Site Profile
Batchfire’s Callide Coal Mine in Central Queensland is an open-cut operation located 120km southwest of Gladstone and 20km northeast of the township of Biloela. The mine produces approximately 12 million tonnes per year of low sulphur, sub-bituminous thermal coal for both domestic power generation and export. Site uses conventional open cut mining methods, utilising two draglines, haul trucks and excavator fleets.

The Situation
Batchfire Resources engaged Orica to conduct an Advanced Vibration Management (AVM) project in their Boundary Hill East pit where high tension towers are located 70 metres from mining and blasting operations. The goal of the AVM project is to maintain an efficient mining process whilst managing vibration levels within licensing agreements.

Technical Solutions
Orica and Batchfire Resources Technical Services teams compared scenarios and concluded that in the early development of the Boundary Hill East pit blasting to top of coal in one pass was effective. As the pit develops the need to blast in multiple passes is required due to drill depth constraints. Large blasts were required to minimise disruption to the digging fleet.

To deliver consistent reliable vibration predictions to allow larger blasts to be delivered the team decided to utilise a seed wave superposition model generated from eleven single blastholes. This model was developed then calibrated using the first 4 blasts. From this point the team combined a trim blast and a production blast utilising i-kon™ timing and Orica’s standard bulk explosives range to limit the maximum instantaneous charge (MIC) whilst delivering fragmented material to the dig fleet to maintain budgeted dig rates. At the time of writing the team are able to blast the full width of the pit in a single blast thus reducing the downtime of the dig fleet and maximizing productivity.

Batchfire Technical Services design the drill pattern and Orica utilise SHOTPlus™ software to design the loading and initiation as well as modelling the predicted vibration levels for each blast.

Discussions were held with the blast crew highlighting the requirement for accurate loading of the decks.

The Result
A total of 10 blasts have been fired to date. Vibration levels for each blast have been below the agreed vibration limit for the high tension towers of 100mm/s. Blasts 1 to 4 were used to calibrate the parameters for the seed wave superposition vibration model.

<table>
<thead>
<tr>
<th>Blast No.</th>
<th>No. Holes</th>
<th>Bulk Tonnes (t)</th>
<th>Distance to Towers (m)</th>
<th>Vibration Results (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>266</td>
<td>89</td>
<td>121</td>
<td>30.4</td>
</tr>
<tr>
<td>6</td>
<td>106</td>
<td>26</td>
<td>148</td>
<td>44</td>
</tr>
<tr>
<td>7</td>
<td>694</td>
<td>424</td>
<td>155</td>
<td>46.4</td>
</tr>
<tr>
<td>8</td>
<td>388</td>
<td>235</td>
<td>130</td>
<td>66.5</td>
</tr>
<tr>
<td>9</td>
<td>651</td>
<td>395</td>
<td>87</td>
<td>71</td>
</tr>
<tr>
<td>10</td>
<td>591</td>
<td>113</td>
<td>76</td>
<td>69.5</td>
</tr>
</tbody>
</table>

Table 1 – Summary of Blast Results & Parameters (Blasts 5 to 10)

These larger blasts have reduced the impact of blast delays on the digging fleet as well as reducing drill movements to and from the pit.
Testimonial
“Keith and the Orica team have done a great job with providing us with timely and accurate loading and tie up advice to keep our blasting vibrations within the allowable limits. They consistently provide reliable service to allow us to continue mining in very close proximity to the powerlines running through the minesite”.

Stephens Simmons, Drill and Blast Engineer
Callide Coal Mine, Batchfire Resources.

Acknowledgements
Orica wishes to thank the Batchfire Technical Services team, in particular Brandon May and Stephen Simmons, for the opportunity to work in partnership in this project and look forward to its continuing success

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Date: 27th June 2018

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