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Environment Protection Authority Victoria
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6 August 2018

Dear Sir/Madam,

Loy Yang A Power Station

AGL's Response to the Issues Raised by the Community During the EPA's Brown Coal-Fired Power Station Licence Reviews

AGL Loy Yang Pty Limited (AGL Loy Yang) owns and operates the brown coal fired Loy Yang A Power Station (Loy Yang A) and the adjoining Loy Yang Mine (Mine).

AGL Loy Yang thanks the community for their input to the Environment Protection Authority Victoria's (EPA) review of the brown coal fired power station environmental licences and welcomes the opportunity provided to respond to the issues raised.

Loy Yang A

Loy Yang A and the Mine are located 165 kilometres south east of Melbourne. They were originally constructed through the 1980s by the government owned State Electricity Commission of Victoria (SECV) and were acquired by AGL Loy Yang in June 2012.

Loy Yang A has four generating units with a combined capacity of 2200MW. It operates 24/7 to generate approximately 30% of Victoria's power requirements and produces enough power to supply over 2 million average Australian homes every year. The Mine supplies both Loy Yang A and Loy Yang B - fuelling around 50% of Victoria's energy requirements. Loy Yang A and the Mine are integral to the security of electricity supply for Victoria and across the broader Australian national electricity market (NEM).

Loy Yang A and the Mine are also a key source of employment in the Latrobe Valley and employ approximately 600 people.

About AGL

AGL Loy Yang forms part of the AGL Energy corporate group (AGL).

AGL operates the country's largest electricity generation portfolio. We are also the largest ASX-listed investor in renewable energy and have more than 3.6 million customer accounts.

Proudly Australian, with more than 180 years of experience, we have a responsibility to provide sustainable, secure and affordable energy for our customers. Our aim is to prosper in a carbon-constrained world and build customer advocacy and meaningful community relationships, as our industry transforms. That is why we have committed to exiting coal-fired generation by 2050 and why we will continue to develop innovative solutions for our customers.

Our diverse power generation portfolio includes base, peaking and intermediate generation plants, spread across traditional thermal generation as well as renewable sources including hydro, wind, and solar.

AGL is committed to achieving excellence in environmental management and performance across all its assets. We are focused on delivering new, innovative and integrated offerings to meet the changing needs of our customers and the changing needs of the energy environment.

As Australia's largest scope one (direct) greenhouse gas emitting business, we recognise we have a key role to play in reducing emissions while providing secure and affordable energy for Australian households and



businesses. Information on our greenhouse gas emissions is available in our annual sustainability reports and our online data centre, and provides a complete account of the annual greenhouse gas impacts from our business.

We know it is important for the community, particularly in the Latrobe Valley, to understand the environmental impacts of our business and strong views are held on greenhouse gas emissions, air emission limits, monitoring and reporting as well as the environmental implications of our operations.

Our approach to greenhouse gas emissions and climate change is set out in our [Greenhouse Gas Policy](#). Our Greenhouse Gas Policy acknowledges that Australia is moving to a carbon-constrained future and provides a framework within which we will structure our greenhouse gas reduction activities. It also presents a pathway for the decarbonisation of our generation portfolio by 2050.

AGL's number one priority is the safety of our employees and the local community. AGL's culture places environmental principles at front of mind as part of everyday business and promotes excellent environmental performance, continuous improvement and the ongoing reduction of environmental risks. We are committed to engaging with our stakeholders on these issues and recognise that our future success and reputational standing is shaped and measured by the social and environmental impacts of our operations.

Our Environmental Commitments for Loy Yang A

AGL Loy Yang values the Latrobe Valley community. We are committed to transparency and honest communication as we help shape a sustainable energy future for Australia while continuing to operate our coal fired assets, such as Loy Yang A, in accordance with best practices in the context of their design.

We understand the community, particularly the Latrobe Valley community surrounding Loy Yang A, is interested in air quality, emissions, monitoring and reporting. Our annual Loy Yang Community Forum allows members of the community to interact with our leaders about current and future operations. We also have a quarterly Environment Review Committee and Community Dialogue Group which provide feedback from key stakeholder representatives on our operations and environmental impacts.

We recognise that air emissions from our operations such as Loy Yang can potentially contribute to regional airshed issues. We are committed to ensuring that our operations run efficiently, within the parameters set by regulatory controls and that we monitor emissions to verify compliance with relevant limits.

Loy Yang A and the Mine are regulated under environment licence 11149 (**EPA Licence**) issued by the EPA under the *Environment Protection Act 1970 (VIC)* and must also comply with the provisions of the State Environment Protection Policies. The EPA Licence contains detailed conditions regulating environmental impacts from Loy Yang A and the Mine and was most recently updated on 2 August 2018. The State Environment Protection Policies contain further controls to ensure that beneficial uses of the environment, including human health and wellbeing, are met.

Loy Yang A has four generating units, each of which are monitored continuously for sulphur dioxide, nitrogen oxides, carbon monoxide and total particulates. Loy Yang A is also subject to limits for sulphur trioxide, fluorine compounds and chlorine compounds which are monitored via stack sampling.

Air emissions from Loy Yang A are reported to the Federal Government's National Pollutant Inventory (NPI) each year, a publicly available database of emissions from Australian industrial facilities. We have also committed to provide publicly available summaries of the key emissions data from Loy Yang A on our website to ensure greater transparency.

AGL Loy Yang is also a contributing member and participant in the Latrobe Valley Air Monitoring Network Inc (LVAMN), which operates and maintains ambient air monitoring stations at Jeeralang Hill and Rosedale South and undertakes air quality compliance assessments funded through industry member contributions.

Daily summaries and annual reports of the results of this air monitoring program are published on the LVAMN's website. The LVAMN also supports displaying data on the EPA Air Watch website in real time.



We have committed to closing Loy Yang A by no later than 2048. When the time comes to close Loy Yang A we will:

- Provide five years notice of closure of Loy Yang A, which is two years more than the Australian Energy Market Commission will include in its planned rule change to require three years notice of closure;
- Continue to work with the Latrobe Valley community and Loy Yang workforce to build the foundations for new opportunities and diversify the economy in the transition towards a carbon constrained future;
- Support the transition of the AGL Loy Yang workforce to new opportunities prior to and following closure; and
- Rehabilitate the site in line with the progressive rehabilitation plans prepared for the Mine and the commitments made in our [Rehabilitation Report](#). Our Rehabilitation Report outlines how AGL is approaching the challenges associated with rehabilitating large, long-lived assets and infrastructure and provides an overview of processes, strategies and timelines that are considered in the development of rehabilitation plans.

Until then, we will continue to invest in Loy Yang A and the Mine in accordance with all regulatory requirements and the commitments made in the [AGL Environment Policy](#). Our Environment Policy records our commitment to:

- Adhere to high standards to protect the environment where we do business;
- Meet or exceed our regulatory obligations;
- Analyse and improve the way we do business to reduce environmental risks and impacts;
- Continuously improve our environmental performance through developing and reviewing effective management systems, measurement and targets;
- Contribute to research and adaptation to new technologies that improve environmental outcomes; and
- Use resources and energy efficiently, minimising emissions and waste.

In line with these commitments:

- We completed a turbine refurbishment on unit 1 at Loy Yang A last year which produced a saving of almost 80,000 tonnes of CO₂ a year.
- Our unit 3 refurbishment will be completed in 2019 and will result in a similar CO₂ saving.
- Loy Yang A has collaborated with the CSIRO on post combustion carbon capture trials since 2008. The [project](#) underway at Loy Yang A is a post-combustion capture research project which will evaluate innovative processes using gases drawn from Loy Yang A with the aim of increasing efficiency of carbon capture technologies. The project is targeting a 40 percent reduction in energy use compared to current carbon capture processes. The PICA project is the fourth research project which Loy Yang A has been involved with and the fifth collaboration between Loy Yang A and the CSIRO.
- The Mine will also play a role in the world-first innovative Hydrogen Energy Supply Chain project which will convert brown coal from the mine into liquid hydrogen – a clean energy solution with the potential to reduce carbon emissions.

Response to Community Submissions

The report attached to this letter responds in detail to the issues highlighted by the EPA and the community during the consultation carried out by the EPA as part of the EPA's Brown Coal-Fired Power Station Licence Review.



Air Modelling Report

In addition to this response to the issues raised during consultation, AGL Loy Yang has also, together with the operators of the Loy Yang B and Yallourn Power Stations, commissioned GHD to undertake detailed modelling in accordance with EPA approved methodology to enable the community to have a better understanding of the air quality impacts resulting from the three brown coal power stations. The results of this air modelling will be provided in a separate report (Air Modelling Report) and should be considered alongside the report attached to this letter. AGL Loy Yang may supplement the report attached to this letter following the finalisation of the Air Modelling Report.

We acknowledge and support the EPA's commitment to continue working with us to achieve the best outcomes for all stakeholders and welcome the opportunity to discuss any aspect of this response.

Yours sincerely

A handwritten signature in blue ink that reads 'Stephen g Rieniets'.

Steve Rieniets

General Manager - AGL Loy Yang



Response to the Issues Raised by the Community During the EPA's Brown Coal-Fired Power Station Licence Review Process

Overview

This report responds to the following key issues and suggestions identified in the submissions received from environmental groups and the community as part of the EPA's Brown Coal-Fired Power Station Licence Review:

1. Best practice management of dust emissions from the mines using prescriptive licence conditions
2. Best practice management of land, surface water and groundwater contamination from ash ponds
3. Best practice management of waste water discharges from mines and power stations to maintain river health and protect human health
4. Changes to licence should only go ahead after careful analysis—in consultation with impacted businesses - of cost for complying with the changes and their environmental gain
5. Collaboration between the Latrobe Valley Air Monitoring Network (LVAMN) and other EPA monitoring to release information in real time on EPA's AirWatch
6. Consider climate and set limits for greenhouse gases
7. Continuous improvement to reduce emissions in line with best available techniques
8. Continuous monitoring of emissions of oxides of nitrogen (NO_x), sulphur dioxide (SO₂), carbon monoxide (CO), mercury (Hg) (new), coarse particles (PM₁₀) and fine particles (PM_{2.5}) (currently just total particles)
9. Dust particle characterisation study to better understand sources of particle pollution in the Latrobe Valley
10. Monitoring and ending the release of mercury into the environment
11. Move away from waste oil / black coal used during startups with natural gas to reduce air emissions
12. Move to load based licensing scheme to encourage investment in emission reduction technologies
13. Public release of emission data in real time in a public friendly format
14. The need for health assessments of current impacts and ongoing risks from existing coal projects in the Latrobe Valley
15. Distinction between current licences and other approvals used in the rehabilitation or remediation phase of the mines and power stations, for clarity and consideration of sufficiency of bonds / assurances

In responding to each of these issues we have also considered the more detailed issues and themes raised by the submissions.



1. Best practice management of dust emissions from the mines using prescriptive licence conditions

Dust from the Mine has the potential to impact our neighbours under dry and windy weather conditions unless appropriately managed.

The EPA Licence, which covers both Loy Yang A and the Mine, includes condition requiring us to ensure that nuisance dust and/or nuisance airborne particles are not discharged or emitted beyond the boundaries of the premises.

We have comprehensive procedures for the Mine that look at both predicting weather events which may result in dust emissions and controlling activities and preventing or minimising impacts when such weather events are likely to occur.

We undertake monitoring of weather conditions and implement a weather alert system to provide alerts giving 48 hours notice prior to weather events with an elevated dust risk. These alerts are provided to all relevant personnel so that planning and allocation of resources for dust suppression can be undertaken. A trigger action response plan (TARP) sets the relevant actions for key staff to undertake following an alert. This includes actions such as wetting of coal surfaces prior to the forecast weather event, rescheduling of operational activities where practicable and minimising traffic movement during periods when weather conditions are likely to facilitate high concentrated deposition rates.

We also have an ongoing program to place dust suppressant over exposed coal surfaces and are undertaking progressive rehabilitation of exposed surfaces in the Mine to minimise dust generation.

AGL Loy Yang is committed to continuously improving the management of fugitive dust at the Mine. We recently engaged an independent consultant to review and assess the dust mitigation activities utilised on site with a view to improving the current controls and implementing additional controls and strategies. Once this review is complete we will update our TARP action plan.

The EPA and Department of Economic Development, Jobs, Transport and Resources (DEDJTR) undertake regular audits and inspections of our dust management practices, which confirm we are implementing actions consistent with our outlined procedures.

We believe that the existing licence conditions regulating dust emissions and our demonstrated commitment to implementing best practice dust management means that additional licence conditions are not required.

2. Best practice management of land, surface water and groundwater contamination from ash ponds

Overview of Ash Management Practices at Loy Yang A

Loy Yang A generates electricity by combusting brown coal in its boilers to produce steam. The steam generated in the boilers then drives the turbines contained in each generating unit and generates electricity.

Ash is the incombustible solid residue from the combustion of the brown coal in the boilers. The ash is collected in the boiler hearths and electrostatic precipitator hoppers and is conveyed as a slurry mixed with water to an ash pond (Ash Pond). Once the ash slurry enters the Ash Pond the ash settles out from the water in the slurry mixture. The water from the Ash Pond is decanted to be either recycled back to Loy Yang A for reuse or transferred to the saline waste outfall pipeline to a licenced discharge point under Gippsland Water's EPA licence. The ash is removed from the Ash Pond and deposited into EPA licenced disposal onsite sites (Ash Landfill).



Ash Pond

The Ash Pond is comprised of three interconnected ponds:

- The northern settlement pond and the southern settlement pond operate on a two-year cycle, with one of the two settlement ponds being filled in the first year and then dewatered and the ash removed in the second year. This operation alternates between the two settlement ponds to provide continual ash storage capacity.
- The eastern clarification pond, which receives overflow water from the settlement ponds and the saline water from Hazelwood and Yallourn, allows for further settlement of suspended solids.

The Ash Pond was constructed in an area selected for its prevalence of large quantities of clay, which forms a natural liner for the Ash Pond. It was constructed by the SECV in 1980-81 through cut and fill operations, with the majority of excavated material utilised for the construction of the dam wall. The Ash Pond was commissioned in 1982 and was initially used by the SECV to hold saline wastewater from the Hazelwood and Yallourn Power Stations.

The Ash Pond commenced receiving ash in 1983 with the commissioning of the Loy Yang A Power Station. The Ash Pond still receives a continuous discharge of ash from both the Loy Yang A and Loy Yang B power stations, as well as saline water from the Yallourn Power Station.

The original design intent was that the Ash Pond would accommodate the ash generated over the life of the Loy Yang project. However, by the mid-1990's the Ash Pond reached its storage capacity had been reached. As a result, it was necessary to construct the Ash Landfill to take ash removed from the Ash Ponds (see below for details).

Groundwater monitoring, which has been conducted since the early 1980s, indicates that seepage from the Ash Pond has the potential to affect surrounding groundwater. In the 1990s measures were undertaken to reduce ash deposition rates and to lessen impacts on groundwater. However, further action to eliminate seepage from the Ash Pond cannot be implemented without an extended, simultaneous shutdown of all the Latrobe Valley power stations. Accordingly, in 2001 the EPA designated a groundwater attenuation zone in the vicinity of the Ash Pond. The EPA Licence includes conditions regarding this groundwater attenuation zone and requiring AGL Loy Yang to ensure that all activities outside this zone do not pollute groundwater or cause detriment to any beneficial use of groundwater. The ongoing groundwater monitoring program being undertaken at site demonstrates that natural attenuation is occurring in the shallow aquifers around the Ash Pond and that impacts remain within the boundary of the attenuation zone and no impact has occurred outside the attenuation zone.

Ash Landfill

An ash disposal site was developed in the Overburden Dump (OB) to the west of the Ash Pond in accordance with works approvals granted by EPA (with the first such approval being granted in 1996).

The Ash Landfill has been developed as a series of levels, with each successive level overlying the previous to form a terrace mound. After placement of overburden material to the required level, the material is shaped, trimmed then capped to achieve the approved landform contours.

As ash filling progresses in the Ash Landfill, the older completed landfill areas have been covered by several metres of overburden material. The newer Ash Landfill areas are then constructed in a new overburden level which overlies the now covered areas.

The EPA Licence contains detailed conditions requiring:



- implementation of a monitoring program to evaluate environmental risks associated with the Ash Landfill and the steps required to manage such risks and enable determination of any resulting changes to the condition of the environment; and
- verification of the monitoring program by an independent EPA appointed auditor every two years. The reports of these audits are published on EPA's website and our responses to the auditor's recommended actions are reported in our Annual Performance Statement to the EPA (which is also available on EPA's website).

3. Best practice management of waste water discharges from mines and power stations to maintain river health and protect human health

Loy Yang A and the Mine discharges treated water to Traralgon Creek via two licensed discharge points, L160 and L171, which are regulated under the EPA Licence which sets detailed discharge limits. The discharge limits set in our EPA licence are consistent with the *State Environment Protection Policy (Waters of Victoria)*, which sets environmental quality objectives for the protection of beneficial water uses.

Licensed discharge point L171 is the primary discharge point and receives the combined outflow from the Settling Pond and the treated water from the OB Runoff Treatment System.

Licensed discharge point L160 receives treated stormwater from elsewhere on the site.

The key waste water streams and the systems in place to manage these prior to discharge through the licensed discharge points are as follows:

- Rainfall runoff and wash down water from the OB Dump is treated through a three-stage settlement system prior to discharge via licensed discharge point L171. The first stage is a retention pond which enables the larger particles time to settle out. The second stage includes the application of flocculant to assist settlement of the suspended clay and coal particles in either one of the two flocculation ponds. The third stage provides additional settlement time before final discharge in accordance with the limits imposed under the EPA Licence.
- Stormwater from AGL Loy Yang A Power Station, the AGL Loy Yang Mine offices and workshops and the Alinta Energy Loy Yang B Power Station progressively flows through a network of stormwater drains into a main drainage line. The water is treated with a flocculant to aid settlement of suspended particles prior to discharge into the Settling Pond. The settled particles form a sludge on the floor of the Settling Pond and the clean water exits via a submerged outlet at the southern end of the pond, discharging via licensed discharge point L171.
- Due to local topography and natural drainage paths, a number of sources external to Loy Yang's operations (and external to treatment system catchment) also contribute to licensed discharge point L171, including areas with highly variable water quality such as road side drainage, road side aggregate storage areas and surrounding pastured areas used for stock grazing.
- Rainfall runoff from the northern boundary of the Mine, land used for agricultural purposes to the north and north west of the Mine and roadside runoff from along the Hyland Highway is directed to a retention pond before being treated with a polymer to control suspended solids. After this it is directed to a flocculation pond to settle solids, then a runoff pond before discharging via licensed discharge point L160. The flow from licensed discharge point L160 is not a continuous and is directly dependent on rainfall.
- Rainfall and other water runoff within the Mine is not directed to the licensed discharge points. Instead it is directed to the Fire Service Reservoir, where it is reused in the Mine for cleaning activities, dust suppression and firefighting purposes.



AGL Loy Yang has a comprehensive surface water monitoring program in place to monitor discharges from its licenced discharge points and ensure that it complies with the limits set by the EPA Licence.

Our primary discharge point L171 is continuously monitored and we are currently upgrading the monitoring of our secondary licenced discharge point L160, which is currently monitored via weekly sampling, to include online continuous monitoring. We also continuously monitor key points within our drainage network, and upstream and downstream of our primary discharge into Traralgon Creek. Alarms are in place to enable us to respond to any water quality monitoring results outside the set parameters.

4. Changes to licence should only go ahead after careful analysis—in consultation with impacted businesses - of cost for complying with the changes and their environmental gain

The EPA Licence is issued under and regulated by the *Environment Protection Act 1970 (VIC)*. This Act states that

- (1) Sound environmental practices and procedures should be adopted as a basis for ecologically sustainable development for the benefit of all human beings and the environment.*
- (2) This requires the effective integration of economic, social and environmental considerations in decision making processes with the need to improve community well-being and the benefit of future generations.*
- (3) The measures adopted should be cost-effective and in proportion to the significance of the environmental problems being addressed.*

AGL Loy Yang supports the role of the EPA in setting conditions and emission limits for industries to ensure local communities and the environment are protected. We recognise that licensing conditions need to be risk based, informed by scientific research and data, to provide confidence in the regulatory system and reflect community expectations.

We recognise and support the EPA's commitment to consult with us in relation to any changes proposed to the EPA Licence to ensure that the costs of complying and potential impacts on the security of electricity supply from Loy Yang A are able to be considered along with potential environmental gains.

The treatment of environmental risk and mitigation between different industries should be undertaken in a consistent way, and where possible, regulatory frameworks in Victoria should be harmonised with requirements in other jurisdictions to enable the consistent application of environmental solutions.

The mechanisms to achieve emissions reductions in the electricity sector should be aligned and integrated with the design and operation of the energy market.

5. Collaboration between the LVAMN and other EPA monitoring to release information in real time on EPA's AirWatch

AGL Loy Yang is a contributing member and participant in the Latrobe Valley Air Monitoring Network Inc (LVAMN), which operates and maintains ambient air monitoring stations at Jeeralang Hill and Rosedale South, and undertakes air quality compliance assessments funded through industry member contributions.

The results of the LVAMN ambient air monitoring program are currently published on the LVAMN's website in the form of daily summaries and annual reports.

AGL Loy Yang and the LVAMN supports displaying LVAMN monitoring data on the EPA Air Watch website in real time and have committed to work with the EPA to facilitate this.



6. Consider climate and set limits for greenhouse gases

AGL recognises it has a key role to play in reducing greenhouse gas emissions while providing secure and affordable energy for Australian households and businesses.

AGL's approach to greenhouse gas emissions and climate change is documented within the AGL Greenhouse Gas Policy. The policy, which was revised in April 2015, acknowledges that Australia is moving to a carbon constrained future and provides a framework within which AGL will structure its carbon reduction activities. It also presents a pathway for the decarbonisation of the AGL generation portfolio in line with AGL's commitments to close all existing coal-fired power stations in its portfolio by 2050 and not build, finance or acquire new conventional coal-fired power stations in Australia. Please refer to the cover letter to this report for more details on the work AGL Loy Yang has carried out and proposes to reduce greenhouse emissions from Loy Yang A and our commitment to closing Loy Yang A by no later than 2048 in a responsible manner.

AGL also continues to advocate for effective long-term government policy to reduce Australia's emissions, and that will enable further investment in renewable and low-emissions power generation.

AGL recognises that a long-term, nationally consistent approach to climate change policy is required to provide investors with the certainty required to develop the long-lived and often capital intensive projects that will enable Australia to reduce its emissions efficiently over time, whilst delivering affordable and reliable power.

Australia's response to climate change should ideally occur at the national level, including the setting of emissions reduction targets and policies. A national approach is particularly important for the transition to a decarbonised electricity generation sector given the existence of the interconnected NEM and Victoria's critical central position within it, importing and exporting energy to and from three of the five state jurisdictions within the NEM.

The transition to a sustainable NEM that utilises substantial amounts of renewable energy must be orderly. Australia requires a long-term carbon policy that drives investment in low-emissions sources and can steer the electricity sector smoothly through the process of replacing aging thermal plant with less emissions-intensive generation.

Given the importance of taking a national, whole of NEM approach, to the crucial issue of climate change and greenhouse gases, AGL does not support the inclusion of facility specific greenhouse gas limits on EPA licences in the absence of an integrated and ideally sectorial or national approach.

7. Continuous improvement to reduce emissions in line with best available techniques

AGL Loy Yang is committed to continuously reviewing and improving its environmental performance. State Environment Protection Policies prepared by under the *Environment Protection Act 1970 (VIC)* define the environmental values and beneficial uses that require protection from the effects of pollution. These beneficial uses include human health and wellbeing, ecosystem protection and local amenity.

State environment protection policy (Ambient Air Quality) (SEPP AAQ) sets air quality objectives and goals for Victoria to ensure that the beneficial uses of the air environment, including human health and well being, are met.

State Environment Protection Policy Air Quality Management (SEPP AQM) sets ground level design criteria and intervention levels to ensure that the beneficial uses of the air environment are met. In addition:

- Clause 18 of SEPP AQM requires that generators of emissions pursue continuous improvement in their environmental management practices and environmental performance and apply best practice to the management of emissions; and



- clause 19 of SEPP AQM also requires that generators "new or substantially modified source of emissions" must apply best practice to the management of those emissions and, in the case of "Class 3 indicators" must "reduce those emissions to the maximum extent achievable".

AGL Loy Yang's EPA Licence imposes specific limits, informed by the levels set in SEPP AQM, on the air emissions which Loy Yang A may generate from the burning of coal to generate electricity. It also requires the establishment and implementation of a risk based monitoring program that enables both us and EPA to determine compliance with these limits (and each other condition of the EPA Licence).

EPA Publication 1517 *Demonstrating Best Practice* notes that "*the term 'best practice' implies a degree of pragmatism and cost effectiveness*" and that "*EPA does not expect best practice to be pursued 'at any cost'. It is important that the proposed approach be cost effective in the context of the relevant industry sector within which the site operates or is planned to operate, as well as within the context of the total project cost. Most important is that the preferred option is proportional to the environmental risk*".

AGL considers that best practice raises different considerations for new coal plants, such as High Efficiency Low Emissions plants, which are able to incorporate additional controls at the design stage, than for existing operating plants, which are necessarily limited by the retrofitting options available. In particular, AGL considers that any new coal plants should be required to implement Best Available Control Technology and, in the case of key emissions, Maximum Achievable Control Technology, to ensure that they are truly low emission.

Sulphur Dioxide

AGL Loy Yang acknowledges that sulphur dioxide emissions from power stations in the United States are lower due to implementation of sulphur dioxide capture technology, however this was in response to the much higher ambient sulphur dioxide levels in the United States airshed and the resulting acid rain and human health impacts.

The current ambient sulphur dioxide air quality objective in Victoria under SEPP AAQ is 200 ppb for 1 hr, not to be exceeded on more than 1 day. It should be noted that the United States objective of 75 ppb for one hour is actually the 99th percentile of 1 hour daily maximum concentrations, averaged over 3 years. This would allow just under 11 days with a 1 hour exceedance over the three year period (or 3.65 days / year on average). Further, there is a secondary US 3 hourly objective of 500 ppb, not to be exceeded more than once per year.

There are also two further ambient air quality objectives in Victoria that restrict sulphur dioxide concentrations to an average daily value of 80 ppb which cannot be exceeded on more than 1 day per year and a maximum yearly average of 20 ppb which cannot be exceeded.

Sulphur dioxide levels measured at the EPA Traralgon and the LVAMN Rosedale South ambient air monitoring stations consistently comply with all relevant SEPP AAQ air quality objectives.

AGL Loy Yang acknowledges that there are a limited number of occasions each year (generally less than 5 one hour periods) whereby the hourly average sulphur dioxide level measured at the LVAMN Jeeralang Hill ambient air monitoring station exceeds the 200 ppb ambient air quality objective which are most likely due to plumes from coal fuelled power stations intercepting high ground in the Strzelecki Ranges, including at the Jeeralang Hill monitoring station, which is located 510 metres above sea level.¹ These events occur during the night or early morning hours, during low easterly wind speed conditions when the meteorological conditions are not conducive to good air dispersion.

¹ Jacobs, *LVAMN Air Monitoring Report 2016*, Latrobe Valley Air Monitoring Network, Final, 15 Jan 2018.



Nitrogen Oxides

The existing burners and boilers at AGL Loy Yang already have a number of features that result in lower nitrogen oxide (NO_x) formation compared to black coal fired burners. In effect, the burners have flue gas recirculation with the use of hot gases extracted from the furnace to dry the coal in the mills, with the gas then supplied back to the burners along with the pulverised coal. These gases reduce the oxygen content of the flame and act to reduce flame temperatures. Peak flame temperatures are further reduced due to residual coal moisture evaporating in the flame prior to combustion. The lower peak temperatures and lower oxygen content of the flame reduce thermal NO_x formation to very low levels, and overall NO_x emissions are significantly lower than for black coal fired boilers.

The current ambient NO_x air quality objective in Victoria under SEPP AAQ is 120 ppb for 1 hr, not to be exceeded on more than 1 day in a given year. It should be noted that the United States objective of 100 ppb for one hour is actually the 98th percentile of 1 hour daily maximum concentrations, averaged over three years. This would allow 21 days with 1 hour's exceedance over the three year period.

NO_x levels measured at the EPA Traralgon and the LVAMN Jeeralang Hill and Rosedale South ambient air monitoring stations consistently comply with the ambient standards.

Particulates

AGL Loy Yang utilises electrostatic precipitators to extract solid particles from the boiler flue gases before the gases are discharged into the atmosphere. An electrostatic precipitator separates solid particles from gases by electrically charging the dust particles and then attracting them to collecting electrodes of opposite polarity. On the electrode surface the dust particles give up their charge and, in time, form a layer which can be rapped off and removed. The electrostatic precipitators remove on average approximately 99% of the particles, with a peak separation efficiency (depending on the ash properties and other process conditions) of 99.5%.

There are significant differences in the discharge conditions experienced at brown coal fired power stations compared with black coal fired power stations which may make the use of fabric filters impractical and, at a minimum, constitutes a high risk for conversion from the current electrostatic precipitators. Stack temperatures for brown coal fired stations are higher than for black coal fired stations which can result in the operating temperature limit being reached for conventional filter bags (potentially requiring the use of filter bags that are rated for high temperature applications). The comparatively high moisture content of brown coal, combined with sulphur in the coal results in a high risk of acid / water dew point temperature issues (in particular during start-up, shut-down, during process upsets and also back-pulsing) leading to ash sticking to the bags which may not be able to be removed by pulsing, resulting in increasing pressure drop and/or long term damage to bags. Other potential risks and issues limiting bag selection and performance include ash shedding behaviour, and bag resistance to attack by sulphur trioxide, alkali components in the ash, oxidation by oxygen and hydrolysis by moisture content (noting rates of attack will be affected by the higher flue gas temperature) and the resultant impact on bag life, failure rate and hence dust emissions.

It should also be noted that the ash content of Victorian brown coal is up to ten times lower (on a dry basis) than that supplied to black coal fired power stations in Australia. With these coal properties, Loy Yang A which has a 99.0% dust collection efficiency with an electrostatic precipitator, has the same emissions as a black coal fired station with a 99.9% dust collection efficiency installed with a baghouse.

The lower dust burden, higher gas temperatures and high moisture content flue gas were key drivers in the selection of electrostatic precipitator technology utilised at Loy Yang A.

The ambient air quality objectives in SEPP AAQ for PM₁₀ and PM_{2.5} are some of the strictest in the world. EPA Publication 1623 (April 2016) notes that *"EPA's air quality data shows that air quality in 2015 was consistently good in the Latrobe Valley. This is consistent with long-term air quality data in the region. Overall, air quality in the Latrobe Valley is comparable to Geelong and metropolitan Melbourne."* EPA Publication 1601 (June 2015) notes that *"aside from the 2013 bushfire and 2014 mine fire, the long-term*



trend of PM10 in the Latrobe Valley is one of reasonably consistent, low levels with a few instances of peaks during public and private planned burns”.

Air Modelling Report

Please refer to the Air Modelling Report which will be provided separately and will contain detailed information on emissions.

8. Continuous monitoring of emissions of oxides of nitrogen (NO_x), sulphur dioxide (SO₂), carbon monoxide (CO), mercury (Hg) (new), coarse particles (PM10) and fine particles (PM2.5) (currently just total particles)

General

The EPA Licence requires AGL Loy Yang to establish and implement a risk based monitoring program that enables both us and EPA to determine compliance with each condition of the licence, including all emission limits.

Loy Yang A has four generating units, and currently each unit is monitored continuously for sulphur dioxide, nitrogen oxides, carbon monoxide and total particulates to ensure compliance with the limits contained in the EPA Licence.

The EPA Licence also imposes limits for sulphur trioxide, fluorine compounds and chlorine compounds which are monitored via stack sampling.

Particulates

At Loy Yang A opacity is used as a surrogate for total particulate matter emissions which are regulated by the EPA Licence. Opacity is defined as the degree to which particles reduce the transmission of light. The technology to monitor opacity is based on determining the amount of light absorbed and scattered when a light signal of known intensity is passed through a gas stream. Stack sampling is undertaken to obtain a correlation between the measured concentration of total particulate matter and the corresponding opacity.

Total particulate matter refers to particles of various sizes. PM10 is particulate matter 10 micrometres or less in diameter and PM2.5 is particulate matter 2.5 micrometres or less in diameter.

Our research has indicated that proven in-stack particulate matter continuous emissions monitoring systems (CEMS) for separately monitoring PM10 and PM2.5 as well as Total Particulate Matter are not commercially available.

Both the LVAMN and EPA Victoria monitor ambient levels of PM10 and PM2.5.

Mercury

AGL Loy Yang recognises that mercury emissions are an important issue. We are currently reviewing the monitoring options available for Loy Yang A and will work with the EPA and the community to put in place mercury limits and mercury monitoring and reporting for Loy Yang A consistent with the best practice principles contained in EPA Publication 1517 *Demonstrating Best Practice*.

Air Modelling Report

Please refer to the Air Modelling Report which will be provided separately and will contain detailed information on emissions.



9. Dust particle characterisation study to better understand sources of particle pollution in the Latrobe Valley

The NSW Office of Environment and Heritage and NSW EPA have commissioned several particle characterisation studies to investigate the composition and major sources of particles in various locations including the Lower Hunter, Upper Hunter, and Sydney air sheds.

These studies indicate that fine particulate matter (PM_{2.5}) results from a variety of sources including from the burning of fossil fuels such as coal, but also from bushfires, prescribed burns, domestic wood heaters, motor vehicles, soil, pollen and sea salt, even at inland locations.

AGL Loy Yang agrees there is a need to establish a comprehensive inventory of all sources of PM₁₀ and PM_{2.5}, both natural and anthropogenic, in the Latrobe Valley to inform programs to reduce Latrobe Valley residents' exposure to particle pollution. However, AGL considers that, in line with the approach taken in NSW, such a study should be independently carried out by the EPA.

Representatives of the LVAMN have already met with EPA to discuss the details of a data sharing arrangement between LVAMN and the EPA. AGL would support the use of LVAMN data in any dust particle characterisation study to be carried out by the EPA.

10. Monitoring and ending the release of mercury into the environment

Mercury is released to the environment from natural sources and as a result of human (anthropogenic) activities. Mercury is emitted from coal fired power stations when coal containing trace levels of mercury is combusted.

The 2012 study *Atmospheric mercury emissions in Australia from anthropogenic, natural and recycled sources* by Nelson et al concluded that approximately 15% of anthropogenic emissions in Australia of mercury result from coal combustion in power stations. However, this study also concluded that anthropogenic emissions account for less than 10% of total Australian emissions and are exceeded by emissions from soil and vegetation which contribute approximately 70% and those from bushfires which contribute approximately 20%. Therefore, the overall contribution to emissions from coal combustion in power stations corresponds to 1.1% of the estimated total mercury emissions.

In 2015 the CSIRO report *Modelling atmospheric mercury from power stations in the Latrobe Valley, Victoria* by Emmerson et al showed that the power stations contribute less than 1% to the total mercury ambient air concentrations modelled in the Latrobe Valley.

Please refer to the Air Modelling Report which will be provided separately and will contain detailed information on mercury emissions.

AGL Loy Yang supports taking steps to address mercury emissions across in Australia to reduce environmental and human exposure. As outlined above, AGL Loy Yang is currently reviewing the monitoring options available for Loy Yang A and will work with the EPA and the community to put in place mercury limits and mercury monitoring and reporting for Loy Yang A consistent with the best practice principles contained in EPA Publication 1517 *Demonstrating Best Practice*.

11. Move away from waste oil / black coal used during startups with natural gas to reduce air emissions

Loy Yang A utilises brown coal, supplied by the adjacent Mine, as the fuel source to generate electricity.

Coal from the Mine is conveyed from the coal bunker to the pulverised fuel mills before being supplied to the boiler furnace combustion chamber. During this process the coal is dried by hot gases drawn from the boiler



furnace, pulverised and dried in the mills and finally mixed with heated combustion air as it is blown into the furnace. The pulverising, drying and mixing processes ensure that the coal reaches the furnace in the correct conditions for optimum combustion performance.

It is essential for the stable combustion of the Station's main brown coal fuel source that a sufficiently high temperature is maintained within the combustion chamber when the main mills are in service. This ensures that adequate heat is in the gases drawn from the furnace by the mills to dry the pulverised brown coal fuel before it is discharged into the combustion chamber and ensure the pulverised fuel-air mixture ignites smoothly and continuously.

Whilst these conditions can be maintained once combustion has stabilised, they cannot establish themselves to begin with during a unit start-up. Accordingly, the support of an auxiliary firing system is required to provide the necessary initial heat input for the combustion chamber during unit start ups. On average the auxiliary firing system is only used 0.3% of the time.

The auxiliary fuel is required to initiate and enable spontaneous ignition and sustainable combustion in the cold boiler furnace until such time as the boiler furnace is sufficiently hot to stabilise combustion, at which point the primary fuel source can be introduced and auxiliary firing is no longer required.

AGL Loy Yang currently utilises black coal as the auxiliary fuel. Whilst the properties of black coal differ from the primary brown coal fuel source used at Loy Yang A, only low volumes of flue gas are produced during auxiliary firing. This ensures that Loy Yang A remains able to operate within all limits applying under the EPA Licence when operating on auxiliary fuel.

Each auxiliary burner has a central pilot burner which is used to ignite the pulverised black coal auxiliary fuel. The pilot burner utilises natural gas and is ignited by a natural gas electric spark ignitor.

The natural gas supply infrastructure at Loy Yang A are insufficient to supply the volume of natural gas which would be needed were it to be utilised it as an auxiliary fuel contrary to the design intent. The significant infrastructure changes which would be required to utilise natural gas as an auxiliary fuel at Loy Yang A are not warranted for the low utilisation time of the auxiliary firing system which operates in compliance with all limits applying under the EPA Licence.

12. Move to load based licensing scheme to encourage investment in emission reduction technologies

Load-based licensing is sometimes advocated as an economic instrument to incentivise businesses to reduce pollution. Theoretically the higher the fee, the greater the reduction in pollution and this gives businesses a financial incentive to reduce emissions where feasible to the point where the cost of pollution abatement exceeds the licence fee.

The level of fees required to economically incentivise the high retrofit costs required to achieve significant reduction in emissions at Loy Yang A would have to be in the order of hundreds of millions of dollars. This would threaten the economic viability not only of Loy Yang A, but many other EPA licence holders and potentially result in site closures and widespread disruptions and shortages.

AGL Loy Yang agrees that licence fees need to reflect the amount and types of pollutants discharged to the environment. The current EPA licence fee structure already includes a component fee linked to the pollutant type and amount. However, the fee must be proportional to the environmental risk, rather than simply proportional to the cost of abatement as is advocated by load-based licencing proponents.

Any load based licencing scheme introduced in Victoria needs to be included at a whole of State level and following careful consideration to the design and structure of the scheme. It would also require legislative amendments. It is not practicable or appropriate to introduce such a scheme in the narrower context of the EPA's review of the brown coal EPA licences.



13. Public release of emission data in real time in a public friendly format

AGL Loy Yang is committed to providing meaningful monitoring data in a timely manner in a way that clearly shows our environmental performance against our EPA licence requirements.

AGL Loy Yang proposes to make the monitoring data collected for the purpose of demonstrating compliance with its EPA Licence conditions available in a public friendly format that is consistent with AGL's assets in NSW, and the guidance provided in the NSW EPA Publication *Requirements for publishing pollution monitoring data*.

Consistent with this approach, AGL Loy Yang will publish a summary of the monitoring data on the AGL website within 14 working days of the end of each month. The data will include the EPA licence monitoring point, pollutant, unit of measure, monitoring frequency, relevant limit imposed by the licence, relevant dates, notes regarding apparent missing data, and in the event of any non-compliances, information regarding why the limits specified in the licence were not met.

The results of the LVAMN ambient air monitoring program are currently published on the LVAMN's website in the form of daily summaries and annual reports. The LVAMN has committed to work with EPA to facilitate displaying LVAMN monitoring data in real time on the EPA Air Watch website.

14. The need for health assessments of current impacts and ongoing risks from existing coal projects in the Latrobe Valley

The *Environment Protection Act 1970 (VIC)* sets a legislative framework for the protection of the environment in Victoria having regard to the principles of environment protection enshrined in that Act. The State Environment Protection Policies (SEPPs) made under the Act, including SEPP AAQ and SEPP AQM, then set levels to ensure that the beneficial uses of the environment, including human health, are met.

In setting the standards contained in the SEPPs, a rigorous hazard assessment was undertaken which gives consideration to both epidemiological and toxicological data to set relevant objectives and standards. Accordingly, health protection is built into the SEPPs along with margins of safety to ensure protection of sensitive groups.

The SEPPs define the environmental values and beneficial uses that require protection from the effects of pollution. Protected beneficial uses include human health and wellbeing, and local amenity. In particular, SEPP AQM protects human health and well being by establishing acceptable levels of air pollution.

Periodic review of the SEPPs ensures that developments in the scientific understanding of the effects of pollutants on health and the environment are incorporated into the setting of applicable objectives and standards and these are revised as appropriate.

Any health assessment of ambient air levels across Victoria, including in the Latrobe Valley, should be carried out by the EPA in the context of any review of relevant SEPPs, including SEPP AAQ and SEPP AQM, and not in the narrower context of licence reviews for currently operating projects such as Loy Yang A.

15. Distinction between current licences and other approvals used in the rehabilitation or remediation phase of the mines and power stations, for clarity and consideration of sufficiency of bonds / assurances.

In 2016 AGL commenced a strategic review of rehabilitation across its major generation assets, including Loy Yang A and the Mine. The review considered several factors for each asset including the technical end of life of the asset, the potential for life extension, the ability to repurpose the site, regulatory requirements, anticipated site conditions at end of life and community expectations for end use.



In August 2017 AGL released its Rehabilitation Report, which outlines AGL's approach to rehabilitation of its power generation infrastructure at their planned end of life. Please refer to the covering letter accompanying this report for details of AGL's commitments in relation to the planned closure of Loy Yang A by no later than 2048.

AGL Loy Yang acknowledges that an appropriate financial security should be in place to ensure that rehabilitation can be undertaken by the State should an operator be unable to meet its rehabilitation obligations. AGL Loy Yang has existing financial obligations and commitments under both its EPA Licence and its and mining licences as outlined below.

The EPA Licence applies to the operation of the Loy Yang A Power Station (scheduled category K01 Power Stations), operation of the adjacent Loy Yang brown coal Mine (C01 Extractive Industry and Mining) and the landfilling of ash in containment cells within the Overburden Dump (A05 Landfills). The *Environment Protection (Scheduled Premises) Regulations 2017 (VIC)* specify that certain scheduled activities, including landfills, are required to submit financial assurance. The conditions of the EPA Licence accordingly require AGL Loy Yang to maintain a financial assurance calculated in accordance with the relevant EPA method.

Mining licence MIN5189 issued under the *Mineral Resources (Sustainable Development) Act 1990 (VIC)* also applies to the Mine and Overburden Dump. The Act and associated regulations requires mine operators to rehabilitate land that has been mined in accordance with an approved rehabilitation plan and enter into a rehabilitation bond determined by the Minister for Resources.

In accordance with the Victorian Government's *Latrobe Valley Mine Rehabilitation Bond Policy*, the Earth Resources Regulation Division of DEDJTR undertake an independent assessment of mine rehabilitation liabilities no less frequently than every 5 years, or in response to a Work Plan variation that includes substantial updates to the rehabilitation plan.

AGL Loy Yang believes that the current bond and financial assurance systems are effective ways for managing rehabilitation liability and that the current regulatory framework provides for clear regulatory oversight of the decommissioning and remediation phases of Loy Yang A and the Mine.