ON-BOARD MASS TECHNOLOGY POLICY FRAMEWORK

DRAFT POSITION PAPER

June 2010

Prepared by

National Transport Commission

National Transport Commission

On-Board Mass Technology Policy Framework Draft Position Paper

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REPORT OUTLINE

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Type of report:	Draft Position Paper
Objectives:	To address policy implications for the emerging use and availability of on-board mass measurement technology for heavy vehicles. To develop options and recommendations for how policy may be developed to support agreed transport objectives. To provide an opportunity for public input and feedback
NTC Programs:	Heavy vehicle access
Key Milestones:	Final policy framework proposal to ATC for approval.
Abstract:	This paper discusses options for an on-board mass policy framework, an emerging technology with potential implications for heavy vehicle mass compliance and pricing policy. The paper is intended to stimulate discussion and the submission of more detailed evidence that may support the formation of evidence-based on-board mass policy.
Purpose:	For comment.
Key words:	On-board mass monitoring, mass compliance, heavy vehicle pricing, NHVAS Mass Management module.
Comments by:	21 July 2010.
Comments to be addressed to:	Chief Executive National Transport Commission L15/628 Bourke Street MELBOURNE VIC 3000 Telephone: (03) 9236 5000 Facsimile: (03) 9642 8922 Email: ntc@ntc.gov.au Website: www.ntc.gov.au

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FOREWORD

The National Transport Commission (NTC) is an independent body established under Commonwealth legislation and an Inter-Governmental Agreement and is funded jointly by the Commonwealth, states and territories. The NTC has an on-going responsibility to develop, monitor, maintain and review uniform or nationally consistent regulatory and operational reforms relating to road, rail and intermodal transport.

The Commonwealth Government requested the NTC to develop a policy framework regarding the use of on-board mass monitoring technology in the heavy vehicle transport sector. This work has been guided by the Strategic Research and Technology Working Group's (ASTART) policy framework for technological innovation in the transport sector[1], as well as the Draft National In-Vehicle Telematics Strategy: The Road Freight Sector, which is currently being developed by the NTC.

In its policy framework paper, ASTART stated that:

"The creation of a national technological innovation framework should encourage a move away from technology-led policy and towards policy-led innovation. The clarification of policy objectives will lead to the development of a wide range of commercial solutions to support the achievement of national policy objectives."

Technology itself should not be a driver of transport policy. Rather, it may present opportunities to further contribute to the achievement of transport policy objectives. This paper seeks to explore those opportunities in the context of mass compliance.

NTC is seeking public comment on the content and recommendations in this position paper. Public submissions will be made available on the NTC website (www.ntc.gov.au) and considered in developing the final proposal for ATC to consider.

I acknowledge the work of NTC staff in developing this report, particularly Julian Del Beato and George Konstandakos.

Greg Martin

Chairman

[1] ATC Strategic Research and Technology Working Group, *Harnessing the power of technology for Australian transportation reform*, September 2009 (unpublished, approved by ATC on 6 November 2009).

SUMMARY

The Commonwealth Government requested the NTC to develop a policy proposal for the use of on-board mass monitoring technology. Although the original request was made in response to a more robust means of managing compliance under the Higher Mass Limits (HML) scheme, it is clear that regulatory interest in on-board mass technology extends to the broader regulation of heavy vehicles.

The draft policy for on-board mass technology has been informed by the development of a broader Draft National In-Vehicle Telematics Strategy: The Road Freight Sector and national policy objectives endorsed by ATC in 2009, through ASTART. The Draft National In-Vehicle Telematics Strategy: The Road Freight Sector will seek to encourage the wider take-up of technology to support national transport policy objectives (refer to Appendix A).

Table 1. Australian transport objectives for technology innovation in the transport sector

<table>
<tr><td colspan="4">ATC objectives for technology innovation in the transport sector:

1. Technological application and innovation to be policy led where possible.

2. Technology needs to support the implementation of the ATC's key policy directions with reference to the work agendas of SCOT’s Standing Sub-Committees.

3. Systems architecture and communications standards need to be the preferred approach to achieve inter-operability ahead of a product standards approach.

4. The way forward requires input, support and cooperation between government policy makers, technology providers and technology users.</td></tr>
<tr><td colspan="4">DRAFT NATIONAL IN-VEHICLE TELEMATICS STRATEGY: THE ROAD FREIGHT SECTOR

(an agreed national vision and strategy for the use of in-vehicle telematics)</td></tr>
<tr><td>On-Board Mass technology policy</td><td>Electronic Work Diary policy</td><td>Speed policy</td><td>Business transactions</td></tr>
</table>

On-board mass measurement refers to a means of measuring the mass of a given heavy vehicle with equipment affixed to the vehicle. While such equipment has been available for some years, it has matured in its accuracy, reliability, proliferation and acceptance amongst heavy vehicle operators.

In this draft position paper, the use of on-board mass technology has been reviewed in two main areas:

- as a means of improving mass compliance; and
- as a potential future technology option to support the Council of Australian Governments (COAG) Road Reform Plan (CRRP) for heavy vehicle pricing.

On-board mass technology can be used as a means of managing the risk of overloading (non-compliance with mass limits). Overloading can increase the cost of road

infrastructure maintenance by increasing the rate of wear and damage to pavements and bridges.

The additional costs imposed by overloaded vehicles are subsidised by the majority of compliant heavy vehicle transport sector. Overloading may also reduce road safety levels by making heavy vehicles less stable and reducing their braking effectiveness (causing them to take longer to stop).

Reduced confidence in mass compliance may have limited the extent of road network access for higher productivity vehicles.

Looking forward, on-board mass technology has the potential to support heavy vehicle pricing reform options being developed by the COAG Road Reform Plan.

The NTC sought the views of a range of industry members and regulators. Existing regulatory arrangements for managing mass compliance were also reviewed.

Evidence has not yet been identified to suggest that overloading is occurring on a scale to justify any substantial interventionist approach by governments. Rather, the evidence suggests that Chain of Responsibility reform and National Heavy Vehicle Accreditation Scheme mass management have improved mass compliance. On-board mass technology fitted to heavy vehicles voluntarily is playing an important role in supporting those reforms.

A summary of the options which were considered in developing a national on-board mass compliance policy are detailed in Table 2 below.

Table 2. Summary of options for on-board mass compliance policy

OPTION	Summary
Business as usual	Improved levels of mass compliance through continued incremental implementation and improvement of current measures and regulations.
	Recognising the continued use of on-board mass technology as a general (voluntary) compliance aid.
REGULATORY OPTIONS	
Transport operations assessed as involving a high risk of mass compliance	Potential for requiring certified on-board mass monitoring equipment to be fitted, where there is a need for additional regulatory scrutiny (e.g. repeat overloading offenders and the protection of highly vulnerable assets).
As an alternative to "paper-based" compliance	Certified on-board mass monitoring equipment as a possible voluntary, "electronic alternative" to the National Heavy Vehicle Accreditation Scheme Mass Management module.
Formalising the role and value of on-board mass technology in meeting compliance obligations	Option to develop guidance for industry on how on-board mass technology may be utilised in taking "reasonable steps" under Chain of Responsibility, such as under a code of practice.

Consultation with government and industry members on their early experience with the Chain of Responsibility approach has suggested that it has been effective in encouraging transport industry members to develop improved compliance management systems. It is through industry-developed compliance management systems, rather than a mandated approach by government, that the utilisation of on-board mass technology is expected to be of greatest value, and experience the highest growth.

Other potential applications for on-board mass systems may exist as part of the COAG Road Reform Plan heavy vehicle pricing feasibility study. This may require an accurate and robust certified mass measurement as well as more flexible mass compliance regulations to improve productivity. The following options to support pricing reform have been identified:

Option 1: low volume technology trials to inform COAG Road Reform Plan policy development.

Option 2: await outcomes of the COAG Road Reform Plan feasibility study before proceeding with any implementation of certified on-board mass monitoring technology.

On the basis that implementation would initially be at low volumes or for trial purposes, option 1 is supported.

In summary, NTC supports the voluntary take-up of certified and uncertified on-board mass technology to achieve transport policy objectives. Mandated fitment of certified on-board mass technology may be warranted where there is a significant compliance risk.

Some discussion has been included on how ATC endorsed policy principles for the development of transport technology standards may be applied to those for on-board mass technology. That framework cautioned on the risk of regulatory technical product standards impeding technological innovation. The issue of technology certification and the role of the Intelligent Access Program has been explored as part of NTC's Draft National In-Vehicle Telematics Strategy: The Road Freight Sector.

Following further consultation, the NTC will develop and submit an on-board mass policy framework proposal to ATC for voting. Feedback on this draft position paper is welcomed.

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1. BACKGROUND

The Commonwealth Government requested the NTC to develop a policy proposal for the use of on-board mass monitoring technology on heavy vehicles. This request followed from a Bilateral Agreement between New South Wales and Queensland to fund the extension of Higher Mass Limits road networks in these states. To support this, the Commonwealth agreed to *"provide funding to the NTC and/or Transport Certification Australia Limited, as appropriate, to accelerate this process with the view to ensuring that both route access and mass compliance can be accurately monitored and regulatory breaches enforced"*[2].

While on-board mass technology has been available for some years, it has matured in its accuracy, reliability, proliferation and acceptance amongst heavy vehicle operators.

In 1998, Australian Transport Council (ATC) approved the Higher Mass Limits policy[3], which provided increased axle mass limits for heavy vehicles. These increases were allowed under the following conditions:

- adherence to route restrictions;
- apply only to axle groups fitted with road friendly suspension; and
- require operators to be accredited to the National Heavy Vehicle Accreditation Scheme Mass Management module.

Some governments have raised concerns in relation to industry compliance with these conditions, in particular the adherence to mass limits on approved routes. From 2009, NSW and Queensland have required that heavy vehicles operating at Higher Mass Limits be fitted with location tracking devices certified under the Intelligence Access Program. Enhanced functionality would be drawn from the ability to also monitor the mass of a heavy vehicle.

In addition to heavy vehicles operating under the Higher Mass Limits scheme, it is likely that such a technology may be considered for the regulation of mass limits applying under other heavy vehicle schemes and operations.

In 2007, the Council of Australian Governments (COAG) agreed to a Road Reform Plan with the objective of promoting a more efficient, productive and sustainable provision of, and use of, heavy freight infrastructure. The project includes a feasibility study into a direct heavy vehicle charging arrangement, including incremental charging and mass distance location (MDL) charging. The development and availability of on-board mass technology has potential implications for how heavy vehicle mass data may be collected, under any arrangement that required this type of data.

As part of a separate project and at the request of ATC, the NTC has prepared advice for the future direction of in-vehicle telematics. Policy for the specific application of on-board

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[2] *Implementation of the AusLink National Land Transport Plan, Bilateral Agreement Between the Commonwealth of Australia and the State of New South Wales 2004 – 2009*, http://www.infrastructure.gov.au/transport/publications/files/NSW_Bilateral.pdf.

[3] National Transport Commission, *Higher Mass Limits*, available at http://www.ntc.gov.au/viewpage.aspx?AreaId=37&DocumentId=1806, last accessed 21 October 2009.

mass technology will draw from this strategy for the regulation of broader in-vehicle technology, including telematics.

2. PURPOSE AND SCOPE

The NTC has been asked to develop a policy framework for on-board mass technology. In doing so, ”problems” have been identified for which on-board mass technology may actually serve as a solution, have been identified.

Although the NTC was asked to develop policy for on-board mass technology to support compliance with conditions of the Higher Mass Limits scheme, it is clear that its application in heavy vehicle regulation may extend more broadly. This includes as a mass compliance tool for alternative heavy vehicle access schemes and potentially as an enabler for heavy vehicle pricing reform.

As noted by the NTC in providing advice to ATC on a National Transport Policy Framework[4]:

“Technology will play a critical role in addressing Australia’s national transport challenges. While intelligent transport systems are being used, the divide between technology development and policy development needs to be bridged.”

Technology itself is not a driver of transport policy. Rather, supported by the development of appropriate policy, it presents opportunities to further contribute to meeting transport policy objectives.

The NTC is currently developing a Draft National In-Vehicle Telematics Strategy: The Road Freight Sector. The strategy will articulate a vision for greater uptake of in-vehicle telematics by the road freight sector, in a manner that supports transport policy objectives. Policy for telematics systems has advocated enabling greater rates of uptake through measures for improved interoperability, such as encouraging a common systems architecture platform and integrated on-board telematics units[5]. This has important implications for the range of “plug in” in-vehicle technologies, including on-board mass systems.

From the current circumstance in which in-vehicle technologies are mostly “stand-alone” systems, the capability to communicate a range of data to third parties has potential benefits and implications for both the transport industry, as well as regulators. Accordingly, in this paper, a distinction has been drawn between on-board mass *measurement* and *monitoring*:

- *on-board mass measurement* refers to a means of measuring the mass of a given heavy vehicle with equipment affixed to the vehicle; while
- *on-board mass monitoring* refers to on-board mass measurement in a form that includes a means of telecommunicating measured mass data to a third party.

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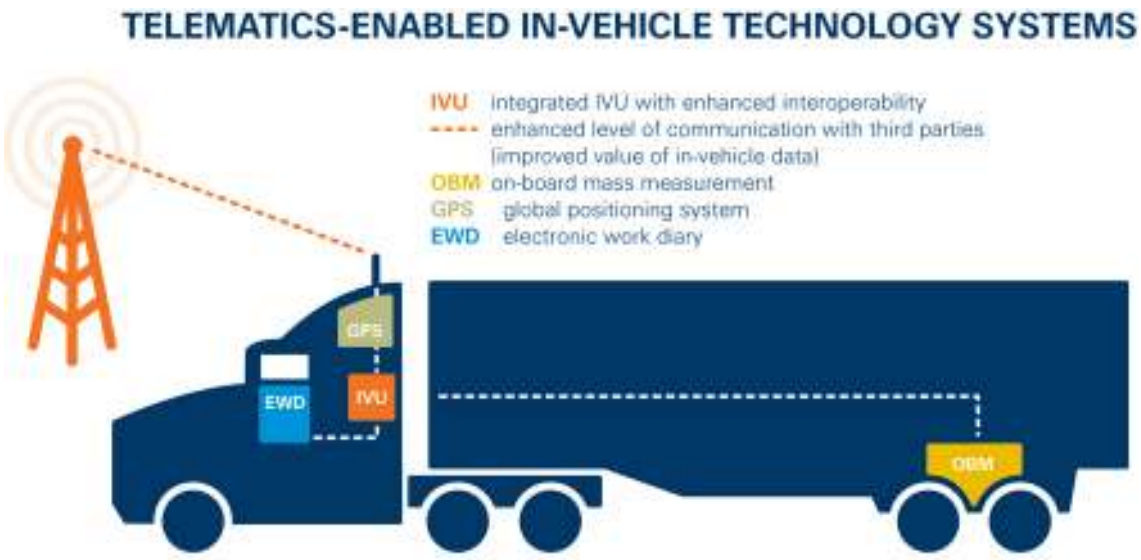
[4] National Transport Policy Framework, A New Beginning (Volume 2), available at http://www.ntc.gov.au/filemedia/Publications/NationalTransportPlanVol2Mar2008.pdf, p.89, last checked 18 February 2010.

[5] ATC Strategic Research and Technology Working Group, *Harnessing the power of technology for Australian transportation reform*, September 2009 (unpublished, approved by ATC on 6 November 2009).

This is illustrated in Figure 1 and Figure 2.

Figure 1. Current use of in-vehicle technology

Figure 2. Impact of enhanced uptake of and more interoperable telematics systems.



The on-board mass policy framework is therefore guided by the Draft National In-Vehicle Telematics Strategy: The Road Freight Sector, but will address policy matters specifically relevant to the use of on-board mass technology (refer to Table 3).

Table 3. Role of the Draft National In-Vehicle Telematics Strategy: The Road Freight Sector and supporting national policies

DRAFT NATIONAL IN-VEHICLE TELEMATICS STRATEGY: THE ROAD FREIGHT SECTOR (an agreed national vision and strategy for the use of in-vehicle telematics)			
On-Board Mass technology policy	Electronic Work Diary policy	Speed policy	Business transactions

Through a process of consultation with policy makers, industry members and the public, the NTC will develop a policy proposal for submission to the ATC. The policy proposal will include clarification for the role of on-board mass technology, including an assessment against other (non on-board mass technology) options.

This position paper outlines preliminary findings in the process of developing the policy framework. It is circulated for the purpose of presenting NTC's initial findings, inviting comments, gathering further information and feedback from all interested parties.

3. PROBLEM STATEMENT

In developing policy for on-board mass technology, it is necessary to define what underlying problems exist that the technology may help to resolve.

3.1 Impact on road infrastructure

The loading above axle mass limits (or overloading) can cause increased wear and damage to road infrastructure, particularly to pavements and bridges. This results in increased costs to road maintenance and repair.

As higher road freight costs are passed along the supply chain, overloading increases the cost of consumer goods and services to the community transported by heavy vehicles, resulting in higher prices for consumers.

This is inconsistent with the following ATC Transport Policy[6] objectives :

- To promote the efficient movement of people and goods in order to support sustainable economic development and prosperity.
- Transparency in funding and charging.

3.1.1 Overloading under the Higher Mass Limits scheme

The Higher Mass Limits scheme provides increased axle mass limits for heavy vehicles that meet certain conditions. One condition is that when operating at increased axle mass limits, vehicles must adhere to route restrictions, i.e. roads assessed as structurally capable

[6] ATC Joint Communiqué, available at http://www.atcouncil.gov.au/communique/files/27thATC-Communique.pdf, p.7, 2 May 2008.

of supporting them. This adds a degree of complexity to the Higher Mass Limits scheme, not applicable to most other heavy vehicle access arrangements.

The Higher Mass Limits scheme imposes a number of conditions on participants. In this report, the following conditions related to mass compliance are relevant:

- adherence to route conditions while operating at Higher Mass Limits (i.e. operating above the default mass limit, but below the Higher Mass Limit on an approved Higher Mass Limits route); and
- overloading above Higher Mass Limits (on any route).

Some governments have raised concerns in relation to industry compliance with mass limits on approved Higher Mass Limits routes. Some of the government concerns raised include:

- reduced likelihood of trucks being intercepted by enforcement officers due to factors such as the growing freight task and limited number of enforcement resources;
- the difficulty in detecting mass and route non-compliance of Higher Mass Limits operators. For example, non-compliance with Higher Mass Limits route may only occur during the first and last mile of the trip which usually represents a small portion of the overall trip; and
- the lack of visual cues for detecting non-compliance with Higher Mass Limits conditions. For example a B-double or a heavy mobile crane operating "off route" is easier to identify than a truck operating at Higher Mass Limits with no obvious visual cues that would assist in its detection.

It should be noted that the impact of overloading applies to all heavy vehicles, regardless of which regulatory scheme they may be operating under. The compliance risk of heavy vehicles operating under the Higher Mass Limits scheme and the need for regulatory countermeasures must be assessed in this broader context, i.e. relative to the risk and need for countermeasures applying to other schemes and arrangements.

3.1.2 Overloading under alternative heavy vehicle access arrangements

Although the motivation for investigating on-board mass technology was to achieve improved compliance for the Higher Mass Limits scheme, it is clear from discussions with regulators that there may also be an interest for this technology to support wider mass compliance under alternative heavy vehicle schemes and arrangements.

There is a wide range of heavy vehicle access schemes and types of heavy vehicle transport operating in Australia. Overloading would have a similar effect to that described above for heavy vehicles operating under the Higher Mass Limits scheme.

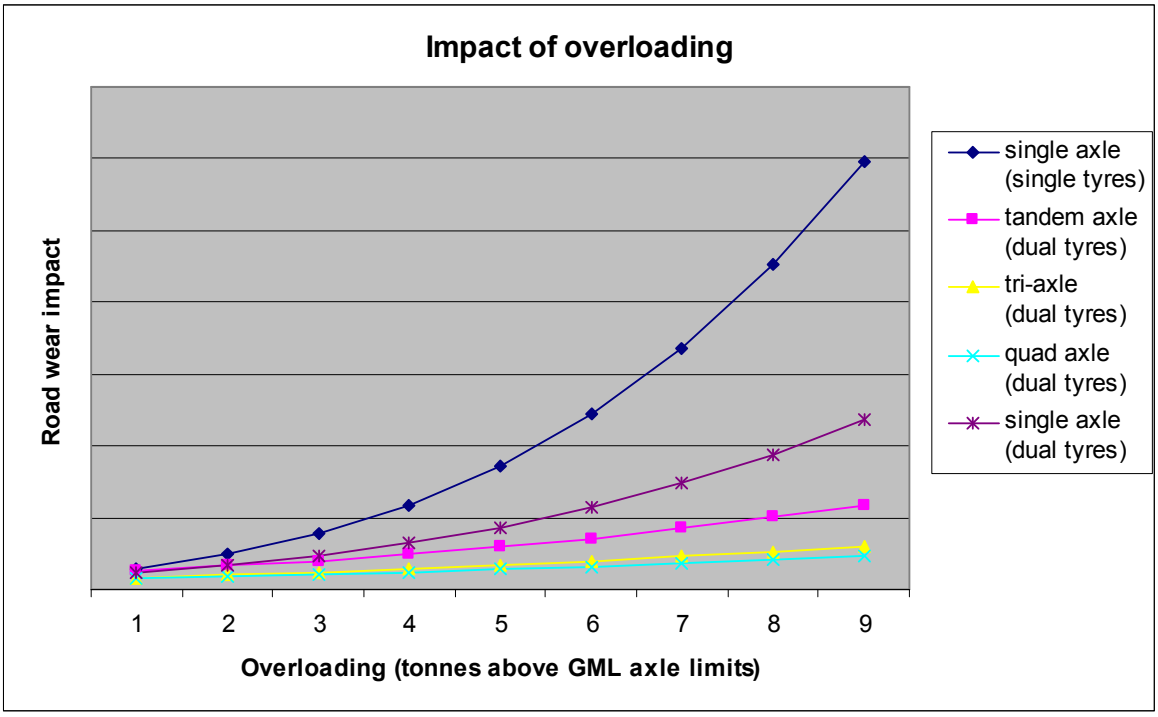
The degree of mass compliance may vary according to different factors. To assess how on-board mass technology may be utilised to help minimise wear and damage to road infrastructure, it is necessary to firstly analyse the nature and extent of the problem.

3.1.3 Measuring the impact of overloading

Overloading is a term generically used to describe any load above the legal limit. Heavy vehicle mass limits have been historically set at "reasonable" levels as determined by infrastructure experts. However, as shown in Figure 3, the impact of overloading varies

significantly, with severe overloading having a much more significant effect on pavement wear than minor overloads.

Figure 3. Impact of overloading by excess mass and axle group configuration



Degrees of overloading have already been addressed under the *Road Transport Reform (Compliance and Enforcement) Bill*[7], which categorises mass breaches as:

- exceeding a mass limit (*minor breach*);
- a *substantial risk breach*, where the breach exceeds the greater of five percent of the mass limit or 0.5 tonnes; and
- a *severe risk breach*, where the breach exceeds twenty percent of the mass limit.

In addressing the objective of *minimising wear and damage to road infrastructure*, it is clear that minimising the prevalence of severe and substantial overloading is a high priority.

3.1.4 Prevalence of overloading

In regard to overloading, there is evidence that significant cultural change has occurred across much of the transport and logistics industry. Industry and governments have largely put this down to the implementation of Chain of Responsibility legislation, which places the responsibility for compliance on the broader transport and logistics industry.

[7] National Transport Commission, *National Transport Commission (Road Transport Legislation - Compliance and Enforcement Regulations) Regulations 2006*, available at http://www.comlaw.gov.au/comlaw/management.nsf/lookupindexpagesbyid/IP200613175?OpenDocument, last checked 24 October 2009.

In order to accurately assess the level of industry compliance with mass limits, the NTC will be reviewing historical and current Weigh in Motion (WIM) data. The NTC is also seeking more detailed enforcement data to support an analysis of mass compliance.

Table 4 provides a summary of load data based on weigh-in-motion data from six jurisdictions, collected during 1998, 1999 and 2000 (note: the data was derived from a July 2005 NTC Information Paper: *Review of Heavy Vehicle Axle Data*, available on www.ntc.gov.au). Updated data collected in 2007 is currently being reviewed to evaluate the trend.

Table 4. Load data based on weigh-in-motion data

NTC REVIEW OF 1998~2000 HEAVY VEHICLE AXLE LOAD DATA (2005)			
Degree of overloading	Axle group		
	Steer	Drive	Trailer
Minor breach	2.3%	1.5%	1.4%
Substantial breach	3.1%	1.2%	1.1%
Severe breach	0.8%	0.2%	0.1%
Under limit	93.7%	97.1%	97.4%

In consulting with regulators, different views on the general level of compliance have been presented. Most regulators have reported that Chain of Responsibility legislation has driven significant improvements in compliance levels. Nevertheless, there remains scope for further improvement, particularly for transport and logistics industry members not highly integrated within the chain of responsibility.

Industry members have reported to the NTC that minor overloading often occurs while attempting to maximise payloads. This may lead to *inadvertent overloading*, when a heavy vehicle has exceeded prescribed mass limits, but a party liable for its compliance had intended for it to be compliant. An example of inadvertent overloading is when a compliant load shifts during transport, resulting in one axle group being overloaded.

On the other hand, payload maximisation may be undertaken by *deliberate overloading*, which occurs when a liable party is aware that a heavy vehicle is overloaded. Both inadvertent and deliberate cases of overloading constitute breaches of transport law. However, in any resulting prosecution, the intent of the liable party would be taken into account. Typically, cases of inadvertent overloading are of a lower magnitude (measured by how much the mass limit was exceeded) than deliberate overloads.

In assessing the prevalence or frequency of overloading, these distinctions are important. As suggested by industry members, previous studies[8] have found that severe overloading is far less prevalent than minor overloading.

[8] For example a 1998 study by the National Road Transport Commission, *Incidence of Grossly Overloaded Heavy Vehicles (Technical Working Paper No. 32)*, found that under 2 percent of trucks were overloaded by more than 5 and 17 percent of their allowable gross mass in urban and rural environments, respectively. It is likely that these rates have since fallen, since the introduction of reforms such as Chain of Responsibility.

Question for comment

Would the technology most appropriately be utilised as a compliance aid for more precise loading (i.e. minimising minor, often inadvertent overloading) or the detection of more severe (and deliberate) overloading?

3.1.5 At-risk industry segments

Patterns and the risk of overloading are not uniform. It is therefore useful to consider which segments of the heavy vehicle transport industry are most at risk of overloading. Identifying at-risk areas of the industry may facilitate a more meaningful analysis of how on-board mass technology may be appropriately utilised as an effective means of minimising overloading.

Fundamentally, mass constrained operators, i.e. those for whom payloads are (frequently) limited by legal axle mass limits, represent the highest risk. But within this group, the risk varies significantly. One significant factor is when operators are involved in *uncontrolled loading*, referred to here as loading for which the ability to accurately measure payload mass is compromised.

A common example of uncontrolled loading, where there is limited access to practical weighing equipment, is the loading of bulk commodities such as grain.

Case study: Grain transport

In December 2009, representatives from the NTC visited a number of sites and spoke with industry members involved with the harvest, storage, handling and transport of grain. These visits took place during the grain harvest period, in the Wimmera region of Victoria. They were arranged by the Victorian Farmers Federation, whose assistance is acknowledged.

The first phase of grain transport is from the farm to a storage facility. Loading trucks on farms in a compliant manner is a challenging aspect of grain transport. Farms are almost never equipped with weighbridges. The principal means of controlling mass compliance is therefore one of two methods: some form of truck on-board mass measurement and/or experience and knowledge of the truck driver.

In applicable states and territories, in order to qualify for Higher Mass Limits, most operators engaged in grain transport are accredited to the National Heavy Vehicle Accreditation Scheme. Such accreditation is only feasible if an operator's trucks are equipped with a means of on-board mass measurement, most commonly air pressure gauges from which readings are interpolated to determine axle masses.

Without any means of on-board mass measurement, truck operators must utilise their judgement and experience in loading within mass limits. When transporting grain off a farm during harvest, numerous trips may be necessary. Weighbridge measurements taken at the drop-off point (grain storage facility) provide an operator with feedback, enabling them to gradually increase the load on each subsequent trip (measured visually, i.e. from the top of the trailer) until it approaches legal limits.

Even when utilising on-board mass measurement, a truck operator must still exercise judgement to ensure the grain is loaded within mass limits. For example, when the truck is positioned on uneven or soft ground, the accuracy of on-board mass measurements may be reduced.

There are a couple of particular challenges with loading and transporting grain. Firstly, the density of grain varies with the variety and moisture content. Whilst this has little impact on a loading method utilising on-board mass measurement, it increases the degree of difficulty for loading methods reliant on the driver's judgement and experience.

Secondly, as a bulk commodity, grain is prone to shifting its position within a trailer under acceleration, in both the fore and aft directions. This may occur under braking and while ascending or descending a hill. Whilst load shift will not cause the gross vehicle mass limit to be exceeded, it may cause an axle group to be overloaded.

The simplest means of complying with mass limits is to load conservatively. However, there is a strong commercial incentive for grain transporters to maximise their payload. In practice, grain transporters aim to load their vehicles as close to legal mass limits as possible.

This case study has considered the practicalities of loading grain, for operators who intend to comply with mass limits. It is apparent that on-board mass measurement technology is useful in reducing the risk of inadvertent, minor overloads. However, as illustrated in Figure 4 on p.13, compliance is not automatically the objective of all operators. It is clear that significantly greater gains, by reducing the frequency of severe overloading, have been achieved through the introduction of Chain of Responsibility legislation.

The above case study on grain transport describes some of the practical difficulties in attempting to maximise payload while not breaching mass limits. Grain operators have reported to the NTC that this practice may result in the occasional minor overloads.

However, such difficulties do not explain overloading of greater severity. An important risk factor for more severe (deliberate) overloading is the perceived risk of detection. Where this is low, the temptation to overload is greater. More discussion on the nature of this risk is discussed below in the section 3.1.6 (Effectiveness of current regulatory measures*)*.

On the other hand, many types of transport involve more controlled loading, such as where there is access to a weighbridge, where the load is of a determinable mass (e.g. cartons of beer) or where on-board mass technology is fitted to the vehicle. The case study on Australia Post discusses a transport operation for which the degree of control of overloading has been maximised by developing a robust mass management system.

Case study: Australia Post

In the 2008/09 financial year, Australia Post handled over five billion mail articles and provided a delivery service to over ten million delivery points[9]. At various points of handling, mail articles are transported by heavy vehicles, the majority of which are owned and operated by Australia Post. Some mail is contracted to hire-and-reward heavy vehicle operators.

In managing its mass compliance, Australia Post implemented policies and procedures that apply to its self-managed resources and to a lesser extent, external customers.

[9] Australia Post, *Australia Post – the statistics for the year ended 30 June 2009*, available at http://www.auspost.com.au/annualreport2009/pdfs/Australia_Post_Statistics.pdf, last checked 24 October 2009.

To move mail articles from their acceptance to delivery point in a cost effective and timely manner, Australia Post operates a 'hub and spoke' network of mail distribution centres, general and local post offices. Postal articles transported by heavy vehicles are contained in Unit Load Devices.

Unit Load Devices manage the distribution of bulk mail products, and assist with mass compliance. Australia Post requires all Unit Load Devices to be weighed prior to being presented for carriage on a heavy vehicle. The weight must then be clearly printed on the Unit Load Device label.

Each heavy vehicle type is assessed for how Unit Load Devices can be loaded in a configuration that complies with all associated mass limits. Australia Post has produced guides that are available on each truck and at all company operated loading points. The truck driver must ensure the loading configuration is adhered to, and it is the responsibility of the 'consignor' to ensure each Unit Load Device has been accurately weighed and labelled.

Australia Post drivers must not accept Unit Load Devices that have not been weighed and labelled by the 'consignor'. The role of 'consignor' may be assumed by Australia Post distribution centres, as well as external customers, such as bulk mailing houses. All 'consignors' are responsible for declaring the weight of all Unit Load Devices that they present for transport. In practice, this is usually achieved with the assistance of a forklift fitted with scales. Some Australia Post facilities are also equipped with fixed weighbridges that are used to verify the mass of heavy vehicles.

Where the transport of postal items has been contracted to a hire-and-reward operator, Australia Post clearly identifies the weights of each individual Unit Load Device presented to the contractor's driver. The responsibility for ensuring the contractor's heavy vehicle is loaded in a compliant manner then lies with the driver.

To support their mass management program Australia Post has a multi-level compliance audit program including auditor visits to postal facilities and checks for policy compliance in all areas.

By implementing a number of measures over and above the minimum requirements of transport law, Australia Post has effectively minimised the risk of overloading. However, not all transport operators are in a position to develop and implement a mass management system on this scale. Therefore, the ability of transport operators to manage their compliance is an important risk factor.

Separate to any deliberate non-compliance, regulators have stated that more proficient operators are able to limit overloading with effective internal management systems. Conversely, less proficient operators may be more prone to engage in overloading.

A track record of non-compliance is a clear indicator that an operator represents an elevated mass compliance risk.

3.1.6 Effectiveness of current regulatory measures

Question for comment

How may on-board mass technology contribute to minimising wear and damage to road infrastructure, beyond the capability and effectiveness of existing regulatory arrangements?

Aside from the determination of appropriate mass limits and heavy vehicle access arrangements, regulatory measures to minimise wear and damage to road infrastructure amount to encouraging compliance with mass regulations. Their effectiveness is discussed in this section and is important in identifying the means and extent to which on-board mass technology may be used to supplement existing arrangements.

3.1.6.1 On-road enforcement

In its simplest and most common form, enforcement is conducted by on-road interception. Heavy vehicles may be pulled over by mobile enforcement officers and weighed with portable scales. Additionally, they may be diverted into roadside areas featuring fixed weighing stations.

On-road enforcement is conducted by authorised road agency and police officers. Checks may be conducted in a random manner, but increasingly, checks are more targeted.

Operators detected not complying with mass limits may be subjected to sanctions and penalties. Random and targeted on-road enforcement provides a disincentive for operators to overload their vehicles. However, this is only effective when the risk of detection and sanctions are perceived as being greater than the financial benefit derived from overloading.

Regulators have emphasised the need for a compliance strategy capable of sustaining itself under projections of strong growth in the freight task. Enforcement agencies have reported that the deterrent posed by roadside enforcement has progressively diminished, as enforcement agencies struggle to keep pace with the growing freight task and volume of trucks on the road.

Additionally and as discussed in the section 3.1.1 Overloading under the Higher Mass Limits scheme, detection of mass breaches via on-road enforcement is often more difficult for heavy vehicles operating under Higher Mass Limits. Therefore the reliance of conventional, roadside enforcement alone may be insufficient.

However, intelligence obtained from on-road enforcement is a vital component of the other compliance schemes and legislation (i.e. National Heavy Vehicle Accreditation Scheme and Chain of Responsibility). It therefore continues to play an important part in managing compliance levels.

In 2010, the NTC is scheduled to undertake a project to develop a national transport compliance strategy.

3.1.6.2 Chain of Responsibility

Consultation with government and industry members has revealed that the Chain of Responsibility legislation has supported significant improvements in mass compliance across the transport industry.

Part of the Road Transport Reform (Compliance and Enforcement) Bill, approved as model legislation in 2007, Chain of Responsibility legislation extends liability for compliance with various types of transport regulations, including mass limits, beyond just the heavy vehicle driver or operator. Under Chain of Responsibility, all parties having influence over how a heavy vehicle is loaded are, to varying degrees, liable for its compliance.

A key objective of the legislation is to reduce the incidences of parties, not previously liable for their actions, placing pressure on heavy vehicle drivers and operators to breach areas of transport legislation (including mass limits). In fact, the legislation requires such parties to take reasonable steps to ensure transport operators are complying with transport regulations.

To date, New South Wales, Victoria, Queensland, the Australian Capital Territory, Tasmania and South Australia have implemented the Bill. The legislation applies to how heavy vehicles are loaded, including compliance with mass limits, as well as a range of other heavy vehicle transport legislation such as fatigue management, the transportation of dangerous goods and speeding.

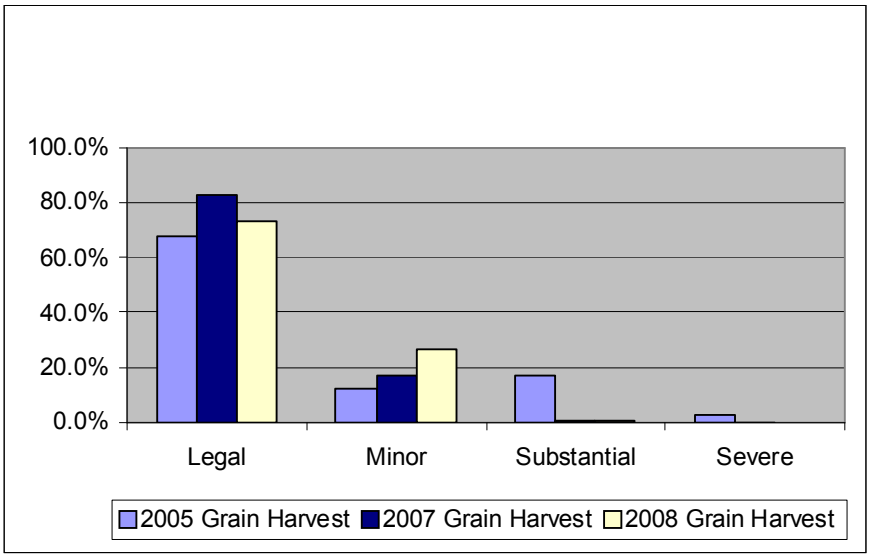
Previously, much of heavy vehicle transport law was practicably applied only to heavy vehicle drivers and operators. Chain of Responsibility explicitly extends the law to parties including consignors, consignees, packers, loaders and receivers of goods.

Since its introduction, a number of investigations and prosecutions have been made against companies alleged and/or found to have engaged in persistent offending. This has been significant in demonstrating to members of the transport industry that enforcement is no longer restricted to roadside detection, but that members may increasingly be held accountable not only for their compliance at a given point in time, but in the broader sense, over a period of time.

In response, many organisations who are parties in the chain of responsibility have introduced more robust policies and procedures aimed at demonstrating their compliance management. Perhaps more importantly, this has led to improved compliance practices.

This trend has particularly been observed with major transport customers who are engaged with a large number of second and third parties. They tend to have internal company policies and procedures that ensures that they only deal with connected parties who comply with the legal mass limits. Some operators have claimed that in this type of circumstance, breaching transport law would be impractical regardless of their own company's policies and attitudes.

Figure 4. Results from targeted overloading audits of grain harvest vehicles in NSW



An example of the effectiveness of the Chain of Responsibility can be shown in Figure 4, which details the results of overloading audits conducted on the NSW grain industry by the Roads and Traffic Authority over a four year period. Following introduction of the legislation and an investigation into mass compliance breaches, it is clear that compliance levels have improved significantly. These improvements are understood to have resulted from industry-wide changes to compliance management procedures and culture.

It should be noted that the flow-on benefits of Chain of Responsibility apply most directly to 'centralised' transport supply chains, i.e. where large organisation(s) with significant freight exposure have adopted robust compliance policies that have had a positive flow-on effect for other parties. On the other hand, this flow-on benefit would apply less to 'decentralised' transport supply chains.

3.1.6.3 National Heavy Vehicle Accreditation Scheme

For heavy vehicle access schemes in which there is deemed an elevated mass compliance risk, including Concessional and Higher Mass Limits, it is common for regulators to require operators to be accredited to the National Heavy Vehicle Accreditation Scheme Mass Management module.

The module requires participants to demonstrate adherence to an effective mass management system, tailored to the circumstances of each individual participant's transport operation. It recognises that the compliance task and risks vary between transport operations. This approach provides greater flexibility and supports more precise compliance risk management than do other regulatory schemes, such as uniform operating conditions attached to Higher Mass Limits.

A requirement of the scheme is that participants maintain an auditable set of records, detailing how their vehicles were loaded. Records must be kept for each vehicle under control of the accredited operator and for each loading event. A demonstrated ability to verify the mass of each load is a cornerstone of the scheme. At the discretion of enforcement officers, accredited operators are potentially subject to the same enforcement as non-accredited operators.

In regulatory terms, the major benefits of accreditation to the National Heavy Vehicle Accreditation Scheme Mass Management module are:

- to ensure that operators have developed and are utilising an effective system of managing their compliance with mass limits; and
- to provide regulators with a degree of confidence that accredited operators are managing mass compliance.

Discussions with regulators suggested that an important factor in the National Heavy Vehicle Accreditation Scheme serving as an incentive for transport operators to effectively manage their mass compliance is how effectively the scheme is administered by regulators themselves. If operators learn that regulators lack the resources to follow up identified non-compliance with mass limits or lapses in meeting audit schedules, the incentive to comply with their accreditation requirements is diminished.

There are also differing views on the extent to which the National Heavy Vehicle Accreditation Scheme serves as a means of compliance assurance. An obvious omission in the scheme is that there is no route compliance assurance element. NSW and Queensland have addressed this through the requirement of Intelligent Access Program (IAP) to ensure route compliance for Higher Mass Limits participants.

The need for a more robust accreditation scheme was considered as part of the Accreditation Policy Review[10]. It included recommendations to support that objective, approved by ATC.

In many respects, the National Heavy Vehicle Accreditation Scheme Mass Management module has similar objectives, albeit using different methods, to on-board mass monitoring technology. This is that they both encourage operators to proactively manage their mass compliance. In some cases, the only practical means of verifying loads, a prerequisite of accreditation to the National Heavy Vehicle Accreditation Scheme Mass Management module, may be to fit an on-board mass system to the vehicle.

At present, National Heavy Vehicle Accreditation Scheme Mass Management module is utilised primarily as an operating condition of national schemes, i.e. Concessional and Higher Mass Limits. Consultation has suggested that there is a reluctance amongst some regulators to accept an operator's accreditation as assurance of their compliance with mass regulations. This is reportedly due to factors such as the reliability of both National Heavy Vehicle Accreditation Scheme mass records and a perception that it provides them with poor 'visibility' of operators' compliance levels. For these reasons, there is a tendency for some regulators to view the scheme more as an operating condition than as a key means of managing mass compliance. Some regulators believe that automatic reporting of non-compliance using an on-board mass enabled Intelligent Access Program system would be more effective.

3.1.6.4 Restricted access to the road network under Higher Mass Limits

A frequent criticism from industry is that the Higher Mass Limits scheme has inadequate road network access in some states. Predominantly, such criticism has focussed on the lack of 'last mile' access, which refers to the difficulty operators have experienced in gaining

[10] National Transport Commission, *Accreditation Policy Review*, June 2009 (unpublished).

approval for access to the start and end points of their journey which are located off approved Higher Mass Limits routes.

In many cases, approval for such access is by negotiation with the relevant local government. It is a process that lacks both transparency and accountability. It may be likely that such applications are not viewed as high priority matters by many local governments. Additionally, it is understood that they often lack the technical expertise to properly assess such applications on their merits.

Some states have recognised that enforcement of 'last mile' access restrictions is often impractical and difficult to enforce. NSW and Queensland have included participation in the Intelligent Access Program as a condition of the Higher Mass Limits scheme. The addition of on-board mass functionality into Intelligent Access Program is seen as the next step in ensuring both Higher Mass Limits route and mass compliance.

However, there is a relationship between the extent of access and the level of compliance required. For example in Victoria, which has been able to provide extensive access to heavy vehicles operating under the Higher Mass Limits scheme, the risk of non-compliance has been judged as insufficient to require participation in the Intelligent Access Program.

It must be acknowledged that various constraints may inhibit governments from providing the full level of road network access desired by the transport and logistics industry. Nevertheless, it is clear that compliance levels are dependent not only on transport operator ethics and the level of enforcement, but also the effectiveness with which regulations have been developed and implemented. In the case of the Higher Mass Limits scheme, broader access and a more streamlined and transparent application process for access extensions would support improved compliance levels, in turn reducing the need for enforcement and regulatory scrutiny.

3.1.6.5 Summary

There appears to be evidence that a combination of the three major means of regulating mass compliance; 1) On-road enforcement, 2) Chain of Responsibility and 3) National Heavy Vehicle Accreditation Scheme Mass Management module, are effective in encouraging mass compliance for most operators. However, it is also apparent that:

- This hinges on the effectiveness with which they are administered by regulators.
- There is scope to improve the effectiveness of existing regulatory arrangements.
- Their effectiveness varies depending on the circumstances. For some members of the transport industry, existing regulatory measures represent an insufficient compliance incentive.

Question for comment

How can on-board mass measurement technology be used to complement the existing range of regulatory compliance measures?

Aside from general improvements to existing compliance schemes and regulations, an important objective for policy makers is to more precisely target non-compliant segments of the transport industry. In particular, the predominant practice of relying on the

management of compliance risk according to the type of scheme an operator has chosen to participate in (e.g. additional compliance requirements for Higher Mass Limits participants) lacks the precision necessary to effectively target non-compliance.

It is notable that there are significant parallels between the objectives of a potential on-board mass monitoring scheme and the existing National Heavy Vehicle Accreditation Scheme Mass Management module. Using different methods, both aim to verify the mass compliance of participants, at the individual load level. Importantly, a feature of the National Heavy Vehicle Accreditation Scheme is the requirement for each participant to develop a compliance management system, tailored to the circumstances and risks of the participant's specific transport operation. In at least some cases, this includes fitting on-board mass technology to an operator's trucks.

3.2 Diminished road safety

Overloading of heavy vehicles also has the potential to reduce road safety levels. There are two mechanisms by which this may occur:

- Heavy vehicle stability is an important factor in minimising the risk of rollover. As heavy vehicle mass increases, the stability tends to decrease. Grossly overloaded heavy vehicles are often at a greater increased risk of rollover.
- Heavy vehicle braking performance is reduced as mass increases.

Although there is a popular perception that overloaded heavy vehicles are a road safety risk, the risk is proportional to the degree of overloading. In fact, most modern heavy vehicles are design-rated to operate at masses significantly above legal limits. The major risk associated with overloading is arguably reduced stability (rollover propensity).

In general terms, it can be stated that grossly overloaded heavy vehicles present a significantly higher road safety risk. However, for minor levels of overloading, the increased risk is lower or even negligible. Regulatory countermeasures against overloading are the same as and were discussed in section 3.1 Impact on road infrastructure.

3.3 Limited access for higher productivity vehicles

Where a reduction in mass compliance risk (or improved compliance assurance) for higher productivity vehicles can be achieved, there may be scope for improved road network access.

Maximising access is a key objective of heavy vehicle productivity schemes (such as Higher Mass Limits). As discussed in section 3.2 Diminished road safety, lack of confidence in mass compliance translates to lack of confidence in the capacity of vulnerable road infrastructure to support applicable types of heavy vehicles.

Historically, this risk has been controlled by restricting access for higher productivity vehicles to vulnerable road infrastructure. In turn, this reduces the efficient movement of people and goods.

The relationship between regulator confidence in mass compliance for higher productivity vehicles and the extent of road network access is difficult to quantify. There are a range of factors that affect decisions on granting road network access, of which mass compliance is only one.

It is understood, however, that uniform factors of safety for heavy vehicle mass are utilised in assessing bridge capacity ratings for freight vehicles. Such factors of safety are intended to account for mass compliance risk across the broader heavy vehicle fleet, but do not provide for risk assessments at anything less than a fleet level. The NTC, in conjunction with Austroads, is currently undertaking a project to develop an updated bridge assessment tool. It is anticipated that this project will provide a greater understanding and transparency around matters such as whether improved mass compliance assurance may justify broader network access.

3.4 Heavy vehicle pricing arrangements not supporting the efficient use of the road network

On-board mass technology is one option that has the potential to support more efficient pricing arrangements for heavy vehicles. With the road network being a limited resource, it is important that regulatory policy encourages its efficient use so that its benefits are maximised. Accordingly, a National Transport Policy Framework objective is "*to promote the efficient movement of people and goods in order to support sustainable economic development and prosperity"*.

COAG has outlined a Road Reform Plan[11] to better achieve this objective:

"COAG's objective for road reform is to promote a more efficient, productive and sustainable provision of and use of heavy freight infrastructure.

"COAG's road pricing reform program has the potential to improve the link between road use and funding. The work agenda is scheduled to be completed in stages over seven years; including incremental charges for heavier (more productive) loads.

"The first phase focused on developing the building blocks for mass-distance-location based charges through research and policy development, including incremental pricing."

On-board mass technology has the potential to support more accurate and precise measurement of heavy vehicle mass. Under the COAG Road Reform Plan, a feasibility study is being undertaken into a more direct heavy vehicle charging arrangement, including incremental charging and mass-distance-location (MDL) charging.

The specific role of on-board mass technology in supporting outcomes of the COAG Road Reform Plan is a matter that will be determined by that project. However, consideration will be given here to the potential implications of its use in that capacity for other potential uses; principally in supporting mass compliance.

The COAG Road Reform Plan is currently considering a range of options including more direct pricing for heavy vehicles, according to the actual mass that a vehicle is carrying on a given trip. If the policy required an accurate and robust means of ascertaining heavy vehicle mass data, this would have significant implications for the regulation of mass compliance; for applicable vehicles, existing means of regulating mass limits may be rendered obsolete.

Importantly, it would also change many of the circumstances considered in the process of developing a policy framework for on-board mass technology. It is important that the

[11] National Transport Commission, *The COAG road reform plan project and history*, http://ntc.gov.au/viewpage.aspx?AreaId=37&DocumentId=1910, last checked 21 January 2010.

policy proposals, conclusions and recommendations included in this position paper properly account for this contingency.

It is possible that on-board mass technology could be utilised to support such a pricing arrangement. As the performance requirements of on-board mass technology developed specifically for a pricing application would differ in some ways to those for mass compliance, the implications of this must be considered.

Certified and uncertified on-board mass monitoring and measurement

On-board mass technology has been divided in this discussion paper into two categories: certified and uncertified. Currently, all on-board mass technology falls into the latter category. A range of uncertified on-board mass measurement products of varying accuracy and design are available for sale, commonly used by transport operators as voluntary compliance aids. The measurements are displayed on the truck, or in some cases transmitted wirelessly to a computer owned by the transport operator. The data is not automatically available to regulators.

Under the Intelligent Access Program (IAP) model, detected incidents of non-conformance with route restrictions are electronically reported to the relevant authorities (e.g. road agency). An option is to expand this model to include mass compliance by fitting certified on-board mass monitoring systems connected to an IAP unit. Certification would be offered as a type of approval to systems demonstrated to have met minimum levels of functionality, accuracy and robustness.

This would provide regulators with the ability to monitor, via automatic electronic reporting of non-compliance events, the mass compliance for applicable vehicles. Under current arrangements, operators of vehicles with IAP units fitted must manually declare the mass of their vehicle.

Certification is a step offering assurance that a given product has met minimum standards (standards are discussed in the section The development of on-board mass standards in section 4.3). It has been proposed that mass data sourced from a certified on-board mass monitoring system may be able to be relied upon as the principal source of evidence in assessing mass compliance for that vehicle/operator, including pursuing any prosecution for a breach of mass limits.

If it was determined that on-board mass technology was to support heavy vehicle pricing reform, it is likely that certified on-board mass technology would be required. Whilst uncertified devices have usefully served transport operators as voluntary mass compliance aids, it is unlikely that they would provide the required level of assured accuracy and robustness to be relied upon for the purpose of determining road use charges.

In developing policy for on-board mass technology, both certified and uncertified on-board mass technology will be considered. Further consideration of policy on the need for and how the certification of in-vehicle telematics systems should be managed is addressed by the National In-Vehicle Telematics Strategy: The Road Freight Sector[12].

[12] National Transport Commission, *Draft National In-Vehicle Telematics Strategy: The Road Freight Sector*, 2010.

To support heavy vehicle pricing, it is possible that only certified on-board mass technology would be deemed suitable. It is also possible that in some circumstances, certified on-board mass technology may be deemed appropriate for supporting mass compliance.

There can be significant costs associated with the development and fitment of on-board mass products to meet regulatory specifications. It is important that any such costs are minimised. Any investments made in on-board mass technology should not be rendered prematurely obsolete by foreseeable regulatory changes.

Questions for comment:

Can a technical specification be developed that would serve both purposes, or would it be appropriate for there to be two sets of specifications?

Which types of trucks and how many would be likely candidates for being fitted with on-board mass technology, for either or both applications?

How does timing of the COAG Road Reform Plan impact upon these matters, including the ability of policy makers to account for outcomes of that project, in developing on-board mass policy?

How may the specification of regulatory on-board mass technology minimise the risk of obsolescence?

4. OPTIONS

The NTC was asked to develop a policy framework for on-board mass technology. Two areas of heavy vehicle regulation were identified as being impacted: mass compliance and heavy vehicle pricing.

This position paper has analysed how the objectives of these regulatory areas may best be supported by the appropriate utilisation of on-board mass technology. In doing that, shortcomings with existing regulatory arrangements, as well as emerging policy challenges were identified. From these, options have been developed as potential solutions, including but not limited to the utilisation of on-board mass technology.

The preliminary conclusions and recommendations of this position paper are intended to stimulate further feedback and particularly the provision of evidence that may help substantiate policy proposals.

4.1 Options for improved mass compliance assurance

In developing options, several of the identified problems have been grouped together:

- Impact on road infrastructure.
- Diminished road safety.
- Limited access for higher productivity vehicles.

With the root cause for each of these problems being overloading, it is appropriate that options be developed that may increase the level of heavy vehicle mass compliance

assurance. The following options should not be considered as absolute choices. Rather, it is possible that different options may suit different circumstances.

Option 1. Business as usual

As yet, the NTC has not identified any substantial evidence to support heavy vehicle mass compliance being rated as a high priority reform issue. It is reasonable to believe that under existing regulatory arrangements, there is, in broad terms, a good level of compliance with mass limits. There is also early evidence that the Chain of Responsibility approach has been effective in driving compliance improvements within some lagging segments of the industry.

Nevertheless, there are a range of options already being considered (or implemented) for how existing compliance arrangements could be improved. These include:

- measures to provide regulators with greater confidence in National Heavy Vehicle Accreditation Scheme Mass Management accreditation as an indicator of compliance assurance (as outlined in the Accreditation Policy Review[13]);
- continued implementation and strengthening of the Chain of Responsibility approach by road agencies and police;
- more targeted enforcement;
- more robust action against persistent offenders. Where sanctions and penalties have proven ineffective in curbing non-compliance, the Road Transport Reform (Compliance and Enforcement) Bill provides for the imposition of Supervisory Intervention Orders by courts; and
- improvements to existing heavy vehicle access arrangements that may reduce the incentive for non-compliance (e.g. broader road network access).

Questions for comment

The development of on-board mass technology and policy has been proposed partly due to the perceived lack of confidence in existing arrangements, such as the National Heavy Vehicle Accreditation Scheme Mass Management. This scheme supports a sufficient degree of mass compliance assurance. In developing policy for on-board mass technology, relevant questions include:

- Can improvements practicably be made to existing compliance arrangements that would address regulators' current concerns with their effectiveness?
- How would the cost effectiveness compare with other options, such as the required fitment and use of on-board mass technology?
- Is the degree of non-compliance with mass limits of a sufficient magnitude to justify additional costs being incurred (under any option)?

[13] National Transport Commission, loc. cit.

The cost effectiveness of compliance options is an important consideration. Regulators have stated that with the growth of the freight task, traditional methods such as on-road enforcement have become economically less viable. Electronic monitoring has been proposed by some as a more cost effective means for regulators to track compliance levels. However, it is questionable whether the broader adoption of on-board mass monitoring would substantially alleviate the need for other mass compliance arrangements, such as on-road enforcement.

For example, as discussed in section 3.1.5 (At-risk industry segments), industry segments are exposed to compliance measures in different ways and to varying degrees. An objective is therefore to develop mass compliance policy so that regulatory measures are matched to the nature and degree of the compliance risk, as it varies with circumstances.

In this context, the major policy question is not whether on-board mass technology can replace existing compliance measures, but more to determine the appropriate circumstances in which each of the available suite of compliance measures should apply.

Regulators are already undertaking improvements to how existing compliance measures are administered. More sharing of compliance 'intelligence' between states and territories, as well as the growing use of automated compliance technology (e.g. Safe-T-Cam) may support more targeted enforcement.

There is evidence that the Chain of Responsibility approach has recently driven substantial improvements in compliance levels, including within some historically 'lagging' sectors of the transport and logistics industry. However, the benefits of Chain of Responsibility legislation have not yet been fully realised. As regulators are given more time to implement and administer, and industry members learn to adapt, it is likely that compliance levels will continue to improve.

The NTC considers that the National Heavy Vehicle Accreditation Scheme Mass Management module continues to represent an effective means of encouraging operators to manage mass compliance levels. It is expected that implementation of recent outcomes for the Accreditation Policy Review[14], including to strengthen auditing requirements, will provide a greater degree of assurance to regulators for the scheme's robustness.

An option for improving the robustness of Mass Management accreditation may be to include some form of record keeping requirements for route compliance.

Recommendation:

The NTC supports improvements in current compliance arrangements, the benefits of which may combine with other options discussed below.

Option 2. Mandated use of certified on-board mass monitoring systems

The requirement for a heavy vehicle to be fitted with a certified on-board mass monitoring system would subject the operator to a higher degree of regulatory scrutiny than is available via other means. Some regulators have expressed enthusiasm for this option, as a means of providing a greater degree of mass compliance assurance than other means.

However, it would also impose additional costs. For a semi-trailer, the cost of an on-board mass system was estimated in 2009 at between $5,000 and $12,000. For a B-double, the

[14] National Transport Commission, loc. cit.

cost is between $7,500 and $17,000[15]. Equipment suppliers have indicated that these costs are likely to decrease over time. For an on-board mass monitoring system certified by Transport Certification Australia, these costs would be additional to and packaged with those for an Intelligent Access Program system[16].

Question for comment

In what circumstances would this option be justified, over and above other options for providing mass compliance assurance?

The NTC recommends that justification for this option must be subject to a cost-benefit analysis and using established principles of risk management. Mass compliance risk can be divided into the following categories:

- the risk of a non-compliance event occurring and
- the severity of outcome for a non-compliance event.

Historically, mass compliance risk has tended to be assessed by regulators in terms of severity of outcome. An assumption has been that heavy vehicles operating at relatively higher mass limits, e.g. those under the Higher Mass Limits scheme, represent a higher risk. Although the severity of outcome for non-compliance may be greater, this method fails to properly account for the risk of occurrence. Evidence, such as discussed in section 3.1.5 (At-risk industry segments), strongly suggests that severity of outcome varies greatly between operators in a given scheme.

Where uncertified on-board mass measurement systems may serve as a useful compliance aid for transport operators, a key feature of certified on-board mass monitoring systems is their enhanced ability to assist authorities to detect non-compliance. The NTC recommends that this option (required fitment of a certified on-board mass monitoring system) may be appropriate where the mass compliance risk has been assessed at a level above that for which other available compliance measures are capable of addressing.

Mandated use of uncertified on-board mass measurement systems

A variation of this option is for mandated use of uncertified on-board mass measurement systems. Utilised as part of a mass compliance management system, such equipment may serve as a useful compliance aid. Indeed, Option 4 considers the value of this type of use for on-board mass systems.

However, it is unlikely that a simple requirement for fitting an uncertified on-board mass measurement system, without any requirements for how the system may be properly utilised, would be of any substantial value for encouraging improved levels of compliance.

[15] Transport Certification Australia, *On-Board Mass Monitoring Test Report (Final)*, April 2009, available at http://www.tca.gov.au/SiteMedia/w3svc051/Uploads/Documents/OBM_test_report_FINAL.pdf, last checked 22 February 2010.

[16] The current cost of an Intelligent Access Program system to operators is understood to be in the order of $60-100 per month, per unit/vehicle. As on-board mass systems may need to be installed in a more permanent fashion, it is unclear precisely how the cost of an on-board mass-enabled IAP system would be structured (i.e. on a subscription basis or an up-front purchase cost) and therefore what the actual, additional cost may be.

Unlike for an on-board mass monitoring system, an operator may simply disregard readings from an on-board mass measurement system that indicates overloading has occurred. Rather, it is the demonstrated will and capability on the part of a transport operator to manage their mass compliance, such as through the National Heavy Vehicle Accreditation Scheme, that are of greater importance.

For example, this may include operators who have demonstrated an inability or unwillingness to comply with applicable mass limits. Where other compliance schemes and enforcement measures have consistently failed to deter an operator from overloading, this option would allow regulators to impose a greater degree of scrutiny and take immediate action against any further infringements. Under the Compliance and Enforcement Bill, courts have the authority to impose Supervisory Intervention Orders on persistent offenders, including a requirement to fit a certified on-board mass monitoring system and impose further sanctions if compliance levels do not sufficiently improve.

However, mitigating the risk of occurrence is a fundamental objective of the National Heavy Vehicle Accreditation Scheme Mass Management module. Accreditation is only granted to operators who have demonstrated that they have developed and implemented a suitably robust mass management system. Importantly, the objectives of the National Heavy Vehicle Accreditation Scheme Mass Management module and a certified on-board mass monitoring system are similar: to mitigate the risk of non-compliance with mass limits.

Some regulators have expressed concern for the effectiveness of the National Heavy Vehicle Accreditation Scheme Mass Management module as a means of mitigating the risk of non-compliance. Recommendations to improve the robustness of the scheme were included as part of the Accreditation Policy Review, approved by ATC in June 2009. Although some operators have conceded minor breaches may occur from time to time, the NTC is unaware of evidence suggesting widespread non-compliance with mass limits by National Heavy Vehicle Accreditation Scheme Mass Management accredited operators.

Therefore, for the majority of operators participating in schemes already requiring accreditation to the National Heavy Vehicle Accreditation Scheme Mass Management module, there is no clear justification for increasing the applicable compliance burden.

As justified by an objective risk management assessment, there may be circumstances that justify requiring the fitment of certified on-board mass monitoring systems. However, these circumstances do not apply to the majority of heavy vehicles and operators where existing compliance measures appear to be effective.

A certified on-board mass monitoring system could provide regulators with a means of managing the 'high risk' end of the transport mass compliance spectrum, such as for repeat mass limit offenders under a Supervisory Intervention Order. In developing policy, it is appropriate that policy makers apply an objective risk management process.

Recommendation:

The NTC supports this option only where it can be justified in circumstances where there is a 'significant' compliance risk that cannot be practicably mitigated by the range of existing compliance measures. The NTC is unaware of evidence to suggest that the majority of heavy vehicles and operators, including those accredited under the National Heavy Vehicle Accreditation Scheme Mass Management module, would represent such an elevated risk.

Option 3. Voluntary use of on-board mass systems

This option analyses circumstances in which operators may choose to voluntarily fit on-board mass systems, in order to comply with transport regulations.

Option 3a. Uncertified on-board mass measurement systems as a compliance aid under National Heavy Vehicle Accreditation Scheme

Under the existing National Heavy Vehicle Accreditation Scheme Mass Management accreditation arrangements, fitting some form of on-board mass technology in certain circumstances is practically a requirement[17]. Particularly where loading occurs in an uncontrolled environment, such as in the farm paddock during harvest, the most (or only) reliable means of verifying loads (other than conservative loading) may be some form of on-board mass measurement.

Typically, this is achieved by fitting analogue suspension air pressure gauges to the truck. The NTC understands that, used and maintained in good faith (as per National Heavy Vehicle Accreditation Scheme Mass Management accreditation requirements), these devices are sufficiently accurate to support compliant loading[18].

This option differs from Option 3b (requiring uncertified on-board mass measurement systems to be fitted). Under National Heavy Vehicle Accreditation Scheme, no specific technology requirements are imposed on operators. Instead, in demonstrating their ability to manage their mass compliance, it is operators themselves who may choose to fit an on-board mass system. The choice of technology is secondary to the objective of encouraging operators to develop and utilise an effective mass management system.

Recommendation:

The NTC supports the continued use of non-certified on-board mass technology to be fitted in appropriate circumstances, as a compliance aid. This option recognises the existing practice of operators utilising on-board mass technology, including in supporting National Heavy Vehicle Accreditation Scheme.

Option 3b. Certified on-board mass monitoring systems as an alternative to National Heavy Vehicle Accreditation Scheme Mass Management

Certified on-board mass monitoring systems have the potential to serve as a voluntary alternative and substitute for audit based mass compliance, under the National Heavy Vehicle Accreditation Scheme Mass Management scheme. Instead of manually recording

[17] Officially, accreditation to the National Heavy Vehicle Accreditation Scheme is voluntary. However, it is a prerequisite for operating at Concessional and Higher Mass Limits. For those operators whose viability depends on maximising their payload mass and for whom fitting on-board mass systems is the only practical means of satisfying the National Heavy Vehicle Accreditation Scheme standards, on-board mass systems are indispensable.

[18] The accuracy of on-board mass systems has been reviewed by Transport Certification Australia[15]. Although analogue air gauges were not included in that review, it has been established that the accuracy of all on-board mass systems depends partly on their judicious operation. Consultation suggests that for an operator with a sufficient degree of skill and experience, whose objective is to comply with mass limits, judicious interpretation of analogue air gauge readings, in conjunction with conservative loading, are sufficiently accurate to serve as an effective compliance aid. In other words, the more accurate the means of verifying a load, the more confidently an operator can minimise their margin for error, without affecting the compliance outcome.

mass measurements under the National Heavy Vehicle Accreditation Scheme, an on-board mass monitoring system would automatically record them. Instead of compliance being assessed by an auditor under the National Heavy Vehicle Accreditation Scheme, an on-board mass monitoring system would automatically notify regulators of non-compliance.

Some operators have indicated that the cost of gaining and maintaining accreditation to the National Heavy Vehicle Accreditation Scheme serves as a barrier to entry to the module. If the cost of purchasing, fitting and maintaining an on-board mass monitoring system were less than the current National Heavy Vehicle Accreditation Scheme, providing it as an alternative may serve to lower the entry barrier.

For others, the administrative burden of gaining accreditation to the National Heavy Vehicle Accreditation Scheme is prohibitive. An option to fit an on-board mass monitoring system instead may help alleviate that burden. Such operators may be willing to pay a price premium (over the cost of the National Heavy Vehicle Accreditation Scheme).

Currently, the National Heavy Vehicle Accreditation Scheme Mass Management module requires operators to develop a sufficiently robust mass management process. A drawback of this option would be the removal of this requirement (i.e. not altogether, but only for those who chose to fit an on-board mass monitoring system). It could be argued that the requirement to develop a mass management system is a core principle of the National Heavy Vehicle Accreditation Scheme. However, by providing regulators with a more 'complete view' of an operator's mass compliance, it could also be argued that the outcome (compliance) is more important than the process (mass management system) by which it is achieved.

It is unlikely that the need for completing paperwork could be avoided altogether. For instance, the National Heavy Vehicle Accreditation Scheme Mass Management module also requires the operator to undertake a program and keep records of suspension condition monitoring and maintenance. The on-board mass monitoring system proposed by Transport Certification Australia also includes record keeping requirements.

The viability of this option rests primarily on the relative cost, i.e. compared with the current requirement for paper based record keeping. The NTC has estimated the cost[19] of gaining and maintaining the National Heavy Vehicle Accreditation Scheme Mass Management module over a two year period at about $7,000 for an operator with three trucks and $12,000 for one with five trucks.

In comparison, the cost of certified on-board mass monitoring systems (incorporating the Intelligent Access Program capability) over the same two year period has been estimated at about $14,000 and $24,000 (for an operator with three and five trucks respectively, excluding maintenance costs).

At present, it is likely that certified on-board mass monitoring systems are at a cost disadvantage, as a voluntary alternative to existing means of gaining accreditation to the National Heavy Vehicle Accreditation Scheme Mass Management module. However, telematics industry members have claimed that costs are trending downwards. It is possible that the cost difference, as estimated here, may fall over time. The trend for reducing costs of telematics (including on-board mass) equipment is understood to be substantially contingent upon increasing sales volumes.

[19] Cost here refers to the cost incurred by the operator and excludes other costs, such as those to government in administering the scheme.

Recommendation:

This option is supported if a cost benefit analysis showed it to be a viable alternative to the current audit based scheme. This has the potential to alleviate some of the costs and administrative burden of the current scheme, particularly for operators whose circumstances may make achieving accreditation to the existing standards difficult.

Comments requested:

Further information on costs and cost projections that would support a cost benefit analysis for this option is sought from telematics and on-board mass industry members.

Option 3c. On-board mass measurement systems supporting reduction in bridge load safety factor

On-board mass systems have the potential to be utilised by operators, to serve as a justification for providing them with productivity benefits. Uncertainty on the part of regulators for the level of mass compliance assurance (or the risk of non-compliance) by a given operator has, in some circumstances, served as a limitation on productivity. An example of this is for bridge loading standards and assessments, in which it is common to assess heavy vehicles at significantly above their legal mass limit[20]. This has tended to reduce either the extent of road network access available to higher productivity vehicles, or their mass limit (and therefore productivity). This practice has historically been deemed necessary in order to protect bridges from the effects of overloading.

It stands to reason that where the risk of overloading has been demonstrated as having been suitably reduced, there may be opportunities to 'recover' some productivity benefits. Previous consultation with road agency staff has revealed mixed views on the scope for delivering this option, which for bridge assessments in particular is acknowledged as technically complex.

Other proposed options in this paper also include scope for productivity benefits. For instance, participation in the National Heavy Vehicle Accreditation Scheme Mass Management module has been a prerequisite for productivity-based schemes such as Higher and Concessional Mass Limits. However, for others, such as Performance Based Standards, bridge assessments have typically been separate and additional. A productivity benefit available under one scheme (i.e. Performance Based Standards) is of no practical benefit if it refused under another (i.e. bridge assessment). Indeed, this has been a substantial constraint on effectiveness of the Performance Based Standards scheme. This option may help overcome that limitation.

It is important to note that the measurement of mass compliance risk does not hinge solely on the utilisation of on-board mass technology by a heavy vehicle operator. Other factors, including participation in the National Heavy Vehicle Accreditation Scheme Mass Management module and the nature of a given heavy vehicle operation also impact on compliance risk. The matter of on-board mass standards is also relevant, with the use of certified monitoring systems (with data more directly available to regulators) likely to provide a greater degree of assurance than uncertified measurement systems.

[20] National Transport Commission, *Performance Based Standards Review*, July 2009, p.43, available at http://www.ntc.gov.au/DocView.aspx?DocumentId=1887 (last checked 7 June 2010).

A limitation on this option is the lack of a defined standard or mechanism through which such a productivity benefit may be delivered. Defining a clearer relationship between mass compliance risk and bridge assessment safety factors is outside the scope of this project. However, it is an objective of the current Austroads project FS1580 (Bridge Assessment Tool).

The potential for a more precise application of heavy vehicle load safety factors in bridge assessments has received some attention from policy makers. However, there may also be scope on a similar basis for extending productivity benefits through amendments to pavement vertical loading standards.

Recommendation:

Investigation of the feasibility for this option is supported, to be progressed initially under the current Austroads project FS1580 (Bridge Assessment Tool).

Option 3d. Other voluntary use of on-board mass systems

On-board mass systems are often utilised by transport operators as a voluntary compliance aid, including to maximise their payloads and to manage their Chain of Responsibility obligations. Option 3a addresses this type of use specifically for National Heavy Vehicle Accreditation Scheme Mass Management accredited operators. However, voluntary use of on-board mass systems is available to all operators, whether by fitting certified monitoring or uncertified on-board mass measurement systems.

Some industry members have reported to the NTC that Chain of Responsibility has driven significant changes in the selection criteria for contracted and sub-contracted transport operators. Specifically, to minimise their liability under Chain of Responsibility, confidence in the compliance of contractors has grown in importance.

The NTC understands that it has become more common for transport customers to impose requirements, such as National Heavy Vehicle Accreditation Scheme accreditation under the terms of contract. An additional option is to require on-board mass systems to be fitted.

It should be noted that responsible parties cannot ‘outsource’ their responsibilities under the Chain of Responsibility by simply requiring contractors to fit on-board mass technology to their vehicles. Instead, on-board mass systems would more appropriately form part of a broader compliance management system.

Further guidance on how technology may best support transport operator-managed compliance systems will be developed as part of the Draft National In-Vehicle Telematics Strategy: The Road Freight Sector. One option being considered is to provide such guidance in the form of a code of practice.

The use of on-board mass systems in these capacities is deemed voluntary, as they are not explicitly required by regulations. In developing a policy framework for on-board mass technology, it is useful to compare the need for prescribing the use of on-board mass systems, in contrast to a framework that imposes overarching responsibilities on the transport industry (the outcome, such as through Chain of Responsibility). The latter approach provides industry members with greater flexibility in determining the most practical, cost-effective means of fulfilling those responsibilities (the process).

The NTC believes that for most of the transport industry, the latter approach has proven the most cost-effective. An important reason is that compliance management systems are not a ‘one size fits all’ proposition. Rather, the ability of transport companies to develop and

manage compliance systems varies significantly, as does their available budget. Whilst such variations do not justify poor compliance management, they highlight the need for policy makers to provide maximum flexibility in how industry members may best comply with their obligations.

As on-board mass technology becomes more affordable, it is more likely that industry members may choose it ahead of other alternatives (such as discussed under Option 3b - Certified on-board mass monitoring systems as an alternative to National Heavy Vehicle Accreditation Scheme mass management).

In developing a policy framework for on-board mass technology, there is a temptation for regulators to predetermine precisely how and when its use would be required. There are some specific circumstances in which this approach may be necessary. However, where other existing compliance arrangements have proven effective, on-board mass systems may best be viewed as a supporting technology.

Recommendation:

Potentially the greatest need and demand for on-board mass technology is to support transport operator compliance management systems. Such systems are developed around the need to demonstrate compliance with transport law, including Chain of Responsibility, rather than the technology itself.

For this type of use, it is unnecessary to develop specific policy for on-board mass technology.

4.2 Options for coordinating with heavy vehicle pricing reform

It is not the role of this project to develop policy for heavy vehicle pricing reform, nor to determine precisely how it may be supported by on-board mass technology. Nevertheless, it is clear that such matters impact upon on-board mass policy.

To date, Transport Certification Australia has undertaken significant research and development into a specification for on-board mass technology, against which commercial on-board mass products may be certified. Similar to that for the Intelligent Access Program, the intention is that certified products would provide regulators with a means of obtaining mass compliance information, with a minimum level of accuracy, robustness and reliability.

It is likely that many features of such an on-board mass specification developed to support mass compliance would be similar to one developed to support heavy vehicle pricing. However, it is also likely that there would be some differences and in some respects, potentially a higher performance standard required to support a pricing application.

It is reasonable to conclude that research and development activities into an on-board mass specification would usefully serve either application (mass compliance or heavy vehicle pricing). However, there are greater risks around the implementation of on-board mass technology, that is, any requirement for operators to fit certified on-board mass devices to heavy vehicles.

In simple terms, policy makers must endeavour to ensure that any investment in on-board mass products is not rendered prematurely obsolete by future regulatory reform. There are two principal risks:

- the potential for substantial changes to the heavy vehicle compliance landscape, resulting from heavy vehicle pricing reform, and
- the risk of a heavy vehicle being required to be fitted with an on-board mass system certified for mass compliance purposes, then at a later point in time, a different system certified for heavy vehicle pricing.

The analysis included in this position paper is based on current policy arrangements. Reform to heavy vehicle pricing policy has the potential to substantially alter the current compliance landscape, including the circumstances under which the options and recommendations in this discussion paper were based upon.

Options for managing these risks are discussed below.

Option 1. Proceed with implementation of certified (mass compliance specification) on-board mass systems

One option would be to proceed with deploying or implementing certified on-board mass monitoring technology without waiting for the outcomes of the heavy vehicle pricing policy development process. This would be subject to a sufficient case being made for on-board mass monitoring systems to cost effectively support improved levels of mass compliance.

Implementation here refers to:

- developing a specification for certified on-board mass (compliance) monitoring technology,
- developing policy for the circumstances in which this type of equipment would be required to be fitted to heavy vehicles (as addressed in this discussion paper),
- the fitting and operation of certified on-board mass monitoring technology by heavy vehicle operators, and
- administering heavy vehicle regulations, including any enforcement actions, utilising certified on-board mass technology generated information.

Under this option, the risk of technology being rendered obsolete (and the associated costs) could be mitigated by measures to ensure that on-board mass technology and specifications are developed in a manner that would allow for on-board mass firmware and software (and even hardware) to be upgraded (at minimum possible expense).

The risk of obsolescence is also linked to the scale of deployment. Certified on-board mass monitoring policy and technology is very much in its infancy. A conservative program of implementation, based initially on trialling a smaller volume of systems would also help mitigate the risk of obsolescence. This would allow for specification and system improvements to be made with a minimum of cost and for outcomes of the COAG Road Reform Plan feasibility study to be incorporated into ongoing development and policy.

Such trials are already underway. The Queensland Department of Transport and Main Roads has overseen the operation of such a system for a period of time. Transport Certification Australia has managed ongoing trials on-board mass systems, as part of its initiative to develop a certification standard under the Intelligent Access Program model.

Recommendation:

Subject to the demonstrated need and demand for on-board mass monitoring technology to support mass compliance, this option is supported where implementation is undertaken in a staged manner, such as an initial small volume trial. Outcomes of the COAG Road Reform Plan feasibility study are due at the end of 2011, which will confirm whether there is a need or role for on-board mass technology. In this way, the risk of inadvertent outcomes, such as large volumes of equipment being rendered obsolete by future regulatory changes may be minimised.

Option 2. Await outcomes of COAG Road Reform Plan feasibility study

As part of the COAG Road Reform Plan feasibility study, the Business Systems work stream is investigating the need and/or role of an on-board mass system. Results of the feasibility study are due at the end of 2011. This would provide clarity on whether there is a need for the performance requirements of certified on-board mass systems and reduce the risk of installed systems being rendered prematurely obsolete.

Transport Certification Australia have clarified that in developing an on-board mass specification, they can take into account for the potential need to upgrade the system.

Recommendation:

This option may better position policy makers to consider the technical requirements of certified on-board mass systems and reduce the risk of obsolescence. However, it is recommended that the mitigating measures as described under Option 1 would likely be sufficient to mitigate the identified risks.

4.3 The development of on-board mass standards

This discussion paper has addressed on-board mass systems subject to the availability of various potential standards. These may include:

1. a draft specification being developed by Transport Certification Australia to support the interoperability with Intelligent Access Program,
2. a potential standard to support heavy vehicle pricing, and
3. proprietary systems which are not subject to an official standard.

At present, only the third type of system above exists in practice.

For telematics, standards may be divided into:

- *systems architecture*, which defines the overarching structure of a telematics system and the interrelationship between parties involved in its delivery,
- *communication standards*, that may facilitate enhanced interoperability; and
- *product standards*, that address technical functionality and performance.

In its 2009 report to ATC, *Harnessing the power of technology for Australian transportation reform*[21], the Strategic Research and Technology Working Group stated that:

"The case for using systems architecture and communications standards as a means to achieve inter-operability is self evident. This policy will need to be applied regularly during implementation of a policy led approach."

In proposing a way forward, there was caution against overly prescriptive product standards, that risk inhibiting technological innovation and stifling uptake of transport technology by the freight industry:

"The temptation for governments is to react to new and emerging technologies with technical standards. However, this technology-led policy approach tends to lead to market capture by single technologies and can inhibit future transport competition."

"Systems architecture and communications standards need to be the preferred approach to achieve inter-operability ahead of a product standards approach."

The need for standards vary based on how on-board systems are used. In assessing the need for standards, the following criteria are proposed:

- industry members and regulators must rely on the accuracy and integrity of on-board mass data,
- on-board mass systems must be interoperable, and
- on-board mass data must be readily accessible to regulators (including whether in a standard format).

Proprietary on-board mass systems are currently utilised by transport operators in supporting their internal compliance management systems. The need for interoperability and a uniform systems architecture model between on-board mass systems used in this context would be lower than for regulatory purposes. The need for mandatory standards in these circumstance would be assessed as low.

The NTC, through its development of a Draft National In-Vehicle Telematics Strategy: The Road Freight Sector, is assessing the feasibility of developing a code of practice for telematics systems. One option is to provide guidance to the heavy vehicle operators on how in-vehicle telematics products may be most effectively utilised in supporting their management of compliance. Such a code may include elements of a voluntary standard.

Although the policy developed by the Strategic Research and Technology Working Group recommended minimising the imposition of technical product standards, in some circumstances they may be necessary. Where on-board mass systems may be required to support the determination of road pricing, or serve as the primary source of evidence in detecting and prosecuting for incidences of overloading, the need for mandatory standards is higher. A fundamental difference for these types of uses would be the need for regulators to access reliable data. However, it would be difficult to justify such a 'higher' technical standard being adopted as a single, uniform standard for the broader industry.

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[21] ATC Strategic Research and Technology Working Group, *Harnessing the power of technology for Australian transportation reform*, September 2009 (unpublished, approved by ATC on 6 November 2009).

Where the procurement of on-board mass technology may be required as a condition of operating in a voluntary scheme, it is important that sufficient competition exists for its supply. Network architecture and communication standards are useful for ensuring interoperability between different products, supporting consumer choice and minimising switching costs for heavy vehicle operators.

To avoid the risk of market monopoly, it is important that the wider on-board mass technology industry be provided with the opportunity to account for such standards in ongoing and future product development.

These risks also apply to heavy vehicle operators investing in on-board mass technology where their investments may be rendered obsolete by future regulatory changes. As for technology developers, it is also important for heavy vehicle operators that any potential on-board mass standards be developed and maintained in a transparent manner. This may only be achieved through a process of public consultation, including the publication of any regulatory standards.

In summary, it is recommended that:

- There is a role for government, through the Draft National In-Vehicle Telematics Strategy: The Road Freight Sector, in clarifying the policy framework to allow for the development of systems architecture and communication standards that may support improved levels of interoperability for in-vehicle telematics (including on-board mass) products.
- Governments should minimise the imposition of technical product standards that risk stifling innovation, although in some circumstances (such as where more strict monitoring of compliance levels is justified) these may be unavoidable.
- Through the Draft National In-Vehicle Telematics Strategy: The Road Freight Sector, the government support industry in the development of a code of practice. This would provide operators with guidance on how to utilise in-vehicle telematics in supporting their management of compliance.
- To provide a level playing field and to support competition amongst technology developers and suppliers, regulatory on-board mass standards should be developed and maintained in a transparent manner (including publication).

On-board mass systems may or may not form part of a telematics system. An on-board mass measurement system that displays data in the vehicle cabin may not be a telematics system. However, an on-board mass monitoring system that includes the wireless communication of readings to a third party may be categorised as a telematics system.

As the adoption of and interoperability between in-vehicle telematics in the heavy vehicle industry increases, it is likely that there will be a continued trend away from ‘stand alone’ products to integrated telematics systems, of which on-board mass technology may form a component. As such, regulatory policy and standards for such systems need to be developed in the same integrated manner. This is being undertaken through the Draft National In-Vehicle Telematics Strategy: The Road Freight Sector. The on-board mass policy framework is therefore guided by the Draft National In-Vehicle Telematics Strategy: The Road Freight Sector, while focussing on issues applying more specifically to on-board mass technology.

5. SUMMARY

5.1 Mass compliance

The impetus for this project was a proposal to develop on-board mass technology for the purpose of supporting compliance with Higher Mass Limits conditions (in NSW and Queensland). In consulting with regulators, it is clear that there is potential interest for how on-board mass technology may support mass compliance in a broader range of applications. It is this broader context that the policy framework has considered.

The NTC has not yet been able to obtain substantial evidence that there is any major problem with mass compliance levels across the heavy vehicle fleet. However, there is evidence that compliance risk is circumstantial. Risk indicators include:

- being engaged in mass constrained transport operations,
- being engaged in operations that involve 'uncontrolled' loading,
- (non) participation in the National Heavy Vehicle Accreditation Scheme Mass Management module,
- level of exposure to on-road enforcement,
- degree of 'integration' within the Chain of Responsibility, and
- previous mass compliance record.

The NTC proposes that regulatory measures are applied using an objective process of risk-based assessment. The options discussed in this paper follow this principle, with:

- mandatory use of certified on-board mass systems recommended for high risk transport operations (option 2),
- voluntary use of certified on-board mass systems as an alternative to 'paper-based' National Heavy Vehicle Accreditation Scheme Mass Management (option 3b), and
- voluntary use of certified or uncertified on-board mass systems as a compliance aid to support meeting Chain of Responsibility obligations.

Under Option 1 (Business as usual) there is evidence that measures such as Chain of Responsibility have recently driven substantial improvements in compliance levels, including within some historically 'lagging' sectors of the transport and logistics industry.

The NTC considers that the National Heavy Vehicle Accreditation Scheme Mass Management module continues to play an important role in encouraging operators to manage their mass compliance. It is expected that implementation of recent outcomes for the Accreditation Policy Review, including to strengthen auditing requirements, will provide a greater degree of assurance to regulators for the scheme's robustness. It is important that policy for on-board mass technology is developed in coordination with that for the National Heavy Vehicle Accreditation Scheme Mass Management module. For operators who have achieved accreditation to the scheme, it may be difficult to justify the need for imposing additional compliance burden and cost.

Option 2 considered the need for mandating the use of certified on-board mass monitoring systems. It is proposed that this option may be justified in circumstances where there is a higher degree of compliance risk than may practicably be mitigated by the range of other,

existing compliance measures. The NTC has as yet been unable to obtain substantial evidence to suggest that the majority of heavy vehicles and operators, including those accredited under the National Heavy Vehicle Accreditation Scheme Mass Management module, would represent such an elevated risk.

Option 3 (collectively) considered the need for voluntary use of on-board mass systems. Three sub-options were identified, including Option 3a: the existing practice of operators utilising on-board mass technology in supporting the National Heavy Vehicle Accreditation Scheme. It is recommended that this is an effective practice that should continue.

Option 3b would allow for the fitting of certified on-board mass monitoring systems as automatic qualification for the National Heavy Vehicle Accreditation Scheme Mass Management module (i.e. as an alternative to the current requirements). This has the potential to alleviate some of the costs and administrative burden of the current scheme, particularly for operators whose circumstances may make achieving accreditation to the existing standards difficult.

Option 3c is to consider the feasibility of more precisely applying load safety factors in heavy vehicle bridge assessments, as justified by a demonstrated reduction in mass compliance risk. On-board mass measurement systems may serve as one means of supporting that option. It is recommended that this option be progressed as part of a separate project to develop bridge assessment procedures.

Finally, Option 3d recognises the ability of transport industry members to utilise on-board mass technology in supporting the development of compliance management systems. This option represents an alternative approach to others, including those discussed in this paper that may seek to prescribe the use of on-board mass technology. With growing awareness amongst industry members of their expanded obligations under the Chain of Responsibility, there is evidence of an increasingly positive response.

It was recognised that in certain circumstances, some industry members have and may continue to respond inadequately to the need for effectively managing their compliance. In such circumstances, this option alone may be insufficient, and others less flexible, such as Option 2 (required use of on-board mass systems) may be necessary. However, for the majority of industry members, it is proposed that the optimum approach remains one that imposes obligations on their compliance, while providing industry with the flexibility to determine how best to comply with the regulations.

5.2 Heavy vehicle pricing

On-board mass technology has been identified as a potential means of supporting heavy vehicle pricing reform. Although it is beyond the scope of this project to determine pricing policy or the role of on-board mass technology, it is appropriate to consider the implications of potential outcomes of the COAG Road Reform Plan. A significant issue is that heavy vehicle pricing reform may result in significant changes to the mass compliance landscape, upon which options and recommendations of this policy paper have been based.

Option 1 is to proceed with any policy and implementation of on-board mass systems certified for a mass compliance application. Implementation may most appropriately be undertaken in a staged manner, such as initially through trials based on smaller volumes. Outcomes of the COAG Road Reform Plan feasibility study are due by the end of 2011, by which time a clearer understanding for the role of on-board mass technology may be

known. In this way, the risk of inadvertent outcomes, such as large volumes of equipment being rendered obsolete by future regulatory changes may be minimised. This option is recommended.

Option 2 is to await outcomes of the COAG Road Reform Plan feasibility study. This option may better position policy makers to consider the technical requirements of certified on-board mass systems and reduce the risk of obsolescence. However, it is recommended that the mitigating measures as described under Option 1 would likely be sufficient to mitigate the identified risks.

5.3 The development of on-board mass standards

An important element of policy for on-board mass technology is how the development of standards is managed. Guiding principles were outlined by the ATC Strategic Research and Technology Working Group in November 2009[22], with a recommended focus on facilitating interoperability and minimising the risk of impeding technological innovation.

In summary, it is recommended that:

- There is a role for government, through the Draft National In-Vehicle Telematics Strategy: The Road Freight Sector, in clarifying the policy framework to allow for the development of systems architecture and communication standards that may support improved levels of interoperability for in-vehicle telematics (including on-board mass) products.
- Governments should minimise the imposition of technical product standards that risk stifling innovation. In some circumstances (such as where more strict monitoring of compliance levels is justified) these may be unavoidable.
- Through the Draft National In-Vehicle Telematics Strategy: The Road Freight Sector, the government support industry in the development of a code of practice This may provide operators with guidance on how to most effectively utilise in-vehicle telematics in supporting their management of compliance.
- To provide a level playing field and to support competition amongst technology developers and suppliers, regulatory on-board mass standards should be developed and maintained in a transparent manner (including publication).

6. NEXT STEPS

Subject to consultation on the options identified in this position paper and after making any appropriate amendments, the NTC will submit an on-board mass policy proposal to ATC for voting.

The ability to develop evidence-based on-board mass policy, particularly in drawing reliable conclusions on compliance rates and technology costs, depends on the provision of relevant information by both regulators and industry members. The NTC invites interested parties to provide their views and; in particular, supporting information on any of the matters discussed in this paper.

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[22] ATC Strategic Research and Technology Working Group, *Harnessing the power of technology for Australian transportation reform*, September 2009 (unpublished, approved by ATC on 6 November 2009).

The NTC is also exploring the viability of obtaining mass compliance data, as measured by a national network of weigh-in-motion devices. The availability of such data would assist in drawing more reliable conclusions on mass compliance rates.

A key recommendation of this draft policy is for mass compliance policy, including the imposition by regulators of operating conditions (including fitting a certified on-board mass monitoring system to specified types of heavy vehicles), be developed using an objective risk-based approach. Certified on-board mass monitoring has been proposed as a countermeasure that is most appropriate for heavy vehicle transport posing the highest levels of mass compliance risk.

Subject to approval of the proposed on-board mass policy framework, the NTC proposes to develop objective criteria to help guide the assessment of mass compliance risk and the imposition of appropriate countermeasures. In July 2009, COAG agreed to establish a National Heavy Vehicle Regulator by the end of 2012. An important objective of the Regulator is to support the implementation of more nationally consistent heavy vehicle policy. It is appropriate that the development of any such criteria be undertaken in collaboration and with due consideration to the role of the National Heavy Vehicle Regulator.

7. CONSULTATION

In the course of preparing this discussion paper, consultation was undertaken with the following individuals and organisations.

- The Victoria Farmer's Federation. The NTC wishes to thank Akemi Pham-Vu, Darryl Harrison, Tanya Pittard, Andrew Weidemann, Rob McRae and Marshall Rodda for organising an inspection of Victorian grain facilities.
- David Pickering of Graincorp (Warracknabeal).
- The Australian Trucking Association. The NTC wishes to thank David Coonan for organising a workshop on 3 September 2009, as well as for their input and attendance, Jason Williams of Boral, Anthony Eldridge of Eldridge Corporation, Ashley Morrow of Australia Post, Wayne Walker of Mountain Industries, Troy Cook of Divalls Earth Moving and Bulk Haulage.
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- John Welsh of Logistics Safety Solutions.
- Michael Robertson of BlueScope Steel Australia.
- Carmine Cambereri, Don Leoni, Russell Greenland and Richard Bell of VicRoads.
- John Jarrad, Brett Staker and Peter Sakoulas of Transport South Australia.
- Ferdie Kroon and Michael Woods of the Tasmanian Forest Contractors Association.
- Brendan Moritz of the Mildura Transport and Logistics Cluster.
- Roger Sack of Tramanco.
- Dr Charles Karl, David Cai and Shaun Talko of Transport Certification Australia.
- Doug Morgan of Main Roads Western Australia.
- Graham Taylor of the Queensland Department of Transport and Main Roads.
- Steve Lynch of BusNSW.

8. APPENDIX A: ATC OBJECTIVES

In May 2008, underpinning the development of a National Transport Policy Framework, Australia's Transport Ministers committed to the following policy objectives[23]:

- Economic - To promote the efficient movement of people and goods in order to support sustainable economic development and prosperity.
- Safety - To provide a safe transport system that meets Australia's mobility, social and economic objectives with maximum safety for its user.
- Social - To promote social inclusion by connecting remote and disadvantaged communities and increasing accessibility to the transport network for all Australians.
- Environmental - Protect our environment and improve health by building and investing transport systems that minimise emissions and consumption of resources and energy.
- Integration - Promote effective and efficient integration and linkage of Australia's transport system with urban and regional planning at every level of government and with international transport systems.
- Transparency - Transparency in funding and charging to provide equitable access to the transport system, through clearly identified means where full cost recovery is not applied.

In February 2008, ATC directed the Tasmanian Minister for Infrastructure, through establishment of the Strategic Research and Technology Working Group, to develop the strategic research and technology component of the National Transport Policy Framework. The following *criteria for future work* were endorsed by ATC in November 2009[24]:

- Technological application and innovation to be policy led where possible.
- Technology needs to support the implementation of the ATC's key policy directions with reference to the work agendas of SCOT's Standing Sub-Committees.
- Systems architecture and communications standards need to be the preferred approach to achieve inter-operability ahead of a product standards approach.
- The way forward requires input, support and cooperation between government policy makers, technology providers and technology users.

[23] ATC Joint Communiqué, available at http://www.atcouncil.gov.au/communique/files/27thATC-Communique.pdfhttp://www.ntc.gov.au/filemedia/Publications/NationalTransportPlanVol1Mar2008.pdf, p.117, February 2 May 2008.

[24] ATC Strategic Research and Technology Working Group, *Harnessing the power of technology for Australian transportation reform*, September 2009 (unpublished, approved by ATC on 6 November 2009).