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THE HAZELWOOD MINE FIRE 2014

David Cliff

ABSTRACT: On 9 February 2014 a fire began in the open cut brown coal mine at Hazelwood near Morwell in Victoria. This fire burnt for 45 days before it was extinguished. The fire necessitated the evacuation of parts of Morwell and required a major coordinated fire-fighting effort. The severity of the fire and the impact upon the local community caused the Victorian Government to institute a Board of Inquiry (Teague *et al.*, 2014). This paper discusses the information presented to the Board of Inquiry into this fire and the conclusions and recommendation of the Inquiry, focussing on what caused the fire and what could be done to prevent a recurrence. This paper draws heavily on the Board's published report of over 430 pages (Teague *et al.*, 2014) and is the source of the information unless otherwise stated.

INTRODUCTION

The Latrobe Valley coal reserves are unique and are characterised by a relatively thin layer of soil and clay overburden covering massive coal seams that are on average 100 metres thick. This makes accessing the vast brown coal reserves in the Latrobe Valley relatively easy compared with elsewhere in the world.

The Hazelwood Mine provides approximately 25 per cent of Victoria's baseline electricity supply. Coal was first discovered at Morwell were discovered in the late nineteenth century by the Great Morwell Coal Mining Company. The State Electricity Commission of Victoria (SECV) acquired the Hazelwood mine site in 1924. The SECV established the Hazelwood mine, then known as the Morwell Open Cut in 1949, in order to supply brown coal to the adjoining briquette works, to supply the increase in power demands post world war two. Mining operations initially commenced in 1955 in what is now known as the east field, bounded at the north by the northern batters.

The Hazelwood mine was further developed from the late 1950s. Between 1964 and 1971, the Hazelwood Power Station was built and demand for coal from the Hazelwood mine increased dramatically. The Hazelwood pondage was constructed in the early 1970s to establish a supply of cooling water for the Hazelwood Power Station. Mining of the east field continued until about 1980. The Hazelwood mine then expanded to the south-west, then to the south-east and then west again, where the operational area of the mine is now situated. Under the current proposed mining schedule, mining at the Hazelwood mine will continue to the west and then to the north before the anticipated closure of the mine in 2031.

The Victorian Government privatised the SECV in the early to mid-1990s, and its power stations were sold separately to overseas interests.

The Hazelwood mine, including the land on which it operates, is owned by the Hazelwood Power Partnership. Since 7 June 2013, the four partners have been subsidiaries of International Power (Australia) Holdings Pty Ltd. This company is in turn jointly owned by subsidiaries of GDF Suez S.A. (72 per cent ownership) and Mitsui & Co Ltd (28 per cent ownership). GDF Suez S.A. is a global energy company with corporate headquarters in France.

Fire is a well-known occurrence in mines in the Latrobe Valley, and there have been a number of fires in the past ten years at the Hazelwood mine, most recently in 2005, 2006 and 2008. On each of these occasions the fire initiated in a single location, rapidly increased in size, fanned by strong winds and took a number of days to extinguish (Potter, 2008).

THE MINE

The Latrobe Valley currently contains three huge open cut brown coal mines. Open cut brown coal mines are particularly vulnerable to fire. Laboratory reactivity tests place the coal in the exceptionally high category (Beamish and Arisoy, 2008) due to its low rank. The coal is only stable when wet (inherent moisture is about 60 % by weight). If the coal was dried, any fire initiated in the coal would spread quickly and be difficult to extinguish. The coal is not stockpiled but burnt as soon as possible after being

mined. Hazelwood open cut mine is shown in figure 1. The mine stretches approximately 5km from west to east and about 2.5 km from south to north at the widest point. The area being extracted is located in the south west of the pit.



Figure 1: Aerial view of the mine (Teague *et al.*, 2014)

THE EVENT

Victoria experienced one of its hottest and driest summers on record in 2014. In mid-January 2014, Melbourne endured its most prolonged heatwave since 1908, with four consecutive days over 40°C. Between 7 and 9 February 2014, emergency services and firefighting resources were committed to responding to multiple significant fires across the State and within the Latrobe Valley. The Fire Services Commissioner and the Chief Health Officer made several announcements warning the community about the potential for extreme weather conditions and associated fire and health risks. On 9 February 2014, the entire State of Victoria was facing the most extreme weather conditions since Black Saturday.

This weather had the effect of drying out the abandoned areas of the mine leaving the exposed batters in the north and east in a reactive state. The predominant wind at this time came from the north-west/south-west that would tend to fan any fire along the exposed batters and the abandoned area of the mine.

The Hazelwood mine fire that began on 9 February 2014 was the largest and longest burning mine fire that has occurred in the Latrobe Valley to date. The fire was not a spontaneous combustion event. The fire was probably caused by embers spotting into the Hazelwood mine from bushfires burning in close proximity to the mine. The mine fire burned for 45 days and sent smoke and ash over the town of Morwell and surrounding areas for much of that time.

The Hazelwood mine fire was not only a major complex fire emergency but also posed a serious public health emergency.

The impact of the Hazelwood mine fire on the Latrobe Valley community has been significant. People have been affected in many ways. First and foremost, the community has experienced adverse health effects and may be affected for an indeterminate period into the future.

In addition there have been significant financial impacts on many people, including medical costs, veterinary costs, time taken off work, relocation from their homes and cleaning their homes. Local businesses have suffered a downturn in business, and the costs of cleaning their businesses. There is also the possible decrease in property values.

It is impossible to quantify the cost of the Hazelwood mine fire, but the Board of Inquiry estimated the total cost borne by the Victorian Government, the local community and the operator of the Hazelwood mine, GDF Suez, exceeds \$100 million.

During the Inquiry, the State and GDF Suez expressed a commitment to undertake numerous additional actions in response to the Hazelwood mine fire. The Board of Inquiry made 18 recommendations to the State and GDF Suez, which have been drafted taking into account the feasibility of implementation, as well as the issues raised by the Latrobe Valley community.

THE SOURCE OF THE FIRE

The Hazelwood mine fire was not just one fire, it started as a series of smaller fires that ignited in the northern, eastern and south-eastern batters and floor of the Hazelwood mine on 9 February 2014.

There is difficulty in determining with precision which of the external fires was responsible for the spotting of embers into the mine. On the evidence provided, spotting from the Hernes Oak fire was the more likely cause of the Hazelwood mine fire, while spotting from the Driffield fire may have also contributed. Both the Hernes Oak fire and the Driffield fire are regarded by Victoria Police as suspicious and both are the subject of ongoing investigation.

The probability of embers spotting into the Hazelwood mine was supported by clear evidence from several mine employees, contemporaneous photographs and video, expert evidence and computer simulations of likely fire behaviour on 9 February 2014. Figure 2 shows possible fire sources and area of the mine affected.



Figure 2: Possible sources of the fire and areas of the mine that burnt (Teague *et al.*, 2014)

RECOMMENDATIONS OF THE INQUIRY AND COMMENTS

The discussion on the causes of the fire and what can be done to minimise the potential for a repeat

including mitigating any potential consequences is best framed in terms of the recommendations of the Board of Inquiry.

The recommendations of the inquiry focus in two different areas: the State and GDF Suez, the operator of the mine. The term 'State' is used broadly in the recommendations to refer to the Victorian Government, the Victorian public service, and public entities such as Emergency Management Victoria, the Country Fire Authority, the Environment Protection Authority and the Victorian WorkCover Authority. Recommendations relevant to the State are generally not prescriptive in terms of the entity tasked with implementation.

The first recommendation relates to mandating a plan to implement the recommendations of the Inquiry and the commitments made by GDF SUEZ, and to report on the progress made in their implementation.

Recommendation 1

The State empowers and require the Auditor-General or another appropriate agency, to:

- oversee the implementation of these recommendations and the commitments made by the State and GDF Suez during this Inquiry; and
- report publicly every year for the next three years on the progress made in implementing recommendations and commitments.

The next two recommendations relate to the need to improve the rapidity and complexity of the response to an incident by external agencies. It is interesting to note that most Queensland coal mines operate emergency response plans based upon the Australasian Inter-service Incident Management System and it is the model recommended by the Mines Rescue Service of New South Wales.

Recommendation 2

The State establish, for any future incident, integrated incident management teams with GDF Suez and other Victorian essential industry providers, to:

- require that emergency services personnel work with GDF Suez and other appropriate essential industry providers; and
- implement the Australasian Inter-service Incident Management System.

Recommendation 3

The State enact legislation, to:

- require Integrated Fire Management Planning; and
- authorise the Emergency Management Commissioner to develop and implement regional and municipal fire management plans.

The next recommendation enhances the capacity of the legislation to consider the potential impacts of fire on the adjacent community, and the capacity of the government to monitor compliance with this.

Recommendation 4

The State:

- bring forward the commencement date of s.16 of the Mineral Resources (Sustainable Development) Amendment Act 2014 (Vic), to facilitate the requirement that approved work plans specifically address fire prevention, mitigation and suppression; and
- acquire the expertise necessary to monitor and enforce compliance with fire risk measures adopted by the Victorian coal mining industry under both the mine licensing and occupational health and safety regimes.

One of the major issues identified was the time taken to assess the potential health impact of the smoke from the fire on the population of Morwell. In particular the capacity to assess the potential health impacts from fine particles sub 2.5 micrometres in diameter (PM_{2.5}) was recognised as being inadequate. The Victorian EPA was not equipped to respond to the monitoring requirements of such a

fire. Further, it was recognised that more work was needed to quantify the potential health impacts and to try to establish a full national ambient air quality standard for PM_{2.5} rather than the current advisory standard. The potential exposure of fire fighters to carbon monoxide from the fire was also a concern to the Inquiry. Due to the level of uncertainty of the potential health impacts on the local population the Inquiry recommended a long-term health study of the residents.

Recommendation 5

The State equip itself to undertake rapid air quality monitoring in any location in Victoria, to:

- collect all relevant data, including data on PM_{2.5}, carbon monoxide and ozone; and
- ensure this data is used to inform decision-making within 24 hours of the incident occurring.

Recommendation 6

The State take the lead in advocating for a national compliance standard for PM_{2.5}.

Recommendation 7

The State review and revise the community carbon monoxide response protocol and the firefighter carbon monoxide response protocol, to:

- ensure both protocols are consistent with each other;
- ensure both protocols include assessment methods and trigger points for specific responses;
- ensure GDF Suez and other appropriate essential industry providers are required to adopt and apply the firefighter carbon monoxide protocol; and
- inform all firefighters about the dangers of carbon monoxide poisoning, and in particular
- highlight the increased risks for those with health conditions and those who are pregnant.

Recommendation 8

The State review and revise the Bushfire Smoke Protocol and the PM_{2.5} Health Protection Protocol, to:

- ensure both protocols are consistent with each other; and
- ensure both protocols include assessment methods and trigger points for specific responses.

Recommendation 9

The State develop and widely disseminate an integrated State Smoke Guide, to:

- incorporate the proposed State Smoke Plan for the management of public health impacts from large scale, extended smoke events;
- include updated Bushfire Smoke, carbon monoxide and PM_{2.5} protocols; and
- provide practical advice and support materials to employers, communities and individuals on how to minimise the harmful effects of smoke.

Recommendation 10

The State should continue the long-term health study, and:

- extend the study to at least 20 years;
- appoint an independent board, which includes Latrobe Valley community representatives, to govern the study; and
- direct that the independent board publish regular progress reports.

Communications during the fire came under close scrutiny and there were a number of instances where inadequate communications occurred between the various emergency response agencies and also by the agencies with the public. Appropriate risk communication with the public is difficult to achieve and relates not just to information but establishing and maintaining trust so that the information is accepted.

Recommendation 11

The State review and revise its communication strategy, to:

- ensure all emergency response agencies have, or have access to, the capability and resources needed for effective and rapid public communications during an emergency; and
- ensure, where appropriate, that private operators of essential infrastructure are included in the coordination of public communications during an emergency concerning that infrastructure.

Recommendation 12

The State, led by Emergency Management Victoria, develop a community engagement model for emergency management to ensure all State agencies and local governments engage with communities and already identified trusted networks as an integral component of emergency management planning.

The remaining recommendations relate to improving the capacity of the mine operator to prevent and control such an event in the future. Some of the recommendations relate to improved capacity in terms of preparedness and equipment redundancy whilst others relate to improved planning and risk assessment and control.

Recommendation 13

GDF Suez revise its Emergency Response Plan, to:

- require an increased state of readiness on days of Total Fire Ban;
- require pre-establishment of an Emergency Command Centre;
- require pre-positioning of an accredited Incident Controller as Emergency Commander; and
- require any persons nominated as Emergency Commander to have incident controller accreditation and proficiency in the use of the Australasian Inter-service Incident Management System.

Recommendation 14

GDF Suez establish enhanced back-up power supply arrangements that do not depend wholly on mains power, to:

- ensure that the Emergency Command Centre can continue to operate if mains power is lost; and
- ensure that the reticulated fire services water system can operate with minimal disruption if mains power is lost.

Recommendation 15

GDF Suez:

- conduct, assisted by an independent consultant, a risk assessment of the likelihood and consequences of fire in the worked out areas of the Hazelwood mine, and an assessment of the most effective fire protection for the exposed coal surfaces;
- prepare an implementation plan that ensures the most effective and reasonably practicable controls are in place to eliminate or reduce the risk of fire; and
- implement the plan.

Recommendation 16

GDF Suez:

- review its 'Mine Fire Service Policy and Code of Practice' so that it reflects industry best practice and ensures that, by taking a risk management approach, it is suitable for fire prevention, mitigation and suppression in all parts of the Hazelwood mine; and
- incorporate the revised 'Mine Fire Service Policy and Code of Practice' into the approved work plan for the Hazelwood mine.

Recommendation 17

GDF Suez adopt and apply the firefighter carbon monoxide response protocol.

Recommendation 18

GDF Suez improve its crisis management communication strategy for the Hazelwood mine in line with international best practice.

CONCLUSION

The fire in the open cut at Hazelwood in February 2014 caused major disruption to the local community as well as major costs to the state. The Board of Inquiry established to inquire into the incident found that there were major deficiencies in the way the fire was treated. The Board of Inquiry did not accept the position of the mine operator that the fire was not reasonably predictable – a “Perfect Storm”. It found that more should have been done to prevent such an occurrence.

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