Muswellbrook Coal Company Limited

Established 1907

SPONTANEOUS COMBUSTION MANAGEMENT PLAN (SCMP)

APPROVED BY MSC

DATE: OCTOBER 2020

Version	Date	Section Modified	Reason for Modification	Review Team
1	February 2005	All	Original Management Plan	MCC Technical Services Department Carbon Based Environmental
2	December 2010	All	5 Yearly Review	MCC Technical Services Department Carbon Based Environmental
3	December 2015	All	5 Yearly Review	MCC Environmental, Technical Services and Production Departments
4	June 2017	All	Update following modification for Continuation Project	MCC Environmental, Technical Services and Production Departments Peer review by approved Technical Expert
5	October 2020	Addition of Section 5.0 Administrative changes throughout	3 Yearly Review	MCC Environmental, Technical Services and Production Departments

Approved by General Manager: Signature on file

Effective Date: December 2020

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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 September 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 on several occasions with the latest modification granted in 2016 to allow mining in an area known as the "Continuation Project" and to extend the life of the mining operations to 2022. Rehabilitation activities will continue past this date.

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.

The SCMP prepared in 2017 was endorsed by a suitably qualified expert whose appointment had been approved by Muswellbrook Shire Council (MSC). This expert has continued to provide MCC with advice on a regular basis and has not identified any improvements to the SCMP. This SCMP has been prepared to the satisfaction of MSC (see **Appendix 1** for copies of correspondence and endorsement letter).

1.2 OBJECTIVES

The main objective of the SCMP is to minimise the occurrence and manage the effect from spontaneous combustion in:

- The highwall and existing U/G mine workings in Open Cut 1;
- The overburden/interburden removal and coal removal in Open Cut 1;
- Active and recent emplacement areas within Open Cut 1;
- Open Cut 2;
- Coal emplacement and storage areas; and
- Elsewhere with the disturbance area.

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 1: Statutory Requirements

Approval/ Licence Condition No.	Condition	Section
Development Consent		
31	The applicant must prepare a detailed Spontaneous Combustion Management Plan to the satisfaction of Council, and carry out the development in accordance with this plan. The plan must:	This plan
31(a)	Be endorsed by a suitably qualified expert/s whose appointment/s have been approved by Council;	Appendix 1
31(b)	Describe what measures are to be undertaken to minimise the occurrence of spontaneous combustion. Should spontaneous combustion occur, describe what methods would be employed to extinguish, or reduce the size and duration of the outbreak. This is to include details of the times, areas, locations etc. that will trigger actions, and criteria provided to indicate success or further works being required. The plan must break these activities up to be specific to the following areas: i. The highwall and existing U/G mine workings in the No.1 pit; ii. The overburden/interburden removal and coal removal in the No.1 pit; iii. Active and recent emplacement areas within the No.1 pit; iv. The No.2 pit; v. Coal emplacement and storage areas; and vi. Elsewhere with the disturbance area.	8.0
31(c)	Defines what constitutes a spontaneous combustion incident, and includes a protocol for notifying Council and other relevant stakeholders of spontaneous combustion incidents.	10.0
31(d)	Defines what will trigger a review of the Spontaneous Combustion Management Plan. This is to include a Trigger Action Response Plan resulting from a spontaneous combustion incident that has as one of its outcomes a review of this Management Plan.	12.0
Environmental Protection Licence		

Approval/ Licence Condition No.	Condition	Section
R4.4	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.	11.2
Mining Lease 1562		
27(a)	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.	11.2
27(b)	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.	This 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.

4.1 ACARP PROJECT 1609 (1993 – 1994)

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 SPONTANEOUS COMBUSTION EMISSIONS STUDY

MCC has undertaken a spontaneous combustion emissions study in accordance with the requirements set by the EPA. This study involved undertaking 12 months of continuous monitoring to determine if emissions from the spontaneous combustion of coal were causing exceedances of relevant air quality criteria.

All monitoring data were reviewed by an air quality expert and the following main conclusions were made:

- There were eight (8) unique days in the 12-month period when monitored H_2S concentrations exceeded the odour detection threshold at the installed monitoring locations. It was noted that some individuals may be able to detect H_2S at lower levels than the referenced odour detection threshold. The data showed that H_2S concentrations were generally highest in spring and autumn, depending on the location, and almost always highest in the morning, coinciding with stable atmospheric conditions.
- Most (58%) of the odour complaints in the 12-month period related to reported incidents in the morning. The H2S monitoring data also showed that concentrations were typically highest in the morning.
- H_2S concentrations did not exceed health-based criteria at any time during the 12-month period, indicating that the measured levels would not have caused adverse health effects.
- Measured 24-hour average PM10 concentrations exceeded the EPA's 24-hour average assessment criteria on six (6) days in the 12-month period. Two of the six "exceedance" days were potentially due to activities or emissions at Muswellbrook Coal Mine. The remaining four "exceedance" days were due to regional events or other, non-mine related, factors. Annual average PM10 concentrations did not exceed the EPA's criteria or National standards.
- SO_2 concentrations did not exceed the EPA criteria or National standards.

In addition to analysis, the air quality expert used the monitoring data to derive an estimate of spontaneous combustion emissions (as H_2S) for input to a site-specific odour dispersion model. The odour dispersion model was based on one year of representative meteorological data and was prepared using the procedures outlined in the EPA's "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (EPA 2016). The modelling was based on emissions that were conservatively high however the process did highlight that:

- Emissions from spontaneous combustion are extremely difficult to measure and predict due to the sporadic nature, distribution and intensity of coal fires.
- Areas to the east-northeast of Muswellbrook Coal Mine may experience higher effects of spontaneous combustion emissions (as H_2S) than other locations, because of the elevated terrain. In addition, H_2S from Muswellbrook Coal Mine may be detectable in most areas of the model domain from time-to-time, depending on the location and sensitivity of the individual.

The outcomes of the monitoring and modelling also led to the following recommendations:

- Continued monitoring of H_2S (nominally until 12 months after mining ceases) to assist with the verification of community concern since the complaints data, monitoring data and modelling results indicated that off-site odour (as H2S) is detectable from time-to-time. The availability of longer-term monitoring data may also assist with examining the effectiveness of management controls in terms of off-site odour (as H2S). Any changes to the monitoring arrangements would need to be with the agreement of the EPA, and consistent with the Consent.
    - MCC continues to monitor H_2S and SO_2 in the local community.
- Development of a procedure for identifying whether MCC may have contributed to monitored H_2S concentrations on a day of interest (for example, a day of elevated H_2S).
    - MCC has developed a procedure to identify whether MCC may have contributed to monitored H_2S concentrations on a day of interest.
- Incorporation of the findings from this study into the Air Quality Management Plan (AQMP) and Spontaneous Combustion Management Plan (SCMP) during the next periodic review of these documents.
    - The findings of the study have been incorporated into the reviews of the AQMP and SCMP.

6.0 SPONTANEOUS COMBUSTION PROPENSITY OF MATERIAL

The spontaneous combustion propensity of the material handled at MCC is shown in **Table 2**.

Table 2: Spontaneous Combustion Propensity of Material

Material Type	Propensity to Spontaneously Combust
Interburden	
Fleming	Low
Hallet	Medium
Muswellbrook/St Heliers	Medium
Upper Lewis/W01	Medium
Lower Lewis	Medium
Loder	Medium
Coal	
Fleming	High
Hallet	High
Muswellbrook/St Heliers	High
Upper Lewis/W01	Medium
Lower Lewis	Medium
Loder	Low

7.0 ANNUAL PLANNING

As part of the annual planning process MCC will develop an internal spontaneous combustion action plan to identify the key management areas for the next year. This action plan will be reviewed and signed off by a technical expert. At the end of each year a review will be undertaken to review the commitments in the annual plan vs actual activities on site. The effectiveness of the management activities will be reviewed as part of the annual review. A summary of the review will be included in the Annual Environmental Management Report, which

is available to members of the community via MCC's website. A summary of spontaneous combustion management will be included in the annual community newsletter that will be distributed to the local community.

8.0 MANAGEMENT MEASURES

8.1 HIGHWALL AND EXISTING UNDERGROUND WORKINGS IN OPEN CUT 1

8.1.1 Preventative Measures

The following preventative measures are used at MCC for managing spontaneous combustion in the highwall and underground working areas in Open Cut 1.

- Digging material back to hard/unblasted material to remove loose material along the highwall edge;
- Mining the highwall in accordance with the mine design;
- Flyash sealing in advance of highwall progression targeting known high risk roadways in the underground workings; and
- Temperature and gas monitoring holes in underground workings in targeted roadways.

8.1.2 Control Measures

The following control measures are used at MCC for managing spontaneous combustion in the highwall and underground working areas in Open Cut 1.

- Clay sealing of exposed underground working if there are signs of heating. Start within 5 business days of coal being identified as heating and suitable material is available for sealing;
- Cooling with water on highwall areas; and
- Daily inspections and monitoring.

8.1.3 Trigger Action Response Plan (TARP)

The TARP for spontaneous combustion outbreaks in the highwall and underground workings in Open Cut 1 is shown in **Table 3**.

Table 3: Trigger Action Response Plan for Highwall and Underground Workings

Type of Activity	Trigger	Control Action	Response Timeframe	Responsibility
Normal mining	No heating	Inspection and monitoring	Daily	Production Department
Special outbreak	Visual signs of heating	Develop a specific management plan for the area of heating. Consider the following if practical: • Clay seals • Infusion • Digging down to hot area	Plan developed and actioned within 5 business days of heating being noticed	Technical Services Department

8.2 OVERBURDEN/INTERBURDEN AND COAL REMOVAL IN OPEN CUT 1

8.2.1 Preventative Measures

The following preventative measures are used at MCC for managing spontaneous combustion during interburden/overburden removal in Open Cut 1.

- Test drilling in advance of mining to identify potential hot areas;
- Mining area to mine design parameters;
- Flyash sealing of roadways in advance of mining;
- Daily inspections and monitoring; and
- Underground workings that are below current operational areas to be charged with water (if possible).

8.2.2 Control Measures

The following control measures are used at MCC for managing spontaneous combustion during interburden/overburden removal in Open Cut 1.

- After blasting a known hot area the area will start to be dug out within 10 days. If this is not possible cooling with water will commence within 5 days after blasting has been completed in the area;
- Cooling with water on areas susceptible to heating;
- Clay sealing of exposed underground working if there are signs of heating. Start within 5 business days of coal being mined back to hard and suitable material being available; and
- Bench the coal rill material and clean back to hard material along lowwall edge.

8.2.3 Trigger Action Response Plan (TARP)

The TARP for spontaneous combustion outbreaks for overburden/interburden removals in Open Cut 1 are shown in **Table 4**.

Table 4: Trigger Action Response Plan for Overburden/Interburden Removal

Type of Activity	Trigger	Control Action	Response Timeframe	Responsibility
Normal mining	No heating in blasted area	Inspection and monitoring	Daily	Production Department
Normal mining	Visual signs of heating in blasted area	1. Excavate material 2. If material cannot start to be excavated within 10 days, start to cool with water within 5 days	Start excavation within 10 days or water cooling within 5 days unless circumstances beyond MCC's control (e.g. rain) prevent access	Production Department
Normal mining	No heating in lowwall area	Inspection and monitoring	Daily	Production Department

Type of Activity	Trigger	Control Action	Response Timeframe	Responsibility
Normal mining	Visual signs of heating in lowwall area	1. Dig loose material back to hard 2. Install clay seal 3. Install water infusion	Within 5 days unless circumstances beyond MCC's control (e.g. rain) prevent access	Production Department

8.3 ACTIVE AND RECENT EMPLACEMENT AREAS WITHIN OPEN CUT 1

8.3.1 Preventative Measures

The following preventative measures are used at MCC for managing spontaneous combustion in emplacement areas in Open Cut 1.

- High and medium risk interburden material to be limited to a maximum lift of 10m and will be placed in lower areas of the dump;
- High and medium risk material will not be placed within 15m of the final surface level;
- Overburden material will be placed as per the mine design;
- Daily inspections and monitoring; and
- Maintain dozer access on each high and medium risk dump lift to access dump lifts in case of heating.

8.3.2 Control Measures

The following control measures are used at MCC for managing spontaneous combustion in emplacement areas in Open Cut 1.

- Covering the outside edge of high and medium risk interburden with low risk material;
- Utilising water cart to target hot areas; and
- Track roll and compact hot material with a dozer. Use a water cart to wet and cool material.

8.3.3 Trigger Action Response Plan (TARP)

The TARP for spontaneous combustion outbreaks for emplacement areas in Open Cut 1 are shown in **Table 5**.

Table 5: Trigger Action Response Plan for Emplacement Areas

Type of Activity	Trigger	Control Action	Response Timeframe	Responsibility
Normal mining	No heating in emplacement areas	Inspection and monitoring	Daily	Production Department
Normal mining	Visual signs of heating in accessible dumps	1. Cover with low risk material 2. Dozer/bench push hot material 3. Target with the water cart to wet and compact the area	Complete within 2 days unless circumstances beyond MCC's control (e.g. rain) prevent access	Production Department

Type of Activity	Trigger	Control Action	Response Timeframe	Responsibility
Special Outbreak	Visual signs of heating in non-accessible dumps	Develop a specific plan to manage the issue	Within 5 business days	Technical Services Department

8.4 OPEN CUT 2

The preventative and control measures for Open Cut 2 are the same for the emplacement areas in Open Cut 1 shown in **Section 8.3**.

8.5 COAL EMPLACEMENT AND STORAGE AREAS

8.5.1 Preventative Measures

The following preventative measures are used at MCC for managing spontaneous combustion in coal emplacement and storage areas.

- No coaling of high risk material to the ROM during planned CHPP shutdowns.

The maximum storage times for ROM Coal and Product Coal are shown in **Table 6**.

Table 6: Trigger Action Response Plan for Coal Emplacement and Storage Areas

Propensity for Spontaneous Combustion	Maximum Storage Time	Responsibility
ROM Coal		
Low	> 30 days	Logistics Coordinator
Medium	30 days	Logistics Coordinator
High	5 days	Logistics Coordinator
Product Coal		
Low	> 90 days	Logistics Coordinator
Medium	90 days	Logistics Coordinator
High	30 days	Logistics Coordinator

Product coal has a longer residence time due to the water used in the crushing and washing process cooling down the coal, and therefore the incubation period is restarted.

8.5.2 Control Measures

The following control measures are used at MCC for managing spontaneous combustion in coal emplacement and storage areas.

- Track roll and compact hot material with a dozer. Use a water cart to wet and cool material.

8.5.3 Trigger Action Response Plan (TARP)

The TARP for spontaneous combustion outbreaks for coal emplacement and storage areas in Open Cut 1 are shown in **Table 7**.

Table 7: Trigger Action Response Plan for Coal Emplacement and Storage Areas

Type of Mining	Trigger	Control Action	Response Timeframe	Responsibility
Normal mining	No heating in coal emplacement and storage areas	Inspection and monitoring	Daily	Production Department
Normal mining	Visual signs of heating in coal emplacement and storage areas	1. Track roll hot material 2. Target with the water cart to wet and compact the area 3. Turnover and rotate coal in area	Completed within 2 days unless circumstances beyond MCC's control (e.g. rain) prevent access	Production Department

8.6 ELSEWHERE WITHIN THE MINE DISTURBANCE AREA

If an unexpected outbreak of spontaneous combustion occurs in any other area within the mine disturbance area a specific action plan will be developed to manage the outbreak. This plan will be developed within 5 business days of the outbreak being detected.

A thermal image of the site is captured each year in Winter. This image assists with identifying any potential spontaneous combustion outbreaks in the non-active mining areas.

9.0 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 Environmental Management Strategy.

10.0 INCIDENT MANAGEMENT

A spontaneous combustion incident at MCC is defined as an uncontrolled event that is not managed by the TARP process.

In the event that an initial investigation concludes that a spontaneous combustion related incident has occurred the incident will be reported to MSC and the EPA within 24 hours of confirming the incident.

Within seven days of confirming the incident, MCC will submit a written report to MSC and the EPA that:

a) Describes the date, time, and nature of the incident;
b) Identifies the cause (or likely cause) of the incident;
c) Describes what action has been taken to date; and
d) Describes the proposed measures to address the incident.

11.0 EXTERNAL REPORTING

Within 2 weeks of approval of this SCMP, a copy will be made available 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);
- Annual Community Newsletter; and
- Spontaneous Combustion Reports.

11.1 ANNUAL ENVIRONMENTAL MANAGEMENT REPORT

The AEMR will include a summary of:

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

11.2 SPONTANEOUS COMBUSTION REPORTS

Regular reporting will be provided the EPA as required by the Muswellbrook Coal Environment Protection Licence (No. 656).

A monthly report will be provided to MSC outlining the dates and times that H_2S levels are above the odour threshold trigger at the monitoring sites. This report will include details on spontaneous combustion management activities occurring at MCC, the weather conditions at the time of the trigger and MCC's response to the trigger.

12.0 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 reportable incidents at MCC relating to spontaneous combustion management;
- Following an independent environmental audit which recommends changes to the SCMP;
- At the completion of mining; and
- Every three years, or as directed by MSC, in accordance with Condition 14(e) of the Development Consent Conditions.

13.0 RESPONSIBILITIES

Table 8 outlines the responsibilities relating to the SCMP.

Table 8: Management Plan Responsibilities

Position	Task	Timing
General Manager	Provide adequate resources to implement the requirements of the SCMP	Annual review
	Oversee the implementation of the SCMP	Ongoing
Technical Services Department	Coordinate annual planning process	Annually during budget planning
	Coordinate annual review process	Following each AEMR reporting period
	Develop specific action plans	As required
Production Department	Undertake inspections of the operational areas for signs of spontaneous combustion	Daily
	Implement spontaneous combustion control measures as outlined in SCMP	As outlined in SCMP
Logistics Coordinator	Manage storage residence times at coal emplacement areas	As outlined in SCMP
Environmental Superintendent	Coordinate response to all spontaneous combustion related complaints	Following a spontaneous combustion related complaint
	Coordinate reviews of the SCMP	As outlined in SCMP
	Coordinate reporting as required in SCMP	As outlined in SCMP

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Appendix 1: Correspondence Regarding Spontaneous Combustion Management Plan

Spontaneous Combustion Management Plan approved by MSC via email dated 30 November 2020.

MUSWELLBROOK COAL COMPANY LIMITED
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ESTABLISHED 1907

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Telephone: (02) 6542 2300

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23 December 2016

Steve McDonald
General Manager
Muswellbrook Shire Council
PO Box 122
Muswellbrook NSW 2333

Dear Steve

Approval of Spontaneous Combustion Expert

Muswellbrook Coal Company (MCC) received a modification to our Development Consent (DA205/2002) on 26 October 2016. The modification allows MCC to continue mining in an area known as the "Continuation Project".

Condition 31 of the modified consent requires the preparation of a Spontaneous Combustion Management Plan that has been endorsed by a suitably qualified expert whose appointment has been approved by Muswellbrook Shire Council (MSC).

MCC propose the use of Ian Pankhurst as the suitability qualified expert. Ian has been providing guidance to MCC on the management of spontaneous combustion for >15 years. A copy of Ian's profile is attached to this letter.

MCC look forward to receiving approval from MSC to use Ian Pankhurst as the suitability qualified expert to endorse the Spontaneous Combustion Management Plan.

If you require any further information, please do not hesitate to contact me on 02 6542 2312 or 0427 228 412.

Yours sincerely

Julie Thomas
Environmental Coordinator

IAN PANKHURST
PROFILE

Qualifications:
- Bachelor of Engineering (Mining) 1st Class Honours, UNSW
- Graduate Diploma in Accounting and Financial Management, UNE
- Graduate Diploma in Risk Management, University of Technology
- NSW Mine Manager's Certificate of Competency
- Undermanager and Deputies Certificates of Competency
- Member of AusIMM
- Member of Engineers Australia

Ian Pankhurst progressed into full time mining consultancy during 1999 with his own organisation, Mining Operations Services Pty Limited. During the preceding ten years, employed by Liddell Coal, he held concurrent positions of Open Cut, Washery and Environmental Manager. In those roles, following his development of the concept of open cut mining of remnant underground reserves for the area, he was responsible for all aspects of the planning process, the start up of Liddell Open Cut through to a +3,000,000 tonne per annum operation.

During the two years prior to leaving Liddell Coal, his achievements included bringing Liddell Open Cut to the number one position for productivity ranking in the NSW Open Cut Coal Mining Industry, winning the 1998 NSW Premier's Award for Environmental Excellence for rehabilitation of old open cut workings, including old tailings dams, and reducing the lost time injury rates to near zero.

Ian previously worked as:

- Open Cut Manager at Wambo from 1980 – 1982; and
- Inspector of Coal Mines with the Department of Mineral Resources from 1982 – 1989.

Over that period he was, at one time or another, responsible for every mining area or exploration title area in the Upper Hunter and Gunnedah areas. He also acted as Senior Inspector and in other senior statutory roles. One of his particular areas of expertise was spontaneous combustion related issues.

Prior to that, he held management position at both Wambo Mining as Open Cut Manager (1980 - 1982) and at Lemington mines as relieving manager at the open cut, washeries and underground mines (1976 – 1980).

He has a comprehensive knowledge of legislative and management requirements over a broad spectrum of coal mining operations and new developments. He was a member of the NSW Open cut Coal Examination panel between 1985 and 2003.

Ian's particular knowledge and skills, especially in the areas of highwall and remnant mining, rehabilitation and management of spontaneous combustion, have been recognised by a number of internationally based clients including Xstrata, BHP Billiton (South Africa), Exxon, Mitsui Matsushima, Idemitsu Dosan and Solid Energy New Zealand. Current clients and senior management of Ian's previous employers have also recognised the personal attributes of problem solving, lateral thinking and the development of contingency planning that Ian can provide when faced with problems in

diverse areas including those of management, operations, technical innovation and legislative requirement including environmental compliance.

He is currently operating his own consulting business as well as being part owner of Australian Auger Mining.

In the capacities he undertakes for these companies, Ian is in a unique position of working with a wide range of company personnel, ranging from Board members to field operators. These contacts include not only mining companies, but major contractors such as Downer and also government departments. Current and recent clients, in addition to those already detailed, include Whitehaven, Bloomfield, Sumiseki, Yancoal and Metromix Quarries.

Ian currently provides advice on fire related and spontaneous combustion issues to Solid Energy for South Island operations and project sites. He provides both day-to-day and long term advice on spontaneous combustion and open cut mining of old underground workings for other clients with operational sites, including Werris Creek, and Muswellbrook Coal Company where up to six mining horizons in five seams were originally mined by underground methods.

He also undertakes a similar role at Metromix's Teralba Quarry, where he has been approved by the NSW Department of Planning & Environment as their Technical Expert.

muswellbrook shire council

Enquiries
Please ask for Scott Brooks
Direct 02 6549 3862
Our reference **DA 205/2002**
Your reference

4th January 2017

Grant Clouten
Senior Operations Manager
Muswellbrook Coal Company
PO Box 123
MUSWELLBROOK 2333

Dear Grant

Muswellbrook Coal, Approval of Spontaneous Combustion Expert

Condition 31 of your recently modified consent requires the preparation of a Spontaneous Combustion Management Plan that has been endorsed by a suitably qualified expert whose appointment has been approved by Muswellbrook Shire Council. The purpose of this letter is to provide this approval.

We recently received your request to use the services of Ian Pankhurst to review and endorse the Spontaneous Combustion Management Plan.

We have reviewed your request and can advise that the use of Ian Pankhurst for the requirements of Condition 31 of your consent has been approved.

Should you require further information regarding this letter please contact Scott Brooks on 6549 3862.

Yours faithfully

Olivia Harris
Manager, Planning & Regulatory Services.

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19 January 2017

Grant Clouten
Senior Operations Manager
Muswellbrook Coal Company
PO Box 123
MUSWELLBROOK 2333

Dear Grant

RE: REVIEW OF MUSWELLBROOK COAL COMPANY SPONTANEOUS COMBUSTION MANAGEMENT PLAN

I have reviewed the final draft version of the Muswellbrook Coal Company Spontaneous Combustion Management Plan received on Tuesday 17 January 2017.

I endorse the Spontaneous Combustion Management Plan as being adequate for its purpose, including use as a basis for internal spontaneous combustion action plans.

Yours Faithfully

Ian Pankhurst
Director
Mining Operation Services