SPONTANEOUS COMBUSTION MANAGEMENT PLAN (SCMP)

December 2015

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Section Modified</th>
<th>Reason for Modification</th>
<th>Review Team</th>
</tr>
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<td>1</td>
<td>February 2005</td>
<td>All</td>
<td>Original Management Plan</td>
<td>MCC Technical Services Department Carbon Based Environmental</td>
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<td>2</td>
<td>December 2010</td>
<td>All</td>
<td>5 Yearly Review</td>
<td>MCC Technical Services Department Carbon Based Environmental</td>
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<td>December 2015</td>
<td>All</td>
<td>5 Yearly Review</td>
<td>MCC Environmental, Technical Services and Production Departments</td>
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</tbody>
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Approved by Senior Operations Manager: Grant Clouten – signature on file

Date: 25 January 2016
# TABLE OF CONTENTS

1.0 INTRODUCTION ........................................................................................................ 1  
1.1 SCOPE ..................................................................................................................... 1  
1.2 OBJECTIVES .......................................................................................................... 1  
2.0 STATUTORY REQUIREMENTS ............................................................................. 2  
3.0 EXISTING ENVIRONMENT....................................................................................... 4  
4.0 IDENTIFICATION OF CAUSES ............................................................................ 4  
   4.1 ACARP PROJECT 1609 (1993 – 1994) ................................................................. 4  
5.0 MANAGEMENT MEASURES ................................................................................... 5  
   5.1 GENERAL GUIDELINES ....................................................................................... 5  
   5.2 PREVENTATIVE MEASURES .............................................................................. 6  
   5.3 CONTROL MEASURES ....................................................................................... 6  
6.0 COMPLAINT MANAGEMENT ............................................................................... 7  
7.0 EXTERNAL REPORTING ....................................................................................... 7  
   7.1 ANNUAL ENVIRONMENTAL MANAGEMENT REPORT .................................. 7  
   7.2 QUARTERLY SPONTANEOUS COMBUSTION REPORTS .................................. 8  
8.0 ENVIRONMENTAL AUDITS ................................................................................ 8  
9.0 REVIEW OF MANAGEMENT PLAN ...................................................................... 8  
10.0 RESPONSIBILITES ................................................................................................ 8
1.0 INTRODUCTION
Muswellbrook Coal Company (MCC) is a wholly owned subsidiary of the Idemitsu Kosan Company Ltd. Group. MCC has a long association with coal mining at Muswellbrook, with underground coal mining commencing in 1907 and open cut operations in 1944. The mine is located on Muscle Creek Road, approximately 3 kilometres to the north-east of Muswellbrook.

On December 1, 2003, Development Consent for DA 205/2002 was granted by Muswellbrook Shire Council (MSC) to extend the former MCC No.1 Open Cut. The No.1 Open Cut Extension commenced operations in March 2005 and has a capacity to produce up to 2,000,000 tonnes coal per annum. This approval has subsequently been modified to allow the relocation of the Mine Infrastructure Area (MIA) and to extend the mine life to 2020.

1.1 SCOPE
The Development Consent requires the preparation, approval and implementation of an Environmental Management Strategy (EMS) and subordinate Environmental Management Plans (EMP). One of these EMPs is the Spontaneous Combustion Management Plan (SCMP). Whilst this plan specifically addresses issues related to the management of spontaneous combustion, it should be read in conjunction with other EMP’s.

This SCMP also address other approval and licence conditions that relate to MCC’s spontaneous combustions management system. This SCMP has been prepared to manage spontaneous combustion related impacts associated with mining at MCC and operation of the Coal Handling and Preparation Plant (CHPP).

This SCMP has been prepared to the satisfaction of DRE.

1.2 OBJECTIVES
The main objective of the SCMP is to minimise the occurrence and manage the effect from spontaneous combustion in:
- Existing open cut and underground workings;
- Drilling and blasting;
- Mining of overburden;
- Mining of coal;
- Emplacement of overburden;
- Emplacement of washery reject; and
- Coal stockpiles.
2.0 STATUTORY REQUIREMENTS

The relevant approval and licence conditions are shown in Table 1 along with information on where they are addressed in this plan.

<table>
<thead>
<tr>
<th>Approval/Licence Condition No.</th>
<th>Condition</th>
<th>Section</th>
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<tbody>
<tr>
<td>Development Consent</td>
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<td>2.2</td>
<td>Prior to commencement of operations the Applicant shall prepare a Spontaneous Combustions Management Plan for the Project to the satisfaction of DMR.</td>
<td>This plan</td>
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<tr>
<td>9.2(a)</td>
<td>The Applicant shall, throughout the life of the mine and for five years after the completion of mining in the DA area, prepare and submit an Annual Environmental Management Report (AEMR) to the satisfaction of MSC and DMR. The AEMR shall review the performance of the mine against the Environmental Management Strategy and the relevant Mining Operations Plans, the conditions of this consent, and other licences and approvals relating to the mine. To enable ready comparison with the predictions made in the EIS, diagrams and tables, the report shall include, but not be limited to, the following matters: (i) an annual compliance audit of the performance of the project against conditions of this consent and statutory approvals; (ii) assess the extension against predictions made in the EIS and the terms and commitments in the documents listed in condition 1.1; (iii) a review of the effectiveness of the environmental management of the mine in terms of EPA, DIPNR, DMR, MSC requirements; (iv) results of all environmental monitoring required under this consent or other approvals, including interpretations and discussion by a suitably qualified person; (v) identification of trends in monitoring results over the life of the mine; (vi) an assessment of any changes to agricultural land suitability resulting from the Mining Operations, including cumulative changes; (vii) a listing of any variations obtained to approvals applicable to the DA area during the previous year; (viii) the outcome of the water budget for the year, the quantity of water used from water storages and details of exchange of any water from the site; (ix) status of rehabilitation and revegetation works; and (x) environmental management targets and strategies for the next year, taking into account identified trends in</td>
<td>7.1</td>
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<tr>
<td>Approval/Licence Condition No.</td>
<td>Condition</td>
<td>Section</td>
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<td></td>
<td>monitoring results.</td>
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<td><strong>Environmental Protection Licence</strong></td>
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<td>R4.4</td>
<td>The licensee must prepare and submit quarterly spontaneous combustion management reports to EPA. A copy of each quarterly report must be forwarded to the regional office of EPA no later than two (2) months after the quarterly period being reported. The quarterly report must include but not be limited to the following:   a) A monthly summary of actions and procedures undertaken to prevent or control spontaneous combustion at the site   b) An assessment of the effectiveness of the actions and procedures undertaken   c) Spontaneous combustion areas capped in square meters   d) Spontaneous combustion areas mined out in square meters   e) Areas under water infusion   f) Map of the approximate location of the areas subject to spontaneous combustion, areas capped, areas mined out and areas under water infusion.   g) Number of complaints received in relation to spontaneous combustion.</td>
<td>7.2</td>
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<td><strong>Mining Lease 1562</strong></td>
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<tr>
<td>27 (a)</td>
<td>The lease holder shall take all precautions against causing outbreak of spontaneous combustion and fire on the subject area, shall make records of such occurrence and notify an Environmental Officer of such occurrence.</td>
<td>7.2</td>
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<tr>
<td>27 (b)</td>
<td>Notwithstanding (a) above, the lease holder shall establish and implement a Spontaneous Combustion Management Plan which is to address risk assessment, management control procedures and reporting protocols to the satisfaction of an Environmental Officer.</td>
<td>This plan</td>
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</table>

**Government Department Name Changes:**
DMR is now known as Division of Resources and Energy (DRE). The acronym DRE will be used throughout this management plan.
3.0 EXISTING ENVIRONMENT
The coal seams being mined at MCC are those associated with the Greta Coal Measures. These Measures have a history of spontaneous combustion. Spontaneous combustion has been a long-term issue at MCC since the first operation (an underground mine) opened in 1907.

Incidences of spontaneous combustion have taken place over a number of years, particularly in the spoil piles on the western side of the No.1 Open Cut. During the 1980’s, this was successfully dealt with by sealing both the burning area and the material liable to spontaneous combustion with approximately 10 metres of inert overburden.

Spontaneous combustion has previously occurred within parts of No.2 Underground roadway, particularly near the old tunnel mouth and in the vicinity workings where broken coal was found.

Mining in a manner which removes spontaneous combustion is one of the main reasons for mining at MCC.

4.0 IDENTIFICATION OF CAUSES
In order to develop effective prevention and control measures for spontaneous combustion, it has been necessary to engage in extensive monitoring and research to better understand the mechanisms which cause spontaneous combustion to commence and spread. MCC has participated in industry sponsored research programs in spontaneous combustion in open cut mines.

This project utilised resources from ACIRL and CSIRO to investigate the factors likely to contribute to the occurrence and spread of spontaneous combustion in spoil emplacement areas. Findings from the project suggest the primary contributing factors were:
1) Coal/carbonaceous shale oxidation – the oxidation of coal and carbonaceous shale within the spoil heaps. A direct relationship was found between the percentage of carbonaceous waste and the propensity for spontaneous combustion to occur and to be sustained;
2) Heat and wetting – when water interacts with solid coal, heat is liberated. This phenomenon can generate sufficient heat to cause oxidation in both solid and broken coal and carbonaceous material;
3) Heat and water condensation and evaporation – the transfer of heat throughout an overburden spoil emplacement area by condensation and evaporation of water contributes to the spread of spontaneous combustion; and
4) Oxidation of pyrite – the oxidation of pyrite, whilst not essential, can further increase the likelihood of spontaneous combustion of spoil material if sufficiently carbonaceous.

Extensive mathematical modelling of spoil heaps of different sizes and configurations and with varying distributions of carbonaceous material was carried out. The characterisation of various materials according to propensity to spontaneous combustion was also determined. Drilling into hot spoil heaps and monitoring the heat and oxygen distribution with the spoil emplacements verified this modelling work.
The recommended management measures from this research included:
1) Reducing the overall fuel(carbon) content;
2) Selective placement and rapid burial of material high in carbonaceous content;
3) Building spoil piles with lower dump layers (5 – 15 metres) to increase the stability and reduce voidage; and
4) Covering exposed batters with inert material and compact wherever possible.

5.0 MANAGEMENT MEASURES

5.1 GENERAL GUIDELINES

Mining, including drilling and blasting, takes place in areas currently or previously affected by spontaneous combustion. The effects of spontaneous combustion may include:

- Elevated temperature – MCC has hot hole blasting procedures in place in addition to hot material handling procedures;
- Gases – safe work procedures, including the use of monitoring equipment on machinery, have been developed; and
- Dust – this can occur during blasting and overburden removal, including both loading and dumping.

As part of preparation for mining of areas affected by spontaneous combustion, higher risk areas are identified by:

- Examining previous information records, accumulated over the last ten years, for occurrences of spontaneous combustion;
- Examining the surface for any physical effects of spontaneous combustion such as brown or dying vegetation and increased surface temperature;
- Using infra-red photography, where appropriate, to show areas of increased temperature;
- Measuring borehole temperatures for temperature increases; and
- Measuring surface temperatures.

MCC has successful experience in managing and controlling areas prone to spontaneous combustion. Methods used to manage mining in areas prone to spontaneous combustion include:

- Cooling the heated area with water before mining (water infusion);
- Removal of the fuel by mining the coal;
- Minimisation of areas of coal exposed to the air prior to mining;
- Retention of 5 metres of overburden above workings to exclude oxygen from areas not immediately required for mining operations; and
- Sealing of remaining unmined underground workings with clay or inert material to prevent the ingress of oxygen.

Where spontaneous combustion has been identified as having a significant adverse effect on an area, either currently active or not, an assessment of magnitude of this effect will be made by the Open Cut Examiner (OCE) in conjunction with the Technical Services staff. This assessment will be based upon:

- Previous heating;
- Current temperature both on the surface and in blast holes; and
- Nature of drill cuttings.
Where applicable, water infusion will be used to reduce heat and/or dust. Water infusion will be undertaken in accordance with the relevant safe work procedure. Other measures include placement of select material to exclude oxygen.

5.2 PREVENTATIVE MEASURES
Preventative measures to reduce the incidence of spontaneous combustion within blast holes include the following:
- Blast holes not drilled through major coal seams;
- Stand-off from coal seams whenever feasible;
- Have holes drilled and loaded in the minimum time period; and
- No sleeping holes wherever possible.

Preventative measures to reduce the incidences of spontaneous combustion while mining include the following.
- Cooling the area affected by spontaneous combustion with water infusion before mining;
- Removal of coal affected by spontaneous combustion before the heating can spread; and
- Minimising the areas of exposed coal which is likely to be affected by spontaneous combustion.

Preventative measures to reduce the incidences of spontaneous combustion within overburden spoil emplacement areas include the following.
- Use of the washy for increase of the recovery of carbon material from the geological resource.
- The selective placement of waste materials with high carbonaceous content. This material will be placed progressively in the lower portions of the spoil emplacement areas for deep burial and minimisation of oxidation.
- Rapid burial of carbonaceous material to minimise the time that it is exposed to oxygen and heat.
- Limiting overburden spoil emplacement lifts, under normal conditions, to a height of 10 – 15 metres to increase stability and compaction. This will reduce the flow of oxygen and heat through the spoil.

Visual inspections of all areas of coal stockpiles are carried out daily by the OCE to identify:
- Status and effectiveness of spontaneous combustion control works in progress on product coal stockpiles;
- Areas where active spontaneous combustion is occurring; and
- Areas where spontaneous combustion has occurred within the previous week.

5.3 CONTROL MEASURES
The identification and remediation of outbreaks of spontaneous combustion will be the responsibility of production staff. Incidences of spontaneous combustion that are of high severity will require the guidance and input of technical service staff to develop appropriate control measures.

The OCE will inspect the mining operations including coal stockpiles each shift to identify areas of spontaneous combustion. Outbreaks of spontaneous combustion that are reported by the
community or other employees will be referred to the OCE for immediate inspection and corrective action. Technical Services staff will inspect the open cut on a regular basis, placing emphasis on those areas of spontaneous combustion identified by the OCE. Technical Services staff and/or the OCE will outline areas requiring control works. Suitable sources of inert material will be identified to control any outbreaks of spontaneous combustion.

Each of the areas requiring control works will be prioritised to indicate to production staff the order in which control works will be carried out.

The OCE will be responsible for allocating and coordinating appropriate levels of manning and machinery to undertake control works for outbreaks of spontaneous combustion that have been identified. Mitigation measures include:

- Any blast hole which shows signs of spontaneous combustion or is allowing air into areas of spontaneous combustion is to be bagged off or backfilled.
- Using water infusion or water sprays in accordance with the relevant safe work procedure.
- Removing coal subject to active spontaneous combustion to prevent spreading. This coal will then be spread out and cooled.
- Backfilling with clay against underground headings to prevent ingress of air.
- Spreading out loose heaps of material that are subject to spontaneous combustion and compacting them with a dozer. These areas will be saturated with water from the water cart and/or sealed with inert material, if necessary, to prevent oxidation.
- Battering off overburden spoil emplacement area faces showing signs of spontaneous combustion and covering them with inert material.
- Loose heaps of coal that are subject to spontaneous combustion will be spread out and compacted with a dozer. These areas will be saturated with water from the water cart to prevent oxidation.

6.0 COMPLAINT MANAGEMENT
Spontaneous combustion related complaints by the community can be directed to the 24 hour toll free telephone Environmental Contact Line 1800 600 205. Complaints shall be recorded and responded to in accordance with the MSC Complaints Mechanism.

7.0 EXTERNAL REPORTING
Within 2 weeks of approval of this SCMP, a copy will be made available to the Community Consultative Committee (CCC), relevant agencies and for public viewing via the MCC website.

The performance of MCC’s SCMP will be reported through a number of external reporting requirements, which include;

- Annual Environmental Management Report (AEMR); and
- Quarterly Spontaneous Combustion Reports.

7.1 ANNUAL ENVIRONMENTAL MANAGEMENT REPORT
The AEMR will include a summary of:

- Summary of spontaneous combustion related complaints and management measures undertaken;
- Measures undertaken during the period to manage spontaneous combustion; and
• Review of the performance of management measures.

7.2 QUARTERLY SPONTANEOUS COMBUSTION REPORTS
Quarterly reporting will be provided to DRE in accordance with AEMR inspection requirements (2003/2004) and to the EPA as required by the Muswellbrook Coal Environment Protection Licence (No. 656).

8.0 ENVIRONMENTAL AUDITS
In accordance with the Project Approval, every three years MCC will fund an Independent Environmental Audit that will be performed by an independent third party that has been endorsed by MSC. The audit will include consultation with relevant agencies.

These environmental audits will assess the environmental performance of MCC and compliance against the predictions in the EIS, conditions of the Project Approval, mining leases, water licences and Environmental Protection Licence, and review the adequacy of strategies, plans and/or programs and recommend measures or actions to improve the environmental performance of MCC.

9.0 REVIEW OF MANAGEMENT PLAN
The SCMP will be reviewed;
• Within 3 months of changes to Development Consent or licence conditions relating to spontaneous combustion management;
• Following an independent environmental audit which recommends changes to the SCMP;
• If there is a relevant change in technology or legislation; and
• Every five years, or as directed by MSC, in accordance with Condition 3.2(f) of the Development Consent Conditions.

10.0 RESPONSIBILITIES
Table 2 outlines the responsibilities relating to the SCMP.

<table>
<thead>
<tr>
<th>Position</th>
<th>Task</th>
<th>Timing</th>
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<tbody>
<tr>
<td>Senior Operations Manager</td>
<td>Provide adequate resources to implement the requirements of the SCMP</td>
<td>Annual review</td>
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<tr>
<td>OCE</td>
<td>Undertake inspections of the operational areas for signs of spontaneous combustion</td>
<td>Every shift</td>
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<td></td>
<td>Implement spontaneous combustion control measures as outlined in SCMP</td>
<td>As outlined in SCMP</td>
</tr>
<tr>
<td>Position</td>
<td>Task</td>
<td>Timing</td>
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<tr>
<td>Technical Services Department</td>
<td>Provide support to Production Department in identifying and controlling outbreaks of spontaneous combustion</td>
<td>As outlined in SCMP</td>
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<td>Environmental Coordinator</td>
<td>Coordinate response to all spontaneous combustion related complaints</td>
<td>Following a spontaneous combustion related complaint</td>
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<td></td>
<td>Coordinate reviews of the SCMP</td>
<td>As outlined in SCMP</td>
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<td></td>
<td>Coordinate reporting as required in SCMP</td>
<td>As required (minimum quarterly)</td>
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