

Chapter 3

Standards and monitoring of air quality

3.1 Government involvement in establishing air quality standards to protect human health is important as individuals cannot readily control the extent to which they may be exposed to harmful air-borne pollutants.

3.2 On 26 June 1998 the Commonwealth and State and Territory governments agreed to the National Environmental and Protection Measure for Ambient Air Quality (NEPM). This measure sets air quality standards that are legally binding on each level of government. The desired environmental outcome from the NEPM is achieving 'ambient air quality that allows for the adequate protection of human health and well-being.'¹

3.3 The NEPM regulates six air pollutants: carbon monoxide, nitrogen dioxide (NO₂), photochemical oxidants, sulphur dioxide, lead and particles.² An advisory reporting standard for PM_{2.5} was incorporated in 2003 and an Air Toxics National Environmental Protection Measure (AT-NEPM) was added in 2004.³

3.4 The current approach to controlling air pollution in Australia was explained to the committee as identifying thresholds for specific hazardous air pollutants and set these as air quality targets. Sources of pollution are then monitored to attempt to achieve these targets.⁴ These thresholds are articulated in the NEPM⁵:

Pollutant	Concentration and averaging period
Carbon monoxide	9.0 ppm (parts per million) measured over an eight hour period
Nitrogen dioxide	0.12 ppm averaged over a one hour period
	0.03 ppm averaged over a one year period
Ozone	0.10 ppm of ozone measured over a one hour period
	0.08 ppm of ozone measured over a four hour period

1 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 9.

2 National standards for criteria air pollutants in Australia – Air quality fact sheet, Department of the Environment and Heritage, 2005, available from: <http://www.environment.gov.au/atmosphere/airquality/publications/standards.html> (accessed: 03/04/13)

3 Commonwealth Scientific and Industrial Research Organisation, Submission 48, p. 13.

4 Centre for Air quality and health Research and evaluation, *Submission 25*, p. 5.

5 National standards for criteria air pollutants in Australia – Air quality fact sheet, Department of the Environment and Heritage, 2005, available from: <http://www.environment.gov.au/atmosphere/airquality/publications/standards.html> (accessed: 03/04/13)

Sulfur dioxide	0.20 ppm averaged over a one hour period
	0.08 ppm averaged over a 24 hour period
	0.02 ppm averaged over a one year period
Lead	0.5 µg/m ³ (micrograms per cubic metre) averaged over a one year period
Particles as PM ₁₀	50 µg/m ³ averaged over a 24-hour period
Particles as PM _{2.5}	Advisory reporting standard: 25 µg/m ³ over a one day period; 8 µg/m ³ over a one year period

3.5 The previous chapter discussed the evidence regarding safe exposure limits to pollution, highlighting that in most cases the lower the exposure level the better, and that as a rule of thumb there is no safe level of exposure that does not cause some level of harm.

3.6 The exposure limits outlined in the NEPM were agreed based on the available academic literature, comparable international standards, and Australia conditions. As the Department of Sustainability, Environment, Water, Population and Communities' (Department) website explains:

The standards were set on the basis of scientific studies of air quality and human health from all over the world, as well as the standards set by other organisations, such as the World Health Organisation. Australian conditions, eg climate, geography and demographics, were taken into account in estimating the likely exposure of Australians to these major air pollutants. Each air quality standard has two elements: the maximum acceptable concentration and the time period over which the concentration is averaged.⁶

3.7 As is indicated by the term 'adequate protection' of health in the NEPM, it can be seen that the allowable limits of pollutants in the atmosphere are a necessary compromise between health and necessity. So long as people drive cars, require electricity and farm the land, some level of human created pollution is unavoidable – not to mention sources such as bushfires. As was noted by the National Environmental Protection Council (NEPC): 'The extent to which health risk can be minimised will be dependent on a range of factors, including economic, social and environmental considerations.'⁷

3.8 The International Laboratory for Air Quality and Health (ILAQH) put forward the case that standards are a compromise between competing interests including the economy and human health, stating 'standards are based on all kinds of reasons,

6 National standards for criteria air pollutants in Australia – Air quality fact sheet, Department of the Environment and Heritage, 2005, available from: <http://www.environment.gov.au/atmosphere/airquality/publications/standards.html> (accessed: 03/04/13)

7 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 14.

including economic; therefore, objectives are like this as well. So this is not based on health.⁸

3.9 The development process behind the NEPM targets was explained to the committee by the New South Wales Environment Protection Authority (NSW EPA):

The development of the NEPMs goes through several steps. The first is to go to the literature on what the epidemiological risks are for a given amount of pollutant. The second step is to look at the monitoring data that you have in population centres. Then you map the population sizes, the morbidities from those populations. Then you do a cost-benefit looking at what are the levels that would reduce morbidity and mortality and total health economic cost to the community by reducing those levels to a certain amount. That is how they are arrived at, to look at what is the best cost-beneficial target that we can have in the nation. They are developed on population levels and that requires numbers of people to be exposed to get certain health savings, because if you do it out on the Nullarbor you are not going to save many lives, so the cost-benefit of doing something out there is really quite negligible but the cost-benefit of doing something in a big city or a large population area is much higher. So they are developed on the cost-benefit model and therefore they are applied on the cost-benefit model.⁹

3.10 This principle of population level risk that is used in the NEPM is articulated by the NEPC:

For the purpose of setting air quality standards, the risk characterisation applies to population risk not individual risk. Population risk refers to an assessment of the extent of harm for the population as a whole.¹⁰

2011 Review

3.11 A review of the NEPM in 2011 by the National Environmental Protection Council (NEPC Review), the first since the NEPM was made in 1998, found that:

Implementing the NEPM has led to a greater understanding of air quality in Australia which has, in turn, led to an improved understanding about the health impacts of air pollution on the community... Therefore, governments now have the opportunity to act more strategically to manage and further improve air quality in Australia, moving beyond strict compliance with the standard to a focus on reducing population risk.¹¹

3.12 The NEPC Report summarised the current state of affairs under the NEPM:

8 Professor Morawska, International Laboratory for Air Quality and Health, *Committee Hansard*, 11 June 2013, p. 10.

9 Professor Smith, New South Wales Department of Health, *Committee Hansard*, 16 April 2013, p. 6.

10 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 21.

11 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 3.

Overall, the results of the health reviews show that there are significant health effects at current levels of air pollution in Australian cities. These findings indicate that the current standards are not meeting the requirement for adequate protection of human health. There is evidence that these standards should be revised to minimise the impact of air pollution on the health of the Australian population.¹²

3.13 In light of this conclusion, the review included 23 recommendations – many of which would – if implemented – go a long way to significantly address issues raised throughout this inquiry. The NEPC Review recommended to:

- Revise the desired environmental outcome of the NEPM to 'minimise the risk from adverse health impacts from exposure to air pollution for all people wherever they may live';
- Revise the desired environmental goal to make reference to the air quality standards and incorporation of exposure reduction targets for priority pollutants;
- Remove lead from the Ambient Air Quality NEPM and include in the Air Toxics NEPM during the scheduled Air Toxics NEPM review of 2012;
- Revise the standards for all air pollutants in Schedule 1 of the NEPM to take into account new evidence around the health effects of air pollution;
- Introduce compliance standards for PM_{2.5};
- Introduce an 8-hour standard for ozone;
- Introduce an annual average standard for PM₁₀;
- Introduce an exposure reduction framework and targets for priority pollutants;
- Remove allowable exceedances from Schedule 2 and introduce a natural events rule;
- Redesign monitoring networks to represent population exposure on a pollutant-by-pollutant basis without compromising data collection for long-term trend analysis. A procedure to determine the location and number of sites similar to EU and/or US EPA is recommended;
- Remove the population threshold and formula to enable monitoring on potential population risk rather than on population size;
- Amend requirements of monitoring methods (clause 16 and Schedule 3) to allow appropriate Australian Standards methods; or methods determined by the EU and/or US EPA as Reference or Equivalence Methods;

12 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 28.

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- Remove Schedule 5 of the NEPM;
 - Develop nationally consistent approaches to assess population exposure, including appropriate modelling and emissions inventories;
 - Revise the assessment (clause 17) and reporting (clause 18) protocol to include additional performance assessment indicators and expanded reporting requirements to enable inclusion of population exposure determinations, severity of exceedances and effectiveness and management actions undertaken;
 - Revise guidance documents and templates associated with assessment and reporting to accommodate presentation of clear messages, to allow for better communication and more accessible air quality reports;
 - Amend the NEPM protocol (part 4) to incorporate natural event rule including definition of these events and criteria for assessment and reporting;
 - Require timely reporting of all exceedances, with jurisdictions publicly releasing the analysis of these events on their respective websites within 3 months of the event;
 - Disband the existing PRC and replace with a specialist working group or groups with a broader range of expertise to assist with scientific and technical matters. This working group would report to the Air Quality Working Group;
 - Evaluate the options to assess ozone and secondary particle precursors;
 - Initiate research into the composition of particles in Australia and associated health impacts;
 - Initiate health research on the impact of air pollution (in particular, particles) in regional areas; and
 - Monitor and report coarse particle fraction.¹³

3.14 Evidence received by the committee indicated that the recommended changes from the review will be prioritised and responded to via the development of the National Plan for Clean Air (NPCA) by the Council of Australian Governments Standing Council on Environment and Water (SCEW) for delivery in 2014.¹⁴ The Department emphasized the collaborative nature of SCEW, but assured the committee that the relevant governments continue to work together to address the recommendations of the review, stating:

The Australian government cannot establish, vary or revoke a NEPM unilaterally...The Australian government will continue to work with states

13 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 5.

14 Commonwealth Scientific and Industrial Research Organisation, Submission 48, p. 13.

and territories to respond to the recommendations of the review of the air NEPM in the delivery of the National Plan for Clean Air. The plan is to be delivered to COAG by the end of 2014.¹⁵

National Plan for Clean Air

3.15 In 2011 SCEW agreed to formulate a National Plan for Clean Air (NPCA) to be released in 2014. Representatives from SEWPaC explained to the committee the purpose of NPCA:

It is intended, firstly, to look at the review of the air quality NEPM and the recommendations there and incorporate appropriate action. So it will undertake analysis to see what should be done to implement those recommendations. Secondly—and this links to that review—it will undertake a health risk assessment and also look at developing an exposure risk reduction framework. Both of those are incorporated in the review of the air quality NEPM. So this is looking at shifting the paradigm somewhat. The WHO in its guidelines has said that there is little evidence to suggest that there is a threshold below which adverse health impacts are unlikely to occur. The current approach is really threshold based. Most OECD countries are moving to an exposure risk reduction framework.¹⁶

3.16 The Victoria EPA informed the committee that:

The NPCA, will...include an exposure reduction approach which will take into account health effects at low levels. This will shift the emphasis of policy responses from reducing pollution to reducing the risk of harm from pollution. It will also shift the emphasis from providing an absolute level of protection to also finding the economically optimum point for intervention. The exposure reduction framework will provide efficiency outcomes by maximising health benefits across a population.¹⁷

3.17 The CAR supported the use an incremental scale to achieve the lowest possible pollution levels,¹⁸ a view supported by the AMA.¹⁹ The NEPC Review argued that a move towards an exposure reduction approach would align Australia with international best practice while improving health outcomes:

There appears to be significant merit and across-the-board stakeholder support for an exposure reduction framework...the air quality standards do not provide absolute protection and any reduction in exposure will have a net positive health benefit. The introduction of an exposure reduction

15 Dr Wright, First Assistant Secretary, Environment Quality Division, SEWPaC, Committee Hansard, 17 May 2013, p. 59.

16 Dr Wright, First Assistant Secretary, Environment Quality Division, SEWPaC, Committee Hansard, 17 May 2013, p. 64.

17 Victoria EPA, *Submission 110*, p. 9.

18 Centre for Air quality and health Research and evaluation, *Submission 25*, p. 5.

19 Australian Medical Association, *Submission 114*, p. 11.

approach will align Australian air quality management policy with international best practice approaches.²⁰

3.18 The NEPC Review argued that an exposure reduction framework would be to reduce exposure for communities living in close proximity to large emission sources:

Under the current monitoring protocol in the NEPM, people who live near major sources of pollution such as roads do not have air quality monitoring data and are likely to be exposed to higher levels of air pollution than that measured at performance monitoring stations. The exposure reduction approach would drive improvements in air quality across the whole population and not focus on meeting standards at the designated monitoring stations.²¹

3.19 The committee heard that an exposure reduction framework is better able to take into account the individual communities' appetite for risk when considering specific air quality controls:

We are currently doing interdepartmental work on this—when I say 'we' it is New South Wales Health but I am also on the national environmental health council and they will be looking at these results as well—and we are also doing interjurisdictional work on this at the moment to come up with an incremental level above which you should not pollute. That is based on the same way that you set standards for everything else, which is: what is the risk appetite of the community? We accept risks from radiation, so you get one in 10 to the minus six excess cases of disease per one millisievert above background. For most water quality indices for our drinking water, we will accept a 10 to the minus four or 10 to the minus five increase in risk above background. We are doing the same sort of work around air, looking at: if we translate those sorts of risks that the community is generally going to accept for their environmental hazards and we apply that to air, what numbers do we come up with? That work is in train at the moment.

...

As I said before, most standards are set this way, but there is usually a risk appetite of somewhere between 10 and minus four and 10 and minus six excess risk above and beyond what you would normally get. In other words, if you got one case in 100 normally, then you would have an extra one case in 10,000 above those one cases in 100 of increased risk for a particular health outcome and we are usually talking about death here. That is the way that the process is working for us to look at this as an approach. This hasn't been done before. People have used the NEPM as a standard, saying: 'Okay, you've got to hit this goal.' That is not necessarily correct, because that goal may be too lenient or it may be too strict in certain circumstances. As the discussion earlier noted, you cannot use NEPM on very small populations that are exposed to a particular development. It does not lend itself to that

20 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 19.

21 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 29.

because of the way it was developed. This approach will lend itself to that and it will be much clearer to people who are exposed to these risks what their actual level of risk is and what risk society is asking them to tolerate on behalf of development for all of society.²²

Committee view

3.20 As the previous chapter showed, there is no safe level for exposure to most pollutants, and as was explained above, some pollutants that were previously thought to have threshold effects are now deemed to have no safe limit. This evidence, along with the findings of the NEPC Review, indicates that the exposure reduction model is the best approach to protect human health from harmful air pollutants. The committee notes the efforts of governments around Australia to move towards the exposure reduction approach to ensure the health of all Australians is adequately protected.

Recommendation 1

3.21 The committee recommends that the Australian Government's representative to the Standing Council on Environment and Water support the adoption of the 23 recommendations of the *Ambient Air Quality NEPM Review*.

PM_{2.5} ultrafine particles and other contaminants

3.22 Finding the correct balance between human health and other considerations is a moving target as society's expectations change, and as the evidence base grows. The NEPC Review notes some of this evolution:

Determining potential population health risk resulting from ambient air quality exposure has been complicated by the fact that epidemiology studies are now indicating there is no clear threshold for effect for the current NEPM pollutants, with exposures below the standards still representing a statistically significant and measurable health risk to the Australia population...when the NEPM was made it was thought sulfur dioxide and carbon monoxide had an identified threshold effect, and nitrogen dioxide and lead had an apparent threshold effect.²³

3.23 The committee heard repeated calls throughout this inquiry for more stringent air quality standards to be put in place for pollutants such as PM_{2.5}, ultrafine particles and some other contaminants.

22 Professor Smith, New South Wales Department of Health, *Committee Hansard*, 16 April 2013, pp. 6–8.

23 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 14.

PM_{2.5}

3.24 Under the current NEPM *PM_{2.5}* is subject to an advisory reporting standard rather than a compliance standard. A large number of submissions and witnesses recommended that the advisory standard be replaced with a compliance standard.²⁴

3.25 The decision to include *PM_{2.5}* as an advisory standard in the NEPM from 2003 was to gather data to assess the impacts of *PM_{2.5}*:

Advisory reporting standards are considered to be the appropriate form for a standard for *PM_{2.5}* at this time, given the lack of comprehensive data that would make it possible to establish compliance standards and to fully assess the impacts associated with breaches of such standards. The purpose of advisory reporting standards is to facilitate the collection of data and provide a framework for reporting these data.²⁵

3.26 Since that time it has become clear that *PM_{2.5}* poses a risk to human health. The NSW EPA noted that 'fine particles, *PM_{2.5}*, are the pollutants imposing the greatest health and cost burden on the people of New South Wales.'²⁶

3.27 In recommending the introduction of a compliance standard for *PM_{2.5}* the NEPM Review noted that there is now sufficient Australian evidence to justify a compliance standard:

This support is based on the understanding of the health effects of *PM_{2.5}*. The initial introduction of an advisory reporting standards rather than compliance standards was due to a lack of monitoring data. All jurisdictions have since been monitoring *PM_{2.5}* and there is now sufficient data to develop compliance standards. The Review Team considers that compliance standards should be introduced for *PM_{2.5}*.²⁷

3.28 The introduction of a compliance standard appears to be supported by regulators²⁸ and community groups including by the NSW EPA which commented:

Because of that growing awareness here and internationally that we need to focus on *PM_{2.5}*, we believe that the NEPM needs to change. Specifically, the New South Wales EPA is strongly of the view that the NEPM reporting

24 Australian Medical Association, *Submission 114*, p. 10; Ms Roberts, Campaign Organiser, Communities Protecting Our Regions, *Committee Hansard*, 11 June 2013, p. 45; Cleanairtas, *Submission 81*, p. [7]; Australian Network of Environmental Defender's Offices Inc., *Submission 85*, p. 2; Mr Hutton, President, Lock the Gate Alliance, *Committee Hansard*, 11 June 2013, p. 52.

25 National Environmental Protection Council, *Summary of submissions received in relation to the Draft Variation to the National Environmental Protection (Ambient Air Quality) Measure for Particles as *PM_{2.5}* and National Environmental Protection Council's responses to those submissions*, Adelaide, 2003, pp. 1–2

26 Mr Buffier, Chief Executive Officer, New South Wales Environmental Protection Authority, *Committee Hansard*, 16 April 2013, p. 2.

27 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 28.

28 Environmental Protection Authority Victoria, *Committee Hansard*, 17 May 2013, p. 37.

standard for PM_{2.5} should be adopted as a compliance standard. As well as the annual standard, the health evidence also indicates that a daily standard is necessary.²⁹

Ultrafine particles

3.29 Some submissions also called for UFP, particles of a diameter less than 0.1µm, to be subject to regulation.³⁰ UFP are generally produced through combustion processes and can penetrate deep into the lungs of humans and enter the bloodstream.³¹

3.30 Professor Morawska highlighted that research of the effects of UFP on human health is progressing, but there is still little understanding and monitoring of UFP:

Epidemiological evidence is also mounting on the impact of ultrafine particles on health; however, progress in this field is hampered by the lack of monitoring of these particles. In general there is little monitoring and hence understanding of a complex urban pollution mix, including elemental carbon, primary organics and secondary organic aerosols.³²

3.31 The AMA advocated for a precautionary approach to ultrafine particles:

There is compelling evidence that exposure to ultrafine particulates poses a significant threat to human health, however it is currently not possible to precisely quantify the exposure levels that may result in specific health effects. On this basis, a prudent precautionary approach would necessitate provisional standards and measures designed to reduce exposure to ultrafine particulates, particularly given their ubiquity and presence in vehicle exhaust emissions.³³

3.32 As a result of the lack of current evidence, the ILAQH argued that:

There is a critical need for the routine monitoring of UFPs, to provide input for epidemiological studies and in turn, the development of regulations (it is unlikely that regulations would be developed without exposure-response relationships).³⁴

3.33 The NEPC Review argued against the inclusion of UFP in the NEPM, arguing that there is currently insufficient evidence to justify the inclusion of UFP:

The health reviews conducted as part of this review have shown that, although there is some evidence for health effects linked to ultrafine

29 Mr Buffier, Chief Executive Officer, New South Wales Environmental Protection Authority, *Committee Hansard*, 16 April 2013, p. 2.

30 Lake Macquarie City Council, *Submission 15*, p. 3.

31 Commonwealth Scientific and Industrial Research Organisation, *Submission 48*, p. 4; Doctors for the Environment, *Submission 4*, p. 5.

32 Professor Morawska, International Laboratory for Air Quality and Health, *Committee Hansard*, 11 June 2013, p. 2.

33 Australian Medical Association, *Submission 114*, p. 5.

34 International Laboratory for Air Quality and Health, *Submission 53*, p. 4.

particles, there is not sufficient evidence to support the setting of standards at this time. This finding is supported by the recent reviews conducted by the WHO and by US EPA. In addition, as ultrafine particles are not routinely monitored, there is no monitoring data available in Australia that would enable the setting of standards.³⁵

Committee view

3.34 While the committee appreciates that there may not be sufficient data at this time to warrant a compliance standard, it does appear that there is enough evidence to indicate that further and urgent research is required to assess the levels population exposure to UFP and the impact that this has on human health. In the same way that PM_{2.5} was initially included in the NEPM as an advisory standard to gather data, UFP particles should be included in the NPCA.

Recommendation 2

3.35 The committee recommends that the Australian Government advocate, through the appropriate Council of Australian Governments process, the inclusion of mechanisms to collect additional data on ultrafine particles.

Other contaminants

3.36 A number of other contaminants were nominated for regulation to protect human health. For example, the committee heard that there is currently no standards around arsenic or cadmium for air quality; contaminants important for mining communities where those metals are being extracted. Some communities are also exposed to higher than average levels of lead and dust.³⁶ Although this report is unable to discuss these concerns in detail as little evidence was received on these issues, the committee notes these concerns.

Reducing community exposure: buffer zones

3.37 The committee heard that one of the most effective ways of reducing exposure to harmful pollutants is by separating populations from those pollutants.³⁷ The Minerals Council of Australia explained that buffer zones can be used to control dust and other emissions, improve visual amenity and for occupational health and safety reasons.³⁸ The committee heard concerns from some communities such as Anglesea in

35 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 22.

36 Professor Taylor, Professor of Environmental Science, Macquarie University, *Committee Hansard*, 11 June 2013, pp. 21,25.

37 Dr Jeremijenko, Occupational and Environmental Physician – Australasian Faculty of Occupational and Environmental Medicine, *Committee Hansard*, 11 June 2013, p. 62.

38 Mr McCombe, Assistant Director – Environmental Policy, Minerals Council of Australia, *Committee Hansard*, 16 April 2013, p. 28.

Victoria and Newcastle in New South Wales that mines, port, transport corridors power stations are too close to vulnerable communities.³⁹

3.38 Buffer zones are already used in some jurisdictions for various industrial developments. Queensland has a mandated buffer zone on coal mines of two kilometres from towns with greater than one thousand inhabitants.⁴⁰ Wind farm developments are also subject to a two kilometre buffer zone in Victoria and South Australia.⁴¹

3.39 The verifiability of buffer zones was cited as one of their key benefits as 'you do not have the uncertainty as to whether the standards are being met through complicated monitoring. You can see there is a gap.'⁴²

3.40 Several groups called for a more extensive use of buffer zones to control air quality.⁴³ The Asthma Foundation of New South Wales called for the '[establishment of] a minimum buffer zone between human habitation and all new open-cut coalmines, mine expansion and port infrastructure.'⁴⁴ ANEDO and the Lock the Gate Alliance both suggested that, considering the potential scale of mining developments, two kilometres was an insufficient barrier.⁴⁵ A large number of submissions, while expressing concern regarding the health impacts of air pollution on proximate communities, did not suggest the use of buffer zones⁴⁶ and instead proposed stronger enforcement of current standards or more stringent standards.⁴⁷

3.41 The use of buffer zones does need to take into account the local meteorological and planning circumstances. The town of Moranbah, for example, has mines on three sides of it and their existing buffer zones were reported to the

39 Surf Coast Air Action, *Submission 52*, p. 1; Islington Village Community Group, *Submission 54*, p. 4.

40 Mr Hutton, President, Lock the Gate Alliance, *Committee Hansard*, 11 June 2013, p. 55.

41 Associate Professor Carey, Member – Management Committee, Doctors for the Environment, *Committee Hansard*, 17 May 2013, p. 3.

42 Ms Bragg, representative, Australian Network of Environmental Defenders Offices, *Committee Hansard*, 11 June 2013, p. 64.

43 Australian Network of Environmental Defenders Offices, *Submission 85*, p. 2; Wilderness Society of Newcastle, *Submission 99*, p. [9].

44 Mrs Goldman, Chief Executive Officer, Asthma Foundation New South Wales, *Committee Hansard*, 17 May 2013, p. 41.

45 Ms Bragg, representative, Australian Network of Environmental Defenders Offices, *Committee Hansard*, 11 June 2013, p. 64; Mr Hutton, President, Lock the Gate Alliance, *Committee Hansard*, 11 June 2013, p. 55.

46 Hunter Valley Protection Alliance, *Submission 19*; Environment Victoria, *Submission 27*.

47 Port Adelaide Resident's Environmental Protection Group, *Submission 108*, pp. 4–5; Hunter Community Environment Centre, *Submission 5*, p. 3; Greenpeace Australia Pacific, *Submission 43*; Nature Conservation Council of New South Wales, *Submission 58*, p. [3].

committee to be limiting development in the town.⁴⁸ On the other hand, the Port Augusta City Council reported that although a two kilometre distance exists between local power stations and the city, prevailing winds mean that populations are exposed to air pollution.⁴⁹

Committee view

3.42 The use of buffer zones to protect communities from large point-sources of pollution such as coal mines, power plants, ports and transport corridors is not a new idea. Having considered the evidence before it, the committee is of the view that buffer zones – taking into account local conditions and requirements – are an important tool in protecting communities from poor air pollution. Importantly, buffer zones are physical control measures that the community can see and authorities can accurately verify.

Recommendation 3

3.43 The committee recommends that buffer zones be used to protect populated areas from large point-source emitters.

Air pollution monitoring and data

3.44 Currently in Australia there are two primary sectors responsible for collecting data and monitoring air quality: governments collecting data to meet their requirements under the NEPM; and private sector entities that are required to undertake air quality monitoring as part of their various operating licences.

Government monitoring

3.45 The committee received evidence from a number of State government environmental protection authorities outlining the way in which they monitored air quality in their state. Western Australia and Victoria both reported the use of a fixed network of monitoring stations – necessary to meet their obligations under the NEPM – supplemented by mobile monitoring stations that can be deployed to assess local air quality issues and undertake research into specific point sources.⁵⁰ The NSW EPA operates 40 monitoring stations (15 in Sydney), and works with industry to monitor emissions from local sources.⁵¹

3.46 The NEPM provides explicit guidance on the location and operation of performance monitoring stations, in accordance with the Australian Standard AS2922–1987: *Ambient Air – guide for siting of sampling units*. The stations must be located in a manner that contributes to obtaining a representative measure of the air

48 Ms Dix, Member Representative, Moranbah Cumulative Impacts Group, *Committee Hansard*, 11 June 2013, p. 46.

49 Port Augusta City Council, *Submission 12*, p. 1.

50 Western Australian Government, *Submission 155*, pp. 4–5; Victoria EPA, *Submission 110*, p. 11;

51 New South Wales EPA, *Submission 80*, p. 17.

quality likely to be experienced by the general population in a region.⁵² The NEPC Review provides an explanation of the intent behind this approach:

The intent was to provide some sense of population exposure by focusing on the higher levels to which a regional population was likely to be exposed, without direct influence of local sources such as major traffic areas; that is, where large proportions of the population experience similar average air quality.⁵³

3.47 Data from monitoring conducted by State and Territory governments is widely available. The committee heard that the NSW EPA provides hourly air quality updates and that residents can subscribe to SMS and email alerts informing them of high pollution days.⁵⁴ Western Australian and Victorian residents can similarly view hourly updates on their respective agency's websites.⁵⁵ Findings from the data from periodic point source monitoring, at least in Victoria, is presented 'regularly' via the internet and community meetings.⁵⁶

3.48 Because the NEPM is focused at the population level, the data does not measure air pollution likely to be experienced by any one individual. The NEPC Review explains that:

The NEPM standards were established as ambient standards; that is, pertaining to broad air quality within air sheds. They were not generally aimed at assessing air quality at localised point sources, such as those from industrial plants.⁵⁷

3.49 This measurement of airshed exposures was criticised during the inquiry as hiding the true air quality in places that people live and work. For communities and residents in close proximity to large emitters, they cannot be sure of their actual exposure as data is reported for the airshed as a whole. The AMA argued that this consequence of this system is that individual communities often cannot accurately gauge their specific exposures:

The original intent of Australia's air quality monitoring network was to avoid monitoring near localised sources of pollution, such as industrial areas or heavy traffic flow areas, and to capture instead the average concentrations of pollutants in a specific region, or 'airshed'. Monitoring was not designed to measure the variability in pollutant levels within a specific airshed. As a consequence, the air monitoring that is undertaken

52 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 32.

53 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 32.

54 New South Wales EPA, *Submission 80*, p. 17.

55 Western Australian Government, *Submission 155*, p. 3; Victoria EPA, *Submission 110*, p. 11

56 Victoria EPA, *Submission 110*, p. 11.

57 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, p. 15.

under the current [NEPM] is likely to significantly underestimate real-life exposures for many sections of the population. In addition, monitoring activity is limited in geographic coverage and is not, for example, undertaken in regional areas where there may be poor air quality due to industrial or agricultural practices. As a result, the ability of communities and local governments to access information about air quality in their own areas is often limited.⁵⁸

3.50 As a result of the use of ambient standards, the committee heard that many communities that are collocated with industrial sites, mines, or major transport routes and infrastructure are being exposed to air quality that does not meet the NEPM standard's object of protecting health,⁵⁹ and that currently 'monitoring of pollution and health impacts locally is unsatisfactory and a cause for concern among the local community.'⁶⁰ Representatives from Moranbah in Queensland argued that the lack of information about population exposure is as much a concern for residents as the exposure itself.⁶¹

3.51 One reason for monitoring air pollution levels is to use that data to improve our understanding of the impact poor air quality has on human health. The committee heard concerns that the current design of the NEPM air monitoring regime may be inadequate to collect the necessary data to properly assess the health impacts of poor air quality.⁶² An impact of this system, reported by the AMA, is that the necessary data to draw causal links between health impacts and poor air quality is not being collected.⁶³ The Moranbah Cumulative Impacts Group also called for monitoring to be better integrated with health information to 'provide an accurate picture of any risks to human health or otherwise.'⁶⁴ The Australian Network of Environmental Defender's Offices (ANEDO) also called for 'monitoring stations in areas where the community is being affected – schools, the nearest home, and so forth.'⁶⁵ Doctors for the Environment expressed frustration that the current system limited the ability to draw causal links between air quality and human health:

58 Australian Medical Association, *Submission 114*, p. 11.

59 Associate Professor Carey, Member – Management Committee, Doctors for the Environment, *Committee Hansard*, 17 May 2013, p. 1.

60 Environment Victoria, *Submission 27*, p. 1.

61 Ms Dix, Member Representative, Moranbah Cumulative Impacts Group, *Committee Hansard*, 11 June 2013, p. 46.

62 Professor Morawska, International Laboratory for Air Quality and Health, *Committee Hansard*, 11 June 2013, p. 2.

63 Ms Dobson, Senior Policy Officer, Australian Medical Association, *Committee Hansard*, 16 April 2013, p. 42.

64 Ms Dix, Member Representative, Moranbah Cumulative Impacts Group, *Committee Hansard*, 11 June 2013, p. 46.

65 Ms Bragg, representative, Australian Network of Environmental Defenders Offices, *Committee Hansard*, 11 June 2013, p. 59.

At the moment it seems crazy to the community that the sources that are most polluting, which could be major roads or coal fired power stations, are actively excluded because the EPA is looking for an airshed average and that affects the airshed average. It is very mechanistic. It is not actually giving us the information about risk, which is really what we are after in order to reduce that for the population.⁶⁶

3.52 The committee was informed that in the United States and European Union air quality monitoring considers population exposures rather than airshed concentrations of pollutants.⁶⁷

3.53 The NEPM Review noted the concerns that current monitoring does not adequately capture human exposure to pollutants and recommended a redesign of the monitoring networks to represent population exposure.⁶⁸

3.54 Some pollutants currently monitored under the NEPM are measured as averages over a period of time. This has impacts on the presentation of data, with short intervals of elevated pollution levels being hidden within the averages. It was argued that:

A 24-hour average just hides those spikes and does not really give you a true picture of useful information you can use for health impact, that you can correlate spikes directly with health impact and see what is going on. You cannot get that from averaged information.⁶⁹

3.55 Similarly:

You bodgie up air quality all the time by doing averages. You do an average over a period of time and you get something that comes inside the set parameters and that neglects the fact that on a number of occasions you had serious exceedences, which caused major health issues. You have to go for the large spikes as well as the averages if you are going to get any sort of idea about what impact these are having on health.⁷⁰

3.56 In the case of lead, the NEPM measures use an average of TSP. It was argued that this obscures actual contaminant concentrations:

So, the standard is based on an annual average. What this does not do is, first, take into account the short-term fluctuations, which are very significant—and that information is in the documentation that I sent to the parliament. It also does not take into account the effect of very small particulates, because you have a dilution by consequence of including all

66 Associate Professor Carey, Member – Management Committee, Doctors for the Environment, *Committee Hansard*, 17 May 2013, p. 5.

67 Australian Medical Association, *Submission 114*, p. 12.

68 National Environmental Protection Council, *Ambient Air Quality NEPM Review*, Adelaide, 2011, pp. 5–6.

69 Ms Dix, Member Representative, Moranbah Cumulative Impacts Group, *Committee Hansard*, 11 June 2013, p. 47.

70 Mr Hutton, President, Lock the Gate Alliance, *Committee Hansard*, 11 June 2013, p. 52.

particulates, including coarse particulates, in the measurement. As particles become smaller their surface area to volume increases, and it is well known and well understood that most of the contaminants reside in the very fine particulates.⁷¹

Committee view

3.57 While the committee recognises that certain NEPM standards are evaluated as averages, the committee did not hear any reason why raw data could not be made available to the public. The availability of this data might assuage concerns about exposure and also allow for additional research into correlations between high pollution levels and other markers of health impacts such as hospital admissions.

Industry monitoring

3.58 Some large-scale emitters undertake their own air quality monitoring either on their own initiative or as required as part of their operating licences. These monitoring sites can provide a more detailed picture of air quality being experienced by a proximate community. EPA Victoria reported to the committee that the use of industry monitoring – subject to agreed standards – is standard practice around the world:

[EPAs] require businesses that pollute to monitor and report on their pollution, but there are often concerns from the community that that is not independent, even though it is subject to rigour in the way in which it is done.⁷²

3.59 It was reported to the committee, for example, that North Queensland Bulk Ports (NQBPs) that for over 20 years they have conducted coal dust monitoring around the coal terminals and nearby communities,⁷³ and that power stations in the La Trobe valley and Anglesea in Victoria conduct monitoring.⁷⁴

3.60 The committee heard concerns that the data from these monitoring stations was inaccurate and difficult to obtain,⁷⁵ and does not necessarily measure for things such as PM_{2.5}.⁷⁶ The committee heard evidence from ANEDO that the monitoring requirements in operating licences are often insufficiently specific to ensure that point-source monitoring is conducted in places that will accurately represent

71 Professor Taylor, Professor of Environmental Science, Macquarie University, *Committee Hansard*, 11 June 2013, p. 21.

72 Mr Merritt, Chief Executive Officer, Environment Protection Authority Victoria, *Committee Hansard*, 17 May 2013, p. 39.

73 North Queensland Bulk Ports Corporation, *Submission 148*, p. 4.

74 Mr Merritt, Chief Executive Officer, Environment Protection Authority Victoria, *Committee Hansard*, 17 May 2013, p. 39.

75 Professor Shearman, Honorary Secretary, Doctors for the Environment, *Committee Hansard*, 17 May 2013, p. 3.

76 Mackay Conservation Group, *Submission 8*, p. 3.

community exposure.⁷⁷ It was the view of Doctors for the Environment that, overall, 'there is an overreliance on industry to provide information, and that is frequently far from adequate and far from transparent.'⁷⁸

3.61 Industry bodies, such as NQBP, disputed the negative characterisation of their monitoring practices. They informed the committee that their monitoring was conducted by 'independent consultants' and was thus a reliable indicator of air quality.⁷⁹ The Victorian EPA informed the committee that they monitor industry established monitoring equipment to ensure that the data is accurate and appropriate monitoring standards and practice are being observed.⁸⁰

3.62 The committee is not in a position to verify claims regarding the validity of data, but is of the belief that effective industry monitoring of air quality – especially when one industry is creating a large amount of air pollution such as coal mining in the Upper Hunter Valley area – should be encouraged to supplement government data collection.

3.63 The committee regularly heard that it was difficult for the community to access air quality data, especially data collected from a point source emitter as part of an operating licence. The ANEDO informed the committee that 'it is a torturous and difficult process for the locals to try and get hold of the relevant monitoring data.'⁸¹ Doctors for the Environment elaborated on the difficulties of accessing industry gathered data:

...the trouble with industry monitoring is that it goes to the EPA but it is not transparent and so it is not readily accessible for citizens or people in the community. To be able to extract information from the EPA, as David has mentioned, you have to be extremely committed with your time and energy, generally. People really need something they can quickly look up and get some indication of what sort of problem there is.⁸²

3.64 The committee heard the example of the difficulty the residents of Anglesea in Victoria faced in trying to access data collected by Alcoa:

...at the moment that data is difficult to access. It can be accessed at times through—for example, the reporting that companies do to the EPA. However, that reporting may or may not be made public. So, for example,

77 Ms Bragg, representative, Australian Network of Environmental Defenders Offices, *Committee Hansard*, 11 June 2013, p. 59.

78 Associate Professor Carey, Member – Management Committee, Doctors for the Environment, *Committee Hansard*, 17 May 2013, p. 3.

79 North Queensland Bulk Ports Corporation, *Submission 148*, p. 4.

80 Mr Torre, Principle Expert – Air Quality, Environment Protection Authority Victoria, *Committee Hansard*, 17 May 2013, p. 34.

81 Ms Bragg, representative, Australian Network of Environmental Defenders Offices, *Committee Hansard*, 11 June 2013, pp. 58–59.

82 Associate Professor Carey, Member – Management Committee, Doctors for the Environment, *Committee Hansard*, 17 May 2013, p. 4.

the community was not able to access the particulate matter data recorded at Anglesea power station without having gone through a process of freedom of information and eventually a decision being made by the Victorian parliament that Alcoa Anglesea was required to provide its health impact assessments to that community. It was a period of years that that community was seeking information that contained monitoring levels before they were able to be provided with that information.⁸³

3.65 It was recommended by ANEDO that 'real-time online monitoring data' be available to the public.⁸⁴ Quit Coal made the same recommendation so that residents near heavy pollution sources would have the necessary information 'that would allow them to take action to protect themselves.'⁸⁵

3.66 NQBP disputed that data on air quality was difficult to obtain, pointing out that their independent monitoring was available on their website.⁸⁶ The committee notes however that there appears to be a gap of around one month between the data being collected and published.

Committee view

3.67 Industry monitoring of emissions is an important tool in ensuring compliance with licensing conditions and protecting human health. As the creators of potentially harmful pollutants, industry has a responsibility to ensure that human health is preserved and the reliable and regular data is collected. The committee is of the view that this information should be made available to the public in as close to real-time as possible.

Recommendation 4

3.68 The committee recommends that pollution monitoring should accurately capture population exposure for communities and homes proximate to pollution point sources.

Recommendation 5

3.69 The committee recommends that providing monitoring and real-time data of air quality be a condition of environmental approvals issued by the Australian Government unless an operator can demonstrate that air pollution created by the development will not impact upon human health.

83 Dr Redenbach, Representative, Quit Coal, *Committee Hansard*, 17 May 2013, p. 55.

84 Ms Bragg, representative, Australian Network of Environmental Defenders Offices, *Committee Hansard*, 11 June 2013, p. 59.

85 Dr Redenbach, Representative, Quit Coal, *Committee Hansard*, 17 May 2013, p. 53.

86 North Queensland Bulk Ports Corporation, answer to question on notice, 11 June 2013 (received 20 June 2013).

