



**Energy Australia Yallourn**  
**GDF Suez Hazelwood**  
**AGL Loy Yang**  
**Latrobe Valley Mine Fire**  
**Risk Assessment**  
Workshop Summary Report

June 2015

# Executive summary

A generic risk assessment of a major fire event involving the Latrobe Valley coal mines, which included the three mine operators and external agencies was conducted based on the following risk statement:

*'Due to a large scale Latrobe Valley mine fire occurring for greater than a week in duration in proximity to the community under conditions of high temperatures and high winds.'*

The Risk Assessment Rating Matrix from DEDJTR's (Draft Version 1.0, dated March 2015) Resource Rights Allocation and Management (RRAM) Work Plan Guidelines were used to determine the risk levels. The risk assessment outcomes summarised in Table 1 found that with the effective application of the existing controls, five risks would be rated as 'Low' risks and two risks would be rated as 'Medium' risks. There were no risks rated as 'High' or 'Very High'.

**Table 1 Results of risk assessment**

Risk Rating	Number of Risks	Consequence
Low	5	Acute safety impact - On-site severe injury leading to surgery and / or permanent disability
		Chronic health impact - exposure to hazard that could cause injuries or health effects requiring treatment by a physician or hospitalisation
		Environmental impact - Air pollution
		Environmental impact - Land degradation
		Environmental impact - Water contamination
Medium	2	Acute safety impact - On-site fatality or life threatening injury
		Acute safety impact - Off-site fatality or life threatening injury
High	0	
Very High	0	

The basis for this risk assessment included the site conditions and circumstances for the Latrobe Valley mine region at the time of the workshops (April 2015). It should also be acknowledged that considerable reviews and enhancements of fire management practices and effective controls had been implemented by the three mines as a result of the February-March 2014 Hazelwood mine fire. These were considered as part of the assessment process.

Further investigation is required to fully understand the long term chronic health impacts of psychosocial illnesses arising from major fire events. This aspect of the study was limited by the lack of information from the studies currently being undertaken in the community by Monash University and the DHHS. Therefore, this consequence was not rated.

Each mine operator should objectively consider the effectiveness of their existing controls and supplement their existing site specific risk assessments with the outcomes established from this study in compiling their overall fire risk management plan.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1 and the assumptions and qualifications contained throughout the Report.

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# 1. Introduction

## 1.1 Overview

The Latrobe Valley coal mines (Yallourn, Loy Yang and Hazelwood) are located in Victoria's Central Gippsland region approximately 150 km from Melbourne. The three mines are in proximity to the cities of Moe (population 14,896), Morwell (population 13,505) and Traralgon (population 24,358). The proximity of the coal mines in relation to these communities is shown in Figure 1. The coal mines provide coal to power stations which generate approximately 90% of Victorian power and are essential to the supply of electricity through the south eastern Australia energy grid.

Major fires (large scale and long duration) such as experienced at the Hazelwood coal mine in February to March 2014 (Figure 2) are relatively rare events [Ref 1]. Historically and within the region there have been three major coal mine fires in the past century; Yallourn mine (1944), Hazelwood mine (1977) and Hazelwood mine (2014). The factors that stand out for these fires compared to the more common 'in-mine' fires is that they occur during periods of extreme fire conditions and involve a loss of control at the coal mine source of the fire. This loss of control occurs to the point that the coordination of emergency response requires the active participation of all coal mines working together with the external agencies to bring the situation under control. Whilst each coal mine has its own established and practiced fire management plan to protect its people and assets, the surrounding local communities and environment the study's aim was to specifically consider these major events in the context of the wider Latrobe Valley region.

The Department of Economic Development, Jobs, Transport and Resources (DEDJTR) introduced additional mine licence conditions in accordance with the Compliance Requirements for Risk Assessment and Management Plans [Ref 2] for each of the coal mine operators following the Hazelwood mine fire of February-March 2014. In response to this, Energy Australia Yallourn Pty Ltd, GDF Suez Hazelwood and AGL Loy Yang engaged GHD to undertake an initial generic high level fire risk assessment for the three Latrobe Valley coal mines.

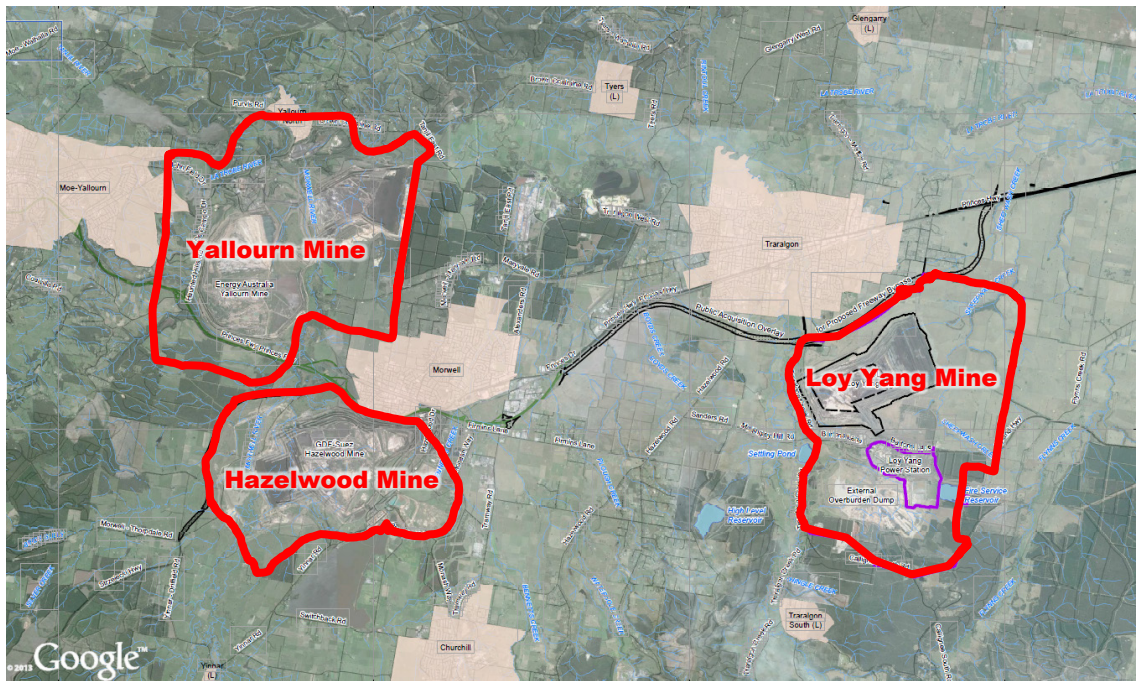
The intention of this study was to undertake a generic fire risk assessment of major fire events affecting a single mine, which may or may not then affect the other mines and the surrounding communities, taking into consideration regional factors and using a common methodology with combined inputs from the three coal mines and external agencies involved in planning for and responding to fire emergencies.

Building on the work already undertaken by individual coal mines, the purpose of the study was to:

- Develop a consolidated generic regional bow-tie diagram showing the possible causes, consequences and suggested controls for a Latrobe Valley coal fire;
- Conduct a risk assessment using a common methodology across the mines which includes inputs from the three mines and external agencies; and
- Provide risk analysis and a framework that may be used by each of the mines to inform their site-specific risk assessments and fire risk management plans.

Two separate workshops were held on Thursday 2nd April and Friday 17th April 2015 to develop the consolidated generic regional bow tie diagram for a 'Latrobe Valley coal fire', including the key controls for each mine and a risk assessment of each of the outcomes resulting from a 'Latrobe Valley coal fire'.





**Figure 1** Location of the three coal mines in the Latrobe Valley  
(Source: Google Maps)



**Figure 2** Aerial view of smoke from Hazelwood mine fire  
(ABC News: <http://www.abc.net.au/news/2014-09-01/aerial-view-of-smoke-from-hazelwood-mine-fire/5711584>)

## 1.2 Purpose of this report

The purpose of this report is to present the key findings and document the outcomes from the study. The report presents the risk assessment component of work undertaken by the three mines to assess mine fires at a regional level. The information presented in the report may be used by each of the mines to inform their site-specific risk assessments. These site-specific outputs will be used in the formulation of separate fire risk management plans and as a basis for submission to DEDJTR for compliance with the additional mine licence conditions.

## 1.3 Scope and limitations

### 1.3.1 Scope of work

The final agreed scope of work included five sequential stages as outlined below:

#### **Stage I – Generic Latrobe Valley Fire Risk Framework (including draft bow-ties / matrix development)**

- Establish the context for assessing the risks of mine-related fires in the Latrobe Valley, including confirmation of the definition of major fire events, to include all internal (mine) and external stakeholders / agencies required;
- Develop a cause-consequence framework e.g. a bow-tie diagram categorising internal and external fire causes;
- Prepare an inventory of control types for each mine that are currently acknowledged to exist or are planned. The controls will address both prevention and mitigation of coal fires and their health, safety and environmental impacts; and
- Selection of consequence scenarios from the bow-tie for inclusion in the fire risk assessment.

#### **Stage II – Bow-tie verification and update (Workshop 1)**

- Review of the bow-tie diagram involving representatives from the three mines and the Earth Resources Regulator (DEDJTR);
- For each mine, compile controls that are the responsibility of the mine and controls that are the responsibility of external agencies to the mine; and
- Review, confirm and develop the envisaged consequences.

#### **Stage III – Update Bowtie**

- Update material as necessary following Stages I and II

#### **Stage IV – Fire Risk Assessment (Workshop 2)**

- Apply the DEDJTR risk framework [Ref 3] to undertake a multi-stakeholder risk assessment involving representatives from the three mines, Earth Resources Regulator – DEDJTR, Country Fire Authority and Emergency Management Victoria;
- Facilitated risk assessment process comprising mixed mine and stakeholder teams, involving syndicate exercises and group collaboration; and
- Understand, through the bow-tie diagrams, the broader internal and external control environment and potential gaps / adequacy by identifying key controls and applying an improbability rating.

## Stage V – Report

- Compile outputs from Stages II and IV workshops in a draft report;
- Circulate to stakeholders as appropriate for comment; and
- Update and issue final report.

Although included in the original scope, the development of risk criteria and a specific risk matrix was not required as the DEDJTR risk criteria and matrix [Ref 3] was adopted by the three mines to help achieve consistency.

### 1.3.2 Limitations

This report has been prepared by GHD for Energy Australia Yallourn Pty Ltd, GDF Suez Hazelwood and AGL Loy Yang and may only be used and relied on by Energy Australia Yallourn Pty Ltd, GDF Suez Hazelwood and AGL Loy Yang for the purpose agreed between GHD and the Energy Australia Yallourn Pty Ltd, GDF Suez Hazelwood and AGL Loy Yang as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Energy Australia Yallourn Pty Ltd, GDF Suez Hazelwood and AGL Loy Yang arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report or such earlier dates as indicated in the body of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section 1 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Energy Australia Yallourn Pty Ltd, GDF Suez Hazelwood and AGL Loy Yang and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

## 1.4 Scope clarifications and exclusions

In relation to the scope of services provided, the following list of clarifications and exclusions apply to the report:

- The report is to be used by mine operators to assist in the development of their individual site-specific risk assessments and fire risk management plans;
- The risk assessment process covered the risk of fire to the environment and public safety (including external emergency responders but not mine staff or contractors);
- The analysis of the controls was limited to the identification of the top ten prevention and mitigation controls undertaken independently by each of the mines;
- The assessment considers an acute fire event rather than effect of all fires over the life of the mine(s); and
- The outcomes are based on the DEDJTR risk criteria and risk matrix as provided in the DEDJTR document “Completing a Work Plan in RRAM: Guidance, Draft Version 1.0 March 2015” [Ref 3].



## 1.5 Assumptions

In preparing this report, GHD has assumed the following in relation to the material it received, unless otherwise specifically stated, and this report is therefore subject to these assumptions and to the other limitations and assumptions which appear in the body of this report (“the Assumptions”):

- The information provided in the material was true and accurate in all respects and contained no material errors or omissions
- The officers and advisors who provided advice to GHD and / or participated in the workshops were competent to answer the questions that they answered
- All documents and records examined by GHD were genuine, complete and up to date
- There are no defaults or contraventions under any permit or licence conditions, agreement or instrument other than those set out in the material reviewed by GHD
- All employees of Client and its shareholders who are aware of any information which has not otherwise been specifically made known to GHD and which could affect the correctness of the opinions expressed in this report, have communicated that information to GHD.
- Energy Australia Yallourn Pty Ltd, GDF Suez Hazelwood and AGL Loy Yang have current licences to operate the assets and comply with applicable laws and regulations and are operated by Energy Australia Yallourn Pty Ltd, GDF Suez Hazelwood and AGL Loy Yang without contravening any laws and industrial health and safety and environmental regulations.

Nothing has come to the attention of GHD that has led it to believe that such Assumptions are not correct or that it would be unreasonable to rely on the Assumptions in the circumstances. However, if any of our assumptions are not accurate or the advice GHD has relied on is incorrect, the opinions GHD has expressed will need to be re-examined and may need to be changed.

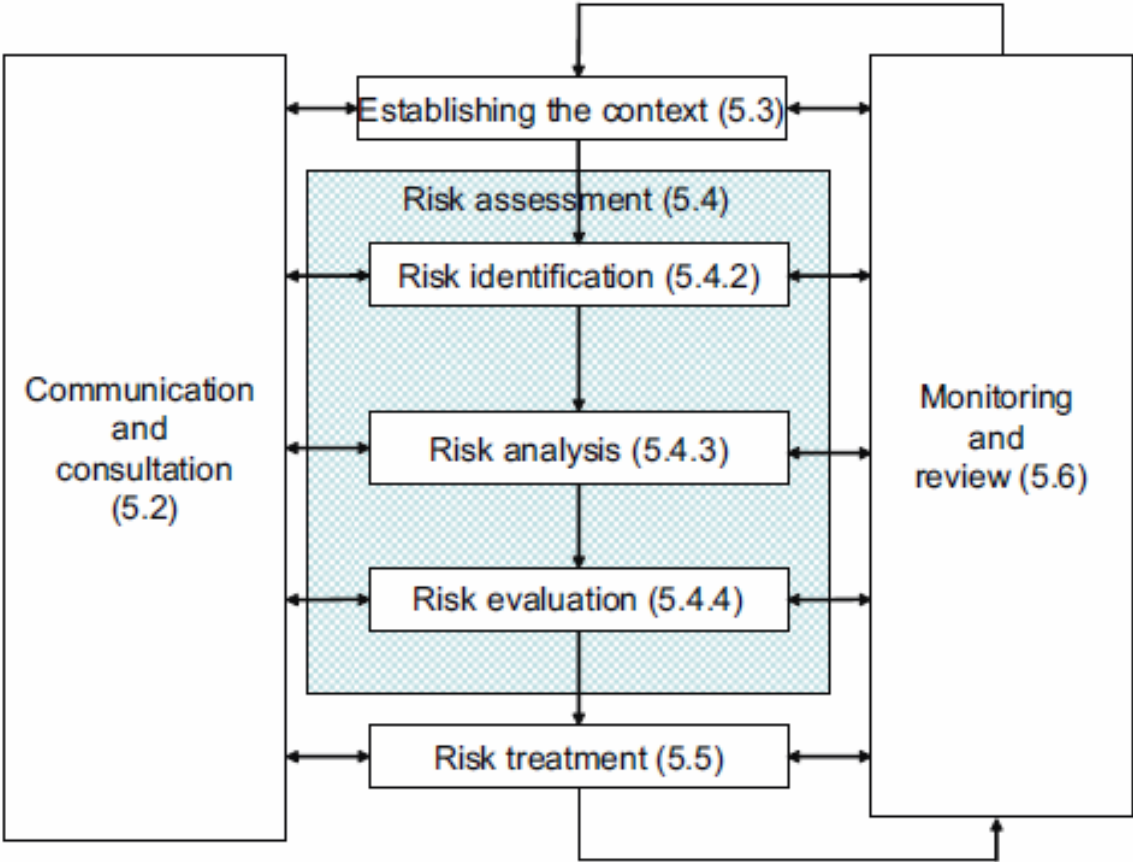
GHD disclaims liability arising from any of the Assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Energy Australia Yallourn Pty Ltd, GDF Suez Hazelwood, AGL Loy Yang and DEDJTR, which GHD has not independently verified or checked beyond the agreed scope of work. GHD disclaims liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

# 2. Methodology

## 2.1 Risk assessment

This study was conducted using the principles outlined in AS / NZS ISO 31000:2009 and the framework shown below in Figure 3. Table 2 shows the alignment between the Risk Management Standard and the activities forming the scope of this study.



**Figure 3 Risk management process as per AS / NZS ISO 31000:2009 (with clause references – page 14)**

**Table 2 Application of AS/NZS/ISO 31000:2009 to Latrobe Valley Mine fire risk assessment**

AS/NZS / ISO 31000 Clause	Requirement	Alignment Activity
5.3	Establish the context	Define the risk statement and DEDJTR risk criteria to be applied for the risk assessment
5.4.2	Risk identification	Develop the bow-tie diagrams involving in mine and external to the mine controls
5.4.3	Risk analysis	Use of a risk matrix to discuss and agree consequence and likelihood descriptions
5.4.4	Risk evaluation	Comparison of the risk ratings with DEDJTR risk levels
5.5	Risk treatment	Apply further risk treatments to reduce risk levels (not required)
5.2	Communicate and consult	Involve a multi-stakeholder workshop team comprising the three mines and external agencies
5.6	Monitor and review	Incorporation of the findings of the risk assessment into the mine specific fire risk management plans (outside scope)

## 2.2 Workshop approach

Two workshops were conducted at the GHD Morwell Office on Thursday 2 April 2015 and Friday 17 April 2015. Taking into consideration the significant number of stakeholders in the workshops a syndicate workshop approach was adopted. This entailed each mine forming a break-out group, each group being individually facilitated through the discussions and then each group reporting back to the broader group in order to yield greater focus and enhanced contributions from those present.

1. Workshop 1 was tasked with the development of a bow-tie diagram for the risk of a Latrobe Valley Mine Coal Fire.
2. Workshop 2 sought to identify the significant controls as assessed by each of the mines in syndicate exercises.

The contributions from the syndicate exercises and group discussions were collated into Minutes and incorporated into the bow-tie diagram and a Risk Register by the GHD facilitators.

## 3. Workshop outcomes

### 3.1 Workshop Summary

The study brought together several key stakeholders to conduct workshops for the purposes of delivering a high level overview risk assessment of a fire in the mine licenced areas of the Latrobe Valley.

A full listing of all attendees and organisations represented at the two workshops is provided in Appendix A. Latrobe City Council representatives were invited to Workshop 2 but were unavailable to attend.

#### 3.1.1 Workshop 1

Workshop 1 was attended by representatives from each of the three mines and two representatives from DEDJTR Earth Resources Regulation. The workshop was presented with a draft bow-tie diagram constructed from documentation provided by the mine operators prior to the Workshop and based on the previous experience of the GHD risk consultants. This bow-tie diagram was reviewed by each of the mines in syndicate exercises.

Following the workshop, the bow-tie diagram was updated with all the edits and additions. The bow-tie diagram was then reorganised and presented with three Left Hand Side pathways (one for each mine) tailored to the outcomes of the syndicate discussions for each mine. The Right Hand Side pathways were reorganised and presented as one set of pathways generic to all of the mines based on consensus of the outcomes from the three mines. These updated bow-tie diagrams were submitted to the mine managers for review prior to Workshop 2.

#### 3.1.2 Workshop 2

Workshop 2 was attended by representatives from the DEDJTR, Country Fire Authority (CFA) and Emergency Management Victoria (EMV) to provide a boarder perspective on mine fire risk.

Each mine selected their top ten controls for prevention and for mitigation of coal mine fires. The top ten controls for the prevention and mitigation of coal mine fires were consolidated into the updated bow-tie diagram for inclusion in the risk assessment. A separate risk assessment was conducted for each of the outcome pathways on the bow-tie diagram.

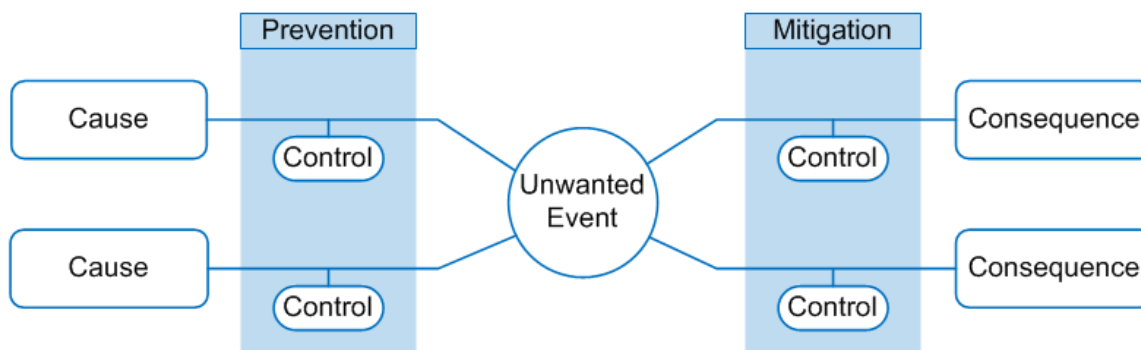
At the conclusion of the workshop the controls that are the responsibility of the mine or that are controlled by external agencies were noted in the risk register.

Records of the discussions from each workshop are detailed in the workshop Minutes in Appendix B.

## 4. Latrobe Valley Mine fire bow-tie diagram

### 4.1 Bow-tie diagram development

The risks of a Latrobe Valley coal mine fire can be presented on a bow-tie diagram. Conceptually, the bow-tie diagram shown in Figure 4 is a graphical representation of the dynamics of an unwanted event that displays the inter-linkages between causes, controls, pathways and the consequences for each scenario.



**Figure 4 Conceptual bow-tie diagram**

A bow-tie diagram can be developed as a desktop exercise or in a workshop setting. Bow-tie diagram development involves the identification of the potential causes and pathways that lead to each unwanted event, the consequences should the event occur and the controls to prevent the event occurring, or to mitigate the consequences. In addition, any new or potential controls that are suggested as improvements to the management of the risk can be identified, along with critical controls and the controls can also be identified by control type and hierarchy.

For this study, the unwanted event is a major fire event affecting a single mine, which may or may not then affect the other mines all the mines and the surrounding communities. The consolidated regional bow-tie diagram for the Latrobe Valley coal mines is presented in Appendix C, split as follows to assist visualisation:

- a. Yallourn Coal Mine – Left Hand Side (causes and prevention controls)
- b. Loy Yang Coal Mine – Left Hand Side (causes and prevention controls)
- c. Hazelwood Coal Mine – Left Hand Side (causes and prevention controls)
- d. All Coal Mines – Right Hand Side (consequences and mitigation controls)

The causes, consequences and controls for these major fire events are discussed in the following sections.



## 4.2 Causes of fires

Six ignition sources (causes) were considered by the mine operators and workshop participants as the most likely causes of a fire in a Latrobe Valley coal mine that would have the potential for impact on the broader community. These six sources (with examples) included:

- **Off-site ignition** – fire burning from the surrounding district into the mine or fire starting in the mine from off-site sources spotting embers;
- **On-site environmental ignition** – fire sparked in the mine from lightning;
- **On-site mining ignition** – fire starting in the mine due to friction or sparks from mining activities;
- **On-site non-mining ignition** – fire sparked by failure of on-site power network;
- **Deliberate ignition** – arson caused by persons inside or outside the mine; and
- **Other causes** – spontaneous combustion of coal material.

A suggestion was made in Workshop 1 that the on-site mining ignition and the on-site non-mining ignition sources could be combined. The workshop, however, resolved to retain the two separate causes.

## 4.3 Consequences of fires

A major fire event involving the Latrobe Valley coal mines was considered by the mine operators and workshop participants to have the following seven consequences:

1. Acute safety
  - a. On-site injury / fatality
  - b. Public (off-site) injury / fatality
2. Chronic Health
  - a. Physical disease / fatality
  - b. Psychosocial illnesses
3. Environmental Impact
  - a. Air pollution
  - b. Land degradation
  - c. Water contamination

The consequences were limited to consideration of the health and safety of personnel on-site to fight the fires and to the members of the public in the surrounding communities, resulting from their exposure at the time of the fire (acute impact) and from the longer term effects of the exposure (chronic impact). The environmental impacts of the fires were also included. The financial / business interruption costs associated with the fires was not included, as each mine has its own internal approach to determining these consequences.

The workshop team discussed the cumulative consequences of mine fires over the life of the mines and agreed that this was not within scope for this risk assessment.

## 4.4 Prevention controls

The prevention controls used by each mine for each of the six ignition sources were reviewed. All of the mine operators identified similar controls regarding their fire management plans, suppression activities, coal capping procedures, working with external emergency agencies, extreme weather operations, fuel reduction and monitoring of hot spots to prevent coal mine fires.

Other controls that were discussed for further consideration included:

- Seasonal briefings with external agencies;
- Inspection and auditing pre-season – check each other’s equipment (peer audit);
- Signage and access for CFA and other authorities – purchasing using common standards;
- Latrobe Valley wide fire spotting – CFA / Hancocks;
- Industry Brigade status for mine fire stations;
- Mutual aid arrangements strengthened between mines – coordination of resources and equipment;
- Three mines working together with external planning agencies to reduce encroachments into mine lease buffer zones by forestry and community developments;
- Mine fire scenario training for response to deliberate ignition (acts of vandalism / terrorism); and
- Joint exercises and peer review for enacting the same fire scenario and measure the reactions for each mine.

## 4.5 Mitigation controls

The mitigation controls for the seven acute safety, chronic health and environmental impact consequences identified for a Latrobe Valley coal fire were reviewed. As with the prevention controls, all of the mine operators identified similar mitigation controls. These included: firefighting systems, training and competency for emergency response teams, first aid training systems and response, community engagement and consultation, external agencies liaison and support (including mine familiarisation and awareness in fighting coal fires), coordination with external agencies for community warnings and evacuation, and staff fatigue management.

Other controls that were discussed for further consideration included:

- Consider Traffic Management Plan – ability to allow access for mine staff during road blocks set up during fire events;
- Air quality monitoring could be a tool for news updates and advice, with the potential for mines to pay for / undertake additional testing;
- Obtain DHHS advice on public evacuation plan – fire safety refuges;
- Consideration of long term health study implications currently underway;
- Engagement programs for at risk personnel – to reduce potential for arson;
- Community health programs; and
- Proactive stakeholder management before, during and after fires – dedicated resources, community engagement programs.

Mitigation controls were identified for environmental consequences including: weather monitoring, dust management, use of Compressed Air Foam System (CAFS) to extinguish fire, water run-off controls and water quality monitoring.

## **4.6 Use of the bow-tie diagram**

As a result of the study, the consolidated regional bow-tie diagram presented in Appendix C can be used by each of the mine operators to supplement previous mine fire bow-tie diagram development work and assist them to identify gaps in their own mine fire bow-tie diagrams. The operators can also use the diagram to assist them to assess the relative strengths and weaknesses of their fire risk management plans compared with the other operators in the region.

# 5. Latrobe Valley Mine fire risk assessment

## 5.1 Risk statement

In developing an appropriate risk statement in context of the major fire event being assessed, the workshop team discussed the type of fire events that would have significance to the Latrobe Valley mines and noted the following:

1. Mine fires are common (especially at a small scale) and generally easily controlled within the mines operations.
2. Mine fires are believed to not normally pose a threat to fire fighters.
3. The types of fires that can impact on the community occur on days of severe weather conditions and must extend outside the mining operational areas.
4. Fires must be sustained to have an impact on the community.

The workshop focused on the high consequence major fire events affecting the Latrobe Valley mines, which occur relatively infrequently (for example Hazelwood 2014 and 1977, and Yallourn 1944).

As a result of these discussions the following risk statement was agreed by the workshop team.

*“Due to a large scale Latrobe Valley mine fire occurring for greater than a week in duration in proximity to community under conditions of high temperatures and high winds”*

In agreeing this statement the mine operators acknowledged the ongoing risk posed by typical mine fires over the life of mine, but believed that their current understanding of these risks is adequate based on their own internal risk assessment procedures.

## 5.2 Risk criteria

It was originally proposed to develop a standardised risk framework for the study that could then be reinterpreted by each of the mine operators' risk management systems. However, in order to meet regulatory submission requirements, the workshop participants agreed to adopt the DEDJTR risk criteria and risk matrix provided in the DEDJTR document “Completing a Work Plan in RRAM: Guidance, Draft Version 1.0 March 2015” [Ref 3]. The risk criteria and risk matrix are provided in Appendix D.

When using the framework for the agreed risk statement it was observed by the participants that there were no consequence criteria for business or economic impacts. The criteria for public safety were interpreted using the relative scale of injuries or fatalities, but for public health the interpretation of the descriptors provided in the criteria was limited by the lack of information from long term health studies.

## 5.3 Findings

The risk assessment was recorded in a Risk Register with seven risks, one for each of the outcome pathways on the Right Hand Side of the bowtie. The completed Risk Register is provided in Appendix E.

In the workshop, a decision was made to split ‘Acute safety - On-site fatality or life threatening injury’ to create an additional risk for ‘Acute safety - On-site severe injury leading to surgery and / or permanent disability’. This was done to assess and rate separately the fatality and severe injury risks on-site as per the descriptors in the DEDJTR risk matrix.

One risk was not assessed during the workshop – ‘Chronic Health impacts due to psychosocial illnesses were not analysed due to a lack of information from the studies currently being undertaken in the community.

### 5.3.1 Risk assessment

Overall from the seven risks assessed during the workshop the breakdown of the risk rating is shown in Table 3 below:

**Table 3 Summary of risks by rating**

Risk Rating	Number of Risks	Consequence
Low	5	Acute safety impact - On-site severe injury leading to surgery and / or permanent disability
		Chronic health impact - exposure to hazard that could cause injuries or health effects requiring treatment by a physician or hospitalisation
		Environmental impact - Air pollution
		Environmental impact - Land degradation
		Environmental impact - Water contamination
Medium	2	Acute safety impact - On-site fatality or life threatening injury
		Acute safety impact - Off-site fatality or life threatening injury
High	0	
Very High	0	

### 5.3.2 Top ten controls

In determining the risk ratings above a process was conducted to compile a list of existing control measures. To provide additional focus to the risk assessment discussions the Left Hand Side of the bowties were reviewed by each syndicate to determine their top ten prevention controls. These top ten controls were shared to the rest of the participants in the group feedback session. The same process was repeated for the Right Hand Side of the bowtie diagram.

The top ten controls for prevention and mitigation across the three mines were then aggregated to form a list of 'standard' controls that captured the essence of the most common and likely effective controls used by the Latrobe Valley coal mines. These selected controls formed the existing control measures in the Latrobe Valley Mine Fire Risk Register. A further classification was undertaken by dividing them between controls primarily the responsibility of the mines and controls primarily the responsibility by others.

The findings presented in Table 3 show that none of the risks were rated above 'Medium'. Accordingly, the workshop participants determined that no further risk assessment steps were required. The DEDJTR RRAM Work Plan Guideline [Ref 3] notes that consideration of additional controls measures and undertaking a residual risk rating is only required for risks rated 'High' or above.

This direction was taken from page 11 of the Guideline (reproduced below) that indicated additional controls were not required for risks based on the assessment of the risk statement and existing controls that resulted in a Medium rating.

*"A risk rating of 'Medium' and 'Low' will require the monitoring of the identified standard controls, to ensure they remain effective. A risk rating of 'High' will require the monitoring of the identified standard controls and implementation of the additional controls defined as the Risk Treatment, ensuring the application of all controls remain effective."*



### **5.3.3 Additional control required**

*A Risk Treatment Plan is required if a Risk Hazard has a Risk Rating of 'High'. The plan defines the additional controls to be applied where standard controls are assessed as insufficient to mitigate the risks. This may include expert advice provided by third parties. The Risk Treatment Plan will be included as an attachment on the Plan Submission section of this plan."*

### **5.3.4 External stakeholder participation**

The external stakeholders from EMV, CFA and DEDJTR contributed to the syndicate group discussions and broader workshop deliberations. They were able to bring their experiences from previous mine fire events and understanding over the broader mine operation environment.

These interactions clearly highlighted the scope for greater communication protocols with regard to mine fire prevention and response between the mine operators and external agencies. This may lead to the formalisation of these protocols as interface agreements.

Unfortunately representatives from Latrobe City Council were unable to participate on the day of Workshop 2.

### **5.3.5 Qualifications**

The outcomes of this risk assessment is limited to the context of the risk statement, the risk criteria used and the participation in the assessment of suitably experienced and knowledgeable team members.

Certain qualifications apply to the findings. This risk assessment:

- Considered the risks to on-site emergency response personnel and the public of an acute fire event rather than effect of all fires over the life of the mine;
- Applied the DEDJTR risk criteria and risk matrix. Other risk criteria may give different ratings in this type of risk assessment; and
- Was limited by the lack of information from the studies of the long term chronic health consequences of major fire events currently being undertaken in the community by Monash University and the DHHS.

However, the findings of the risk assessment were judged to be a valid outcome by the workshop participants given the information available and the contributions of the mine operators and external agencies represented.

# 6. Recommendations & next steps

## 6.1 Further investigation and consideration

The following items were raised by participants during the workshop process. At the time they were considered beyond the scope of the immediate works, and recommended for consideration by the mine operators and DEDJTR at a later stage and / or during the site specific assessments and management plans to be developed following this study. Items to be considered in the preparation of the individual fire risk management plans are outlined under the subheadings below.

Further development of the outputs in preparation for lodgement with the Regulator:

- Quantification and effectiveness of controls and their development as far as practicable;
- Justification of selected top ten controls;
- Demonstration of pathway of improvement over future years; and
- Review of the outputs with the DEDJTR Compliance Requirements for Risk Assessment and Management Plan.

Further development opportunities for the risk process:

- Through individual site assessments, it may be considered worthwhile to conduct further analysis of controls and reconvene to determine a final risk rating;
- Further investigation of the application and suitability of the provided DEDJTR risk matrix with each mine operators existing risk matrix; and
- Further stakeholder engagement with a wider range of organisations to review the risk assessment conducted in the scope of these works.

Potential controls for further investigation:

- Thresholds for escalating responses to escalating levels of impact (e.g. dust and particulate matter);
- Creation of standards around level of responses to external factors such as carbon monoxide levels, dust levels, particulate matter and smoke among others;
- Mine fire scenario training for response to deliberate ignition (acts of vandalism / terrorism);
- Joint exercises and peer review for enacting the same fire scenario and measuring the reactions for each mine; and
- Proactive stakeholder management before, during and after fires – dedicated resources, community engagement programs.

Areas requiring further investigation:

- Further investigation of Chronic Health (physical and psychosocial illnesses) outcomes on the community;
- Implications of long term health study conducted by Monash University and DHHS, not available at the time of this assessment;
- A supplementary assessment to be undertaken by health professionals to provide detailed information to inform the risk assessment of chronic health;
- Assessment and management of reputational risk and maintenance of the 'social licence';

- Consideration of mine fires occurring simultaneously with other large scale regional bushfires – lack of firefighting resources available to assist the mines;
- Consideration of how different controls interact for detrimental outcomes (water deluge on exposed batters);
- Development of ‘interface agreements’ with external agencies and authorities with defined levels of responsibility and communications; and
- Development of process for mine operators to work together in influencing planning decisions at the state and local government level.

## **6.2 Next steps**

This report and attachments will provide inputs and ideas for the preparation of site-specific and overall fire risk management plans. In consultation with DEDJTR the mine operators will be able to draw on this high level review for input into their mine licence documentation.

## 7. Conclusions

A generic risk assessment of a major fire event involving the Latrobe Valley coal mines with the participation of the three mine operators and external agencies was conducted based on the following risk statement:

*'Due to a large scale Latrobe Valley mine fire occurring for greater than a week in duration in proximity to community under conditions of high temperatures and high winds.'*

The assessment found that with the effective application of the existing controls five consequences would be rated as 'Low' risks and two consequences would be rated as 'Medium' risks. There were no consequences rated as 'High' or 'Very High' risks.

One consequence was not rated due to the lack of information from the studies of the long term chronic health consequences of major fire events currently being undertaken in the community by Monash University and the DHHS. Further investigation is required to fully understand these long term chronic health consequences.

It is recommended that each mine operator objectively consider the effectiveness of their existing controls and supplement their existing site specific risk assessments with the recommendations established from this study in compiling their overall fire risk management plan.

## 8. References

1. Hazelwood Mine Fire Inquiry Report 2014
2. DEDJTR – Compliance Requirements for Risk Assessment and Management Plan
3. DEDJTR – Completing a Work Plan in RRAM: Guidance, Draft Version 1.0 March 2015



# 9. Acronyms & abbreviations

**Table 4 Acronyms & abbreviations**

Acronyms and Abbreviations	Full description
CAFS	Compressed air foam system
CFA	Country Fire Authority
DHHS	Department of Health and Human Services
DEDJTR	Department of Economic Development, Jobs, Training and Resources
EMV	Emergency Management Victoria
RRAM	Resource Rights Allocation and Management

# Appendices

# **Appendix A** – Workshop Attendance List

# Bow tie Workshop Attendance Record



Client:

Project: Latrobe Valley Mine Fire Risk Assessment

Section of Plant: Latrobe Valley Mines

Meeting No:   1  

Date:   2  /04/2015

Sheet 1 of 1

Name	Company	Role	Years Experience	Signature
		Risk + Compliance	36	
		Technical Compliance Manager	33	
		Mine Director	30	
		Compliance	40	
		Director		
		Ops Mgr.		
		HEAD OF MINING	30	
		ENGINEER	15	
		PRODUCTION SUPPORT SUPT	12	
		MGR MINING	40+	
		CO-FACILITATOR	7	
		Facilitator	25+	
		FACILITATOR	25+	
		EER Mgr/observer.	23	

# Workshop Attendance Record



**Client:**  
**Project:** Latrobe Valley Mine Fire Risk Assessment  
**Section of Plant:** Latrobe Valley Mines

**Meeting No:** 2\_                      **Date:** \_17\_/04/2015                      Sheet 1 of 1

Name	Company	Role	Signature				
						OPERATIONS MGR	
						DIRECTOR	
						CI/M TASKFORCE	
						Risk & Compliance	
						Mine Director	
						Senior Compliance Engineer	
						OPERATIONS OFFICER	
						District Mgr Operations	
						Compliance	
						MINE PLANNING	
						MANAGER MINING	
						ICE MANAGER	
						PROD SUP SUPER'T	
		ENGINEER					
		CO-FACILITATOR					
		- 11 -					
		- 11 -					

Stan Kemsley	GDF Suez	Technical Compliance Manager
Shane Mynard	CFA	Operations Officer



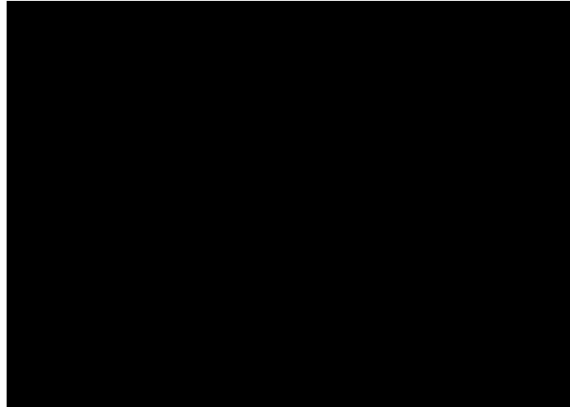
# **Appendix B** – Workshop Agendas and Minutes



# Minutes

Project	Latrobe Valley Mine Fire Risk Assessment	From	GHD
Subject	Workshop 1	Tel	(03) 8687 8461
Venue/Date/Time	GHD Morwell Office Thursday 2 April 2015, 0900-1630	Job No	31/32659

Attendees



Apologies

Agenda	09:00 – 09:15	Welcome & context setting
	09:15 – 09:30	Scope and structure of workshop
	09:30 – 09:45	Presentation of draft mine fire bow tie
	09:45 – 10:45	Syndicate Session 1 – Review preventative controls for each fire ignition source
	10:45 – 11:15	Syndicate Session 1 – Report back findings to the group
	11:15 – 11:30	Morning Tea
	11:30 – 13:00	Syndicate Session 2 – Review mitigating controls for On-site and Public safety for each consequence
	13:00 – 13:30	Lunch
	13:30 – 14:00	Syndicate Session 2 – Report back findings to the group
	14:00 – 15:00	Syndicate Session 3 – Review mitigating controls for the Environment or each consequence
	15:00 – 15:15	Afternoon Tea
	15:15 – 15:45	Syndicate Session 3 – Report back findings to the group
	15:45 – 16:30	Wrap up and next steps

31/32659/242983

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**Minutes****Action**

---

**1. Welcome and context setting**

---

- [REDACTED]
- Building on work done previously
  - Need a pathway forward
  - Identify external experts for the next workshop
  - Not able to eliminate vegetation cover/cap all coal as the control outcome
- 

- [REDACTED]
- Look to bolt on individual mine site specific controls to the workshop outputs
  - Desire for collaborative effort rather than a directive effort
- 

- [REDACTED]
- Learn from each other and share common concerns
  - Take outputs back in own organisations from the group workshops
- 

- [REDACTED]
- Appreciate mines working together
  - Have not yet determined what compliance looks like
  - Seeking continuous improvement with submissions over next three years
  - Plans needs to address public concerns
  - Consider two documents – one internal for regulator / one external for public disclosure
  - Environment and public safety considerations are paramount
- 

**Other comments**

- Education of what is considered working and non-working areas to be confirmed
  - Still many 'grey areas' of the scope for compliance to be worked through
  - Happy for outputs to be shared with Anglesea (Alcoa)
  - Anglesea operates under a different relationship with DEDJTR
  - Workshop to recognise communications and information linkages between mines and other agencies
-

## Minutes

## Action

- 
- Need to demonstrate ongoing engagement with the community both in times of 'peace and war' – community consultation groups (ERC)
  - Need to consider how to maintain the 'social licence' for operating the mine in the community in the context of the RAMP
  - Need to quantify the controls
  - Need to show consideration of all possible controls and which controls selected and why
  - Consider which controls are most effective and who can expand the ideas of potential controls
  - Need to consider how risky is the coal relative to other regions of Australia and the world
  - Pathway is towards quantification of the controls
  - Need to take the controls as far as practicable – no further work eg. Coal is capped
  - Consider the impacts and risk of more than one mine site fire occurring simultaneously
  - Need to assess how effective controls are during an event
  - Not asking for quantification of risk
  - Need to demonstrate a pathway for improvement over the next three years
  - Start by considering quantification for high risk, high consequence
  - State the adequacy of the control and link to the risk
  - Quantify the control and justify
  - All stakeholders reinforced their agreement to share outputs

---

## 2. Syndicate Session 1 – Report back findings to the group: Review preventative controls for each fire ignition source

---

### Introductory remarks

- Suggestion to merge two on site ignition source
  - Suggestion to copy across all causes for same common controls – assist to identify
    - Group common controls to RH side
    - Specific controls on LH side of the pathways
  - Suggestion of classifications
    - Prevention
-

## Minutes

## Action

- 
- Suppression
  - Mitigation
  - Internal
  - External
  - Reputation management to be considered as potential impact
  - Query as to whether DEDJTR is a referral agency for state government planning – No, but DELWP is a referral for land use planning.
  - Suggestion for a recording and coding system for different types of controls

### **Summary of controls presented back to the group:**

#### **GDF Suez – Hazelwood**

- Off-site Ignition
    - Influence planning (external) landscape
    - Buffer zone (internal) land management procedures
    - Fuel reduction land management (external) by DELWP and LCC
    - Water systems
    - Internal processes for managing wind events with hardware fit for purpose
    - Fire management plan (internal)
    - Fire management plan (external) – DELWP, LCC, CFA, ICC, VicRoads, SES
    - Notifications for total fire ban days and wind events
    - Notification to CFA of events in the area
    - Reputational risk (RHS of bowtie)
  - On-site environmental ignition
    - Detection of heat source (FLIR)
    - Fire management plan
    - Techniques for suppression (incorporating slope stability including risk of failure)
    - Emergency command team
    - Operational resources – deployed teams
    - Fire water systems
  - On-site mining ignition
    - Failure of 3rd party asset – AusNet
-

## Minutes

## Action

- 
- Deliberate ignition
    - CCTV at mine site entrance and increase to other areas
    - Joint management with CFA, VicPol
  - Other causes
    - Monitoring FLIR of coal resources and mined out areas
  - Other points of discussion
    - Seasonal briefings with external agencies

## Energy Australia – Yallourn

- Off-site Ignition
    - Communication with CFA regarding fire activity in the area
    - DELWP – planned burning
    - Fire monitoring – ember attacks
    - Emergency response plan
    - Employee fire training
    - (controls listed above are common to all six causes)
  - On-site environmental ignition
    - Inspection and sealing of gaps to prevent attack of infrastructure by vermin, birds and animals
  - On-site mining ignition
    - Total fire ban day restrictions (hot works, dozer operations and mining activity where stockpiles allow)
    - Fire alert days
    - Fire station and resources on site
    - Light vehicles – modification of exhausts
    - Non-approved/modified vehicles not allowed on the mine levels
  - On-site non-mining ignition
    - Inspection and vegetation management around HV poles and wires
    - Lease agreements with SP AusNet to manage third party assets in the mine
  - Deliberate ignition
    - VicPol, CFA, DEDJTR (emergency exercises)
    - Internal communication – raise awareness of suspicious behaviour
  - Other causes
-

## Minutes

## Action

- 
- Use of over height OB for coal coverage
  - Locations of interest (hot spots)
  - Other points of discussion
    - Farming activities on own leased land have control (don't have control on non-leased land)
    - Inspection and auditing pre-season – check each other's equipment (peer audit)

## AGL – Loy Yang

- Off-site Ignition
    - Monitoring and awareness of external events
    - Make all high risk periods have a period specific plan (not just today fire ban days)
    - Fire alert procedure activated early
    - Bushfire exercises with CFA
  - On-site environmental ignition
    - Thermal imaging (hot spots and ignition points)
    - Alternate power supply
    - Gravity systems – water
  - On-site mining ignition
    - Vehicles for suppression with support from external contractors
    - Purchasing standards/processes/checks
    - Defect management system
  - On-site non-mining ignition
    - Dual switching electrical supply
    - Auto-deluge on buildings
    - VESDA in buildings, RCB and key infrastructure
    - Enforcement of cigarette smoking policy and use restricted areas
  - Deliberate ignition
    - Increase fire watch on high risk days
    - Common sharing of information – use of fire watch towers
  - Other causes
    - Monitoring hotspots
    - Foam/chemical treatment
-



## Minutes

## Action

- 
- Standardised crane mounted monitors – especially from crane hire
  - Other points of discussion
    - Rely on other agencies to provide feedback on external event
    - Signage and access for CFA and other authorities – purchasing using common standards
    - Valley wide fire spotting – CFA/Hancocks
    - Industry Brigade status for mine fire stations
    - Mutual aid arrangements
    - Three mines working together to put pressure on external planning agencies

## Other comments

- Controls impacting other controls (eg. Water onto coal batters causing slope stability issues during 2014 fire)
  - Incident of pouring as much water as possible on to batters
  - CFA not aware of stability issues
  - Why not resolved through exercises between mines and fire authorities?
  - Intervention by Department to fire agencies on behalf of mines
  - Fire destroyed slope stability monitoring equipment
  - Mine manager should be able to make call on decision between more safety from ground stability or putting fire out
  - Need to consider taking up terrorism level of scenario training to mine fire scenario
  - Joint exercises and peer review for enacting the same fire scenario and measure the reactions for each mine

---

### 3. Syndicate Session 2 – Report back findings to the group: Review mitigating controls for On-site and Public safety for each consequence

---

#### Introductory remarks

- Potential alternative categorisation of bowtie RHS:

#### Onsite

- Physical (Acute – at the time/Chronic – gradually over time)
- Psychological (Acute – at the time/Chronic – gradually over time)

#### Offsite

---

## Minutes

## Action

- 
- Physical (Acute – at the time/Chronic – gradually over time)
  - Psychological (Acute – at the time/Chronic – gradually over time)
    - Need to consider control over consequence for reputation damage
    - Keep items that have perceived as well as definite actions
    - Consider Traffic Management Plan – ability to allow access for mine staff during road blocks set up during fire events
    - Capture linkages to external controls
    - RH bowtie – record ownership and record of level of influence
    - Consider use of Bowtie XP as a software option
    - Considered difference in RH side structure at the mine level
    - Agreed to keep high level RH as the same amongst the three mines

### **Summary of controls presented back to the group:**

#### **Energy Australia – Yallourn**

- On-site safety (acute) – burn
  - Training of operations and maintenance staff
  - GPS only fitted to site emergency vehicles
- On-site safety (chronic) – cardiac
  - First aid training of all site personnel
  - Defibrillator in shift manager's vehicle and mine office
- Public safety (chronic) – respiratory illness
  - EPA monitoring
  - Health Department advice
- Public safety (chronic) – fear/anxiety
  - Community consultation group (ERC)
- Other points of discussion
  - GPS on all vehicles in Hazelwood mine
  - Air quality monitoring could be a tool for good news advice, potential for requirement for mines to pay/undertake additional testing
  - DHHS advice – public evacuation plan

**Minutes****Action**

---

**AGL – Loy Yang**

- On-site safety (acute) – burn
  - Emergency management plan – response and recovery
  - Response to fatality – continue/stop operations
- On-site safety (acute) – asphyxiation
  - CO management plan
  - Production plan – business continuity
  - Fatality management
- On-site (acute) – vehicle accident
  - Vehicle fire/smoke resistance
  - Vehicle role/criticality in the fire
  - Vehicle/personnel recovery
- On-site (acute) – fatigue/exhaustion
  - EMP – rotation of personnel and maintenance of key functions
  - Fatigue policies during emergency events
- On-site safety (chronic) – respiratory
  - Training of staff in BA
  - Management of CO levels – trigger points and response
  - On-site emergency team response
  - Dust/smoke masks – supply and type
- On-site safety (chronic) – cardiac
  - Vic health department advice – studies
  - Workcover claims – management of future claims/cases
- Public safety (chronic) – fear/anxiety
  - Employee assistance programs
- Other points of discussion
  - How manage find body during firefighting operation? Preserve body where practicable.
  - Capture examples within control descriptions
  - Fencing control for trespass

**GDF Suez – Hazelwood**

- Public safety (acute) – burn
    - Community engagement plan
-

**Minutes****Action**

- 
- Municipal fire management plan
  - Gippsland Arson Prevention Program (GAPP)
  - Public safety (acute) – asphyxiation
    - PPE
    - Air quality monitoring – EPA
  - Public safety (acute) – vehicle accident
    - Engagement with VicRoads regarding traffic management
  - Public safety (chronic) – respiratory illness
    - Local medical community, GPs and other medical services
    - Air quality monitoring – EPA
    - DHHS long term study and future planning
  - Public safety (chronic) – fear/anxiety
    - Targeted information and engagement
    - Empowerment of the local community
  - Other points of discussion
    - Reconsider first aid control in chronic health

**Other comments – chronic health effects**

- Long term health study implications to be considered
  - Community health programs
  - Best in world fire prevention is the goal
  - Ensuring social licence needs to be considered
  - Proactive stakeholder management – before, during and after – dedicated resources
  - Business continuity considerations
  - Stakeholder management
    - Community engagement
    - Brand/reputational management
    - Help with community recovery
    - Open Days – don't have school visits/open days due to terrorism management (Yallourn)
    - Rebuild the trust bank
    - DEDJTR to advise minister to speak with emergency management minister to decide on a consistent approach to balancing terrorism
-

Minutes	Action
<p>and social licence considerations</p> <ul style="list-style-type: none"> <li>- PowerWorks – demonstrate mine operations, donated to community groups, LCC did not want to take on liabilities</li> </ul>	
<p><b>4. Group Session 3 - Review mitigating controls for the Environment for each consequence</b></p>	
<ul style="list-style-type: none"> <li>• Air Quality (emissions – dust, smoke, odour, ash) <ul style="list-style-type: none"> <li>- Weather and other monitoring – report back as part of community engagement</li> <li>- CAFS – smoke reduction and manage impacts to restart site operations</li> <li>- Dust management from fire activity – response to complaints</li> <li>- EMS – controls and complaint management process</li> <li>- Need to understand the thresholds – work with EPA, monitoring procedures, need to quantify the outcome</li> </ul> </li>   <li>• Land (erosion) <ul style="list-style-type: none"> <li>- Put out the fire quickly</li> <li>- Site restoration</li> <li>- Water runoff controls</li> <li>- Re-fencing</li> <li>- Drainage systems</li> <li>- Resewing the land</li> <li>- Reintroduce fauna</li> <li>- Flora and fauna surveys</li> <li>- Replanting projects</li> <li>- Sediment and water quality testing</li> <li>- Clean up programs</li> <li>- Reduce fuel loads by working with lease holders</li> <li>- Community education</li> <li>- Animal shelters</li> </ul> </li>   <li>• Water <ul style="list-style-type: none"> <li>- Ground water monitoring plans</li> <li>- Public safety impacts from ground stability</li> <li>- Potential contaminants from fuel and foams on the ground water</li> </ul> </li> </ul>	

## Minutes

## Action

- 
- Emergency release of water as a result of fighting a fire (permission required?)
  - Water quality discharge/control of release (ground stability issues)
  - Engineering design of the mine to avoid emergency release

## Other comments

- Confidence levels for threshold of achievement of controls
- Number of levels of thresholds for incidents with different reactions
- Multistage resource response to level of incident
- Multistage level of response targets
- Set standards around levels of response – eg. put sand over to pause the spread of fire
- Air quality thresholds for level of response
- Evacuation management plan – extent and duration advise CFA and EPA etc
- Other authorities need to learn from Hazelwood – priority for mine fires and response and advice given by mines to authorities

---

## 5. Wrap up and next steps

- 
- Review/iteration of updated bow ties based on today's discussion – Friday 10th April
  - Development of Latrobe Valley Matrix (tailored for this purpose)
  - Development of risk register
  - Use of the Department Matrix with final work plan submission
    - Qualitative process
    - Copy of manual from Stan/Brad/Anne
  - Transfer of work from previous work done to input into – RRAMS
    - Mandatory Jan 2016 at latest
    - Software standard built on Australian Standards?
  - DEDJTRs – will be auditing the controls listed in the system
  - Only have detailed controls for High and Very High risks
  - Understand full picture with full list of external stakeholders
  - Influence of wider stakeholders post risk assessment
  - Potential stakeholder list for Workshop 2
-

**Minutes****Action**

---

- Regulators – DETJTR
- CFA – priority (Peter Lockwood, Shane Maynard, Peter Schmidt)
- EPA – monitoring, SMEs smoke
- DELWP – planned burning, fire tracking
- Worksafe
- Landholders
- Latrobe City – Lance King
- Taskforce – Peter Schmidt
- Mine Owners and Operators
- Mine Contractors
- Latrobe Valley Mine Fire Task Force
- Not DHHS
- Confirm date for: Friday 17th April
- Discussion between Dave and Mine Mangers for final listing of attending stakeholders

**Other comments**

- Don't forget about other risks
  - DEDJTR to provide department approach and guidance for controls for 'high risk'
-





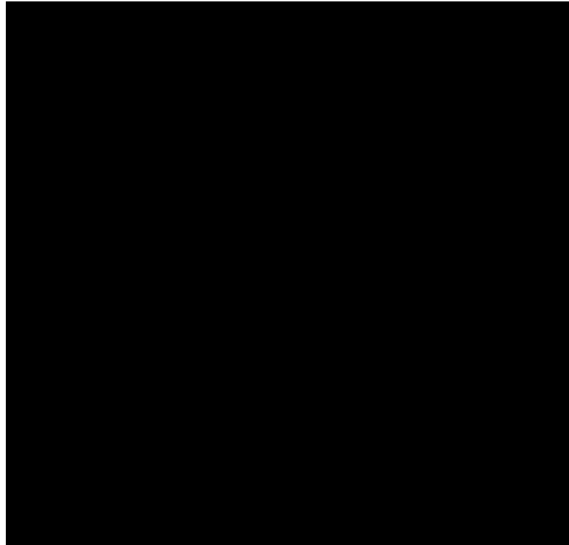
# Minutes

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Project	Latrobe Valley Mine Fire Risk Assessment	From	GHD
Subject	Workshop 2	Tel	(03) 8687 8461
Venue/Date/Time	GHD Morwell Office Friday 17 April 2015, 0900-1630	Job No	31/32659

---

Attendees



Apologies



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Agenda	09:00 – 09:15	Welcome & context setting
	09:15 – 09:30	Scope and structure of workshop
	09:30 – 10:00	Presentation of updated mine fire bow ties from Workshop 1
	10:00 – 10:45	Syndicate Session 1 – Review updated <b>LHS</b> bowties including: <ul style="list-style-type: none"><li>• Add controls and edits suggested by external agencies</li><li>• Select top 10 controls and rate them for improvability</li></ul>
	10:45 – 11:00	Morning Tea
	11:00 – 11:30	Syndicate Session 1 – Report back findings to the group
	11:30 – 12:15	Syndicate Session 2 – Review updated <b>RHS</b> bowties including: <ul style="list-style-type: none"><li>• Add controls and edits suggested by external agencies</li><li>• Select top 10 controls and rate for improvability</li></ul>
	12:15 – 12:45	Syndicate Session 2 –

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31/32659/243047

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Project	Latrobe Valley Mine Fire Risk Assessment	From	GHD
	Report back findings to the group		
	12:45 – 13:15	Lunch	
	13:15 – 15:30	Group Session 1 – Risk Assessment of LV Mine fires:	
		<ul style="list-style-type: none"> <li>• Risk Assessment for each fire risk scenario (Current Risk)</li> <li>• Review controls for improvability (Action Plans)</li> <li>• Residual Risks after implementation of action plans</li> </ul>	
	15:30 – 16:00	Wrap up and next steps	

---

**Minutes**

**Action**

---

**1. Welcome and context setting**

---

**2. Syndicate Session 1 – Report back findings to the group: Review updated LHS bowties including adding controls and edits suggested by external agencies and selecting top 10 controls and rate them for improvability**

---

**AGL – Loy Yang**

- Buffer zones – external fires coming into the mine
    - Improvability Rating = 2 - Fairly good in the precinct
  - Fuel reduction program
    - IR = 2 – annual program
  - Emergency management liaison with external responders – information about conditions and fires in the area
    - IR = 3 – still work to do
  - Weather monitoring – internal procedures and responses
    - IR = 2 – good range of sources
  - Design codes/standards/regulations for fixed and mobile plant – type of materials
    - IR = 3 – areas to improve
  - Maintenance (prevention and defect systems) – preventative and ability to pick up issues as they occur
    - IR = 3 – more work to be done (transitioning between asset management systems)
  - Permit to work procedures – eg. JSA for hot works
-

## Minutes

## Action

- 
- IR = 2 – improvement to hot works procedure
  - Design codes/standards/regulations for electrical systems – isolation and earthing
    - IR = 2 – very few fires from electrical issues
  - Surveillance (patrols and CCTV) – detect fires
    - IR = 2 – more fire watch activities, everyone’s responsibility
  - Inspection/monitoring of operational areas – production personnel, spontaneous combustion
    - IR = 2-3 – time periods in night shift where plant not inspected
  - Other notes:
    - Already working on improving established controls
    - Take back - consider arson inside the gate (staff)

### GDF Suez – Hazelwood

- Mine planning design - pipework
  - IR = 1 – had high level of focus and regulatory scrutiny
- Fire water system
  - IR = 2-3 – increased works since mine fire, particularly in worked out areas for 100% coverage. To be improved.
- Fire management plan
  - IR = 1 – high scrutiny, lots of recent work
- Procedures – fire protection in the mine
  - IR = 2
- External fire management plan
  - IR = 1-2 – improved from fire last year, high engagement with organisations and regulators (goes both directions)
- Procedure – capping of coal/rehabilitation
  - IR = 2 – rehabilitation is good for visual aspects, capping ok

### Energy Australia – Yallourn

- Water supply and access
    - IR = 2 – storage and capacity good, improving pipework in worked out areas
  - Amount of exposed coal (reduce)
-

Minutes	Action
<ul style="list-style-type: none"> <li>- IR = 2 – conflicts with mining operations</li> <li>• Internal ignition sources               <ul style="list-style-type: none"> <li>- IR = 1 – robust hot work procedures</li> </ul> </li> <li>• Vegetation management               <ul style="list-style-type: none"> <li>- IR = 4 – conservation areas protected, room for improvement</li> </ul> </li> <li>• Internal fire services response               <ul style="list-style-type: none"> <li>- IR = 2 – good fire teams, maintain training program</li> </ul> </li> <li>• Preparation for extreme fire days               <ul style="list-style-type: none"> <li>- IR = 2 – proximity to V/Line rail line, potential for fire spark</li> </ul> </li> <li>• Communications on-site and with external agencies               <ul style="list-style-type: none"> <li>- IR = 1 – good communication between other agencies</li> </ul> </li> <li>• Other notes:               <ul style="list-style-type: none"> <li>- Conflicts between agencies (planning of plantations vs planned burning and buffer zones; legislation regarding conservation zones)</li> <li>- Conflicts of controls between geotechnical issues and water deluge during firefighting efforts</li> <li>- Source of fire from V/Line</li> <li>- Communication – very good at local level on the ‘doing’ side, managing upwards more challenging, unable to communicate to the local communities, make one voice from the three mines, automation of information from CFA to the mines</li> </ul> </li> </ul>	
<p><b>3. Syndicate Session 2 – Report back findings to the group: Review updated RHS bowties including adding controls and edits suggested by external agencies and selecting top 10 controls and rate for improvability</b></p>	
<p><b>GDF Suez – Hazelwood</b></p>	
<ul style="list-style-type: none"> <li>• Fire water system – operational               <ul style="list-style-type: none"> <li>- IR = 2+</li> </ul> </li> <li>• Fire water system – non-operational               <ul style="list-style-type: none"> <li>- IR = 2+</li> </ul> </li> <li>• Fire detection/suppression               <ul style="list-style-type: none"> <li>- IR = 1</li> </ul> </li> <li>• Firefighting on-site equipment               <ul style="list-style-type: none"> <li>- IR = 2+</li> </ul> </li> <li>• Onsite personnel</li> </ul>	

## Minutes

## Action

- 
- IR = 1 – ability for all staff to respond
  - Emergency services personnel
    - IR = 2-3 – local brigades good, training could be better for non-local bridges
  - Responding agency emergency messaging and communication
    - IR = 3 – needs more work to get messages out to public, standardisation of the messaging across the three mines, eg. Shelter in place with trigger points, responsibility of responding agency
  - Health protocols
    - IR = 2 – further work although a lot done, some input from mines but principally involves other emergency management agencies, smoke/CO/air monitoring
  - Design of mine to hold contaminated water (2-4GL)
    - IR = 1-2 – large storage, prevent contamination of offsite environment

## Energy Australia – Yallourn

- Water supply
    - IR = 2 – multiple supply systems , more coverage, increase reliability
  - Response equipment
    - IR = 2 – Water takers, dozers, CFA units and people, sprays, logistics
  - Training of people
    - IR = 2 – Incident control and firefighting, local fire brigades trained and familiarisation with mine, through interactions with mine personnel
  - Emergency response/crisis management plan
    - IR = 1 – well proven, people trained in emergency response through desktop and practical exercises,
  - External communications with the community (from a mine fire threat to external communities)
    - IR = 3
  - Regional emergency management team
    - IR = 2 – involvement of all agencies including mine representatives
-

## Minutes

## Action

- Health monitoring
  - IR = 4 – CO exposure, need further science and common sense, new area of concern for safety of staff and ability to fight the fire, not much known about health monitoring for the community

### AGL – Loy Yang

- Fire detection and suppression systems and smoke management (CAFS)
  - IR = 3 – add more CAFS units
- External emergency services
  - IR = 2 – add more CAFS units, build capacity
- Competent and trained response team
  - IR = 2
- Carbon monoxide plan/Pm 2.5 Plan
  - IR = 3
- Municipal fire management plan (MEMP) – external to the mine
  - IR = ?
- Advice DHHS/public evacuation plan (public health)
  - IR = ?
- Resource management plan – crew rotation, comms (long/short term health effects)
  - IR = 3-4
- State Government Disaster Plan
  - IR = ?
- Engagement – community/stakeholders and pre-engagement
  - IR = 2 – 300 people identified for consultation in current plans
- Water runoff controls/water quality discharge
  - IR = 2 – good

---

#### 4. Summary of Existing Control Measures – Preventative and Mitigating

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In order to prepare a list of 'existing control measures' for the risk assessment a summary of top controls was compiled using the lists created by each of the three mines.

- The following list outlines the key preventative controls:
-

## Minutes

## Action

- 
- Mine planning
  - Buffer zones
  - Fuel reduction
  - Fire management plan
  - Emergency management liaison and communications
  - Weather monitoring
  - Maintenance systems
  - Permit to work procedures
  - Design standards/codes for electrical/mechanical systems
  - Surveillance – patrols and CCTV
  - Inspection/monitoring of operational areas
  - Capping/rehabilitation of coal
  - Internal fire service teams and equipment response
  - The following list outlines the key mitigation controls:
    - Water system/supply
    - Onsite personnel - competent and trained response team
    - Emergency services personnel and local trained brigades
    - Emergency messaging and communication between mines and CFA and others (weather conditions)
    - Health protocols - Carbon monoxide plan
    - Design of mine to hold contaminated water (2-4GL)
    - Response equipment including water tankers, dozers, CFA units and people, water sprays
    - **Emergency response/crisis management plan – (Regional EMT)**
    - **External communications with the community – “responding agency” (CFA)**
    - **Regional Emergency Management Team (Emergency Management Victoria)**
    - **Health monitoring (DHHS)**
    - Fire detection and suppression systems (CAFS – smoke management)
    - **Municipal fire management plan (MEMP) – Latrobe City Council**
    - **External agency evacuation protocols (CFA/VicPol/Regional EMT)**
    - Resources management of personnel
    - **State Government Disaster Plan**
    - Engagement – community/stakeholders
-



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**Minutes****Action**

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- Water runoff controls/water quality discharge

**Red** Controls – primarily responsibility of others

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**5. Group Session 3 – Risk Assessment of LV Mine fires**

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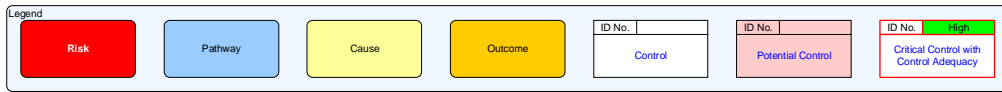
- Risk Assessment for each fire risk scenario (Current Risk)
  - See attached risk register for full details
  - All risks assessed deemed to be LOW/MEDIUM using the DEDJTR risk matrix and likelihood and consequence descriptors
  - As a result of no HIGH risks being identified, a review of controls for improvability (Action Plans) and the assessment of residual risk ratings were not considered in the workshop
  - Without the benefit of supplementary detailed assessments undertaken by health professionals, the 'Chronic Health - Psychosocial effects' risk was unable to be assessed. Impacts partially captured under chronic health.
- 

**6. Wrap up and next steps**

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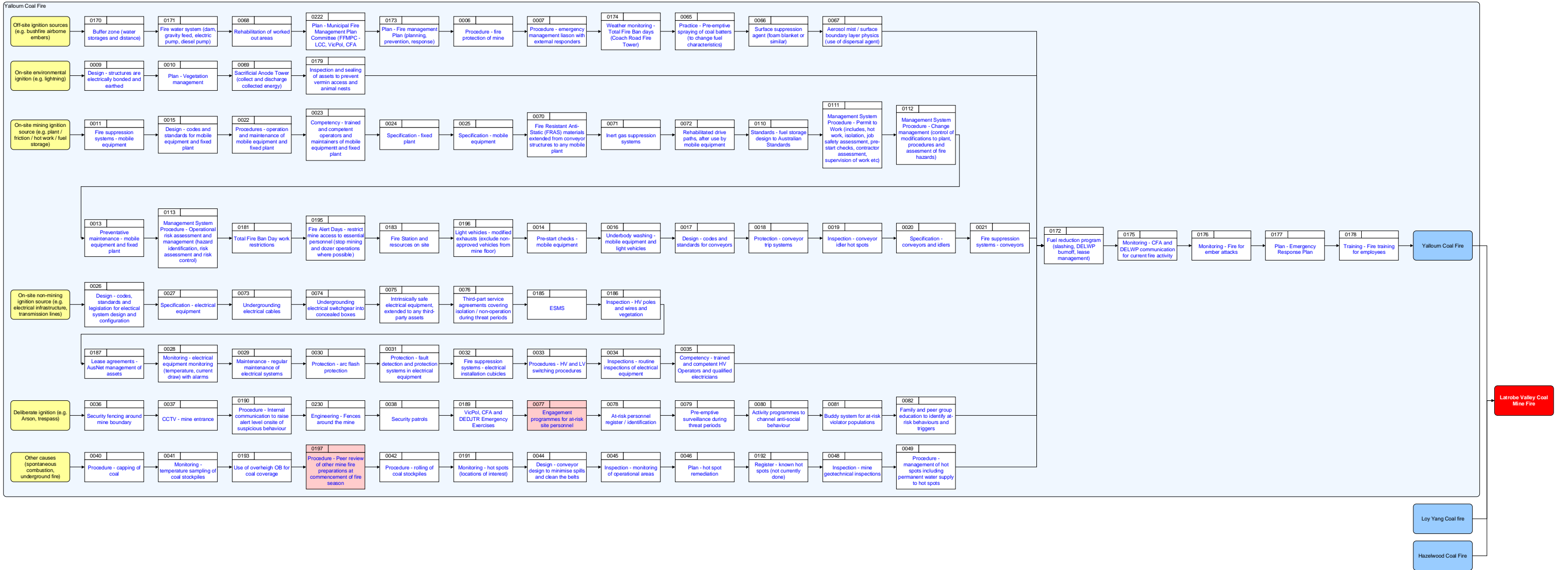
- Take back outputs from today to the individual mines to assess adequacy of the controls (Mine Managers)
  - Today was a robust process, satisfactory outcome (CFA)
  - All mines confirmed happy to share information between all the other mines (Mine Managers)
  - Controls identified in the Risk Register now regarded as the standard controls. Further steps required to quantify standard controls to meet requirements for Risk Assessment Management Plan (GHD).
  - Split up controls into mine owned and other owned. If the control is owned by others must have an interface procedures and controls – defined level of responsibility and communications (DEDJTR )
-

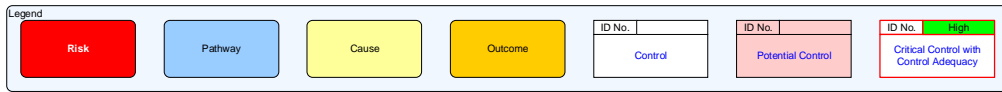
# Appendix C – Bow-tie Diagrams



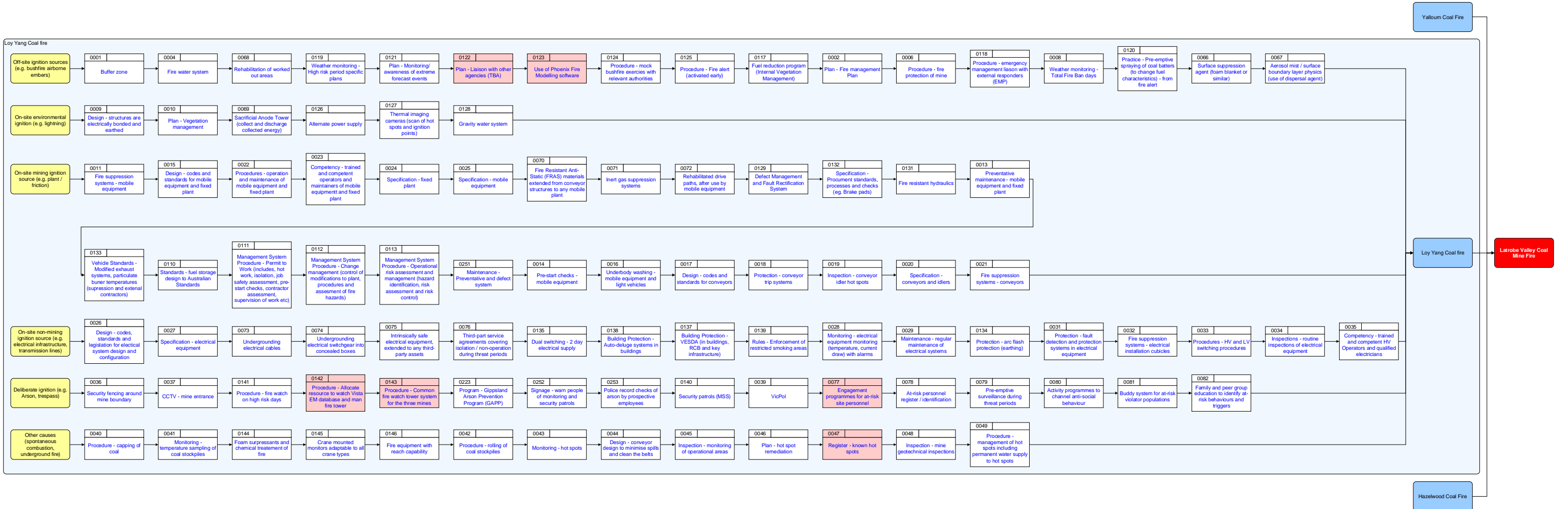
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Hazard Type	Thermal / Fire / Explosion
Risk No.	1
Risk	Latrobe Valley Coal Mine Fire
SORA Date	

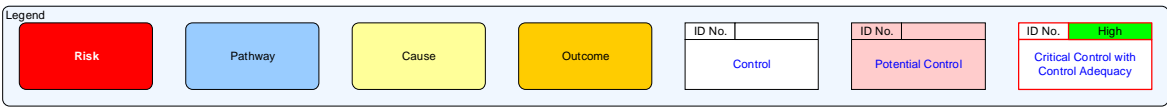
Drawn By:	Russell Mills
Reviewed By:	Edward Smelt
Approved By:	Henry Reynolds
Revision	Rev 4 Issued
Date	11 June 2015



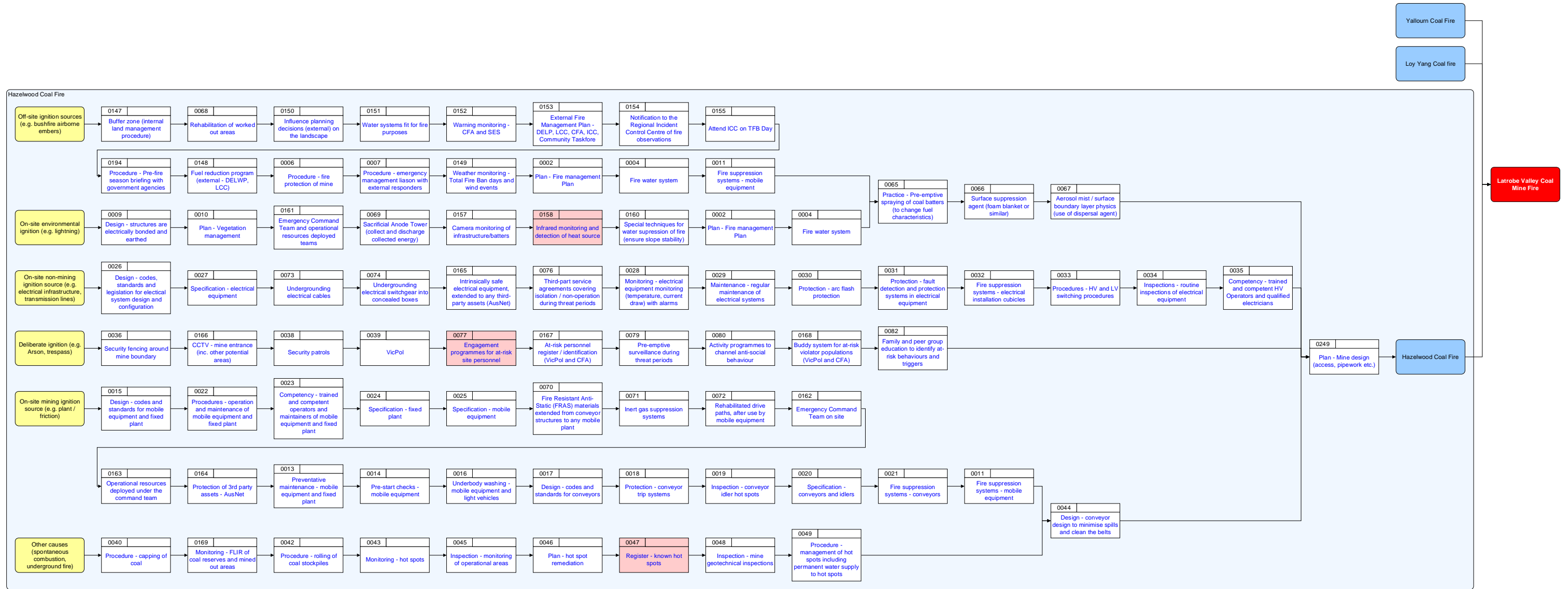


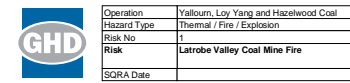
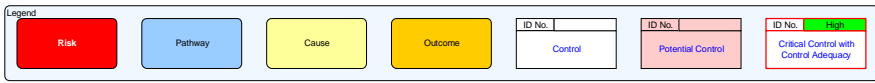
Operation	Yalburn, Loy Yang and Hazelwood Coal
Hazard Type	Thermal / Fire / Explosion
Risk No	1
Risk	Latrobe Valley Coal Mine Fire
SCORA Date	
Drawn By:	Russell Mills
Reviewed By:	Edward Smelt
Approved By:	Henry Reynolds
Revision	Rev 4 Issued
Date	11 June 2015



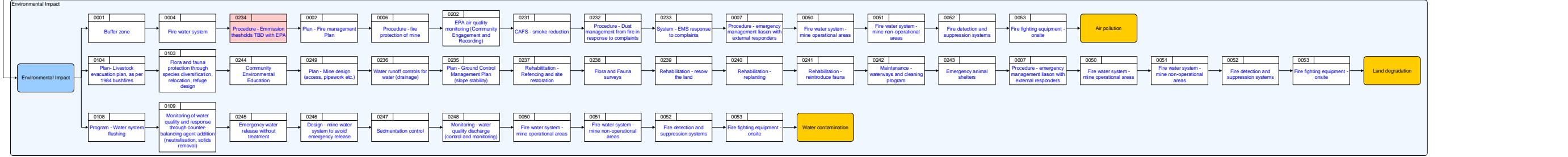
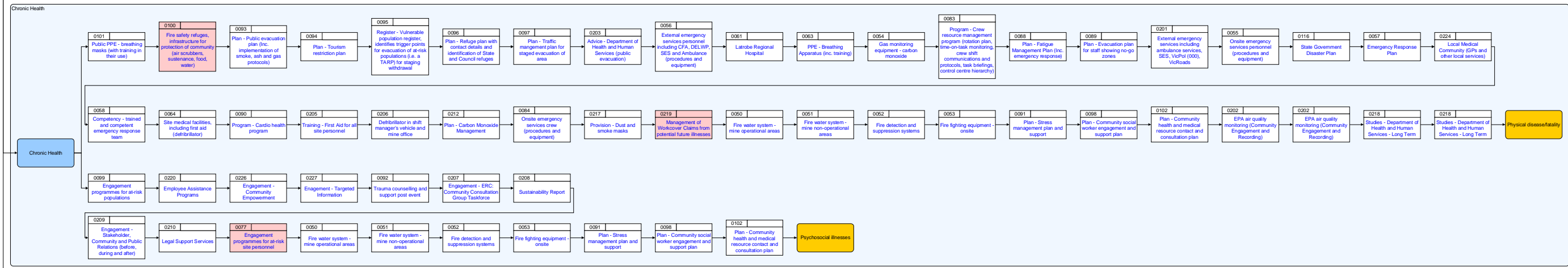
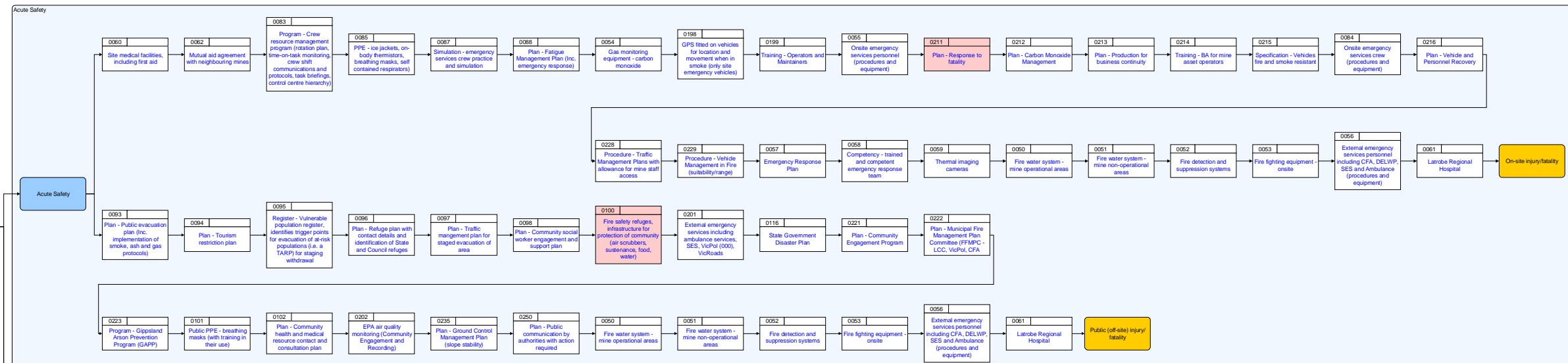
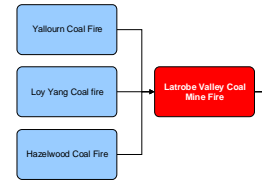


Operation	Yallourn, Loy Yang and Hazelwood Coal
Hazard Type	Thermal / Fire / Explosion
Risk No	1
Risk	Latrobe Valley Coal Mine Fire
SGRA Date	
Drawn By:	Russell Mills
Reviewed By:	Edward Smelt
Approved By:	Henry Reynolds
Revision	Rev 4 Issued
Date	11 June 2015





Operation	Yalourm, Loy Yang and Hazelwood Coal
Hazard Type	Thermal / Fire / Explosion
Risk No	1
Risk	Latrobe Valley Coal Mine Fire
SCORA Date	
Drawn By:	Russell Mills
Reviewed By:	Edward Smet
Approved By:	Henry Reynolds
Revision	Rev 4 Issued
Date	11 June 2015



# Appendix D – DEDJTR Risk Matrix



# RRAM Risk Criteria

Consequence Rating	Public Safety	Community Facilities	Environment
<b>Critical</b>	<ul style="list-style-type: none"> <li>One or more fatalities or life threatening injuries or illness</li> <li>Public exposed to a severe, adverse long-term health impact or life-threatening hazard</li> </ul>	<ul style="list-style-type: none"> <li>Services suspended for an extended (years) period of time</li> <li>&gt;100,000 people being unable to access the service or experiencing disrupted access to the service</li> </ul>	<ul style="list-style-type: none"> <li>Irreversible widespread damage to:                             <ul style="list-style-type: none"> <li>Listed species (Biodiversity)</li> <li>Groundwater Dependent Ecosystems</li> <li>Groundwater and surface water quality</li> </ul> </li> <li>Significant contribution to multiple environmental pollution events</li> <li>Damage will require Government to assume control of the clean-up and provision of significant resources including specialist equipment and resources from Government agencies</li> </ul>
<b>Major</b>	<ul style="list-style-type: none"> <li>One or more injuries or illness requiring surgery or resulting in permanent disablement</li> <li>Public exposed to a hazard that results in surgery or permanent disablement</li> <li>Hospitalisation for extensive treatment from injury or illness → 4 weeks</li> </ul>	<ul style="list-style-type: none"> <li>Services suspended for a major (months) period of time</li> <li>50,000 – 100,000 people being unable to access the service or experiencing disrupted access to the service</li> </ul>	<ul style="list-style-type: none"> <li>Extensive, reversible and long term (remediation lasts longer than 3 years) or irreversible and localised damage:                             <ul style="list-style-type: none"> <li>Listed species (Biodiversity)</li> <li>Groundwater Dependent Ecosystems</li> <li>Groundwater and surface water quality</li> </ul> </li> <li>Damage will require provision of specialist equipment and resources from Government agencies</li> </ul>

Consequence Rating	Public Safety	Community Facilities	Environment
<b>Moderate</b>	<ul style="list-style-type: none"> <li>One or more injuries or illness requiring treatment by a physician or hospitalisation</li> <li>Public exposed to a hazard that could cause injuries or health effects requiring treatment by a physician or hospitalisation</li> <li>Hospitalisation (e.g. for observation) for injury or illness &lt; 4 weeks</li> </ul>	<ul style="list-style-type: none"> <li>Services suspended for a moderate (weeks) period of time</li> <li>1,000 – 50,000 people being unable to access the service or experiencing disrupted access to the service</li> </ul>	<ul style="list-style-type: none"> <li>Localised, extended (remediation lasts &lt; 3 years) and reversible damage:                             <ul style="list-style-type: none"> <li>Listed species (Biodiversity)</li> <li>Groundwater Dependent Ecosystems</li> <li>Groundwater and surface water quality</li> </ul> </li> <li>Damage will require provision of specialist equipment from Government agencies</li> </ul>
<b>Minor</b>	<ul style="list-style-type: none"> <li>One or more injuries or illness requiring treatment by a qualified first aid person</li> <li>Public exposed to a hazard that could cause injuries or adverse health effects requiring treatment by a qualified first aid person</li> <li>Medical treatment required for injury or illness (but not resulting in hospitalisation) – not a Lost Time Injury</li> </ul>	<ul style="list-style-type: none"> <li>Services suspended for a minor (days) period of time</li> <li>100 – 1,000 people being unable to access the service or experiencing disrupted access to the service</li> </ul>	<ul style="list-style-type: none"> <li>Localised, temporary (remediation lasts &lt; 1 year) and reversible damage:                             <ul style="list-style-type: none"> <li>Listed species (Biodiversity)</li> <li>Groundwater Dependent Ecosystems</li> <li>Groundwater and surface water quality</li> </ul> </li> <li>Damage will require provision of specialist advice from Government agencies</li> </ul>
<b>Insignificant</b>	<ul style="list-style-type: none"> <li>An injury or ailment that does not require medical treatment by a physician or a qualified first aid person (e.g. minor bruises, cuts, abrasions, etc. involving only local first aid)</li> </ul>	<ul style="list-style-type: none"> <li>Services suspended for a negligible (hours) period of time</li> <li>&lt;100 people being unable to access the service or experiencing disrupted access to the service</li> </ul>	<ul style="list-style-type: none"> <li>Superficial, short term damage with cosmetic remediation required for impacts on:                             <ul style="list-style-type: none"> <li>Listed species (Biodiversity)</li> <li>Groundwater Dependent Ecosystems</li> <li>Groundwater and surface water quality</li> </ul> </li> <li>Damage will not require any involvement from a Government agency</li> </ul>

Rating	Description of rating	Indicative combined frequency of exposure and the controls fail.	Indicative frequency of exposure	Probability	Historical
Almost certain	Very high probability of the consequences occurring during the project life	One or more event per year	Once a week to daily	Has a > 90% chance of occurring if the activity is not mitigated	Has occurred several times in the past year and in each of the previous 5 years in Victoria
Likely	High probability of the consequences occurring during the project life	At least one event every 2 years	Once a month to weekly	Has a 70-90% chance of occurring if the activity is not mitigated	Has occurred once or twice in the past year and in each of the previous 5 years in Victoria
Possible	Even probability of consequences occurring during the project life	One event per 3 – 10 years	Once a year to monthly	Has a 30-70% chance of occurring if the activity is not mitigated	Has occurred in the past 5 years in the industry, but not in Victoria
Unlikely	Low probability of occurrence during the project life but not negligible	One event per 11 – 50 years	Once in 5 years to annually	Has a 5-30% chance of occurring if the activity is not mitigated	Has occurred once or twice in the industry

Rating	Description of rating	Indicative combined frequency of exposure and the controls fail.	Indicative frequency of exposure	Probability	Historical
Rare	Very low probability of the consequences occurring during the project life but not impossible	Less than one event per 50 years	Greater than 5 years	May occur in exceptional circumstances, i.e. less than 5% chance of occurring if the activity is not mitigated	Unheard of in the industry and has not occurred in the past 5 years

## Risk Assessment Rating Matrix

Table 7.

Consequences	Likelihood				
	Rare	Unlikely	Possible	Likely	Almost Certain
<b>Critical</b>	Medium	Medium	High	High	Very high
<b>Major</b>	Low	Medium	Medium	High	High
<b>Moderate</b>	Low	Low	Medium	Medium	High
<b>Minor</b>	Low	Low	Medium	Medium	Medium
<b>Negligible</b>	Low	Low	Low	Medium	Medium



# RRAM Risk Criteria

## Summary of Risk Assessment Findings

### Risk Criteria

1. Consequence Criteria
  - a. Workshop used the public safety and environment criteria
  - b. Community facilities criteria not regarded as relevant for this risk assessment
  - c. Each of the mines have reputational criteria, which would give more severe ratings than were determined for this risk assessment
2. Likelihood Criteria
  - a. Used the historical criteria for likelihood assessment
3. Risk Assessment Rating Matrix
  - a. Medium and Low risk ratings require monitoring of the identified standard controls for ongoing effectiveness
  - b. High or Very High risk ratings require the monitoring of identified standard controls and additional controls and treatments to be implemented as part of a Risk Treatment Plan

### Risk Statements

To achieve a result from the risk assessment it was necessary to formulate a Risk Statement for the assessment to be based on outcomes defined on the bow tie.

The following statement was agreed with seven defined outcomes.

“Due to a large scale Latrobe Valley Mine fire occurring for greater than a week in duration in proximity to community under conditions of high temperatures, high winds there is an outcome resulting in”

1. Acute safety impact - On-site fatality or life threatening injury
2. Acute safety impact - On-site severe injury leading to surgery and/or permanent disability
3. Acute safety impact - Off-site fatality or life threatening injury
4. Chronic Health impact - exposure to hazard that could cause injuries or health effects requiring treatment by a physician or hospitalisation. This also includes psychosocial illnesses.
5. Environmental impact - Air pollution
6. Environmental impact - Land degradation
7. Environmental impact - Water contamination

### Risk Assessments

Risk ratings for the above statements were either Low or Medium, based on the low frequency of mine fires of sufficient size to impact on the public and environment (LHS controls) combined with the low likelihood of the outcomes resulting from the fire (RHS controls).

Mine fires of lesser magnitude were not regarded as credible events to produce the outcomes listed above to the public both on-site (fire fighters) and off-site (surrounding community), and to the environment and were therefore screened out of the risk assessment.

Comments on the RRAM Risk Criteria.

- Misaligned with each of the LV Mines' risk criteria
- Too generic to be applied to this particular type of event
- Missing any reputational impact criteria, which would cause more severe risk ratings

# **Appendix E** – Latrobe Valley Coal Mine Fire Risk Register



## Latrobe Valley Mine Fire Risk Register

Job Name: Latrobe Valley Mine Fire Risk Assessment		Job No:	31/32659		Client:	EnergyAustralia - Yallourn GDF Suez - Hazelwood AGL - Loy Yang		Date:	17-Apr-15		Document Status:	Rev 4 Issued	
Reference No	Incident	Outcome	Existing Control Measures		Initial Risk Rating			Additional Control Measures and Treatments		Residual Risk Rating			Comments
			Preventative	Mitigating	Likelihood	Consequence	Risk Rating	Preventative	Mitigating	Likelihood	Consequence	Risk Rating	
1	Due to a large scale Latrobe Valley Mine fire occurring for greater than a week in duration in proximity to community under conditions of high temperatures, high winds	Results in acute safety impact - On site fatality or life threatening injury	<p>Mine planning</p> <p>Buffer zones</p> <p>Fuel reduction</p> <p>Fire management plan</p> <p>Emergency management liaison and communications</p> <p>Weather monitoring</p> <p>Maintenance systems</p> <p>Permit to work procedures</p> <p>Design standards/codes for electrical/mechanical systems</p> <p>Surveillance – patrols and CCTV</p> <p>Inspection/monitoring of operational areas</p> <p>Capping/rehabilitation of coal</p> <p>Internal fire service teams and equipment response</p>	<p>Controls primarily owned by the mine:</p> <p>Water system/supply</p> <p>Onsite personnel - competent and trained response team</p> <p>Emergency services personnel and local trained brigades</p> <p>Emergency messaging and communication between mines and CFA and others (weather conditions)</p> <p>Health protocols - Carbon monoxide plan</p> <p>Design of mine to hold contaminated water (2-4GL)</p> <p>Response equipment including water tankers, dozers, CFA units and people, water sprays</p> <p>Fire detection and suppression systems (CAFS – smoke management)</p> <p>Resources management of personnel</p> <p>Engagement – community/stakeholders</p> <p>Water runoff controls/water quality discharge</p> <p>Controls primarily owned by others:</p> <p>Emergency response/crisis management plan – (Regional EMT)</p> <p>External communications with the community – “responding agency” (CFA)</p> <p>Regional Emergency Management Team (Emergency Management Victoria)</p> <p>Health monitoring (DHHS)</p> <p>Municipal fire management plan (MEMP) – Latrobe City Council</p> <p>External agency evacuation protocols (CFA/VicPol/Regional EMT)</p> <p>State Government Disaster Plan</p>	Rare	Critical	Medium						
2	Due to a large scale Latrobe Valley Mine fire occurring for greater than a week in duration in proximity to community under conditions of high temperatures, high winds	Results in acute safety impact - On site severe injury leading to surgery and/or permanent disability	<p>Mine planning</p> <p>Buffer zones</p> <p>Fuel reduction</p> <p>Fire management plan</p> <p>Emergency management liaison and communications</p> <p>Weather monitoring</p> <p>Maintenance systems</p> <p>Permit to work procedures</p> <p>Design standards/codes for electrical/mechanical systems</p> <p>Surveillance – patrols and CCTV</p> <p>Inspection/monitoring of operational areas</p> <p>Capping/rehabilitation of coal</p> <p>Internal fire service teams and equipment response</p>	<p>Controls primarily owned by the mine:</p> <p>Water system/supply</p> <p>Onsite personnel - competent and trained response team</p> <p>Emergency services personnel and local trained brigades</p> <p>Emergency messaging and communication between mines and CFA and others (weather conditions)</p> <p>Health protocols - Carbon monoxide plan</p> <p>Design of mine to hold contaminated water (2-4GL)</p> <p>Response equipment including water tankers, dozers, CFA units and people, water sprays</p> <p>Fire detection and suppression systems (CAFS – smoke management)</p> <p>Resources management of personnel</p> <p>Engagement – community/stakeholders</p> <p>Water runoff controls/water quality discharge</p> <p>Controls primarily owned by others:</p> <p>Emergency response/crisis management plan – (Regional EMT)</p> <p>External communications with the community – “responding agency” (CFA)</p> <p>Regional Emergency Management Team (Emergency Management Victoria)</p> <p>Health monitoring (DHHS)</p> <p>Municipal fire management plan (MEMP) – Latrobe City Council</p> <p>External agency evacuation protocols (CFA/VicPol/Regional EMT)</p> <p>State Government Disaster Plan</p>	Rare	Major	Low						



## Latrobe Valley Mine Fire Risk Register

Job Name:	Latrobe Valley Mine Fire Risk Assessment	Job No:	31/32659	Client:	EnergyAustralia - Yallourn GDF Suez - Hazelwood AGL - Loy Yang	Date:	17-Apr-15	Document Status:	Rev 4 Issued				
Reference No	Incident	Outcome	Existing Control Measures		Initial Risk Rating			Additional Control Measures and Treatments		Residual Risk Rating			Comments
			Preventative	Mitigating	Likelihood	Consequence	Risk Rating	Preventative	Mitigating	Likelihood	Consequence	Risk Rating	
3	Due to a large scale Latrobe Valley Mine fire occurring for greater than a week in duration in proximity to community under conditions of high temperatures, high winds	Results in acute safety impact - Off-site fatality or life threatening injury	Mine planning Buffer zones Fuel reduction Fire management plan Emergency management liaison and communications Weather monitoring Maintenance systems Permit to work procedures Design standards/codes for electrical/mechanical systems Surveillance – patrols and CCTV Inspection/monitoring of operational areas Capping/rehabilitation of coal Internal fire service teams and equipment response	<u>Controls primarily owned by the mine:</u> Water system/supply Onsite personnel - competent and trained response team Emergency services personnel and local trained brigades Emergency messaging and communication between mines and CFA and others (weather conditions) Health protocols - Carbon monoxide plan Design of mine to hold contaminated water (2-4GL) Response equipment including water tankers, dozers, CFA units and people, water sprays Fire detection and suppression systems (CAFS – smoke management) Resources management of personnel Engagement – community/stakeholders Water runoff controls/water quality discharge  <u>Controls primarily owned by others:</u> Emergency response/crisis management plan – (Regional EMT) External communications with the community – “responding agency” (CFA) Regional Emergency Management Team (Emergency Management Victoria) Health monitoring (DHHS) Municipal fire management plan (MEMP) – Latrobe City Council External agency evacuation protocols (CFA/VicPol/Regional EMT) State Government Disaster Plan	Rare	Critical	Medium						
4	Due to a large scale Latrobe Valley Mine fire occurring for greater than a week in duration in proximity to community under conditions of high temperatures, high winds	Results in chronic health impact - exposure to hazard that could cause injuries or health effects requiring treatment by a physician or hospitalisation	Mine planning Buffer zones Fuel reduction Fire management plan Emergency management liaison and communications Weather monitoring Maintenance systems Permit to work procedures Design standards/codes for electrical/mechanical systems Surveillance – patrols and CCTV Inspection/monitoring of operational areas Capping/rehabilitation of coal Internal fire service teams and equipment response	<u>Controls primarily owned by the mine:</u> Water system/supply Onsite personnel - competent and trained response team Emergency services personnel and local trained brigades Emergency messaging and communication between mines and CFA and others (weather conditions) Health protocols - Carbon monoxide plan Design of mine to hold contaminated water (2-4GL) Response equipment including water tankers, dozers, CFA units and people, water sprays Fire detection and suppression systems (CAFS – smoke management) Resources management of personnel Engagement – community/stakeholders Water runoff controls/water quality discharge  <u>Controls primarily owned by others:</u> Emergency response/crisis management plan – (Regional EMT) External communications with the community – “responding agency” (CFA) Regional Emergency Management Team (Emergency Management Victoria) Health monitoring (DHHS) Municipal fire management plan (MEMP) – Latrobe City Council External agency evacuation protocols (CFA/VicPol/Regional EMT) State Government Disaster Plan	Rare	Moderate	Low						Long term health study (currently underway) - DHHS



## Latrobe Valley Mine Fire Risk Register

Job Name:	Latrobe Valley Mine Fire Risk Assessment	Job No:	31/32659	Client:	EnergyAustralia - Yallourn GDF Suez - Hazelwood AGL - Loy Yang	Date:	17-Apr-15	Document Status:	Rev 4 Issued				
Reference No	Incident	Outcome	Existing Control Measures		Initial Risk Rating			Additional Control Measures and Treatments		Residual Risk Rating			Comments
			Preventative	Mitigating	Likelihood	Consequence	Risk Rating	Preventative	Mitigating	Likelihood	Consequence	Risk Rating	
5	Due to a large scale Latrobe Valley Mine fire occurring for greater than a week in duration in proximity to community under conditions of high temperatures, high winds	Results in chronic health impact - Psychosocial illnesses  (Note: Without the benefit of supplementary detailed assessments from studies currently being undertaken in the community, this risk was unable to be assessed.)	Mine planning Buffer zones Fuel reduction Fire management plan Emergency management liaison and communications Weather monitoring Maintenance systems Permit to work procedures Design standards/codes for electrical/mechanical systems Surveillance – patrols and CCTV Inspection/monitoring of operational areas Capping/rehabilitation of coal Internal fire service teams and equipment response	<u>Controls primarily owned by the mine:</u> Water system/supply Onsite personnel - competent and trained response team Emergency services personnel and local trained brigades Emergency messaging and communication between mines and CFA and others (weather conditions) Health protocols - Carbon monoxide plan Design of mine to hold contaminated water (2-4GL) Response equipment including water tankers, dozers, CFA units and people, water sprays Fire detection and suppression systems (CAFS – smoke management) Resources management of personnel Engagement – community/stakeholders Water runoff controls/water quality discharge  <u>Controls primarily owned by others:</u> Emergency response/crisis management plan – (Regional EMT) External communications with the community – “responding agency” (CFA) Regional Emergency Management Team (Emergency Management Victoria) Health monitoring (DHHS) Municipal fire management plan (MEMP) – Latrobe City Council External agency evacuation protocols (CFA/VicPol/Regional EMT) State Government Disaster Plan	Not scored or assessed					Not scored or assessed			DHHS are responsible for monitoring impacts on the community
6	Due to a large scale Latrobe Valley Mine fire occurring for greater than a week in duration in proximity to community under conditions of high temperatures, high winds	Results in environmental impact - Air pollution	Mine planning Buffer zones Fuel reduction Fire management plan Emergency management liaison and communications Weather monitoring Maintenance systems Permit to work procedures Design standards/codes for electrical/mechanical systems Surveillance – patrols and CCTV Inspection/monitoring of operational areas Capping/rehabilitation of coal Internal fire service teams and equipment response	<u>Controls primarily owned by the mine:</u> Water system/supply Onsite personnel - competent and trained response team Emergency services personnel and local trained brigades Emergency messaging and communication between mines and CFA and others (weather conditions) Health protocols - Carbon monoxide plan Design of mine to hold contaminated water (2-4GL) Response equipment including water tankers, dozers, CFA units and people, water sprays Fire detection and suppression systems (CAFS – smoke management) Resources management of personnel Engagement – community/stakeholders Water runoff controls/water quality discharge  <u>Controls primarily owned by others:</u> Emergency response/crisis management plan – (Regional EMT) External communications with the community – “responding agency” (CFA) Regional Emergency Management Team (Emergency Management Victoria) Health monitoring (DHHS) Municipal fire management plan (MEMP) – Latrobe City Council External agency evacuation protocols (CFA/VicPol/Regional EMT) State Government Disaster Plan	Unlikely	Minor	Low						



## Latrobe Valley Mine Fire Risk Register

Job Name:	Latrobe Valley Mine Fire Risk Assessment	Job No:	31/32659	Client:	EnergyAustralia - Yallourn GDF Suez - Hazelwood AGL - Loy Yang	Date:	17-Apr-15	Document Status:	Rev 4 Issued				
Reference No	Incident	Outcome	Existing Control Measures		Initial Risk Rating			Additional Control Measures and Treatments		Residual Risk Rating			Comments
			Preventative	Mitigating	Likelihood	Consequence	Risk Rating	Preventative	Mitigating	Likelihood	Consequence	Risk Rating	
7	Due to a large scale Latrobe Valley Mine fire occurring for greater than a week in duration in proximity to community under conditions of high temperatures, high winds	Results in environmental impact - Land degradation	Mine planning Buffer zones Fuel reduction Fire management plan Emergency management liaison and communications Weather monitoring Maintenance systems Permit to work procedures Design standards/codes for electrical/mechanical systems Surveillance – patrols and CCTV Inspection/monitoring of operational areas Capping/rehabilitation of coal Internal fire service teams and equipment response	<u>Controls primarily owned by the mine:</u> Water system/supply Onsite personnel - competent and trained response team Emergency services personnel and local trained brigades Emergency messaging and communication between mines and CFA and others (weather conditions) Health protocols - Carbon monoxide plan Design of mine to hold contaminated water (2-4GL) Response equipment including water tankers, dozers, CFA units and people, water sprays Fire detection and suppression systems (CAFS – smoke management) Resources management of personnel Engagement – community/stakeholders Water runoff controls/water quality discharge  <u>Controls primarily owned by others:</u> Emergency response/crisis management plan – (Regional EMT) External communications with the community – “responding agency” (CFA) Regional Emergency Management Team (Emergency Management Victoria) Health monitoring (DHHS) Municipal fire management plan (MEMP) – Latrobe City Council External agency evacuation protocols (CFA/VicPol/Regional EMT) State Government Disaster Plan	Unlikely	Minor	Low						
8	Due to a large scale Latrobe Valley Mine fire occurring for greater than a week in duration in proximity to community under conditions of high temperatures, high winds	Results in environmental impact - Water contamination	Mine planning Buffer zones Fuel reduction Fire management plan Emergency management liaison and communications Weather monitoring Maintenance systems Permit to work procedures Design standards/codes for electrical/mechanical systems Surveillance – patrols and CCTV Inspection/monitoring of operational areas Capping/rehabilitation of coal Internal fire service teams and equipment response	<u>Controls primarily owned by the mine:</u> Water system/supply Onsite personnel - competent and trained response team Emergency services personnel and local trained brigades Emergency messaging and communication between mines and CFA and others (weather conditions) Health protocols - Carbon monoxide plan Design of mine to hold contaminated water (2-4GL) Response equipment including water tankers, dozers, CFA units and people, water sprays Fire detection and suppression systems (CAFS – smoke management) Resources management of personnel Engagement – community/stakeholders Water runoff controls/water quality discharge  <u>Controls primarily owned by others:</u> Emergency response/crisis management plan – (Regional EMT) External communications with the community – “responding agency” (CFA) Regional Emergency Management Team (Emergency Management Victoria) Health monitoring (DHHS) Municipal fire management plan (MEMP) – Latrobe City Council External agency evacuation protocols (CFA/VicPol/Regional EMT) State Government Disaster Plan	Rare	Minor	Low						

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Document Status

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		Name	Signature	Name	Signature	Date
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