

Summary of Submissions on Preliminary Work for the Ozone Standard

Introduction

Twelve submissions were received in response to the Issues Paper for the Preliminary Work on Ozone for the Review of the Ambient Air Quality NEPM, including four submissions from government agencies and two submissions from industry. A list of submitters is found on page 9.

The Issues Paper contained information relating to the most appropriate averaging periods for Australian ozone standards and discussed approaches to incorporating achievability in the Ambient Air Quality NEPM ozone goal.

It sought input on a number of key questions relating to the health impacts of ozone, background ozone levels, ozone exposure patterns and incorporating achievability considerations in ozone standard setting.

This document summarises the issues raised in submissions relating to each of the key questions set out in the Issues Paper. This document also includes a brief response to these issues. Where relevant, issues raised in submissions will be referred on to the review of the Ambient Air Quality NEPM currently under way.

What health outcomes should be used as a basis for setting ozone standards?

The general view was that a range of ozone health impacts should be considered in setting the ozone standard. Malfroy Environmental Strategies noted the recommendation of the health experts workshop that FEV₁ (forced expiratory volume in one second) was a useful measure, but other health outcomes should also inform standard setting. The Australian Government Department of the Environment and Heritage (DEH) noted that associations between ozone and asthma, COPD (chronic obstructive pulmonary disease) and cardiovascular disease should be taken into account. Mr Robert Joy noted that relevant health outcomes include exacerbation of asthma, reductions in lung function, increased airway inflammation, hospital admissions and emergency department attendances. The NSW Department of Health (NSW Health) considered that any exposure-concentration proven to have an effect on respiratory function should be considered in setting a standard for ozone. The Queensland Government (Queensland) put the view that 'adverse effects' should be assessed by specialists with an expert understanding of the mechanism in question (eg respiratory or cardiac specialists).

The SA Department of Health (SA Health) suggested that the standard setting process should involve presentation of incremental decrements in health endpoints for given levels of ozone. This information would assist in drawing conclusions as to which health endpoints should be used. The submission suggested that charts presented in figure 7-7, 12 etc of the USEPA '*Air Quality Criteria for Ozone and Related Photochemical Oxidants*' (First External Review Draft), Ch 7, could be used as a guide. Queensland put a similar view, stating that "it would have been useful to include summary tables of epidemiological information in order to determine consistency

across studies in the areas of susceptible groups, significant health outcomes, levels at which effects are found, methodologies and pollution averaging periods”.

Queensland put the view that “a systematic review of toxicology and epidemiological evidence will be required when determining the most appropriate health protection levels for determined averaging periods. How epidemiological studies account for the effects of other critical pollutants such as particles will need to be clearly analysed in any systematic review”. SA Health also suggested that co-pollutant health effects should be accounted for.

Response

A broad range of health outcomes, as outlined in the Issues Paper and in submissions, should be considered in evaluating whether the ozone standards are sufficiently protective of health.

To what extent should standards take account of the most sensitive individuals in the community?

The general view put in submissions was that the standard setting process should consider the full range of sensitivities across the community. Mr Robert Joy considered that children’s health should be a significant focus “given the nature of their exposure patterns and their inherently greater susceptibility to the effects of pollutants such as ozone (deriving from factors such as their lung capacity)”. Queensland put the view that “sensitive/susceptible sub-groups should be clearly defined and an estimate of the proportion of the population that they represent in the population should be identified”.

There was also broad recognition that there is significant variability in responses to ozone between individuals, with some people responding at very low levels. Thus, it was suggested by a significant proportion of submissions, that it may not be possible to provide comprehensive protection to all susceptible individuals in the community. There was also support for transparency regarding the level of protection provided by the ozone standard. For example DEH suggested that “it should be made clear which sensitive groups are being protected under the standards and those which are not”. Queensland also put this view.

Response

Standards should seek to protect all sensitive groups in the community, and where susceptible groups are not able to be wholly protected by standards, those subgroups at risk should be clearly identified. Children with asthma are considered to be a particularly significant sensitive subgroup in relation to ozone. Other sensitive subgroups are people with existing conditions such as asthma, chronic obstructive pulmonary disease and other respiratory conditions, and cardiovascular disease, the elderly, and people who may have an inherent genetic susceptibility to ozone. In addition, those individuals who spend long periods of time outdoors are susceptible to ozone because of their potential for longer exposures to ozone.

What does the health data suggest about the appropriate averaging periods for ozone standards?

The most prevalent view in submissions was that one and eight hours would be appropriate averaging periods based on health data. Submitters putting this view included DEH, Queensland, SA Health and NSW Health.

NSW Health explained the health rationale as follows: “As the concentration of ozone is the more important factor in determining response, then it would seem that short-term averaging periods (one hour or less) are important in standard-setting. The observed effects at relatively low concentrations over 6-8 hours also means that this period of exposure is also important to control”.

Mr Robert Joy noted that recent health literature provides an increasingly strong case for concern over the effects of prolonged exposure to elevated levels of ozone. However, he considered that monitoring information is also a key consideration in determining the most appropriate averaging periods for the ozone standard (see further below).

According to Malfroy Environmental Strategies, health data suggests a combination of a one and four or eight hour standard is appropriate.

Dr Jonathan Streeton was of the view that both short and longer-term standards are required for health protection. He also noted that “for early responses to ozone peaks to be instituted, short measuring periods are required, clearly much shorter than eight hours if adequate public health protection to susceptible subgroups is to remain the ultimate primary aim”.

Response

Health data suggest that short (eg one hour) and longer-term (eg four or eight hour) standards are important for health protection. An averaging period of around one hour is important as concentration of ozone is the more important factor (versus length of exposure) in determining health response. A standard with a longer averaging period is also important as there are increased responses to ozone with time and health effects are observed at lower concentrations with prolonged exposure.

What is the most appropriate definition of background ozone in a policy context? What is the best approach for estimating background ozone levels?

A number of submissions noted the existence of different ways of defining background, eg naturally occurring levels in the absence of anthropogenic emissions or a low frequency level, eg 10th or 25th percentile. As a whole, the submissions tended to support an understanding of background as representing ozone levels in the absence of anthropogenic sources.

Mr Jack Chiodo suggested that ‘natural’ background could be estimated by measuring ozone levels at remote locations such as Cape Grim. Queensland noted that long-term measurements from Cape Grim suggest the background ozone level is approximately 0.024 - 0.026ppm.

A number of submissions noted the difficulty of estimating natural background levels. Mr Robert Joy was of the view that “given the significant local/regional influence of vegetation, meteorology and topography, natural background levels at pristine sites such as Cape Grim are of limited relevance to the background levels of the major Australian airsheds”. Malfroy Environmental Strategies also noted that defining background is problematic given ozone shows significant temporal and

spatial variability in large part due to meteorological variables. DEH considered that there do not currently appear to be any robust approaches to estimating background.

The submission of Malfroy Environmental Strategies supported the background levels suggested in the Issues Paper (of between 0.02 and 0.04ppm) as a reasonable estimate of natural background. Mr Robert Joy also considered jurisdictions had done sufficient work to estimate background levels in the major urban airsheds.

Response

Non-anthropogenic ozone is the most useful definition of background ozone for policy purposes. It is recognised that estimating background accurately is problematic, in part as it can vary according to location, time of day and season. However, estimates made by jurisdictions, which range from 0.02 - 0.04ppm are considered adequate to inform standard setting.

How should background ozone be taken into account in the standard setting process?

Submissions were generally of the view that background ozone levels are a relevant consideration in analysing the achievability of proposed ozone standards. Mr Jack Chiodo suggested that “it is a matter of judgement as to how close the standard can be to background and still be achievable, and this can be tested by detailed analysis and modelling”. Malfroy Environmental Strategies commented on the relevance of averaging periods and background levels in standard setting – “it is recognised that the consideration of ‘background’ levels becomes more significant as the averaging period is increased and concentrations at which adverse health impacts are observed decrease”. Mr Robert Joy’s submission followed a similar line.

The National Generators Forum was of the view “background clearly raises significant questions for a low eight hour standard, such as 0.06ppm”.

Response

Background levels are a relevant consideration in analysing the achievability of proposed ozone standards.

What does the analysis of Australian ozone monitoring data suggest about averaging periods for ozone standards?

The submissions of Mr Jack Chiodo, Malfroy Environmental Strategies and Mr Robert Joy supported the retention of a one and four hour standard (although Mr Chiodo suggested that the four hour standard may suffice to cover longer and shorter potential exposure periods).

In Mr Chiodo’s view “the data presented indicate elevated ozone episodes are generally of the order of a few hours, with very few exceeding four hours other than NSW. On this basis a four-hour standard would capture most potential exposures”.

Malfroy Environmental Strategies considered that “the results of the time activity study and monitoring data from jurisdictions lend support to the maintenance of a four-hour standard. It is considered that a four-hour standard should be able to provide protection for those people who may spend longer periods outdoors”.

Mr Robert Joy also noted that “in the Australian context, monitoring data indicate that occurrences of prolonged ozone events are still relatively infrequent except in the Sydney airshed”. Therefore, he suggested, it may be appropriate to establish a national advisory reporting standard for eight hours and conduct a mid-term review of the need to retain the four-hour period.

The submissions of NSW Health, DEH, SA Health and Queensland supported a combination of one and eight-hour standards based upon health and monitoring data.

DEH considered that “the data show that Australian urban airsheds regularly experience short-term, acute ozone episodes and also indicate that longer episodes of elevated ozone levels also occur. Up to 20% of elevated ozone levels are five hours or longer in duration, and can last up to nine hours in duration”.

Queensland noted that “though shorter-term peaks are more common, longer episodes occur in some cities at some times of the year. These patterns suggest that averaging periods of both one hour and greater than four hours may be required”. Queensland also noted that longer ozone episodes may occur in south-east Queensland in the future as a result of population growth and urban development patterns.

Response

Ozone monitoring data show that most instances of elevated ozone (one-hour average levels above 0.06ppm) are one or two hours in duration. Across the major urban airsheds, elevated ozone levels rarely last longer than four hours. However, in the Sydney airshed, approximately 20% of episodes of elevated ozone last five hours or longer. Monitoring data, together with health information, suggests that one, four and eight-hour averaging periods are appropriate in the Australian context.

While a four-hour averaging period may be appropriate in most airsheds, there are times in Sydney and occasionally in other cities, when an eight-hour standard would be appropriate. For equivalent protection of individuals across all jurisdictions, it is considered appropriate to investigate standards at all three averaging periods.

Do we need the same averaging periods as overseas, taking into account exposure in Australia?

Submissions were generally of the view that averaging periods should reflect Australian conditions. Whilst Mr Jack Chiodo, Malfroy Environmental Strategies and Mr Robert Joy considered that Australian conditions did not support an eight-hour standard, SA Health and NSW Health and the National Generators Forum were of the view that there is no persuasive evidence that Australia should have different averaging periods to those overseas.

DEH challenged the importance of exposure in selecting appropriate averaging periods. It presented the view that “in most overseas jurisdictions, the averaging period is based on health effects as the primary consideration. This should also be the case in Australia”.

Both DEH and Mr Jack Chiodo noted that having the same averaging periods as overseas would make comparison between Australian and overseas ozone levels easier.

Response

Whilst it is useful to consider overseas standards in setting Australian standards for air quality, averaging periods for the ozone standard should be set taking into account Australian conditions.

How important is time-activity data for setting standards for ozone?

Submissions generally supported the consideration of time-activity data in setting ozone standards. There were different interpretations of the significance of time-activity data in relation to averaging periods. While Malfroy Environmental Strategies considered that time-activity data lent support to a four-hour standard, NSW Health and Queensland argued that an individual should not have reduced protection if they choose a different pattern of outdoor activity to the majority. They also observed that outdoor workers are one group who may spend at least eight hours a day outdoors.

A number of submissions also noted that current time-activity data is limited in its representativeness of the population in relation to summer activity patterns (NSW Health, DEH, SA Health, Queensland). Only children, young adults and the elderly were considered in the recent Australian study, and this study did not cover the main summer-holiday outdoor activity period.

Response

The use of time-activity data in standard setting will be considered by the EPHC Standard Setting Working Group which will be recommending a standard setting methodology for the Ambient Air Quality NEPM review and any subsequent NEPM variation process.

To what extent should achievability be considered in setting standards for health protection?

Submissions generally agreed that the Ambient Air Quality NEPM standards should be health-based. Nonetheless, achievability was recognised as an important consideration in setting compliance goals for jurisdictions. Clearly separating the identification of health-based values from the achievability process was a common theme in government submissions.

There were a number of suggestions for ways to incorporate achievability in ozone goals without compromising the health basis of the standards. Mr Jack Chiodo suggested “stretch and progressive targets, eg 10 exceedances in five years, five exceedances in 10 years, etc”. The National Generators Forum made a similar suggestion. Mr Robert Joy argued that “there is a case to be made for adopting the WHO/EU/USEPA approach of basing standards exclusively on health considerations. Assessments of achievability can then be reflected in the levels of exceedances which society is willing to accept”. NSW Health and Queensland suggested a similar approach.

Malfroy Environmental Strategies suggested that “the inclusion of ‘alert’ or ‘warning’ level(s) set at a lower (more stringent) level than the standard itself would

assist in both protecting susceptible subgroups and in the task of developing air quality management plans based on achievable standards”.

The issue of bushfires was raised by a number of submissions. The Australasian Fire Authorities Council noted the inclusion of bushfires in the Issues Paper as a natural source of ozone. DEH suggested that provision should be made for jurisdictions to be able to report circumstances beyond their control to explain exceedances. Queensland also suggested “there should be recognition that exceedances may occur due to natural emission events and poor meteorology outside of the control of management strategies”.

Response

The Ambient Air Quality NEPM review and any subsequent NEPM variation process should consider basing standard levels on health protection and incorporate achievability in the NEPM goals through other mechanisms, eg allowable exceedances, timeframe for compliance, measuring compliance via a statistical measure (eg 98th percentile ozone level).

How should achievability be taken into account in the setting of the standards?

A majority of submissions supported a risk-based approach, involving assessment of economic costs and health benefits of proposed standards to assist assessment of the achievability of proposed standards (Mr Jack Chiodo, Malfroy Environmental Strategies, DEH, SA Health, Mr Robert Joy, Queensland). Malfroy Environmental Strategies stressed that the cost benefit analysis should be conducted for “alternative possible standards (value, exceedances and time frames)”. Queensland put a similar view that “it would be desirable to ensure information was available on the costs and benefits of implementing management strategies to achieve a range of possible standards and allowable exceedances”. It was also of the view that “an agreed framework for conducting cost benefit analysis would be an important prerequisite”.

Response

Should a change to the ozone goal be seriously considered as part of the Ambient Air Quality NEPM review and any subsequent variation process, cost benefit analysis should be conducted for a number of ozone goal options to inform the question of achievability. This would need to examine the health benefits of meeting potential ozone goals and the costs to jurisdictions of putting in place measures necessary to achieve ozone goals under consideration.

How should climate change be taken into account in the setting of standards?

Mr Jack Chiodo was of the view that “potential changes in health impacts from individual pollutants due to potential changes in climate are speculative (and too uncertain to reasonably be considered at this stage)”.

Mr Robert Joy argued that the contribution of tropospheric ozone to accelerated greenhouse warming is small compared with that of CO₂ and so the primary driving force in setting national standards should be ozone’s impact on health on an airshed level and not its contribution to greenhouse”. The National Generators Forum also put this view.

NSW Health and Queensland suggested that climate change could be relevant to achievability considerations and in developing strategies to manage ozone.

Response

Climate change is likely to have relatively small impacts on temperature and ozone formation over the next 10-15 year period and there is little quantitative information available. It is not thought to be a significant issue in terms of setting the levels for ozone standards at this time. However, the greenhouse co-benefits of ozone abatement strategies should be taken into account as part of the cost benefit analysis for any proposed changes to the NEPM.

Are there any other issues that need to be considered in setting ozone standards in Australia?

Dr David Doley and Mr John Mabb put forward the view that ecosystem impacts (eg impacts on plants and animals) should be considered in the standard setting process. The Australasian Fire Authorities Council did not support this.

Response

Ecological risk assessment is on the agenda for the Standard Setting Working Group. However, data on the ecosystem impacts of ozone in Australia is currently limited.

NSW Health and Queensland suggested that the application of the ozone standard to indoor air should be considered.

Response

The NEPC Acts restrict the Ambient Air Quality NEPM to 'ambient' air quality, as opposed to 'indoor' air quality. This comment will be passed on to the NEPM review process for consideration.

List of Submitters

1. Mr John Mabb
2. Mr Jack Chiodo, CH Environmental
3. Mr Hugh Malfroy, Malfroy Environmental Strategies Pty Ltd, on behalf of NSW government owned electricity generators
4. Mr Robert Joy
5. Australian Government Department of the Environment and Heritage
6. South Australian Department of Health
7. Dr David Doley, Centre for Mined Land Rehabilitation, University of Queensland
8. NSW Department of Health
9. National Generators Forum
10. The Government of Queensland
11. Dr Jonathan Streeton
12. Australasian Fire Authorities Council