Best Practices in Truck Safety Executive Summary

The primary purpose of this study was to identify the principal causes of casualty collisions involving heavy trucks in British Columbia (B.C.) and to use this information as the basis for identifying effective prevention programs and policies to improve safety on B.C.'s highways. Firstly, the characteristics and causes of fatal and injury collisions involving heavy trucks (gross vehicle weight of 4,536 kg and greater) in B.C. were compared to those in other regions of Canada. Secondly, current practices for increasing truck safety in B.C., other Canada jurisdictions, and other countries were identified and reviewed by examining the literature, searching the internet, conducting a survey of jurisdictions and contacting key informants. Thirdly, based on the characteristics of the heavy truck collisions in B.C. compared to other regions and on the current practices to improve truck safety, best practices were identified for government, the motor carrier industry and police services.

Characteristics of Collisions Involving Heavy Trucks in British Columbia

Compared to other regions, fatal collisions involving heavy trucks in B.C. were more likely to involve truck drivers aged 41 and older, truck drivers who were speeding, single vehicle collisions, run-off-the-road or head-on collision configurations, winter months, curved roads with a gradient, poor road surface conditions, and poor weather conditions. Compared to other regions, injury collisions involving heavy trucks in B.C. were more likely to involve truck drivers' speeding, inexperience, inattention, single-vehicle collisions, run-off-the-road and head-on configurations, poor road surface conditions, and curved roads with a gradient. The collision data were also analyzed separately by single- versus multiple- vehicle involvement and differences were identified.

Logistic regression analyses were performed on the combined casualty (i.e., fatal and injury) collision data separately for single- and multiple-vehicle collisions in order to identify the major characteristics and contributing factors. Based on making a significant contribution to explaining the differences in collision characteristics between B.C. and the other regions as well as exhibiting differences from other regions which were at least 5%, B.C. single-vehicle collisions were more likely to involve a run-off-road configuration, undivided roads, poor road surface conditions, roads that were curved with a gradient, and truck drivers who were speeding, fatigued, or inattentive. Using the same criteria, B.C. multiple-vehicle collisions, were more likely to involve a head-on or run-off-the-road configuration, poor road surface conditions, curved roads with a gradient, and truck drivers who were inattentive or impaired, compared to other regions.

Compared to other regions, at-fault analyses indicated that the truck drivers in B.C. were less likely to be at-fault for casualty collisions than the other driver involved, particularly for injury collisions. However, using charges laid by the police in B.C. as a result of the collision, it was found that truck drivers were slightly more likely to have been charged than the drivers of the other vehicles involved, particularly in the case of fatal crashes.

Overall, the relative involvement of alcohol in heavy truck collisions depends on the measure used. If coroner data for fatally injured drivers are used, alcohol involvement by truck drivers was generally lower in B.C. (7%) than in other regions regardless of the

Blood Alcohol Concentration (BAC) level. Alcohol involvement was considerably lower for heavy truck drivers than for other fatally injured drivers. However, if a surrogate measure is used for fatalities or injuries, then B.C. ranked a close second behind the Western region for all BAC levels. Given that the coroner data provides an actual measure of BAC for truck drivers, this measure is likely more reliable for fatalities. Furthermore, the surrogate measure of alcohol involvement does not indicate whether the truck driver or the other driver had been drinking prior to the collision.

Using an operational definition of driver fatigue developed by the Canadian Council of Motor Transport Administrators, it was estimated that fatigue involvement in B.C. varied from 21% to 23% of collisions, depending on whether the collision involved a fatality or an injury and this involvement rate for B.C. was either lowest or second lowest among the regions. However, it should be emphasized that this surrogate measure of fatigue involvement did not distinguish between whether the truck driver or the driver of the other vehicle was fatigued.

Based on these data analyses, the following key characteristics and contributing factors of heavy truck collisions are:

- driver speeding;
- driver inattention;
- driver impaired by alcohol or drugs;
- driver fatigue;
- run-off-road collisions;
- head-on collisions;
- undivided roads;
- curved roads with gradient; and,
- poor road surface condition (i.e., wet, snow, ice).

Current Practices for Improving Heavy Truck Safety

Most Canadian jurisdictions are conducting research on heavy truck safety, passing new laws and regulations addressing truck safety, improving the training and licensing requirements for heavy truck drivers, carrying out commercial vehicle enforcement campaigns, and conducting awareness and education campaigns for truck drivers as well as the general driving public. In B.C.:

- the Truck Compliance Advisory Panel was formed in 2008 by the B.C Minister of Transportation and Infrastructure to promote continuous improvement in trucking safety;
- WorkSafeBC has developed the TruckSafe Strategy with its partners and conducts research as well as awareness and education programs to increase the safety of motor carrier operators;
- British Columbia Trucking Safety Council will be implementing a safety certificate of recognition (COR) program for companies in WorkSafeBC's General Trucking and Moving & Storage classification units;
- The British Columbia Forest Safety Council runs a very active program of research, advocacy, and awareness and education programs to reduce the involvement of logging trucks in collisions on B.C. roads.

Some of the leading Canadian jurisdictions are:

> Alberta with its' Road Safety Action Plan, a Professional Driver designation on the driver's licence of those drivers who take the Professional Driver Certificate course at Red Deer Community College and its' Partners in Compliance program for carriers with excellent safety performance;
> Manitoba Public Insurance offers the Entry Level Professional Truck Driver Training Program which provides driver training and financial support to qualified candidates (100% tuition funding) who want to work in the Manitoba trucking industry
> Ontario has started using the Tall Wall concrete barrier, a high performance median barrier which is highly effective in reducing median crossover collisions not only for passenger vehicles but also for large tractor trailer combination vehicles
> Ontario and Quebec have both introduced legislation to limit the speed of heavy trucks to 105kph.
> Quebec has created a Government-Industry Advisory Committee on vehicle safety, which recommended various measures to improve road safety with respect to the circulation and operation of heavy vehicles in that province.

The leading countries on improving heavy truck safety are the United States, the United Kingdom, Australia and New Zealand. These countries have very active programs on research, legislation and regulation, fleet safety management, and awareness and education in the area of trucking safety. In addition, there are many companies with fleets of vehicles which have adopted very progressive fleet safety management systems (e.g. Shell, British Telephone, Nestle). Unfortunately, most of these programs, whether they be from government, private sector, or non-governmental organizations, have not been evaluated to determine their effectiveness.

Best Practices for Increasing Heavy Truck Safety

Based on the characteristics and causes of collisions in B.C. and on the current practices in Canada and other countries, the following best practices are provided for governments, the motor carrier industry and for police services.

Government

Understanding and managing the situation:

> analyze collision data periodically to identify the magnitude and to understand the nature of fatal and injury collisions involving heavy vehicles as well as to identify trends or changes in the problem and in the key contributing crash factors (e.g., driver speeding, driver inattention) – a review of the findings from this report would provide a starting point for understanding the current situation in British Columbia;
> establish a provincial multi-stakeholder committee as Quebec has done, including relevant government and police agencies and the trucking industry, to review the heavy truck collision situation in the province;
> based on this review, establish a provincial strategy for heavy truck safety, building on the TruckSafe strategy and adopting a safe system approach which addresses vehicles, road infrastructure, drivers and carrier management;

> develop specific action plans to implement the strategy and provide sufficient funding and staff to support the implementation of proven interventions; and,
> establish a measurable target for heavy truck safety in the province, as Australia has done (e.g., reduction in the percent of total fatalities that involve heavy trucks or in number of fatalities involving heavy trucks per million vehicle kilometers traveled) to be achieved during a reasonable timeframe (e.g., 5-10 years) based on the current situation and the proven interventions in the action plan that can be implemented given the resources.

Increasing the safety of truck drivers:

> encourage an independent review of the province's commercial vehicle driver licensing standards and testing procedures to determine if they are adequately preparing novice truck drivers to drive safely;
> encourage more women to become truck drivers given that in general, they are less prone to risk taking;
> given the difficulty of getting new drivers into the trucking industry, establish a program that provides 100% tuition funding for truck driver training to qualified candidates, as Manitoba Public Insurance has done;
> establish a Certificate of Professional Competence for truck drivers requiring mandatory training and apprenticeship similar to what the European Union has required; and,
> develop and evaluate a standard curriculum for driver training programs that could be used throughout the province or even nationally.

Increasing the safety of heavy trucks:

> encourage government departments that have vehicle fleets to adopt a fleet safety program which adheres to international best practices;
> use the Safety Measurement System adopted by the U.S. Federal Motor Carrier Safety Administration's Comprehensive Safety Analysis (2010) to more effectively target commercial vehicle enforcement resources;
> require electronic stability control on all heavy vehicles as the European Union has done;
> limit the maximum speed of heavy trucks to 105 kph as Ontario and Quebec have done;
> consider requirement of a tire under-inflation warning system and alcohol ignition interlocks; and,
> consider permitting the use of long combination vehicles in the province under certain operational restrictions similar to what Alberta permits.

Increasing the safety of the road infrastructure:

> continue to twin highways so that opposing lanes are separated by medians or alternatively introduce 2+1 lanes as they have done in Sweden where a wire barrier is installed between opposing lanes on undivided highways;
> install concrete barriers on divided highways, such as the Tall Walls used in Ontario, to prevent vehicles crossing the median into opposing lanes;
> install rumble strips on the road edge and on the centre line to warn drivers that they are deviating from their lane;
> install high tension cable barrier systems on the shoulders of curved highways to

provide greater protection from running off the road for large trucks as Alberta has been doing;
> install roadside variable messaging signs to warn drivers of poor driving conditions ahead, and,
> improve lane delineation and signage particularly for curves on the highway.

Increasing awareness and education about heavy trucks:

> conduct awareness and education programs targeted at the drivers of passenger vehicles so that they are more knowledgeable about driving safely around heavy trucks (e.g., Share the Road programs); and,
> conduct awareness and education programs targeted at the heavy truck industry and heavy truck drivers to inform them about the key crash factors such as driving on slippery roads, speeding, fatigue, inattention, and to provide guidance as to effective solutions that they should adopt to address the problem.

Recognizing safe motor carriers:

> establish a program such as Alberta has done with Partners in Compliance which recognizes safe carrier operations and provides them with some benefits to partially offset costs of meeting the program requirements.

Measurement and Accountability:

> measure changes in the magnitude and characteristics of heavy truck crashes to assess the extent to which the target is being achieved and to identify new effective solutions to address the problem;
> evaluate the safety impacts of new programs for fleet safety; and,
> produce annual reports on the safety of heavy trucks indicating actions taken and progress toward achieving the target.

Industry

Understanding and managing the situation

> using collision and other data, demonstrate to senior management why it is important to manage fleet safety in terms of the organization's responsibility, the benefits to the organization as well as to the community (i.e., corporate social responsibility) and build a business case for the fleet safety management program to be adequately supported financially;
> adopt a fleet safety management model which incorporates leadership and accountability by senior management;
> adopt a safe systems approach when developing a fleet safety management program which not only looks at the drivers, vehicles and road infrastructure but also looks at the safety culture within the organization and in the society at large;
> adopt a multidisciplinary approach which considers civil and mechanical engineering, education, enforcement, medicine, and social sciences, when developing fleet safety policies and interventions;
> establish a fleet safety committee that includes both management and employees which meets regularly to discuss improving safety;
> set a measureable target for improvement in fleet safety;
> formally adopt a fleet safety policy which is signed by senior management and

provide documentation of the policy to employees; and,
> organize and implement a fleet safety program, including management structure (i.e., what resources are needed and who is responsible for fleet safety), staff involvement (i.e., staff should support a positive safety culture based on competence, control, cooperation and communication), and planning and implementation of the program (i.e., what are the major risks that should be addressed first).

I**ncreasing the safety of drivers:**

> develop and implement a valid driver recruitment and selection process using inperson applications, screening of employment and driving history, minimum driving experience, driving test, physical exams, personality tests (i.e., to assess risk taking potential) and personal interviews and conduct effective driver training programs, both initial and ongoing (i.e., every five years);
> develop a driver performance standard, a driver fitness standard, and specific policies on pre-trip inspections, drug and alcohol use, seat belt use, speeding, driver distraction including cell phone use, and driver fatigue and explain these standards and policies in a handbook provided to all drivers; and,
> implement a fatigue management program which addresses driver training, sleep disorders, and trip scheduling which maximizes drivers' opportunity for sleep.

Increasing the safety of vehicles:

> select safe fleet vehicles (e.g., anti-lock brakes, electronic stability control, lane positioning sensor; speed limiters) and conduct regular vehicle maintenance and servicing; and,
> use the latest technology to increase compliance with regulations and policies in order to promote safety (e.g., electronic on-board recording of hours of operation and speed, event data recording system to capture information about collisions, Intelligent Transportation Systems).

Recognizing safe drivers:

> develop safe driver incentive programs which provide bonuses tied to drivers' performance assessments.

Measurement and accountability:

> regularly conduct risk assessment and risk management using collision data, insurance costs, and reported incidents;
> conduct regular internal monitoring and measurement of progress toward target based on key performance indicators, and periodic third party audits and management reviews of the fleet safety program;
> carry out full in-depth investigations of all collisions involving heavy vehicles in order to better understand their causes and make adjustments to the fleet safety program;
> perform periodic bench marking by comparing the fleet's safety performance with that of other similar operations; and,
> provide annual reports to senior management regarding fleet safety.

Police Services

Understanding and managing the situation

> using collision data and specialized software such as the RCMP's Traffic Services Management Information Tool (TSMIT), identify high-risk corridors which have disproportionate numbers of serious collisions involving heavy trucks; and,
> establish multi-stakeholder committees, including the trucking industry, in communities where high-risk corridors are located in order to get local buy-in and support, as was done in the Fraser Canyon corridor.

Increasing safety on the roads

> conduct regular enforcement campaigns combined with awareness and education, in high-risk corridors to address problem areas (e.g., seat belt use, impaired driving by alcohol, drugs, distraction, inattention or fatigue, and speeding); and,
> establish hotlines in all communities where members of the public can phone in toll-free complaints about unsafe truck driver behaviour, such as the Fraser Canyon Watch program and the Forestry Safety Hotline.