ADMINISTRATIVE GUIDELINES, RULES AND CODES FOR OPERATION OF PERFORMANCE-BASED STANDARDS VEHICLES

DISCUSSION PAPER

March 2006

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National Transport Commission

Administrative Guidelines, Rules and Codes for Operation of Performance-Based Standards Vehicles: Discussion Paper

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REPORT OUTLINE

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Abstract: This Discussion Paper outlines the development of four documents that are aimed to ensure that a Performance-Based Standards (PBS) vehicle is constructed as assumed in the PBS assessment and is operated in a manner that is consistent with the assumptions made in the PBS assessment. The four documents are:
  • the Vehicle Assurance and Operating Rules;
  • the Vehicle Certification Code;
  • the Operator Certification Guidelines; and
  • the Compliance Assurance Guidelines.
Purpose: To seek comments on the proposed Guidelines, Rules and Codes for various aspects of the administration of PBS.
Key words: Performance based standards, road safety, road efficiency, productivity, guidelines
Comments by: Friday 12 May 2006
Comments to be addressed to:
            Chief Executive
            National Transport Commission
            L15/628 Bourke Street
            MELBOURNE VIC 3000
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FOREWORD

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

In May 2001, the Australian Transport Council (ATC) endorsed a policy proposal and principles for the development of a performance-based standards (PBS) approach to heavy vehicle regulation, which would act as an alternative regulatory system to the current prescriptive regulations. A substantial sub-project then developed a set of performance measures and appropriate levels of performance. In March 2004, ATC approved the resultant PBS Standards as an interim set, pending the submission of the completed PBS package for ATC approval in 2006/07.

This Discussion Paper details the development of an important set of documents that were drafted to ensure that PBS vehicles will continue to meet the PBS Standards. The documents are:

- Vehicle Assurance and Operating Rules;
- Vehicle Certification Code;
- Operator Certification Guidelines; and
- Compliance Assurance Guidelines.

These documents are intended to complement other recently completed documents (which will be available on the NTC website, www.ntc.gov.au, from 3 April 2006) in particular:

- Guidelines for Accreditation and Audit of PBS Assessors, which deal with the standards necessary to become an Assessor and the means by which Assessors will be audited and reviewed; and
- Rules for Assessment of Potential PBS Vehicles, which detail the methods that must be used by an Assessor when determining whether a potential PBS vehicles meets the PBS standards;

I wish to acknowledge the significant contributions made by Mr Bob Pearson, (Pearsons Transport Resource Centre P/L), Dr Hans Prem and Dr Luan Mai (Mechanical System Dynamics P/L) and Mr Bob Gardner (Emanar Consultants). At the NTC, I thank Parry Serafim, David Rolland, Peter Leyden, Christine Freeland and Susie Barragans for their ongoing enthusiasm and commitment toward the completion of this Discussion Paper and accompanying documents.

Comments are invited relating to any issue in either the Discussion Paper or in the first drafts of the Vehicle Assurance and Operating Rules, Vehicle Certification Code, Operator Certification Guidelines and the Compliance Assurance Guidelines.

The submission period ends on 12 May 2006.

Email comments to: pserafim@ntc.gov.au
Telephone: (03) 9236 5052
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Website: www.ntc.gov.au
Submissions by email are preferred, however responses may be mailed to the following address:

Mr Tony Wilson  
Chief Executive  
National Transport Commission  
L15/628 Bourke Street  
MELBOURNE VIC 3000
SUMMARY

Performance-based standards (PBS) is intended as a national alternative to the current system of heavy vehicle regulation. PBS focuses on outcomes rather than prescriptive inputs. In other words, PBS specifies how the vehicle should operate in terms of vehicle and road safety and infrastructure wear, whereas the current prescriptive approach specifies a range of maximum mass and dimensions. The PBS system being developed in Australia will be a regime that will be optional and operate in parallel to the present system of prescriptive regulation of heavy vehicle mass, dimensions and configuration.

A set of standards which PBS vehicles must comply has been developed. Assessment of the compliance with these standards may be undertaken by numerical modelling or by testing. The Rules for Assessment of Potential PBS Vehicles specify the methods and requirements of assessments, which are anticipated will be undertaken by accredited Assessors.

Having determined that a vehicle meets the PBS standards and is eligible to become a PBS vehicle, attention turns to means to ensure that the vehicle continues to comply with the PBS standards when it is operating under the PBS regime. This Discussion Paper outlines the development of four documents that are intended to provide the assurances necessary for the integrity of the PBS regime. The focus of these documents is:

<table>
<thead>
<tr>
<th>Basic question</th>
<th>Focus</th>
<th>Name of document</th>
</tr>
</thead>
<tbody>
<tr>
<td>What <strong>should</strong> the vehicle look like?</td>
<td>Construction requirements that will give confidence that the vehicle would continue to meet PBS standards</td>
<td>Vehicle Assurance and Operating Rules</td>
</tr>
<tr>
<td>What <strong>does</strong> the vehicle look like?</td>
<td>Inspection requirements that will guarantee that the vehicle is constructed as intended</td>
<td>Vehicle Certification Code</td>
</tr>
<tr>
<td>What <strong>should</strong> the operator do?</td>
<td>Minimum operator requirements aimed to give confidence that the vehicle will be operated within PBS approvals</td>
<td>Operator Certification Guidelines</td>
</tr>
<tr>
<td>How <strong>should</strong> the vehicle be operated (safety assessment)?</td>
<td>Operating conditions that will give confidence that the vehicle will continue to meet PBS safety and infrastructure standards</td>
<td>Vehicle Assurance and Operating Rules</td>
</tr>
<tr>
<td>How <strong>should</strong> the vehicle be operated (ARAC assessment)?</td>
<td>Additional operating requirements that will give confidence that the vehicle will not cause concerns for the infrastructure or road safety, either by exceeding approved mass and dimension conditions or straying off the route</td>
<td>Compliance Assurance Guidelines</td>
</tr>
</tbody>
</table>

The Vehicle Assurance and Operating Rules provide requirements for the development of vehicle physical characteristics and vehicle operating conditions by a PBS Assessor. Using a risk based approach, the PBS Assessor will specify what features should be included in the as-built vehicle to match the assumptions made during the assessment and what operating conditions are required for the same purpose. The vehicle and operating features are submitted to the Accreditation, Review and Audit Corporation (ARAC).

The ARAC will determine, based on the recommendations of the PBS Assessor, what are the vehicle physical characteristics that must be included in the vehicle. These requirements are passed to a PBS Vehicle Inspector, who will inspect the vehicle (or any separate part of a combination) in accordance with the Vehicle Certification Code and determine if the physical characteristics are the same as specified by ARAC. If the vehicle
is constructed as part of a production run, the PBS Vehicle Inspector will inspect only the first vehicle and the manufacturer will certify that the other vehicles are identical to the inspected vehicle.

A number of significant issues are involved in selecting PBS Vehicle Inspectors, including:

- are the eligibility requirements and competencies of the inspector sufficient?
- does the proposed method of appointment of PBS Vehicle Inspectors provide for mutual recognition of inspections?

The *Operator Certification Guidelines* are the base set of conditions that are considered necessary to become an operator of PBS vehicles. The Guidelines incorporate a requirement for a PBS Operator Management System, a system which comprises the Mass Management and Maintenance Management modules of the National Heavy Vehicle Accreditation Scheme (NHVAS) together with some additional requirements. Mass Management is considered necessary because the mass of the vehicle is likely to be critical for a number of PBS Standards, particularly Static Rollover Threshold. A specific requirement relating to tyres has been introduced into Maintenance Management as tyres are a particularly critical aspect of vehicle dynamic performance.

The *Operator Certification Guidelines* also include requirements for a “Suitable Operator” to ensure that operators of PBS vehicles do not have a history of non-compliance with transport laws. There are also provisions for the suspension and termination of PBS approvals.

The *Compliance Assurance Guidelines* are supplementary to the *Operator Certification Guidelines* and concentrate on conditions that might be applied to PBS operators based on operator history and particular aspects of the PBS vehicle.

The separate documents are Appendices to the Discussion Paper as follows:

- Appendix A: Vehicle Assurance and Operating Rules;
- Appendix B: Vehicle Certification Code;
- Appendix C: Operator Certification Guidelines; and
- Appendix D: Compliance Assurance Guidelines.

These documents are complementary to other sets of Rules, Codes and Guidelines that are being developed for the administration of PBS. Documents that have already been completed in draft form are:

- Rules for the Assessment of Potential PBS Vehicles;
- Road Classification Guidelines;
- Bridge Classification Guidelines; and
- Guidelines for the Accreditation and Audit of PBS Assessors.

To complete the documents, Enforcement Guidelines need to be drafted, along with the development of guidelines for database management.
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1. BACKGROUND

1.1 Context

The aim of the performance-based standards (PBS) project is to improve road safety, protect road infrastructure and promote innovation in heavy vehicle design through the adoption of a performance-based system of regulation for heavy vehicles. Factors motivating PBS include:

- speed of innovation in heavy vehicle design;
- the ongoing issue of incremental "creep" in prescriptive regulations;
- the forecast doubling in road freight between 2000 and 2020; and
- the need to increase productivity yet progressively improve road safety.

PBS is intended as a national alternative to the current system of heavy vehicle regulation. It focuses on specific performance outcomes rather than prescriptive inputs. In other words, PBS specifies how the vehicle should operate in terms of vehicle and road safety and infrastructure wear, whereas the current prescriptive approach specifies a range of maximum mass and dimensions.

The PBS system will be a regime that will be optional and operate in parallel to the present system of regulation.

In May 2001, Australian Transport Council (ATC) endorsed the policy framework for the development of a performance-based approach to heavy vehicle regulation and in March 2004 voted to adopt an interim set of performance based standards (the “PBS Standards”).

The PBS project is being undertaken in six phases, some concurrently, as follows:

- **Phase A: Performance Measures and Standards** – identifying the appropriate performance measures and standards and surveying the performance of the current heavy vehicle fleet;
- **Phase B: Regulatory and Compliance Processes** – establishing a regulatory system in which PBS can operate as a seamless national alternative to existing prescriptive regulations, including national compliance and enforcement arrangements;
- **Phase C: Guidelines** – preparing guidelines detailing the procedures and processes for the consistent application of PBS;
- **Phase D: Legislation** – developing the legislative arrangements for PBS to operate as an alternative to prescriptive regulations;
- **Phase E: Case Studies** – assembling work previously conducted and demonstrating the practical application of PBS to nationally agreed priorities; and
- **Phase F: Implementation** – putting in place the necessary legislative and administrative systems to allow PBS to operate nationally and providing the training and information to support these changes.

Significant work has already been undertaken on PBS, and the website of the National Transport Commission (NTC) contains previous reports (www.ntc.gov.au).

This project to develop these Guidelines, Rules and Codes is part of Phase C: Guidelines.
Figure 1 illustrates the proposed regulatory system.

**Figure 1. The proposed PBS regulatory system**

The draft Regulatory Impact Statement for the Regulatory Processes identified the national body responsible for administration of PBS as the Accreditation, Review and Audit Corporation (ARAC). An Interim Review Panel (IRP) has been formed and may undertake some of the functions of ARAC until the Corporation has been formed, but the Discussion Paper and the various Guidelines, Rules and Codes make reference only to ARAC. Any of the Guidelines, Rules and Codes could be adapted to another administrative body by inserting the name of that body for ARAC.
1.2 **Scope of this project**

PBS will be supported by technical and administrative guidelines, codes and rules. The technical documents include:

- Rules for the Assessment of Potential PBS Vehicles;
- Interim Road Classification Guidelines; and
- Bridge Classification Guidelines.

The first two of these documents have been issued in draft form and are available from the NTC website, [www.ntc.gov.au](http://www.ntc.gov.au)

Administrative documents include those being developed in this project, being:

- Vehicle Assurance and Operating Rules;
- Vehicle Certification Code;
- Operator Certification Guidelines; and
- Compliance Assurance Guidelines

Other administrative documents are:

- Guidelines for the Accreditation and Audit of PBS Assessors; and
- Enforcement Guidelines.

The former of these documents has been issued in draft form ([www.ntc.gov.au](http://www.ntc.gov.au)) and the latter is presently being developed in a separate project.

It is possible also that some form of guidelines for database management will be required.

1.3 **Acknowledgements**

A questionnaire was sent to jurisdictions early in the project relating to present inspection regimes and present accreditation practices. The authors are grateful to those officers who responded to this questionnaire.

Feedback during a discussion with the NTC PBS Reference and Coordination Group was of assistance to the Project Team members.

Valuable guidance has been provided by NTC officers, particularly during the early stages.
2. FRAMEWORK

A number of basic questions provide the framework for this project, as outlined in Table 1.

**Table 1. Focus of the Guidelines**

<table>
<thead>
<tr>
<th>Basic question</th>
<th>Focus</th>
<th>Name of document</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRE-OPERATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What <em>should</em> the vehicle look like?</td>
<td>Construction requirements that will <em>give confidence</em> that the vehicle would continue to meet PBS standards</td>
<td>Vehicle Assurance and Operating Rules</td>
</tr>
<tr>
<td>What <em>does</em> the vehicle look like?</td>
<td>Inspection requirements that will <em>guarantee</em> that the vehicle is constructed as intended</td>
<td>Vehicle Certification Code</td>
</tr>
<tr>
<td><strong>Operator requirements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What <em>should</em> the operator do?</td>
<td>Minimum operator requirements aimed to <em>give confidence</em> that the vehicle will be operated within PBS approvals</td>
<td>Operator Certification Guidelines</td>
</tr>
<tr>
<td>How <em>should</em> the vehicle be operated (safety assessment)?</td>
<td>Operating conditions that will <em>give confidence</em> that the vehicle will continue to meet PBS safety and infrastructure standards</td>
<td>Vehicle Assurance and Operating Rules</td>
</tr>
<tr>
<td>How <em>should</em> the vehicle be operated (ARAC assessment)?</td>
<td>Additional operating requirements that will <em>give confidence</em> that the vehicle will not cause concerns for the infrastructure or road safety, either by exceeding approved mass and dimension conditions or straying off the route</td>
<td>Compliance Assurance Guidelines</td>
</tr>
<tr>
<td><strong>OPERATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operator/vehicle activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What <em>does</em> the operator do?</td>
<td>To determine if the operator complies with imposed requirements</td>
<td>Enforcement Guidelines</td>
</tr>
<tr>
<td>How <em>is</em> the vehicle operated?</td>
<td>To determine if the vehicle is operated in accordance with imposed requirements</td>
<td>Enforcement Guidelines</td>
</tr>
</tbody>
</table>

In this project, *Codes or Rules* are the titles given to documents that are to be used by non-regulators (the Assessors and vehicle inspectors) while *Guidelines* is the title given to documents that are to be used by Regulators.

The *Enforcement Guidelines* are not part of this project and will therefore not be further considered.

To give further direction to the needs of the project, it is important to identify who is responsible for answering the basic questions and on what the answer is based. These issues are covered in Table 2.
Table 2. Responsibilities for end products of this project

<table>
<thead>
<tr>
<th>Basic question</th>
<th>Responsibility for answering the question</th>
<th>Answer based on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What <em>should</em> the vehicle look like?</td>
<td>Assessor(s) of the potential PBS vehicle</td>
<td>Assumptions in the assessment</td>
</tr>
<tr>
<td>What <em>does</em> the vehicle look like?</td>
<td>Inspector and/or vehicle manufacturer</td>
<td>The as-built vehicle</td>
</tr>
<tr>
<td>Operator requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What <em>should</em> the operator do?</td>
<td>ARAC</td>
<td>Minimum requirements for operators of PBS vehicles</td>
</tr>
<tr>
<td>How <em>should</em> the vehicle be operated (safety assessment)?</td>
<td>Assessor(s) of the potential PBS vehicle</td>
<td>Assumptions in the assessment</td>
</tr>
<tr>
<td>How <em>should</em> the vehicle be operated (ARAC assessment)?</td>
<td>ARAC</td>
<td>Risk assessment of the operation/route</td>
</tr>
</tbody>
</table>

Finally, the oversight of documents and resultant action is given in Table 3.

Table 3. Results of use of the Guidelines, Codes and Rules

<table>
<thead>
<tr>
<th>Basic question</th>
<th>Responsibility for answering question</th>
<th>Resultant action</th>
<th>Result used by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle requirements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What <em>should</em> the vehicle look like?</td>
<td>Assessor(s)</td>
<td>Regulator considers and approves requirements</td>
<td>Inspector/manufacturer and enforcement</td>
</tr>
<tr>
<td>What <em>does</em> the vehicle look like?</td>
<td>Inspector and/or manufacturer</td>
<td>Regulator considers and approves certification by the inspector</td>
<td>Enforcement</td>
</tr>
<tr>
<td>Operator requirements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What <em>should</em> the operator do?</td>
<td>ARAC</td>
<td>Operator prepares management system</td>
<td>Regulator (approves), enforcement</td>
</tr>
<tr>
<td>How <em>should</em> the vehicle be operated (safety assessment)?</td>
<td>Assessor(s)</td>
<td>Regulator considers and approves requirements, operator prepares management system</td>
<td>Regulator (approves), enforcement</td>
</tr>
<tr>
<td>How <em>should</em> the vehicle be operated (ARAC assessment)?</td>
<td>ARAC</td>
<td>Operator prepares management system</td>
<td>Regulator (approves), enforcement</td>
</tr>
</tbody>
</table>

It can be seen from Table 3 that the outcome of three of the documents feed into the PBS Operator Management System, as shown in Figure 2. The three documents are:

- Operation Certification Guidelines;
- Vehicle Assurance and Operating Rules; and
- Compliance Assurance Guidelines
Figure 2. Inputs into the PBS Operator Management System

Operator Compliance Guidelines

Vehicle Assurance and Operating Rules

Compliance Assurance Guidelines

ARAC consideration

PBS Operator Management System
3. DEVELOPMENT OF THE VEHICLE ASSURANCE AND OPERATING RULES

3.1 Introduction

The Vehicle Assurance and Operating Rules deal with important issues related to identification of significant construction characteristics of a potential PBS vehicle and specification of how the PBS vehicle should be operated in order that the PBS vehicle would be expected to continue to comply with the PBS Standards.

For certification and subsequent operation of potential PBS vehicles, these Rules are intended to instruct an Assessor on how to identify, either directly or indirectly, a sufficiently complete specification of critical components and/or sub-assemblies, as well as operating requirements that are necessary to ensure the performance of the as-built vehicle is consistent with the performance assumed by the Assessor when the PBS Assessment was performed.

The Rules deal with:

- identification and ranking of Risk Sensitive Parameters (see Section 3.2);
- specification of vehicle physical characteristics (see Section 3.3) presented in a form that can be checked on the vehicle by a PBS Vehicle Inspector; and
- specification of vehicle operating conditions (see Section 3.3).

These Rules assume the main method of vehicle assessment is by numerical modelling.

A draft of the Rules is given at Appendix A to this Discussion Paper.

3.2 Risk Sensitive Parameters

3.2.1 General Comments

In the formal assessment of a potential PBS vehicle performed in accordance with the Rules for Assessment of Potential PBS Vehicles, the Assessor is required to carry out sensitivity testing (NTC, 2005a). In its broadest interpretation, sensitivity testing is designed to identify parameters that have the greatest influence on heavy vehicle performance values measured by each of the performance standards.

The primary purpose of sensitivity testing, which is central to identifying and managing risks associated with operating PBS vehicles on the road network, is to identify the Risk Sensitive Parameters and quantify the influence of each Risk Sensitive Parameter on performance levels.

Formally, a Risk Sensitive Parameter is any mechanical property of the vehicle, or a related operating factor, whether it is or is not vehicle or component specific, geometric, or mass related, having a significant influence on vehicle performance in one or more PBS safety standards.
3.2.2  Design Features and Operating Factors

a) Vehicle Design Features

A vehicle design feature is any mechanical property of a vehicle that can be uniquely identified and its properties described and quantified in engineering terms. Design features can be geometric (e.g. dimensions, spatial relationship between parts), mass related (e.g. wheel or axle group loads, centre-of-gravity location, mass distribution), physical constraints (e.g. how one part is connected to another part) or, more broadly, component or sub-assembly specific (e.g. engine, gearbox, suspensions and tyres, steering arrangements).

Therefore, by definition, Risk Sensitive Parameters are a subset of vehicle design features.

The assessment that is performed of vehicle design features to determine Risk Sensitive Parameters is performed using numerical modelling by the Assessor. It is important to note that the outcome of sensitivity testing will depend on the features contained in the numerical model. For example, models used to assess low-speed offtracking that are based purely on geometry will not be responsive to changes in tyre loads and would only be suitable as preliminary indicators of performance level. Therefore, it is a requirement, as specified in the Rules for Assessment of Potential PBS Vehicles, that numerical models used for PBS Assessments are constructed and contain sufficient detail to reproduce the main responses of the actual PBS vehicle in each specified manoeuvre.

In some circumstances, if the potential PBS vehicle has already been built, the assessment of vehicle design features to determine Risk Sensitive Parameters may also be performed by physical testing. However, as it generally requires a large number of parameters to be varied and the influence of each change on performance quantified, for the majority of assessments (at least during the initial stages of vehicle development) field testing may be impractical and expensive. On the other hand, for some parameters, such as suspension settings and tyres and payload variations, parametric studies performed under controlled conditions may be a viable option. Further, under the right circumstances a combination of numerical modelling and field testing may prove an attractive and practical proposition.

In accordance with the Rules for Assessment of Potential PBS Vehicles, baseline performance levels must be established using a reference set of parameters. The reference set of parameters must be those values that define the PBS vehicles. The Risk Sensitive Parameters for each of the PBS Safety Standards that must be considered in an initial sensitivity analysis are presented in Attachment A of the Vehicle Assurance and Operating Rules. It should be noted that the list in Attachment A is not all-inclusive and there may be other parameters that the Assessor will need to consider that will become obvious once the formal PBS assessment of the potential PBS Vehicle is underway.

Further, some of the parameters listed in Attachment A may be highly significant for some applications but they will be not significant (in a practical sense) in other applications. The height of the sprung mass centre-of-gravity (CG), for example, is a critical parameter in defining a vehicle’s static rollover threshold. However, it may not be significant in applications where only high-density payloads are being transported and low CG heights can be guaranteed. In these applications the vehicle’s static rollover threshold will always be well above the PBS threshold value (acceptable) and it may not be necessary to closely control loading. In other applications, where the CG height and payload offsets are critical factors in defining the vehicle’s static rollover threshold, these will need to be closely controlled to ensure they do not fall outside the defined limits inherent in the design or set by the Assessor as part of the PBS assessment.
Where vehicle design features are unique features not yet found in the majority of current fleet vehicles, these features will need to be identified and appropriate recommendations put forward by the Assessor to address performance issues related to Risk Sensitive Parameters. The Assessor will need to ensure, either directly or indirectly, that measures are either put in place, or can be put in place, that will ensure the unique features that improve vehicle performance maintain their effectiveness. This may require involvement of third parties, those involved in the design and development of the unique feature, and it may require skills upgrading and training of operators and drivers. Drivers, in particular, may need special training if novel steering systems, or similar, are a vehicle feature.

b) Vehicle Operating Factors

Vehicle operating factors are the parameters that can vary or change in the day-to-day operation of the PBS vehicle. These will need to be controlled to ensure the performance of the PBS vehicle is consistent with the performance under the PBS approval. Straightforward examples of vehicle operating factors that can have a significant impact on vehicle performance are speed, payload (total mass and CG location), tyre inflation pressure and tyre wear. Each of these parameters can vary between trips or within a single trip, and will need to be checked or inspected at the beginning of a trip, at nominated intervals, or continuously, as determined to be necessary, and adjusted as specified in order to ensure the performance of the PBS vehicle remains within the boundaries defined by the PBS approval.

Speed is a very important operating factor, as it has a significant influence on the high-speed directional responses and stability of heavy vehicles (rearward amplification, high-speed transient offtracking, yaw damping coefficient). If prior approval to operate at a lower speed has been granted by ARAC under the Compliance Assurance Guidelines (see Section 6) then the PBS assessment need only consider performance issues up to the maximum permitted speed. That is, the Assessor will not be permitted to specify a maximum speed below the posted speed limit to achieve compliance unless prior approval has been formally agreed and granted.

In a manner similar to that for vehicle design features, the Assessor using numerical modelling, physical testing or a combination of physical testing and numerical modelling, performs an assessment of vehicle operating factors to determine Risk Sensitive Parameters. Where vehicle operating factors are unique and not yet found in the majority of current fleet vehicles, these will need to be identified and appropriate recommendations put forward by the Assessor to address performance issues related to Risk Sensitive Parameters.

As before, the Risk Sensitive Parameters for each of the PBS Safety Standards that must be considered in an initial sensitivity analysis are presented in Attachment B of the Vehicle Assurance and Operating Rules. It should be noted that the list in Attachment B is not all-inclusive and there may be other parameters that the Assessor will need to consider that will become obvious once the formal PBS assessment of the potential PBS vehicle is underway.
3.2.3 **Sensitivity Analysis**

The sensitivity analysis is central to the effective risk management of PBS vehicles because it identifies parameters that are most likely to adversely impact safety performance. Once identified, effective controls can be put in place to ensure the parameters are contained within acceptable boundaries.

As a default, the sensitivity analysis considers off-baseline variations in parameter values that are up to ±20% of the baseline values, unless it can be shown that such variations do not adequately represent variations that can occur in practice. These variations can occur either during construction of the vehicle or in-service when operating.

If variations that are ±20% of the baseline values are not appropriate, the larger of the following should be used:

- expected variations due to manufacturing tolerances;
- expected variations in the performance characteristics of like components sourced from the same or different suppliers; or
- expected in-service variations due to normal wear and tear.

To ensure only the critical parameters are identified and controlled, vehicle design features or operating factors are identified as *Risk Sensitive Parameters* and ranked according to the outcome of the sensitivity analysis. If the off-baseline variation produces a change in the value of the PBS Safety Standard outcome of not less than 2.0% then the vehicle design feature or operating factor is classified as a *Risk Sensitive Parameter*. While at first glance a 2.0% sensitivity may appear to be a small change in performance, under the right conditions five parameters with a 2.0% sensitivity can in combination lead to a 10% change (good or bad) in a performance outcome. To further assist risk management the *Risk Sensitive Parameters* are assigned rankings in accordance with the schedule listed below in Table 4 (reproduced from Attachment A to the *Vehicle Assurance and Operating Rules* (Appendix A)).

### Table 4. Ranking of Risk Sensitive Parameters

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Percentage change in numerical value of PBS Safety Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20.0% or more</td>
</tr>
<tr>
<td>2</td>
<td>5.0% or more but less than 20.0%</td>
</tr>
<tr>
<td>3</td>
<td>2.0% or more but less than 5.0%</td>
</tr>
</tbody>
</table>

The *Risk Sensitive Parameters* related to vehicle design features that receive a ranking of one (1) for a “typical” PBS vehicle are listed below in Table 5. These have been compiled from the list detailed in Attachment A of Appendix A.
Table 5. Significant and high rank risk sensitive parameters (typical) for vehicle design features

<table>
<thead>
<tr>
<th>PBS Standard</th>
<th>Risk Sensitive Parameters (typical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startability, Gradeability, Acceleration capability</td>
<td>Gross mass; Engine torque-speed characteristics; Clutch engagement torque or torque converter characteristics; Gearbox and final drive ratios; tyre rolling radius; time delays associated with gear shifting.</td>
</tr>
<tr>
<td>Tracking ability on a straight path</td>
<td>Tyre cornering characteristics; centre-of-gravity (CG) height and load offset; Gross mass; Wheelbase; Chassis torsional flexibility.</td>
</tr>
<tr>
<td>Low speed swept path, Frontal Swing, Tail Swing, Steer tyre friction demand</td>
<td>Wheelbase dimensions; Front and rear over hang dimensions; Forward projection; Plan profiles of outside corners and protuberances; Steer axle load.</td>
</tr>
<tr>
<td>Static rollover threshold, Rearward amplification, Yaw damping coefficient, High speed transient offtracking</td>
<td>Centre-of-gravity (CG) height; Tyre cornering characteristics; Wheelbase dimensions; chassis torsional flexibility.</td>
</tr>
</tbody>
</table>

From the above table, the Risk Sensitive Parameters related to vehicle design features that appear most often across all the standards in the above table are:

- gross mass;
- centre-of-gravity (CG) height and load offset;
- tyre cornering characteristics,
- wheel base dimensions; and
- chassis torsional flexibility.

Similarly, the Risk Sensitive Parameters related to vehicle operating factors that are both significant and receive a ranking of one (1) for a “typical” PBS vehicle are listed below in Table 6. These have also been compiled from the list detailed in Attachment B of Appendix A.

Table 6. Significant and high ranking risk sensitive parameters (typical) for vehicle operating factors

<table>
<thead>
<tr>
<th>PBS Standard</th>
<th>Risk Sensitive Parameters (typical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startability, Gradeability, Acceleration capability</td>
<td>Gross mass</td>
</tr>
<tr>
<td>Tracking ability on a straight path</td>
<td>Tyre cornering characteristics; centre-of-gravity (CG) height and load offset; Gross mass; Operating speed.</td>
</tr>
<tr>
<td>Low speed swept path, Frontal Swing, Tail Swing, Steer tyre friction demand</td>
<td>Steer axle load.</td>
</tr>
<tr>
<td>Static rollover threshold, Rearward amplification, Yaw damping coefficient, High speed transient offtracking</td>
<td>Centre-of-gravity (CG) height; Tyre cornering characteristics; Operating speed.</td>
</tr>
</tbody>
</table>
From Table 6, the Risk Sensitive Parameters related to vehicle operating factors that appear most often across all the standards in the above table are:

- gross mass;
- centre-of-gravity (CG) height and load offset;
- tyre cornering characteristics; and
- operating speed.

It is important to note that, in each of the PBS safety related manoeuvres, operating speed is specified and precisely controlled and the performance level is determined at defined speed. For the in-service vehicle the operating speed will be set by the prevailing traffic conditions, posted speed limits, speed restrictions imposed by permits issued by road agencies (as discussed earlier) or on-board speed limiters.

3.3 Specification of Risk Sensitive Parameters

3.3.1 Introduction

In order to ensure a PBS vehicle has been constructed and is operated in a manner consistent with the performance determined by the PBS Assessor when the approved PBS Assessment was performed, the Risk Sensitive Parameters must be specified in a way that will allow relatively simple specific checks to be performed by approved PBS Vehicle Inspectors. It may also be necessary for some checks to be performed by transport operators, drivers and anyone else involved in the maintenance and day-to-day operation of the PBS vehicle.

To achieve this outcome, the vehicle design features and vehicle operating factors must be specified in terms of vehicle physical characteristics and vehicle operating conditions. These are physical quantities or items of hardware than can be certified, easily checked or measured. Critical vehicle physical characteristics must be identified and carefully managed, and these will be directly linked to Risk Sensitive Parameters that emerge from the sensitivity analysis.

By way of example, physical dimensions can be measured using basic or sophisticated equipment, whereas tyre cornering-characteristics are not easily measured and would require highly specialised and expensive equipment not readily available to approved PBS Vehicle Inspectors or vehicle operators. Therefore, generally speaking, physical dimensions can be considered as vehicle physical characteristics. Tyre cornering characteristics, on the other hand, may have to be linked to a generic tyre size, or a specific one that requires the size, make, model, tread pattern and inflation pressure to be declared, that is, the vehicle physical characteristics become a generic or complete component specification rather than a dimension or similar per se.

Other more obscure Risk Sensitive Parameters that may be associated with novel and innovative systems may be difficult to measure, but these will need to be identified, defined and checks specified in a way that ensures appropriate steps are in place to give a high level of confidence that a PBS vehicle has been constructed and will be operated and maintained in a manner consistent with that assumed in the PBS Assessment.
### 3.3.2 Vehicle Design Features

The Assessor must identify vehicle design features in terms of *vehicle physical characteristics*. If the PBS vehicle is a combination, the vehicle physical characteristics must be identified for each separate vehicle unit in the combination. If there is more than one trailer, semi-trailer or dolly in the combination, the position of the vehicle unit in the potential PBS vehicle must also be identified.

The *vehicle physical characteristics* must be specified in a way that allows the characteristics to be checked using one or more of the following methods:

- physically checked on the vehicle by straightforward measurements taken by a PBS Vehicle Inspector;
- checked by a simple visual inspection of components performed by a PBS Vehicle Inspector. This would involve certifying the make, model and serial number of specific components such as chassis, engines and transmissions, entire suspension assemblies or individual suspension components (shock absorbers, airbags, springs, and the like), tyres, and other features or components deemed to be risk sensitive; and
- checked by the PBS Vehicle Inspector by sighting certified documents from service providers (these could include other PBS Assessors not involved with the specific PBS Assessment), manufacturers or component suppliers/testers.

Any *vehicle physical characteristics* associated with a *Risk Sensitive Parameter* rank of 1 or 2 (see Table 4) must be defined precisely in order to accurately represent the assumptions of the Assessor.

The Assessor is required to complete the Schedule to the Rules so that the potential PBS vehicle is specified as the Assessor assumed. The Schedule has been designed such that it is completed by the Assessor, forwarded to ARAC with the Final Application, checked and approved (or modified) by ARAC, sent by ARAC to the PBS Vehicle Inspector who certifies that the vehicle has been built according to the ARAC approval and then returned to ARAC. Use of the Schedule in this way should eliminate errors in translation of requirements. It is expected that electronic means will be used for recording and forwarding and this will enhance the electronic record keeping of ARAC.

Dimensions are a particularly difficult area. With vehicle dimensions, the approach with prescriptive limits is that actual dimensions must not be greater than maximum allowable nor less than minimum allowable (within measurement allowances). However, with PBS vehicles, variations in actual dimensions will affect a number of outcomes. For example, with low speed swept path, the combination of dimensions could be critical as a small increase in a large dimension will add significantly to maximum swept path. For both frontal swing and tail swing, it may be necessary for the Assessor to specify an envelope of acceptable dimensions if tapering at the front or the rear, or perhaps load overhang, is required.

It is open to the Assessor to test a range of dimensions (or tolerances) to ensure compliance with all PBS standards. However, if the Assessor does not specify tolerances for any given dimension, the dimension as specified in the Schedule and measured by the PBS Vehicle Inspector must be within the new Austroads dimensional adjustments (Austroads 2004).
3.3.3 **Vehicle Operating Factors**

Similar to *physical vehicle characteristics*, the *vehicle operating conditions* must be specified in a way using one or more of the following methods that allows the conditions to be:

- **a)** checked or inspected at nominated intervals;
- **b)** continuously monitored and manually adjusted at nominated intervals; or
- **c)** monitored continuously and adjusted automatically either continuously or at nominated intervals.

By way of example, the above three can be applied to tyre inflation pressure, which has a direct influence on a range of tyre mechanical properties (vertical stiffness, lateral and longitudinal force response). For some PBS vehicles tyre inflation pressure will not be a risk sensitive parameter, and so normally it need only be checked at manufacturer recommended intervals. In other applications, where load height and cornering performance are very sensitive to tyre inflation pressure, it may be necessary to monitor inflation pressure continuously and/or have it adjusted automatically, via Central Tyre Inflation (CTI) system, or manually at the first available opportunity when it falls outside accepted boundaries.

The Assessor is required to complete a Schedule to the Rules with the following information:

- acceptable load types – the load types that were assessed must be described;
- the Centre-of-Gravity (CG) Height (above ground level) of each load type on each motor vehicle and trailer or semi-trailer (as appropriate) that was assumed in the PBS Assessment must be specified, as must the “least favourable load condition” as described in the Rules for Assessment of Potential PBS Vehicles;
- the maximum and minimum tyre pressures for each axle group must be specified and a number of questions answered about the sensitivity to tyre pressures;
- the maximum speed at which the vehicle can meet the high speed PBS Safety Standards must be specified if prior approval was granted to a speed lower than the open road speed limit; and
- any special operating conditions that were assumed during the assessment and are critical to vehicle operating conditions must be reported.

ARAC would use this information to advise the operator of the requirements of the PBS Operator Management System (see Section 5).

### 3.4 Special Requirements

As noted earlier, other more obscure *Risk Sensitive Parameters* that may be associated with novel and innovative systems may be difficult to measure, but these will need to be identified, defined and checks specified in a way that ensures appropriate steps are in place to give a high level of confidence that a PBS vehicle has been constructed and will be operated and maintained in a manner consistent with that assumed in the *PBS Assessment*.

Where *vehicle physical characteristics* cannot be specified using one or more of the methods described in this paper, the Assessor must specify a reasonable way for a PBS Vehicle Inspector to check the characteristic.
3.5 Assessment by Testing

The majority of the preceding discussion has assumed that the Assessor has used numerical modelling to assess the vehicle. In the unlikely event that some or all of the assessment is completed by testing, the vehicle as tested must be specified by the Assessor, although any variations that do not affect the compliance with the PBS standards can be included.
4. DEVELOPMENT OF THE VEHICLE CERTIFICATION CODE

4.1 Introduction

4.1.1 General

The *Vehicle Certification Code* deals with the inspection and certification of the as-built vehicle to ensure that it meets the requirements of the specifications produced in accordance with the *Vehicle Assurance and Operating Rules*.

The PBS Vehicle Inspector will inspect the potential PBS vehicle and certify that the physical characteristics identified by the PBS Assessor (and endorsed or modified by ARAC) have been incorporated in the final as-built vehicle.

The questions that need to be answered include:

- who should undertake the inspection;
- how should the inspection and certification be undertaken; and
- what degree of confidence can all registration authorities have in the certification regardless of the jurisdiction in which the inspection was undertaken.

Other issues that need to be considered for inclusion in the Code include:

- the need to define procedures for vehicle certification and the steps taken to conduct the certification;
- the need to define procedures for handling non-compliance and resulting reporting mechanisms;
- when and by whom a vehicle is to be presented for certification;
- the need for each separate portion of a combination vehicle to be certified at the same time;
- the aspects of a vehicle that must be checked, including how the vehicle verification data will be used;
- the role, if any, of the relevant manufacturers;
- dealing with multiple vehicles of the same specification;
- how the vehicle is entered into the PBS data base; and
- how the vehicle is linked into the jurisdiction’s registration system.

The costs associated with the certification system have been estimated. However, it has been a basic assumption throughout this paper that the PBS Operator should bear the costs of the inspection process. As it must be the prerogative of the PBS Operator to organise the inspection when and where it suits and nominate any of the PBS Vehicle Inspectors from ARAC's list of endorsed inspectors, then the PBS Operator must also be responsible for payment to the inspector including re-imbursement of any travel and/or accommodation costs.
4.1.2 Code

The first draft of the Vehicle Certification Code is Appendix B to this Discussion Paper.

As the persons most likely to be endorsed as PBS Vehicle Inspectors will be from a group whose current activities regularly involve working with and being familiar with technical documents such as the Australian Design Rules and Vehicle Standards Bulletin No 6 (the National Heavy Vehicle Modification Code of Practice), the Vehicle Certification Code has been formatted and structured in a similar manner to those documents. Therefore, the numbering of the Code is different to the numbering of the other three documents.

4.2 Who can undertake a PBS certification inspection?

Among the range of persons would be capable of undertaking the physical inspections of potential PBS vehicles, the role of the different manufacturers is of obvious importance. Also important is the issue of independence, which is addressed in Section 4.2.6.

4.2.1 Should Manufacturers be able to Undertake a PBS Certification Inspection?

Australian Design Rule (ADR) certification for volume produced vehicles is carried out by the vehicle manufacturer who is authorised to fit compliance plates to their products. Therefore, should not the manufacturers of PBS vehicles be allowed to provide PBS vehicle certification?

The ADR certification process is backed up by a process of initial submission of a summary of compliance evidence, issue of compliance plate approval, in some cases government implemented single unit type inspections (SUTI), and conformity of production (COP) audits. Further, certification approval is generally for substantial numbers of (near) identical vehicles produced by volume manufacturers that have considerable experience in their product and a substantial investment in their facilities. These manufacturers also face possibly very expensive and market influencing recalls of many vehicles should evidence of non-compliance (or another safety related issue) be identified in just a small number of their vehicles. On the other hand, many PBS vehicles are likely to be unique or manufactured in very small numbers by businesses that may have only a limited understanding of the implications of PBS requirements.

The assessment of the original application for PBS approval is to be carried out by an accredited Assessor to provide a high degree of assurance that the proposal will meet PBS requirements. The PBS certification of the vehicle is also to provide a similar level of assurance that the vehicle(s), when constructed, meets the criteria identified in the original assessment.

While the vehicle manufacturer will endeavour to build the vehicle(s) to meet the criteria established in the PBS assessment, the subsequent PBS certification of the completed vehicle(s) is a check on whether the manufacturer’s work does actually meet PBS requirements. Therefore, while some check on PBS compliance independent of the vehicle manufacturer is required, this would not preclude a vehicle manufacturer providing certification that a number of vehicles produced at the same time and using the same components supplied by the same suppliers are identical to another vehicle from that same production run that has already been certified as complying with the PBS requirements. This manufacturer's certification, when combined with the independent inspector's certification of one of the “identical” vehicles, would provide adequate evidence that all the vehicles meet PBS requirements. With this approach, an independent check on the PBS compliance is achieved and the manufacturer does not need to have a high degree of
understanding of the implications of PBS requirements - this is covered by the initial certification of one of the vehicles by the independent inspector.

Using the system described above, the manufacturer is not explicitly certifying that the vehicles meet the PBS requirements (only that the vehicles are identical to one which has already been certified as complying) but as noted later, there are some aspects of PBS certification that may need to rely almost totally on the manufacturer/s.

4.2.2 Can Manufacturers’ Information be Used for PBS Certification?

In many cases the person certifying the completed vehicle may not be in the best position to assess some characteristics and it may be acceptable to use evidence or sub-certification from other appropriately qualified persons. These other persons may be the suppliers of specific components of the vehicle. For example, without extensive and expensive testing, the torque/RPM characteristics of an engine can only be realistically provided by the engine manufacturer and/or dealer. The dealer has to be included here as there are usually different levels of controlled access to the engine’s Electronic Control Module (ECM), its firmware and the software/programs and in some cases the dealer can change some parameters (within limits) that effect engine output.

While a download or printout of the ECM data using tools such as Prolink™ and Ultralink™ may identify firmware levels and/or revisions and may provide some ECM identification information, this information can often only be reliably interpreted by the dealer or manufacturer.

The situation is somewhat similar for transmissions and rear axles where the casings may be generic to a number of different units. While for these items there may be external tags or plating which provide a clue to the internals, with the emergence of transmissions linked to, or controlled by, the ECM, again only the manufacturer or dealer may be able to confirm the exact parameters or installed contents.

4.2.3 What Evidence is Required for PBS Certification and Who Can Supply it?

The discussion above raises the issue of how far back it is necessary or allowable to go with a PBS certification. That is, how remote from the finished vehicle can a certifier be yet still provide an acceptable PBS certification and can a PBS certification be made up of sub-certifications each of which may be made up of more sub-certifications? For example, an engine made by manufacturer X with a gear box made by manufacturer Y is installed in a prime mover made by manufacturer Z with a separate manufacturer again providing the electronic engine management system. If the engine and gearbox are critical components, is certification required from the subcomponent suppliers or only from the truck manufacturer who may in turn base their certification on what the subcomponent suppliers provide to them? It gets even more complex if an automatic/self select transmission is used as this would be linked to the engine management system.

Added to this issue is the complication relating to physical inspection of the vehicle and identification of particular characteristics. For example, a particular engine and transmission (and differential) combination may have been specified for a prime mover. While the external identifiers of the components may be readily determined, there may be a variety of electronic engine and power train management systems available or they may be programmable such that the performance characteristics of the engine and transmission combination can be widely different. In this case the supplier of the engine, transmission and electronic control systems could be the most appropriate to certify compliance of this aspect. Similarly, the one transmission or differential housing may be fitted with a variety
of gear ratios, and while labels or tags on the outside may identify these, they may be in coded form. Consequently, the transmission or differential supplier would appear to be the most appropriate to be accountable for the certification of this aspect.

If it is deemed that a number of different sources are acceptable for different aspects of the certification, at some point near the end of the PBS certification process either all the separate PBS certifications would need to be submitted to ARAC for consolidation and checking or a single inspector be responsible for this work, at least for each individual vehicle that is part of a combination.

The latter approach is favoured as this strengthens accountabilities. Also, while unlikely, it may be possible for a vehicle to meet all the Assessor’s requirements for PBS compliance yet have been built with some other legitimate feature that was not considered and which compromises its PBS compliance. The single inspector would then be responsible for reporting this to ARAC.

While a single inspector may not be held accountable for the technical correctness of the certification of aspects that they were not reasonably in a position to certify, such as those aspects that only the component manufacturer could certify, that individual must still be accountable for ensuring that a certification statement was provided for each critical component. Also, that single inspector should be accountable for determining that the various certifications are from persons or organisations suitably positioned to provide those assurances and the certifications thus acceptable.

Therefore, to ensure proper accountability, the person certifying the vehicle must ultimately be responsible and they must ensure the veracity of all the evidence upon which they based their certification. Further, to keep the chain of responsibility short and to avoid clouding accountabilities, it is suggested that for motor vehicles, the certification statements should only be from the vehicle manufacturer, who may in turn base their statements on information provided to them from component suppliers such as engine and gearbox manufacturers. In the case of other vehicles, certification statements from the suppliers of major, readily identifiable, self contained components could be acceptable in lieu of the vehicle manufacturer’s certification. For some physical aspects such as CG height, certification statements from either the vehicle manufacturer or recognised testing organisations should also be acceptable.

4.2.4 What Competencies are Required of PBS Vehicle Inspectors?

The PBS Assessor is required to document all the physical features, characteristics and parameters which must be present for the completed PBS vehicle (or combination of completed vehicles) to meet PBS requirements. These are required to be presented in a form that will, as far as is possible, allow them to be readily verified during a visual inspection of the completed vehicle. Therefore, the PBS Vehicle Inspector does not need to have a high degree of engineering skills. Nevertheless, the PBS Vehicle Inspector needs to have a good knowledge of heavy vehicles, have the ability to identify components and/or know how or who to contact in the vehicle or component manufacturing industries to obtain any required information, specifications and certification statements, have the ability to understand the information, specifications or certification statements provided by others and be familiar with ADR definitions and typical heavy vehicle terminology. The PBS Vehicle Inspector will also need to undertake measurements including making allowances for measuring adjustments, carry out some calculations and record and document findings during the inspection. Therefore the PBS Vehicle Inspector must have good basic mathematics and logic skills as well as demonstrated written communication skills.
Most jurisdictions have either a signatory scheme for assessing vehicle modifications or carry out these assessments with their own staff. Any person authorised to assess and approve a broad range of modifications to heavy vehicles (i.e. not persons authorised in just limited areas of expertise) under these systems would generally have the skills, knowledge and capabilities to carry out a PBS certification inspection. These persons will usually have at least five years practical experience in heavy vehicle design, inspection, maintenance or modification or a combination thereof covering a broad range of heavy vehicle issues. However, in many cases they may not have trade qualifications but rather, extensive trade experience.

Many jurisdiction agencies’ heavy vehicle on-road enforcement officers, some of whom do not have motor trade qualifications, would also possess the skills and experience to undertake a PBS certification inspection despite the fact that the nature of inspections they normally carry out (looking for evidence that the vehicle does not comply in some area) may be considered quite different from a PBS certification inspection (checking that all aspects of a vehicle do comply).

Therefore, it is considered that trade qualifications are not essential and that any individual with:
- at least five years experience covering a broad range of activities such as design, inspection, maintenance and/or modification of heavy vehicles; and
- good basic mathematics and reasoning skills; and
- good written communication skills.

would possess the competencies to become a PBS Vehicle Inspector.

It should be noted that authorisation as a PBS Vehicle Inspector would be issued to individuals not organisations and the authorisation would be based on an assessment of the individual’s experience and skills and other eligibility requirements as below.

### 4.2.5 Other Eligibility Requirements

The question arises as to other requirements of an inspector, particularly “fit and proper” or suitable person requirements. These are particularly important issues for PBS Vehicle Inspectors as mutual recognition across jurisdictions of the veracity of the inspection and certification is required. Without this mutual recognition, costly and prohibitive duplication will occur.

Many accreditation schemes have a “fit and proper” person test for eligibility. For example, the VicRoads Vehicle Assessment Signatory Scheme (VASS) has the following description of person who is not “fit and proper”:

A person will not be considered to be fit and proper if the person:
- has been found guilty of an offence of dishonesty;
- is bankrupt;
- is prevented by any illness or mental or physical disability from properly performing the obligations of a Signatory;
- has failed, in VicRoads opinion, to properly perform the obligations of a Signatory, or of a person with responsibilities of a Signatory under any previous scheme similar to the Vehicle Assessment Signatory Scheme, or a similar scheme in any other State or Territory;
- has had his or her authorisation under the scheme, or a similar previous or interstate scheme, suspended or cancelled and, in VicRoads opinion, the circumstances or actions that led to the suspension or cancellation are continuing or are likely to re-occur if the person is appointed or re-appointed as a Signatory.
These five requirements are fairly standard in accreditation schemes and are therefore an excellent starting point for consideration of fit and proper person requirements.

The first three dot points above normally require record checks or some assessment by the authorising agency. The first dot point is an obvious pre-requisite. However, while the second and third dot points may seem superfluous initially, their inclusion (along with the last two) would enable the authorising body to readily withdraw the authorisation of an inspector should any of the particular situations arise.

The last two clauses in the VASS list relate to poor performance of signatories. As it is probable that in at least some jurisdictions, the PBS Vehicle Inspectors will be a sub-set of their engineering signatory schemes, the inclusion of some judgmental provision from the nominating jurisdiction agency (see section 4.2.7) is justified and may well be essential for mutual recognition of inspections. Consequently, the wording in the VASS scheme appears a good basis for similar wording for eligibility for PBS Vehicle Inspectors.

### 4.2.6 The Need for an Independent Inspector

Before addressing the issue of independence of the PBS Vehicle Inspector, it is worthwhile to revisit the need for independence of the PBS Assessor. As indicated in 4.2.1, the assessment of the original application for PBS approval is to be carried out by an accredited Assessor to provide a high degree of assurance that the proposal will meet PBS requirements. However, the Assessor is likely to be in the employ of, or contracted to, the organisation presenting the PBS proposal and because of the nature of the work, will need to interact closely with the operator and vehicle manufacturer. A PBS proposal will require approval from ARAC and consequently there is the opportunity to oversee or check the work of the PBS Assessor.

In the case of PBS Vehicle Inspectors however, there will not be the opportunity to oversee activities. While the vehicle manufacturer will endeavour to build the vehicle(s) to meet the criteria established by the PBS Assessor, the PBS certification inspection needs to be carried out by a person and in a manner that will also provide a high level of assurance that the vehicle(s), when constructed, meets the criteria identified in the original assessment. Consequently, the PBS Vehicle Inspector needs to be a “third party” or independent inspector as the vehicle may not be thoroughly inspected for some period after it enters service.

NTC (2005b) noted that a “third party” or independent inspector is defined as a Type A inspector in International Standard ISO 17020:1998, *General criteria for the operation of various types of bodies performing inspection*. Procedure No 14 is a guidance document issued by JAS-ANZ (Joint Accreditation System of Australia & New Zealand) for ISO 17020:1998. It describes a Type A inspection body thus:

A **Type A Inspection Body**, to claim to be independent of the parties involved, shall demonstrate that it is not linked to the party directly involved in design, manufacture, supply, installation, purchase, ownership, use or maintenance of the items inspected or similar competitive items by

- common ownership (except where the owners have no ability to influence the outcome of an inspection)
- common ownership appointees on the boards (or equivalent) of the organisations (except where these have functions that have not influence on the outcome of an inspection)
- directly reporting to the same level of management
- contractual arrangement, informal understanding or other means that may have an ability to influence the outcome of an inspection.
This gives rise to the question, “how do we guarantee independence?” As the appointment or selection of a PBS Vehicle Inspector must be the prerogative of the PBS Operator as they are responsible for payment (a basic assumption has been that the cost of PBS certification inspections will be born by the PBS Operator) then the independence of the inspector can only be addressed by the system used to appoint or accredit inspectors in the first place and the undertakings required of PBS Vehicle Inspectors as a condition of appointment (see section 4.2.7 below).

In addition to requiring the independence of the inspector it is also important that the inspector does not have any conflict of interest with the PBS Operator which might influence the inspection outcomes or timing. This can also only be addressed realistically by the undertakings required of the inspector as a condition of appointment.

4.2.7 How should the Inspectors be appointed?

To provide adequate assurance of compliance of the finished vehicle, the PBS Vehicle Inspector must be a person who is acceptable to ARAC and to all jurisdictions in which that vehicle is to operate. The simplest way to achieve both these goals is for each jurisdiction agency to nominate to ARAC persons that they consider acceptable to undertake PBS certification inspections in their jurisdiction. ARAC would then, in consultation with agencies, prepare a national list of accredited PBS Vehicle Inspectors. The operator would then be free to choose any inspector from the listing.

This approach should give jurisdictions confidence in the PBS certification regardless of where the inspection was undertaken as each jurisdiction agency has the ability to make any objections known about any nominated persons from any jurisdiction before ARAC accredits them.

As indicated in section 4.2.6 above, a PBS Vehicle Inspector must be independent of the other parties involved in the development of the PBS proposal, the design of the vehicle and the manufacture of the vehicle. This does not mean that PBS Vehicle Inspectors should be totally prohibited from being involved in the development, design or manufacture of PBS vehicles per se. One option even suggests that persons involved in such activities are better qualified than most to undertake PBS certification inspections. However, it does mean that they must be independent of the other parties involved for the particular vehicle they are inspecting. Therefore, the conditions of appointment as a PBS Vehicle Inspector should include an undertaking that they will not undertake an inspection of any vehicle in which they have been so involved. Breach of this undertaking would result in withdrawal of their accreditation.

To further strengthen the independence of inspectors, they should also be required to give an undertaking that they will not carry out an inspection of a vehicle for any PBS Operator with which they have any employment, remuneration or contractual arrangement other than that directly related to the carrying out of the specific inspection. Breach of this undertaking would also result in the withdrawal of their accreditation.

Also, to avoid a potential for conflict of interest arising, the inspector should be required to provide an undertaking that they will not carry out an inspection of a vehicle where there is a conflict of interest with the PBS Operator. It may also be considered appropriate in this undertaking to cover possible conflict of interest with the vehicle manufacturer of a component manufacturer. However, because there may well be varying degrees of conflicts of interest, it is proposed that a breach of this undertaking would not automatically result in the withdrawal of their accreditation but would be at the discretion of ARAC.
4.3 Where Should PBS Certification Inspections be Carried Out?

Where all the vehicles in the PBS combination are manufactured in the one jurisdiction and the combination is assembled in that same jurisdiction, the certification inspection would logically be carried out in that jurisdiction.

However, in a number of cases the motor vehicle component may be manufactured in one location and the trailer component(s) and bodies manufactured at one or more other locations, and the full combination not be completely assembled until the vehicle combination is ready to be put in service at yet another location again, which may be quite remote and not have ready access to PBS Vehicle Inspectors.

As each vehicle in a PBS combination is likely to be a stand alone unit, i.e. the only connections between the vehicles will be the couplings, brake hoses and electrical connections, then each vehicle should be able to be assessed for compliance with the PBS requirements in isolation. Where a shared connection such as a coupling is critical to a combination meeting PBS requirements, the PBS approval documentation for both vehicles in the combination would include that item albeit as complementary/matching components. Therefore, it should not be necessary to assemble the PBS combination before undertaking a certification inspection.

Further, each vehicle in a PBS combination may individually be a fully ADR complying vehicle in every sense including dimensions, but when the combination is assembled it may exceed use requirements such as overall length. However, provided each of the individual vehicles meet the relevant approval documentation and is certified as such, there is no benefit or additional surety provided by carrying out a further PBS certification inspection once the combination is made up.

Where each component vehicle in a PBS combination is inspected for compliance in isolation and in separate jurisdictions and possibly in jurisdictions in which the PBS combination will not operate, mutual recognition of the compliance inspections between jurisdiction agencies will be critical.

4.4 When and By Whom a Vehicle is to be Presented for PBS Certification?

As indicated in section 4.2.6, it has been a basic assumption that the PBS Operator will be responsible for paying for the inspection. The operator is also the first one to know when the vehicle is ready for inspection and where the vehicle is. It therefore should be the operator’s responsibility to nominate the inspector(s). However, to keep ARAC and the jurisdiction informed and to maintain a consistent method irrespective of whether the inspection is done by the jurisdiction agency or is outsourced, it is proposed that the operator advise the lead agency of when and where the vehicle will be available for inspection and who will be undertaking the inspection and for the lead agency to arrange (through ARAC) for the PBS vehicle assessment information (the Schedule to the Vehicle Assurance and Operating Rules) to be sent to the inspector(s).

Once the inspection has been completed, the inspector provides the lead agency with the original certification and provides a copy to the operator. Once this is done the inspector’s part of the arrangement is completed.

Figure 3 illustrates the actions for each party involved.

**Figure 3. Flow chart for inspection of a Potential PBS Vehicle**
4.5 What Should be Inspected in a PBS Certification Inspection?

4.5.1 General

During the initial assessment, the Assessor is required to consider, identify and document all the physical features, characteristics and parameters which must be present for the completed vehicle (or combination of completed vehicles) to meet PBS requirements. These items will be included in the approval in a form that will, as far as is possible, allow them to be readily verified during a visual inspection of the completed vehicle.

Therefore, all those items documented in the approval as being critical for PBS requirements must be inspected and verified against the approval documentation.

Each of the critical aspects must be specified as a physical characteristic, a generic characteristic, a specific component or some combination of these.

4.5.2 Physical Characteristics

These are the dimensional or geometric requirements for the vehicle or various components of the vehicle. For example, the ‘S’ dimension of a semi trailer (the distance between the king pin and the centre of the rear axle group) may be defined as a set dimension ± a tolerance. This tolerance would normally be the Austroads measurement adjustments but during the assessment the Assessor may have identified cases where such an allowance would be unacceptable or too restrictive and may specify other tolerances.

4.5.3 Generic Characteristics

These are essentially defined by the performance of the component. For example, the suspension system may be defined by characteristics such as its roll stiffness, deflection rate, damping and roll steer, and any proprietary system that meets these characteristics would be acceptable.

Similarly, the torque/RPM characteristics of the engine may be specified along with the multiplication factors and internal power loss characteristics of the transmission and differential.

Some components may be defined only in part by generic characteristics. For example, tyre size may be a critical factor but other tyre characteristics may not be an issue and therefore any brand or series of the required size would be acceptable. In this case just tyre size would be defined and documented by the Assessor.
4.5.4 Specific Components

For some critical aspects there may be only one or two products that achieve the required performance characteristics. Alternatively, while there may be a number of products that could achieve the required performance characteristics, only one or two specific products may have been confirmed as suitable by the Assessor. In these cases the acceptable component(s) would then be defined by the particular brand and model and any other identifier needed and only those items specified would be acceptable.

For example, only one brand, series and size of tyre may have the right combination of all the characteristics necessary to provide the required traction, side slip and cornering stiffness to achieve the low and high speed longitudinal performance and at the same time achieve the high speed directional stiffness. For example, the tyre requirements for a PBS prime mover may be specified as:

- Steer Axle - Brand A, series R150, size 295/80R22.5
- Drive Axles - Brand A, series M722, size 305/70R22.5

and in such a case only the specified make, series and size would be acceptable for the particular axle.

4.5.5 Combination

Some components may be specified as a combination of component brand plus some generic or physical characteristics. For example, a semi trailer may be specified as requiring a BRAND AAA self steering axle that, when fitted to a trailer with an ‘S’ dimension of XX, provides a certain self steering axle angle when the axis of the prime mover is a ZZ degrees to the axis of the trailer. The inspector would then have to check that the self steering axle was of BRAND AAA and using measurements from the vehicle and technical information from the component supplier ascertain that the specified physical characteristics would be achieved.

4.6 How Should the PBS Certification Process be Undertaken?

4.6.1 Physical Characteristics

Where an aspect is defined by a geometrical or dimensional characteristic that dimensional characteristic must be measured and confirmed as complying with the approval documentation including any tolerances specified. If no tolerance is stated by the Assessor, the dimension must be within the Austroads measurement adjustments.

Alternatively, for characteristics such as the centre of gravity (CG) height of the unladen vehicle (which can be readily and accurately produced by many vehicle Computer Aided Drawing (CAD) programs) written information from the vehicle manufacturer may be used to confirm that the vehicle meets approval documentation requirements. The use of information provided by a manufacturer must always be confirmed as being appropriate and still valid. For example, the manufacturer’s CG height information would be invalid if the vehicle had been subsequently modified by the fitting (or removal) of components such as sleeper cabs, fuel tanks, etc. or the fitting of tyres or a different suspension system that raised or lowered the chassis rail height.

4.6.2 Generic Characteristics

Where an aspect has been defined as a generic characteristic, this will usually be because there are a number of possible options and either the generic characteristics of these are
readily determined, or the manufacturers or suppliers of these components produce comprehensive specification sheets, or all available generic components of that type would fulfil the PBS needs. For example, the rear suspension on a prime mover might be simply specified as an airbag system that has a deflection rate of XX mm per tonne. In this type of situation it would be the responsibility of the PBS Vehicle Inspector to identify the component and confirm that it meets the approval documentation either by visual inspection or by reference to component specification data.

4.6.3 Specific Components

Where an aspect has been detailed as a specific component and there are adequate external identifiers supplied in the approval documents and available on the component itself, then the presence of the specific component must be confirmed in a visual assessment by the PBS Vehicle Inspector. Unless acceptable alternatives are also included in the approval documentation then only the one specified component is acceptable.

Examples:

- if the brand, series and size is specified for the tyres then the visual check should confirm that the tyres fitted meet all these identifiers;
- if Brand A/Series Y tyres OR Brand B/Series Z tyres of a specific size are specified then the visual check should confirm that either of the Brand/Series specified is fitted and they are of the specified size;
- if a particular make and model of self steering axle is specified for a semi trailer then the inspection should confirm that that make and model item is fitted and no other make or model would be acceptable.

Where a specific component is not readily identified and/or its characteristics cannot be readily confirmed in a visual check, then written evidence from an appropriately authorised person such as a representative of the Original Equipment (OE) component manufacturer or supplier or an authorised dealer may be accepted provided that the evidence confirms that the component meets the approval documentation requirements and clearly relates or links to the actual component being inspected. This link may be by some unique identifier on the component or by direct reference to the particular vehicle (via its Vehicle Identification Number (VIN)) in which the component is installed.

For example, a truck manufacturer/dealer might certify that engine number AAAAAAAAAA was installed in vehicle VIN XXXXXXXXXXXXXXXXXXX and had a BRAND YYY Electronic Control Module, firmware Rev 123 and software program LT567 and this engine installation meets the engine torque/RPM requirements of PBS approval No 234.

4.6.4 Combination

Where a component has been specified as a combination of component brand plus some generic or physical characteristics, the inspection should confirm that the specified brand has been installed and then determine whether the physical or generic characteristics specified in the approval documentation are met. The latter part of the inspection would utilise the same methods indicated earlier for inspecting for physical or generic characteristics.
4.6.5 Carrying Out the Inspection

As outlined in Section 4.4, when a draft PBS approval vehicle has been constructed, the PBS Operator will advise the lead agency of the name of the nominated PBS Vehicle Inspector and where and when the vehicle will be available for inspection. This information will be passed on to ARAC which will then provide the nominated PBS Vehicle Inspector with a list of physical requirements for the vehicle. This list will be part of the PBS approval documentation and will set out what the vehicle should look like in terms that, as far as is possible, will enable the compliance with the PBS approval of the finished vehicle to be ascertained via a visual inspection.

Once the selected PBS Vehicle Inspector has received the required information from ARAC he must then make arrangements to inspect the vehicle at a suitable time and location. The location will generally be either at the vehicle manufacturer or supplier’s premises or the operator’s premises but the vehicle is unlikely to have been registered for use on the road at this time.

The operator may have already obtained documentary evidence for some aspects of the vehicle but in other cases the inspector may have to determine what documentary evidence is needed or available and make arrangements for sourcing this material. It may also be necessary to have physical tests if required by the ARAC approval.

Each characteristic of the finished vehicle specified in the PBS approval documentation is to be checked, confirmed and recorded as meeting the PBS approval documentation requirements.

The checking and confirming of physical compliance may be on the basis of one or more of the following:

- visual observations;
- physical measurements and calculations;
- examination of vehicle or component specification sheets;
- certification statements provided by the vehicle manufacturer (in the case of characteristics that cannot be readily confirmed by visual means such as engine output, gearbox and differential ratios, unladen CG height, auto gearbox shift delays, etc);
- certification statements provided by component manufacturers (in the case of readily identifiable, self contained components that have characteristics that cannot be readily confirmed by visual means such as suspension stiffness, forced steering system characteristics, etc);
- assessment of test results.

In the case of certification statements or assessment of test results, the inspector is responsible for ensuring that these are from persons and/or organisations suitably authorised to make such statements or to carry out such tests.

When a vehicle has been confirmed as complying with the PBS approval documentation a certification would be provided to the operator.

4.6.6 Multiple Vehicle Inspections

Where a number of vehicles of the same specification are to be inspected, because each vehicle was constructed individually, each vehicle could be inspected individually as there
is no guarantee that they are indeed identical. However, where "identical" vehicles for the one PBS Operator have been manufactured in the same production run and one has already been inspected and certified by a PBS Vehicle Inspector, the remaining vehicles in that production run could be certified by the manufacturer as being identical for the purposes of PBS to the already certified vehicle. Then that certification together with a copy of the certification of the original vehicle would be sufficient evidence of PBS compliance and further inspections of these vehicles should not be required.

Except where all vehicles inspected are for the one PBS Operator, a complete set of separate evidence must be compiled for each vehicle. Where a single item of evidence that relates to a number of vehicles is provided, for example a certification statement from a truck manufacturer may list several VINs and several engine numbers, the statement should be photocopied and a copy kept in each set of evidence.

Where all the vehicles are not for the one PBS Operator, a separate certification should be provided for each PBS Operator.

4.7 Recording

4.7.1 Non Compliance

It is inevitable that at some stage non-compliance will be encountered. Where the non-compliance is minor and is a simple matter to rectify, the PBS Vehicle Inspector should refer it to the operator for action. For example, the king pin may have been installed with the wrong lead because the wrong set of bolt holes in the mounting plate were used.

Where the non-compliance is major but can still be readily rectified, not only should it be referred to the operator for action but the lead agency should also be advised as it may be indicative of poor quality control processes by the manufacturer which could have other implications.

In either case, the certification cannot be issued until the non-compliance has been rectified and confirmed as such by the PBS Vehicle Inspector.

In other cases the non-compliance may not be practical to rectify or the PBS Operator does not wish to rectify the non-compliance. In such cases the inspector must not issue a certification and must provide full details to the lead agency.

4.7.2 PBS Certification

On being satisfied that all details are correct, the PBS Vehicle Inspector certifies that the physical characteristics match the PBS approval.

On receipt of the certification by the PBS Vehicle Inspector, the lead agency approves and records the PBS certification and forwards the originals of the documentation to ARAC.

4.7.3 Confidentiality

It is likely that the information contained in the PBS approval documentation provided by ARAC to the PBS Vehicle Inspector will be commercially sensitive, and therefore, the PBS Vehicle Inspector should not disclose this information to others without prior written approval from the relevant parties. It is therefore proposed that once the PBS Vehicle Inspector has been nominated and ARAC has provided that inspector with the information necessary to carry out the inspection only that PBS Vehicle Inspector should carry out the inspection, i.e. the PBS Vehicle Inspector should not be permitted to outsource or pass on the work (which would require passing on the information from ARAC) to any other
inspector without the agreement and prior written approval from all relevant parties. However, the PBS Vehicle Inspector would be permitted to employ others to assist in the inspection process or to provide technical information to support the inspection and assessment process under the same conditions of confidentiality.

To cover any unforeseen situations, another PBS Vehicle Inspector may be nominated by the PBS Operator and on such advice ARAC may permit the information it provided to the initial PBS Vehicle Inspector to be passed on or ARAC may provide the information directly to that new PBS Vehicle Inspector. This would enable all the legitimate holders of the information to be identified by ARAC.

Despite the above, there will be situations where parts of the information provided by ARAC will need to be conveyed to others such as where the PBS Vehicle Inspector needs to get certification statements from vehicle or component manufacturers or technical information to assist in the inspection and assessment process. However, in these circumstances the information passed on to others should be limited to just that part of the information that is required for those others to competently provide the certifications or technical information needed.

In some circumstances, it may also be necessary for individual PBS Vehicle Inspectors (and others assisting with inspections) to sign confidentiality agreements.

**4.7.4 Inspection Costs**

Cost for inspection of a potential PBS vehicle will vary depending on the degree to which the components of the vehicle have been identified by the Assessor. If the Assessor has detailed specific components that are readily identifiable for suspension, tyres etc, the inspection will be relatively straightforward. If, on the other hand, the Assessor specifies performance requirements then the inspection will be significantly more detailed and require greater investigation.

For relatively simple inspections, the cost would be expected to be a few hundred dollars for a trailer and about $400 to $500 for a motor vehicle but these costs would at least double for a more extensive inspection requirement.

Where a PBS Operator requires an inspection to be carried out at a remote location and, for expediency, wants to nominate an PBS Vehicle Inspector from a different area or even jurisdiction, there may also be travel and accommodation costs involved.
5. DEVELOPMENT OF THE OPERATOR CERTIFICATION GUIDELINES

5.1 Introduction

The Operator Certification Guidelines establish the minimum operator requirements aimed to give confidence that the vehicle will be operated within PBS approvals. They will, by definition, apply to all PBS Operators. The requirements in these Guidelines will be supplemented by consideration of the individual operator that is covered by the Compliance Assurance Guidelines outlined in Section 6.

The Guidelines, a draft of which is given in Appendix C, cover the suitability of an operator to manage the responsibilities required of a PBS Operator and the requirements of the operator’s quality management system.

5.2 Operator Suitability

5.2.1 Suitability to be a PBS Operator

Approval to operate a PBS vehicle comes with a responsibility to operate the vehicle in accordance with conditions imposed to ensure that the vehicle continues to meet the PBS standards. If an applicant to operate a PBS vehicle has shown an apparent disregard for transport laws, it is unlikely that such an operator would comply with the conditions that are necessary to operate a PBS vehicle. Under such circumstances, it appears that a good case exists for the Operator Certification Guidelines to contain requirements for a “fit and proper operator” or a “Suitable Operator”. Fit and proper requirements for PBS Vehicle Inspectors were discussed in Section 4.2.5 but the issues relating to PBS Vehicle Inspector are different to those for PBS Operators. The PBS Vehicle Inspector is responsible for a regulatory-type function whereas a PBS Operator is not.

Presently, the National Heavy Vehicle Accreditation Scheme (NHVAS) does not contain any consideration of the suitability of an operator but many bus and similar accreditation schemes operating throughout Australia contain requirements for suitability for accreditation. The most common tests for not being fit and proper in accreditation schemes are listed in Table 7.

Table 7. Common tests for not being fit and proper in accreditation schemes

<table>
<thead>
<tr>
<th>Test</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has been found guilty of an offence (e.g. fraud, violence, drug, company offences)</td>
<td>Offences against transport laws are the most relevant offences</td>
</tr>
<tr>
<td>Is bankrupt or not financially viable</td>
<td>A PBS operator who is bankrupt would not be operating anyway</td>
</tr>
<tr>
<td>Cannot provide a satisfactory service due to illness or mental or physical disability</td>
<td>Relates to individuals rather than companies as would be the case for PBS operators</td>
</tr>
<tr>
<td>Does not have adequate facilities</td>
<td>Could be considered relevant but in reality would be difficult to define what is adequate</td>
</tr>
<tr>
<td>Has been previously terminated or suspended from the same scheme</td>
<td>Very relevant</td>
</tr>
</tbody>
</table>

It is suggested that a history of offences against transport laws or having been previously terminated or suspended from operation of PBS vehicles are logical reasons for an operator not being suitable to be permitted to operate a PBS vehicle. In addition, any failure to
provide the necessary assistance relating to auditing or inspection of the operator should be deemed to make the operator unsuitable.

The requirements in the draft *Operator Certification Guidelines* cover the following conditions for not being a *Suitable Operator*, dealing with both an operator who is not presently operating PBS vehicles and an operator who is operating PBS vehicles (i.e. is already a PBS Operator).

It is proposed that an operator is not a *Suitable Operator* if:

- the operator has, in the opinion of ARAC, shown apparent disregard for transport laws of the Commonwealth or any State or Territory in the period of up to three years prior the Final Application to operate a PBS vehicle. Apparent disregard for transport laws exists if the potential PBS Operator has had about twice the average percentage of breaches of transport laws (or more) as the average or typical operator; or
- the operator has had authorisation to operate a PBS vehicle terminated within the previous 12 months; or
- the operator has been terminated due to breaches of a PBS approval and fails to show that adequate safeguards have been introduced to ensure that a further breach of a PBS approval is unlikely.

It is proposed that a PBS Operator is not a *Suitable Operator* if:

- the operator has been found to be in breach of a PBS approval on a number of occasions in previous years (see discussion in Section 5.2.2 below); or
- the operator has failed to assist with various auditing and inspection activities.

Specific comment is requested relating to whether the “definition” of *apparent disregard* above is adequate and if it is not, suggestions for modification.

It should be noted that, while these provisions are given in guidelines, it is likely that the requirements of a *Suitable Operator* will need to be included in the PBS legislation.

### 5.2.2 Suspension and Termination

ARAC should have the ability to suspend the operation of PBS vehicles if the operator does not undertake the activities of a PBS Operator in a satisfactory manner.

Defining the level of unsatisfactory activity is difficult but it should be quantified to assist ARAC in its deliberations. It is suggested that three breaches of a PBS approval (not covering all approvals if the operator has multiple approvals but for any one particular approval) over a two year period is adequate reason to question the suitability of the operator. The degree of the breach of the approval is relevant and three times being about 100 kg over gross mass is not reason to suspend an operator but some discretion needs to be left to ARAC. Suspension would be for the particular operation that has exhibited unsatisfactory activity, as it would be unreasonable to suspend other PBS operations that have not breached approvals.

It would be expected that an operator would be warned of impending suspension and given a chance to rectify the problems that led to the threat of suspension. Having failed to rectify the problems, the PBS approval would be suspended. Suspension should be for a particular period of time and the suspension lifted if the operator can demonstrate that the
reasons for suspension are unlikely to recur due to the operator taking remedial action. If the operator cannot demonstrate that the reasons for suspension are unlikely to recur, the suspension would become a termination.

By implication, a Suitable Operator as discussed in Section 5.2.1 means a suitable operator for the PBS operation in question or under consideration. The wording of the provisions in the Guidelines has been carefully chosen so that the suspension or termination relates only to the particular PBS approval that has been breached and not other PBS approvals that are or have been operating satisfactorily.

A PBS Operator that has been terminated would need to re-apply and demonstrate that the reasons for termination are unlikely to reoccur before being accepted for accreditation. In addition, any application for operations of a similar nature to the suspended operation would need to demonstrate additional safeguards are in place prior to approval being granted. A flow chart of the suggested suspension/termination processes is given in Figure 4.

**Figure 4. Suggested suspension and termination processes**

Where a PBS approval has been suspended and adequate safeguards are applied during the period of suspension, the suspension is simply lifted. Where a PBS approval has been terminated, a period of time would be expected to elapse before the operator can re-apply for the same or a similar PBS operation. It is suggested that the period of time be 12 months.

It should be noted that the intention is that a PBS Operator that has been terminated would not be able to apply for additional PBS approvals during that 12 month period but existing PBS approvals that have not be breached would not be affected.
5.3 PBS Operator Management System

5.3.1 Introduction

A review of the Vehicle Assurance and Operating Rules (see Section 3) shows that critical factors in a PBS vehicle continuing to meet the PBS Standards include loading and vehicle parameters.

The most important parameters identified in Section 3 include:

- loading characteristics, particularly as the centre of gravity of the load is a critical influence on Static Rollover Threshold (SRT); and
- tyre and suspension characteristics.

The loading characteristics indicate the need for a mass management system while the tyre and suspension characteristics indicate the need for a maintenance management system. Infrastructure considerations further indicate that these systems are necessary. Therefore, a PBS Operator will need an auditable quality management system to ensure that a vehicle continues to meet the PBS standards.

It would be only on rare occasions that a PBS Operator might not need Mass Management. Examples would include a tanker or similarly load-restricted vehicle where the worst case assessment shows that mass limits and all safety standards are complied with, or if the vehicle is significantly below present mass limits and the assessment shows that the SRT of a vehicle is not close to the maximum permitted. A clause has been inserted to the effect that all accreditation standards are required unless specifically exempted by ARAC.

It needs to be made clear that an auditable quality system does not necessarily mean a quality system to international standards. It could mean that quality management principles are applied, such as in the NHVAS Modules. As Mass Management and Maintenance Management are two of the operational modules of NHVAS, it is appropriate these modules be incorporated in the requirements for the PBS Operator Management System (OMS).

5.3.2 NHVAS Modules

The two modules, Mass Management and Maintenance Management both provide minimum Standards that must be demonstrated for accreditation. The present Standards are given in Table 8 and are arranged with common standards in the same row.

<table>
<thead>
<tr>
<th>Table 8. NHVAS Mass Management and Maintenance Management Standards</th>
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<tbody>
<tr>
<td><strong>Mass Management Standards</strong></td>
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<tr>
<td><strong>1.0 Responsibilities</strong></td>
</tr>
<tr>
<td>The authorities, responsibilities and duties of all positions involved in the management, operation, administration, participation and verification of the Mass Management System are current, clearly defined and documented.</td>
</tr>
<tr>
<td><strong>4.0 Records and Documentation</strong></td>
</tr>
<tr>
<td>Documented evidence must be maintained to demonstrate the effective operation of the Mass Management System.</td>
</tr>
<tr>
<td>Mass Management Standards</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td><strong>6.0 Internal Review</strong></td>
</tr>
<tr>
<td>The Mass Management system must be subject to</td>
</tr>
<tr>
<td>annual internal review to verify that all results</td>
</tr>
<tr>
<td>and activities comply with the system’s policies,</td>
</tr>
<tr>
<td>procedures and instructions.</td>
</tr>
<tr>
<td></td>
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<tr>
<td><strong>7.0 Training and Education</strong></td>
</tr>
<tr>
<td>The persons who hold positions of responsibility</td>
</tr>
<tr>
<td>under the Mass Management Systems are trained in</td>
</tr>
<tr>
<td>and familiar with the specific policy, procedure</td>
</tr>
<tr>
<td>and instruction they are to carry out.</td>
</tr>
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<td></td>
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<tr>
<td><strong>2.0 Vehicle Control</strong></td>
</tr>
<tr>
<td>All vehicles nominated by the accredited operator</td>
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<tr>
<td>must be operated in accordance with the Mass</td>
</tr>
<tr>
<td>Management System.</td>
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<tr>
<td><strong>3.0 Vehicle Use</strong></td>
</tr>
<tr>
<td>The vehicle mass must be determined by weighing</td>
</tr>
<tr>
<td>or by a method of assessment prior to departure</td>
</tr>
<tr>
<td>allowing for any variation.</td>
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<td></td>
</tr>
<tr>
<td><strong>5.0 Verification</strong></td>
</tr>
<tr>
<td>The weight of the vehicle and load must be</td>
</tr>
<tr>
<td>verified to produce an auditable record.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>4.0 Maintenance Schedules and Methods</strong></td>
</tr>
<tr>
<td>The Maintenance Management System must include</td>
</tr>
<tr>
<td>Periodic Maintenance Schedules with identified</td>
</tr>
<tr>
<td>service periods that describe the tasks to be</td>
</tr>
<tr>
<td>completed.</td>
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</tbody>
</table>

It can be seen that the common standards are:

- responsibilities;
- records and documentation;
- internal review; and
- training and education.

The remaining standards in each NHVAS module are related specifically to the topic to ensure that, in the case of Mass Management, it can be demonstrated that a vehicle meets all mass limits and, in the case of Maintenance Management, the vehicle meets the Vehicle Standards and is roadworthy. All of these will be required of a PBS Operator.

Attachment 1 to the Operation Compliance Guidelines are the PBS Accreditation Standards for the PBS Operator Management System (OMS). These Standards are a compilation of the national accreditation standards for Mass Management and Maintenance Management, changed in the following manner:

- re-ordered so that the common standards to both modules are not repeated;
- wording changed to indicate that it a PBS OMS; and
additional criteria introduced as follows:

⇒ a requirement under Vehicle Control that all individual vehicles of a PBS vehicle must have valid inspection certification and, for a combination, are coupled in the order specified in the PBS approval;

⇒ an additional loading standard which requires that the vehicle must be loaded so that the height of the CG of the load does not exceed the height permitted in the PBS approval; and

⇒ specific checks for tyres and suspensions.

It is intended that the PBS Accreditation Standards, apart from the additional requirements, be identical to the requirements in the NHVAS Modules. By implication, if the NHVAS Modules change, so should the requirements for the PBS OMS. In particular, a new suspension criterion is being introduced into Mass Management and the requirement shown here should be changed to the requirements finally agreed nationally.

A review of the *Vehicle Assurance and Operating Rules* does not reveal any other system requirements that should be imposed on a PBS Operator as a minimum requirement. Other controls for individual operators that are specific to the proposed PBS vehicles would be considered under the *Vehicle Assurance and Operating Rules* or the *Compliance Assurance Guidelines* that are outlined in Section 6.

### 5.3.3 Possible Other Requirements

One important issue relates to any modifications to the vehicle that might impinge on compliance with PBS Standards. The most likely example is changing the type of tyre that has been given specific approval, which is covered in the tyre check. Suspension requirements relating to dampers are likely to be covered and changing dimensions is unlikely although fifth wheel positions may be variable. However, a new standard of vehicle modifications has been included to require that vehicle components listed in the PBS Assessment Information given to the PBS Operator by the PBS Vehicle Inspector are not changed so as to alter the performance characteristics of the component.

Driver licensing requirements do not appear to warrant any particular requirements. The national driver license classes are:

- **C**: Motor Vehicle less than or equal to 4.5t Gross Vehicle Mass (GVM) which carries no more than 12 passengers (including driver) plus a trailer of not more than 9t GVM.

- **LR**: Light Rigid - a vehicle (no axle limit) which is greater than 4.5t GVM, but less than or equal to 8t GVM plus a trailer of not more than 9t GVM (also includes vehicles which carry more than 12 passengers but weigh less than 4.5 t).

- **MR**: Medium Rigid - a vehicle (2 axle only) which is greater than 8t GVM, plus a trailer of no more than 9t GVM.

- **HR**: Heavy Rigid - a vehicle (no axle limit) which is greater than 8t GVM, plus a trailer of no more than 9t GVM.

- **HC**: Heavy Combination - either a heavy rigid vehicle with a trailer greater than 9t GVM or a prime mover and semi-trailer.

- **MC**: Multi-Combination - either a B-Double or Road Train.
A road train is defined as a combination, except a B-double, consisting of a motor vehicle towing at least two trailers (counting as a single trailer a converter dolly supporting a semi-trailer). While PBS may result in configurations that are not covered by the present configurational definitions, it appears that the present driver licence classes are adequately described for the purposes of PBS.

Any particular driver training requirements resulting from unusual features in a PBS vehicle can be dealt with under the Compliance Assurance Guidelines.

The environmental standards for PBS vehicles will also have to be included in the PBS OMS but, as they have not been completed at this time, provision can only be made for their inclusion. Environmental standards for PBS vehicles are due for completion in 2006.

5.4 Audit and Monitoring

It would appear logical that NHVAS auditors be utilised for the auditing, both entry and annual, because of the similarities between NHVAS and the likely requirements of the PBS OMS. However, the wording used in the draft Operator Compliance Guidelines is that auditing is to be undertaken by an Auditor approved by ARAC. It would be expected that ARAC would seek the names of State and Territory approved NHVAS auditors in compiling a list of approved auditors in much the same way as State and Territory nominees are expected to be PBS Vehicle Inspectors.

The Guidelines also require that “ARAC may require that the PBS Operator Management System be audited by an Auditor approved by ARAC”. It is expected that the requirement would be annual inspections but ARAC can make that choice based on operator history. In addition, this wording allows an audit to be conducted at any time if ARAC considers that breaches may have occurred, but the Guidelines require ARAC to pay for an audit that is within 12 months of the previous audit. Even if breaches are shown by the audit to have occurred, penalties in the form of suspension are likely to be more effective than the requirement to pay for an audit.

The Guidelines provide for ARAC to be able to make adjustments to the PBS OMS as a result of an audit and, if ARAC is not satisfied with the response, may recommend that the PBS approval be suspended.

The Enforcement Guidelines have yet to be drafted and therefore the type and form of checking by State and Territory agencies is not known. However, some checks will be undertaken by enforcement agencies and may reveal breaches of PBS approvals. Detection of breaches would most likely lead to a requirement for an audit.
6. DEVELOPMENT OF THE COMPLIANCE ASSURANCE GUIDELINES

6.1 Introduction

As outlined in Section 2, the Compliance Assurance Guidelines are designed to answer the question “How should the vehicle be operated”, as assessed by the Regulators. The Compliance Assurance Guidelines are additional operating requirements that will give confidence that the vehicle will not cause concerns for the infrastructure or road safety, either by exceeding approved mass and dimension conditions or straying off the route and will continue to comply with the PBS Standards.

The Compliance Assurance Guidelines are operator specific and vehicle specific. The Compliance Assurance Guidelines are therefore complementary to the Operator Certification Guidelines and the Vehicle Assurance and Operating Rules. The conditions imposed under the Compliance Assurance Guidelines will arise from a review by ARAC of the operator history and the Assessor recommendations relating to operating conditions.

A draft of the Compliance Assurance Guidelines is given at Appendix D.

The conditions imposed under the Compliance Assurance Guidelines should not be confused with any requirements that are route specific. For example, times of travel for a given route are imposed for community or environmental reasons and would apply to all vehicles on that route. Similarly, it is probable that any gross mass limit imposed for bridge protection would apply to all vehicles on a given route and not be applied to any particular operator or vehicle.

The Guidelines are divided into possible conditions that are operator specific and vehicle specific and are considered under these headings in this Discussion Paper.

A general rule is that a condition imposed under the Guidelines may be for a specific period or the condition may be a continuing requirement. Any conditions imposed must be incorporated into the PBS Operator Management System.

6.2 Conditions That Are Operator Specific

The Operator Certification Guidelines discussed in Section 5 apply to all operators and are the minimum requirements considered appropriate for operation of PBS vehicles. However, not all operators are the same and the compliance history of the applicant operator needs to be considered.

The introductory section suggests that, inter alia:

- ARAC should consider the compliance history of a potential PBS Operator when considering an application for a PBS vehicle. The compliance history should relate not only to the present operations of the PBS Operator but also to associated companies and companies previously controlled by the PBS Operator.

- If a PBS Operator has been suspended or terminated due to not being a Suitable Operator under the Operator Certification Guidelines, it would be expected that ARAC would impose operating conditions that would give assurance that the cause of the suspension or termination would be unlikely to recur.

The Guidelines suggest that additional conditions may be imposed for the reasons given in Table 9.
Table 9. Additional conditions based on the operators compliance history

<table>
<thead>
<tr>
<th>Reason</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>The potential PBS Operator has a history of failing to comply with mass limits</td>
<td>Independent verification of the mass of the vehicle prior to the commencement of each laden trip</td>
</tr>
<tr>
<td>The potential PBS Operator has a history of failing to comply with speed limits</td>
<td>Independent verification of the speed of the vehicle</td>
</tr>
<tr>
<td>The potential PBS Operator has a history of failing to comply with route restrictions</td>
<td>Independent verification of the location and route of the vehicle</td>
</tr>
<tr>
<td>The potential PBS Operator has a history of failing to comply with dimension limits</td>
<td>Additional verification of the dimensions of the vehicle prior to the commencement of each laden trip</td>
</tr>
</tbody>
</table>

It is suggested that a history of failing to comply does not relate solely to the number of offences but consideration should be given to any patterns of non-compliance and percentage of trips that are non-complying in relation to other transport operators.

The draft Guidelines provide that ARAC has the option to impose any condition but the Guidelines also suggest that the following condition would normally be imposed:

- for mass, weighing on a weighbridge;
- for speed or route restrictions, a GPS system; and
- for dimensions, certification of the dimensions by a senior staff member of the operator.

The Guidelines restrict themselves to parameters that would most likely impinge on the ability of the PBS vehicle to continue to meet PBS Standards but ARAC has the option of imposing any condition if the operator has an unsatisfactory history of compliance with any legal aspect.

6.3 Conditions That Are Vehicle Specific

While it is expected that conditions based on the degree of innovation of the vehicle would be recommended under the Vehicle Assurance and Operating Rules, ARAC would be permitted to impose appropriate conditions in the absence of any recommendations by the Assessor. In particular, the Guidelines note that the driver needs to be appropriately trained if a vehicle is fitted with a forced steering system or any other feature that requires additional driver skills.

The Guidelines also allow ARAC to impose conditions to ensure that features that improve vehicle performance (for example forced steering systems) maintain their effectiveness.

There is a specific section on tyres and the provision to require the PBS vehicle to be fitted with a Central Tyre Inflation (CTI) system or tyre monitoring system if tyres are shown to be a critical parameter. However, it is noted that there are significant variations in the functions and features of these systems, as well as cost variations, and that ARAC should discuss aspects of such systems with the PBS Operator prior to imposing a condition that a particular type of system be fitted.
6.4 Other Possible Conditions

The final part of the Guidelines relates to conditions that might be imposed in particular circumstances or that may be suggested by the operator as being desirable.

There does not appear to be grounds for widespread imposition of a GPS or IAP requirement. Apart from the operator history aspects noted in Section 6.2 above, most IAP applications would derive from route considerations and be imposed on all vehicles if there were particular infrastructure concerns. For example, no case can be made for requiring a vehicle that is permitted to travel on all roads (Level 1) to be fitted with IAP unless the operator has a history of speed violations and that would be covered by operator history requirements. Nevertheless, there may be particular concessions granted that may warrant requiring IAP and therefore a general clause has been included.

Permitted speed was discussed in Section 3 and it was determined that, as a general rule, no vehicle would be certified at less that the open road speed limit. However, these Guidelines recognise that special circumstances may arise and these are detailed in the Guidelines as follows:

• where no section of a route exceeds a particular maximum (e.g. the vehicle operates only in urban areas) and the vehicle is limited to that particular route; or
• where the speed limit on that route for road trains is 90 km/h, the vehicle is not a road train and the vehicle is limited to that particular route; or
• a route has very low traffic volumes and the vehicle is limited to that particular route.

Other conditions that might be imposed in particular circumstances as detailed in the Guidelines are:

• additional mass verification
• dimensional verification
• crash and incident reporting
• load restraint
• vehicle signing

Finally, the Guidelines note that it would not usually be appropriate for ARAC to impose limits on times of travel or impose environmental restrictions as these would be imposed on a route basis by a road agency and all appropriate vehicles using that route would need to comply.
7. CONCLUSIONS AND ISSUES FOR COMMENT

The four documents outlined in this Discussion Paper contain comprehensive requirements to ensure that the assumptions in the vehicle assessment are translated into the physical characteristics in a PBS vehicle and its conditions of operation. The four documents, which are Appendices to this paper, are:

- Vehicle Assurance and Operating Rules;
- Vehicle Verification Code;
- Operator Compliance Guidelines; and
- Compliance Assurance Guidelines.

The first issue for comment therefore is – are the documents sufficiently comprehensive for the intended purposes as outlined in Section 2? Perhaps they are too comprehensive and likely to impose costs beyond what is realistically required of PBS.

Comments are invited on any other issues but the list below gives some guidance for those wishing to comment.

In relation to the **Vehicle Assurance and Operating Rules**, the specific issues on which comments are sought are:

- Are the instructions clear and guidance sufficient as to what the Assessor must do?
- Are there other issues not covered in the Rules that need to be addressed?
- Is the level of reporting adequate?

In relation to the **Vehicle Certification Code**, the specific issues on which comments are sought are:

- Are the instructions clear and guidance sufficient as to what the inspector must do?
- Are the eligibility requirements and competencies of the inspector sufficient?
- Does the proposed method of appointment of PBS Vehicle Inspectors provide for mutual recognition of inspections?
- Are the arrangements to allow manufacturers to certify identical vehicles from the same production sufficiently robust?

In relation to the **Operator Certification Guidelines and the Operator Compliance Guidelines**, the specific issues on which comments are sought are:

- The requirements for a “suitable operator”, particularly the use of the “apparent disregard for transport laws”;
- The adequacy of the minimum requirements for the PBS Operator Management System;
- The adequacy of the requirements based on operator compliance history, including any additional conditions for an operator with a history of failing to comply with dimension laws; and
- Any other conditions that are suitable for inclusion in Table 1 of the Compliance Assurance Guidelines.
8. REFERENCES


