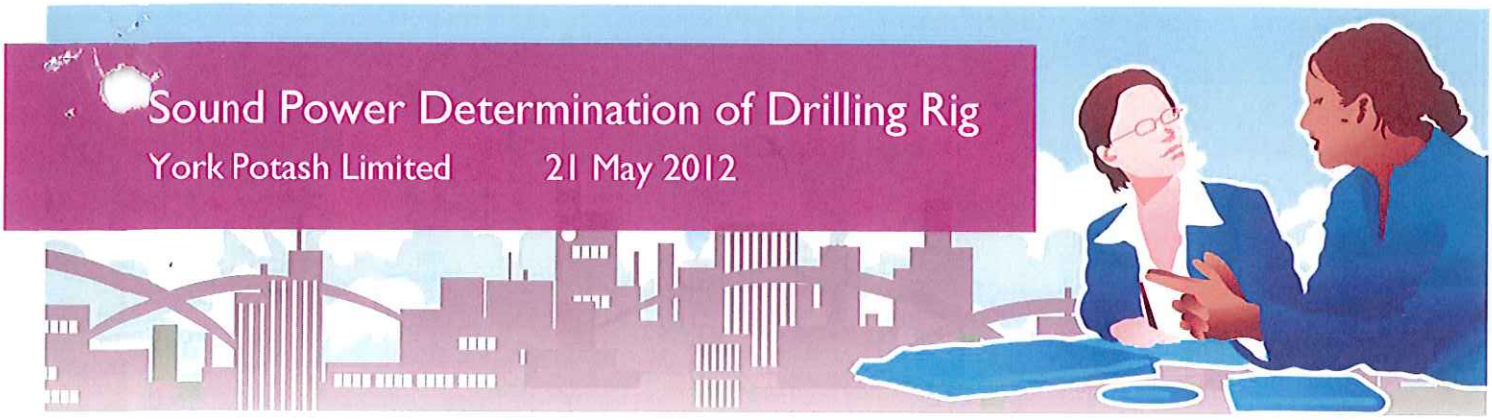


Sound Power Determination of Drilling Rig

York Potash Limited 21 May 2012

Addendum to WSP Acoustics Report Dated the 21 May 2012, project Reference 19211/ Doves Nest Farm, and entitled, Doves Nest Farm – Potash / Polyhalite Drilling Noise Assessment.

Sound Power Determination of Marriott MI-45 Drilling Rig and Associated Mud Pump

21 May 2012

INTRODUCTION

This report constitutes an addendum to the noise assessment report as referenced above (which is hereafter referred to as the original noise assessment report). The original noise assessment report included a series of drilling noise level predictions which were undertaken based on the sound power level data provided for two of the drilling rigs being considered for use at this site.

Subsequently the Marriott MI-45 drilling rig is now also being considered for use at this site. Accordingly, WSP Acoustics have been commissioned by York Potash Limited to complete a series of noise measurements around this drilling rig and the associated mud pump at P R Marriott Drilling Limited's headquarters in Chesterfield.

The noise monitoring results have been used to determine sound power levels for each of these plant items and a brief comparison has been made with sound power levels adopted in the original noise assessment report, to determine whether the original noise assessment report conclusions remain valid.

NOISE SURVEY

General details

The noise survey was conducted on 7th July 2011 between 10:30 and 14:00 hours. Weather conditions during the survey were warm, with a light breeze. There was occasional light drizzle, however meteorological conditions were conducive to noise measurement.

Instrumentation

Details of the instrumentation used to measure noise levels have been provided below in Table 1.

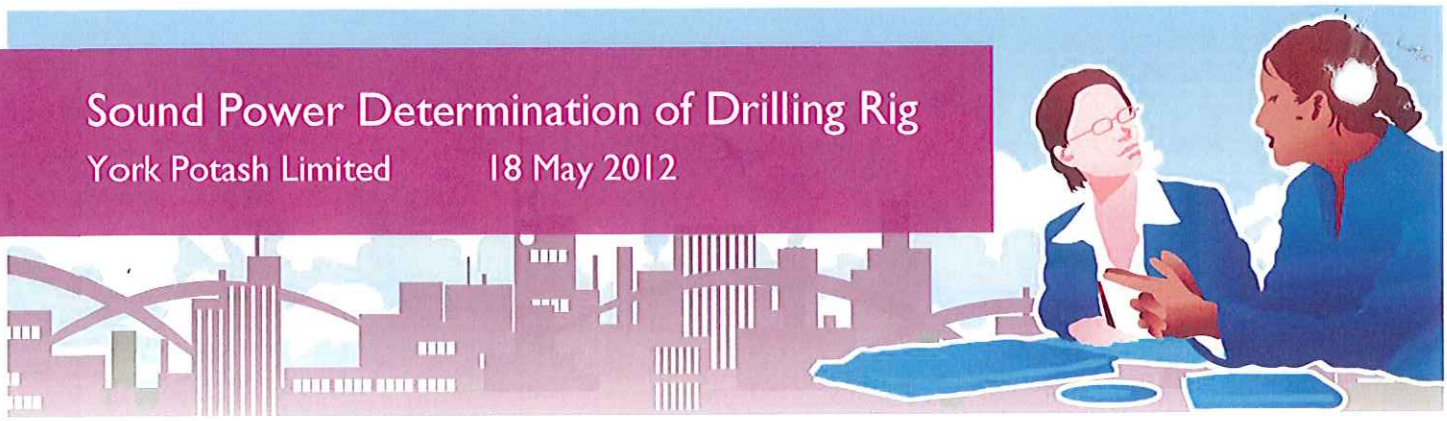


Table 1 Noise Monitoring Equipment Used (Type 1 Specification)

Equipment	Description	Serial Number
Sound Level Meter	01dB-METRAVIB Solo Master	60532
Pre-amplifier	01dB-Stell PRE 21 S	13150
Microphone	Microtech Gefell GmbH MCE212	65593
Sound Calibrator	01dB-Stell Cal 21	01120240

The sound level meter was calibrated before and after the survey and there was no drift in calibration observed.

Measurement Procedure

Measurements were carried out at the P R Marriott site in Chesterfield in one of their yards, away from building facades and other reflective surfaces. The ground condition was hard.

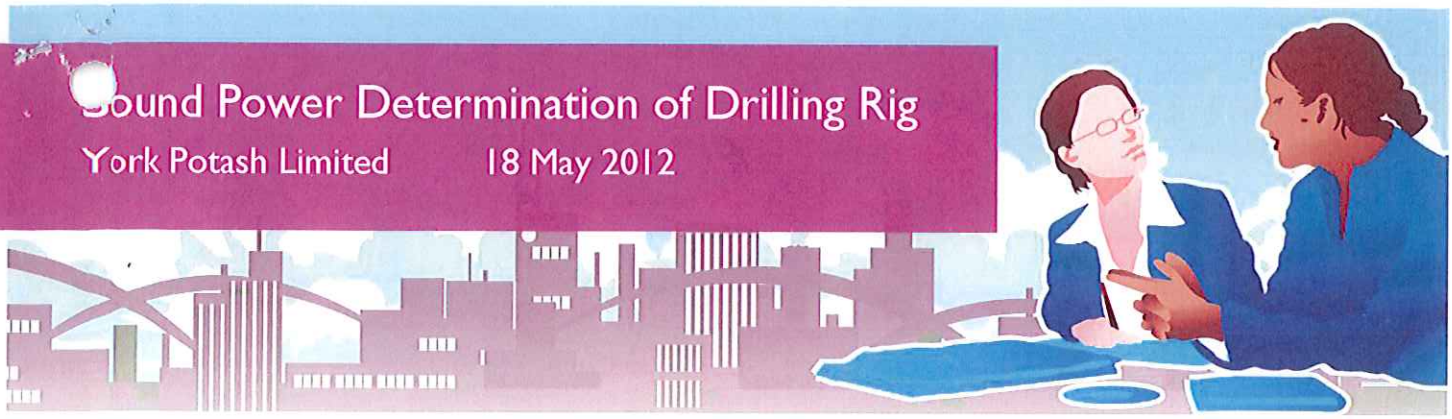
Two items of equipment were measured:-

- MI-45 Massenza Drilling Rig (Truck Mounted)
- F800 Mud Pump (Cummings KTA 38 G3 V12)

The equipment was operated across a range of duties and measurements were made at varying distances from the operating equipment. In each case, the microphone was positioned at 1.5m above ground level. In each measurement, the item of equipment was considered to dominate the ambient noise measurement at the microphone position.

Measurements were taken in 30 second L_{Aeq} values. L_{Aeq} is the equivalent continuous noise level and is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period. Octave band noise measurements were also taken.

In the case of the Drilling Rig, measurements were made at pre-selected distances from the four sides of the vehicle upon which the rig is mounted. In the case of the Mud Pump, measurements were made at pre-selected distances from the non-louvred side of the equipment. The louvred vertical end of the equipment housing did not radiate significant levels of noise and the other two sides were identical, both with access doors and some louvred sections. A series of check measurements was also undertaken on all sides, to confirm that the non-louvred side generated the highest noise levels.



It should be noted that during the noise measurements, the drilling mechanism was not in operation, but it was confirmed by the operator that this was not a dominant noise source when in operation. The dominant noise source was confirmed to be the drill power source, i.e. the diesel engine.

RESULTS

Table 2 shows a summary of the measurement results for the Drilling Rig based on data collected at distances of 10m and 20m.

In each case, the Sound Power has been derived from the measurement data assuming hemispherical radiation.

Table 2 Measurement Results for MI-45 Drilling Rig

Duty	10 metres from source		20 metres from source	
	Average $L_{Aeq,30sec}$ (dB)	Derived Sound Power L_w (dBA)	Average $L_{Aeq,30sec}$ (dB)	Derived Sound Power L_w (dBA)
25%	63.2	91.2	59.6	93.6
50%	66.4	94.4	62.2	96.2
75%	68.6	96.6	64.4	98.4
100%	70.9	98.9	67.0	101.0

Table 3 shows a summary of the measurement results for the Mud Pump based on data collected at distances of 10m and 20m.

As with the results from the Drilling Rig, the Sound Power has been derived from the measurement data assuming hemispherical radiation.

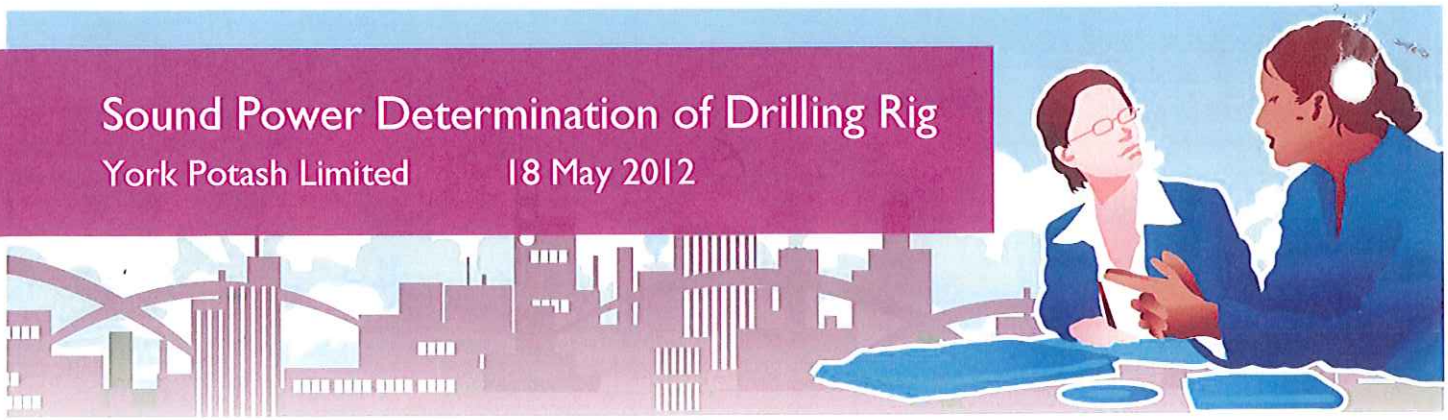


Table 3 Measurement Results for F800 (Cummings KTA 38 G3 V12) Mud Pump

Duty (rpm)	10 metres from source		20 metres from source	
	Average $L_{Aeq,30sec}$ (dB)	Derived Sound Power L_w (dBA)	Average $L_{Aeq,30sec}$ (dB)	Derived Sound Power L_w (dBA)
780	64.8	92.8	58.9	92.9
1070	66.3	94.3	60.1	94.1
1470	69.3	97.3	63.6	97.6

The octave band noise data for the derived sound power levels provided in Tables 2 and 3 are contained in Appendix A at the end of this report.

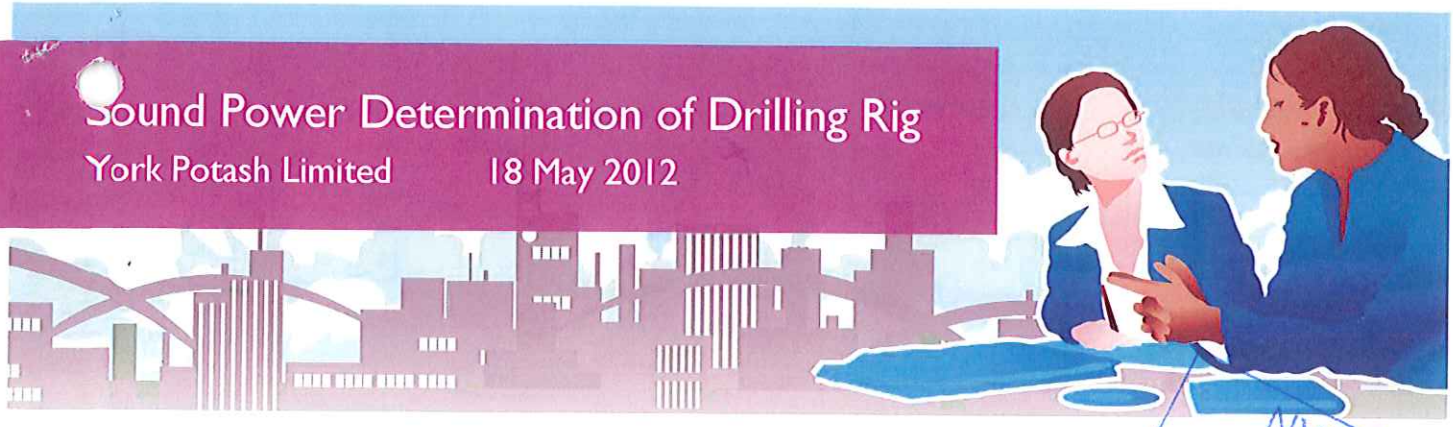
DISCUSSION

Table 2 shows that, when operating at 100% duty, the derived sound power level of the Drilling Rig is determined to be up to 101.0 dB(A). Table 3 shows that, when the Mud Pump is operating at 1470 rpm, its derived sound power level is determined to be up to 97.6 dB(A). Therefore the combined equivalent sound power level of the Drilling Rig and the Mud Pump is determined to be up to 102.6 dB(A).

It is understood that, in addition to these items of equipment, typical drilling operations may also require equipment such as shale shakers, generators and a centrifuge and such items will also generate a degree of noise.

The noise level calculations contained within the original noise assessment were based on noise emission data for the British Drilling and Freezing (BDF) Rig 28, the sound power of which was determined to be 109.6 dB(A) by Acoustic and Engineering Consultants (AEC) Ltd. The original noise assessment also identified that the BDF Rig 28 also has a similar sound power level as the Forraco BF831 rig (as determined by Spectrum Acoustics Ltd), which is also being considered for use at this site. The original assessment identified that the noise levels predicted to be generated by the proposed drilling works will be acceptable and will meet appropriate daytime, evening and night-time assessment criteria determined in accordance with a stringent interpretation of applicable national guidance.

In broad terms, the P R Marriott Drilling Limited equipment is circa 7 dB(A) quieter than the DBF Rig 28. As such the noise predictions previously conducted, and contained within the original noise assessment report, are considered to represent a worst case, and use of the PR Marriot rig as an alternative would yield even lower noise levels.



WSP Acoustics

Appendix A Octave Band Noise Sound Power Levels

Table A1 Sound Power Levels for MI-45 Drilling Rig

Duty	Location	Distance (m)	A-weighted Noise Level, dB(A)	Octave Band Centre Frequency (Hz)								
				31.5	63	125	250	500	1 k	2 k	4 k	8 k
25%	Front	10	61.7	76.8	84.3	71.9	61.6	57.6	54.1	48.2	42.5	36.6
	Side 1	10	63.7	75.1	72.2	68.9	65.0	62.4	57.9	54.2	46.8	38.9
	Rear	10	59.5	73.1	83.2	65.9	60.5	54.5	53.4	48.0	38.9	35.3
	Side 2	10	65.6	77.8	81.9	70.5	65.1	62.0	61.6	57.0	47.7	39.4
	Average $L_{Aeq,30sec}$	10	63.2	76.0	82.1	69.8	63.5	60.2	58.0	53.5	45.2	37.9
	Power Level L_w		91.2	104.0	110.1	97.8	91.5	88.2	86.0	81.5	73.2	65.9
	Front	20	57.9	72.7	79.0	68.9	58.8	53.4	50.2	44.3	38.3	32.8
	Side 1	20	59.3	70.2	67.7	65.5	62.0	56.3	53.6	49.8	42.2	34.3
	Rear	20	57	75.4	80.5	63.8	58.9	52.5	50.0	45.3	38.2	34.7
	Side 2	20	62.2	73.5	76.4	67.3	64.5	59.8	57.1	52.5	44.1	35.7
	Average $L_{Aeq,30sec}$	20	59.6	73.3	77.8	66.8	61.7	56.5	53.7	49.2	41.4	34.5
	Power Level L_w		93.6	107.3	111.8	100.8	95.7	90.5	87.7	83.2	75.4	68.5
50%	Front	10	65.2	81.4	82.4	73.3	68.5	61.7	57.0	52.9	46.2	39.2
	Side 1	10	65.7	71.7	76.1	69.5	65.8	64.1	60.5	57.1	48.7	40.6
	Rear	10	62.1	73.8	77.8	68.9	65.2	58.3	56.5	51.5	40.9	34.9
	Side 2	10	69.5	76.1	80.0	71.4	69.3	66.4	64.9	61.5	51.8	44.3
	Average $L_{Aeq,30sec}$	10	66.4	77.4	79.7	71.1	67.5	63.6	61.1	57.5	48.4	41.0
	Power Level L_w		94.4	105.4	107.7	99.1	95.5	91.6	89.1	85.5	76.4	69.0
	Front	20	60.6	77.9	76.9	69.0	64.4	56.5	52.9	48.1	41.3	35.9
	Side 1	20	61.4	70.2	69.3	66.7	64.4	58.4	55.7	52.3	44.2	36.4
	Rear	20	59.5	73.0	76.6	68.8	62.9	55.0	52.0	46.5	37.4	32.9
	Side 2	20	65.1	73.6	76.9	67.6	67.5	61.9	59.7	56.2	46.9	38.7
	Average $L_{Aeq,30sec}$	20	62.2	74.6	75.8	68.1	65.1	58.8	56.2	52.4	43.7	36.4
	Power Level L_w		96.2	108.6	109.8	102.1	99.1	92.8	90.2	86.4	77.7	70.4

Sound Power Determination of Drilling Rig

York Potash Limited 18 May 2012

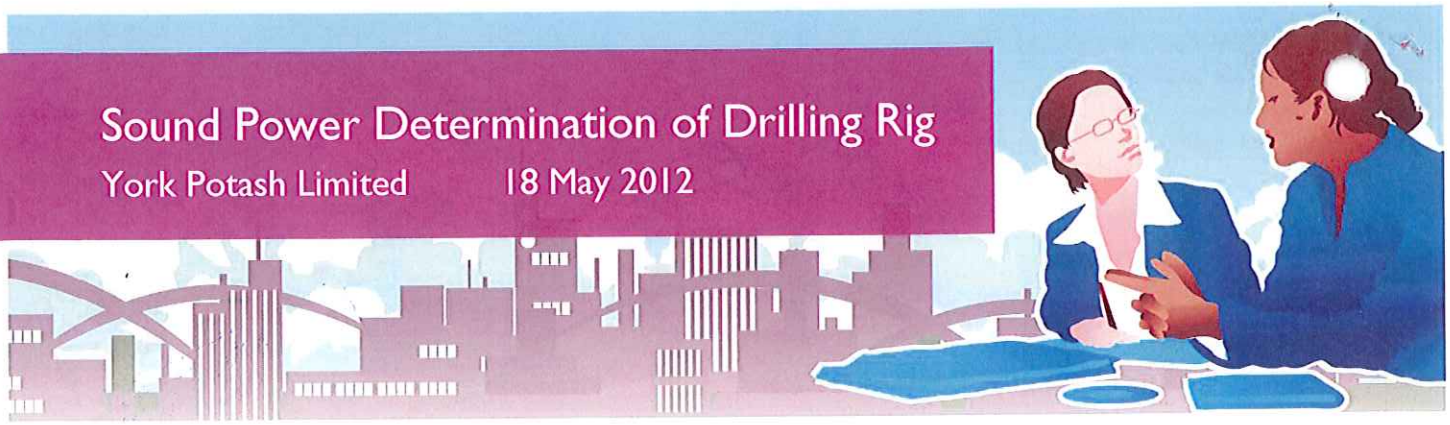


Table A1 Sound Power Levels for MI-45 Drilling Rig

Duty	Location	Distance (m)	A-weighted Noise Level, dB(A)	Octave Band Centre Frequency (Hz)								
				31.5	63	125	250	500	1 k	2 k	4 k	8 k
75%	Front	10	66.3	81.9	80.6	74.9	72.1	60.4	58.0	53.7	46.6	39.4
	Side 1	10	67.4	73.9	73.3	72.6	66.7	64.5	62.9	59.2	50.8	42.9
	Rear	10	63.7	73.4	77.4	69.0	64.6	61.7	58.7	54.4	44.5	36.7
	Side 2	10	72.3	81.9	77.6	71.5	74.0	70.9	66.7	64.5	55.3	48.2
	Average $L_{Aeq,30sec}$	10	68.6	79.5	77.9	72.5	70.9	66.5	63.0	60.2	51.2	43.9
	Power Level L_w		96.6	107.5	105.9	100.5	98.9	94.5	91.0	88.2	79.2	71.9
	Front	20	63.9	77.5	77.9	73.0	70.4	56.4	54.2	49.4	42.0	35.5
	Side 1	20	65	77.4	72.1	73.7	67.4	60.7	58.5	55.1	46.2	39.1
	Rear	20	60.5	73.9	73.8	66.5	63.8	58.0	55.7	49.3	40.5	34.1
	Side 2	20	66.4	79.0	70.8	68.0	68.8	63.2	60.8	59.0	50.4	42.9
	Average $L_{Aeq,30sec}$	20	64.4	77.3	74.5	71.3	68.2	60.3	58.0	55.1	46.5	39.3
	Power Level L_w		98.4	111.3	108.5	105.3	102.2	94.3	92.0	89.1	80.5	73.3
100%	Front	10	67.2	84.4	78.0	70.5	70.8	65.0	61.9	57.3	49.9	43.5
	Side 1	10	69.7	75.8	75.8	70.9	71.3	68.3	64.3	61.1	52.1	45.5
	Rear	10	65.9	72.2	77.7	71.4	68.8	62.0	61.3	56.1	46.6	39.1
	Side 2	10	74.8	83.9	79.5	74.4	73.8	73.1	69.9	67.0	56.8	50.8
	Average $L_{Aeq,30sec}$	10	70.9	81.6	77.9	72.1	71.5	69.0	65.8	62.6	52.9	46.7
	Power Level L_w		98.9	109.6	105.9	100.1	99.5	97.0	93.8	90.6	80.9	74.7
	Front	20	64.0	78.1	72.8	66.8	69.0	62.1	57.2	53.7	45.2	38.0
	Side 1	20	66.6	73.9	73.4	70.3	71.3	62.9	60.4	58.0	49.3	41.8
	Rear	20	62.8	74.4	74.5	68.5	65.6	61.1	57.2	52.0	42.8	35.3
	Side 2	20	70.5	80.2	76.0	69.7	76.2	66.1	64.5	61.0	52.6	45.5
	Average $L_{Aeq,30sec}$	20	67.0	77.4	74.4	69.0	72.2	63.5	60.9	57.6	49.0	41.8
	Power Level L_w		101.0	111.4	108.4	103.0	106.2	97.5	94.9	91.6	83.0	75.8

Table A2 Sound Power Levels for F800 (Cummings KTA 38 G3 V12) Mud Pump

Duty	Location	Distance (m)	A-weighted Noise Level, dB(A)	Octave Band Centre Frequency (Hz)								
				31.5	63	125	250	500	1 k	2 k	4 k	8 k
780	Side	10	64.6	81.7	85.1	69.1	60.3	59.1	58.9	55.8	45.4	38.1
	Front	10	65.0	76.9	81.5	68.6	63.4	57.5	62.3	56.0	42.7	32.7
	Average $L_{Aeq,30sec}$	10	64.8	79.9	83.7	68.9	62.1	58.4	60.9	55.9	44.3	36.2
	Power Level L_w		92.8	107.9	111.7	96.9	90.1	86.4	88.9	83.9	72.3	64.2
	Side	20	60.1	78.7	81.3	64.7	56.9	53.2	54.8	49.6	40.4	36.3
	Front	20	57.1	68.6	78.3	64.2	55.4	49.2	48.1	49.2	37.1	26.9
	Average $L_{Aeq,30sec}$	20	58.9	76.1	80.1	64.5	56.2	51.6	52.6	49.4	39.1	33.8
	Power Level L_w		92.9	110.1	114.1	98.5	90.2	85.6	86.6	83.4	73.1	67.8
1070	Side	10	66.4	70.5	83.2	71.7	68.1	59.5	60.5	60.6	48.3	38.8
	Front	10	66.1	80.0	80.4	75.5	69.7	59.8	58.7	59.3	47.7	39.5
	Average $L_{Aeq,30sec}$	10	66.3	77.5	82.0	74.0	69.0	59.7	59.7	60.0	48.0	39.2
	Power Level L_w		94.3	105.5	110.0	102.0	97.0	87.7	87.7	88.0	76.0	67.2
	Side	20	60.8	74.8	80.0	67.3	62.8	55.2	55.0	52.8	44.3	38.3
	Front	20	59.2	71.3	73.3	69.0	62.1	54.1	49.7	52.3	41.3	34.3
	Average $L_{Aeq,30sec}$	20	60.1	73.4	77.8	68.2	62.5	54.7	53.1	52.6	43.1	36.7
	Power Level L_w		94.1	107.4	111.8	102.2	96.5	88.7	87.1	86.6	77.1	70.7
1470	Front	10	68.9	78.9	81.4	80.2	73.3	62.8	59.2	59.2	50.1	40.9
	Side	10	69.6	78.0	89.5	78.0	69.4	63.1	61.4	62.7	50.4	42.6
	Average $L_{Aeq,30sec}$	10	69.3	78.5	87.1	79.2	71.8	63.0	60.4	61.3	50.3	41.8
	Power Level L_w		97.3	106.5	115.1	107.2	99.8	91.0	88.4	89.3	78.3	69.8
	Front	20	62.8	75.2	78.0	74.6	67.5	55.8	51.1	52.5	43.5	35.2
	Side	20	64.2	74.1	83.0	73.9	65.7	57.9	57.1	55.7	45.1	38.1
	Average $L_{Aeq,30sec}$	20	63.6	74.7	81.2	74.3	66.7	57.0	55.1	54.4	44.4	36.9
	Power Level L_w		97.6	108.7	115.2	108.3	100.7	91.0	89.1	88.4	78.4	70.9