



SUMMARY REPORT

ASSESSMENT OF A HEAVY TRUCK SPEED LIMITER REQUIREMENT IN CANADA

On behalf of the Councils of Deputy Ministers / Ministers Responsible for Transportation
and Highway Safety

July 2008

TC 1002758



Canada⁺

Disclaimer

This report summarizes consultant studies and other assessments on a heavy truck speed limiter requirement in Canada and does not necessarily reflect the views of Transport Canada or the Councils of Deputy Ministers/Ministers Responsible for Transportation and Highway Safety.

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EXECUTIVE SUMMARY

Rationale

In late 2005, the Canadian Trucking Alliance (CTA) called on the federal and provincial governments to mandate the activation of speed limiters on all heavy trucks traveling into or within Canada at no more than 105 kilometres per hour (kph).

At their September 2006 meeting, the Council of Deputy Ministers Responsible for Transportation and Highway Safety (CODMT) reviewed a *Discussion Paper on Speed Limiters For Trucks Operating in Canada* that contained preliminary environmental and truck safety benefits of a speed limiter mandate. However, it was also noted that further analysis concerning the national implications of such a mandate was necessary. Deputy Ministers and subsequently Ministers discussed the issue and agreed to work together to assess outstanding issues. Transport Canada (TC) offered to lead this effort with assistance from several of the provinces and territories.

The issue of a speed limiter mandate within the Canadian context is complex and a thorough and impartial assessment of the potential implications of such a requirement in the Canadian context, particularly relating to highway safety and economic impacts, had never been undertaken. It is noteworthy that based on TC's examination, this is the first time that such a holistic, multi-dimensional review of the potential national implications of a speed limiter mandate has ever been conducted in Canada or elsewhere in the world.

With the assistance of a federal-provincial steering committee, TC commissioned a number of studies and assessments in 2007 to review the implications of a national speed limiter requirement from a safety, environmental, economic and operational perspective. This report, containing a synthesis of the key results from these studies and assessments, is intended to inform Canadian provincial and territorial governments on key aspects concerning speed limiters for heavy trucks.

The analysis completed is timely, as two Canadian provinces (Ontario and Quebec) have passed speed limiter legislation. There is also a petition before the U.S. government by the American Trucking Associations for a national speed limiter mandate. The studies and assessments, summarized below, examined the potential highway safety impacts of speed limiters through traffic modeling, the trade and competitiveness impacts, the environmental benefits via fuel savings and greenhouse gas reduction, the experience of speed-limited carriers through a case study, the experience of other countries with speed limiter legislation and technical considerations.

Overview of Speed Limiter Usage

Prior to summarizing results from the studies and assessments, the following section provides an overview of heavy truck speed limiter usage in North America.

Speed limiters electronically limit the maximum attainable road speed and have been standard equipment on the majority of heavy trucks built since mid-1990.

Hence, these trucks come enabled with the requisite hardware that the truck purchaser is free to activate or not. The activation of speed limiters through the truck's electronic control module (ECM) is relatively simple but requires manufacturer's software and is password-protected.

A common theme emanating from this work is that speed limiters are already heavily integrated into the Canadian and U.S. trucking industry. For many fleets, it is just "good business" to activate speed limiters in most, if not all, of their trucks. The larger the fleet, the greater the likelihood that speed limiters will be activated. Some fleet operators also require owner-operators (sub-contracted truckers) to activate their speed limiters, or if not, they must follow their corporate speed policy. Although smaller fleets are less likely to activate speed limiters, most operators follow a speed policy to reduce fuel costs.

It is estimated that at least 60% of heavy truck fleets in North America use speed limiters. As larger fleets are more likely to be speed limited, the percentage of trucks that are speed limited is higher at an estimated 77%. While speed limiter settings within Canada are in the 100-112 kilometer per hour (kph) range, settings on U.S. fleets may be somewhat higher to account for some higher state speed limits. The average setting across Canadian and U.S. fleets was found to be 105 kph. Main reasons cited for using speed limiters include reducing the top speed of the vehicle, reducing crash risk and increasing fuel economy. The main reasons for not using speed limiters are car-truck speed differentials, inability of the vehicle to pass, and refusal by non-company drivers to comply.

Safety Implications of Mandating Speed Limiters

This study assessed the safety implications of mandating speed limiters through a traffic simulation model that estimates crash potential and how this may be impacted by different road and traffic conditions.

Several highway scenarios are modeled in this study: freeway off-ramps segments, freeway on-ramps segments, combined on-off ramp segments, and straight freeway segments. A case study of a straight Canadian freeway section along the Queensway Express Way (QEW) in the Greater Toronto Area was also performed. Each scenario is modeled using experimental traffic characteristics such as: varying traffic volumes and truck ratios in the traffic stream; speed limiter compliance rates, and; several maximum speed limiter settings.

The relevant traffic scenarios considered in this study are:

- High (2000 vehicles per hour per lane) and low (500 vehicles per hour per lane) freeway volumes
- High (15) and low (2.5) percentage trucks in traffic stream
- Mandatory truck speed limiter compliance rates (75%, 100%)
- Non-mandated speed limiter application (35% of truck population set at 105 kph)
- Maximum speed limiter settings of 110, 105, 100, 90 and 80 kph.

A Crash Potential Index (CPI) was used to evaluate the safety impacts as it captures speed differential, vehicle spacing and vehicle/driver braking capabilities. The CPI can distinguish dangerous vehicular interactions that could result in a collision.

The key results of this study are:

- The introduction of speed limiters set at 105 kph increases safety in the uncongested region of traffic flow for all geometric configurations considered, especially for the straight segment. As maximum speed is set at 110 kph the safety gains from the introduction of speed limiters becomes less pronounced. Maximum safety gains were obtained when the maximum speed limiter setting was at 90 kph for the uncongested traffic volumes under consideration.
- As traffic volume and percentage trucks in the traffic stream are increased, the safety gains associated with mandatory limiters set at 105 kph become less pronounced. As the volume is set close to capacity (2000 vehicles per hour per lane - vphpl), more vehicle interactions are expected to take place which can lead to reductions in safety especially for those segments with increased merging and lane-change activity (such as, on and off ramps). In these instances the introduction of truck speed limiters can actually reduce the level of safety when compared to the non-speed limiter base case.
- As compliance is increased, there is a small corresponding increase in safety for the mandatory speed limiter case. It should also be noted that as volume and percent of trucks increase, the safety gains associated with the full compliance are offset by the additional traffic turbulence caused by higher volume and percentage trucks.
- The QEW case study application confirms the findings obtained from the sensitivity analysis of different traffic scenarios and speed control strategies. When the limiter speed is set at 105 kph, its introduction yields statistically significant safety gains along the case study corridor as compared to the base case (no mandatory limiters). A total of 30 simulation runs were performed, and in 21 cases the introduction of limiters yielded positive safety gains.

Subsequent to the modeling work undertaken, a cursory investigation of the safety implications of speed limiters for two lane rural highways was carried out, based on a review of previous studies supplemented by an analysis of speed profiles for large trucks from Alberta and Saskatchewan and a review of provincial/territorial policies on setting speed limits on highways. The results show:

- Typical speed limits on two-lane undivided rural highways are in the range of 80 to 90 kph but highways can have posted speed limits of 100 kph.
- Data from several two-lane rural undivided highways in Alberta and Saskatchewan with a posted speed limit of 100 kph showed approximately 40% of truck drivers achieve speeds exceeding 105 kph on these highways. This has safety implications for mandated truck speed limiters set at 105 kph, especially as it relates to the possibility of unsafe overtaking manoeuvres.

- The possibility for increased unsafe passing maneuvers poses special safety challenges where trucks are subject to a maximum speed set by limiters for two lane undivided rural highways. Further study of this situation is required before a more definitive statement can be made concerning the safety implications of truck speed limiters for this type of highway.

Trade and Competitiveness Assessment

This study assessed the potential trade and competitiveness impacts of mandating speed limiters under two scenarios: (1) speed limiter mandates only implemented in Ontario and Quebec and (2) a national speed limiter mandate implemented throughout Canada. Under both scenarios, all heavy trucks operating in the speed-limited jurisdiction would have to have their speed limiter electronically activated at 105 kph. This study also considered the potential economic impacts on the trucking sector and industry competitiveness issues relating to jurisdictions with and without speed limiter mandates.

The analysis conducted was based largely on several speed limiter surveys and a survey of Canadian and U.S. trucking operations by the project team.

This study concluded that there would likely be very few competitiveness issues from implementing a speed limiter mandate at 105 kph under either scenario. However, smaller fleet operators and owner-operators who feel that safety could be compromised may avoid operating in those speed-limited jurisdictions¹.

Based on the survey results, the majority of freight in North America transported by large fleets is moved in trucks that are speed-limited around 105 kph. For those fleets already speed-limited at or below this speed, there would likely be no competitive impact operating under a speed limiter mandate. Canadian fleets operating in the 106-110 kph range would be able to operate under a 105 kph mandate with limited difficulty. In addition, those fleets operating at higher speed settings, or without the speed limiter set, noted that they typically travel at or below 105 kph to save on fuel costs.

Under both scenarios, larger U.S.-based fleets would likely be impacted minimally as most operate at or below 105 kph. By contrast, owner-operators were concerned with being speed limited at 105 kph. Many owner-operators operate in U.S. states with higher speed limits and they believe that safety would be compromised by increased car-truck interactions (limited passing ability and increased speed differentials). Most U.S.-based owner-operators interviewed noted that they would stop operating into Canada because of these safety concerns.

Under an Ontario/Quebec speed limiter mandate, a higher portion of Atlantic Canada-based trucking would be impacted than Western Canada-based fleets. It is estimated that about 30% of Atlantic Canada's heavy trucks operate into Ontario and Quebec and would potentially be impacted. However, many large fleets are already speed limited at 105 kph. Based on similar truck traffic patterns (e.g. operations into Ontario and Quebec), an

¹ Many owner-operators sub-contract to large fleets with speed control policies in place.

estimated 10% of Western Canada's heavy truck fleet would be impacted by such a mandate. Similar to the position noted by U.S.-based owner-operators, western owner-operators indicated that they would avoid operating into Ontario and Quebec.

From an economic perspective, the main impact on the trucking industry from a speed limiter mandate would be savings in fuel and other vehicle operating costs. Based on an estimated annual fuel savings of 228 million litres (Environmental Benefits study), a national speed limiter mandate could save the trucking industry up to \$200 million annually. In addition, there would likely be very little impact on shippers as the majority of freight is already being moved by fleets speed limited at 105 kph or less. A costing analysis was also performed to illustrate the potential trade-off between productivity benefits and increased costs. Results demonstrated that the increased fuel costs of operating at speeds higher than 105 kph outweigh any productivity gains.

The owner-operators interviewed stated that speed-limited fleets would be placed at a disadvantage when recruiting drivers. This view was not shared by the majority of large and small fleet managers, who noted that it is the overall pay package that drivers consider such as mileage rates, quality of equipment and fringe benefits. It was their opinion that the lack of a speed limiter policy would not be an incentive in terms of driver recruitment and retention.

TC also requested an assessment by the Trade Law Bureau of the Department of Justice (DOJ) of the trade agreement implications. DOJ counsel concluded that any proposed national speed limiter mandate would be generally consistent with Canada's international trade law obligations and the potential for a successful challenge was viewed to be minimal.

Environmental Benefits Study

This study assessed the potential national diesel fuel savings and corresponding greenhouse gas (GHG) reductions from a national speed limiter mandate. It updated preliminary estimates provided in the 2006 *Discussion Paper on Speed Limiters for Trucks Operating in Canada* based on more detailed truck speed distribution and truck traffic volume data obtained from the provinces / territories.

Annual truck traffic volume data for provincial highways with posted speed limits of 100 kph and 110 kph was collected at various data collection sites and applied against provincial speed distribution data to produce estimated annual totals of truck travel above 105 kph. Nationally, it was found that about 62% of heavy trucks travel at 105 kph or lower, 23% were in the 105-110 kph range and 15% were at 110 kph or above.

British Columbia and Manitoba represented the lowest proportion of truck traffic potentially impacted by a speed limiter requirement with only about 3% and 25% respectively of vehicles traveling above 105 kph. The Alberta (110 kph location) and Ontario (100 kph location) represented the highest proportion of truck traffic potentially impacted by the requirement with about 55% and 59% respectively. Most other locations would potentially see 35% to 50% of trucks impacted by a speed limiter requirement.

A national mandate would potentially result in fuel savings of 228.6 million litres of on-road diesel. This represents 1.4% of the total on-road diesel consumed in 2006. Annual GHG savings are estimated at 0.64 megatonnes. Ontario and Quebec combined would account for 64% of the estimated national savings.

Of the estimated annual fuel savings of 228.6 million litres, three provinces – Ontario, Quebec, Alberta – would account for 83% of the savings.

Case Study

A case study was conducted to investigate the actual benefits and experience of speed limiter usage by carriers. Two large carriers participated, one from the for-hire sector and one private trucking firm. Together, these carriers operate about 400 power units. For confidentiality reasons, the carriers who participated in the study could not be named. Attempts were made to include an owner-operator; however, a participant could not be confirmed within the project schedule.

The study collected both quantitative and qualitative information from the carriers with a focus on operational cost savings and safety. Improved fuel efficiency and fleet safety was stated as the motivation behind the introduction of speed controls in both firms and these policies have been in place for at least 20 years. Although it was not possible to collect data for both pre and post speed limiter implementation, both carriers believed that their speed control policies have had a significant impact on reducing fleet fuel consumption. They also reported that maintenance costs were also kept in check by operating their vehicles at reduced speeds.

Although drivers interviewed noted some concerns about driving speed-limited trucks, overall they did not believe that the speed control policies within their companies have created any significant operational or safety concerns. Each carrier initially experienced some tension in terms of drivers' acceptance of speed limiters. However, drivers have generally accepted speed controls and expressed satisfaction with their jobs.

The study also found that both fleets did not perceive any market disadvantage compared to their competitors as a result of their speed control policies, and in fact their policies support the ability to retain good drivers.

From a safety perspective, both fleet operators believed that lower speeds have resulted in an improved safety record. Based on the collision data reviewed, there was no evidence that speed limiters are contributing to the occurrence of collisions. In fact, there were no rear-end collisions attributed to operating under a speed control policy in which another vehicle hit one of their trucks at highway speed.

International Assessment

An assessment was conducted to learn from the experiences of three countries—Australia, the United Kingdom, and Sweden—which have implemented speed limiter legislation.

Australia and the European Union² (EU) have legislated the use of heavy truck speed limiters since the early 1990s. Legislative approaches, impact on road safety, enforcement and compliance issues were researched.

Australia implemented speed limiter legislation to address rising traffic fatalities involving heavy trucks and has noted a decrease in the number of collisions since its implementation.

EU directives legislated the use of speed limiters in heavy trucks and buses for road safety and environmental reasons. However, the extent to which speed limiters have contributed to improved road safety and decreased heavy truck collisions is difficult to determine as no studies were completed to quantifiably draw this conclusion.

Best available data comes from the U.K., which showed a 26% decrease in heavy truck accidents since the legislation was enacted in 1992. Furthermore, government officials interviewed in all three countries believe that speed limiters have had a positive impact on road safety.

Australia and the EU require speed limiters for trucks over 12 tonnes to be set at no more than 100 kph and 90 kph respectively. The EU also limits the speed of buses over 10 tonnes at 100 kph, and legislation was extended to medium-duty trucks over 3.5 tonnes in 2002. However, EU directives do not apply to foreign trucks. A report was prepared for the European Parliament in 2001 that estimated the total cost savings of speed-limiting all EU trucks in the 3.5-12 tonne range at 3 billion euros.

In all three countries, officials noted that compliance and enforcement efforts were integral to the effectiveness of the speed limiter policy. Roadside inspections, targeted enforcement of high-risk offenders, highway data collection camera networks, and annual inspections were used towards speed limiter compliance. However, the lack of sufficient enforcement personnel was noted as a consistent problem.

Tampering was identified as a significant problem in all countries. Australian officials estimated a 10-30 % speed limiter tampering rate and data from Sweden suggested that 40% of heavy trucks were exceeding their maximum allowable speed. Tampering methods included unauthorized changes to the electronic control module (ECM) settings. Operators would also adjust the tire size or transmission gear ratios to allow the true vehicle speed to exceed the speed limiter setting.

Road safety concerns identified by officials and industry stakeholders included increased highway congestion and difficulty accessing on and off-ramps resulting from bunching of speed-limited trucks. In an effort to limit the impact of increased highway congestion from speed-limited trucks overtaking one another, U.K. officials restricted heavy vehicles to the inside lane of motorways.

The importance of a consistent national approach to speed limiter compliance was stressed by a number of officials and stakeholders interviewed. Australian states and

² The United Kingdom and Sweden are member states of the European Union.

territories are provided flexibility with respect to legislative approaches towards compliance and enforcement. Similarly, the European Commission (EC) allows EU member states flexibility with specific regulatory provisions and implementation dates. However, the core legislative objectives (e.g. speed limiter set at 100 kph for all trucks over 12 tonnes) must be maintained.

In the case of Australia of Sweden, regulations and policies proposed at the national level are not always adopted at the state, territorial or county level and this has led to inconsistencies in regulatory approaches toward enforcement and compliance.

Technical Considerations Assessment

This report, based on survey responses from the Truck Manufacturers Association and Engine Manufacturers Association, summarizes technical issues and limitations of electronic speed limiters with respect to compliance, enforcement, and tampering. These issues should be considered in the context of a speed limiter mandate as they may influence the effectiveness of a jurisdiction's enforcement efforts to ensure compliance.

It is important to note that a heavy truck's speed limiter setting itself does not control the vehicle's top speed. Other variables, such as the tire-rolling radius and rear axle gear ratio, are essential for the ECM to calculate an accurate top speed. The customer specifies these variables when the truck is ordered and the ECM cannot be calibrated until final assembly. Both truck and engine manufacturers believe that the speed limiter setting should be a customer-configurable feature and pre-programming a particular setting is unrealistic and ignores the realities of customized production for the global market.

The speed limiter setting can only be accessed with manufacturer software, ECM password and computer equipment. Many fleets set the speed limiter once upon delivery of a new truck according to the company's speed control policy. The setting could conceivably be adjusted from within the truck cab assuming the necessary hardware/software and password were available. However, only vehicle owners and service personnel typically have access to the necessary equipment and passwords.

There are also technical challenges with respect to interfacing with all truck (ECM) makes and models on a uniform basis in order to access the speed limiter setting. Each engine manufacturer may have multiple hardware and software configurations and regularly update proprietary engine software. This may present challenges for enforcement personnel to access and verify the speed limiter settings in a uniform manner. However, reading tools are available that allow strictly read-only access to all major engine types.

CHAPTER ONE - INTRODUCTION

1.1 INTRODUCTION

This report contains a synthesis of key results from studies and related assessments completed to better understand the implications of implementing a heavy truck speed limiter requirement in Canada. At the outset of this exercise, the highway safety and economic impacts were not fully understood. A thorough and impartial assessment of the potential impacts of such a requirement in the Canadian context had never been undertaken and it was necessary to examine the safety, environmental, economic and operational aspects of mandating speed limiters. While there may be obvious benefits from slowing down all heavy trucks on Canadian highways, mandating speed limiters is a complex, multi-faceted issue and the analysis undertaken, drawn together in this report, injects a degree of clarity into the discussion. Whether mandating a speed limiter requirement will be further considered by Canadian jurisdictions is the issue at hand.

1.2 STRUCTURE OF THIS REPORT

This report is organized into four chapters. Chapter One provides an overview and background on the speed limiter issue. Chapter Two describes the results from the preliminary assessment undertaken in the Discussion Paper, TC's safety assessment and the workplan developed to guide the requisite studies. Chapter Three summarizes the key results of the consultant studies and other analysis. Chapter Four draws conclusions based on the analysis completed.

1.3 PURPOSE OF THIS REPORT

The issue of a mandatory speed limiter requirement for heavy trucks operating in Canada was first discussed at the spring 2006 meeting of the Councils of Deputy Ministers/ Ministers Responsible for Transportation and Highway Safety (CODMT/COMT). The Councils agreed that the issue of mandated truck speed limiters required further study and the discussion would be revisited once the necessary analysis of the potential impacts was completed. This analysis has been finalized and summarized herein. The purpose of this report was to inform CODMT/COMT on key aspects concerning mandating speed limiters for heavy trucks. At the April 2008 CODMT/COMT meetings, it was agreed to publicly release all speed limiter reports simultaneously in English and French once translations were completed. All reports are now available on the Transport Canada (TC) website at:

http://www.tc.gc.ca/roadsafety/speed_limit/menu.htm (English)

>

http://www.tc.gc.ca/securiteroutiere/limiteur_vitesse/menu.htm (French)

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1.4 BACKGROUND

In late 2005, the Canadian Trucking Alliance (CTA) called on the federal and provincial governments to mandate the activation of electronic speed limiters³ on all heavy trucks (manufacturers or gross vehicle weight rating of 11,000 kg or more) at no more than 105 kilometres per hour (kph). The proposal would require all heavy truck owners or operators to set the speed limiter microchip within the vehicle's electronic control module (ECM) at the prescribed maximum speed (105 kph). This would apply to all trucks traveling within Canada regardless of domicile.

In order to inform all jurisdictions on the issues surrounding this proposal, a federal-provincial working group was struck to guide the preparation of a Discussion Paper on the matter. The report (August 2006), albeit a preliminary assessment, noted potential benefits to the environment from reduced fuel consumption and potential highway safety benefits from slowing down heavy trucks (see section 2.1 for further detail on the report). The CTA proposal and the Discussion Paper were discussed by the CODMT/COMT and it was concluded that further analysis was necessary to better understand the implications of a speed limiter requirement. Federal, provincial and territorial Deputy Ministers agreed to work together to assess the outstanding issues and TC offered to lead this effort.

Drawing on the collaborative effort used to prepare the Discussion Paper, a federal-provincial steering committee was formed to guide this additional work. Membership included Transport Canada and representatives from the transportation departments of Ontario, Quebec, New Brunswick, Manitoba and British Columbia. The steering committee developed and approved a workplan that focused on the studies and other analysis that would be used to better understand the impact of speed limiters in Canada.

Starting in 2007, a number of consultant studies and assessments were undertaken to examine the feasibility of mandating truck speed limiters. These studies analysed the safety impacts of speed limiters on highways through traffic modelling, quantify the environmental benefits of fuel savings and reduced greenhouse gas (GHG) emissions, and assess the trade and competitiveness impacts of a speed limiter mandate in both the Canadian and North American context. A case study was also carried out to assess two carriers' experiences with implementing speed limiters. In addition, TC undertook an assessment to identify technical and tampering issues associated with speed limiters and an international assessment to learn from the experiences of other countries that have implemented speed limiter legislation. A brief overview of each study is found in section 2.3.

1.5 CONTEXT

The trucking industry in Canada is a large and growing sector, estimated to be worth about \$55 billion⁴ a year (2003). The for-hire sector includes approximately 10,000 carriers and

³ Speed limiters, also formerly known as speed governors on mechanically controlled engines, are devices which limit the maximum attainable road speed of the vehicle through the engine's electronic control module (ECM).

⁴ Transport Canada website – Carrier by Industry Segment. This figure does not include the owner-operators sector.

represents roughly \$24 billion of the \$55 billion. The private trucking sector also includes approximately 10,000 carriers and generates about \$25 billion of the industry total. Although private trucking accounts for just over 50% of the heavy trucks on the road, it only represents about 35% of the vehicle kilometres as distances traveled are typically shorter. There are an estimated 36,000 owner-operators in Canada with about half of these based in Ontario and Quebec. Although the owner-operator segment is made up primarily of self-employed individuals, many provide services on a sub-contracted basis to the for-hire and private trucking sectors.

The speed limiter debate has been one of the more divisive issues to impact the Canadian trucking industry in some time. Some interests strongly support speed limiters claiming that the fuel savings and safety benefits make the decision obvious. Others in the industry staunchly oppose speed limiters citing the potential safety hazard from increased truck-car speed differentials. Others still are undecided, claiming the expected results perhaps do not justify the means (regulation) and there may be other voluntary or other means to achieve the same benefits.

The activation of electronic speed limiters in heavy truck fleets in North America is already common practice. Recent speed limiter surveys⁵, supported by estimates from U.S. and Canadian trucking associations, suggest that up to two-thirds of large fleets already have speed limiters activated. Speed limiter settings are in the 100-112 kph range with an average setting of 105 kph (about 65 miles-per-hour) for both Canadian and U.S.-based large fleets. However, some U.S. fleets set their speed limiters up to 70 mph to account for higher state speed limits. The main reasons cited for using speed limiters include reducing the top speed of the fleet, reducing crash risk and increasing fuel economy. The main reasons for not using speed limiters are car-truck speed differentials, inability of the vehicle to accelerate and refusal by non-company drivers to comply.

Two Canadian jurisdictions have passed legislation requiring the activation of speed limiters on all heavy trucks operating in their province. On June 16, 2008, the Ontario Legislature passed legislation (Bill 41) requiring the electronic activation of the speed limiter for all heavy trucks operating in Ontario at no more than 105 kph. The Ontario regulation is expected to become a requirement by fall 2008 with full enforcement likely by fall 2009. Quebec has also passed speed limiter legislation under a package of traffic safety measures to improve road safety (Bill 42) and is expected to implement speed limiter regulations at the same time as Ontario.

In the U.S., the American Trucking Associations (ATA) announced their support of a national speed limiter mandate and submitted a petition for rule-making to the U.S. Department of Transportation in October 2006. The proposal to the National Highway Traffic Safety Administration (NHTSA) petitioned for heavy truck manufacturers to set speed limiters on new trucks at no more than 68 mph (about 110 kph) and to the Federal Motor Carrier Safety Administration (FMCSA) prohibiting the adjustment of the speed limiter on all trucks higher than 68 mph or tampering of the speed limiter setting. NHTSA and FMCSA subsequently issued a notice in the federal register requesting comments on

⁵ U.S.-based surveys of American carriers by the American Transportation Research Institute (ATRI) and Bishops Consulting for the Transportation Research Board.

the ATA petition. Close to 4,000 comments were submitted. A petition, similar to ATA's, was also submitted by Road Safe America. NHTSA and FMCSA are currently working together to review all relevant information and have not yet issued a decision on whether or not to grant or deny the ATA request.

On the international front, speed limiters have been legislated on all heavy trucks operating in Australia and Europe for more than a decade. Recently, the European Union (EU) also extended the speed limiter requirement to new medium-duty commercial vehicles. Government officials in these countries believe that speed limiters have generally had a positive effect on road safety through a reduction in the number and severity of heavy truck accidents. However, challenges remain with respect to enforcement, compliance rates and tampering. An analysis of the link between mandating the use of speed limiters and reductions in number and severity of collisions involving heavy trucks has not been undertaken.

1.6 IMPLEMENTATION

There are no current Canadian requirements or restrictions for the installation or use of vehicle speed control systems. A national speed limiter mandate would likely require a harmonized regulatory approach with the provinces and territories. Under the National Safety Code (NSC), a new standard could be developed, subject to the approval of the provinces and territories, through the Canadian Council of Motor Transport Administrators (CCMTA). However, the NSC has no legal authority in itself and therefore each jurisdiction would need to develop and implement "mirror" regulations. The federal Motor Vehicle Transport Act (MVTA) and the applicable provincial and territorial legislation would then need to be amended, based on the NSC standard, to ensure consistent application to all commercial vehicles operating in Canada, regardless of their origin.

CHAPTER TWO – PREPARATORY WORK

2.1 DISCUSSION PAPER

Following preliminary discussions by CODMT/COMT in 2006 concerning the feasibility of a speed limiter requirement, it was decided that a scoping paper was necessary to better understand the issues. On behalf of the Councils, TC completed a *Discussion Paper on Speed Limiters for Trucks Operating in Canada* in August 2006 that generally concluded the following:

- A speed limiter requirement (105 kph) could result in significant annual fuel savings for truck traffic using 100 kph highways of 2% or 227 million litres, and greenhouse gas emissions (GHGs) could be reduced by 640 kilotonnes per annum;
- A speed limiter requirement would affect 40% of truck traffic on highways posted at 100 kph, with 15% experiencing a speed reduction greater than 5 kph;
- Average truck speeds on these highways would be reduced by 2 kph, thereby reducing the average speed of all traffic by 0.4 to 0.5 kph;
- Speed limiters could result in a positive effect on both truck speeding and the severity of truck crashes. However, further assessment was needed on the possible safety risks (e.g. car/truck interactions) due to altered traffic patterns—bunching of speed-limited trucks, on and off-ramp congestion, increased driver frustration etc.;
- Issues relating to Canada/U.S. trade and industry competitiveness required further analysis and a strong enforcement program would be required as compliance and tampering is an issue in other countries.

2.2 ASSESSMENT OF SAFETY IMPACTS

In 2006, TC conducted a preliminary assessment of the safety implications of mandating speed limiters. This included an analysis of the scientific literature on the relationship between speed and safety and specifically on the speed differential between trucks and cars. Key results of this analysis, summarized following, provided the impetus for the Safety Implications study:

- Speed differentials only contribute to a limited portion of road crashes. For example, it has no effect on the occurrence of single vehicle crashes or head-on collisions.
- Speed limiters would decrease the crash risk of trucks currently traveling above 105 kph as well as the severity of their crashes when they occur.

- Speed limiters for trucks would generate some positive effects on the speed differential as it would decrease the speed variance within the trucking population and prevent trucks from overtaking cars traveling at or around the speed limit.
- There is no evidence that slightly increasing the mean (car-truck) speed differential by slowing down trucks to 105 kph will increase crash risks for trucks.
- The increase in interactions between cars overtaking speed-limited trucks and the risks associated with these interactions are unknown and more research is needed on this issue.

On the basis of these observations, Transport Canada's assessment concluded the following:

1. Rejecting the CTA proposal to mandate speed limiters based solely on safety risks was not warranted by the scientific literature and that further research was needed, and;
2. Traffic modeling simulations would help further clarify the safety implications of the proposal and bring valuable quantitative evidence to this issue.

2.3 SPEED LIMITER WORKPLAN

In order to address the additional analytical needs identified in the Discussion Paper, a federal-provincial steering committee was convened to guide the work. Transport Canada led the effort and drafted a workplan scoping out key issues to be addressed. The workplan, vetted and ultimately endorsed by the steering committee, structured the speed limiter studies that would be completed. The workplan was also circulated to the Policy and Planning Steering Committee of the CODMT.

The following briefly summarizes the scope of key studies and other assessments completed while Chapter Three summarizes the key results of this work.

1. Safety Implications of Mandating Speed Limiters – evaluates whether speed limiters would reduce the risk and severity of crashes for trucks and assesses the safety impact of speed differentials and car-truck interactions in a speed-limited environment.
2. Trade and Competitiveness Assessment of Speed Limiters – evaluates the trade and competitiveness impacts of electronically speed limiting heavy trucks in Canada under two scenarios: first is a national requirement implemented throughout Canada and the second is a requirement only implemented by some provinces (e.g. Ontario and Quebec).
3. Environmental Benefits of Speed Limiters – quantifies the anticipated annual diesel fuel savings and greenhouse gas reductions from a national speed limiter mandate.

4. Case Study - assesses the real-world experience (benefits, effectiveness and implementation issues) of speed limiters through carrier case studies in two Canadian trucking segments (for-hire, private).
5. International Assessment –researches the experiences of countries with national speed limiter legislation in place. Australia, the United Kingdom, and Sweden were selected and the analysis focused on compliance and enforcement strategies, the effectiveness of the legislation, and viewpoints from stakeholders in government, enforcement, trucking associations and others.
6. Technical Considerations –summarizes technical issues and limitations of electronic speed limiters with respect to compliance, enforcement, and tampering based on questionnaire responses from the Truck Manufacturers Association and the Engine Manufacturers Association.

CHAPTER THREE – SUMMARY OF SPEED LIMITER STUDY & ANALYSIS RESULTS

3.1 SAFETY IMPLICATIONS OF MANDATING SPEED LIMITERS

No consensus has been reached to date among stakeholders as to the safety implications of mandatory speed limiters for large trucks in Canada. Moreover, an analysis of the scientific literature on the speed/safety relationship confirms that there is still significant ambiguity surrounding the issue. This study therefore attempts to provide a scientific basis for informing Canadian jurisdictions as to these safety implications, and hopefully reduce some of the uncertainty concerning the issue of mandatory speed limiters.

The purpose of this study was to assess the safety implications of mandating speed limiters for heavy trucks at different maximum speeds, including the 105 kph threshold. As the basis for measuring safety performance and assessing the implications of truck speed limiters, the study develops a microscopic traffic simulation model that provides accurate real time estimates of crash potential (or safety performance) and assesses how this potential is affected by different types of highways and traffic conditions. The term “safety” in this report encompasses both the expected frequency and severity of crashes. The results provide useful insights as to the conditions under which truck speed limiters may impact highway safety.

Methodology

In brief, the project team:

- Conducted a scientific review of literature to identify and analyze relevant studies on the potential safety implications of speed limiters;
- Developed a framework to investigate the safety implications of truck speed limiters for different road and traffic scenarios, and integrated this framework into VISSIM, a microscopic traffic simulation platform that provides accurate real-time estimates of crash potential;
- Calibrated and validated VISSIM with safety performance measures derived from observed vehicle tracking data obtained from the NGSIMS traffic study;
- Developed a Crash Potential Index (CPI) that distinguishes between dangerous and non-dangerous vehicular interactions, and validated it on the basis of real crash/non-crash data;
- Applied the simulation to different road geometries, traffic volumes, number of lanes, truck ratios (percentage of trucks in the traffic stream) etc., and investigated the potential impact of speed limiters on crash risk;

- Established a representative freeway corridor case study for application of the simulation model and evaluated the potential safety impacts of the speed limiter strategy as applied to this straight highway corridor.

Several highway scenarios are modeled in this study: freeway segments including off-ramps, freeway segments including on-ramps, freeway segments with combined on-off ramps, and straight freeway segments. A case study of a straight Canadian freeway section along the Queensway Express Way (QEW) in the Greater Toronto Area was also performed. Each scenario is modeled using experimental traffic characteristics such as: varying traffic volumes and truck ratios in the traffic stream; speed limiter compliance rates, and; several maximum speed limiter settings.

The relevant traffic scenarios considered in this study are:

- High (2000 vehicles per hour per lane) and low (500 vehicles per hour per lane) freeway volumes
- High (15) and low (2.5) percentage trucks in traffic stream
- Mandatory truck speed limiter compliance rates (75%, 100%)
- Non-mandated speed limiter application (35% of truck population set at 105 kph)
- Maximum speed limiter settings of 80, 90, 100, 105 and 110 kph.

The 105 and 110 kph maximum settings were adopted to reflect recent Ontario and Quebec speed limiter legislation. The remaining maximum speed control strategies have permitted an appreciation of the sensitivity of safety to maximum speed thresholds. In order to obtain an appreciation of the results of speed limiter safety for an existing corridor, the model has been applied to the Eastbound QEW freeway in Halton Region for the segment from Guelph Line to Burloak Drive.

The CPI was used to evaluate the safety impacts of implementing speed limiters. In brief, the CPI captures speed differential, space headway and vehicle/driver braking capabilities in real-time for different vehicle interactions. A higher CPI suggests a higher safety risk. It can distinguish dangerous vehicular interactions that could produce a crash. In this study, the CPI is validated using the NGSIM database as well as actual crash data.

Key Results:

- The introduction of speed limiters set at 105 kph increases safety in the uncongested region of traffic flow for all geometric configurations, especially in the straight segment. As maximum speed is set at 110 kph the safety gains with the introduction of mandatory limiters become less prominent. This result holds for the uncongested region of traffic flow. The maximum safety gains were obtained when the maximum control speed was set at 90 kph for uncongested traffic volumes.
- As volume and percentage trucks are increased the safety gains associated with mandatory limiters set at 105 kph become less pronounced.
- As the volume is set close to capacity (2000 vehicles per hour per lane) more vehicle interactions take place and this leads to a reduction in safety especially for those

segments with increased merging and lane-change activity, such as, near on and off ramp segments. In these instances the introduction of truck speed limiters can actually reduce the level of safety when compared to the non-speed limiter case.

- As speed limiter compliance rates are increased, there is a small corresponding increase in safety for the mandatory speed limiter case. It should also be noted that as volume and percent of trucks increase, the safety gains associated with the full compliance are offset by the additional traffic turbulence caused by higher volume and percentage trucks.

This suggests that for higher traffic volumes and truck ratios, speed differentials and lack of space to adjust speed/lane can compromise safety. Given the typical high traffic volumes and percentages of trucks experienced on many freeways in Canada, this result can present some safety challenges. It could nevertheless be argued that average speeds could decrease below 105 kph as volume approaches congestion, limiting the potential negative impacts of speed limiters.

Case study: Straight highway segment on the QEW west of Toronto

A corridor case study was also undertaken for the eastbound QEW, which compared the scenario with and without mandatory speed limiters set at 105 kph and 100% compliance. Ten-day average volumes from 6:00 AM to 7:00 AM were used with a traffic composition of 5% of trucks. The QEW case study application confirms the findings obtained from the sensitivity analysis of different traffic scenarios and speed control strategies. The introduction of speed limiters set at 105 kph yields statistically significant safety gains along the case study corridor as compared to the base case (no mandatory limiters). A total of 30 simulation runs were performed, with an average 16% gain in safety (CPI/veh). In 21 cases, positive safety gains were observed. The differences in the CPI/veh between the base case and the limiter case yielded significant positive values suggesting that for the corridor, limiters resulted in safety gains.

Considerations relative to undivided highways

The traffic modeling evaluation of the safety impacts of speed limiters for trucks on undivided highways would require developing a completely different modeling approach. However, a parallel investigation of the safety implications of limiters for two lane rural highways was carried out, based on a review of previous studies supplemented by an analysis of speed profiles for large trucks from Alberta and Saskatchewan and a review of speed limit policies across Canada. The results show that speed limits on two-lane undivided rural highways are generally in the range of 80 to 90 kph. However, two-lane undivided rural highways can have posted speed limits of 100 kph. On these highways with higher posted speeds the data shows that approximately 40% of the trucks travel at speeds greater than 105 kph.

The implementation of mandatory speed limiters on rural two-lane highways may lead to an increase of passing maneuvers onto the opposing traffic lane. The possibility for increased unsafe passing maneuvers poses special safety challenges where trucks are subject to a maximum speed set by limiters for two lane undivided rural highways. Further

study of this situation is required before a more definitive statement can be made concerning the safety implications of truck speed limiters for this type of highway.

3.2 TRADE AND COMPETITIVENESS ASSESSMENT

The report, *Trade and Competitiveness Assessment of Mandated Speed Limiters for Heavy Trucks Operating in Canada*, was prepared to assess the trade and competitiveness impacts of electronically restricting the speed of all heavy trucks operating in Canada with speed limiters. This assessment considered the potential economic impact on trucking and industry competitiveness issues relating to jurisdictions with and without speed limiter mandates. It also contains an impact analysis on issues specific to the trucking industry such as impact on shippers and driver recruitment.

The trade and competitiveness assessment was conducted under two scenarios. The first was based on speed limiters implemented only in Ontario and Quebec with an emphasis on the potential impact on other regions in Canada as well Ontario/Quebec–U.S. issues. The second was a national speed limiter mandate implemented throughout Canada with an emphasis on Canada–U.S. issues. Both scenarios assumed all heavy trucks traveling in the speed-limited jurisdiction would have to have the speed limiter set at 105 kph.

The key results require qualification as follows:

- Comprehensive data on inter-provincial and Canada-U.S. truck movements was limited.
- Analysis conducted as part of the study was largely based on several speed limiter surveys as well as a survey conducted by the project team of Canadian and U.S. trucking firms. These surveys were of a relatively small sample size but nevertheless “best available data” was used to estimate and extrapolate anticipated trade and competitiveness impacts on the industry at large.

The survey conducted as part of this study included 55 interviews, 40 for-hire and private fleets of various sizes (6 to over 1,000 power units) and 15 owner-operators. About half of the owner-operators interviewed were U.S.-based and operated into Canada.

Canada–U.S. Trade and Truck Traffic

The U.S. is by far Canada’s most important trading partner, capturing 69% (in value) of Canada’s total trade, or \$575 billion in 2006⁶. The most important trade flows between Canada and the U.S. involved Ontario and the U.S. central region, totalling \$161 billion. Around 75% of Canada-U.S. trade carried by truck (by value) was concentrated at six border crossings, three of these in Ontario (Windsor, Fort Erie, Sarnia). Ontario accounts for nearly two-thirds of Canada-U.S. truck border crossings. Ontario and Quebec combined account for three-quarters of this traffic.

⁶ Transport Canada’s Transportation in Canada 2006 report

Trucking is of vital importance to the economies of Canada and the United States. By value, trucking accounts for about 70% of total trade between Canada and the U.S. Currently there are 6.3 million one-way truck trips between Canada and the U.S. with about 70% of these trucks being Canadian-based and 30% are U.S.-based.

Use of speed limiters

Speed limiters are in widespread use within North America's trucking industry. Recent speed limiter surveys in the U.S. indicate that about 60% of heavy truck fleets are speed limited⁷. As larger fleets are more likely to be speed limited, the percentage of trucks that are speed limited is higher at an estimated 77%. Similar surveys have not been conducted in Canada but available information indicates a similar level of usage. There seems to be a correlation between speed limiter usage and fleet size; the greater the fleet size, the greater likelihood of speed limiter usage by that fleet. In addition, larger fleets were more likely to be setting lower speeds than smaller fleets. Results show that the majority of large North American fleets use speed limiters and have all, or nearly all, of their vehicles equipped with activated speed limiters. In contrast, only a limited number of smaller fleets (typically comprised of less than 20 units) and the majority of owner-operators do not use speed limiters or have higher settings.

Common speed limiter settings in Canada range from 100 to 112 kph, with an average setting of around 105 kph for Canadian speed-limited fleets. Based on U.S. survey results, speed limiter settings in American fleets range from 60 to 90 mph (96.6 kph to 145 kph) with an average per truck setting also around 105 kph. The proposals by the Canadian Trucking Alliance (CTA) and the American Trucking Associations to mandate speed limiters at 105 kph and 68 mph (109.5 kph) respectively largely reflect the current practice of larger fleets.

Safety and reduced vehicle operating costs are the main reasons cited for speed limiter usage. The safety arguments for speed limiters centre on the premise that lower heavy vehicle speeds improve road safety by reducing the number and severity of truck collisions. Surveys on the use of speed limiters in North America show that fleet managers, especially for larger fleets, are of this view.

The argument against speed limiters is that safety could be compromised in situations where lack of passing speed or increased speed differentials between trucks and other vehicles occur (such as when passing slower moving vehicles or in traffic merging situations). Interviews conducted during this study suggest that owner-operators and managers of smaller fleets tend to support this viewpoint.

⁷ Survey by the American Transportation Research Institute (ATRI) found 71% of respondents used speed limiters on at least some of their fleet vehicles. Survey of company-employed drivers by the U.S. Owner-Operators Independent Drivers Association (OOIDA) found a 64.6% speed limiter usage rate. Survey for the Transportation Research Board found a 82.5% usage rate. Project survey found all large fleets (20 or more vehicles) were speed -limited.

North American speed limits for heavy vehicles vary from 80 kph to 120 kph depending upon the jurisdiction. In total, 23 states and 4 provinces currently have legal truck speeds above 105 kph.

Competitiveness Assessment

The general conclusion from the study's assessment is that there would likely be very few competitiveness issues from implementing speed limiter mandates at 105 kph. The main concerns originate from smaller fleets and owner-operators who feel that safety could be compromised under a speed limiter mandate and hence state that they would likely avoid operating in those speed-limited jurisdictions⁸. This would, in effect, reduce competition in these jurisdictions by reducing the number of operators competing for business. Some of these operators also state that their productivity may be compromised and they would not be able to travel as far in light of other regulatory requirements such as hours-of-service.

The majority of freight in North America transported by large fleets is moved in trucks speed limited around 105 kph. Again, the larger the fleet, the greater likelihood of speed limiter activation. This statement is supported by speed limiter settings and usage rates drawn from several speed limiter surveys. For those fleets already speed limited at or below this speed, there would likely be no competitive impact from a 105-kph speed limiter mandate under either scenario.

However, the results also show that only about 60% of Canadian and U.S.-based heavy truck fleets are speed-limited. But this percentage increases to 77% on a per-truck basis as larger fleets make more use of speed limiters than smaller ones. Based on the project survey, those Canadian fleets operating in the 106-110 kph range would likely be able to operate within a 105 kph mandate with limited difficulty. A costing analysis conducted as part of this study, and described later, shows these fleets would in fact save money by reduced fuel costs.

Those fleets operating with higher speed settings, or without settings, noted they typically travel at or below 105 kph to control fuel costs. The study survey found that half of the smaller fleets did not activate speed limiters on their trucks, but did maintain speed policies of posted speed or lower. For the most part, these fleets have their routes set for these speeds and would feel little economic impact. It has been estimated that 62% of trucks on intercity highways across Canada are already traveling at 105 kph or less⁹. Another 22% travel between 105 and 110 kph for which the time-savings over most runs would be minimal (for example, maximum 30 minutes on a 600 km run assuming entire run is at top speed). Companies with a speed policy in this range indicated, for the most part, little adverse impact on their operations with reducing speed to 105 kph.

⁸ Again, these results are based on a relatively small survey sample and may not be representative of views of all small fleet operators and owner-operators.

⁹ Environmental Benefits of Speed Limiters report, prepared for Transport Canada November 2007.

The ATA proposal for a mandated speed limiter setting of 110 kph (68 mph) appears to be based on the common practices of larger fleets in the U.S. The interviews and analysis conducted as part of this project did not indicate any specific reasons why different limits (105 vs. 110 kph) could not be implemented. Many of those interviewed indicated that in the interests of harmonization, both countries should adopt one setting. Harmonization may also negate the possibility of any challenges under trade agreements.

Scenario 1: Ontario & Quebec Speed Limiter Mandate

Data drawn from Statistics Canada *Commodity Origin Destination Survey* suggests that such a mandate would affect a much higher portion of Atlantic Canada's trucking industry than Western Canada's.

Implications for Atlantic Canada

Should Quebec and Ontario mandate speed limiters, about 30% of Atlantic Canada's heavy trucks would need to set their limiters accordingly due to the interaction of the Atlantic industry with Quebec and Ontario. Many large fleets based in the region operate into the U.S. and move through Ontario and/or Quebec on the return portion of the trip, completing a triangular movement. As a result, the majority of Atlantic Canada long distance fleets would potentially fall under the speed limiter mandate. However, most large fleets are already operating at the mandated 105 kph or less and hence would not be affected. Those interviewed as part of this study did not express any competitive concerns.

In contrast, owner-operators felt their safety would be adversely impacted by increased car-truck interactions, especially when traveling in the higher speed limit states. They also noted that in some circumstances their productivity could be adversely affected.

Implications for Western Canada

Unlike Atlantic Canada, only a small portion of Western Canada's trucking industry interacts with Ontario and Quebec. Over 70% of Western Canada's truck revenues with Eastern Canada either originates in, or is destined for, Manitoba. This means the majority of carrier operations in Western Canada would be unaffected if Ontario and Quebec were to adopt a speed limiter mandate. It is estimated that only about 10% or less of Western Canada's heavy truck population would be affected by Ontario and Quebec mandating speed limiters. While most large fleets in Eastern Canada and Western Canada are already at or below the proposed 105 kph maximum speed, only a small portion of smaller fleets in the west would need to adjust their speed limiter settings.

Available speed data for B.C. indicates that, for the most part, truck speeds in the province are already below the proposed 105 kph limit due to the constrained highway design speeds in the mountainous terrain.

Western-based owner operators indicated that if Ontario and Quebec implemented the policy they would avoid operating in those provinces, as they believe that the slower speed would increase car-truck interactions and cause potential safety hazards. They also expressed concerns that if they set their speed limiters for Ontario and Quebec runs, that this would adversely affect safety outcomes when operating within Western Canada and the U.S., where they conduct the majority of their business. They also indicated increased safety risk when traveling on two-lane undivided highways in Alberta and Saskatchewan as well as two-lane portions of the Trans-Canada highway in Northern Ontario. These arguments, however, could be mitigated should these operators invest in and use the tools that would allow the speed limiter setting to be changed as they enter and leave speed-limited jurisdictions.

Implications for Ontario/Quebec – U.S. Traffic

U.S.-based fleets operating into Ontario and Quebec would need to set the speed limiter on their trucks at 105 kph unless they chose to reset the setting when operating outside of the speed limited jurisdictions. However, most fleets would avoid this as it would likely place control to alter settings in the hands of the driver. Further, all companies interviewed maintained a consistent speed limit policy across all of their operations and did not adjust speed limiter settings by region or jurisdiction. They also noted that they would not allocate their fleet dependant on speed limiter requirements.

Despite the potential competitive disadvantage from U.S.-based fleets operating into Ontario and Quebec at lower speeds compared to other U.S.-based fleets that do not travel north, this is again not an issue as most of these fleets already operate at or below 105 kph.

In addition, 47% of Canada-U.S. truck traffic (by value) moves between Ontario and its seven neighbouring states (Michigan, Wisconsin, New York, Pennsylvania, Ohio, Indiana and Illinois). The maximum legal truck speed limit in these states is 65 mph (105 kph) or less, suggesting that this traffic would be unaffected by a speed limiter mandate (assuming the trucks do not exceed legal speed limits).

Owner-operators and small fleets expressed opposition to the speed limiter mandate citing safety concerns due to increased car-truck interactions. On this basis alone, 80% of the owner-operators interviewed as part of the project survey indicated that they would no longer haul into Ontario or Quebec to avoid being speed-limited. This argument could be mitigated to the extent that these operators could decide to purchase and use the tools necessary to change speed limiter settings.

Scenario 2: National Speed Limiter Mandate

U.S.-based fleets operating into Canada would be required to operate those trucks with speed limiters set at 105 kph, regardless of whether those trucks are operating in Canada or the U.S. Concern has been expressed that speed differences created by setting truck speed limiters at 105 kph could cause competitive issues for these fleets vis-à-vis other U.S.-based fleets that do not operate into Canada. These other fleets could operate at higher speeds and perhaps gain a competitive advantage.

This in turn could keep U.S. fleets out of Canada, as they would not want to lose this competitive edge (by operating at higher speeds) in their U.S. operations, which are potentially much larger than their Canada-U.S. operations.

Larger U.S.-based fleets interviewed were not concerned with this potential speed restriction as they are already operating at or below 65 mph (105 kph). As well, ATA did not note this as a concern when they were interviewed.

As most large Canadian fleets operate at or below 105 kph, there would be minimal impact under this scenario. With higher posted speed limits on highways in some provinces (New Brunswick, Nova Scotia, Alberta, Saskatchewan), a speed limit differential could conceivably be created between trucks and cars, something that does not currently exist in Canada. However, the reality is that most trucks already operate below the average speed of cars.

Owner-operators, on the other hand, were very much concerned with being speed-limited at 105 kph. Many owner-operators are long-haul drivers who operate on longer runs and hence are exposed to states that have higher speed limits. Their primary opposition to mandated speed limiters relates to safety concerns and increased car-truck interaction from limited passing ability and increased speed differentials. U.S.-based owner-operators noted that due to these safety concerns, they would stop operating into Canada. Some small fleets and owner-operators interviewed do not set the speed limiter settings or set them near 110 kph to allow flexibility when passing slower moving vehicles, particularly on two-lane highways.

Economic Impact on the Trucking Sector

A costing analysis was performed to illustrate the potential trade-off between productivity benefits and increased costs. Results show that the increased fuel costs of operating at speeds higher than 105 kph are greater than any productivity gains. A speed of 105 kph (65 mph) was used as the baseline speed and compared against truck operating costs at 113 kph (70 mph) and 121 kph (75 mph). The analysis assumed maximum productivity such as traveling at maximum posted speed limits and optimizing hours-of-service regulations. In addition, the analysis only considered increased fuel costs and not other costs (e.g. tire wear) from operating at higher speeds.

Overall the analysis showed that driving at 105 kph provides the lowest overall cost as the fuel savings at the lower speed outweigh the increased productivity benefits of the higher speeds. There is an overall cost savings of 2% when operating at 105 kph compared to operating at 113 kph and 9.5% when operating at 121 kph. As noted, this is based on a maximum theoretical productivity. In actual driving conditions, this level of productivity would not likely to be achieved due to operating in and around areas with slower traffic speeds as well as loading and unloading wait times.

While the company or vehicle owner would realize this overall cost saving, the transport driver increases income by driving at the higher speeds¹⁰. For the example analyzed, the driver's pay would be 6.5% higher at 113 kph. So while the transport fleet owner benefits from the lower speed, the driver benefits from the higher speed.

From strictly an income point of view, drivers would have a preference for higher speeds. Owner-operators experience higher gross annual revenues by driving at the higher speed, but a lower net income after increased fuel expenses.

The main economic impact on the trucking industry would be a savings in fuel and other vehicle operating costs. These fuel savings have been estimated at 228 million litres annually if speed limiters were mandated nationwide in Canada¹¹. Depending upon fuel prices paid by the fleets in their area of operations, this could represent an overall savings to the trucking sector in the order of \$190 million to \$200 million annually.

Fleet operators and owner-operators could conceivably have some runs adversely affected where they are at or near their Hours-of-Service limits. However, only a few fleet operators interviewed indicated this as a concern and most indicated that they would adjust their delivery schedules accordingly. A detailed audit of several firms would be required to quantify these potential costs. However, owner-operators felt that where these productivity losses occurred, it could potentially cost them a day's pay¹².

Impact on Shippers

Overall, there would be very little impact on shippers as the majority of freight is already being moved by fleets that are speed limited at 105 kph or less. The impact would be felt mainly by shippers who may wish to ship within tight deadlines requiring trucks to travel illegally at higher than posted speeds to meet delivery time lines.

The interviews conducted as part of this study indicate that mandated speed limiters would not keep larger fleets from operating into such jurisdictions. While owner-operators indicated they would avoid such jurisdictions, the numbers that actually may do so, out of the total available population of trucks, would likely be relatively small and not affect competitiveness as far as shippers are concerned.

Driver recruitment and retention

Some expressed the view that fleets may use higher speeds as a driver recruitment tool, or fleets operating into speed-limited jurisdictions could lose drivers to fleets not operating in such jurisdictions. Conceivably, this could affect the ability of these fleets to move freight and hence they could potentially lose market share.

¹⁰ Assuming the driver is paid on a distance vs. time basis (e.g. x cents/mile) and covers more distance over a set interval by traveling at a higher rate of speed.

¹¹ Environmental Benefits of Speed Limiters Report

¹² The period of time over which the potential income loss (e.g. a day's pay) would be realized was not specified.

The owner-operators interviewed shared these views that drivers may avoid speed-limited fleets or operating in speed limiter jurisdictions. However, fleet managers, large and small, did not share this view. They indicated it was the overall pay package that the driver considers including such factors as mileage rate paid, monthly miles attained, quality of equipment and fringe benefits. It was their opinion that being speed limited would not affect their ability to recruit and retain drivers.

A large scale, scientifically designed survey of drivers concerning their previous employment decisions and employment expectations would be required to quantify the extent to which that speed limiters can be an effective driver recruitment and retention tool. However, the qualitative information available indicates the ability to attract drivers via this means is quite limited.

3.3 ENVIRONMENTAL BENEFITS OF SPEED LIMITERS

The report, *Environmental Benefits of Speed Limiters for Trucks Operating in Canada*, was prepared to update preliminary fuel savings and greenhouse gas (GHG) reduction estimates provided in the 2006 Discussion Paper. Due to data availability issues and time constraints associated with the preparation of the Discussion Paper, initial estimates were based on limited information. The updated estimates are drawn from more detailed truck speed distribution and truck traffic volume data obtained from the provinces and territories.

While the total amount of truck travel increased, the truck speeds were somewhat lower than previously estimated, limiting the overall savings. The updated annual fuel savings are now estimated at 228.6 million litres, 0.6% above the previously estimated total of 227.3 million litres. This represents 1.4% of the total diesel fuel consumed by road vehicles operating in Canada in 2006.

The annual GHG savings are now estimated at 0.64 megatonnes, compared to the previous estimate of 0.63 megatonnes. Ontario and Quebec combined account for 64% of the estimated national savings.

Truck traffic volume data was obtained primarily from provincial traffic count programs. Annual truck travel (vehicles greater than 11,000 kg) on provincial highways with posted speed limits 100 kph or higher was estimated at 24.6 billion kilometres (using 2006 data). Speed distribution data was collected from Weigh-in-Motion and provincial sites, and then averaged to produce a speed distribution profile by province. These profiles were then applied to the total truck volume data for each province to produce estimated annual totals of truck travel above 105 kph. For provinces with roads posted at 110 kph, separate speed distributions were calculated for 110 kph posted highways and 100 kph posted highways.

As shown in Exhibit 1, it was found that nationally, approximately 62% of truck traffic traveled at 105 kph or lower, 23% were in the 105-110 kph range and 15% were at 110 kph or above.

Exhibit 1: Average Speed Distribution by Province

Province	Percent of Truck Traffic Within Speed Interval Indicated				
	<105	105-110	110-115	115-120	120+
New Brunswick * (100 kph locations)	64.2	22.5	9.2	3.0	1.1
New Brunswick (110 kph locations)	55.1	31.5	9.6	2.5	1.3
Quebec (100 kph locations)	64.5	23.0	9.8	2.1	0.6
Ontario (100 kph locations)	49.1	28.0	16.6	5.0	1.3
Manitoba (100 kph locations)	75.4	19.4	4.4	0.2	0.1
Saskatchewan (110 kph locations)	50.1	23.2	16.1	7.1	3.5
Saskatchewan (100 kph locations)	54.1	28.0	12.0	3.6	2.3
Alberta (110 kph locations)	44.4	26.5	18.9	7.3	2.9
Alberta (100 kph locations)	69.7	22.5	6.0	1.3	0.5
British Columbia** (100 kph locations)	97.2	1.8	0.6	0.2	0.2
National average***	62.4	22.7	10.3	3.2	1.4

*Speed distribution data for New Brunswick used for Nova Scotia and Newfoundland.

**Terrain constraints limit vehicle speeds on most commercial vehicle routes in B.C.

***Arithmetic average of speeds shown in each column

British Columbia and Manitoba represented the lowest proportion of truck traffic potentially impacted by a speed limiter requirement with only about 3% and 25% respectively of vehicles traveling above 105 kph. The Alberta 110 kph location and Ontario 100 kph location represented the highest proportion of truck traffic potentially impacted by the requirement with about 55% and 59% respectively. Most other locations would potentially see 35% to 50% of trucks impacted by a speed limiter requirement.

This data served as the basis for estimating the percent fuel savings from each speed interval above 105 kph (120+, 115-120, 110-115, 110-105). To calculate the fuel savings associated with limiting truck speeds to a maximum of 105 kph for each province (Exhibit 2), the fuel consumed¹³ by truck traffic in each interval was calculated using total truck traffic for that interval.

¹³ Fuel consumption rates are exponentially related to speed (fuel consumption increases faster than speed increases). A base fuel consumption rate of 40L/100km for trucks traveling 105 kph is assumed based on fuel consumption rates from NRCan's report "Fuel Efficiency Benchmarking in Canada's Trucking Industry, March 2000".

Of the estimated annual fuel savings of 228.6 million litres, three provinces –Ontario, Quebec, Alberta– accounted for 83% of the savings.

Exhibit 2: Estimated Fuel Savings and GHG Reductions by Province if Speed Limiter Policy Implemented

Province	Estimated Annual Total Truck Travel (billion km)	Estimated Annual Fuel Savings (millions litres)	Estimated Annual GHG Savings (megatonnes)
Newfoundland	0.2	1.9	0.01
Nova Scotia	0.4	4.9	0.01
PEI	n/a	0.0	0.00
New Brunswick	0.4	6.8	0.02
Quebec	5.8	46.3	0.13
Ontario*	9.9	100.3	0.28
Manitoba	0.6	2.8	0.01
Saskatchewan**	1.4	21.2	0.06
Alberta	3.7	42.4	0.12
British Columbia	2.2	2.0	0.01
Total	24.6	228.6	0.64

*Savings were calculated for 6.2 billion km of travel to cover traffic on roads posted at 100 kph. Roads posted at 90 kph or less were not included due to available data indicating speeds higher than 105 kph are not that prevalent.

**Savings calculated for 1.2 billion km of travel as roads posted at 90 kph or less were excluded

3.4 CASE STUDY

A case study was conducted to document the benefits and experience of speed limiter usage within the Canadian trucking industry. Two large trucking firms were selected through their respective trucking associations, one for-hire carrier and one private carrier. Both are based in Ontario, and together have about 400 power units on the road. Due to business confidentiality reasons, these carriers cannot be identified. Several attempts were made to locate an owner-operator carrier for this study. However, due to time constraints, a participant from this sector could not be secured. This was further complicated by a key study criterion, electronic activation of the speed limiter. Many owner-operators do not voluntarily activate the speed limiters in their trucks but may follow a speed policy.

The background research found that the three trucking sectors, as represented by their respective associations, had rather polarized views on the issue of mandatory speed limiters. The Canadian Trucking Alliance (CTA), the association representing the for-hire sector and the group who first proposed the notion of mandatory speed limiters in trucks, continues to support their original position and is a strong advocate of a national speed limiter mandate. The other end of the spectrum is the Owner-Operators Business Association of Canada (OBAC). OBAC is strongly opposed to mandatory speed limiters in trucks and is against any provincial or national regulations making such requirements compulsory.

The third group, the Private Motor Truck Council of Canada (PMTTC), representing Canadian private carriers, questions the rationale for a speed limiter mandate specific to trucks, and questions the view that truck speeding is a significant issue. PMTC believes that GHG / nitrous oxide (Nox) reductions are being realized through other means such as the 2007 engine specifications and those planned for 2010, and the move toward ultra-low sulphur fuel in 2006, and that a speed limiter mandate should specifically target chronic offenders (e.g. those drivers/carriers with speeding violations). Further, PMTC feels that the entire issue of speeding needs to be addressed in a manner that includes all offending vehicles, not just trucks.

This study collected both quantitative and qualitative information from these carriers with a focus on operational cost savings and safety. The study sought to make a comparison of speed limiters pre and post implementation. However, it was not possible to collect any quantifiable data for the pre-implementation period as both carriers have used some form of speed control for close to 20 years and representative (pre) data was unavailable.

Cost savings and safety were motivating factors behind the introduction and continued use of speed controls in both firms. Management stated that speed limiters have resulted in lower operating costs through reduced fuel consumption, and allowing them to remain competitive. A second important consideration was the belief that speed controls would result in fewer collisions. Both carriers build sufficient lead-time into their delivery schedules, accounting for maximum allowable speeds and hours-of-service requirements.

The for-hire carrier maintains a speed limiter setting of 101 kph (99 kph on cruise control) and the private carrier's setting was 108 kph (103 on cruise). Both also set a critical speed setting in the ECM whereby if the truck exceeds this maximum allowable speed, typically traveling downhill, the company is immediately notified and the driver receives a warning message.

Both carriers used a tiered disciplinary system for driver speed infractions. Although both reported speeding violations, termination was a rare occurrence. In one instance, however, the for-hire carrier reported that they caught a driver disarming the speed limiter function within the ECM in order to travel at higher speeds. Tampering within the ECM was evident and the driver was terminated. The private carrier did not report any instances of tampering.

Fuel Savings

Despite the data limitations, the for-hire carrier believes that their speed control policy has had a significant impact on reducing fuel consumption. The private carrier also stated that the speed control policy has resulted in fuel savings, but the positive impact was reduced due to travel patterns (e.g. short haul runs through urban areas and lower-speed rural highways). Fuel consumption data for the private carrier was only available for a two-year period and; therefore, no quantifiable estimate in fuel savings due to the speed control policy was possible.

The for-hire carrier maintains a consistent speed limiter policy across its entire fleet and requires its owner-operators to activate the speed limiter to the same speed as company trucks. In some cases, this has resulted in reduced fuel efficiency for the owner-operators as the driveline specifications of their trucks may be configured for a cruising speed higher than the speed limiter setting.

Maintenance Costs

Both carriers stated that speed limiters have resulted in reduced wear on engines, brakes and tires, thereby reducing maintenance costs. Engines operating at lower rotations-per-minute (RPM) will experience less wear and reduced maintenance requirements, truck brakes will run cooler at lower speeds and last longer, and tires on trucks operated at lower speeds will also wear less. While both firms expressed the opinion that their speed control policy has reduced maintenance costs, given the absence of pre-implementation cost data, the study was not able to draw any quantitative conclusions regarding the effect of speed limiters on maintenance and repair costs. Both carriers also reported no significant costs associated with servicing the ECM or setting the speed limiter function.

Driver Issues

One driver from each carrier was interviewed to provide insights from those operating speed-limited trucks. Recognizing that only two drivers were interviewed, it cannot be assumed that the views expressed are representative of all drivers in that particular trucking sector. The for-hire driver supported a speed limiter mandate, while the private carrier's driver believed governments should not be regulating truck speeds and such a requirement would lead to increased highway congestion and potentially reduced safety.

Drivers interviewed did not believe that the speed control policies within their companies have created any significant operational or safety concerns. However, each carrier has experienced some tension in terms of drivers' acceptance of speed limiters. Concerns and objections included reduced ability to pass other trucks quickly, resulting in trucks traveling side-by-side on highways for extended periods of time; too low setting of the critical speed setting, forcing drivers to ride the brakes when traveling downhill; and rude treatment including being cut off by other motorists and non-speed limited trucks traveling at higher speeds. Despite the above, the drivers generally accepted the speed control policy and expressed satisfaction with their jobs.

The case study also found that neither of the carrier fleets studied appear to have any market disadvantage compared to their competitors as a result of their speed control policies and in fact may have a market advantage associated with driver retention and driver job satisfaction. Both carriers reported a low driver turnover rate and their speed control policies did not appear to be a factor in hiring new drivers. However, some owner-operators wishing to provide services to the for-hire carrier have declined when learning of the speed limiter requirement.

Safety Issues

A review of speed violations at both carriers indicated a relatively low number of incidences. Speeding tickets were typically received on lower speed non-freeway roads.

Both carriers believed that their lower fleet speed has resulted in an improved safety record. About half of the reported collisions were low-speed yard accidents (on company property) resulting in property damage only. For the remaining collisions, the following was noted:

- There was no evidence of vehicles rear-ending either the for-hire or private carrier's trucks or 'vehicle run under truck' collisions occurring at high speeds.
- There is no evidence of fatigue being a factor in any collision; and
- Truck drivers were noted as being less likely to be considered "at fault" than the other driver.

The private trucking firm representative noted that they have had issues with other drivers hitting the back of their trucks on a number of occasions just as the truck was exiting the freeway onto the road near their headquarters. The truck was not traveling at full highway speed at the time of the collision; rather it was decelerating as it entered the exit ramp. The for-hire carrier also experienced a number of rear-end collisions; however, specifics on which vehicle (for-hire truck or other) hit the other were not available. The for-hire carrier has never experienced a collision at highway speed in which another vehicle rear-ended one of their trucks.

The collision data analyzed does not show any evidence that speed limiters are contributing to the occurrence of collisions and both carriers believe that their speed control policy has resulted in a reduction in collisions.

3.5 INTERNATIONAL ASSESSMENT

Australia and the European Union (EU) have legislated the use of heavy truck speed limiters since the early 1990s. Worldwide, since it is estimated that up to 30 countries require the use of truck speed limiters, including Japan, Zambia and recently a state in India, it seemed prudent to learn from the experience of others. As such, the report, *Learning from Others: An International Study on Heavy Truck Speed Limiters*, was completed and is summarized below.

The assessment centered on three countries: Australia, the United Kingdom and Sweden. These countries were selected for a variety of reasons including geographic similarities to Canada, best available literature and data, and availability of key contacts to discuss speed limiter issues. Speed limiter legislative approaches, compliance regimes, enforcement methods, and tampering issues were highlighted.

As part of the study plan, the rationale and driving force behind each jurisdiction's speed limiter legislation was researched. A comprehensive assessment or study completed to rationalize the implementation of a speed limiter requirement was not undertaken by any jurisdiction. The one exception was a European Commission (EC) report, referenced later in this section, assessing potential benefits from a speed limiter directive applying to medium-duty vehicles.

In Australia, speed limiter legislation was but one of a number of road safety initiatives implemented in 1990 to deal with the rise in traffic fatalities involving heavy trucks. Road safety and the environment were the main reasons for the EC legislating the use of speed limiters in heavy trucks and buses for its 27 member states. There is no evidence of any systematic research or modeling work conducted to link anticipated outcomes to the proposed speed limiter legislation prior to implementation.

This doesn't suggest that there have not been any positive results from such legislation. Government officials interviewed generally believe that speed limiters have had a positive impact on road safety and have contributed to a decrease in accidents involving heavy trucks. For example, since the U.K. enacted speed limiter legislation in 1992, heavy vehicle accidents have dropped by 26%. In Australia, the number of heavy truck accidents has also decreased since the legislation was implemented. However, the extent to which speed limiters contributed to these decreases is difficult to determine as no studies were completed in any participating jurisdiction to directly link their use with improvements to road safety.

Due to this ambiguity and unproven link between speed limiters and demonstrable improvements in road safety, it may be difficult to draw any conclusions on the safety benefits that could be gained in Canada directly from the international experience.

Australia implemented its speed limiter legislation in 1990 (heavy trucks over 12 tonnes and buses over 5 tonnes) requiring these vehicles to have their limiters set at no more than 100 kph. States and territories were provided flexibility in the legislative approach to regulate speed limiter settings for other vehicle classes provided the 100 kph maximum setting was not exceeded. For example, road trains with two or more trailers are speed limited to 90 kph in South Australia and the Northern Territory.

In 1992, the European Commission issued a directive (92/6/EEC) for all member states requiring the use of speed limiter devices on buses over 10 tonnes (and more than eight passengers) set at no more than 100 kph and trucks over 12 tonnes registered after January 1988 set at 90 kph. In 2002, the legislation was extended to medium-duty vehicles (Directive 2002/85/EC) to include buses less than 10 tonnes (and more than eight passengers) and trucks over 3.5 tonnes. The target implementation date was January 2005 although some countries delayed implementation up to January 2008. These directives did not apply to foreign trucks registered outside of the EU.

Although EC directives are binding legislation, member states are allowed some flexibility when drafting regulations including staggered implementation dates and other adjustments that would not infringe on the core objectives of the directive.

Sweden, for example, delayed implementation until 1994 for the heavy-duty directive and January 2008 for the medium-duty directive to allow industry time to comply with the provisions.

Some jurisdictions, including the U.K. and Sweden, have implemented additional speed limiter legislation, extending the scope of the requirement to other heavy vehicle weight categories.

The U.K., for example, implemented additional legislation for all trucks exceeding 7.5 tonnes and registered since 1992 to be fitted with speed limiters and also delayed implementation of the medium-duty directive until 2008.

The safety and environment rationale behind the EC speed limiter directives was premised on the argument that lower speeds result in fewer accidents and casualties as well as lower fuel consumption and air emissions. The basis for extending the scope of the directive to medium-duty vehicles also included eliminating an unfair competitive advantage by operators of lighter-duty vehicles registered in EU countries who may provide faster or cheaper transportation services by not being speed limited.

A study conducted in the Netherlands estimated a cost savings of 89 million euros from reduced fuel, maintenance, etc. for speed limiting trucks less than 12 tonnes. In a 2001 report to the European Parliament and the Council¹⁴ evaluating potential savings from the medium-duty directive, the Netherlands estimate was extrapolated to a total estimated cost savings of 3 billion euros for the European Union from speed limiting all trucks in the 3.5-12 tonne range. The report also noted the traffic congestion problem of speed-limited trucks overtaking each other over long distances, but stakeholder input on the effectiveness of speed limiters was generally positive. Some criticized the lack of adequate enforcement to combat the high rate of tampering. A potential competitive issue of non-EU trucks, exempted from the speed limiter directive, carrying goods at higher speeds within the EU bloc was also highlighted. The solution suggested to member states to rectify this situation was to consider making the use of speed limiters mandatory for trucks from non-EU countries as part of future trade agreements.

The issue of inconsistent application of speed limiter directives was also raised by some stakeholders, specifically relating to eligible classes of vehicles and exemptions allowed for older vehicles. EC directives allow flexibility with respect to implementation, effective dates for the directive and eligible classes of vehicles (dependant on the registration date) would vary between member states. In the U.K., for example, the medium-duty directive applies to trucks over 3.5 tonnes registered after October 2001. Officials believe that this has resulted in operators holding onto older trucks longer as these vehicles can travel up to 70 mph (113 kph). Newer speed-limited trucks in this class cannot exceed 56 mph (90 kph). The U.K. government is attempting to rectify this imbalance by lowering the speed limit for all eligible trucks on motorways to 60 mph, including those registered pre-2001.

¹⁴ Report from the Commission of the European Communities to the European Parliament and the Council on the Implementation of Council Directive 92/6/EEC of 10 February 1992 on the Installation and Use of Speed Limitation Devices for Certain Categories of Motor Vehicles in the Community, Brussels, 14.06.2001

The following summarizes key findings of the international assessment:

1. Ancillary Benefits – Based on an assessment conducted by the EC, other positive benefits from speed limiter legislation included an estimated reduction in fuel consumption of 3-11%, lower vehicle maintenance costs and reduced insurance premiums.
2. Enforcement & Compliance – Many road transport officials noted that compliance and enforcement efforts were integral to ensure the effectiveness of the speed limiter policy. The lack of sufficient enforcement personnel to verify speed limiter compliance was identified as a problem in all participating jurisdictions. For example, Sweden only has 200 enforcement officers for all heavy vehicle compliance efforts. The number of dedicated officers was similarly low in the U.K. and Australia.

Swedish police employ two strategies for speed limiter compliance: roadside inspections and heavy vehicle speed compliance campaigns. The later involves verifying the speed of trucks with radar guns and issuing fines for non-compliance if the vehicle is found to exceed its speed-limiter setting.

The U.K. strategy for speed limiter compliance includes roadside inspections and annual roadworthiness tests. The later involves annual safety checks on eligible classes of vehicles and included ensuring the speed limiter and tachograph is in good working condition.

Targeting enforcement to high-risk offenders seems to have been an effective compliance approach in Australia and the U.K., particularly with limited enforcement resources. For example, the South Australia Police Heavy Vehicle Enforcement Group uses a network of fixed data collection cameras and other intelligence gathering techniques to target interceptions on high-risk operators/drivers. The U.K. heavy vehicle enforcement officers use Automatic Number Plate Recognition (ANPR) Cameras to identify and target trucks with a violation history. There are some 20,000 ANPR cameras at fixed sites throughout the U.K.

Appropriate testing equipment to verify speed limiter settings also presented challenges. Australian enforcement officers are able to verify compliance for most engine types by plugging into the engine control module (ECM) using a hand-held testing device. Swedish and U.K. officers test for compliance with a device that plugs into the analog tachograph. However, this device will soon become obsolete when the EU implements a new digital tachograph requirement¹⁵.

3. Tampering – Tampering was identified as a significant problem in all three countries. Australian officials estimate a 10-30% tampering rate, but no official estimates were available for Sweden and the U.K.

¹⁵ Under EC Directive 2006/22/EC, digital tachographs are an Hours of Service compliance requirement for all new EU vehicles registered after May 2006.

However, one data collection site in Sweden found that 40% of heavy trucks were traveling faster than their maximum allowable speed. Tampering methods included unauthorized changes to the ECM settings and adjusting the tire size or transmission gear ratios. Fines for non-compliant speed limiters range from approximately C\$300 in Sweden to C\$150 in one Australia state (South Australia) to C\$2660 for a driver and C\$13,000 for a company in another (New South Wales).

In Australia, if a heavy vehicle is suspected to have a tampered speed limiter, officers will verify the ECM setting as well as the correct tire size and transmission gear ratio. The operator can be issued a fine and a defect notice requiring the speed limiter to be repaired and recertified.

4. Road Safety Concerns – Issues with increased highway congestion and difficulty with access to on and off-ramps resulting from bunching of speed-limited trucks were also identified as concerns. The long distance required for one speed limited truck to overtake another (and the resulting traffic backlog) were challenges identified by officials in the U.K. and Sweden. This problem resulted in U.K officials restricting heavy trucks to the inside lane of motorways and Swedish officials in some counties restricting truck overtaking on some stretches of highway.

In the U.K., the inside lane restriction may have addressed the heavy truck overtaking issue, but government officials acknowledge this may have amplified the problem of other traffic being able to easily access exit or merge onto motorways.

5. National Consistency – Government officials and trucking stakeholders in Australia and Sweden stressed the importance of a consistent national approach to speed limiter compliance. However, regulations and policies proposed at the national level are not always adopted or applied consistently at the state, territory or county level. In Australia, states and territories develop and pass their own compliance and enforcement regulations, which has led to inconsistencies across the country. The state legislature of Queensland, for example, passed a regulation in 1999 specifying that heavy vehicles would be issued a fine and defect notice requiring recertification of the speed limiter if detected traveling at 115 kph or higher. The vehicle travel speed is used as evidence that the speed limiter is either defective or has been tampered with.

The Australian *National Three Strikes Policy* and Chain of Responsibility (COR) provisions within the Compliance and Enforcement Bill are examples of attempts at designing national compliance and enforcement legislation to promote heavy vehicle speed compliance. However, neither has been implemented uniformly across all jurisdictions. The COR provisions provide increasingly severe penalties for speed limiter tampering and holds all parties in the transportation chain accountable for breaches in road transport laws. Australia continues to strive towards a nationally consistent approach to compliance.

Swedish officials also noted the lack of consistency across counties in their approach to verifying and prosecuting for speed limiter non-compliance.

3.6 TECHNICAL CONSIDERATIONS ASSESSMENT

The technical considerations assessment, based on survey responses from truck and engine manufacturers, was conducted to investigate technical issues that should be considered in the context of a speed limiter requirement. These technical limitations of the speed limiting function of the ECM may influence the effectiveness of a jurisdiction's enforcement efforts to ensure compliance. For example, there are potential limitations on the ability of enforcement personnel to uniformly read and obtain an accurate assessment of the speed limiter settings on many types of ECMs currently in use as well as variability between the maximum road speed setting and the true road speed. These central issues are explained in more detail in this section.

As outlined in the previous section, the experience of other countries with speed limiter legislation in place for some time would suggest that these technical challenges, combined with tampering and non-compliance rates, are legitimate issues.

Electronically limiting a vehicle's top speed through the truck's on-board computer has been a feature available on most heavy-duty trucks since the mid 1990s. It is one of many programmable features of the ECM to tailor the truck to specific customer needs and is standard equipment on most Class 8 trucks on the market today. It is also worth noting that unlike mass-produced light-duty vehicles coming off the assembly line, heavy-duty trucks are typically custom orders. The customer, prior to final assembly, may specify numerous configurations and options on a new heavy-duty truck. This "specing" could include the engine size, driveline components and truck body features. These specifications consider horsepower requirements, vehicle load ratings, other customer preferences as well as jurisdictional regulatory requirements. Depending on the anticipated highway cruise speed of the truck, the final engine type/size and gearing configuration is chosen so that the vehicle operates within an optimal, fuel-efficient RPM range.

The speed limiter setting is dependant on an engine/vehicle interface and the setting itself does not control vehicle top speed; other variables are essential for the ECM to calculate and control top speed. The speed limiter (within the ECM) functions by receiving a speed input signal from the driveline (transmission output shaft). In order to properly assess that signal against the maximum road speed (speed limiter) setting, the ECM requires other input variables such as the tire rolling radius, rear axle gear ratio and transmission top gear ratio. These variables, selected by the customer during "specing", are typically calibrated by the truck manufacturer or dealer and are essential for an accurate maximum road speed setting.

The maximum road speed setting can only be accessed with the proper hardware (e.g. laptop), manufacturer software and ECM password. Verifying a setting involves plugging into the vehicle's on-board diagnostic (OBDII) port usually located near the driver's door under the dashboard or on the floor of the cab between the driver's door and seat. The connection is typically with a laptop interface cable or wireless reader.

In order to better understand some of the technical issues and considerations with respect to compliance, enforcement and tampering, a questionnaire was circulated to the Truck Manufacturers Association (TMA) and the Engine Manufacturers Association (EMA).

The responses from both associations were closely aligned and identified a number of concerns with respect to the practicality of a speed limiter requirement.

The following summarizes key issues noted by TMA and EMA:

1. Manufacturers believe that the maximum vehicle road speed setting is a customer-configurable feature and requiring manufacturers to “lock-in”, or pre-program, a particular setting is unrealistic, unachievable and ignores the realities of the production of engines and vehicles for the global market. Engine manufacturers can not know the final vehicle configuration at the customer delivery stage, nor the jurisdiction in which the engines will operate, and therefore do not/cannot set the maximum road speed setting.
2. A speed limiter is set or adjusted using manufacturer’s proprietary software and a password. Most large fleet owners have the ability, through their own shop facilities and service personnel, to set or change speed limiter settings. Many carriers typically set the speed limiter once with the software/password provided upon delivery of new truck according to the company speed limit. Conceivably, the speed limiter setting could be adjusted from within the cab assuming the necessary hardware/software and password were available. However, most company drivers would not have access to the necessary equipment. TMA estimates equipment cost at \$1,000-2,000 (\$450 for software, connectors/hardware around \$650-700). The ability to change speed limiter settings remotely via Global Positioning Systems (GPS) is currently unavailable—a relevant issue for trucks traveling between jurisdictions with and without speed limiter requirements in place.

It should also be noted that smaller operators may not have the ability or resources to change speed limiter settings on their own and would need to rely on service facilities or dealers to make changes. Shop service fees or costs to purchase the necessary software and hardware would be the responsibility of the vehicle owner.

3. From an enforcement perspective, there are technical challenges with respect to interfacing with all truck (ECM) makes and models on a uniform basis in order to access the speed limiter setting. Each engine manufacturer may have multiple hardware and software configurations, or in some cases multiple configurations for a particular engine model. In addition, engine manufacturers regularly update their proprietary engine software. These multiple requirements would suggest that anyone requiring full access (set, read or change) to the speed limiter setting would require up-to-date engine software for all engine models on the market. This may complicate the ability of enforcement personnel to maintain up-to-date equipment to access and verify the speed limiter settings in a uniform manner. EMA states that: “It is unlikely that a device could be designed and built to interface with all makes and models on a uniform basis”. However, based on the research conducted by the Ontario Ministry of Transportation into portable ECM readers currently on the market and information submitted from technology suppliers through their recent Request for Information (RFI), universal reading tools are available with limited access to just read the current speed limiter setting (versus full access to set, read or change).

4. In order to verify the efficacy of the vehicle's speed limiter setting, a reference to the original settings (e.g. tire size, gear ratio) would be necessary, possibly with a manufacturer-specific catalogue. A physical inspection of the vehicle (tire size, transmission plate) would also be necessary to ensure that the documented settings match the actual configuration of the vehicle.
5. Some trucks as new as the 2003 model year were built with mechanically controlled engines that do not include a vehicle speed limiting system. There are no known electronic speed limiters available for retrofit on these mechanically controlled engines. (Note: the recent survey by the Transportation Research Board suggests retrofit kits are available, and used on a small percentage of on-road trucks. However, it is unclear if these aftermarket retrofit kits are used on mechanically or electronically controlled engines).
6. Protecting the vehicle ECM password is the primary defense against altering the speed limiter settings or other ECM settings (e.g. tire size, gear ratio). However, there are other (non-electronic) means by which the maximum road speed on a speed-limited truck can be altered. The most conventional method seems to be via altering original vehicle driveline components, namely tire size and rear axle ratio. For example, changing out a rear axle to one with a higher gear ratio will increase the true vehicle top speed. Alterations to the tire or wheel size can also significantly affect the vehicle top speed. For example, just switching out to a set of taller tires on the same rims (e.g. 295/60R 22.5 to 315/80R 22.5) will result in a 68 mph (109.5 kph) speed-limited truck achieving a true top speed of 80.5 mph (129.6 kph)—a 20 kph increase.

As stated earlier, password protection is the main defense against electronic tampering of the speed limiter settings in the ECM. Vehicle owners and/or service shop personnel typically keep vehicle-specific passwords on file. However, there is no guarantee against unauthorized use of passwords. It is also important to note that a truck crossing from one jurisdiction into another would not be able to change the setting unless the driver had the necessary equipment.

CHAPTER FOUR – CONCLUSIONS

The central conclusions from the assessments and studies follow.

Safety Implications of Speed Limiters

The Safety Implications Study was conducted to determine whether speed limiters would reduce the risk and severity of crashes for trucks and assessed the safety impact of speed differentials and car-truck interactions in a speed-limited environment. Traffic simulations for three highway scenarios were conducted for the study as well as a case study of a Canadian freeway section.

Based on the simulations conducted, it was concluded that truck speed limiters set at 105 kph increases safety in the uncongested region of traffic flow for all geometric configurations, especially in the straight segment. As maximum speed is set at 110 kph the safety gains with the introduction of mandatory limiters are reduced for the uncongested region of traffic flow. The maximum safety gains were obtained when the maximum control speed was set at 90 kph for uncongested traffic volumes.

The results, however, do not appear to apply to all volumes and truck ratio levels. In fact, the safety risk increases when traffic volumes and truck ratios increase. For example, when traffic volume is set close to capacity (2000 vehicles per hour per lane) more vehicle interactions take place and this leads to a reduction in safety especially for those segments with increased merging and lane-change activity, such as, on and off ramp segments. This suggests that for higher traffic volumes and truck ratios, speed differentials and lack of space to adjust speed/lane can compromise safety. Given the typical high traffic volumes and percentages of trucks experienced on many freeways in Canada, this result suggests some safety challenges. It could nevertheless be argued that average speeds could decrease below 105 kph as volume approaches congestion, limiting the potential negative impacts of speed limiters.

Preliminary results from the freeway case study, undertaken for the Eastbound Queen Elizabeth Way (QEW) in Toronto, concluded that the introduction of speed limiters set at 105 kph yields statistically significant safety gains along the case study corridor as compared to the base case (no mandatory limiters) Although the modeling approach used could not be applied to assess the potential impact on rural undivided highways, a study review and analysis of provincial speed profiles found that mandatory speed limiters may present safety challenges resulting from an increase in passing maneuvers on two-lane roads. Further study of this situation is required before a more definitive statement can be made concerning the safety implications of truck speed limiters for this type of highway.

Trade and Competitiveness Assessment

This assessment investigated the potential trade and competitiveness impact of mandating speed limiters under two scenarios: an Ontario/Quebec mandate and a national mandate.

The general conclusion from the assessment is that there would likely be very few competitiveness issues. Currently, the majority of large North American fleets already use speed limiters—60% of Canadian and U.S.-based heavy truck fleets and even higher on a

per-truck basis. Average speed limiter settings in both countries for large fleets are around 105 kph. For those fleets, there would likely be no competitive impact of a speed limiter mandate.

Concerns about a speed limiter mandate originate from North American smaller fleet operators and owner-operators, who typically don't use speed limiters or have them set at higher speeds. These operators cite safety concerns and state that they would avoid operating in speed-limited jurisdictions. However, this argument could be mitigated if they chose to purchase and use the tools necessary to change speed limiter settings.

Another issue identified was the effect speed limiters would have on driver recruitment and retention, thus limiting operators' ability to move freight and causing loss of market share if they chose to run in speed-limited jurisdictions. Fleet managers, large and small, indicated, however, that drivers are more likely to consider other employment factors such as the overall pay package including mileage rate paid, monthly miles attained, quality of equipment and fringe benefits.

Based on an Ontario/Quebec mandate scenario, the assessment concluded that a much higher portion of Atlantic Canada's trucking industry (30% of heavy trucks) than Western Canada's (10% or less of heavy trucks) could potentially be impacted. Atlantic Canada would be more heavily affected because many large fleets based in the region operate into the U.S., moving through Quebec and Ontario as part of their operations. These large fleets, however, are typically operating at 105 kph or less, and hence would not be affected. Additionally, the majority of U.S.-based fleets operating into Ontario and Quebec would be unaffected by the mandate as these fleets also already operate at or below 105 kph. Owner-operators, as discussed previously, oppose the mandate due to safety concerns and on this basis alone, 80% of these operators, interviewed as part of the project survey, indicated that they would no longer haul into Quebec and Ontario.

Based on a national mandate scenario, the assessment conclusions are similar to the previous scenario's in that large U.S.-based and Canadian truck fleets would not be impacted by a speed limiter mandate as they are already operating at or below 105 kph. Owner-operators, however, voiced concerns over the mandate as many are long-haul drivers who operate on longer runs and are exposed to states with higher speed limits. Their primary opposition to mandated speed limiters related to safety concerns and increased car-truck interactions from limited passing ability and increased speed differentials

The assessment also included a cost analysis to determine the potential trade-off between productivity benefits and increased costs. Conclusions from this analysis indicate that increased fuel costs from operating at higher speeds than 105 kph are greater than any productivity gains. There is an overall cost savings of 2% when operating at 105 kph compared to operating at 113 kph and a 9.5% cost savings when compared to operating at 121 kph. In total, the fuel savings from a national mandate are estimated at 228 million litres annually, which could represent an overall savings to the trucking sector in the order of \$190 million to \$200 million annually.

One final conclusion relates to the impact of a speed limiter mandate on shippers, which would be minimal as most freight is already being moved by fleets speed limited at 105 kph.

Environmental Benefits Study

The Environmental Benefits study quantifies the anticipated annual diesel fuel savings and greenhouse gas reductions from a national speed limiter mandate. This study updates preliminary estimates provided in the 2006 *Discussion Paper on Speed Limiters for Trucks Operating in Canada*.

Conclusions from the study include an updated annual fuel savings estimate of 228.6 million litres, 0.6% above the previously estimated total of 227.3 million litres. This represents 1.4% of the total diesel fuel consumed by road vehicles operating in Canada in 2006.

The annual GHG savings are now estimated at 0.64 megatonnes, compared to the previous estimate of 0.63 megatonnes. Ontario and Quebec combined account for 64% of the estimated national savings.

The study also included provincial estimates of truck traffic above 105 kph, which would be impacted by a speed limiter mandate. Nationally, approximately 62% of truck traffic traveled at 105 kph or lower, 23% were in the 105-110 kph range and 15% at 110 kph or above. British Columbia and Manitoba represented the lowest proportion of truck traffic potentially impacted by a speed limiter requirement with only about 3% and 25% respectively of vehicles traveling above 105 kph. The Alberta (110 kph locations) and Ontario (100 kph locations) represented the highest proportion of truck traffic potentially impacted by the requirement with about 55% and 59% respectively. Most other locations would potentially see 35% to 50% of trucks impacted by a speed limiter requirement.

Case Study

A case study, involving two large Canadian carriers, was conducted to document the benefits and experience of speed limiter usage within the Canadian trucking industry. Both firms, representing the for hire and private trucking sectors, have integrated speed control policies into their operations for close to 20 years—specifically speed limiters since the mid 1990s. They believe speed limiters have had a significant positive impact on safety, fuel savings, and other maintenance costs.

Drivers interviewed did not believe that the speed control policies within their companies have created any significant operational or safety concerns and generally accepted the speed control policy and expressed satisfaction with their jobs.

The case study also found that neither of the carrier fleets studied appear to have any market disadvantage compared to their competitors as a result of their speed control policies and in fact may have a market advantage associated with driver retention and driver job satisfaction.

From a safety perspective, both fleets believed that lower speeds have resulted in an improved safety record. Based on the collision data reviewed, there was no evidence that speed limiters are contributing to the occurrence of collisions. In fact, there were no rear-end collisions attributed to operating under a speed control policy in which another vehicle hit one of their trucks at highway speed.

International Assessment

The International Assessment researched the experiences of three countries (Australia, Sweden and the U.K.) with speed limiter legislation in place.

In all three countries, officials noted that compliance and enforcement efforts were integral to the effectiveness of the speed limiter policy. Roadside inspections, targeted enforcement to high-risk offenders, highway data collection camera networks, and annual inspections were used towards speed limiter compliance. However, the lack of sufficient enforcement personnel was noted as a consistent problem.

Tampering was identified as a significant problem in all countries. Australian officials estimated a 10-30 % speed limiter tampering rate and data from Sweden suggested that 40% of heavy trucks were exceeding their maximum allowable speed. Tampering methods included unauthorized changes to the ECM settings. Some operators also made adjustments to the tire size or transmission gear ratios to allow the true vehicle speed to exceed the speed limiter setting.

Road safety concerns identified by officials and industry stakeholders included increased highway congestion and difficulty accessing on and off-ramps resulting from bunching of speed-limited trucks. In an effort to limit the impact of increased highway congestion from speed-limited trucks overtaking one another, U.K. officials restricted heavy vehicles to the inside lane of motorways.

The importance of a consistent national approach to speed limiter compliance was stressed by a number of officials and stakeholders interviewed. Australian states and territories are provided flexibility with respect to legislative approaches towards compliance and enforcement. Similarly, the European Commission (EC) allows EU member states flexibility with specific regulatory provisions and implementation dates. However, the core legislative objectives (e.g. speed limiter set at 100 kph for all trucks over 12 tonnes) must be maintained.

In the case of Australia of Sweden, regulations and policies proposed at the national level are not always adopted at the state, territorial or county level and this has led to inconsistencies in regulatory approaches toward enforcement and compliance.

Technical Considerations Assessment

The Technical Considerations Assessment summarized technical issues and limitations of electronic speed limiters with respect to compliance, enforcement, and tampering based on survey responses from truck and engine manufacturers. These issues centre on

technical limitations of the speed limiting function of the ECM that may influence the effectiveness of a jurisdiction's enforcement efforts to ensure compliance.

The assessment concluded that the speed limiter setting itself does not control vehicle top speed; other vehicle variables such as the tire rolling radius, rear axle gear ratio and transmission top gear ratio can increase the maximum attainable truck speed. These variables, selected by the customer during "specing", are typically calibrated by the truck manufacturer or dealer and are essential for an accurate maximum road speed setting.

The maximum road speed setting can only be accessed with the proper hardware (e.g. laptop), manufacturer software and ECM password. Verifying a setting involves plugging into the vehicle's on-board diagnostic (OBDII) port usually located near the driver's door under the dashboard or on the floor of the cab between the driver's door and seat. The connection is typically with a laptop interface cable or wireless reader. Most large fleet owners have the ability, through their own shop facilities and service personnel, to set or change speed limiter settings. Many carriers typically set the speed limiter once with the software/password provided upon delivery of new truck according to the company speed limit

Manufacturers believe that the maximum vehicle road speed setting is a customer-configurable feature and engine manufacturers can not know the final vehicle configuration at the customer delivery stage, nor the jurisdiction in which the engines will operate, and therefore do not/cannot set the maximum road speed setting.

From an enforcement perspective, there are technical challenges with respect to interfacing with all truck (ECM) makes and models on a uniform basis in order to access the speed limiter setting. Each engine manufacturer may have multiple hardware and software configuration, or in some cases multiple configurations for a particular engine model. This may complicate the ability of enforcement personnel to access and verify the speed limiter settings in a uniform manner.

Protecting the vehicle ECM password is the primary defense against altering the speed limiter settings or other ECM settings (e.g. tire size, gear ratio). Vehicle owners and/or service shop personnel typically keep vehicle-specific passwords on file. However, there is no guarantee against unauthorized use of passwords. Other (non-electronic) means by which the maximum road speed on a speed-limited truck can be changed include altering original vehicle driveline components, namely tire size and rear axle ratio.