31 January 2018

Ref: 171356/7479

Muswellbrook Coal Company Limited
PO Box 123
Muswellbrook NSW 2333

RE: PLANT NOISE TEST RESULTS – NOVEMBER 2017

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

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.

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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 method uncertainty error as defined in Annex N of ISO 6395.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Action/Mode</th>
<th>Test condition</th>
<th>Lw (2016)</th>
<th>Lw, dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavator no. 212</td>
<td>Dynamic (rotation)</td>
<td>Stationary (operation)</td>
<td>117 ± 1</td>
<td>116 ± 1</td>
</tr>
<tr>
<td>CAT Loader no. 150</td>
<td>Dynamic (fwd / rev)</td>
<td>Travel on flat</td>
<td>110 ± 1</td>
<td>110 ± 1</td>
</tr>
<tr>
<td>CAT Loader no. 323</td>
<td>Dynamic (fwd / rev)</td>
<td>Travel on flat</td>
<td>110 ± 1</td>
<td>112 ± 1</td>
</tr>
<tr>
<td>Water cart 1117</td>
<td>Dynamic (forward)</td>
<td>Travel on incline</td>
<td>118 ± 1</td>
<td>117 ± 1</td>
</tr>
<tr>
<td>Grader 1548</td>
<td>Dynamic (fwd / rev)</td>
<td>Travel on flat</td>
<td>108 ± 1</td>
<td>112 ± 1</td>
</tr>
<tr>
<td>CAT 777 truck 1218</td>
<td>Dynamic (forward)</td>
<td>Travel on incline</td>
<td>117 ± 1</td>
<td>118 ± 1</td>
</tr>
<tr>
<td>Hitachi truck 1239</td>
<td>Dynamic (forward)</td>
<td>Travel on incline</td>
<td>118 ± 1</td>
<td>117 ± 1</td>
</tr>
<tr>
<td>Blast hole drill DR217</td>
<td>Drilling</td>
<td>Stationary (operation)</td>
<td>115 ± 1</td>
<td>117 ± 1</td>
</tr>
<tr>
<td>Dozer 1439</td>
<td>Dynamic fwd/rev*</td>
<td>Drive-by</td>
<td>123 ± 1</td>
<td>122 ± 1</td>
</tr>
<tr>
<td>Dozer 1437</td>
<td>Dynamic fwd/rev*</td>
<td>Drive-by</td>
<td>123 ± 1</td>
<td>122 ± 1</td>
</tr>
</tbody>
</table>

* Geometric average of results for first and second gears.

Section 4.2 of the site Noise Management Plan (NMP, May 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. The grader #1548 is on the 2 dB difference limit when error margins are allowed for. Graders are a minor noise source on any mine site in terms of both quantity and sound power. For example, two graders at 112 dB(A) total 115 dB(A) and four dozers at 123 dB(A) each total 128 dB(A). Attended noise monitoring throughout 2017 identified dozer track-slap noise, however this did not contribute to any exceedance of environmental noise criteria. Graders are not audible off-site. Accordingly, we advise that noise from grader #1548 is not a significant contributor to off-site noise levels and further investigation of this plant item is not necessary.

In summary, we advise that MCC mobile plant sound power levels do not exceed the levels measured in 2016 by more than 2 dB. The grader #1548 is marginally compliant but poses no appreciable risk of adverse off-site noise impacts. 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: Neil Pennington MAIP, MAAS
Acoustical Consultant

Review: Ross Hodge MAAS
Acoustical Consultant

This document was prepared for the sole use of Muswellbrook Coal Limited and the regulatory agencies that are directly involved in this project, the only intended beneficiaries of our work. No other party should rely on the information contained herein without the prior written consent of Spectrum Acoustics Pty Limited and Muswellbrook Coal Limited.
## Certificate of Calibration

**Certificate No:** CAU1600465

### Calibration of:

- **Sound Level Meter:** Brüel & Kjær 2250
- **Microphone:** Brüel & Kjær 4189
- **Preamplifier:** Brüel & Kjær ZC-0032
- **Supplied Calibrator:** Brüel & Kjær N/A
- **Software version:** BZT130 Version 4.6
- **Instruction manual:** BE1712-22

### 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 IEC61672-2:2006 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 & Kjaer Sound Level Meter Calibration System B&K 3530 with application software type 7763 (version 6.0 - DB: 6.00) and test procedure 2250-4189.

### Results:

<table>
<thead>
<tr>
<th></th>
<th>Calibration prior to repair/adjustment</th>
<th>Calibration after repair/adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial calibration</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Calibration without repair/adjustment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:** 16/05/2016  
**Certificate issued:** 16/05/2016

[Sajeeb Tharayil]  
Calibration Technician

[Jan Rasmussen]  
Approved Signatory

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# CERTIFICATE OF CALIBRATION

**Certificate No:** CAU1700839  
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## CALIBRATION OF:

<table>
<thead>
<tr>
<th>Sound Level Meter:</th>
<th>Bruel &amp; Kjaer</th>
<th>2250</th>
<th>No: 2653961</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microphone:</td>
<td>Bruel &amp; Kjaer</td>
<td>4189</td>
<td>No: 5089490</td>
</tr>
<tr>
<td>Precalibrator:</td>
<td>Bruel &amp; Kjaer</td>
<td>ZC-0032</td>
<td>No: 23104</td>
</tr>
<tr>
<td>Supplied Calibrator:</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Software version:</td>
<td>R77737 Version 4.5.1</td>
<td></td>
<td>PTR</td>
</tr>
<tr>
<td>Instruction manual:</td>
<td>B&amp;K1712-22</td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

## CUSTOMER:

Spectrum Acoustics Pty Ltd  
30 Veronica Street  
Caulfield NSW 2235

## 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 Bruel & Kjaer Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 6.0 - DR: 6.09) and test procedure 2250-4189.

## RESULTS:

<table>
<thead>
<tr>
<th>Initial calibration</th>
<th>Calibration prior to repair/adjustment</th>
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</thead>
<tbody>
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<td>X Calibration after repair/adjustment</td>
</tr>
</tbody>
</table>

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 IEC-A-402 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  
Certificate Issued: 04/09/2017

[Sajeed Tharayil  
Calibration Technician]

[Ian Rasmussen  
Approved signature]

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