National Environment Protection (Ambient Air Quality) Measure

Technical Paper No. 2

Selection of Regions

Prepared by the
Peer Review Committee

May 2001

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PREAMBLE

The National Environment Protection Measure (NEPM) for Ambient Air Quality was made in June 1998 with the desired environmental outcome of "ambient air quality that allows for the adequate protection of human health and well-being" across Australia. The NEPM sets national standards against which ambient air quality can be assessed. The NEPM includes a monitoring protocol to determine whether these standards are being met. Each jurisdiction is required to submit to the National Environment Protection Council (NEPC) a monitoring plan consistent with the protocol.

The Peer Review Committee (PRC) was established to assist NEPC in its task of assessing and reporting on the implementation and effectiveness of the NEPM by participating jurisdictions. The PRC includes government experts from all participating jurisdictions, in addition to representatives from industry and community groups. A significant activity of the PRC is the provision of advice to NEPC on the adequacy of jurisdictional monitoring arrangements, to ensure as far as possible that a nationally consistent data set is obtained.

To assure the consistency and transparency of its advisory function, the PRC has developed a set of guidance papers that clarify a number of technical issues in interpretation of the NEPM protocol. These Technical Papers provide the basis for PRC assessment of jurisdictional plans, aimed at assuring the quality and national consistency of NEPM monitoring.

The PRC Technical Papers are advisory for jurisdictions, and they will evolve with time as the science of air quality monitoring and assessment develops and as practical experience with monitoring increases.

M J Manton
Chair
Peer Review Committee

1.   PURPOSE

The purpose of this paper is to provide guidance to jurisdictions in the selection of regions for monitoring and assessment under the National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM).

2.   INTRODUCTION

The AAQ NEPM specifies a population threshold of 25,000 for the monitoring of pollutants within a region.   The AAQ NEPM also defines a region as "an area within a boundary surrounding population centres as determined by the relevant participating jurisdiction".

In a report issued on 30 April 1998 which was referred to the Ambient Air Quality Project Team by an official working group (hereafter referred to as the Working Group Report), three types of regions were identified, as follows:

Type 1   A large urban or town complex with a population of 25,000 people or more requiring direct monitoring and contained within a single airshed;

Type 2   A region with no one population centre with 25,000 people or more but with a total population of 25,000 or more, and with significant point source or area based emissions as to require a level of direct monitoring; and

Type 3   A region with a population of 25,000 people or more but with no significant point or area based emissions, so that ancillary data can be used to infer that direct monitoring is not required.

Moreover, the Working Group Report specified that the initial determination of population in a region be obtained from the most recent Australian Bureau of Statistics (ABS) data. The Working Group Report, however, did not specify which of the possible ABS spatial units were to be used for defining Type 1, 2 or 3 regions.

This Paper explores the ABS data and provides guidance on how it may be used to identify regions for monitoring as required under the AAQ NEPM, and presents a preliminary identification of these regions by jurisdiction.

3.   AUSTRALIAN BUREAU OF STATISTICS GEOGRAPHICAL CLASSIFICATION

The ABS uses the Australian Standard Geographical Classification (ASGC) to disseminate data from a large number of ABS collections. The component spatial units of ASGC include so-called urban centres, statistical districts, local government areas and statistical divisions, just to name a few. A definition of areas defined by ABS is presented in Attachment 1, and the corresponding number of spatial units by State/Territory is presented in Table 1. Where spatial units cross State/Territory borders they may be counted twice, but they are counted once for the Australia total. For example, New South Wales (NSW) has three, Victoria (Vic) one, Queensland (Qld) one and Australian Capital Territory (ACT) one such statistical districts and urban centres with a population of 25,000 or more: Albury-Wodonga (NSW/Vic), Gold Coast-Tweed (Qld/NSW) and Canberra-Queanbeyan (ACT/NSW).

4.   IDENTIFICATION OF REGIONS

For the purpose of conducting a preliminary identification of monitoring regions as defined under the AAQ NEPM in general, and more specifically the Working Group Report's Type 1 regions, ABS "urban centre" data appear to provide a transparent and well defined option for jurisdictions.

In Table 2, the ABS urban centres with populations of 25,000 or more are listed for each jurisdiction (1996 Census data). New South Wales has the largest number of urban centres with a population of 25,000 or more (15 in total), followed by Queensland with 13, Victoria with 8, Western Australia (WA) with 5, Tasmania (Tas) with 2 and South Australia (SA), Northern Territory (NT) and Australian Capital Territory with 1 each.

However, it should be noted that after due consideration of factors such as local emissions, meteorology and terrain, jurisdictions may consider that some of the urban centres listed in Table 2 may be re-classified as Type 3 regions, and apply for exclusion from direct monitoring.

Regions identified under the ABS urban centre classification may provide a reasonable and transparent basis for a preliminary assessment on where to conduct monitoring of primary pollutants (five of the six pollutants covered under the AAQ NEPM).

However, in the case of a secondary pollutant such as ozone, concentration maxima may be produced many kilometres beyond the boundaries of large centres such as Sydney, Melbourne or Perth. For this reason, ozone monitoring in medium to small urban centres (population below 25,000) on the outskirts of megacities may in cases also be warranted. Moreover, some ABS urban centres on the outskirts of large cities may be considered to be part of that city's ozone monitoring network. For example, Rockingham and Mandurah in WA, classified by ABS as urban centres with populations of 25,000 or more, may be considered to form part of the Perth Airshed ozone monitoring network.

For the purpose of establishing the boundaries of airsheds for Type 1 regions, one may consider the amalgamation of ABS urban centres of 25,000 people or more, as documented in Table 2, as a starting point. Such a process may require significant local knowledge and access to ambient monitoring data and/or suitable atmospheric modelling results.

There may be some urban centres with a population less than 25,000 which collectively with other nearby urban centres may form a region with a population equal to or greater than 25,000. From Table 3, it is noted that according to Census 1996, there were 17 urban centres in Australia with a population between 20,000 and 25,000 and a further 14 centres with populations between 15,000 and 20,000. Some of the regions formed by such an amalgamation of urban centres may by virtue of significant point or area based sources contained therein constitute Type 2 regions requiring a level of direct monitoring. For example, the Latrobe Valley in Victoria may be classified as a Type 2 region because it contains a number of urban centres including Traralgon (population of 18,993), Moe - Yallourn (15,512) and Morwell (13,823) which collectively have a population well over 25,000, and the region forms part of an airshed with major point sources (coal-fired power stations). Clearly, ABS data cannot be used directly to identify Type 2 and/or Type 3 regions as defined in the Working Group Report. It is recommended that jurisdictions examine each of the major urban centres with populations in the vicinity of 20,000 and based on a structured and transparent approach form a judgement on whether the surrounding population, emission sources and airshed characteristics would lead to a Type 2 region warranting some direct monitoring.

Jurisdictions may also elect to monitor in isolated regions where the airshed population is clearly less than 25,000 on the basis of existing industrial sources (e.g. Portland, Vic). However, such monitoring falls outside the formal requirements of the AAQ NEPM.

In summary, whilst the ABS "urban centre" population data may provide a transparent basis for a preliminary assessment of regions for AAQ NEPM monitoring, it is important to note that other considerations such as local knowledge of region /airshed population, emission sources,

topography and dispersion should also be considered. In applying the formula that guides the number of monitoring sites needed on the basis of population, the actual population in the affected airshed should be estimated by integrating up the ABS data as appropriate. The changes in population that can result from this integration may be substantial. In some instances it may raise the population above the lower threshold where monitoring needs to be considered. Moreover, a narrow application of the ABS population data should not be used as a justification for a lower level of monitoring than would result from a consideration of an airshed concept.

Table 1. Counts of Areas from 1996 Census Output[*]

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Urban Centres ≥ 25,000	15	8	13	5	1	2	1	1
Urban Centre/Locality	524	314	348	168	152	99	2	52
Statistical Division	13	12	12	10	8	5	2	3
Statistical Subdivision	43	45	30	26	21	9	8	11
Statistical Local Area	189	200	449	151	130	44	107	63
Local Government Area	178	79	126	143	119	30	1	9
Statistical District	6	7	8	na	na	2	1	na
Major Statistical Region	2	2	2	2	2	1	1	1
Statistical Region	23	14	11	7	6	1	1	1
Collection District	11,566	7,889	6,366	3,480	3,150	1,089	492	378
Collection District in Capital City SD	6,504	5,241	2,607	2,314	2,141	390	485	138

*: ABS, Census 1996, Statistical Geography, Volume 2, Census Geographical Areas, Australia, Catal. No. 2905.0.

Table 2. Urban Centres with Population ≥ 25,000 (rounded to the nearest thousand) Ranked by Population (x1000) by State/Territory**

NSW	Pop	Vic	Pop	Qld	Pop	WA	Pop	SA	Pop	Tas	Pop	ACT	Pop	NT	Pop
Sydney	3,276	Melbourne	2,865	Brisbane	1,291	Perth	1,097	Adelaide	978	Hobart	126	Canberra.-Queanbeyan (ACT comp.)	297	Darwin	70
Newcastle	270	Geelong	125	Gold Coast-Tweed Heads (Qld comp.)	274	Rockingham	50			Launceston	68				
Central Coast	228	Ballarat	65	Townsville-Thuringowa	110	Mandurah	36								
Wollongong	220	Bendigo	60	Cairns	92	Kalgoorlie-Boulder	28								
Maitland	50	Shepparton-Mooroopna	32	Toowoomba	83	Geraldton	25								
Wagga Wagga	43	Melton	30	Rockhampton	58										
Albury-Wodonga (NSW comp.)	41	Warrnambool	26	Mackay	45										
Gold Coast-Tweed H. (NSW comp.)	38	Albury-Wodonga (Vic comp.)	26	Bundaberg	41										
Port Macquarie	34			Maroochydore-Mooloolaba	36										
Tamworth	32			Hervey Bay	32										
Orange	31			Caloundra	28										
Dubbo	30			Gladstone	26										
Lismore	28			Tewantin-Noosa	26										
Bathurst	26														
Canberra.-Queanbeyan (NSW comp.)	26														

**: ABS, Census 1996, Census of Population and Housing, Selected Characteristics for Urban Centres, Australia, Catal. No. 2016.0.

Table 3. Number of Urban Centres and Localities by Population Category by State/Territory, Census 1996***

Population	NSW	Vic	Qld	WA	SA	ACT	Tas	NT	Australia
Over 1,000,000	1	1	1	1	0	0	0	0	4
100,000 - 1,000,000	3	1	2	0	1	1	1	0	9
50,000 - <100,000	1	2	3	1	0	0	1	1	9
25,000 - <50,000	10	4	7	3	0	0	0	0	21
20,000 - <25,000	6[a]	3[b]	2[c]	2[d]	2[e]	0	1[f]	1[g]	17
15,000 - <20,000	6[h]	3[i]	2[j]	1[k]	1[l]	0	1[m]	0	14
200 - <15,000	497	300	331	160	148	1	95	50	1582

***. ABS, Census 1996, Census of Population and Housing, Selected Characteristics for Urban Centres and Localities, Catalogue Nos. 2016.0-8.

a. Nowra-Bomaderry 23 823, Coffs Harbour 22 177, Armidale 21 330, Richmond-Windsor 21 317, Goulburn 21 293, and Broken Hill 20 963.
b. Cranbourne 24 752, Mildura 24 142, and Sunbury 22 126
c. Mt Isa 21 751, and Maryborough 21 286.
d. Bunbury 24 945, and Albany 20 493.
e. Whyalla 23 382, and Mt Gambier 22 037.
f. Devonport 22 299.
g. Alice Springs 22 488.
h. Katoomba-Wentworth Falls 17 700, Cessnock-Bellbird 17 540, Taree 16 702, Grafton 16 562, Ballina 16 056, and Forster-Tuncurry 15 943.
i. Traralgon 18 993, Wangaratta 15 527, and Moe-Yallourn 15 512.
j. Caboolture 17 571, and Kawana Waters 16 264.
k. Kwinana 15 674.
l. Gawler 15 484.
m. Burnie-Somerset 19 134.

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ATTACHMENT 1

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<u>Australian Standard Geographical Classification</u>

The Australian Bureau of Statistics (ABS) uses the Australian Standard Geographical Classification (ASGC) to disseminate data from a large number of ABS collections. The component spatial units of ASGC include:

Census Collection District (CD)	CDs are designed for use in census years for the collection and dissemination of census data. In non-census years, CDs are undefined.
	The CD is the smallest spatial unit in the ASGC. For the 1996 Census, over 34,000 CDs were defined throughout Australia (see Table 1 for jurisdictional break down).
	The basic concept of a CD is that it defines an area that one census collector can cover, delivering and collecting forms in about 2 weeks. In urban areas CDs average about 220 dwellings. In rural areas the number of dwellings per CD decreases with decreasing population density.
Statistical Local Area (SLA)	The SLA is the base spatial unit used to collect and disseminate statistics other than those collected from censuses. In non-census years, the SLA is the smallest unit defined in the ASGC.
	In the 1996 Census, there were 1,336 SLAs in Australia including 3 SLAs for Other Territories (OT) – Territories of Cocos Islands and Christmas Island and Jervis Bay.
Statistical Division (SD)	The SD is a general purpose spatial unit and is the largest and most stable spatial unit within each State/Territory (S/T).
	In the 1996 Census, there were 66 (including one for OT) SDs in Australia.
Local Government Area (LGA)	The LGA represents the whole geographical area of responsibility of either an incorporated Local Government Council or an incorporated Community Government Council in the Northern Territory.
	In the 1996 Census, there were 686 LGAs (including one for OT) in Australia.
Statistical District (S Dist)	S Dists are predominantly urban areas, the boundaries of which are designed to contain anticipated urban spread of the area for at least 20 years. S Dists are generally defined as having a population of 25,000 or more.
	There were 21 S Dists in the 1996 Census. Three of these straddled two States: Albury-Wodonga (NSW/Vic), Gold Coast-Tweed Heads (Qld/NSW) and Canberra-Queanbeyan (ACT/NSW).
Statistical Region (SR)	In the capital cities of NSW, Vic, Qld, SA and WA, SRs aggregate to form the respective Capital City SDs. Outside of the capital cities in these States, SRs consist of one or more adjoining SDs.
	There were 65 (including one for OT) SRs in the 1996 Census.
Major Statistical Region (MSR)	Each of the five larger States have 2 MSRs. One MSR equates with the capital city SD and the other with the balance of the State. The other S/Ts have one MSR each, which covers the whole S/T.
Urban Centre/Locality (UC/L)	The UC/L classification groups CDs together to form defined areas according to population size criteria. The resulting areas are known as Urban Centres or Localities.
	In broad terms, an Urban Centre is a population cluster of 1,000 or more people, while a Locality is a population cluster of between 200 and 999 people.
Sections of State (SoS)	Within a S/T, each SoS represents an aggregation of non-contiguous geographical areas of a particular urban/rural type. These include: • Major Urban: urban areas with a population of 100, 000 and over; and • Other Urban: urban areas with a population of 1,000 to 99,999.