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International Power Hazelwood

September 2008 Mine Fire Incident Investigation Report

November 2008





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Appendices

- A Review of Recommendations of October 2006 Fire
- B Improvements to the ICP Facilities
- C Brainstorming Session Minutes
- D Glossary



1. Executive Summary

1.1 Incident Cause Analysis Method (ICAM) Investigation Process

The ICAM investigation involved the following key stages:

- ▶ The Incident Investigation Leader, Simon Casey, conducted interviews with relevant stakeholders including IPRH employees and contractors and CFA, gathering relevant facts to understand the mine fire incident and the events which led to the incident. Interviews were conducted at the mine site between the 25th September '08 and 17th of October '08.
- ▶ Once all relevant data had been collected, it was correlated into a Timeline chart (Refer to Section 7) to depict the sequences of events leading to the mine fire incident. Key events from the Timeline chart were examined to determine the contributing factors.
- ▶ The ICAM analysis was undertaken to classify the events with contributing factors and underlying causes into one of the four ICAM categories: Organisational factors, Task/Environmental Conditions, Individual/Team Actions and Absent/Failed Defences.
- ▶ Recommendations for preventative and corrective actions were developed by reviewing each contributing factor and underlying causes, depicted in the ICAM charts.
- ▶ A review of the recommendations contained in the October 2006 Mine Fire Investigation report was also conducted to establish progress on lessons learned. Refer to Appendix A.
- ▶ A brainstorming session was held with IPRH personnel to identify potential step change and left field improvements to the Prevention, Preparation, Detection Initial and Emergency Response phases. Refer to Appendix D.

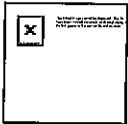
1.2 Immediate Cause and Escalation

Based on information collected during interviews from the ICAM investigation process and from document investigations of previous fires in a similar area, it is very likely that the cause of the fire was a pre-existing geological hotspot in a non-operational area of the mine that flared up and was exacerbated by the batters being exposed to strong north-westerly winds.

Whilst reducing the likelihood of future initial causes from a range of sources is important, the threat of fires is constant with the IPRH Open Cut Mine experiencing approximately 100 small fires per year.

It is essential that IPRH are able to mount a decisive initial response to prevent small fires escalating into large fires. This is particularly important out of normal work hours when manning levels are very low. It takes CFA up to 2 hours to mobilise a full response of sufficient resources to combat significant fire at IPRH.

The significant factor in this fire was the escalation of a fire into an uncontrollable fire within a short time due to the inability of the IPRH personnel to mount an effective initial response as the non-operational areas have very difficult access and there were insufficient fire-fighting facilities available.



1.3 Recommendations

The following recommendations were identified and are covered in more detail in Section 6.

1. IPRH to consider updating their command structure to better reflect CFA structure
2. IPRH to assume "deputy" roles equivalent to the CFA roles in a CFA run incident response.
3. IPRH ER Team members to undergo CFA Incident Control System (ICS) training to better understand the CFA ICS process.
4. IPRH ER Team to undertake regular fire emergency exercises in conjunction with CFA.
5. IPRH ER personnel should utilise a handover form and log sheet similar to that of the CFA.
6. Allocate IPRH personnel to CFA strike teams.
7. Develop a mine safety briefing video and coal mine fire fighting techniques video.
8. The annual audit of the fire system must include non-operational areas.
9. Access to non-operational areas should be included in the annual audit.
10. A risk assessment should be undertaken on the non-operational areas to determine if further prevention work is required. The risk assessment should include a Cost/ Benefit Analysis.
11. Improve shift changeover process in conjunction with CFA
12. Further clarification on when to call the CFA.
13. A number of potential improvements were identified to the ICP at the Training Centre and should be considered.
14. A number of potential improvements were identified to the fire fighting equipment and PPE and should be considered.
15. Train a number of Elite Fire Fighters on each shift in advanced coal mine fire fighting techniques.
16. Pre-existing geological hot spots need to be better monitored.
17. Review selection criteria for purchasing Thermal Imaging cameras.
18. Maintain a electronic register of check-in/ check-out and use to assist in monitoring fatigue and CO exposure
19. Streamline the Carbon Monoxide (CO) monitoring process.
20. Consider developing an IPRH Welfare Officer role.
21. Managing roads, access and civil infrastructure should be allocated to an Emergency Response role, either combined with other civil activities or a separate Access Officer role.
22. Use of Power Station or Administration staff in specific roles.
23. Information Technology (IT) officer onsite during initial establishment of the ICP.
24. Review status of Recommendations from October 2006 fire investigation.



1.4 Commendable Activities

The following activities undertaken during the incident were noted and commended:

- ▶ The level of fire fighting effort and dedication shown by all IPRH personnel and contractors during the initial response was very commendable. The role played by the maintenance alliance partners (in general plus RTL in particular) should be emphasised.
- ▶ Coal production and power station operation was maintained throughout the incident.
- ▶ The clear objective throughout the response was to contain the fire to the non-operational areas of the mine and it did not pose a threat offsite or to other mine areas.
- ▶ The cranes and the excavator-mounted monitors were very effective in fighting the fire.
- ▶ The effort involved in establishing the ICP in the two years since the last fire was very commendable. As was the level of thought that has been implemented. This report identifies a number of further improvements, but the significance of the work done to date cannot be over emphasised.
- ▶ Establishing a command response and implementing a strategic response was significantly improved compared to previous fires.



2. Terms of Reference

2.1 Scope

This document outlines the outcomes from the independent incident investigation undertaken for the mine fire at the International Power Hazelwood Open-Cut Coal Mine between the 14th and the 22nd September '08.

The contributing factors and underlying causes leading to the mine fire are documented in order to assist in identifying what led to the event so that effective preventative and corrective actions can be implemented to prevent reoccurrence.

2.2 Terms Of Reference for Incident Investigation

2.2.1 Objectives

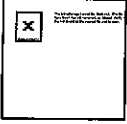
- ▶ Identify the initial cause(s) of the incident (in conjunction with the CFA);
- ▶ Identify the sequence of events and reasons for escalation;
- ▶ Assess the operational response and identify recommendations for further improvement;
- ▶ Review the recommendations from the October 2006 Incident Investigation.

2.2.2 Incident Investigation Process

The incident investigation process was based on the Incident Cause Analysis Method (ICAM), which is widely used in the mining and transportation industries.

The stages in the ICAM investigation process are:

1. Immediate Actions
2. Investigation Planning
3. Data Collection
4. Data Organisation
5. ICAM Analysis
6. Preventative and Corrective Actions
7. Reporting the Findings



Key outcomes of Incident Investigation process

- ▶ Establish the facts surrounding the event;
- ▶ Identify the initial cause(s) of the fire in conjunction with the CFA;
- ▶ Identify contributing factors and underlying causes;
- ▶ Review the adequacy of existing controls and procedures;
- ▶ Review the operational response in light of improvements to the ICP and procedures;
- ▶ Review the status of actions implemented from the recommendations from the October 2006 Incident Investigation;
- ▶ Determine whether the completed actions fulfil the intent of the original recommendations.
- ▶ Recommend further preventative and corrective actions;
- ▶ Undertake the investigation in a manner that does not apportion blame or liability.

2.2.3 Incident Investigation Structure and Responsibilities

Investigation Leadership Team

The Investigation Leadership Team comprises:

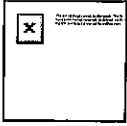
- ▶ Sponsor – Graeme York, CEO
- ▶ IPRH Contact – Ian Quail, Mine Director
- ▶ Main Contact – Romeo Prezioso, Fire Services Officer
- ▶ Other members as deemed appropriate.

The responsibilities of the Investigation Leadership Team are to:

- ▶ Agree the Terms of Reference of the investigation on behalf of IPRH;
- ▶ Ensure sufficient site resources are made available at the relevant priority for the investigation;
- ▶ Ensure that the investigation is implemented in a no blame manner and with due regard to confidentiality;
- ▶ Comment on and sign-off on the final report;
- ▶ Present the final report, findings and recommendations to the IPRH Board;
- ▶ Review, consider and, where appropriate, implement the findings and recommendations of the incident investigation;
- ▶ Communicate as required
- ▶ Arrange an independent review of the report if considered desirable.

2.2.4 IPRH Resources

Romeo Prezioso will co-ordinate initial contacts to identify IPRH resources.



2.2.5 Incident Investigation Team

The Incident Investigation Team comprises:

- ▶ Incident Investigation Leader;
Simon Casey, GHD Risk Management Group, Melbourne
- ▶ Support and administration staff;
GHD Morwell Staff as required.

The responsibilities of the Incident Investigation Team are to:

- ▶ Undertake the investigation in a safe and responsible manner following site procedures where available;
- ▶ Brief the incident team members, IPRH Leadership Team, site management and employees, and relevant stakeholders in the incident investigation process;
- ▶ Undertake the incident investigation in a manner that does not apportion blame and pay due regard to confidentiality;
- ▶ Follow the incident investigation process;
- ▶ Communicate and consult appropriately with all relevant stakeholders;
- ▶ Produce all deliverables from the incident investigation.



3. Incident Description

3.1 Details of the Incident

Location: International Power Hazelwood Open-Cut Coal Mine

Date: 14th September 2008 (Sunday)

The following details the key events leading up to and during the incident.

At approximately 7.00, mine personnel coming on shift noted a smell of smoke but were unable to identify the source of the smell. Mine staff were alerted to the strong winds and presence of a smell of smoke. At approximately 9.00 it began to rain, which removed the smell of smoke.

At approximately 12.45, the Mine Team Leader spotted a fire of Level 5 around the stacker dump and notified the Mine Control Centre.

The Mine Team Leader, Fire Services and Mine Shift Manager attended the site of the fire.

Identified that fire water supply was unavailable in the area and as it was clear that the site could not control the fire, the CFA were called and the Mine Shift Manager assumed the role of Emergency Commander.

Between 12.50 and 13.00 additional IPRH staff were notified and began to arrive onsite.

The CFA arrived onsite at approximately 13.00.

IPRH Production Manager arrived at 13.45 and assumed the role of Emergency Commander.

CFA Regional Duty Officer arrived at 14.15 and assumed the role of Incident Commander. The ICC was established at the Mine Control Centre at this point.

IPRH Mining Director arrived onsite at approximately 15.00 and assumed the role of Emergency Commander, to enable the IPRH Production Manager to return as Emergency Commander at 04.00.

The Incident Control Centre (ICC) was established at the IPRH Incident Control Point (ICP) by approximately 15.30.

3.2 Environmental conditions

Strong northwesterly winds were present during the morning of the 14th September. However, the conditions were not such that a Fire Alert should have been called. 3 mm of rain fell during the morning of the fire.

3.3 Pre-existing Geological Hotspot

The site of the fire is a pre-existing geological hotspot and as such a fire had occurred in the area on 30th December 2005 and had taken 3-4 days to control.

3.4 Fire Water Supply

At some stage prior to the September 2008 fire, the fire water pipe that supplied this section of the mine had been damaged and the fire water isolated. This was not known to the mine staff working on the day.



3.5 Health and Safety

IPRH personnel and contractors and CFA personnel suffered a number of first aid incidents during the fire fighting, including:

- ▶ Eye irritation
- ▶ Minor burns
- ▶ Headaches from dehydration and from exposure to carbon monoxide (CO)
- ▶ Mild hypothermia during night shift

No medical treatment injuries were notified to IPRH.

Whilst the number of injuries sustained by IPRH personnel and contractors and the CFA was relatively low, it was noted that some people were prepared to expose themselves to higher than acceptable risks. It should be emphasised that there is no job that is so important that people should take excessive risks.

3.6 Property Damage

IPRH to provide a summary



4. ICAM Analysis

ICAM analysis was undertaken to classify the sequence of events into one of the four ICAM categories: Organisational factors, Task/Environmental Conditions, Individual/Team Actions and Absent/Failed Defences. The results of the ICAM analysis are shown in the

Absent/Failed Defences

Defences are those measures designed to prevent the consequences of a human act or component failure producing an incident. Defences are equipment or procedures for detection, warning, recovery, containment, escape and evacuation, as well as individual awareness, protective equipment and rescue.

These failures result from inadequate or absent defences that failed to detect and protect the system against technical and human failures. These are the last minute measures that did not prevent the outcome of the incident or mitigate/reduce its consequences.

Task/Environmental Conditions

These are the conditions in existence immediately prior to or at the time of the incident that directly influence human and equipment performance in the workplace. These are the circumstances under which errors and violations took place and relate to task demands, the work environment, individual capabilities and human factors.

Individual/Team Actions

These are the errors or violations that led directly to the incident. They are typically associated with personnel such as operators or maintainers having direct contact with equipment or material. They are always committed 'actively' (someone did or didn't do something) and have a direct relation with the incident. For most of the time however, the defences built into our operations prevent these 'Human errors' from causing harm.

Organisational Factors

These are the underlying organisational factors that produce the conditions affecting performance in the workplace. They may lie dormant or undetected for a long time within an organisation. Their effect only becomes apparent when they combine with the local conditions and errors or violations to breach the system's defences.



5. Key Findings

5.1 Immediate cause

Based on information collected during interviews from the ICAM investigation process and from document investigations of previous fires in a similar area, it is very likely that the cause of the fire was a pre-existing geological hotspot in a non-operational area of the mine that flared up and was exacerbated by the batters being exposed to strong north-westerly winds.

Whilst reducing the likelihood of future initial causes from a range of sources is important, the threat of fires is constant with the IPRH Open Cut Mine experiencing approximately 100 small fires per year.

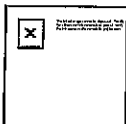
It is essential that IPRH are able to mount a decisive initial response to prevent small fires escalating into large fires. This is particularly important out of normal work hours when manning levels are very low. It takes CFA up to 2 hours to mobilise a full response of sufficient resources to combat significant fire at IPRH.

The significant factor in this fire was the escalation of a fire into an uncontrollable fire within a short time due to the inability of the IPRH personnel to mount an effective initial response as the non-operational areas have very difficult access and there were insufficient fire-fighting facilities available.

5.2 Commendable Activities

The following activities undertaken during the incident were noted and commended:

- ▶ The level of fire fighting effort and dedication shown by all IPRH personnel and contractors during the initial response was very commendable. The role played by the maintenance alliance partners (in general plus RTL in particular) should be emphasised.
- ▶ Coal production and power station operation was maintained throughout the incident.
- ▶ The clear objective throughout the response was to contain the fire to the non-operational areas of the mine and it did not pose a threat offsite or to other mine areas.
- ▶ The cranes and the excavator-mounted monitors were very effective in fighting the fire.
- ▶ The effort involved in establishing the ICP in the two years since the last fire was very commendable. As was the level of thought that has been implemented. This report identifies a number of further improvements, but the significance of the work done to date cannot be over emphasised.
- ▶ Establishing a command response and implementing a strategic response was significantly improved compared to previous fires.



6. Recommendations

Subsequent to the incident investigation many of the underlying causes related to the lack of review, implementation and adherence to organisational documentation including procedures, roles and responsibilities. Recommendations for preventative and corrective actions were developed to address deficiencies in system defences and organisational processes by reviewing each contributing factor and underlying cause, determined in the ICAM analysis.

Recommendation 1

- ▶ ***IPRH to consider updating their command structure to better reflect CFA structure***

Recommendation 2

- ▶ ***IPRH to assume "deputy" roles equivalent to the CFA roles in a CFA run incident response.***

Recommendation 3

- ▶ ***IPRH ER Team members to undergo CFA Incident Control System (ICS) training to better understand the CFA ICS process.***

Recommendation 4

- ▶ ***IPRH ER Team to undertake regular fire emergency exercises in conjunction with CFA.***

The integration of the IPRH ER personnel into a similar structure to the CFA made significant improvements in the co-ordination between IPRH and CFA. IPRH EC (Emergency Commander) assumed the role of Deputy IC (Incident Commander) and also established a Deputy Operations Officer role.

IPRH should review the AIIMS ICS (Australian Inter-service Incident Management System Incident Control System) as established by the Australasian Fire Authorities Council (AFAC).

Better alignment between IPRH and CFA will also assist in resolving issues relating to naming of sectors to correspond to mine areas.

Exercising is a critical part of an Emergency Response process and should reflect the typical emergency scenarios that are prevalent at the site. Exercises relating to the management of fires and the integration between IPRH and CFA personnel should be run at regular intervals.

Recommendation 5

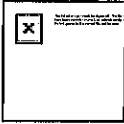
- ▶ ***IPRH ER personnel should utilise a handover form and log sheet similar to that of the CFA.***

The CFA keep very extensive handover note and logs focussed on key missions and objectives. IPRH handovers tended to focus on what was being done rather than passing over a key message and objectives.

Recommendation 6

- ▶ ***Allocate IPRH personnel to CFA strike teams.***

A recommendation from the previous fire investigation was that the allocation of IPRH personnel to CFA strike teams was effective and should be undertaken during future incidents. This recommendation was written into the Emergency Response Plan but was not undertaken initially during the September 2008



fire. The responsibility of allocating IPRH personnel to CFA strike teams should be allocated to the Deputy Operations Officer role. Having an IPRH person allocated to a CFA strike team will also ease the issue relating to multiple radio systems.

Recommendation 7

- ▶ ***Develop a mine safety briefing video and coal mine fire fighting techniques video.***

CFA fire fighters are generally inexperienced in fighting coal mine fires. A video should be developed showing the key techniques and shown on a television in the rest room at the ICP for CFA personnel awaiting briefings or on breaks.

Recommendation 8

- ▶ ***The annual audit of the fire system must include non-operational areas.***

Recommendation 9

- ▶ ***Access to non-operational areas should be included in the annual audit.***

Recommendation 10

- ▶ ***A risk assessment should be undertaken on the non-operational areas to determine if further prevention work is required. The risk assessment should include a Cost/ Benefit Analysis.***

A critical element of the initial response and the ongoing emergency response was the lack of fire water supply to the non-operational areas and the restrictions in access due to the condition of the roads, the accumulation of debris and that some batters did not have road access.

The annual audit should include fire water supply to non-operational areas, access and housekeeping.

A range of options were identified in the brainstorming session (refer Appendix B) in terms of prevention of hot spots from reigniting and detection of hotspots.

Recommendation 11

- ▶ ***Improve shift changeover process in conjunction with CFA***

The CFA took up to 3 hours for shift changeover, which was undertaken away from the fire causing significant lost time in fighting fires.

There were also issues in relation to the most effective time for shift changeover of maintenance alliance partners.

The shift changeover process and timings should be discussed with CFA and maintenance alliance contractors in advance and the co-ordination of this process allocated to the Planning role.

Recommendation 12

- ▶ ***Further clarification on when to call the CFA.***

A recommendation from the previous fire investigation was that a process was established to notify the CFA. This was not an issue during the September 2008 fire, but there is still some confusion, both within IPRH and also within CFA.



Recommendation 13

- ▶ ***A number of potential improvements to the ICP at the Training Centre were identified and should be considered.***

Refer to Appendix B

Recommendation 14

- ▶ ***A number of potential improvements to fire fighting equipment were identified and should be considered.***

Refer to Appendix C

Recommendation 15

- ▶ ***Train a number of Elite Fire Fighters on each shift in advanced coal mine fire fighting techniques.***

A number of key techniques were identified in the September 2008 and October 2006 fires that may be lost unless those people are involved in the next fire. Developing a team of Elite Fire Fighters would assist in maintaining those techniques within the corporate memory. The Elite Fire Fighter training should be used to develop the coal mine fire fighting video.

Suggestions to consider are:

- The importance of the decisive initial response
- Containment if the initial response fails
- How to fight fires in conjunction with the CFA (Strike teams, etc)
- Creating fire curtains by removing a limited number of spray heads
- Use of crane mounted monitors
- Use of excavator-mounted hoses / monitors
- Equipment sourced from other sites (eg Ground Monitors from Esso Longford)

Recommendation 16

- ▶ ***Pre-existing geological hot spots need to be better monitored.***

The source of the September 2008 fire was very likely to be a pre-existing geological hotspot. The location is in the same area as the fire in December 2005, which was extensively covered in clay. Better monitoring processes need to be developed. Hot spots in non-operational areas have an added complexity due to the difficulty in access. Monitoring should consider:

- Records / history of hotspots
- Remote monitoring devices such as Thermal Imaging
- Local monitoring devices such visual inspection or buried temperature gauges (eg thermocouples)



Recommendation 17

▶ ***Review selection criteria for purchasing Thermal Imaging cameras.***

Thermal imaging cameras can play a significant role in the detection of fires at IPRH and in assisting to extinguish fires. They are an expensive purchase and it is important that the objectives are considered in the purchase. Areas where thermal imaging could assist are:

- Determine if fire has been extinguished in an area
- Mounting on cranes to determine if fire is out as it takes a long time to relocate cranes if a fire restarts
- Monitoring hotspots remotely
- Detection of fires

Recommendation 18

▶ ***Maintain a electronic register of check-in/ check-out and use to assist in monitoring fatigue and CO exposure***

Recommendation 19

▶ ***Streamline the Carbon Monoxide (CO) monitoring process.***

Recommendation 20

▶ ***Consider developing an IPRH Welfare Officer role.***

Welfare of staff was well managed but always needs to be a priority in terms of food, water, fatigue, locality, safety, general health, CO exposure, stress, etc.

The Carbon Monoxide (CO) monitoring process needs to be streamlined and made more appropriate to an emergency response. During the September 2008 fire, personal CO monitors were activating frequently resulting in personnel leaving the work area immediately when they were not in any immediate danger and could have waited until their next break.

However, in a lot of cases, personnel who had been exposed to the fire for long periods were not reminded about health checks.

A Welfare Officer role should be considered either as a dedicated role or as a combined role. Their responsibilities would be to:

- Ensure Health checks and CO monitoring is undertaken;
- Routinely check that personnel are getting sufficient breaks and monitor fatigue levels;
- Ensure personnel located away from the mine or ICP (eg stores, etc) receive meals, breaks, etc;
- Review general health and safety activities.



Recommendation 21

- ▶ ***Managing roads, access and civil infrastructure should be allocated to an Emergency Response role, either combined with other civil activities or a separate Access Officer role.***

Recommendation 22

- ▶ ***Use of Power Station or Administration staff in specific roles.***

Recommendation 23

- ▶ ***Information Technology (IT) officer onsite during initial establishment of the ICP.***

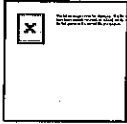
There are a number of roles that are part of the Emergency Response team that do not require mine knowledge and may be better undertaken by other personnel allowing the mine personnel to use their knowledge in a more operational role.

The potential roles that could be resourced from the Power Station or from the support departments (eg mine admin, power station admin, procurement etc) should be identified in advance. Typical roles could be CO monitoring, supplies and logistics, etc.

Recommendation 24

- ▶ ***Review status of recommendations from October 2006 fire investigation.***

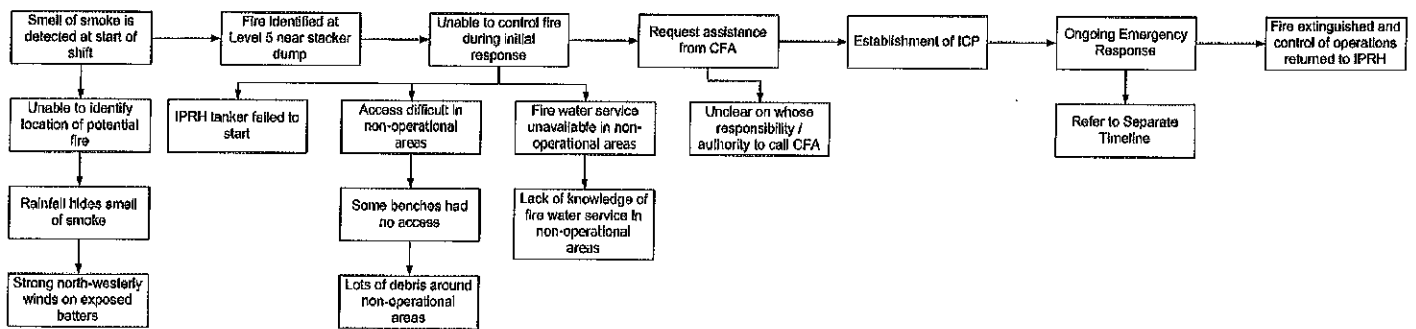
Refer to Appendix A.



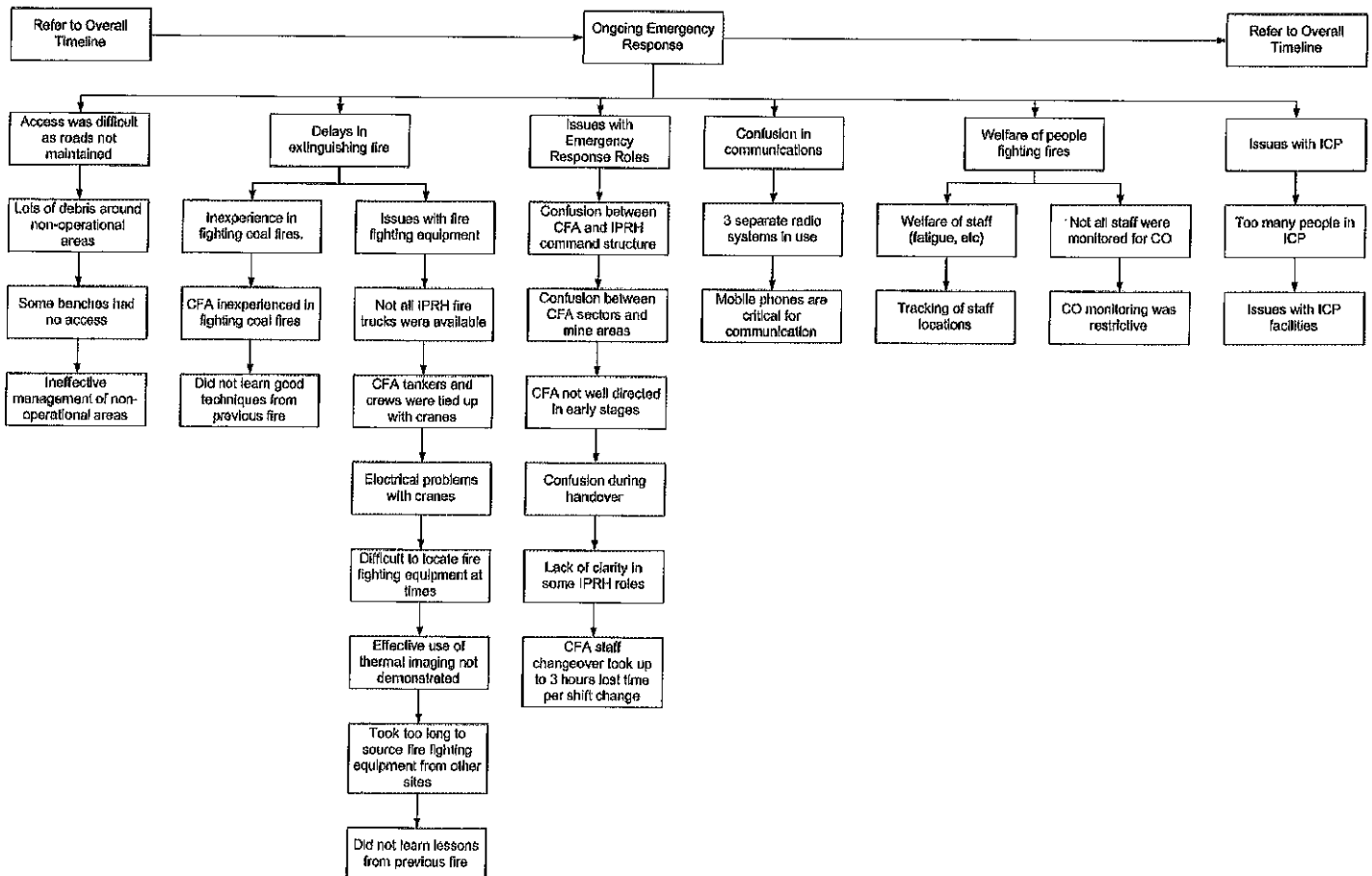
7. Timeline Chart

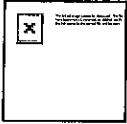
A timeline chart has been developed depicting the separate sequence of events and contributing factors that led to the incident.

TIMELINE CHART – OVERALL TIMELINE



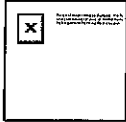
TIMELINE CHART – ONGOING EMERGENCY RESPONSE





Appendix A
Review of Recommendations of October
2006 Fire





Review of Recommendations of October 2006 Fire

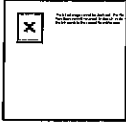
Recommendations from the October 2006 IPRH mine fire investigation		Comparison with the September 2008 IPRH mine fire investigation
1	In July of each year, a plan should be developed for the upcoming fire season based on weather predictions and mine conditions. Note that with the current conditions, a fire season may need to be designated from October to March.	Recommendation has been completed.
2	An annual audit of the fire system should be undertaken prior to the start of the fire season in accordance with the fire season plan (Refer to Recommendation 1). The audit should review all aspects of the fire service facilities, systems and procedures. This should include hardware, documentation (eg. emergency response plans), fire pumps and electrical supply, spray coverage of coal levels and fire fighting training, etc.	Recommendation has been completed. However, it should be noted that there were significant issues with the fire water supply to the non-operational areas that contributed to the 2008 fire.
3	Predefined conditions should be identified to assist in determining whether a Fire Alert should be declared. The criteria should not be based solely on CFA Total Fire Bans as the CFA criteria includes factors relating to conditions that are not applicable to an open-cut coal mine. These conditions should include ranges in temperature, humidity, wind direction or speed that can define 'severe weather conditions'.	Recommendation has been completed.
4	Fire Alert processes are understood but are not always fully complied with. As the Fire Alert is a critical control to prevent fires, the procedures including roles and responsibilities should be reviewed, updated, reiterated and enforced for mine personnel.	Recommendation has been completed. Although this was not relevant to the 2008 fire, it should be noted that there is still some confusion amongst the maintenance alliance partners as to their role in a fire alert.





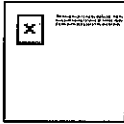
5	<p>Roles and responsibilities of Fire Services and personnel to support Fire Services during a Fire Alert and in an incident should be reviewed. The review should cover the responsibilities and tasks required by the Fire Services Group including the Fire Services Officer, Supervisor and Operators for the normal daily tasks, during a Fire Alert and during an incident. The review should also cover which mine personnel or contractors would provide a valuable and effective resource to support Fire Services during a Fire Alert and an incident dependent on their roles and responsibilities. For instance, utilising the maintenance crew for additional fire spotting after a Fire Alert has been declared. Refer to Appendix D for Organisational responsibilities in Fire Prevention.</p>	<p>Recommendation has been completed.</p>
6	<p>Interface and communications between Operations, Fire Services and Maintenance needs to be reviewed in terms of fire systems, particularly in relation to the power supply for the fire pumps.</p>	<p>Recommendation has been completed.</p> <p>Although it was not an issue in the 2008 fire, the process was followed.</p>
7	<p>Roles, responsibilities and procedures outlined within the IPRH Emergency Response Plan should be reviewed and rewritten utilising a checklist approach so that each person undertaking an emergency role can confirm that they are undertaking their key activities.</p>	<p>Recommendation has been completed.</p> <p>It should be noted that the role checklist are quite high level and could be improved to assist the ER roles.</p>
8	<p>In a significant fire, each coal level should be treated as a fire zone and a Zone leader allocated after consultation with the CFA.</p>	<p>Recommendation has been completed within the Emergency Response Plan but was not well executed during the 2008 fire.</p>
9	<p>Once it has been determined that there is a significant fire, all supervisors should return to the ICP for a briefing and to undertake a role of co-ordinating the fire teams. A co-ordinated approach to fighting fires is more effective than just large numbers of fire fighters.</p>	<p>Recommendation has been completed.</p> <p>This was a significant improvement during the 2008 fire.</p>





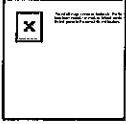
10	The ICP should continue to be established as a special facility separate from normal operations or mine activities. The ICP should have available all essential equipment required for an emergency response, that is easily and quickly accessible; and able to be transported to any onsite facility. This equipment may be available as a mobile 'kit'.	ICP established. The completion of this recommendation contributed significantly to the management of the 2008 fire.
11	IPRH should consider notifying the CFA immediately once a spot fire has been reported and verified on site. The CFA remains on alert for a nominated amount of time (eg. 15 minutes). Within this time frame they must receive further notification from the site that the fire has been extinguished otherwise they will send out an initial response crew in anticipation that the fire has escalated and requires their assistance. This practice is undertaken at other mines in Latrobe Valley.	Recommendation has been completed. It should be noted that some confusion still exists within IPRH and also within CFA as to when the CFA should be notified.
12	The IPRH Significant Issue Corporate Response Plan and the IP Corporate Serious Incident Procedure should be reviewed and updated to ensure there are no discrepancies and the IPRH Emergency Response Plan should be consistent with the IPRH Significant Issue Corporate Response Plan.	Not an issue with the 2008 fire
13	Work procedures and practices within the 'Mine Fire Service Policy and Code of Practice' and the 'Fire Instructions' should be systematically reviewed and updated.	Recommendation has been completed.
14	Whilst it should be recognised that the priority is to ensure that sufficient water is used to control the spread of fires, particularly to ensure no burning coal is transferred to the power station, mine operations should be trained to understand the effects of excessive water transferred to the power station.	Recommendation has been completed however, it was not relevant to the 2008 fire
15	The use of thermal imaging cameras and other technology in the detection of faulty idlers should be investigated for their application and used where appropriate.	Recommendation has been completed however, it was not relevant to the 2008 fire
16	The use of thermal imaging cameras was effective during the fire fighting and should be considered as well as other technology for wider use in spotting fires within the mine.	Action has been completed but use of thermal imaging could be extended further





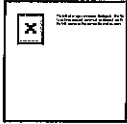
17	A procedure for dealing with Carbon Monoxide (CO) during fire fighting, including the use of CO monitors, should be developed since personnel safety is a major responsibility and concern in fighting coal fires. .	This is still an ongoing issue although a number of actions have been completed.
18	Whilst the efforts of all mine, contractor and CFA personnel are highly commended in their assistance with the fire fighting, it should be emphasised and reinforced to all personnel that no job is so important that they should take excessive risks.	This has been completed but should again be re-emphasised
19	Allocating IPRH operations staff to CFA strike teams during a fire should be included within IPRH procedures (eg. Emergency Response Plan and/or Fire Instructions) and reinforced so that it becomes normal practice.	Recommendation has been completed within the Emergency Response Plan but was not well executed during the 2008 fire.
20	To ensure that the ongoing efficient operations of the mine are not compromised over the long term as a result of the fire incident, a detailed risk analysis should be carried out to assess the life cycle impact of the fire on maintenance costs and longevity of the mine infrastructure assets.	Refers to the original incident only





Appendix B
Improvements to the ICP Facilities





Improvements to the ICP Facilities

The following items should be considered as improvements to the ICP at the Training Centre if appropriate.

1. Check in check out area needs to be redesigned to reduce number of people accessing the Command Centre
2. Issues around hot water for showers
3. Ensure all powerpoints and phones are working at the ICP
4. Consider photocopier or colour printer for ICP
5. Consider outside power points for catering
6. Consider outside covered area for preparing food
7. Better heating in back room and ability to dry wet clothes
8. TV in back room for entertainment and for fire fighting video
9. Improved parking and traffic control around ICP during changeover
10. More seating in rest room
11. Eskies on wheels to keep drinks cool
12. More frequent cleaning of ICP during emergency
13. Consider fire protection and evacuation of ICP if fire escalated to that area

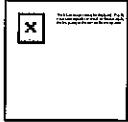




Appendix C

Improvements to Fire Fighting Equipment





Improvements to Fire Fighting Equipment

The following items should be considered as improvements to fire fighting equipment if appropriate.

1. IPRH to source pumper trailers for cranes so not to tie up a CFA tanker and crew
2. IPRH should consider ground monitors similar to Esso Longford
3. All fire fighting equipment should be stored at a single place so people know where to obtain it
4. Improved PM on fire trucks and equipment
5. Consider GPS trackers on major equipment
6. Keep a register of fire fighting equipment available elsewhere (eg Loy Yang, Esso Longford)
7. Improvements to cranes in relation to electrical problems due to exposure to water identified during the September 2008 fire need to be undertaken





Appendix D
Brainstorming Session Minutes





Brainstorming Session Minutes

Phase: **Prevention**

Although IPRH has a number of small hotspots per week, it is still important to prevent where possible, particularly in non-operational areas

Incremental improvements to existing processes:

- ▶ Better housekeeping
- ▶ Isolation of heat sources
 - Improve guidelines/procedure for pre start clean
- ▶ Mine planning needs to take into account fire planning inc access and pipes (not possible for old areas)

New or significant improvements to existing processes:

- ▶ Cover the old coal faces with:
 - Water
 - Clay
 - Polymers
- ▶ Isolation of heat sources
 - Thermal imaging of faulty equipment (Camera being installed)
 - Authorised vehicle sticker for mobile plant and vehicles
 - Portable vehicle wash down facilities at coal face

Left field ideas and suggestions from other sites/ industries:

- ▶ Put a tent over the mine
- ▶ Underground mining
- ▶ Bring forward rehabilitation





Phase: Preparation

A number of processes and systems need to be in place and reviewed regularly so they are ready to be activated in the event of a fire

Incremental improvements to existing processes:

- ▶ Fire alert:
 - Calling of alert needs to take into account pre-fires
 - Fire Alert Controller role needs to be created. Co-ordinate with ops shift
 - Roles for fire watch: improved process for deploying maintenance alliance partners during alert – decide if maintenance supervisor should contact fire alert controller during a fire alert or vice versa

New or significant improvements to existing processes:

- ▶ Consider emergency containers for initial response and decide whether to locate at strategic points OR all in one central location
- ▶ Sprays on old coal
- ▶ Locate water pipes along the edge of batters & remove bunds (pipe becomes the safety barrier) & profile road to divert water across the road & down the batter
- ▶ Review type/quantity of monitors
- ▶ Determine required number of pumper trailers for cranes, excavators, monitors, etc.

Left field ideas and suggestions from other sites/ industries:

- ▶ Consider options for containment lines:
 - Fire blanket (eg Geotech fabric)
 - Clay
 - Paddocking of batters
- ▶ Large diameter lay flat hose
- ▶ Consider use of plastic pipe and compare costs of steel versus plastic large diameter pipe
- ▶ Deluge on batters
- ▶ Deluge for electrical systems
- ▶ Test foam/ polymers on batters, etc.





Phase: Detection and Monitoring

The nature of the hot spots/ fires means that it is not always possible to identify when a fire starts or where there is a hot-spot beneath the coal surface

Monitoring of conditions to enable a response to flare ups immediately post the fire and ongoing monitoring of known hot-spots

Incremental improvements to existing processes:

- ▶ Fire watchers

New or significant improvements to existing processes:

- ▶ Thermal imaging to detect fires. Determine how many and required performance. Consider integrating the monitoring into fire systems.

Left field ideas and suggestions from other sites/ industries:

- ▶ Fusible plastic pipe (similar to bunker conveyors)
- ▶ Buried thermo couples for hot spots
- ▶ Smoke/CO monitors





Phase: Initial Response

The initial response is the critical response in all IPRH fires. It is during the initial response that a small hot spot can be controlled to mitigate it from becoming a fire that requires external assistance.

The initial response should be fast and hard.

Incremental improvements to existing processes:

- ▶ Better use of Emergency Response Trailer & other equipment
- ▶ Better management of vehicles in area of initial response
- ▶ Clearer delegation to request assistance, both internal IPRH and CFA

New or significant improvements to existing processes:

- ▶ Fast and hard response
 - Use of 30T tankers
 - Pumper trailers for cranes and monitors
- ▶ Initial Response Command Structure
 - Emergency Commander to control from a distance, not at the fire (Emergency Commander jacket to remain in control room)
 - Zone commander to provide the fire fighting response (Zone Commander jacket in vehicle)
- ▶ Containment curtain to be deployed if required

Left field ideas and suggestions from other sites/ industries:

- ▶ Elite group/ commando team on each roster for fire fighting trained in specific fire-fighting techniques





Phase: Ongoing Emergency Response

Once a fire is beyond the control of the initial response, an outside agency (CFA) will be called to co-ordinate the ongoing emergency response

During bush-fire season, CFA resources may be limited

Incremental improvements to existing processes:

- ▶ Excavator monitor
- ▶ Better sharing of roles
- ▶ Labels/signs on levels (portable signs)
- ▶ CO monitoring and equipment and ability to operate (current system confusing)

New or significant improvements to existing processes:

- ▶ Share resourcing with power station
- ▶ Commanders during response
 - Need zone/operations commander who's got radio and control
- ▶ Integration with CFA at all levels
- ▶ Training in CFA processes
- ▶ IPRH embedded into CFA teams
- ▶ Board with roles – person in role & contact details
- ▶ Consider separate phone for IC
- ▶ Consider Key Roles (potentially with admin support):
 - Crane mounted Monitor Officer
 - Water Supply Officer
 - Access Officer
 - Thermal Imaging Officer

Left field ideas and suggestions from other sites/ industries:

- ▶ Camera's/closed circuit TV of mine in command centre
- ▶ Tracking of equipment/team locations
 - GPS locations tracking
- ▶ Computer based tracking of personnel with time alarm

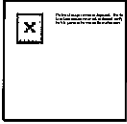




Appendix E

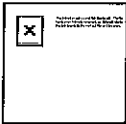
Glossary





Abbreviation	
CFA	Country Fire Authority
CO	Carbon Monoxide
EC	Emergency Commander (IPRH Role)
ERP	Emergency Response Plan
FSO	Fire Services Officer
FSS	Fire Services Supervisor
ICAM	Incident Cause Analysis Method
IC	Incident Controller (CFA Role)
ICC	Incident Control Centre (CFA Term)
ICP	Incident Control Point (IPRH Term)
IPRH	International Power Hazelwood





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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	S Casey					Nov 08

