LETTER OF TRANSMISSION

His Excellency the Honourable Alex Chernov AC QC
Governor of Victoria
Government House
Melbourne VIC 3004

29 August 2014

Your Excellency

In accordance with the Terms of Reference dated 21 March 2014, we have the honour of presenting to you the report of the Hazelwood Mine Fire Inquiry.

The report consists of one volume including an executive summary and 18 recommendations for improvement together with the Board’s record of its affirmations of actions by the Victorian Government and GDF Suez already announced or underway. In addition, the Board has set out in the text its views about matters which need further consideration and action.

Undertaking this work has been a privilege and we would like to thank the people of Morwell and the Latrobe Valley for their hospitality and their generosity. We also appreciate the contribution of the community, industry and government agencies to the Inquiry’s conclusions and recommendations.

We hope the work undertaken through and by this Inquiry will assist to prevent a disaster like that of February and March 2014 from ever happening again.

Yours sincerely,

The Hon. Bernard Teague AO       Prof. John Catford       Ms Sonia Petering
Constitution Act 1975
APPOINTMENT OF A BOARD OF INQUIRY INTO
THE HAZELWOOD COAL MINE FIRE
Order in Council

As:

- the Hazelwood Coal Mine, associated with the Hazelwood Power Station, is situated south of Morwell in the Latrobe Valley and consists of various sections on or adjacent to land on which mining is taking place, has taken place or may take place under Mining Licence Number 5004 (MIN 5004) as in force from time to time;
- in early February a fire ignited which, on or about 9 February 2014, took hold in the Hazelwood Coal Mine (‘Hazelwood Coal Mine Fire’); and
- the people of Morwell and other residents of the Latrobe Valley have been adversely affected by the Hazelwood Coal Mine Fire (‘affected communities’),

the Governor in Council considers it expedient that a Board of Inquiry be appointed for the purposes of inquiring into, and reporting on, and making any recommendations that the Board considers appropriate in relation to, the matters specified below:

The Governor of the State of Victoria, in the Commonwealth of Australia, by and with the advice of the Executive Council and acting pursuant to section 88C of the Constitution Act 1975 and all other enabling powers, appoints:

- The Honourable Bernard George Teague AO
- Professor John Charles Catford
- Ms Sonia Anne Petering

as a Board to inquire into, and report on, and make any recommendations that the Board considers appropriate in relation to the matters specified below.

The specified matters are as follows:

1. The origin and circumstances of the fire, including how it spread into the Hazelwood Coal Mine.
2. The adequacy and effectiveness of the measures taken by or on behalf of the owner, operator and licensee of the Hazelwood Coal Mine to prevent the outbreak of a fire, and to be prepared to respond to an outbreak of a fire including mitigating its spread and severity, in the Hazelwood Coal Mine, including whether the owner, operator and licensee of the Hazelwood Coal Mine, or any person or entity acting on behalf of any of them:
   i. implemented the recommendations arising from reviews of previous events; and
   ii. in the opinion of the Board, breached or did not comply with the requirements of (or under) any relevant statute or regulation, including any notification or directive given under such statute or regulation and any code of practice, management plan or similar scheme, developed and/or implemented due to such requirements.
3. The adequacy and effectiveness of the application and administration of relevant regulatory regimes in relation to the risk of, and response to, fire at the Hazelwood Coal Mine.
4. The adequacy and effectiveness of the response to the Hazelwood Coal Mine Fire by:
   i. the owner, operator and licensee of the Hazelwood Coal Mine;
   ii. the emergency services; and
   iii. other relevant government agencies, including environmental and public health officials,
and, in particular, the measures taken in respect of the health and well-being of the affected communities by:
iv. informing the affected communities of the Hazelwood Coal Mine Fire and about its known effects and risks; and
v. responding to those effects on, and risks to, the affected communities.
5. Any other matter reasonably incidental to the matters specified in paragraphs 1 to 4.

The Board is directed to:
A. seek, in the conduct of its inquiry, not to prejudice any ongoing response or recovery activities or any investigations into the Hazelwood Coal Mine Fire by Victoria Police or a coroner;
B. work co-operatively, as appropriate, with other inquiries or investigations into the Hazelwood Coal Mine Fire to avoid unnecessary duplication;
C. conduct its inquiry otherwise as it considers appropriate, having regard to the desirability of adopting informal and flexible procedures that engage with the affected communities, ascertain the relevant facts as directly and effectively as possible and avoid unnecessary delay or cost; and
D. report to the Governor its findings, and any recommendations, by 31 August 2014 at the latest.

The Governor in Council confirms and declares that:
• the Honourable Bernard George Teague AO is appointed as Chairperson of the Board;
• subject to the provisions of the Evidence (Miscellaneous Provisions) Act 1958, the powers of the Board may at any time be exercised by one or more members of the Board; and
• the Board has full power and authority to inquire into the specified matters by all lawful ways and means whatsoever.

By His Excellency’s Command
Dated 21 March 2014
Responsible Minister:
THE HON DR DENIS NAPTHINE MP
Premier
YVETTE CARISBROOKE
Clerk of the Executive Council
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EXECUTIVE SUMMARY

THE HAZELWOOD MINE FIRE

Victoria is one of the most bushfire prone areas in the world. Victoria experiences bushfires every fire season. Many of these bushfires are catastrophic events resulting in the loss of life and property. The Latrobe Valley, like much of Victoria and many parts of Australia, has been greatly affected by bushfire. Five years ago, on Black Saturday, the Churchill fire claimed 11 lives, injured 35 others and destroyed 145 houses.

The Latrobe Valley is home to three open cut brown coal mines. Open cut brown coal mines are particularly vulnerable to fire and to fire that spreads quickly and is difficult to extinguish.

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.

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 caused by embers spotting into the Hazelwood mine from bushfires burning in close proximity to the mine. The mine fire burned for 45 days. The fire sent smoke and ash over the town of Morwell and surrounding areas for much of that time.

On 11 March 2014, a day after the fire was declared under control, Dr Denis Napthine MP, Premier of Victoria, announced an independent inquiry into the Hazelwood mine fire. On 21 March 2014, the Governor in Council officially established the Board of Inquiry, which comprised the Honourable Bernard Teague AO, Professor Emeritus John Catford, and Ms Sonia Petering.

The Hazelwood mine fire constituted two emergencies: a major complex fire emergency and a serious public health emergency.

The Inquiry’s Terms of Reference required the Board to inquire into and report on a range of issues, including the origin of the fire, the firefighting response, fire prevention and preparedness measures taken by the owner, operator and licensee of the mine and regulatory agencies, the fire’s impacts on the health and wellbeing of affected communities, and the response to the health emergency.

The mine owner, operator and licence holder of the Hazelwood mine is a partnership of subsidiary companies majority owned by GDF Suez S.A. In this Executive Summary, ‘GDF Suez’ is used to refer to the owner, operator and licence holder of the Hazelwood mine and all of its related entities. The term ‘the State’ is used broadly to refer to the Victorian Government, the Victorian public service and Victorian government authorities and agencies.

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.

Many people and local businesses have experienced financial impacts for a range of reasons including a downturn in business, medical costs, veterinary costs, time taken off work, relocation from their homes, cleaning their homes and businesses, and possible decreases in property value.

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

The Board commends all firefighters, including both emergency services personnel and GDF Suez employees, who worked under difficult conditions to protect Hazelwood mine assets and prevent fire spreading into the operating area of the mine. The Board recognises in particular the tireless dedication.
of the volunteers who responded to the Hazelwood mine fire, including volunteer firefighters and other emergency services personnel, local hospital and other healthcare staff, not-for-profit and community based organisations, and the many individuals and organisations in the local community who went above and beyond what was expected of them throughout the course of this event.

Extreme bushfire conditions like those experienced in the summer of 2014 are occurring with increasing frequency and severity. They will happen again. The Latrobe Valley is particularly vulnerable.

Despite the high risk of a catastrophic fire event occurring and the all too recent experience of Black Saturday etched in our memory, many Victorians continue to underestimate the probability of fire events and ‘hope for the best’ in the fire season. This approach ultimately impedes the ability to prepare for, and to respond to, the reality of fire. It is imperative that government agencies and operators of essential infrastructure, in particular the brown coal mining industry, learn from this event and are better prepared to manage fire risk and respond to fire in the future.

This Inquiry took place against a backdrop of significant ongoing reform following lessons learned from the 2009 Victorian Bushfires Royal Commission, particularly in the areas of emergency management and integrated fire management planning.

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 has affirmed a number of these commitments. However, there is more work to be done. The Board of Inquiry makes 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.

Chapter 1 of this report contains important background information, including key facts regarding the Latrobe Valley, the town of Morwell and the Hazelwood mine, as well as an explanation of the Board’s role and the assumptions underlying the Board’s discussions, conclusions and recommendations. It also contains a guide to reading the report and should be the starting point for all readers.

ORIGIN OF THE HAZELWOOD MINE FIRE

The Hazelwood mine fire was not just one fire—it was a complex of fires. The fire 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.

While various suggestions were made during the course of the Inquiry that fire may have started from within the Hazelwood mine, possibly from an existing fire hole, there was no evidence to support this theory. All of the evidence before the Board led to one conclusion. The most likely cause of the Hazelwood mine fire was embers spotting from one or both of two bushfires outside the mine.

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.

The origin and circumstances of the Hazelwood mine fire are considered in Chapter 2.1 of the report.

FIREFIGHTING RESPONSE

FIGHTING THE HAZELWOOD MINE FIRE

In combatting the Hazelwood mine fire, GDF Suez personnel and contractors and the Country Fire Authority (CFA) were faced with the formidable task of extinguishing a huge fire that had an unlimited supply of fuel. That the CFA was able to develop and implement an effective suppression strategy and
successfully extinguish the fire when it did, without interruption to Victoria’s power supply, is a tremendous achievement. GDF Suez personnel must also be acknowledged for their hard work in extremely difficult circumstances throughout the period the Hazelwood mine fire burned.

However, fire services and GDF Suez have a lack of readily available equipment, such as compressed air foam systems relevant to best practice brown coal firefighting. Fire services and GDF Suez recognise that acquisition of best available technology for firefighting in coal mines is an area in need of improvement.

GDF Suez was responsible for the initial response to the mine fire on 9 February 2014. GDF Suez was successful in keeping the Driffield fire from crossing the mine’s boundary at the Morwell River diversion. However, fire that did enter the Hazelwood mine quickly spread in the northern batters, the eastern batters, the south-eastern batters, and the mine floor. There were also multiple fires within the mine at grass level.

Mine personnel worked strategically to turn sprays on and off in the northern batters to create a fire-break between the worked out northern batters that were on fire and the western side of the northern batters near the operational areas of the mine. They were able to successfully defend the operational areas of the mine and the power station.

Despite these efforts, the initial response to the fire was inadequate in suppressing ember attack and containing spot fires that ignited in the mine at various locations on the afternoon of 9 February 2014. Firefighting was significantly impeded by the fact that the reticulated fire services water system or ‘fire service network’ did not extend to large sections of the worked out areas of the Hazelwood mine where fires took hold.

By late afternoon on 9 February, firefighting efforts were further impeded by fire damage to the two SP AusNet 66kV power lines that run across the northern batters of the mine. This resulted in power loss to the two major water pumping stations, triggering a significant drop in water pressure in the fire service network. This not only inhibited the use of fixed water sprays, it hampered the ability to fill up fire tankers with water. Power loss also caused a temporary interruption to coal production and left the mine’s Emergency Command Centre in darkness and staff unable to use equipment such as CCTV monitors and computers.

At the time of the Hazelwood mine fire there were no internal back-up power supply generators at the Hazelwood mine. However, mine electricians and others worked hard to eventually return power to the mine.

The fires were so widespread by early evening on 9 February that firefighting in the worked out areas of the mine was considered too dangerous, and firefighting was limited to suppressing the fires at grass level.

Fire services took command of the firefighting that evening. CFA personnel described a number of problems when they were initially deployed to the Hazelwood mine, such as difficulties and delays in trying to access and navigate the mine.

Planning of a suppression strategy was undertaken across incident, regional and state levels, with GDF Suez personnel continuing to contribute to the firefighting effort, and providing the CFA with information and escorts to assist with navigating the mine.

Five days into the fire, work commenced on installing approximately eight kilometres of extra fire service pipework in the worked out areas of the Hazelwood mine in order to assist the suppression effort.

Following consultation with an expert reference group 10 days into the mine fire, a new fire suppression strategy was implemented. The new strategy involved incrementally suppressing fire in 100 metre segments. This strategy was ultimately successful.

Water (applied by appliances with the assistance of Sikorsky helicopters), compressed air foam and thermal imaging cameras, were all used with considerable success. The use of compressed air foam is not a standard firefighting method employed by Victorian fire services, so large compressed air foam system units (CAFS) were borrowed from Tasmania and New South Wales. The use of CAFS reduced smoke and ash, which was important given that Morwell is so close to the northern batters of the mine.
By 10 March 2014, the mine fire was declared under control. After 45 days of fighting the fire, the Fire Services Commissioner declared the Hazelwood mine fire ‘safe’ on 25 March 2014.

Emergency services and GDF Suez invested enormous resources into the suppression of the Hazelwood mine fire. Up to 80 GDF Suez personnel worked on day shifts and about 50 worked on night shifts over the course of the firefighting effort. GDF Suez also contributed significant firefighting equipment.

Fire services supplied around 200 firefighting appliances, including aircraft, tankers, pumpers, ladder platforms, CAFS units, thermal imaging cameras, command vehicles and support vehicles. More than 7,000 emergency services personnel were involved in firefighting at the Hazelwood mine during February and March 2014. Firefighting personnel were drawn from the CFA, Metropolitan Fire Brigade (MFB), Department of Environment and Primary Industries (DEPI), State Emergency Service, Australian Capital Territory Fire and Rescue, New South Wales Fire and Rescue, Tasmanian Fire Services, Queensland Fire Service, GDF Suez and Air Services Australia.

Firefighting is discussed in detail in Chapter 2.3 of the report.

**ADEQUACY AND EFFECTIVENESS OF THE STATE RESPONSE**

The State was generally well prepared for the extreme fire weather conditions on 9 February 2014. Planning for the fire risks took place at state, regional and local levels.

However, the Board acknowledges that the Traralgon Incident Control Centre was put under significant pressure because a strategic decision was made at both regional and state levels not to set up the base Incident Control Centre in Yarram. That pressure was compounded by the slow delivery of requested additional firefighting resources. These resourcing issues left the Traralgon Incident Control Centre in the unenviable position of having to prepare for and deal with fire activity over a large area of Gippsland.

In light of the number of competing resource demands facing the State in the period 7 to 9 February 2014, the Board considers that the measures adopted by fire services were generally appropriate.

An Incident Emergency Management Team was formed to respond to local fire conditions prior to 9 February 2014. Members of the Incident Emergency Management Team included representatives from various support agencies, local government, businesses and the Central Gippsland Essential Industries Group (CGEIG) (of which GDF Suez is a member).

The Board heard evidence from the Incident Controller that on 8 February 2014, several computer models were produced showing the significant threat to the Hazelwood mine in the event that the Hernes Oak–McDonald’s Track fire broke its containment lines. One model was relayed to GDF Suez personnel via the CGEIG. Unfortunately GDF Suez did not understand the significance of this model.

The Board considers that the CFA responded quickly and effectively to the breakout of the Hernes Oak and Driffield fires. No properties were lost in Morwell. The CFA was able to prevent fire from crossing the Morwell River diversion and entering the operating area of the Hazelwood mine.

Where possible, CFA resources were sent to the mine to assist in asset protection. During the afternoon of 9 February 2014, that assistance was necessarily limited due to the other demands on the CFA’s firefighting resources.

In its submission to the Board, GDF Suez attributed part of the failure of the initial response to the Hazelwood mine fire to the limited firefighting assistance from fire services, and the demands on the CFA to attend to other fires in the Latrobe Valley.

The Board is satisfied that the way that emergency services allocated their resources to suppress fire on 9 February 2014 was consistent with the State Controller’s Strategic Priorities, where the protection of life is paramount.

However, there is potential to improve the efficiency of communication and resource use between emergency services and operators of essential industries infrastructure working together under one integrated incident management team during major fires.
After the recent experience of the Hazelwood mine fire, the Victorian Government is considering various reforms to emergency management planning to better facilitate a consistent response across both public and privately owned land, to better cater for complex land use, and to take account of the diverse hazards of specific industries and facilities, like the Hazelwood mine.

Further reforms that the Victorian Government has committed to relate specifically to engagement and integration of emergency planning and management with the coal mining sector. The Board affirms these commitments.

The adequacy and effectiveness of the State’s response to the Hazelwood mine fire is considered in Chapter 2.3 of the report.

**ADEQUACY AND EFFECTIVENESS OF GDF SUEZ’S RESPONSE**

The inability of GDF Suez to effectively suppress the Hazelwood mine fire during the initial stages was due in large part to the mine operator being inadequately prepared to manage the fire.

GDF Suez recognised the need for fire preparedness planning on 7 February 2014 upon the declaration of a Total Fire Ban for the area. Whilst fire plans were prepared, they were not updated once nearby bushfire started on the afternoon of 7 February 2014 and became a serious threat to the mine. Fire plans should have been reviewed and modified to reflect the changing and serious conditions.

The fire plans also relied on the CFA being able to promptly respond to a fire in the mine. In light of the extreme weather conditions in the period prior to the Hazelwood mine fire and the likely pressures the CFA would be under, GDF Suez should have more closely liaised with the CFA to understand its resourcing and the likely threat to the mine.

GDF Suez should also have revised its assessment of staffing levels and other protective measures it planned to implement over the weekend. A key principle for success in fire suppression is a fast determined first attack, but the resources available for first attack of the Hazelwood mine fire were insufficient to prevent the spread of fire inside the mine.

Once the Emergency Response Plan took effect, clear command and control structures were established. However, all but one of the GDF Suez personnel nominated as an Emergency Commander by the Emergency Response Plan were out of Morwell on a weekend break or holiday. The person asked to step into the role of the Emergency Commander during the Hazelwood mine fire was not designated that role in the Emergency Response Plan.

The Board acknowledges that several members of GDF Suez management, concerned about the impact of any fire on the mine, came into the mine before the fires took hold and were involved in key decision-making in the early afternoon of 9 February. GDF Suez also rapidly increased the number of personnel present at the mine to assist once the mine fire took hold.

Additional staff present at the mine prior to the outbreak of fire would have been beneficial to firefighting efforts. The Board affirms GDF Suez’s commitment to ensuring that more personnel are rostered on and additional contractors are available for dedicated fire protection duties on predicted extreme fire danger days.

GDF Suez personnel failed to activate the mine’s Emergency Response Plan until more than an hour after fire was first reported. Several consequences appear to have arisen from that initial failure.

There was no evidence that anyone within the mine notified the CFA of the fires by calling 000. Whilst calls were made to the local Incident Control Centre during the course of the afternoon on 9 February, it does not appear that any request for CFA resources was made until several hours after the fire started. Firefighting resources in the area were attending other fires and may not have been able to assist any earlier, but early intervention and support at State level could have enhanced the local response.

The adequacy and effectiveness of GDF Suez’s response to the Hazelwood mine fire is considered in Chapter 2.3 of the report.
FIRE RISK MANAGEMENT

In addition to inquiring into and reporting on the response to the Hazelwood mine fire, the Board was tasked with assessing the adequacy and effectiveness of the application and administration of relevant regulatory regimes in relation to the risk of fire at the Hazelwood mine.

Fire risk management currently occurs at state, regional and local levels.

FIRE RISK MANAGEMENT AT THE STATE LEVEL

The State manages fire risk, relevant to the Hazelwood mine in two distinct ways:

- through the emergency services agencies that are responsible for responding to and protecting property from fire, which operate under an overarching state-level emergency management framework
- through agencies which directly regulate coal mines and are able to influence the fire management policies adopted by mine operators.

EMERGENCY MANAGEMENT

Victoria has a multi-agency framework for emergency management, some elements of which are legislated and other elements of which are established by agreement.

From 1 July 2014, new governance arrangements came into effect, including the creation of the role of Emergency Management Commissioner, which succeeds the role of the Fire Services Commissioner. The Emergency Management Commissioner will have a broader oversight, control and coordination role in relation to emergencies.

Under the emergency management arrangements in place at the time of the Hazelwood mine fire, the Fire Services Commissioner had overall control of response activities to a ‘major fire’ in any area of Victoria. The Fire Services Commissioner is supported by the CFA, the MFB and DEPI, depending on the location of the fire. The CFA is responsible for responding to fires on private land within the country area of Victoria, such as the Hazelwood mine.

Over recent years, the CFA has invested in improved firefighting capability in the Latrobe Valley through the acquisition of aerial appliances, modernisation of its firefighting fleet and recruitment of additional firefighters at local CFA brigades. Local CFA brigades comprise both career and volunteer firefighters. When a fire situation escalates or resources are allocated to other fires, brigades may be called in from across the Latrobe Valley.

Victoria adopts a three-tiered approach to emergency management with State, Regional and Incident Controllers responsible for the command and control of different emergency response teams.

Emergency response plans are also prepared at each of these levels.

The allocation of resources for response to fires is governed by Standard Operating Procedures jointly issued by the Fire Services Commissioner, CFA, MFB and DEPI. These procedures aim to ensure that there are Incident Management Teams, headed by an Incident Controller, pre-positioned to manage major bushfires or potential major bushfires. The Incident Controller and Incident Management Team manage bushfire response activities from Incident Control Centres across the State.

The State is able to engage with support agencies and relevant community members in planning and managing an emergency by forming an Incident Emergency Management Team. An Incident Emergency Management Team brings together those responsible for command, control and coordination at the incident level, and community members and other relevant agencies. The Incident Emergency Management Team provides the forum for the Incident Controller to be informed about the likely impacts and consequences of an emergency and enables all members to contribute to the development of the overall incident strategy.
These arrangements generally functioned well during the Hazelwood mine fire, although the Board has made recommendations for improvement, noting that the emergency management framework is already undergoing significant reform.

Important background regarding the emergency management framework and a discussion of the adequacy and effectiveness of State planning for the Hazelwood mine fire can be found in Chapter 2.2 of the report.

**REGULATION OF VICTORIAN COAL MINES**

Regulation of Victorian coal mines is complex and has evolved considerably over time.

The principal regulatory mechanisms that govern the risk and prevention of fire at the Hazelwood mine are mine licensing laws, which are administered and enforced by the Earth Resources Regulation Branch of the Department of State Development, Business and Innovation (the Mining Regulator) and occupational health and safety (OHS) laws, which are administered and enforced by the Earth Resources Unit of the Victorian WorkCover Authority (VWA).

From 1 January 2008, responsibility for oversight of OHS matters in Victorian mines transferred from the Mining Regulator to VWA. From this date, the Mining Regulator no longer considered itself to have any role in regulating fire risk at the Hazelwood mine.

The Mining Regulator and VWA each adopted a narrow reading of the statutory regime underlying their respective areas of responsibility. Contrary to arrangements between the Mining Regulator and VWA, which contemplated collaboration and consultation on areas of overlapping responsibility, such as public safety risks, the agencies operated in silos. The Board was concerned that the manner in which the transition for OHS responsibility to VWA was effected meant that expertise and knowledge relevant to assessing fire risk at the Hazelwood mine was potentially lost.

The combination of these factors resulted in a gap in regulation of the Hazelwood mine in respect of fire risks with the potential to impact on Morwell and surrounding communities, such as that which manifested in 2014. The Hazelwood mine fire was a foreseeable risk that slipped through the cracks between regulatory agencies. This reality must be confronted if similar incidents are to be avoided in the future.

The Mining Regulator doubted whether it had the necessary legislative power to regulate fire risk in Victorian mines, notwithstanding that the Regulator's statutory objectives include ensuring that the health and safety of the public is protected in relation to work being done under a mining licence. The position adopted by the Mining Regulator is not, in the view of the Board, the only interpretation open of the Mining Regulator's regulatory power. This uncertainty is likely to be resolved when legislative amendments enacted in February 2014 come into effect.

The Board was also concerned by aspects of VWA's oversight of fire prevention and mitigation practices at the Hazelwood mine. In carrying out routine audits of the Hazelwood mine's fire management policies, VWA appears to have placed undue focus on administrative or procedural compliance with OHS regulations, rather than ensuring substantive compliance. The Board considers that effective regulation must focus on substance rather than form.

Further, when it came to ensuring GDF Suez had adequately addressed fire risks associated with the Hazelwood mine that had the potential to significantly impact the community, but did not necessarily place workers' lives at risk, VWA did not intervene despite these kinds of risk being entirely foreseeable. VWA justified this approach by its overall strategy of focusing its limited resources on hazards that represent the greatest risk of multiple worker fatalities.

The principle underlying the OHS regime is that the primary obligation to manage risk at a work site rests with the employer. There are necessary constraints on how a government agency can allocate its resources, particularly when VWA is responsible for 250,000 Victorian workplaces. However, the Hazelwood mine fire has demonstrated that there are consequences of real import where the approach to regulation is overly passive.

The Board considers that the Mining Regulator and VWA both have a role in regulating fire risk in the Victorian mining sector. In order to fulfil their shared responsibilities effectively, the Mining Regulator
and VWA also need to be adequately equipped with staff that have the necessary expertise to monitor and enforce compliance with measures to mitigate fire risk.

Chapter 3.2 of the report contains an explanation of the regulatory regimes governing Victorian mines, as well as an analysis of the adequacy and effectiveness of those regimes and their administration and enforcement by government agencies.

**FIRE RISK MANAGEMENT AT THE REGIONAL LEVEL**

At a regional and municipal level, there are a number of regulatory mechanisms in place to address fire risk. Obstacles have inhibited each of these mechanisms from effectively mitigating fire risk at the Hazelwood mine.

**LAND USE PLANNING**

A principal means by which fire risk can be managed at the municipal level is through land use planning schemes. Land use planning can play a significant role in the management of fire risk by regulating how land may or may not be used or developed. Existing patterns of land use in the Latrobe Valley pose some challenges for the mitigation of fire risk. The Latrobe Valley has inherited land use planning decisions that have resulted in a significant gap between the fire protection policies and strategies outlined in the Latrobe Planning Scheme and the reality of land use in the vicinity of the Hazelwood mine.

The Latrobe City Council is the authority responsible for the administration and enforcement of the Latrobe Planning Scheme, which comprises both state-wide and local planning provisions.

The Latrobe Planning Scheme applies a number of strategies to manage bushfire risk and inappropriate development with respect to coal mines in the Latrobe Valley. However, these strategies are limited by the fact they only operate prospectively and have little capacity to deal with past decisions in relation to existing uses of land.

Most notably, there is no buffer zone between the Hazelwood mine and the town of Morwell. The implementation of the buffer zone requirements post-date the approval (in the 1940s) of a new open cut mine adjacent to Morwell. The Latrobe City Council is powerless to enforce any buffer zone within the boundaries of the mine licence. Under legislation, this is the province of the Mining Regulator.

The Board’s attention was also drawn to the existence of three timber plantations within 1,000 metres of the mine licence area. In a landscape that has largely been cleared of native vegetation, timber plantations are a potential source of fuel for a bushfire and can create embers that are carried long distances.

Although the Latrobe Planning Scheme currently provides that a permit is required for timber plantations this close to the mine, for historical reasons each of these plantations exists without a permit.

GDF Suez submitted that the establishment of timber plantations close to the Hazelwood mine represented a fundamental failure in appropriate land use planning in the Valley. Information provided by the plantation owners after the conclusion of the Inquiry’s public hearings paints a more complex picture in relation to both the establishment of the plantations and the risk they pose to the mine. These plantations do not represent the entire potential source of embers spotting into the mine. Other sources include trees and other vegetation, grasslands and trees planted on roads, and nearby rural land.

The Board agrees that it is not desirable that timber plantations be established in close proximity to an open cut coal mine without consideration of fire risk management, nor is it appropriate to extend an open cut coal mine towards existing timber plantations, apparently without regard to fire risk. There is considerable scope for improvement in the way that land use planning in the Latrobe Valley manages the risk of fire, particularly in the vicinity of open cut coal mines.

**INTEGRATED FIRE MANAGEMENT PLANNING**

Integrated fire management planning was introduced following the 2003 Esplin Report. It involves the collaboration of community, public and private land owners, utility providers, the State, councils, and industry. The development of integrated fire management plans in the Latrobe Valley presents an opportunity...
to recognise that there are current sources of risk across the Latrobe Valley landscape, such as pre-existing plantations and roadside vegetation, and that these risks need to be managed with the most effective risk treatments available.

Fire risk management planning is currently occurring at the state, regional and municipal levels, and there is consistency between plans in the recognition of priority risks and assets.

At the regional level, the Gippsland Regional Strategic Fire Management Plan identifies coal mines in the region as assets at extreme risk of fire from external fire events, which have the potential to disrupt power supplies to the national grid. The regional plan identifies existing treatments that address this risk, including legislative controls, emergency management plans, on site firefighting resources and regulatory planning.

At the municipal level, the Latrobe City Council has produced a Municipal Fire Management Plan (as a sub-plan of the Latrobe Municipal Emergency Management Plan), which includes fire history information, assets at risk and control measures. The municipal plan’s treatments for protecting assets are more operational, for example, the treatments listed for the Hazelwood mine include routine asset site maintenance and land use planning considerations for surrounding land use.

Regional and municipal plans are being developed with the involvement of a broad range of stakeholders. However, the Hazelwood mine and the mine’s regulators are key players currently missing from the integrated fire management planning process. Further, the content of the plans, including the treatment of risks, is not known to the agencies that have oversight in those areas. Without an approach that involves the active engagement of all relevant entities, integrated fire management plans will not be adequate or effective.

There is a more fundamental weakness with the regional and municipal plans—it is unclear who is responsible for their implementation, and consequently, no one has taken responsibility. This must be addressed if integrated fire management planning is to be effective.

Legislation is required to give greater force to integrated fire management planning, and to clarify who is responsible for implementation of the plans. The establishment of clear statutory responsibility for the implementation of integrated fire management plans at the municipal, regional and state level is needed.

Establishing a clear line of sight to the responsible regulators for integrated fire management planning should ensure that the actions in the plans are implemented and monitored.

There are a number of problems with the Gippsland Regional Strategic Fire Management Plan. In these circumstances, the Board considers that the regional plan should be reviewed.

The adequacy and effectiveness of regulation of fire risk at the regional and municipal level is considered in detail in Chapter 3.1 of the report.

**FIRE RISK MANAGEMENT AT THE HAZELWOOD MINE**

Fire is an ever-present risk in a brown coal mine. The outbreak of fire can spread extremely quickly. It is therefore critical that there are effective means of both preventing the outbreak of fire and being in a position to rapidly extinguish fires that do occur.

GDF Suez has adopted a range of policies and procedures directed to the prevention, mitigation and suppression of fires. These have evolved considerably over time, and have been enhanced as a result of a process of investigating and reviewing fire incidents at the mine and ensuring that recommendations arising from those investigations are implemented where appropriate.

As a consequence of this process of continual improvement, the fire prevention and preparedness measures at the Hazelwood mine are well-suited to most kinds of mine fires. However, GDF Suez was not adequately prepared for a fire of the kind, severity and complexity of the Hazelwood mine fire. This was primarily because GDF Suez did not sufficiently recognise the risk of embers from a bushfire causing a major fire in the worked out areas of the Hazelwood mine, or the potential impacts such a fire might have on Morwell and surrounding communities.

Contrary to suggestions that the Hazelwood mine fire was the ‘perfect storm of events’, all of the factors contributing to the ignition and spread of the fire were foreseeable. Yet it appears they were not foreseen.
The Board notes that as significant as the fire was, conditions on the day of the fire's ignition could have been worse and the consequences of the fire could have been more severe.

A number of previous fires at the Hazelwood mine bear similarities to aspects of the 2014 Hazelwood mine fire. Fires occurred in December 2005 and September 2008, which took hold in worked out areas of the mine. Ease of access, location and reliability of water supply in worked out areas of the mine were identified as potential vulnerabilities. An incident investigation report into the September 2008 fire recommended that a risk assessment, including a cost/benefit analysis, should be undertaken concerning the risk of fire in worked out areas to determine if further prevention work was required.

This risk assessment was never undertaken.

The failure to conduct a proper risk assessment meant that an opportunity to substantially improve fire protection measures in the worked out areas of the mine and potentially avoid or reduce the severity of the 2014 Hazelwood mine fire was lost.

In not properly identifying hazards associated with a fire in the worked out areas of the Hazelwood mine and the risks to the Morwell and surrounding communities, GDF Suez fell short of its obligations under OHS laws. GDF Suez also failed to adopt reasonably practicable risk control measures to eliminate or reduce the health and safety risks associated with a fire in the worked out areas of the Hazelwood mine.

GDF Suez's main strategy for preventing the outbreak of a mine fire as a result of an external fire has been vegetation management in the rural land surrounding the Hazelwood mine. This can be an effective strategy against a direct firefront, but it does not address the risk of mass ember attack into the Hazelwood mine from external sources resulting in widespread simultaneous ignitions.

The Board heard expert evidence that the Hazelwood mine could only be effectively protected from an external ember attack by either wetting down coal faces or covering exposed coal with earth or some other fire retardant substance.

GDF Suez has its own firefighting infrastructure, plant and equipment, as well as personnel and contractors trained in firefighting who can be called upon in the event of an emergency. The Hazelwood mine features a fire service network, consisting of an extensive pipe network powered by a series of electric pumps, which supplies water to sprays, hydrants and tanker filling points throughout the mine. The fire service network functions both as a means of fire prevention, by allowing wetting down of coal faces on days of high fire risk, and of fire response, by providing a supply of water for firefighting hoses, filling tankers and fixed sprays during firefighting.

During the period from around 1994 until around 2007, degraded or leaking pipework was progressively removed from the fire service network in worked out areas of the Hazelwood mine, principally in an area of the northern batters which was significantly affected by the Hazelwood mine fire in 2014. Prior to the Hazelwood mine fire, the pipework had not been replaced and no risk assessment was conducted to determine whether it should have been.

The removal of this pipework meant that large areas of coal were not covered by either earth or water and were completely exposed. So long as these areas were within five minutes travel from a tanker filling point or hydrant manifold, GDF Suez continued to meet the minimum requirements of its own fire management policies. Tanker filling points and hydrant manifolds are much more relevant to fire suppression than prevention, but in any event proved inadequate for that purpose during the Hazelwood mine fire. Limited reticulated water supply in the northern, eastern and south-eastern batters also severely hampered suppression efforts during February 2014, to the point where extensive pipework had to be installed during the fire. CFA volunteers also described problems with locating and accessing tanker filling points and hydrant manifolds.

In effect, reliance on the minimum requirements under GDF Suez's fire management policies meant that there was no preventive measure in place to protect the worked out areas from ember attack.

While rehabilitation is a routine method of covering exposed coal that could be used as a fire prevention method, there are various factors that make progressive rehabilitation a complex, costly and time-consuming exercise. These obstacles are a real impediment to relying on rehabilitation as the primary
strategy for fire prevention throughout the worked out areas of the Hazelwood mine, although it should be considered as one of the suite of preventive measures available.

There are a range of other potential methods for covering exposed coal in worked out areas of the mine. Clay, a stabilised clay and cement mixture such as ‘shotcrete’, fly ash slurries, foams, gels, organic surfactant materials, polymers and bituminous tar were all raised as potential alternatives to rehabilitation.

Each of these options has advantages and disadvantages. None of the methods appears to have been trialled for this particular application in open cut brown coal mines and may not be suitable for the Hazelwood mine. It is therefore not appropriate for the Board to advocate for any one option without the benefit of proper technical assessment of the feasibility of the measures and a thorough risk assessment that includes a cost/benefit analysis. In reality, the most reasonably practicable control adopted by GDF Suez will probably involve a combination of methods depending on the particular area of the mine.

There are also areas for enhancing fire preparedness measures at the Hazelwood mine. The major area of concern is the lack of back-up power supply or emergency generators available to supplement the mains power supplying the mine, and in particular, pumping stations for the fire service network and the Emergency Command Centre.

The Board considers that existing fire management measures GDF Suez has adopted are deficient in a number of other respects. For example, the vegetation management requirements applying outside the perimeter of the mine do not apply to the worked out areas and mine floor, heightening the risk of fire and hindering access by firefighters; and in worked out areas of the mine where fixed sprays do exist, there is no procedural requirement to wet down coal faces on high fire risk days.

GDF Suez has indicated it will review fire risk in the worked out areas of the mine and has already committed to a range of measures to enhance fire protection. The Board affirms these commitments.

Chapter 3.3 of the report contains a comprehensive discussion of the adequacy and effectiveness of measures taken by GDF Suez to prevent an outbreak of fire in the Hazelwood mine and to mitigate its spread and severity. For an analysis of measures taken by GDF Suez to prepare for and to respond to fire, see Chapter 2.2.

**HEALTH AND WELLBEING**

From 9 February 2014 until 25 March 2014, the local community was overwhelmed by smoke and ash from the Hazelwood mine fire. People were affected in many ways. Smoke and ash produced by the Hazelwood mine fire resulted in a number of distressing adverse health effects for Morwell residents, some of whom may continue to be affected into the future. Many people and local businesses have also experienced financial impacts for a range of reasons.

While the CFA managed the response to the fire, the Environment Protection Authority (EPA), the Department of Health, and the Department of Human Services (DHS), together with the Latrobe City Council, responded to the fire’s health and environmental impacts and led recovery efforts.

The EPA and the Department of Health were the key agencies responsible for providing the community with information about smoke and ash produced by the mine fire and possible adverse health effects. The Department of Health (with the assistance of DHS) set up a number of initiatives to provide respite and relief for the community throughout the event.

Chapter 4.1 of the report includes detailed background information relevant to the environmental and health management of the emergency and its impact on the local community, while Chapter 4.2 provides a chronology of key events.

**ENVIRONMENTAL EFFECTS AND RESPONSE**

When coal is burnt it produces a number of different pollutants. Pollutants emitted during the Hazelwood mine fire included carbon monoxide, particulate matter, nitrogen dioxide, sulphur dioxide, polycyclic aromatic compounds, volatile organic compounds, dioxins and furans, and metals. Particulate matter is a complex mixture of very small particles and liquid droplets that can combine to make dust, soot and
smoke. Exposure to both PM$_{10}$ (particulate matter that is 10 micrometres or less in diameter) and PM$_{2.5}$ (particulate matter that is 2.5 micrometres or less in diameter) has been linked to adverse health effects.

The Hazelwood mine fire also produced a significant amount of ash. While this ash was not ‘fly ash’ it was nonetheless an irritant, and caused significant distress to the community.

The State Environment Protection Policy on Ambient Air Quality provides standards for key pollutants, which are used to monitor ambient air quality. Most of the key pollutants produced during the Hazelwood mine fire are subject to national compliance standards, with the notable exception of PM$_{2.5}$ for which there is only an advisory standard.

During the Hazelwood mine fire, Victoria’s environmental regulator, the EPA, conducted air quality monitoring in Morwell and the surrounding areas. A variety of equipment was used at different locations to obtain relevant data, which was then provided to the Department of Health. The EPA also tested soil, ash and water during the mine fire.

There were three key time periods of significantly elevated levels of pollution (primarily PM$_{2.5}$ and carbon monoxide). These were 15–18 February 2014, 21–25 February 2014, and 26–28 February 2014. During these periods PM$_{2.5}$ levels were well above the advisory standard. A peak reading of PM$_{2.5}$ was recorded on 16 February 2014 when the daily average was approximately 28 times the advisory standard. Carbon monoxide levels were also significantly elevated during the three peak periods, for example on 16 February 2014 at almost four times the compliance standard.

Other pollutants, such as sulphur dioxide, nitrogen dioxide and ozone, were monitored during the mine fire; however they did not exceed compliance standards. The EPA also monitored volatile organic compounds. It found that benzene exceeded the standard at the Morwell Bowling Club on two occasions, and on one occasion at the Maryvale Crescent Preschool. Children were not at the facility at this time, but other residents were close by.

The Board commends the EPA for:

- its commitment to scientific rigour and scientific competence in analysing a large amount of complex air quality data sets in a short period of time
- working assiduously to overcome equipment deficiencies, and moving as swiftly as it could to obtain equipment from wherever it could
- the monitoring conducted from 20 February onwards at the Morwell Bowling Club
- seeking independent peer reviews about its response to the Hazelwood mine fire.

However, the State Control Centre’s initial request for the EPA’s support and advice in responding to the Hazelwood mine fire came too late and the EPA was ill-equipped to respond rapidly. The use of low cost, highly mobile equipment could have allowed monitoring to have commenced earlier in the critical period of the first week when the highest air pollution concentrations were likely to have affected the community.

For a detailed discussion of the environmental effects and an examination of the EPA’s role as a support agency during the Hazelwood mine fire, see Chapter 4.3 of the report.

**HEALTH EFFECTS**

Smoke and ash produced by the Hazelwood mine fire resulted in a number of distressing adverse health effects for Morwell residents, including sore and stinging eyes, headaches and blood noses. The majority of these health effects resolved when the fire was controlled, but some have persisted. Other community members have reported the development of new health conditions as a result of exposure to smoke and ash.

A number of vulnerable groups in the community were particularly susceptible to the adverse health effects of the smoke and ash, namely those with pre-existing cardiovascular and respiratory conditions, pregnant women and unborn children, children and the elderly. The Latrobe Valley has an ageing population with a higher incidence of cardiovascular and respiratory disease. The area also has a high percentage of low-income households and a higher percentage of residents who have a disability. As a result, the Hazelwood mine
fire added further insult to an already vulnerable community. To assist the community to recover from this incident and to improve health outcomes for the future, the Latrobe Valley should be the focus of renewed efforts to improve community health.

During the Hazelwood mine fire, the Department of Health undertook monitoring of the demand on health resources to assess the potential impact of smoke and ash on the community. Through this monitoring activity, the Department of Health determined that there was an initial increase in demand for general practitioners, however there was not a significant increase in attendances at emergency departments, or other hospital admissions during the period of the fire.

Several weeks into the fire, the Department of Health commissioned the Monash University School of Public Health and Preventative Medicine to undertake a Rapid Health Risk Assessment to provide information about the short-term health effects of the Hazelwood mine fire on the local community. The study concluded that the level of exposure to smoke and ash experienced by the community in Morwell would not be expected to cause any deaths if the level of exposure remained at that level for six weeks. However, the study was based on a standard Victorian population and was not adjusted for the poorer health status prevailing in Morwell.

The Board commends the Department of Health for commissioning the Rapid Health Risk Assessment of the potential health effects of the fire. However, the utility of the Rapid Health Risk Assessment would have been enhanced had the results been available earlier to inform the Department of Health’s decision-making. It also would have been beneficial to provide the Rapid Health Risk Assessment findings to the community to address their request for more information about the potential adverse health effects of the exposure to smoke and ash.

There were serious concerns in the community about the potential long-term health impacts of exposure to smoke and ash from the Hazelwood mine fire. Understanding and managing the health and environmental impacts of the Hazelwood mine fire is challenging, as the health effects of medium-term exposure to smoke and ash from a fire in a coal mine are not known.

A primary concern, from a long-term health perspective, is the duration for which residents were living with ash, smoky conditions. The Board heard expert evidence that people with pre-existing cardiovascular and respiratory conditions are particularly susceptible to potential adverse long-term health effects when exposed to ozone, PM$_{2.5}$ and larger particulates. In particular they are susceptible to an aggravation or progression of their underlying condition, an increased risk of lung cancer and potential effects on coagulation, which could result in an increased risk of arrhythmias, morbidity, hospital admissions and death. There was also a risk that the general population could develop medium to long-term effects from the exposure to PM$_{2.5}$ and ozone, including but not limited to the development of respiratory conditions, effects on cardiac conduction, increased risk of heart attack, stroke and lung cancer, long-term cognitive decline and psychosocial effects.

Chapter 4.5 of the report contains a more in-depth discussion of the health effects that the smoke and ash produced by the Hazelwood mine fire had on the community, the likely cause of these health effects, and potential long-term health impacts.

**FIREFIGHTER HEALTH**

The Board of Inquiry heard a number of concerns about the health risks faced by firefighters during the Hazelwood mine fire and received submissions that the CFA, MFB and GDF Suez failed to recognise the potential health risks to those involved in the fire operations, particularly from exposure to carbon monoxide.

Over the course of the Hazelwood mine fire, numerous firefighters from emergency services and GDF Suez required medical treatment. Fourteen emergency service firefighters and 12 GDF Suez staff presented to hospital due to exposure to carbon monoxide, however none required admission. A firefighter was admitted to hospital due to a cut that subsequently became infected and another firefighter was injured activating a water spray in the mine. Several firefighters required first aid at the mine throughout the fire.

Fire services were initially inadequately prepared to respond to the hazardous conditions produced by the Hazelwood mine fire, particularly the risk of firefighters being exposed to elevated levels of carbon monoxide, which is lethal in high concentrations.
Protocols about the protection of firefighters from the risks of exposure to carbon monoxide were not implemented until late in the evening on 9 February 2014, by which time firefighters had already been exposed to increased levels of carbon monoxide.

The Draft Carbon Monoxide Regional Operating Procedure (developed in 2006 by the CFA) was then utilised, with additional measures subsequently incorporated to form a Health Management and Decontamination Plan. The Board considers that the Health Management and Decontamination Plan did not take into account that some firefighters may have had pre-existing conditions such as cardiovascular disease, which would have put them at an increased risk of adverse health effects from carbon monoxide exposure. The Board considers that it is important that all firefighters, including volunteers, are provided information about the potential risks involved in firefighting so that they can make informed choices. It is concerning that the Carbon Monoxide Regional Operating Procedure has remained in draft form since 2006.

GDF Suez had a carbon monoxide procedure in place to manage the risk of exposure to carbon monoxide during a mine fire. However, the Board considers it did not provide adequate protection to the mine's firefighters and operational staff from potential carbon monoxide exposure. If not for GDF Suez subsequently adopting the Health Management and Decontamination Plan utilised by emergency services, carbon monoxide exposure would not have been detected until firefighters began to exhibit symptoms, which may have put them at risk of significant adverse health effects.

The immediate health risks to firefighters during the Hazelwood mine fire and the methods employed to minimise these risks are described in further detail in Chapter 4.4 of the report.

HEALTH RESPONSE

The health response to the Hazelwood mine fire was led by the Department of Health with the assistance of the EPA. The Department of Education and Early Childhood Development and the Latrobe City Council managed the health response for schools and children's services.

The Inquiry revealed that the response to poor air quality in the Latrobe Valley as a result of the Hazelwood mine fire was delayed and overly reliant on validated air data when indicative air data would have been sufficient to inform health advice. This was compounded by issues relating to the protocols relied upon by government agencies to assist their decision-making.

One such protocol was the Bushfire Smoke Protocol, jointly developed by the EPA and the Department of Health in 2006/2007. During the Hazelwood mine fire, the EPA issued 58 advisories in accordance with the Bushfire Smoke Protocol via media releases. These advisories also included general advice about actions to reduce health impacts caused by smoke. However, the advisories were generic and repetitive and did not provide actionable advice for the community to respond to varying levels of smoke. The Bushfire Smoke Protocol should be reviewed and amended to provide practical, clear and user-friendly advice.

During the mine fire two further joint protocols were developed to help inform decision-making and advice to the community about increased levels of carbon monoxide and PM$_{2.5}$ in the air: the community Carbon Monoxide Response Protocol and the PM$_{2.5}$ Health Protection Protocol.

The Board commends the EPA and the Department of Health for their commitment to developing and obtaining peer reviews of the community Carbon Monoxide Response Protocol and the PM$_{2.5}$ Health Protection Protocol. However, because they were only developed during the mine fire, they could not be used to protect the community in the early stages of the fire.

In particular, the PM$_{2.5}$ protocol was not developed until 25 February 2014, by which time the local community had already been subjected to elevated levels of PM$_{2.5}$ for more than two weeks.

After 25 February 2014, levels of PM$_{2.5}$ started to increase again, which prompted the Chief Health Officer to advise on 28 February 2014 that vulnerable groups (preschool aged children, pregnant women, people with pre-existing cardiovascular and respiratory conditions and people over 65 years) temporarily relocate from the area south of Commercial Road in Morwell. Based on the information provided, the Board considers that this temporary relocation advice was provided too late. Further, the basis for limiting the advice to those in vulnerable groups living south of Commercial Road was poorly explained and was perceived by the community as arbitrary and divisive.
The absence of a carbon monoxide protocol in the early stages of the fire meant the response of the EPA, CFA and Department of Health to high carbon monoxide levels lacked coordination and integration. On 15 February 2014, elevated carbon monoxide readings motivated the CFA to issue a ‘Watch and Act’ alert warning residents close to the Hazelwood mine to shelter indoors immediately and close all windows, doors and vents. The Department of Health was not involved in the decision to send the alert and did not consider it necessary or helpful. It also conflicted with health advice the Department was providing to the community at that time.

Worrying carbon monoxide levels continued to be detected on 16 February 2014. The Department of Health considered these detections to be ‘spot readings’ and not sufficiently reliable to inform public health advice. The Department of Health therefore decided not to issue any warnings or advice to the community. Yet if these readings were averaged over a four hour period they were high enough to warrant at least a ‘Watch and Act’ alert. The Board was informed that no adverse health effects from community exposure to carbon monoxide were detected on or after 16 February 2014.

The Board considers it unfortunate that the Department of Health did not have in place a pre-existing carbon monoxide protocol to provide advice to the community about elevated levels of carbon monoxide. The Board is of the view that the State should give further consideration to improving advisory mechanisms for public health emergencies.

The Board is concerned that acute exposure standards, used as a basis for the community carbon monoxide protocol, are too high according to international experts and should be reviewed. Furthermore, inconsistencies between the community carbon monoxide protocol and the firefighter carbon monoxide protocol meant that levels that were not considered safe for firefighters and required evacuation, did not require the same response if the level was measured in the community. This inconsistency in the protocols was not satisfactorily explained to the Board and remains of concern.

Following the establishment of the Inquiry, the Victorian Government signalled it intended to incorporate the Carbon Monoxide Response Protocol and the PM$_{2.5}$ Health Protection Protocol documents into a single operational document. It also intends to develop a State Smoke Plan covering the management of potential public health impacts from large scale, extended smoke events such as bushfires, planned burns, brown coal mine fires or industrial (hazardous material) fires.

The Board affirms this proposal, and recommends that the State Smoke Plan be incorporated into a State Smoke Guide, which would consist of a comprehensive suite of documents and support materials that could be used to minimise the harmful effects of smoke in the community.

A number of additional measures were put in place to provide health information and support to the community during the Hazelwood mine fire. These include the establishment of a community respite centre and a health assessment centre.

The Board commends the Department of Health for the development of a health assessment centre. The centre provided the community with an additional resource to provide health information, guidance and reassurance. Although, the effectiveness of the centre would have been enhanced if local general practitioners had visited the centre to demonstrate their support and to reassure the community that appropriate measures were in hand.

In terms of the longer-term health response, the toxic nature of smoke from the Hazelwood mine fire has raised community and medical concerns that there will be ongoing physical and mental health implications. The Department of Health has agreed to fund a long-term and wide ranging health study. This is not a decision that would have been taken lightly—there are few examples in Australia of long-term studies linked to an environmental disaster.

The Board agrees a long-term study would be an extremely useful predictive tool to assist with understanding future risks, and to prevent or reduce the chances of adverse health effects arising from similar situations in the future. However, all efforts ought to be made to extend the duration of the study to at least 20 years given the long lead times of some potential pollutants and the fact that young children were susceptible to the impacts.
Although there are many excellent health services in the Latrobe Valley and visits to those services increased during the mine fire, there was not a coordinated whole of health sector approach. There is a strong case for the health of the population of the Latrobe Valley to be substantially improved. Based on current health status information, this was justified before the Hazelwood mine fire and is even more necessary now. In the view of the Board, consideration ought to be given to potential avenues to achieve better outcomes for the region, such as the creation of a health conservation zone and the appointment of an independent health advocate.

The adequacy and effectiveness of the health response to the Hazelwood mine fire is considered more comprehensively in Chapter 4.6 of the report.

**RELIEF AND RECOVERY**

During the Hazelwood mine fire, the Latrobe City Council, government agencies and GDF Suez delivered a range of relief and recovery initiatives. These included respite and relocation payments to eligible Morwell residents, clean up kits and financial assistance for professional cleaning services, and financial assistance for businesses.

At community consultations and in written submissions, there was widespread criticism of the timing, adequacy and eligibility criteria for these initiatives.

In accordance with the emergency management arrangements in effect at the time of the Hazelwood mine fire, both DHS and Latrobe City Council had a role in planning and coordination of relief and recovery, with the Council largely responsible for local operational delivery. This led to community confusion regarding their roles and responsibilities.

For example, it is apparent from community consultations that the community was not clear about the decision-making and funding process for the clean up. The Board agrees with Latrobe City Council that improved systems of coordination and communication are required in emergencies of this type. The Board recognises that emergency management reforms underway in Victoria are likely to assist with achieving this objective.

Based on information before the Board, it is apparent that the Latrobe City Council worked hard to implement relief and recovery measures, and to advocate on behalf of the community for adequate clean up packages.

While acknowledging that clean up assistance has not previously been provided by the Victorian Government to households after floods and bushfires, the Board considers the self-clean package was inadequate to the scale of the cleaning task faced by community members. The clean up assistance package for Morwell was not announced until 18 March 2014 and there were further delays in implementing the assisted clean up package. This diminished the usefulness of the package as many people had already made their own cleaning arrangements.

DHS developed tailored relief payments to meet the needs of the residents of Morwell, in particular residents who were advised to temporarily relocate. However, there was confusion about eligibility requirements regarding the respite and relocation payments and flaws in communication, which caused distress in the community. The relief payments created divisions in the local community that have impeded recovery. The Board recognises and supports the decision by DHS to review its programs and guidelines for consistency and clarity of purpose. The Board also supports the Victorian Government’s proposal to implement new technology for recording emergency assistance payments.

The Victorian Government, through the Department of State Development, Business and Innovation, has provided considerable support and assistance for small businesses in Morwell affected by the mine fire. Financial assistance was made available through the Morwell Business Relief Fund and a range of other practical support was also available. GDF Suez has provided additional stimulus to Morwell retailers through its ‘Revive Morwell’ initiative and Community Social Capital grants.

The Board affirms the Victorian Government’s commitment to support local councils through Local Government Victoria. In particular, the Board supports developing formal and informal networks between emergency management officers and a resource base that Local Government Victoria can work closely
with during the response and recovery phases. The proposal for Local Government Victoria to coordinate emergency management officers across local councils is an appropriate approach.

For further exploration into the relief and recovery measures taken to support the Latrobe Valley community during and after the Hazelwood mine fire, see Chapter 4.7 of the report.

**COMMUNICATIONS**

The CFA, EPA, the Department of Health, DHS and the Latrobe City Council were primarily involved in informing the community about the mine fire, its effects and the response taken. A number of community organisations assisted by providing information to the community. Communications from GDF Suez were noticeably absent over the 45 days that the mine fire burned.

Feedback from the community consultation process, public submissions and evidence at public hearings pointed to significant shortcomings by government authorities, as well as GDF Suez, in communicating throughout the emergency. Throughout the 45 days that the fire burned, members of affected communities felt they were not listened to and were not given appropriate and timely information and advice that reflected the crisis at hand and addressed their needs.

Members of the community also reported that lack of coordination among the agencies involved in managing and responding to the mine fire resulted in confusing messages, with agencies appearing to contradict each other. This left affected communities struggling to find the answers and reassurance they were seeking. According to one expert, members of the community were suffering ‘cognitive dissonance’: what they were being told by health and environmental authorities was not what they were experiencing.

A major factor contributing to the community’s disengagement was the State’s initial mischaracterisation of the mine fire as simply a fire emergency, when in fact it evolved into a chronic technological disaster. It then became a significant and lengthy environmental and health crisis.

The Board acknowledges that all government agencies worked under a great deal of pressure to try to ensure that the community received appropriate information. There were a number of examples of commendable efforts by government agencies, the Latrobe City Council, volunteer organisations and individual residents to keep the community informed.

Unfortunately, communication responses overall did not reflect international best practice for crisis communication. Communication did not reach many people in a timely way and in some cases, not at all. Communication was largely one-way with information being transmitted, but not received or understood by the intended recipients. An over-reliance on digital technology, particularly early on, hindered the message reaching all community members. Empathy was also often lacking, particularly from some government spokespeople.

Government departments and agencies did not engage to any significant extent in listening to, or partnering with local residents and community groups. One way of addressing this is to deploy community relations specialists during an emergency to work with previously identified trusted networks and act as an interface between communities and the providers of information and services.

The Board has made several recommendations for enhancing communications in the future. The State is conscious of the need for significant improvement and has already committed to a number of actions, as demonstrated by the communication principles included in the Victorian Emergency Management Reform White Paper and the Victorian Government’s new governance arrangements for emergency management in Victoria through Emergency Management Victoria. The issues raised by this Inquiry and the recommendations of this report should be reflected in crisis communication policy and procedures within the new emergency management framework.

The adequacy and effectiveness of communications employed during the Hazelwood mine fire is considered in depth in Chapter 5 of the report.

The Board hopes the work undertaken through and by this Inquiry will assist to prevent a disaster like that of February and March 2014 from ever happening again.
RECOMMENDATIONS

The Hazelwood Mine Fire Board of Inquiry makes 18 recommendations.

These recommendations have been drafted taking into account issues raised by the Latrobe Valley community and the feasibility of implementation.

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.

Where the term ‘GDF Suez’ is used in these recommendations, this is intended to refer to the entity that can most appropriately implement recommendations in respect of the Hazelwood mine.

The Board’s recommendations should be read alongside the Board’s ‘affirmations’ which comprise the actions that the State and GDF Suez committed to undertake during the course of this Inquiry.

RECOMMENDATIONS TO THE STATE

RECOMMENDATION 1

The State empower 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.

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.
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.

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.

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.
RECOMMENDATIONS TO GDF SUEZ

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.
AFFIRMATIONS

During this Inquiry, the State and GDF Suez have expressed a commitment to undertake numerous actions in response to the Hazelwood mine fire. The State's commitments are included in its written submissions to the Inquiry. GDF Suez's commitments are included in its written submission to the Inquiry.

Some of the actions that the State or GDF Suez have committed to undertake directly address the Inquiry's Terms of Reference and the Board has responded to them in the text of the report. Where the State and GDF Suez have accepted responsibility for undertaking action that directly addresses the Terms of Reference, the Board has not duplicated this commitment with a recommendation. Where the Board considers that an undertaking does not go far enough, it has also made a recommendation.

Some actions that the State or GDF Suez have committed to undertake go beyond the Terms of Reference of this Inquiry, but they remain relevant to the Inquiry and mitigate against an event similar to the recent Hazelwood mine fire happening again. The Board notes that some of these actions are already being implemented.

The Board affirms the commitments listed below. Where there is an inconsistency, the Board’s recommendation prevails.

The Board attaches similar weight to the commitments that are the subject of its affirmations as to its recommendations. As stated in recommendation 1, progress on the commitments the Board has affirmed should be monitored and accounted for on the same basis as the Board’s recommendations.

THE BOARD AFFIRMS THE FOLLOWING ACTIONS THAT THE STATE OF VICTORIA INTENDS TO TAKE:

- The State develop a Strategic Action Plan to improve and strengthen Victoria's emergency management capability.
- The State establish Emergency Management Victoria as the new overarching body for emergency management in Victoria.
- The State establish an Emergency Management Commissioner to ensure that control arrangements are in place, and coordinate the response roles of relevant agencies’ resources.
- The State establish Inspector General Emergency Management as the assurance authority for Victoria's emergency management arrangements.
- The State establish a Volunteer Consultative Forum for the Government to consult with volunteers and ensure their views are heard.
- The State implement actions set out in the White Paper on Emergency Management Reform to improve community awareness and education, and make information available during emergencies.
- The State strengthen industry engagement with the community.
- The State improve the State planning framework for emergencies.
- The State improve Government engagement with the coal mine sector regarding emergency management plans.
- The State improve integration of industry in the response to an emergency.
- The State improve training for career and volunteer firefighters to include lessons highlighted by the Hazelwood mine fire.
- The State improve OHS in emergency response to include lessons highlighted by the Hazelwood mine fire.
- The State develop an integrated emergency resource planning framework for the Latrobe Valley.
• The State review emergency management communications arrangements across Government commissioned by the State Crisis and Resilience Council, including consideration of:
  
(i) the roles and functions of emergency communications committees;
(ii) enhancing specialist crisis communications capability within Government;
(iii) the use of established local networks as a way to communicate during emergencies;
(iv) additional emergency communications training for Government employees; and
(v) developing a coordinated approach to the use of social media by Government during emergencies.

• The State conduct a National Review of Warnings and Information.

• The State review Environment Protection Authority (EPA) emergency protocols, incorporating lessons from the Hazelwood mine fire.

• The State clarify future expectations of incident air monitoring and scenarios, and determine the appropriate inventory of equipment.

• EPA to coordinate a meta-analysis, including smoke plume modelling, of air monitoring data and other relevant information collected during the Hazelwood mine fire to create a body of knowledge of the impacts of extended brown coal fire events.

• The Department of Health and EPA to undertake further development on the carbon monoxide and PM$_{2.5}$ protocols and an engagement and education program around environmental and health standards.

• EPA review its communications response and implement a structured community engagement process with the Morwell and surrounding communities.

• EPA will be monitoring PM$_{2.5}$ at all its fixed automatic air quality monitoring locations by the end of July 2014.

• The State will have an automatic air quality monitoring station in the south of Morwell for the next 12 months [to March 2015].

• The State review the State Environment Protection Policy for Ambient Air Quality.

• The State develop a State Smoke Plan covering the management of potential public health impacts from large scale, extended smoke events.

• The State undertake projects to understand health impacts and predict the movement of smoke from planned burning and bushfires.

• The State improve local engagement on health issues.

• The State improve communication around psycho-social support to communities affected by emergencies.

• The State commission a long-term study into the long-term health effects of the smoke from the Hazelwood mine fire.
• The State review the Personal Hardship Assistance Program and Implementation Guidelines for consistency and clarity of purpose.

• The State implement new technology for recording emergency assistance payments.

• Local Government Victoria coordinate emergency management officers across local councils.

• The State improve relief and recovery information available to Culturally and Linguistically Diverse communities.

• The State review relief and recovery communications and community engagement initiatives.

• The State prepare Regional Growth Plans.

• The State implement a risk-based approach for work plans.

• The State implement the Victorian Critical Infrastructure Resilience Strategy.

• The State enhance emergency risk mitigation planning.

• The State review the Latrobe City Municipal Emergency Management Plan.

• The State initiate a joint program for regulators, emergency service agencies and the Emergency Management Commissioner to assess the prevention and preparedness controls on sites across Victoria.

• The State establish an appropriate mechanism to monitor implementation of the actions set out in its submission and the Government’s response to the Board of Inquiry’s recommendations.
THE BOARD AFFIRMS THE FOLLOWING ACTIONS THAT GDF SUEZ INTENDS TO TAKE:

- GDF Suez nominate a group of staff to be trained in the Phoenix Rapidfire modelling tool prior to the 2014/2015 fire season.

- GDF Suez offer enhanced training prior to the 2014/2015 fire season and on an ongoing basis, to personnel who are intended to perform a role under the emergency command structure and relevant emergency service agencies.

- GDF Suez establish an emergency command structure at the mine to deal with Extreme Fire Danger Days.

- GDF Suez notify Country Fire Authority (CFA) of the identity and contact details of those personnel holding these roles.

- On Extreme Fire Danger Days, GDF Suez ensure more personnel are rostered on and additional contractors are available for dedicated fire protection duties.

- GDF Suez upgrade signage within the mine to make orientation easier for non-mine personnel.

- GDF Suez negotiate with SP AusNet regarding a feasibility study to upgrade the MHO substation from temporary to permanent standard.

- GDF Suez initiate a programme for reducing vegetation in the worked out areas of the northern batters to reduce fire risk commencing in the areas closest to Morwell.

- GDF Suez maintain and continue to use the additional pipe system located in the northern batters which was installed during the 2014 fire and install additional pipework as identified.

- GDF Suez conduct a review of the current pipework and condition in the areas of the mine other than the eastern section of the northern batters.

- On Extreme Fire Danger Days GDF Suez instigate wetting down of non-operational areas.

- GDF Suez nominate a representative to attend the meetings of the Municipal Fire Prevention Committee convened by Latrobe City Council.

- GDF Suez nominate designated people to be in attendance at the CFA Incident Control Centre during an emergency which threatens the mine.

- GDF Suez review its own communications protocol to ensure that during the response to a fire which is capable of impacting on the community, it is able to communicate messages to the community via any protocol adopted following the review by all agencies.

- GDF Suez work with Victorian WorkCover Authority (VWA) to review its Safety Assessment and Safety Management System in light of rr. 5.3.21 and 5.3.23 of the Occupational Health and Safety Regulations 2007 (Vic).

- GDF Suez develop a Carbon Monoxide management protocol for firefighter and mine employee safety prior to the 2014/2015 fire season, in consultation with VWA and CFA.

- GDF Suez undertake the rehabilitation set out in Exhibit 88 – Statement of James Faithful, annexure 5 and discuss the appropriate timing of each sequence of rehabilitation with the Department of State Development, Business and Innovation.
FUTURE PROPOSALS

The Board has not been able, in the time available, to explore all reform options in depth, or test good ideas against a cost/benefit analysis.

However, the Board does not want to narrow policy makers’ vision, nor constrain the State and GDF Suez to the Board’s recommendations, nor limit improvements to those that the State and GDF Suez have committed to undertaking over the course of this Inquiry.

With this in mind, the Board considers that the following proposals, which are referred to in the report, warrant further attention.

PROPOSALS WARRANTING SERIOUS CONSIDERATION

The State:

- Investigate amending the Latrobe Planning Scheme, through the Minister for Planning, advised by the Department of Transport, Planning and Local Infrastructure, and the Latrobe City Council. The purpose of these amendments is to ensure, so far as is reasonably practicable, that the risk of embers from external rural fires (in particular from timber plantations) entering open cut coal mines in the Latrobe Valley, is minimised.

- Create a Health Conservation Zone in the Latrobe Valley. The purpose is to improve significantly the health of the Latrobe Valley community by coordinating and integrating health services with responses which tackle the broader social and environmental determinants of health.

- Appoint a Health Advocate for the Latrobe Valley. The purpose is to provide a local health voice for the Latrobe Valley community that can win the trust of that community and be a sound source of advice, mediation and advocacy on health-related matters.

- Develop an advisory mechanism for public health emergencies to assist the Chief Health Officer and Emergency Management Commissioner. The purpose is to assist the Chief Health Officer and the Emergency Management Commissioner by providing advice on health and medical policies and protocols relevant to public health emergencies.