“Blame It On The Rain” – An Awareness Of The Contemporary Issues In The Consideration Of The Seasonal Variation Of Skid Resistance In Australia

Paul Hillier [Discipline Leader, Road Safety and Traffic]

Consulting Division, ARRB Group

ABSTRACT

This paper is largely for information only, with the objective of raising the awareness of the conference’s international audience of an increasingly important consideration in the management of skid resistance in Australia.

Australia is a vast country, with many diverse climatic zones, and a simple definition of winter being ‘cold and wet’ and summer being ‘hot and dry’ that may apply in other countries, such as UK or New Zealand, is simply not appropriate. In tropical areas, the summer months are often the wettest, and the winter months the most stable. In addition, with much of Australia currently experiencing prolonged drought conditions, some practitioners are questioning the necessity of managing wet weather skid resistance (with the possible exception of locally managing events of periods of rain immediately after long, dry spells of weather), and certainly the need to conduct routine testing, which will typically involve the use of large quantities of water in areas where there are the most severe water usage restrictions and subsequent political issues would result. The classic sinusoidal curve of skid resistance variation (and resultant adoption of concepts such as MSSC and testing in summer months), whilst historically shaping, and continuing to influence the management of skid resistance in some states, is largely simplistic and/or inappropriate in others. It is now the case in some states that average annual rainfall is a factor in selecting lengths of road to receive routine skid resistance monitoring.

The objective of this paper, and its accompanying MS Powerpoint presentation is to provide an awareness of Australian conditions and the aforementioned considerations, rather than to provide any ‘one size fits all’ answer to these issues. It is expected that Austroads documentation scheduled for release in 2009 will be the mechanism through which practitioners will be able to gain practical help in managing the issues raised.

1. INTRODUCTION

ARRB Special Report No.37 (1988) – Seasonal Variation Of Skid Resistance In Australia - Oliver et al

This landmark research was based on the hypothesis that the far from uniform rainfall patterns across Australia would mean that the classic patterns of skid resistance variation found in the Northern Hemisphere (lowest in summer, highest in winter) would be unlikely to be found in Australia.

The research selected major metropolitan areas within Australia and test data was collected (by British Pendulum and SCRIM) at regular intervals over a two year period. The objectives of the study were:

- *"to determine whether skid resistance varies with the season of the year at each location;*
- *if such variation does exist, to identify the minimum values and time of the year when they occur;*
- *to determine whether the skid resistance measurements made at any time of year can be used to calculate a minimum value for the year; and*
- *to identify the environmental factors which have the most important influence on skid resistance"*

The conclusions of the research included:

- that in all States, except Queensland, there was a substantial seasonal variation in skid resistance and that this generally took the form of a sinusoidal curve with a minimum in the summer and maximum in the winter. A double-peaked curve was obtained for sites in New South Wales;
- there were changes in mean level and in amplitude of variation between one year and the next at both local site and state level;
- the minimum value of skid resistance normally occurred in the period December to March each year;
- in the critical, wet condition, skid resistance generally dropped as vehicle speed increased; and
- further (longer term) research should be conducted and research extended to rural areas, which can experience quite significant climatic variation.

The recommendations of the research included:

- that traffic predictor sites, to correct skid resistance to a mean summer minimum value should be established in the different climatic regions of each state; and
- that long-term data from the above predictor sites should be used to

develop a prediction model to determine the expected mean minimum value of skid resistance at any site for the year following an observation made at the site.

It is the author's personal view that, regrettably, little follow up research has resulted from the conclusions and recommendations of this research within Australia.

This is considered to be in stark contrast to developments across the Tasman Sea in New Zealand, where the technical standard adopted by the national road authority, Transit New Zealand, for the management of network skid resistance (Technical Standard T10) has introduced extensively researched protocols to acknowledge the seasonal variation that has been found to occur within that country's climatic conditions. Indeed, research into this phenomenon is on-going, with the aim of further refining the protocols adopted, with studies such as those effected by Dr Douglas Wilson of Auckland University (May 2006) among those leading the way.

Austroads Document AP-G83 (Jan 2005) – Guidelines In The Management Of Road Surface Skid Resistance

The above document was issued by Austroads with the objective of encouraging road authorities to develop a strategy to manage skid resistance.

With respect to seasonal variation the document explains the classic sinusoidal relationship experienced in the Northern Hemisphere, but states:

> *"Research and experience on the state highway network in New Zealand has found some agreement with the UK study, given the similarity in the country's climatic conditions to the UK (i.e. the hottest weather occurs in the driest months)…..*
>
> *However, the findings of the UK study are considered not generally applicable to Australian conditions, where the hottest months can also be some of the wettest. Therefore, wet and dry seasons are more appropriate descriptors for Australia…...*
>
> *In summary, the existence of a seasonal variation in skid resistance has been recognised in both Australia and New Zealand and should, at the very least, be considered when formulating a local strategy to manage skid resistance"*

Later on in the document, it is explained that average annual rainfall may well be one appropriate factor in the determination of lengths of road to receive routine testing, but on the whole, the guidance provided is limited and in the author's opinion, the development of further guidance is needed. The author is heartened that Austroads project AT1131 (outputs due in 2009) has been tasked with developing further practical guidance for road authorities in developing effective strategies to manage skid resistance upon their road networks, and which it is expected will include further consideration of the effects of seasonal variation and whether and/or how to manage sites in drier regions.

The following section of this paper (and associated MS Powerpoint presentation) will introduce the current climatic conditions and patterns being experienced in Australia. At the time of writing, it appears that the Australian continent is starting to free itself from the clutches of the latest El Nino period, with long-term drought conditions starting to ease in many states. However, it must be recognised that the drought will continue to be an influencing factor in how the profession in Australia builds and manages its highway networks for many years to come. In addition, the influence of global warming upon Australia's on-going weather patterns cannot be discounted, with the climate generally becoming more variable and the intensities of both temperature and rainfall set to increase.

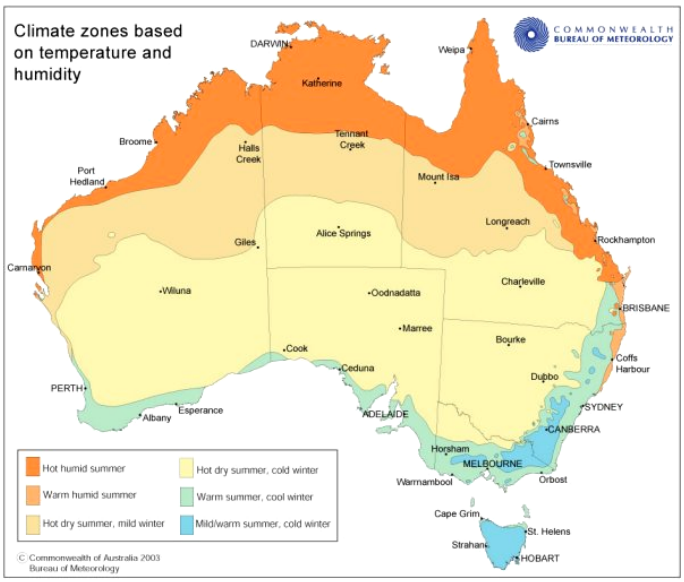
2. CLIMATIC CONDITIONS IN AUSTRALIA

A general map showing the relative positions of Australia and New Zealand.

The Australian Bureau of Meteorology (BoM) describes Australia's weather thus:

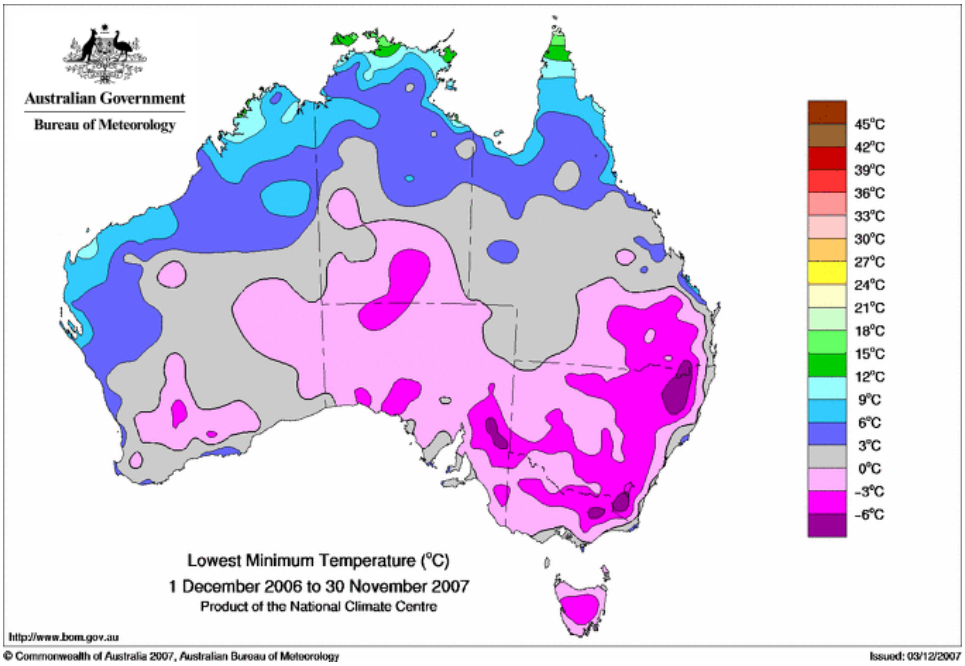
> *"Our continent sits more or less astride the latitudes of the subtropical high pressure belt, an area of sinking, dry, stable air and usually clear skies. The far north and south of the country come under the influence of reasonably regular rain-bearing disturbances for at least part of the year, and the east coast is watered reasonably well by moisture from the Tasman and Coral Seas. However over most of the country rainfall is not only low, but highly erratic"*

Australia's many climatic zones (ref. www.bom.gov.au)

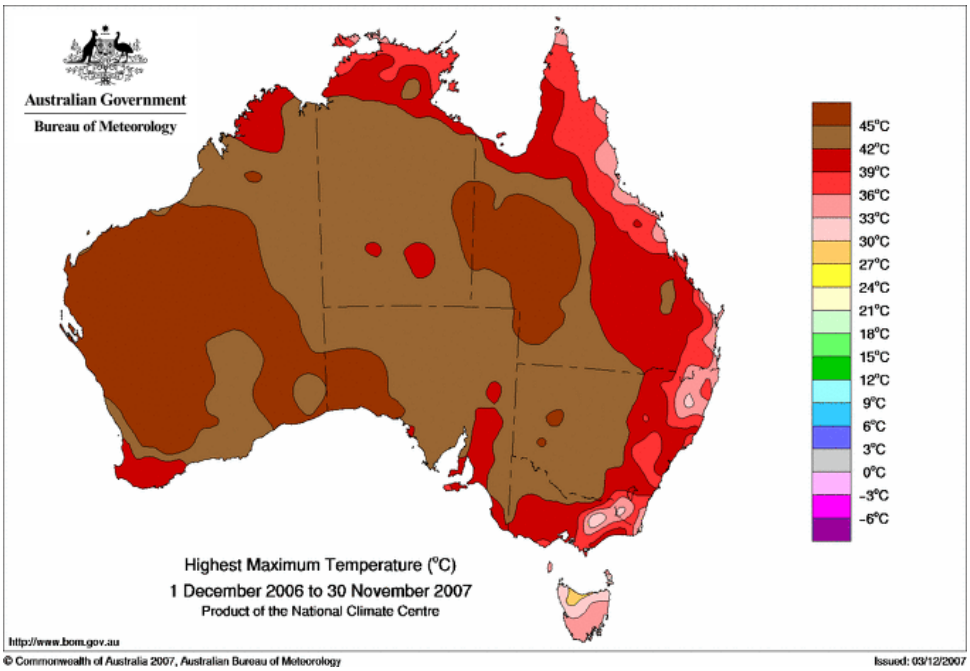


Temperature patterns (ref www.bom.gov.au)

Minimum temperatures



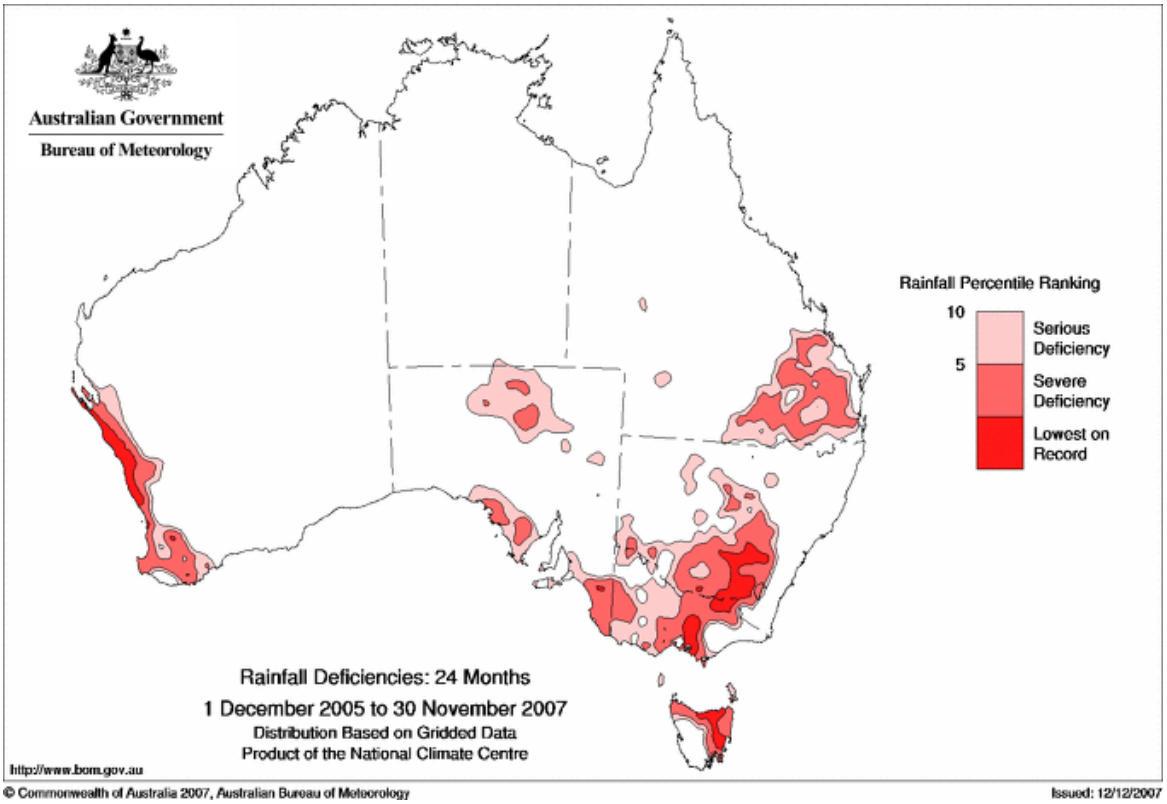
Maximum temperatures



Drought effects (ref www.bom.gov.au)

Drought – A Definition

- *Persistent high pressure over most of Australia leads to low and often erratic rainfall. Drought tends to occur when the high pressure systems are more extensive than usual, excluding rain-bearing systems for lengthy periods of time.*
(Bom)



3. CLOSING THOUGHTS

A number of practitioners in Australia are starting to question the need to routinely manage wet weather skid resistance across their entire road network, favouring an approach that focuses upon the management of obvious poor pavement condition with respect to skid resistance (such as extensive flushing and bleeding) and/or being aware of the implications of rainfall events immediately after long, dry spells of weather.

In addition, it has been argued by some that conducting widespread routine testing is only truly applicable in coastal, urban areas within Australia, and even given this, such a strategy will typically involve the use of large quantities of town water. Testing in such areas, and rural, drought affected areas where the most severe water usage restrictions are often in place, can also show a lack of sensitivity to local community issues and thus invite adverse (often political) comment.

Notwithstanding the above, the classic sinusoidal curve of skid resistance variation has historically shaped, and continues to influence the management of skid resistance in some states. In instances where the curve has been believed to be too simplistic and/or inappropriate, it is often the case that average annual rainfall has emerged as one factor in selecting lengths of road to receive routine skid resistance monitoring.

The objective of this paper, and its accompanying MS Powerpoint presentation has been to provide an awareness of Australian conditions and emerging contemporary issues, rather than to provide any ‘one size fits all’ answer to these issues. It is expected that Austroads documentation scheduled for release in 2009 will provide contemporary help to practitioners.

The views expressed within this paper are those of the author and do not necessarily reflect the views of the ARRB Group.

Whilst every effort has been made to ensure that the material presented in this paper is relevant, accurate and up-to-date, the author cannot accept any liability for any error or omission.

© ARRB Group, 2008

Paul Hillier, BEng (Hons) IEng ADoBM AMICE MIHT MIPWEA MREAAA
Discipline Leader (Road Safety and Traffic), ARRB Group

Paul specialises in incident investigations; highway management and risk management matters. He provides technical input to commissions for a wide range of public & private sector clients in Australia, NZ, UK, the Middle East and Asia. Prior to joining ARRB, he gained experience working with TRL Limited, and in various roles in the road management team of a large UK road authority. He was the Lead Author on the Austroads Guide to the management of road surface skid resistance (Jan 2005) and is currently engaged on various Austroads research into skid resistance and surface texture related issues.

Postal Address:
ARRB Group (Sydney) – Ground Floor, 2-14 Mountain Street, Ultimo, NSW 2007

E-mail: paul.hillier@arrb.com.au

- Website: www.arrb.com.au