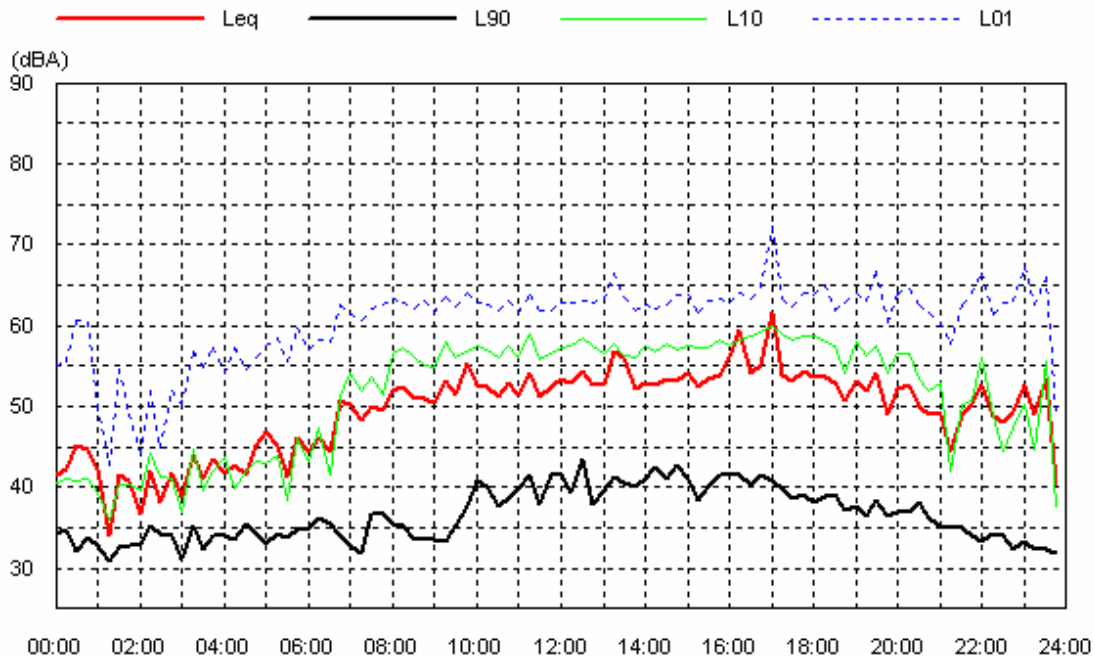


Sat 21 Oct 06

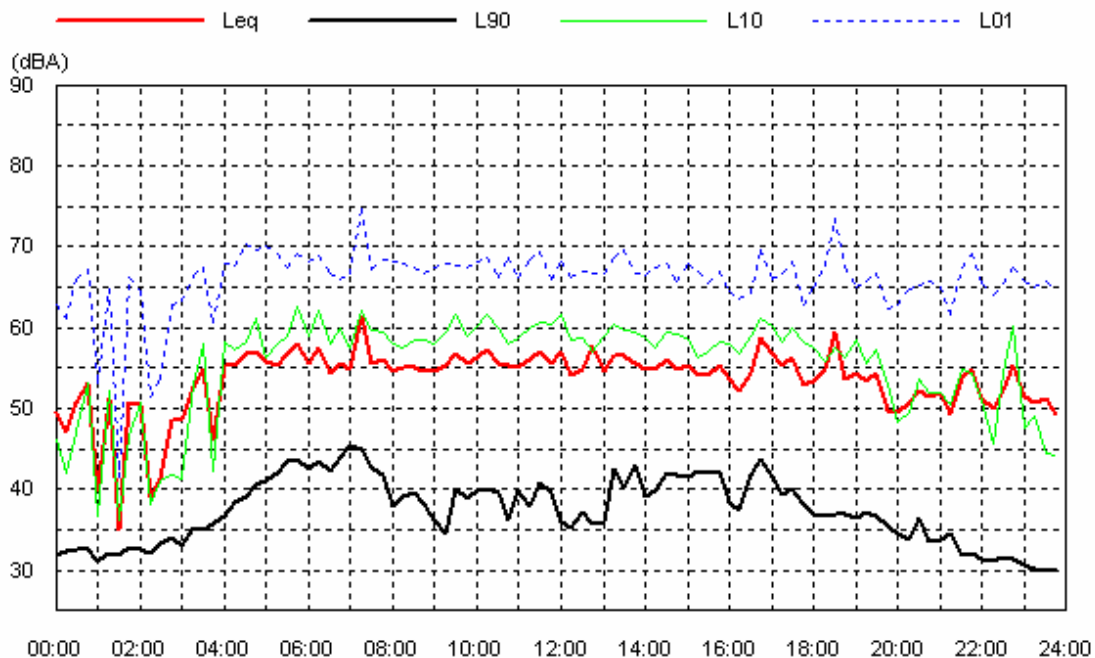


Location: CN-1 Gazzana Residence

Sun 22 Oct 06

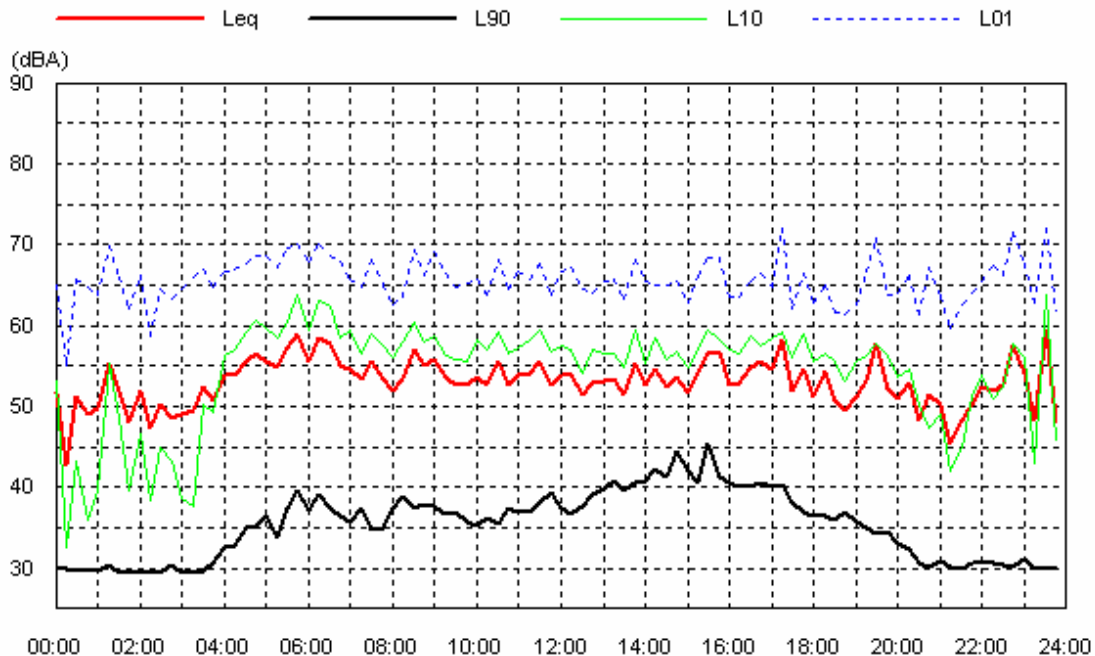


Mon 23 Oct 06

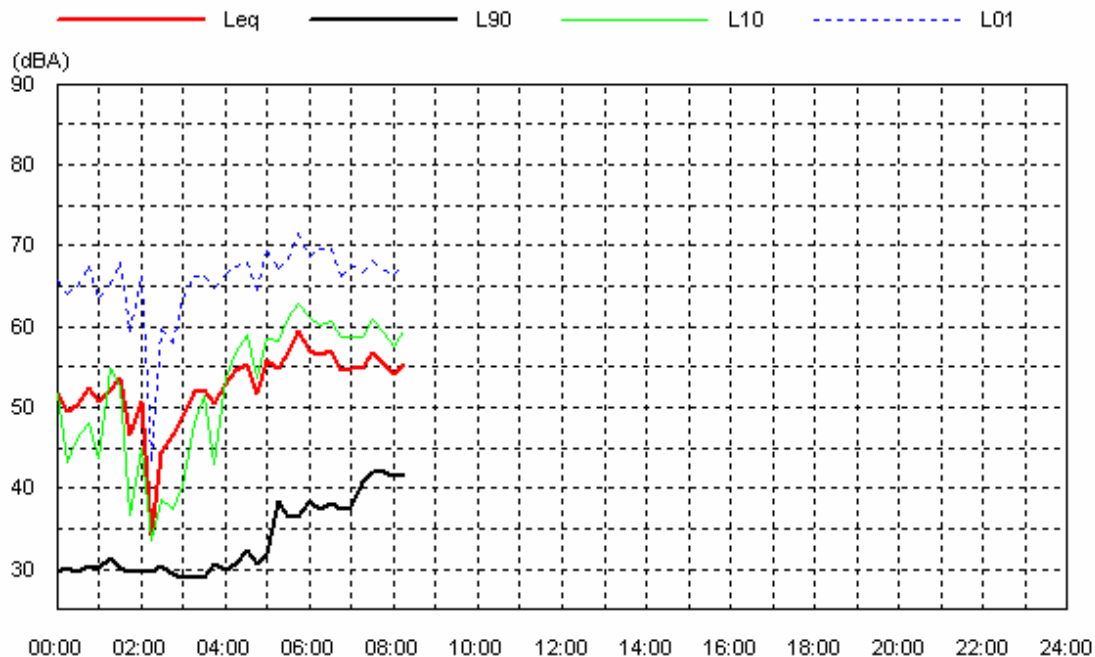


Location: CN-1 Gazzana Residence

Tue 24 Oct 06

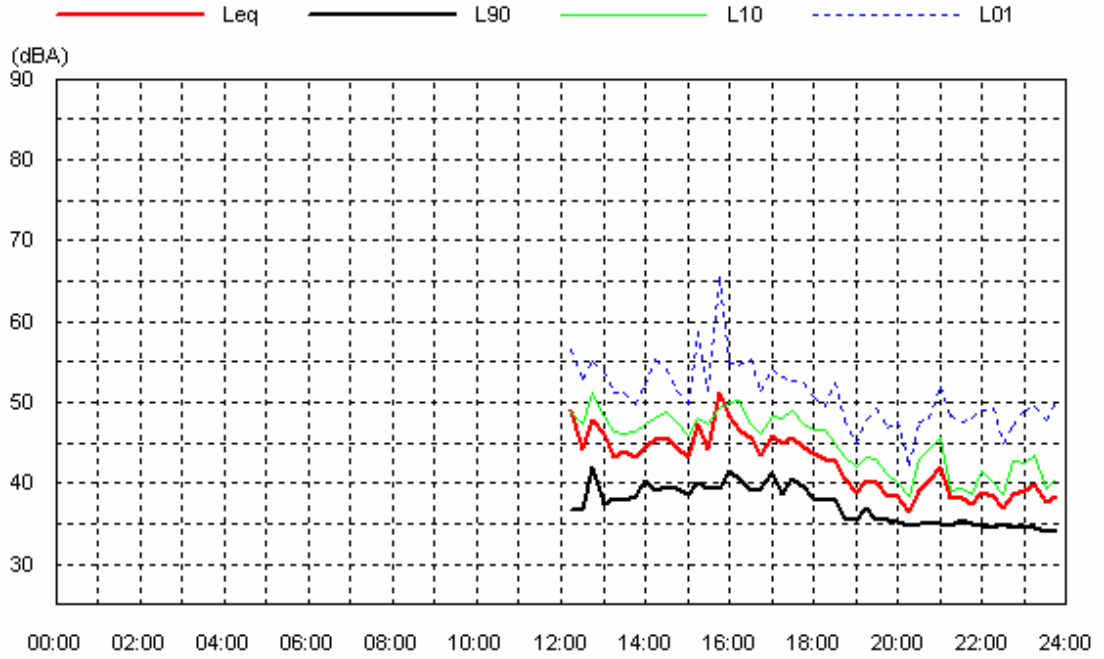


Wed 25 Oct 06

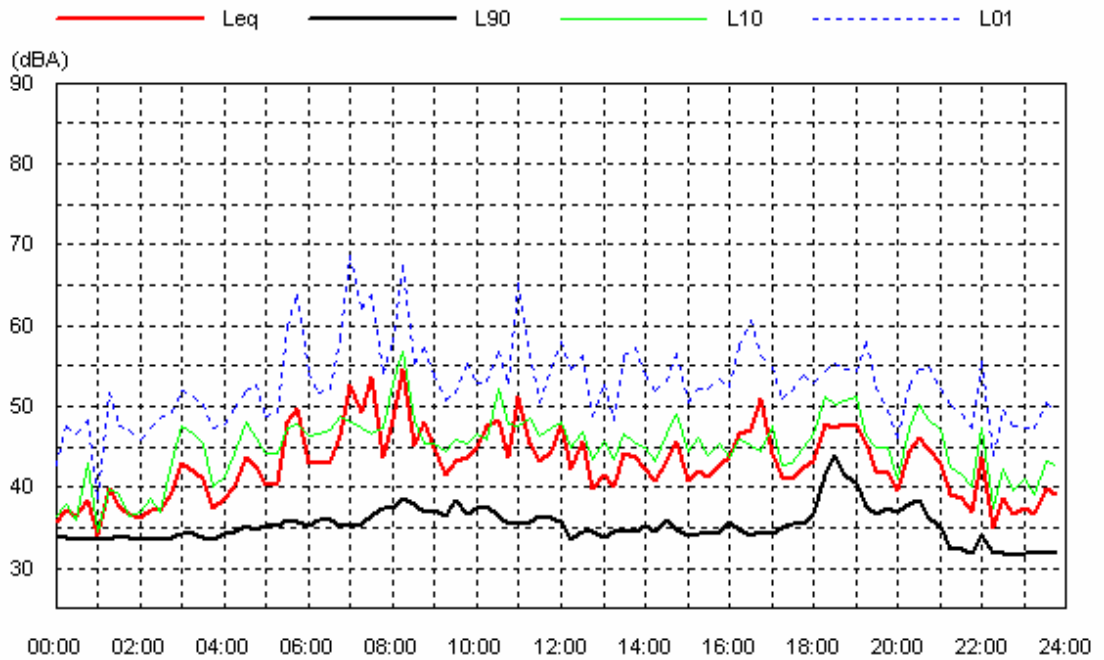


Location: CN-2 King Residence

Mon 16 Oct 06

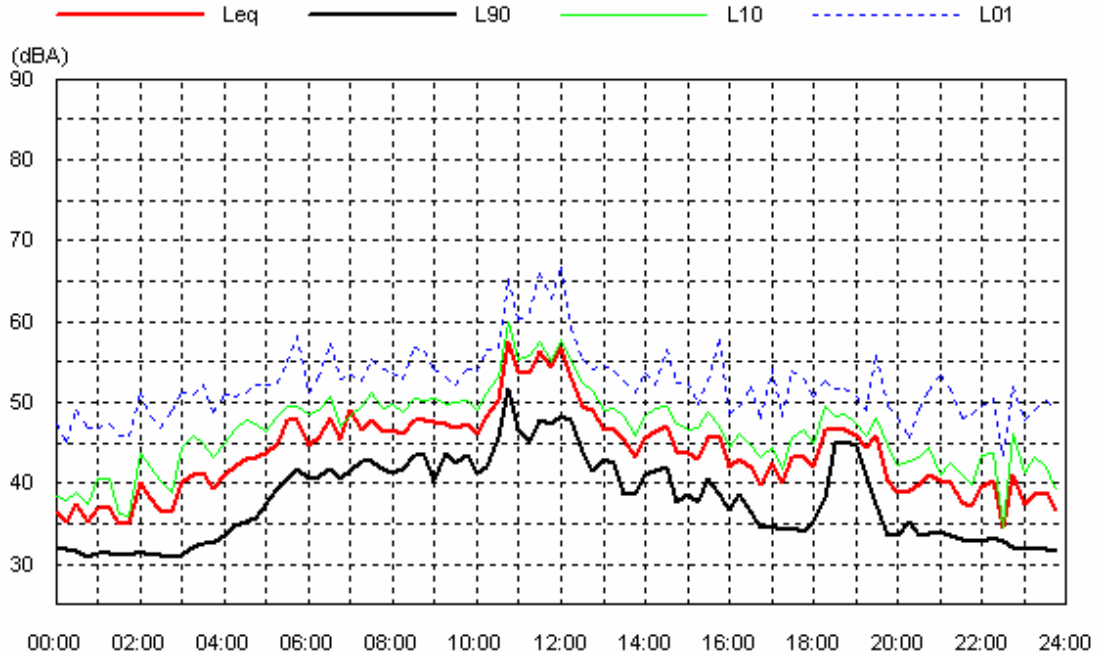


Tue 17 Oct 06

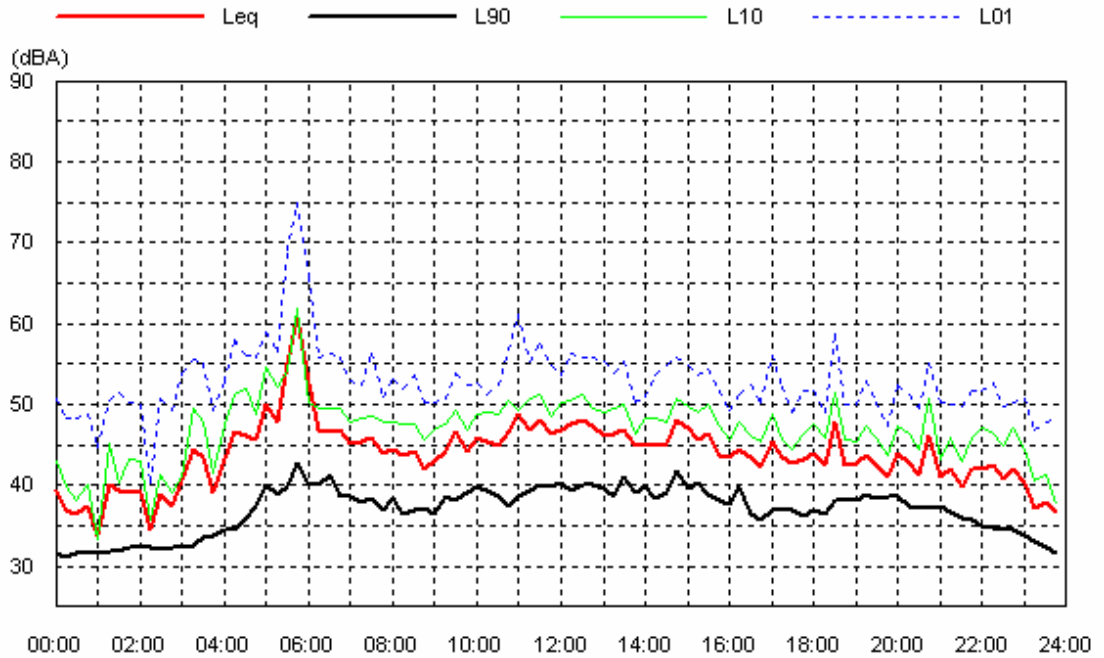


Location: CN-2 King Residence

Wed 18 Oct 06

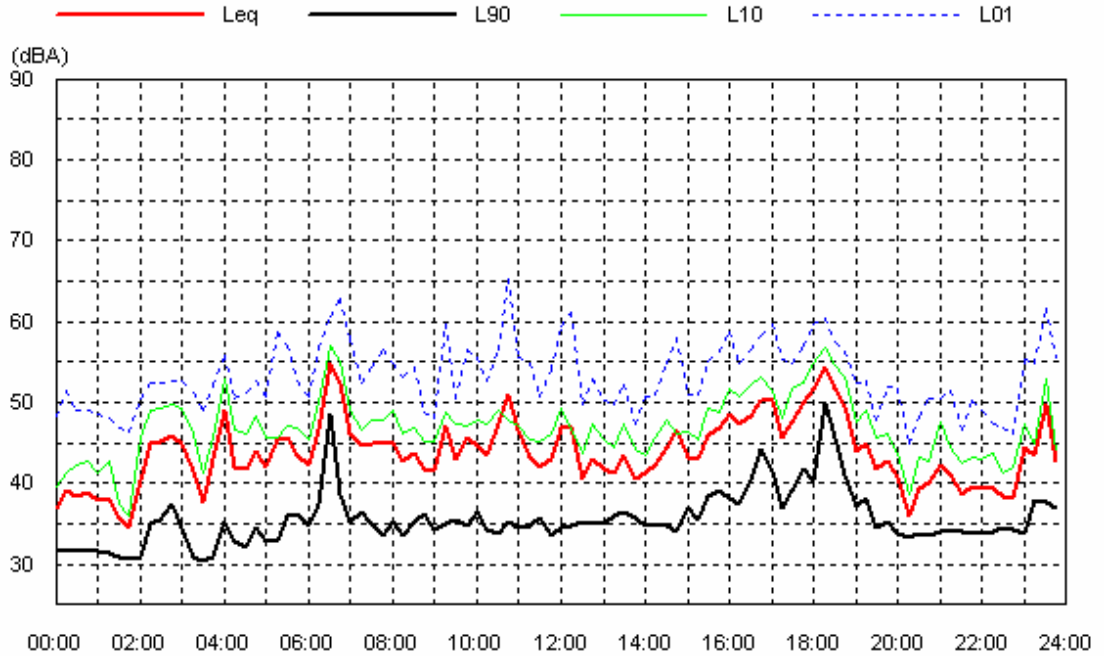


Thu 19 Oct 06

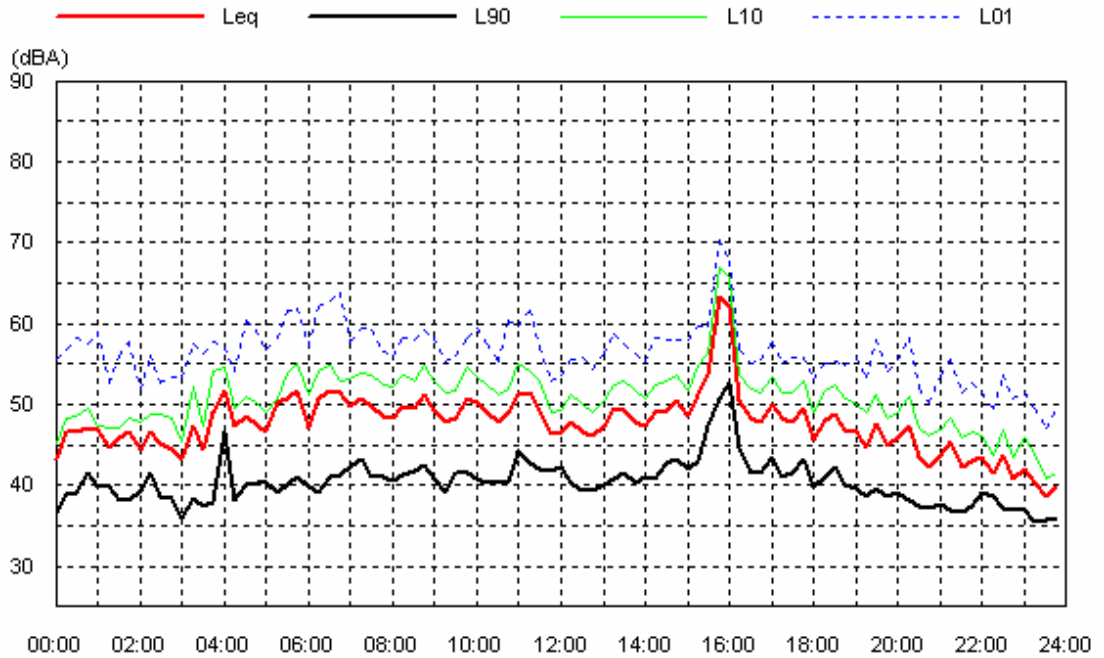


Location: CN-2 King Residence

Fri 20 Oct 06

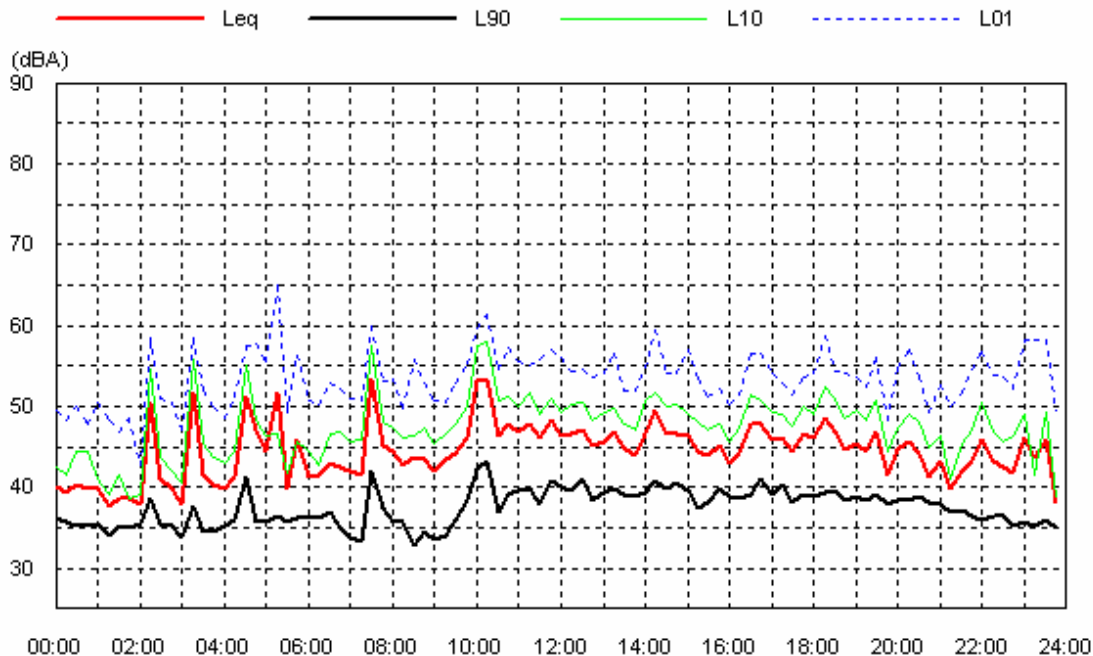


Sat 21 Oct 06

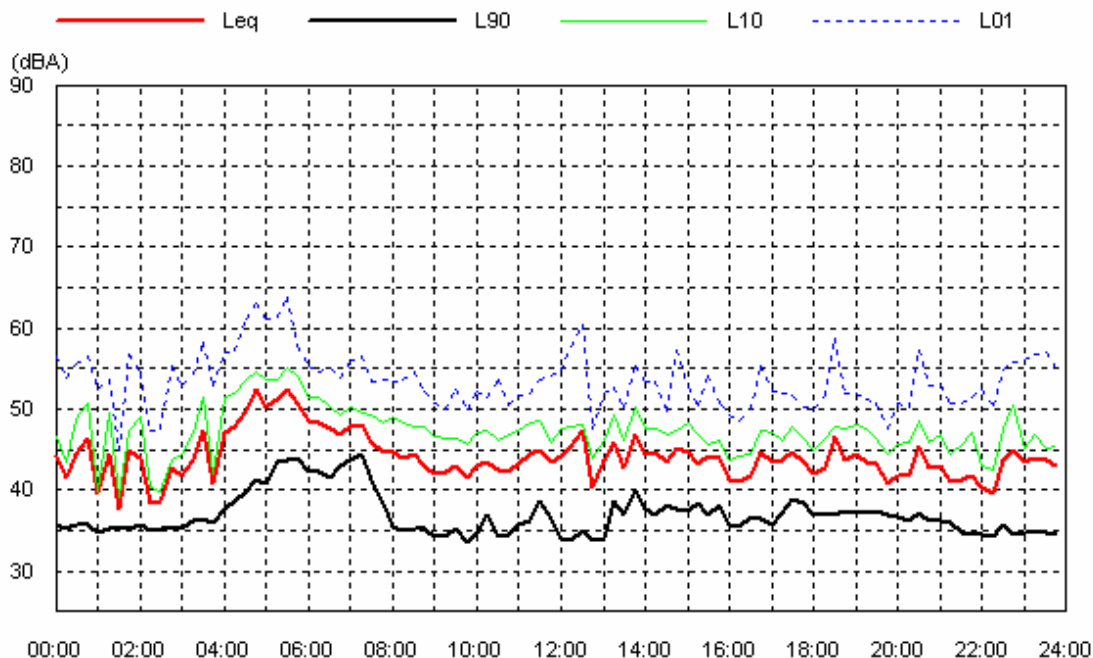


Location: CN-2 King Residence

Sun 22 Oct 06

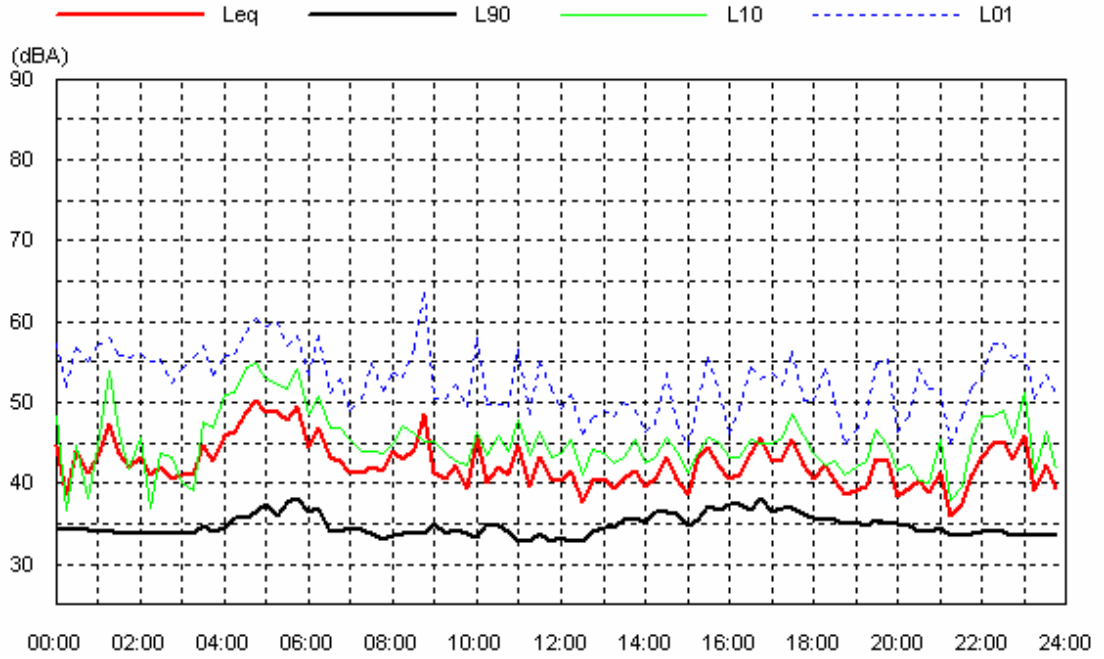


Mon 23 Oct 06

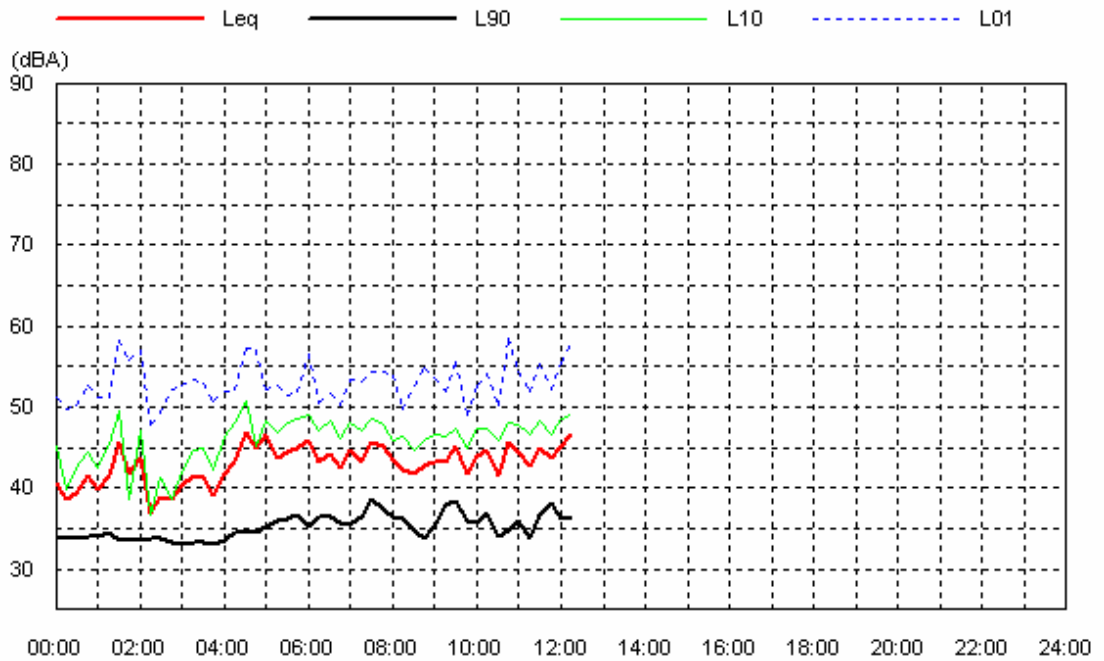


Location: CN-2 King Residence

Tue 24 Oct 06

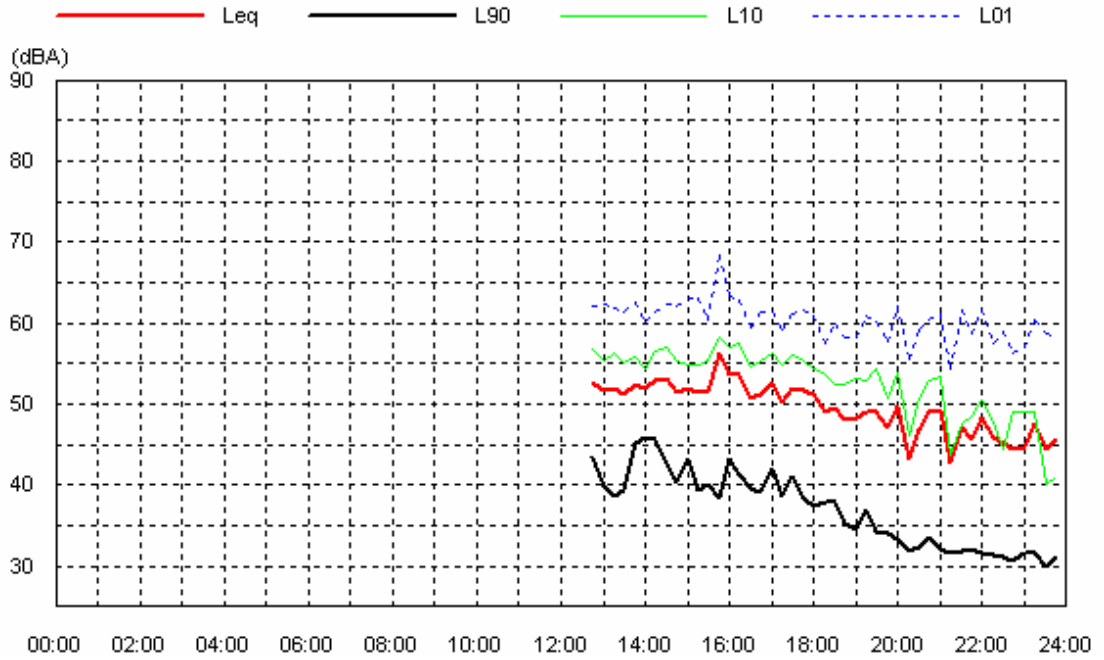


Wed 25 Oct 06

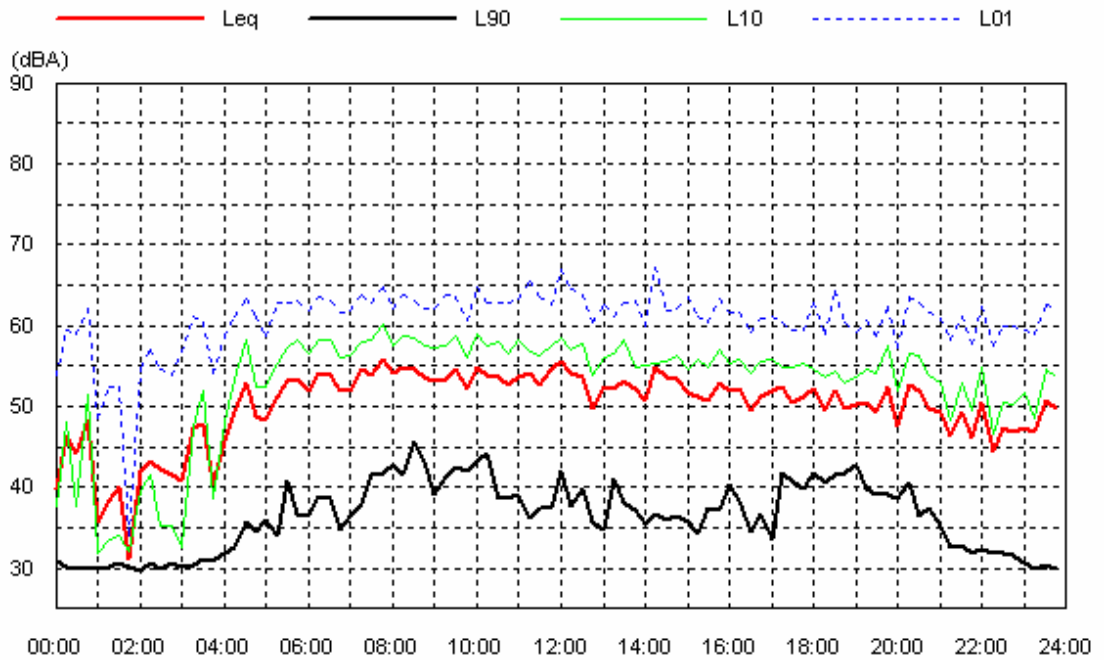


Location: CN-3 Kashouli Residence

Mon 16 Oct 06

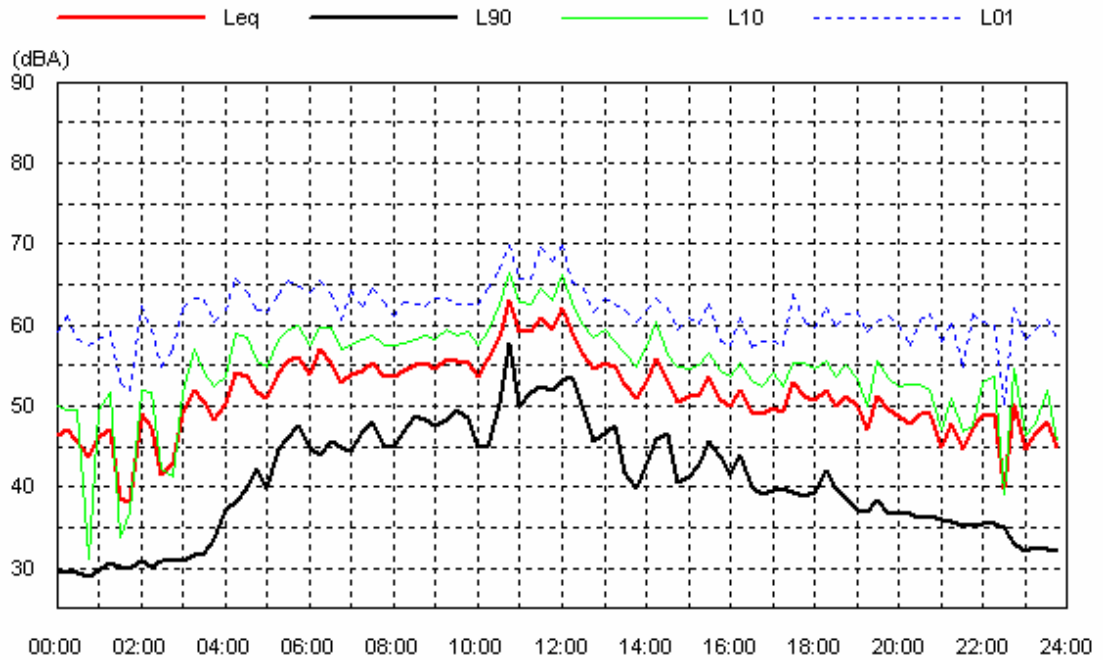


Tue 17 Oct 06

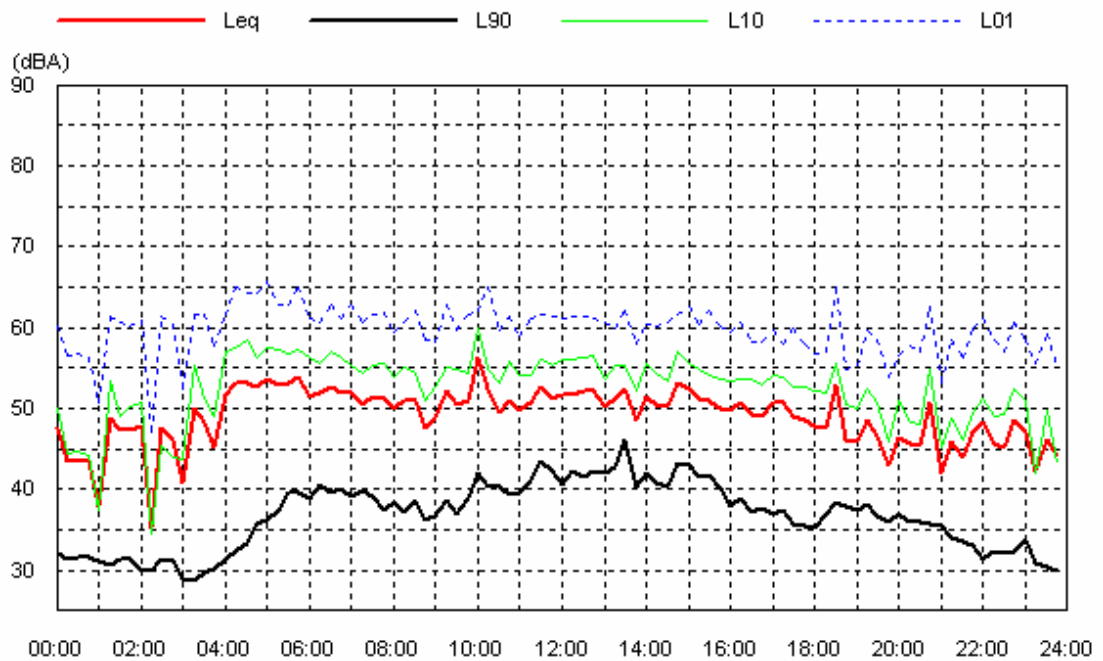


Location: CN-3 Kashouli Residence

Wed 18 Oct 06

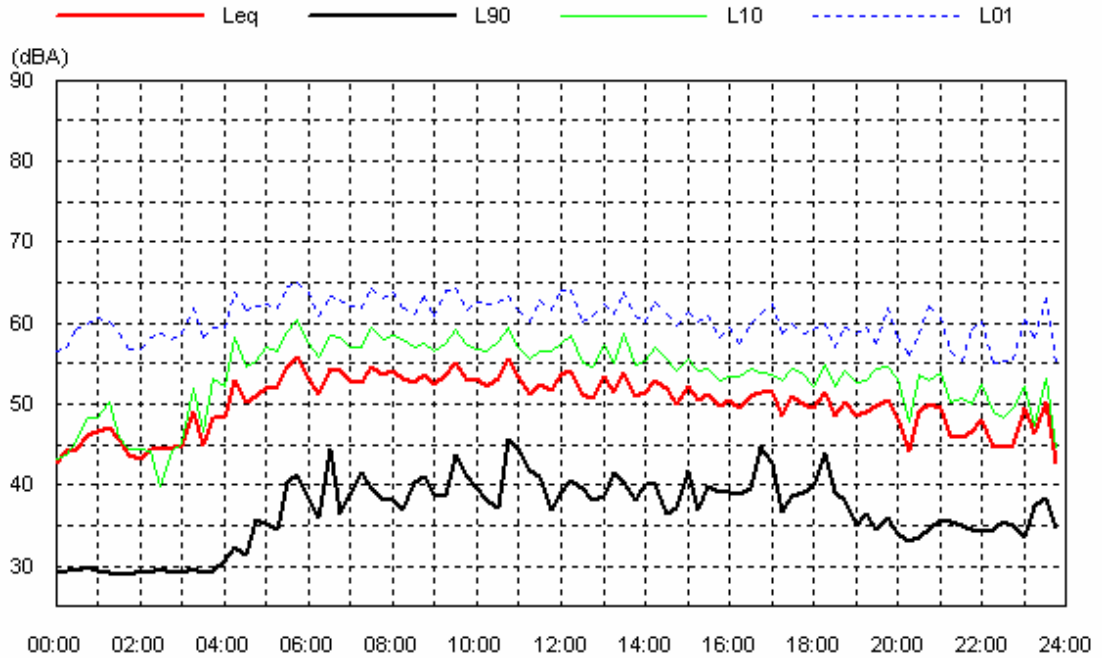


Thu 19 Oct 06

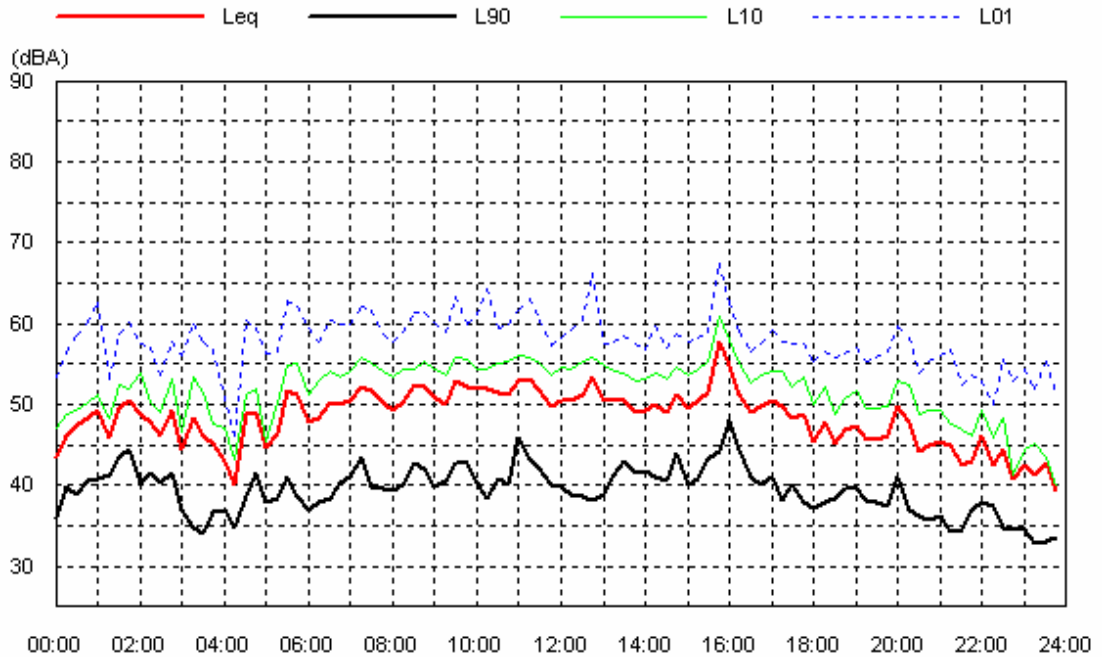


Location: CN-3 Kashouli Residence

Fri 20 Oct 06

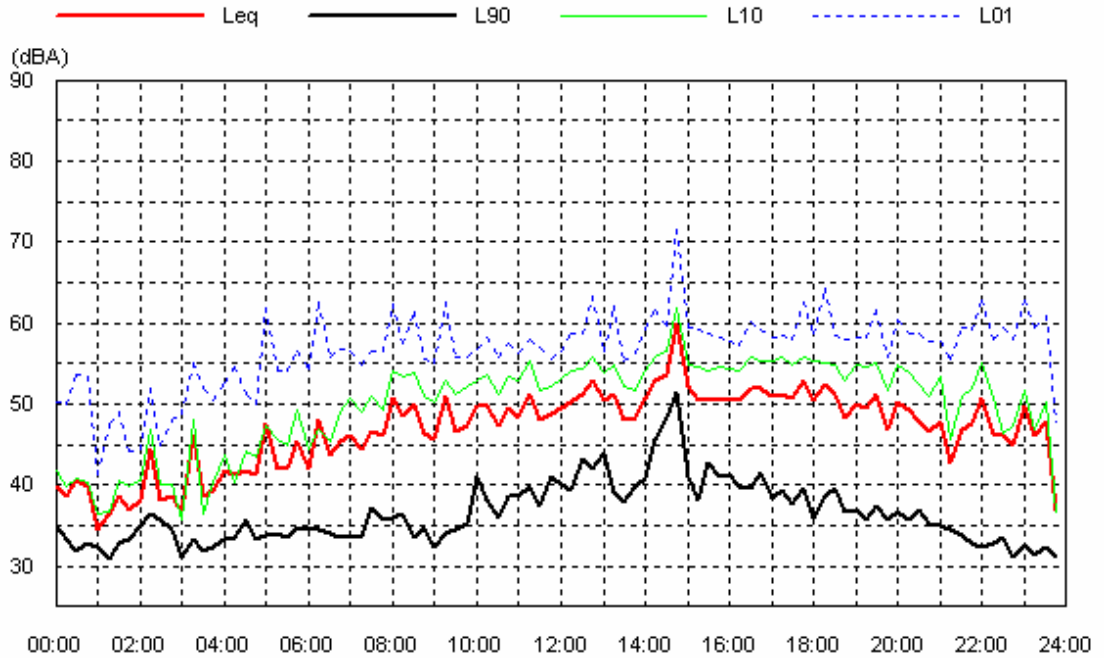


Sat 21 Oct 06

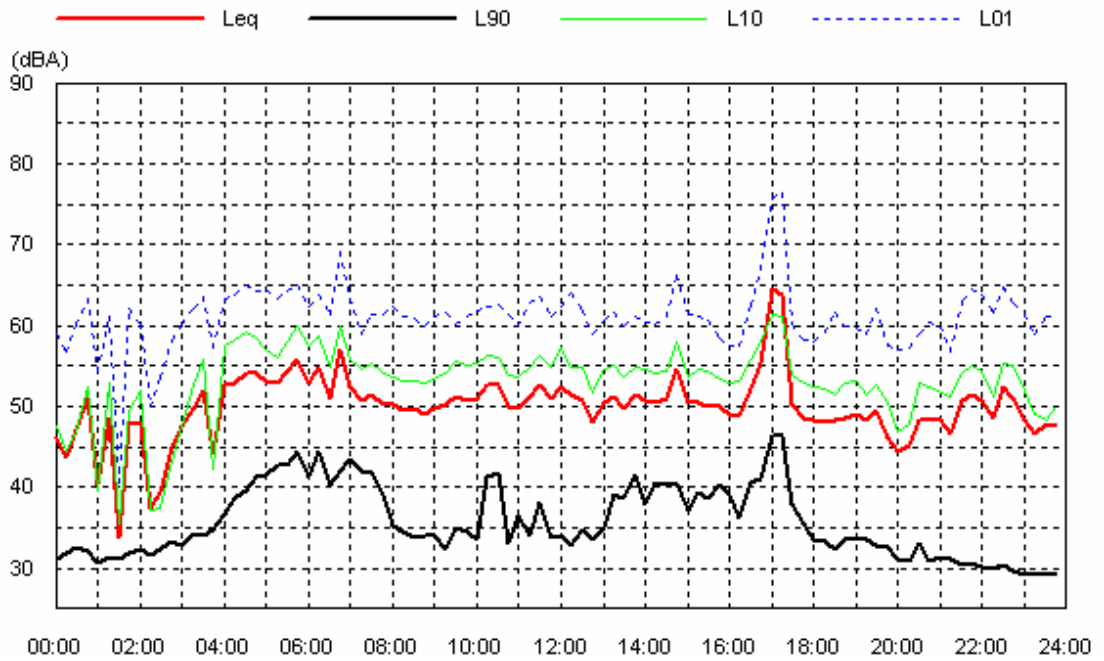


Location: CN-3 Kashouli Residence

Sun 22 Oct 06

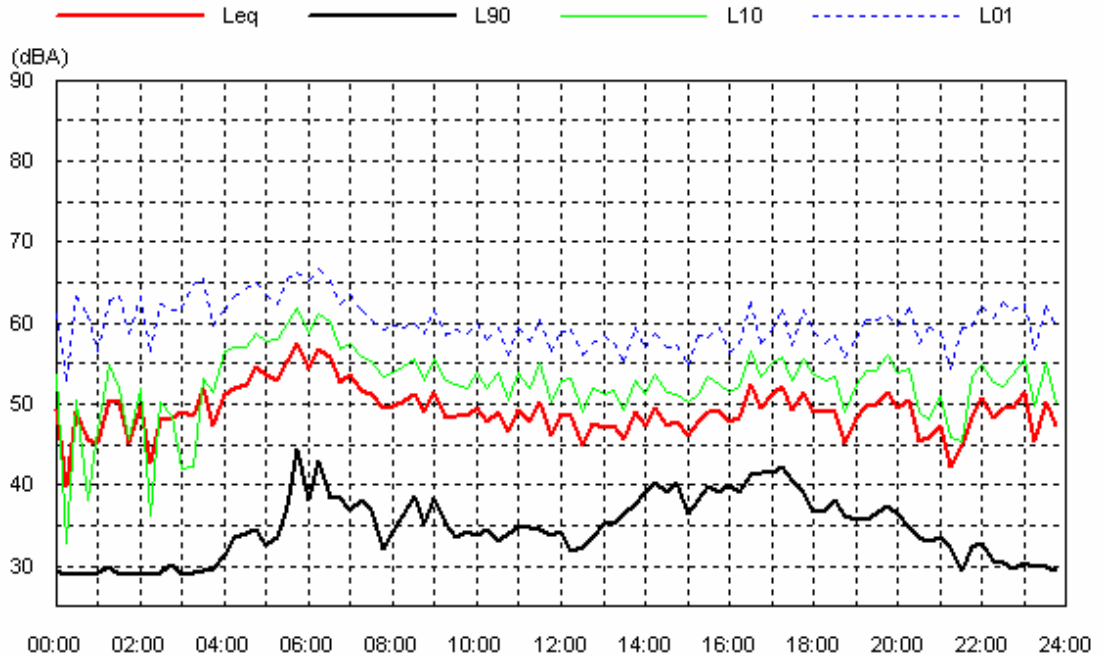


Mon 23 Oct 06

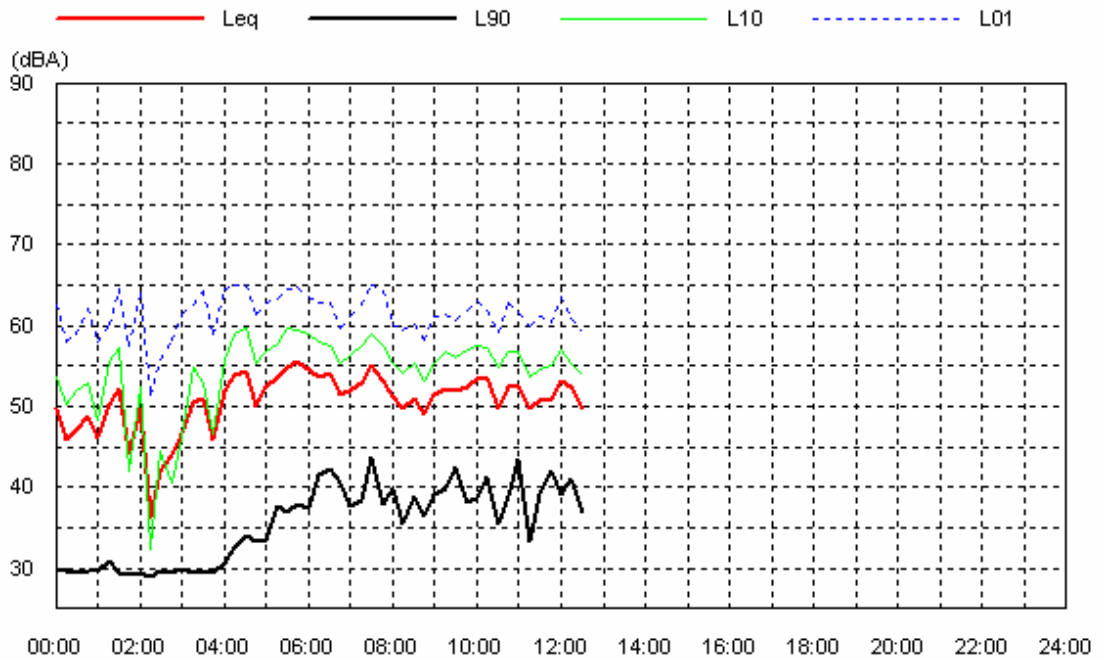


Location: CN-3 Kashouli Residence

Tue 24 Oct 06

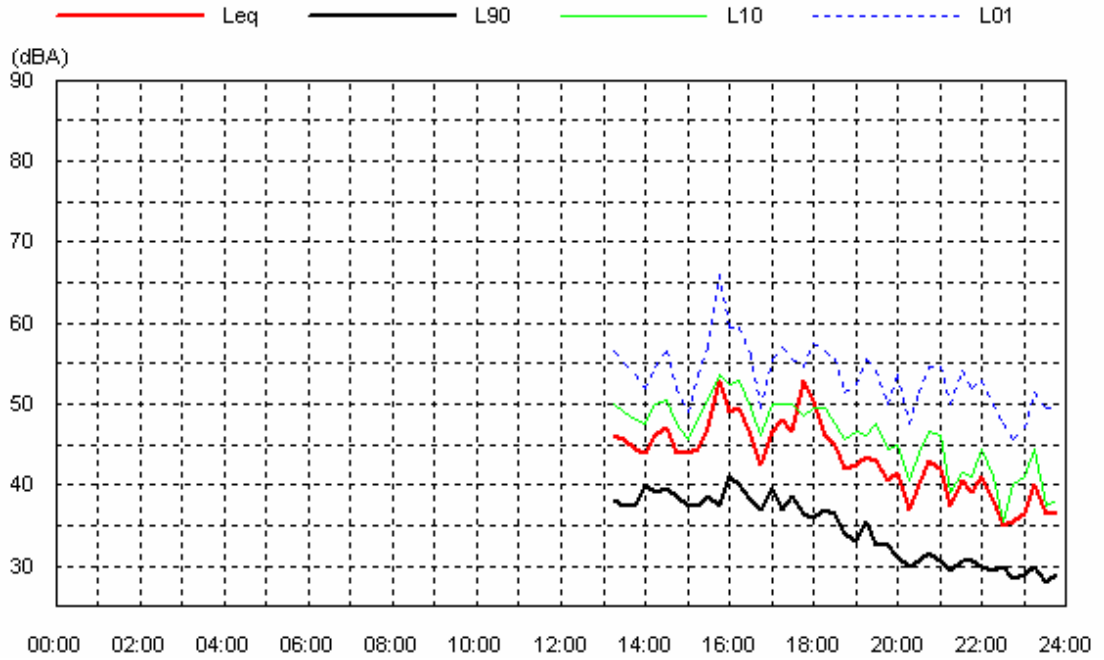


Wed 25 Oct 06

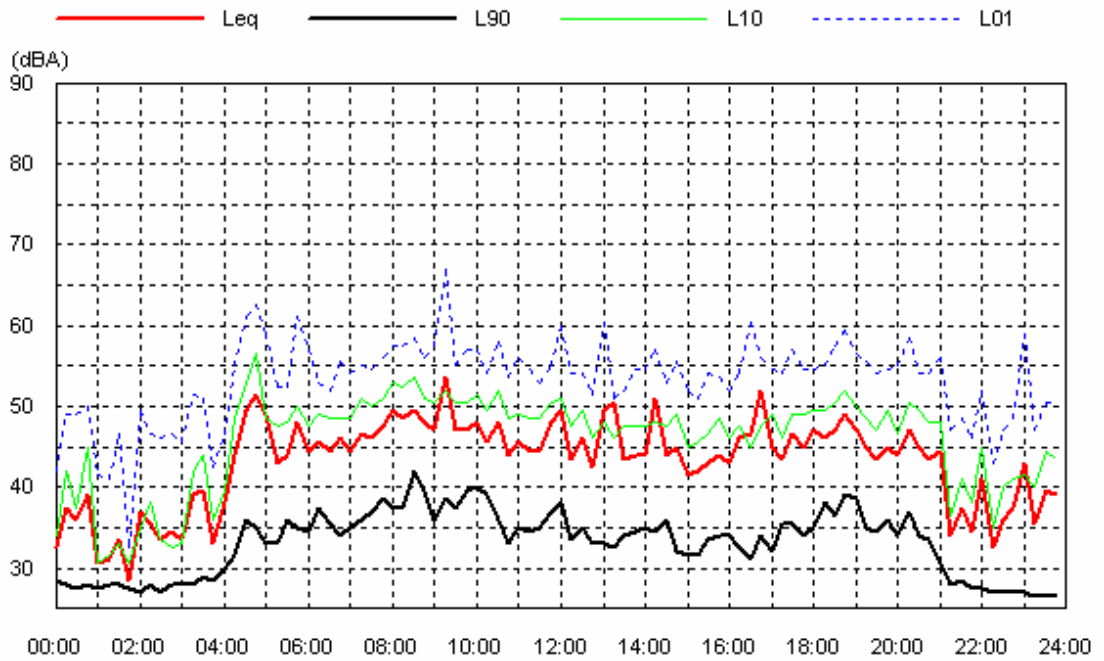


Location: CN-4 Townsend Residence

Mon 16 Oct 06

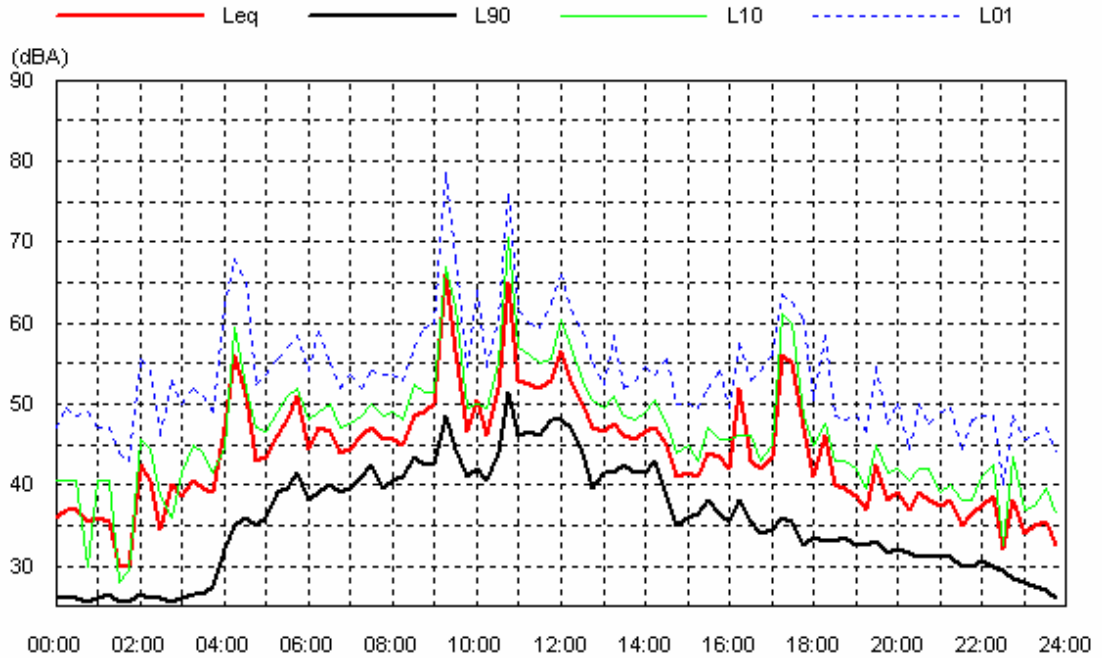


Tue 17 Oct 06

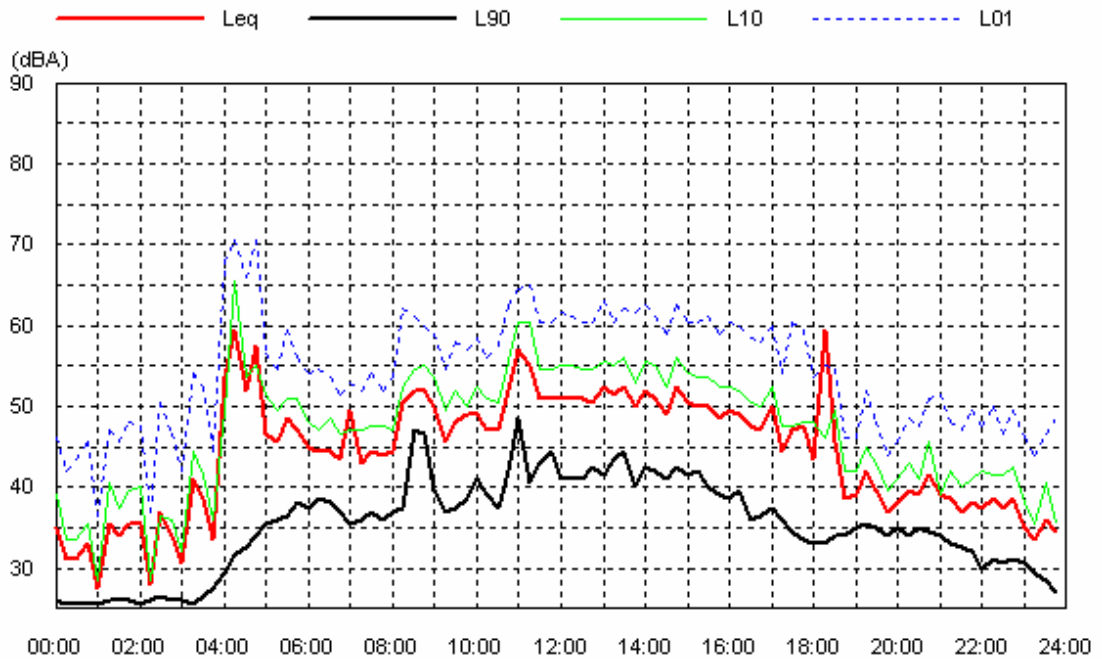


Location: CN-4 Townsend Residence

Wed 18 Oct 06

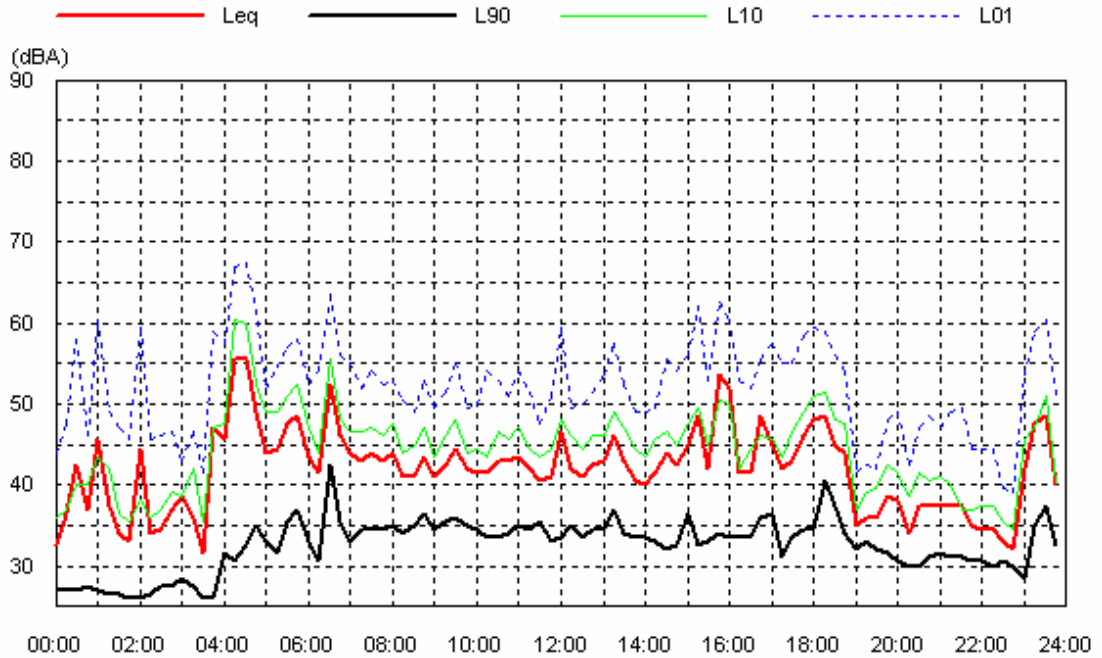


Thu 19 Oct 06

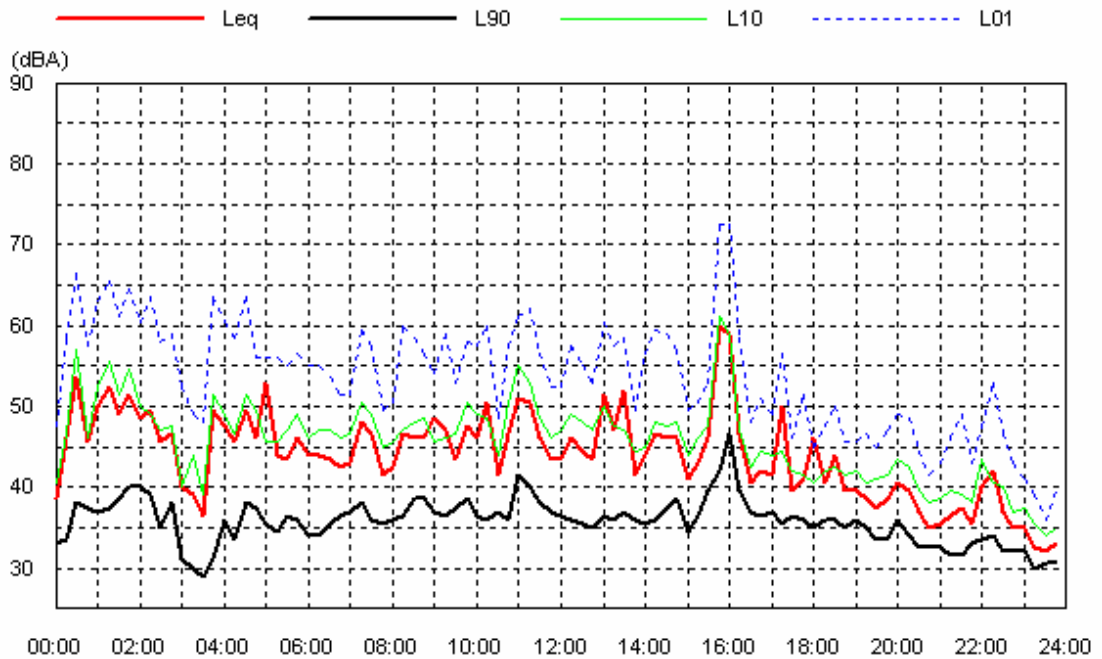


Location: CN-4 Townsend Residence

Fri 20 Oct 06

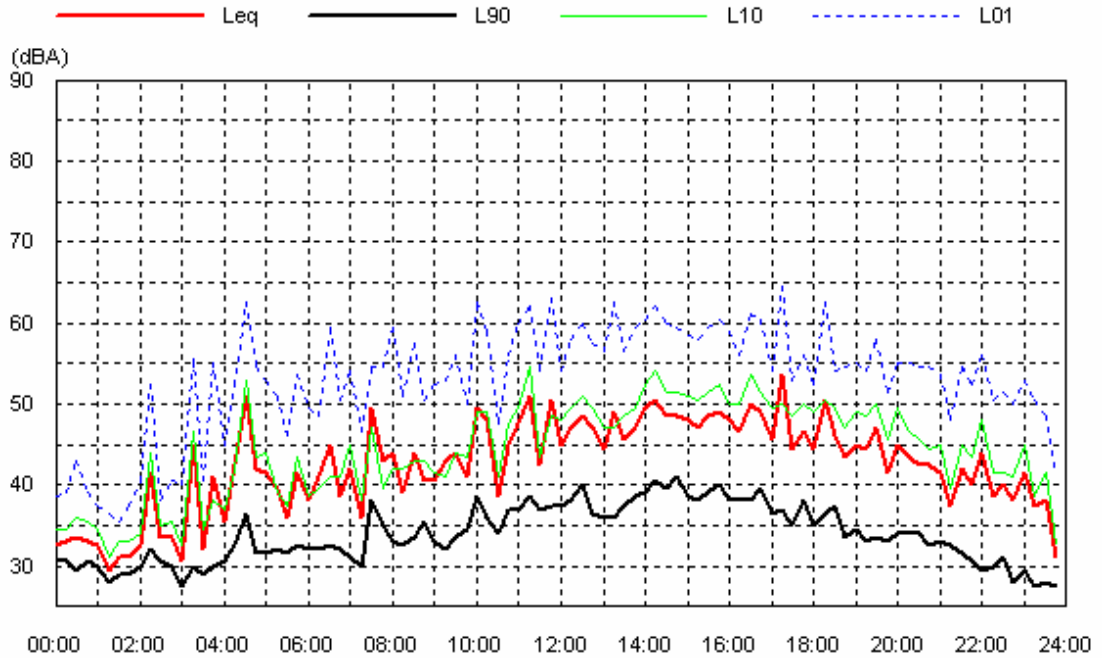


Sat 21 Oct 06

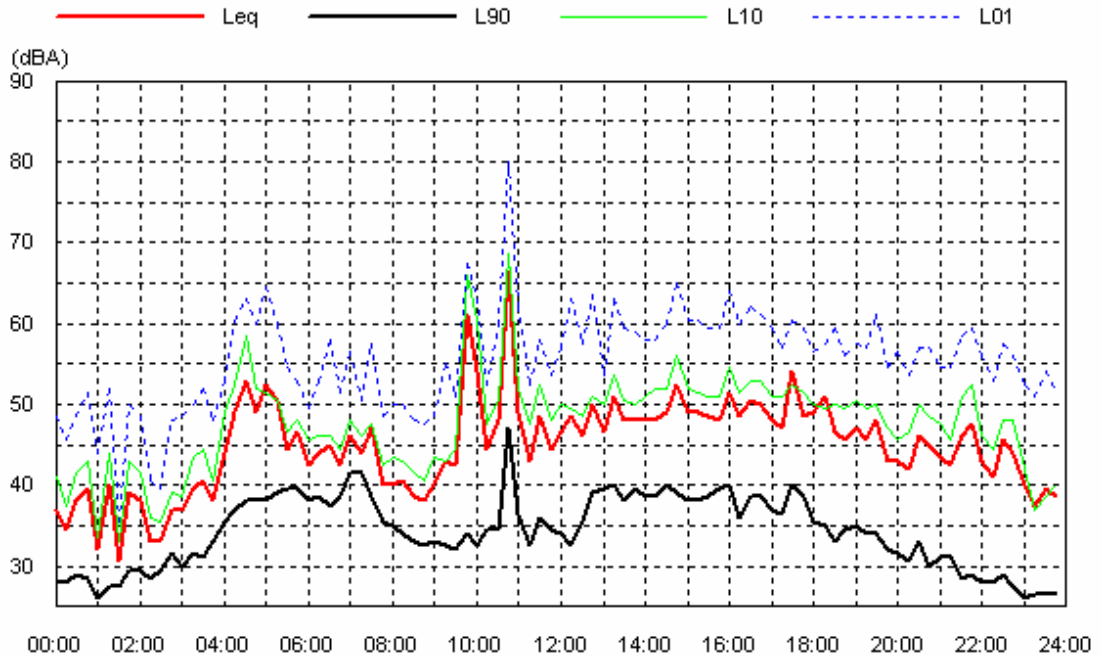


Location: CN-4 Townsend Residence

Sun 22 Oct 06

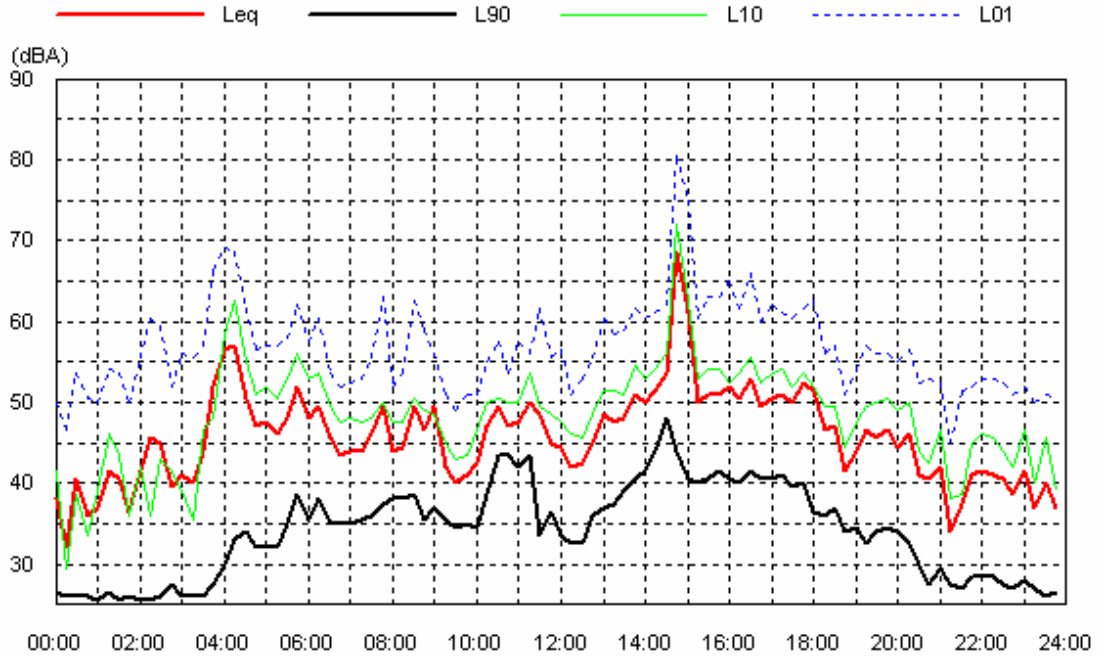


Mon 23 Oct 06



Location: CN-4 Townsend Residence

Tue 24 Oct 06



Wed 25 Oct 06

