**18 July 2018**

Ref: 171356/7956

Muswellbrook Coal Company Limited
PO Box 123
Muswellbrook NSW 2333

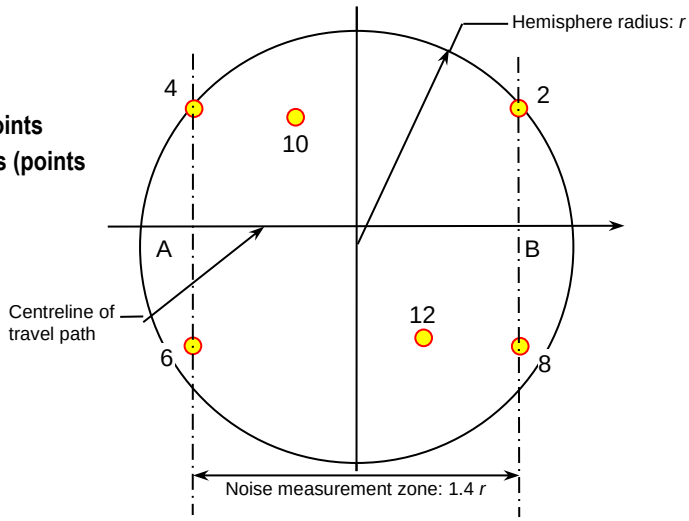
**RE: PLANT NOISE TEST RESULTS – JULY 2017**

This letter report presents the results of plant noise testing conducted for the Muswellbrook Coal Company (MCC) during July 2017 as required in Section 4.2 of the MCC Noise Management Plan (November 2017).

## MONITORING PROCEDURES

Dynamic testing was conducted using a modified version of ISO 6395:2008[1] that utilises two microphones to capture the same data as the four ground level points in the standard. The layout of the machinery path of motion and measurement points in the Standard are shown in **Figure 1**. When applied to dump trucks in motion, the forward measurement path is from point A to point B and then from B to A so that the microphones positions record both the left and right side of the vehicle.

**Figure 1. Measurement points for ISO 6395 dynamic tests (points 10 and 12 omitted).**




Measurement points 2 and 4 (6 and 8) were combined into a single point and the measurement zone extended to approximately 2.8 *r* to allow for an approach distance of 1.4 *r* to represent the measurement at point 2 (4) and a departure distance of 1.4 *r* to represent the measurement at point 6 (8). NATA calibration certificates for the measurement equipment are attached to this report.

[1] Pennington, N. *Theoretical justification for modifying homologation standard ISO 6395:2008(E) to suit the working mine site*. Acoust. Aust. **45**, 77-84 (2017).

## RESULTS

Calculated sound power levels (Lw, dB(A)) are presented in Table 1 below, with the test procedure (Stationary, dynamic or operational) noted. Also listed are the Lw values used in the most recent (2016) noise modelling conducted for MCC. All values are rounded to the nearest whole number with the method uncertainty error as defined in Annex N of ISO 6395.

**TABLE 1**
**Sound Power Levels, Lw dB(A)**
**10 July, 2018**

| Equipment | Action/Mode | Test condition | Lw (2016) | Lw, dB(A) |
|---|---|---|---|---|
| Excavator no. 210 | Dynamic (rotation) | Stationary (operation) | 104 ± 1 | 103 ± 1 |
| Excavator no. 211 | Dynamic (rotation) | Stationary (operation) | 117 ± 1 | 116 ± 1 |
| Water Cart 1115 | Dynamic (forward) | Travel on incline | 117 ± 1 | 116 ± 1 |
| Grader 1547 | Dynamic (fwd / rev) | Travel on flat | 108 ± 1 | 108 ± 1 |
| CAT 777 truck 1216 | Dynamic (forward) | Travel on flat | 116 ± 1 | 118 ± 1 |
| CAT 777 truck 1219 | Dynamic (forward) | Travel on flat | 119 ± 1 | 117 ± 1 |
| Dozer 1436 | Dynamic fwd/rev[1] | Drive-by | 121 ± 1 | 123 ± 1 |
| Dozer 1438 | Dynamic fwd/rev[1] | Drive-by | 119 ± 1 | 121 ± 1 |
| Dozer 1451 | Dynamic fwd/rev[1] | Drive-by | n/a[2] | 120 ± 1 |
| Rotary Breaker | Operating | Stationary | 116 ± 1 | 114 ± 1 |
| Preparation Plant | Operating | Stationary | 119 ± 1 | 110 ± 1 |

1 Geometric average of results for first and second gears.
2. See text below

Section 4.2 of the site Noise Management Plan (NMP, November 2017) states: “MCC conducts a survey of significant noise sources to determine the noise levels from the equipment. This survey will be completed so that all significant noise generating equipment is surveyed over a 3 year period. The results of this monitoring will be compared to previous results and if there is an increase of more than 2dB an investigation into the changes will be conducted to identify if any further mitigation on the equipment is required. As part of this investigation the attended noise monitoring results and complaints history will be considered.”

All items in Table 1 satisfy this requirement with respect to the data used in the 2016 noise modelling. Note that dozer #1451 was not included in the list of modelled plant items from 2016. The modelled noise level for all of the four dozers included in the 2016 report, however, ranged from 119 to 123 dB(A) (as an average for forward and reverse motion). The measured noise level for dozer #1451 falls within this range.

In summary, we advise that MCC mobile plant sound power levels do not exceed the levels measured in 2016 by more than 2 dB. Further targeted noise monitoring of individual plant measured during this survey is not warranted at this stage.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please do not hesitate to contact the undersigned.

Yours faithfully,

**SPECTRUM ACOUSTICS PTY LIMITED**

Author:

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Review:

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**Brüel & Kjær**

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Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301

NATA

# CERTIFICATE OF CALIBRATION

Certificate No: CAU1800652 Page 1 of 10

## CALIBRATION OF:

| | | | |
|---|---|---|---|
| Sound Level Meter: | Bruel & Kjaer | 2250 | No: 2747794 |
| Microphone: | Bruel & Kjaer | 4189 | No: 2733511 |
| Preamplifier: | Bruel & Kjaer | ZC-0032 | No: 15339 |
| Supplied Calibrator: | N/A | N/A | No: N/A |
| Software version: | BZ7224 Version 4.6 | Pattern Approval: | PTB |
| Instruction manual: | BE1712-22 | Identification: | N/A |

## CUSTOMER:

Spectrum Acoustics Pty Ltd
30 Veronica Street
Cardiff NSW 2285

## CALIBRATION CONDITIONS:

Preconditioning: 4 hours at 23 °C
Environment conditions: *see actual values in **Environmental conditions** sections*

## SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-1:2013 class 1. Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

## PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 7.2 - DB: 7.20) and test procedure 2250-4189.

## RESULTS:

| | | | |
|---|---|---|---|
| | Initial calibration | | Calibration prior to repair/adjustment |
| X | Calibration without repair/adjustment | | Calibration after repair/adjustment |

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration: 25/06/2018 Certificate issued: 26/06/2018

Sajeeb Tharayil
Calibration Technician

Jan Rasmussen
Approved signatory

**Brüel & Kjær**

Australian Calibration Laboratory
Suite 2, 6-10 Talavera Road, North Ryde NSW 2113, Australia

NATA
WORLD RECOGNISED ACCREDITATION
Laboratory No. 1301

# CERTIFICATE OF CALIBRATION

Certificate No: CAU1700839 Page 1 of 10

## CALIBRATION OF:

| | | | |
|---|---|---|---|
| Sound Level Meter: | Bruel & Kjaer | 2250 | No: 2653961 |
| Microphone: | Bruel & Kjaer | 4189 | No: 3087490 |
| Preamplifier: | Bruel & Kjaer | ZC-0032 | No: 25104 |
| Supplied Calibrator: | N/A | N/A | No: N/A |
| Software version: | BZ7222 Version 4.5.1 | Pattern Approval: | PTB |
| Instruction manual: | BE1712-22 | Identification: | N/A |

## CUSTOMER:

Spectrum Acoustics Pty Ltd
30 Veronica Street
Cardiff NSW 2285

## CALIBRATION CONDITIONS:

Preconditioning: 4 hours at 23 °C
Environment conditions: *see actual values in **Environmental conditions** sections*

## SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-3:2006 class 1. Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

## PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 6.0 - DB: 6.00) and test procedure 2250-4189.

## RESULTS:

| | | | |
|---|---|---|---|
| | Initial calibration | | Calibration prior to repair/adjustment |
| | Calibration without repair/adjustment | X | Calibration after repair/adjustment |

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration: 04/09/2017

Sajeeb Tharayil
Calibration Technician

Certificate issued: 04/09//2017

Jan Rasmussen
Approved signatory