KCT SPONTANEOUS COMBUSTION MANAGEMENT PROTOCOL

PORT WARATAH
COAL SERVICES

Revision:	2.1
Date:	July 2019
Document Name:	*KCT Spontaneous Combustion Management Protocol*

REVISION HISTORY

Date	Revision	Description
Dec 2011	1	Original Document
Jan 2019	2	Review of R2 to include: • new document format; • updates to the audit and review frequency for the Management Plans
July 2019	2.1	Updated following feedback from DPE, with the following changes: • Inspection of KCT stockyards for spontaneous combustion. • Alignment of the review frequency to 3 yearly in line with the OEMP.

CONTENTS

1 INTRODUCTION

1.1 CONTEXT

Port Waratah Coal Services (Port Waratah) stockpile, blend and load coal for export using a cargo assembly model at each of the two terminals. Port Waratah's cargo assembly model allows the business to deliver high quality, cost effective service to our customers focussed on efficient vessel turn-around time, as such coal is stockpiled on site for relatively short periods of time.

The nature of coal is such that it contains self-combustion properties should the coal type, age and composition produce the right conditions for exothermic oxidation of the coal particles. This potential for coal to produce heat and self-combust presents operational, storage and handling challenges for Port Waratah.

1.2 PURPOSE

The purpose of the KCT *Spontaneous Combustion Management Protocol* is to provide operational and environmental controls relating to the safe management of spontaneous combustion and/or 'hot' stockpiles at the Kooragang Coal Terminal (KCT).

This version of the Protocol has been developed to satisfy the requirements of condition 7.5(d) of the *KCT 120Mtpa Modified Project Approval* (06_0189 MOD 3).

2 PLANNING

2.1 CHARACTERISTICS OF SPONTANEOUS COMBUSTION

Spontaneous combustion of coal can be caused by a range of physical and chemical reactions, however in relation to KCT coal stockpiles, the risk of spontaneous combustion is generally as a result of a build-up of heat resulting from an exothermic reaction between the material and oxygen. Once spontaneous combustion has occurred, it is usually difficult to control and becomes a safety and environmental risk.

Factors which can affect the rate of oxidation and spontaneous combustion include:

- Ambient temperature and solar radiation;
- Coal rank or quality;
- Coal age;
- Stockpile shape and size;
- Particle size;
- Moisture content, and;
- Availability of oxygen.

The coal handled, stored and loaded at KCT is generally of a high quality, suitable for export markets, and has typically been washed at the mine site. These factors reduce the likelihood for spontaneous combustion to occur at KCT as higher quality and washed coals are less likely to self-heat.

2.2 COAL STOCKPILE MANAGEMENT MEASURES

Due to the nature of Port Waratah coal handling and loading activities, coal is often stored and managed for a short period of time, typically less than two weeks, and normally no longer than 8 weeks. The stockpiling of coal is the most likely stage that coal handled at KCT may self-combust. The storage time is typically for short periods, which avoids the circumstances which may lead to the increase in coal stockpile temperature and subsequent spontaneous combustion.

In the event that coal is required to be stored for periods in excess of 8 weeks, the stockpile will be monitored closely by KCT Operations which may include utilising thermographic imaging technology to ensure there is no presence of high coal stockpile temperatures, smoke and/or steam.

Consideration is also given to "turning over" or "relocating" the coal that has been stockpiled longer than 8 weeks.

KCT Operations are required to monitor all stockyard and coal build up areas where spontaneous combustion may occur. This includes stockpiles of drying material from pond and lagoon clean out operations, waste piles, machinery build up areas, coal spillage and other areas where coal may accumulate. Any issues relating to spontaneous combustion in these areas shall be addressed as a priority.

Inspection of the KCT Stockyard shall be undertaken in accordance with the Stockpile Conditioning Report Procedure. The stockyard is inspected at the end of each shift and assessed for the following aspects:

- Slumping of stockpiles;
- Amount of water on the pads and berm areas;
- Vegetation and other obstructions; and
- Spontaneous combustion risks.

2.3 SPONTANEOUS COMBUSTION HAZARDS

Spontaneous combustion of coal can present safety hazards at KCT when not managed appropriately.

Risks associated with spontaneous combustion at KCT can include:

- The production of hot coal and/or flames which can ignite;
- The production of carbon monoxide and methane gases pose a risk to human health when inhaled;
- Carbon monoxide and methane gases can also cause an explosion when available to accumulate, and;
- The risk of explosion can also, under some extreme circumstances, be exacerbated by the application of water which may cause a steam explosion.

2.4 POTENTIAL ENVIRONMENTAL IMPACTS

Combusting coal in either the smouldering or flaming stages can produce large volumes of noxious gases which can also pose environmental impacts.

These impacts include:

- Toxic emissions such as particulates, carbon monoxide (CO), sulphur dioxide (SO2), hydrogen sulphide (H_2S), polycyclic aromatic hydrocarbons (PAH's) and volatile organic compounds (VOC's);
- Greenhouse gas emissions of carbon dioxide (CO_2) and methane (CH_4), and;
- Odours associated with gaseous emissions.

2.5 SPONTANEOUS COMBUSTION MONITORING

The detection of spontaneous combustion or coal hot spots can be monitored as follows:

- **Heating Observations** – Heat haze and 'steam' plumes may be observed.
- **Hot Spot Monitoring** – Hot spots may be detected by infrared or thermal monitoring cameras and other instruments.
- **Temperature Probes** – Temperature probes can measure coal temperature, however persons shall not walk on the stockpile when completing this check, as high coal temperatures may exist beneath the top layers of coal thereby presenting major hazards associated with burns and stockpile instability.
- **Smell** – Oxidation of coal causes the release of large volumes of noxious and flammable gases, which when released, provide a distinctive odour that can provide the early indication of spontaneous combustion.

3 IMPLEMENTATION AND OPERATION

3.1 SPONTANEOUS COMBUSTION MANAGEMENT PROCEDURE – CORRECTIVE ACTION

Should a coal hot spot be identified, actions relating to cooling the area and extinguishing any fire needs to be considered. When considering options for extinguishing any hot spots, a risk assessment should be completed. The Operations Supervisor is accountable for the completion of the risk assessment.

Fires may be extinguished or controlled by totally flooding the area with water or by removing and isolating the burning material. Caution must be used when fighting spontaneous combustion fires with water as there is a potential for a hazardous reaction between the water and the heated coal.

A more suitable and safe method to address hot coal is for the material to be spread out to cool. Protective clothing and breathing apparatus should be worn when dealing with spontaneous combustion fires. Consideration to the suitability of the equipment shall be given for the work undertaken.

The procedure for managing a coal hot spot at Port Waratah is:

- The management of any emergencies relating to spontaneous combustion shall be conducted in accordance with this protocol and the Emergency Management System.
- Thermographic imaging technology is available to be used to identify hot coal areas.
- The Operations Supervisor shall contact the Operations Superintendent immediately if spontaneous combustion is identified.
- The Operations teams shall attempt to isolate the hot spot area of coal from the remainder of the stockpile. This may be done by reclaiming normal temperature coal from the stockpile to another location, thus isolating the hot coal for further management. Extreme care needs to be taken to ensure no hot coal (greater than 80°C), is placed on reclaimer conveyor belts, with consideration given to operate yard equipment manually.
- The utilisation of equipment such as bulldozers and excavators to dig and spread the hot coal may occur. Continued spreading and turning over of coal may need to be completed over several days until such time that the coal temperature has been reduced to normal temperatures. When considering the use of bulldozers and excavators to dig and spread hot coal, consideration must be given to how the mobile equipment can enter and retreat from the stockpile area. Appropriate isolation of reclaimers and stackers in the area must be completed prior to any other mobile equipment and people entering the area.
- Water may then be applied by stockpile sprays and/or hoses (from a safe distance) onto the hot coal to reduce temperatures. Care should be taken by people manning hoses and follow the guidance of the risk assessment.
- Once the hot coal has been returned to its normal storage temperature level, the coal can then be recirculated to an appropriate stockpile.
- Under no circumstances shall hot coal be placed on conveyors or loaded onto a vessel.
- Contact Fire and Rescue NSW if the situation cannot be managed safely by Port Waratah.
- The Customer, Vessel Agent, Vessel Master and Draft Surveyor should all be satisfied prior to commencing ship loading with self-heated coal.

4 ACCOUNTABILITIES

Accountabilities relevant to the management of spontaneous combustion and response activities at KCT are as follows.

Role	Description of Action(s) Accountable For	Frequency
Manager Operations Delivery	Allocate resources to ensure compliance and implementation of the Spontaneous Combustion Management Protocol	Ongoing
	Allocate appropriate resources in the event of a Spontaneous Combustion Emergency	In the event of an emergency
	Accountable for overall coal handling and spontaneous combustion management at Terminals	Ongoing
Operations Superintendents	Accountable for spontaneous combustion management and response.	Ongoing
	Accountable for monitoring variables which may lead to spontaneous combustion and monitor and manage any associated risks.	Ongoing
Operations Supervisors	Accountable for reporting and/ or responding to matters and incidents relating to spontaneous combustion.	Ongoing
Specialist Environment	Ensure that this *Spontaneous Combustion Management Protocol* is reviewed and updated in accordance with the Port Waratah Environmental Management System.	As required
	Provide environmental management assistance to emergency response activities, incidents and/ or spontaneous combustion management.	Ongoing
Specialist OH&S	Provide specialist information regarding spontaneous combustion management	Ongoing
Port Waratah Employees & Contractors	Follow all procedures and policies to manage spontaneous combustion and associated hazards to health, safety and the environment	Ongoing
	Report all environmental incidents and near misses	Ongoing