Log Truck
Cycle Time Review Project

March 2013

BC FOREST SAFETY COUNCIL

Log Truck Cycle Time Review Project

Prepared For: Transportation and Northern Safety, BC Forest Safety Council

Prepared By: Brian LaPointe, RPF, MBA and Dean Daly, RPF.

Date: March 2013

About the Authors

Brian LaPointe, RPF, MBA, is a BC Forest Professional with forty years' experience in timberland operational management throughout the interior of British Columbia. During his career Brian has worked in many different roles with government, the forest industry and the consulting industry.

Dean Daly, RPF is a Registered Professional Forester with twenty five years' experience in forest operations management, forest tenure management, log marketing and First Nations business development in the interior and coast of British Columbia. Dean has worked in various roles for government, the forest industry and the consulting industry.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This report was completed in response to findings and recommendations in the BCFSC Ombudsman's 2008 review of Resource Roads and 2009, the Ombudsman's SAFE Companies Report which identified potential "safety implications of logging truck cycle times".

The purpose of the project is to develop an understanding of the linkages between safety and cycle time by completing surveys and interviews with targeted industry and government groups. We also wished to understand current practices related to determining cycle time, to develop transparent methods to determine cycle time and foster broader understanding and application of effective best practices related to cycle time determination.

A total of fifty seven (57) surveys and interviews were completed throughout the coast and interior of BC with five (5) different survey groups including industry licensees, Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) Revenue Branch staff, B.C. Timber Sales (BCTS) staff, contractors, log truck drivers, and related government organizations including the MOTI, the RCMP, and educators. All survey respondents were given the opportunity to complete a confidentiality agreement providing the authors specific direction to protect the identity of the individual or organization surveyed.

Along with these surveys, interviews were conducted with individuals and organizations and a literature that could provide additional insight or knowledge related to determining cycle time was reviewed.

Based on the interviews, literature reviews and survey responses, the report defines the cycle time by summarizing the recommended activities which should be included in the calculation of log hauling cycle time. Each of the three major components of log hauling cycle time, loaded and empty travel time, loading and unloading trucks, and unavoidable delays, are broken down into a detailed list of activities for consideration by industry participants.

The report summarizes current practices used to estimate, review and revise log hauling cycle time in British Columbia. This is done by comparing coast and interior approaches as well as large versus small licensees.

The coast licensees surveyed tend to bid out or negotiate a significant portion of their annual harvest volume on a delivered log price basis ("stump-to-dump"). The stump to dump rates combine the harvesting phase as well as the log hauling phase into the combined rate which is expressed in dollars per cubic meter ($/m3) of logs delivered. Many of the bid or negotiated contract packages typically contain larger volumes with multiple blocks, a variety of harvest systems, varied haul routes and timber delivery destinations for different log sorts. In the case of tendered bids for stump to dump contract volumes, there is generally not discussion of cycle time as contractors are expected to take into account all costs associated with the project, and bid accordingly. For negotiated volume packages, licensees and contractors report that it is fairly rare to discuss individual route cycle time estimates in negotiations as historic stump to dump rates are typically relied upon for rate estimates. Reportedly, discrepancies between licensee and contractor stump to dump rates are rarely significant enough to warrant detailed analysis of the individual cycle time in order to resolve differences and conclude negotiations. Presumably, successful conclusions to negotiations are achieved through other negotiation mechanisms. In addition, many coast stump-to-dump contracts included provisions to adjust rates annually, accounting for fuel or labour increases, which tends to minimize disputes related to specific contract issues like cycle time discrepancies.

The interior logging industry appears to rely much less on large volume, multi-year, stump to dump contract packages and those licensees surveyed do not typically tender or bid out large packages of volume as frequently. It appears more typical for interior licensees to negotiate contract rates through a more detailed review of the two major phase costs (logging and trucking) associated with each block or cutting permit in a package. This process involves detailed review of the trucking cost component and cycle time associated with haul routes. Interior licensees, particularly large licensees, tend to use more sophisticated models cycle time estimation. The use of global positioning systems (GPS) technology in trucks is becoming more common in the interior for a variety of reasons, including tracking cycle time related information.

Although small enterprises mostly used simple models to estimate cycle time, they tend to have a less formal or sophisticated approach than large enterprises. In addition, small enterprises tend to have an overall lower percent of safe certified operations and they are less frequently participating in safety meetings.

EXECUTIVE SUMMARY

Ultimately, it was reported by all coast and interior contractors and licensees that they are seeking to establish "fair" cycle time during contract discussions.

Generally contractors reported that licensee estimating procedures are tight but fair, with disagreements most often arising in the miscellaneous/unavoidable delay estimates.

Many licensees reported that cycle time was seen only as a mechanical component of calculating the fair cost of hauling services during contract negotiations rather than a safety concern as they believed that the processes employed resulted in safe cycle time calculations. Cycle time from the contractor's perspective was not merely a contract negotiation issue, but a safety issue as well; numerous contractors reported being frustrated at not being able to discuss cycle time issues at safety meetings as licensees indicated it was not the correct forum for the discussion.

While the process of calculating a cycle time is fairly mechanical, once an hourly or tonne rate is applied to cycle time it becomes a contract financial concern for both parties. Contractor frustration appears to be related to the perceived lack of ability to revisit cycle time estimates either within the contract renegotiation parameters (short timelines and rigid data requirements) set by licensees or within the context of safety concerns.

A number of factors which potentially influence cycle time are also discussed in the report.

The authors suggest that meeting the test of due diligence requires review and confirmation that estimated cycle time used in contracts are reasonable. If cycle time is set at an unachievable level and there is no effective way for both parties to review and revise them, there may be an enticement for drivers to compromise safety to "meet the cycle time".

Road maintenance programs influence the safe speed for travel. Agreements related to the safe speed for hauling logs on any road section should also include agreement on the anticipated level of road maintenance. Road maintenance programs should be monitored to ensure that they continue to provide safe conditions for the assumed cycle time travel speeds.

Significant differences in cycle time can be related to specific differences in truck configurations (e.g. self-loading trucks, short log trucks, etc.). The differences tend to be primarily related to differences in loading and unloading time or to increases in unavoidable delays related to applying more wrappers. All licensees reported using an assumed standard truck configuration in long log hauling (although the standard configuration assumed did differ by region and licensee). The use of an assumed standard configuration was not reported by long log hauling contractors as a problem when considering the impacts on cycle time which may be related to truck configuration actually used for the haul. Consistently a higher rate was paid for short log hauling when compared to long log due primarily to increased loading and unloading time and extra time for applying and removing wrappers. Similarly, cycle time discrepancies between the actual truck configuration used for short log hauling versus the licensee assumed short log standard was not cited by contractors as a specific concern.

The report also identified driver attitude and behaviour as a key influence on safe achievement of cycle time. Safety concerns primarily relate to speeding, but they also include concerns regarding inconsistent completion of proper pre-trip and post-trip vehicle inspections and exceeding legal load limits. Drivers, supervisors and the enterprises who hire them have a shared responsibility to ensure that safe work procedures are understood by drivers and are followed. The development of a strong safety culture in organizations is one of the most important influences on driver attitude and behaviour.

Driver training was identified as an important ongoing need, given concerns related to a general shortage of qualified individuals available to all industries.

Driver health and fitness has a significant influence on a driver being able to perform the job functions. A study completed by Dr. Delia Roberts investigated the impact of good health on driver capacity and performance and formed the basis for her recommended health and fitness program. As do several other general and trucker-specific health and wellness initiatives, the Fit To Drive program advocates the concepts that driver mental and physical fitness play an essential role in hazard recognition, response time, critical decision paths, fatigue management, injury prevention and driver sustainability.

Some contractor respondents expressed concerns related to the number of government and industry organizations that have historically had a role to play in research, advocacy and certification related to safety. Those respondents concerns related to the number of different organizations with perceived overlapping mandates which for some had the cumulative effect of overwhelming contractor's capacity to understand "the rules" and reasons for the rules. Other licensee and contractor respondents confirmed that they have

EXECUTIVE SUMMARY

developed a new positive relationship with the local compliance and enforcement agencies by participating in committee meetings with these agencies.

Coastal drivers are typically, paid on an hourly basis which theoretically should eliminate any incentive to speed or skip necessary safety checks. Despite this perceived lack of incentive to compromise safety with hourly payment for services, some coastal licensee survey respondents still expressed concern over safe driving practices and the lack of leadership by contractors to develop a strong safety culture among logging truck drivers. In the interior, most drivers are paid by the tonne in some fashion - usually a percentage of the gross revenue earned by the truck based on a function of trip time, load size, and dollars per tonne ($/tonne) or cubic meter ($/m3) paid to the truck owner. Some respondents suggested this form of payment, particularly when it is applied to a hired driver rather than an owner operator, links driver behavior, more directly, to the economic outcome of the haul and may provide a stronger incentive for drivers to speed, overload or skip required safety checks to increase their perceived rate of pay. If the payment mechanism provides a strong link to the revenue element of the haul, but not to the cost variables of delivering the load (fines, fuel consumption, truck maintenance, increased insurance premiums, etc.), it was suggested that there is little downside for the driver to speed or overload other than direct enforcement activities or the discipline policy of the employer (if one exists and is implemented). Reports reviewed by the authors did not make any definitive conclusion linking safety with driver payment schemes. When asked if there were any potentially better payment schemes, most respondents also reported that tonne payment schemes are the best alternative so long as negotiated cycle time and hourly truck rates are fair.

Almost all licensees reported that cycle time is estimated with consideration for traffic. If historical cycle time is used to estimate current cycle time based on a "historic" level of traffic, and recent traffic patterns have changed, cycle time may need to change to reflect longer delays due to increased traffic.

Reportedly, dispatching or scheduling systems, particularly those that are coordinated between contractors and the licensees, decrease truck waiting time at the log loading location, increase log loader efficiency, increase efficiency of unloading activity, and also minimize delays at the unloading site.

While the large majority of licensees report that the MFLNRO coast and interior appraisal manual sector time are not used or are irrelevant with respect to contract negotiations for log hauling, there are a few licensees who report that appraisal sector time influence, in some way, contract negotiations related to cycle time. The report strongly recommends that licensees and contractors do not use appraisal sector time as a substitute for a separate analysis and review of all reasonable cycle time elements specific to their haul.

Recommended "Best Practices" related to estimate, review and revision of cycle time are made in the report. Additional recommendations are made on related subjects identified during the interview process.

INTRODUCTION

The BC Forest Safety Council (BCFSC) desires to develop a better understanding of cycle time due to strong belief that cycle time parallels road safety.

In 2007 and 2008 the BC Forest Safety Ombudsman, Roger Harris, completed a review of Resource Roads titled No Longer the Road Less Travelled. This report identifies cycle time as a key factor in improving safety on resource roads. Harris' 07/08 report also stated:

> *Cycle times play an important role in improving safety on both resource roads and public highways as how it is calculated may impact driver behaviour.*
>
> *Cycle times are complex, with many variables that influence their determination, including corporate structure, road design, maintenance, construction, truck configurations, changes in road users, changes in regulations and operational conditions.*
>
> *Our office sees the negotiation of a truck rate as a business decision; the determination of a cycle time is a safety issue.*
>
> *Operating a vehicle unsafely to meet posted cycle times puts everyone at risk. Cycle time inquiries are difficult to resolve, as the issues that contribute to the cycle time calculation are complex.*
>
> *Cycle times need to be monitored as part of a management/operational decision-making process. In this way safety considerations will be put on an equal footing with production.*

In 2009, Harris compiled a SAFE Companies Report recommending that Council "*capture the safety implications of logging truck cycle times*".

In 2012, Transportation Safety Director, Rick Walters ordered a cycle time review project. Direction for the project included: stakeholder engagement; identify and analyze cycle time calculation methods; understand the context and systems within which log haulers operate and determine common expectations or misconceptions of cycle time within industry groups. The project was expected to reveal practical strategies; preferred practices; efficiency opportunities; and provide solutions that can be applied to reduce injuries and fatalities attributed to log hauling.

Purpose

The purpose of the cycle time review project is to develop a thorough understanding of cycle time; this will be achieved by reviewing methods and processes used to determine cycle time in BC. The review will include survey data collection from a wide spectrum of forest industry participants.

When detailed evaluations of hauling costs are required, there is a need for a common understanding of what constitutes the cycle time; this report may provide all parties with a reasonable starting point for those negotiations where they are relevant.

Objectives and Deliverables

The cycle time review project has the following objectives and deliverables:

- Record, review, and understand the range of current and previous processes used by industry and/or government to estimate and confirm cycle time.
- Identify and investigate alternate strategies or mechanisms (e.g. blue sky approach, what's happening in other industries/jurisdictions).
- Foster better understanding among stakeholders of the cycle time estimation and review processes.
- Identify factors or practices that influence or contribute to efficient cycle time.
- Identify cycle time factors that may contribute to, or detract from, log hauling safety.
- Identify and develop transparent, reliable "best practice" mechanisms associated with cycle time estimating, monitoring and review.
- Complete a report for industry consideration summarizing findings and best practice recommendations.

METHODOLOGY

Literature Review

A literature review focused on research of heavy truck (including logging trucks) accidents and their causes. Specifically, research prepared by Pierre Thiffault (Ph.D.), Chair Human Factors in Motor Carrier Safety task Force, Canadian Council of Motor Transport Administrators (CCMTA) in the 2011 report "Addressing Human Factors in the Motor Carrier Industry in Canada" and the report published in 2009 titled Best Practices for Truck Safety generated by the Investigation into B.C. Truck Collisions project managed and published by the Traffic Injury Research Foundation sponsored by WorkSafeBC and the BC Trucking Safety Council.

Parameters and processes associated with interior and coastal appraisal policies and historic policy information pertinent to cycle time calculation issues were researched.

Survey Process

Survey and interview questions were formed to obtain a broad cross section of relevant information from respondents, used to develop a comprehensive list of activities included in cycle time and questions tailored to each sector within industry to identify issues and approaches specific to the role.

Interviews were conducted with organizations believed to have insight into cycle time calculation, or those (organizations) that could potentially influence cycle time or driver attitude/behaviour; input and thoughts related to cycle time or related safety issues were recorded.

Five survey groups were targeted and surveys completed with respondents from BC's coast and interior capturing regional differences. Survey groups include:

- industry licensees (major licensees, community forest holders, woodlot licensees, First Nations Non-Replaceable Forest License holders, market loggers);
- MFLNRO Revenue Branch and District staff involved with stumpage appraisals;
- BCTS staff; contractors (including full phase or stump to dump contractors, log hauling contractors, log truck owner operators);
- log truck drivers,
- highway hauling contractors and a public transportation company.

Survey/interview candidates were identified via industry contacts already held and referrals (e.g. owner-operators, fleets, large stump-to-dump contractors, broad geographical representation, large and small licensees, etc.). Respondent surveys were completed using the following steps:

1. Telephone call followed by a letter of introduction for the project.
2. Provision of survey questions in a Word document appropriate to the sector.
3. Surveys were completed independently or recorded during a meeting with the participant. Meetings were scheduled if the respondent preferred it to the written survey and if interviewer/respondent schedules allowed for it.
4. Initial responses were reviewed and clarification requested when necessary.
5. Interviewers confirmed the final response, with each interviewee to ensure that the responses were accurately captured.

All responses have been treated as confidential; each respondent was provided a customizable confidentiality agreement to confirm that responses provided would remain anonymous. Some respondents did not complete the confidentiality agreement however, all input has been treated as confidential and respondents remain anonymous.

Collectively, interior licensees surveyed manage over 20,000,000 m^3 of Crown tenure AAC.

Collectively, coast licensees surveyed manage over 10,000,000 m^3 of Crown tenure AAC and manage or harvest approximately 1,500,000 m^3 of private land volume annually.

The following table summarizes the number of surveys completed by region and industry sector.

Table 1. Number of Surveys Completed by Region and Survey Respondent

Survey Respondent Category	Geographic Region		
	Interior	Coast	Total
Stump to Dump & Trucking Contractors	8	3	**11**
Truck Drivers	4	0	**4**
BCTS Business Units	1	1	**2**
Major Licensees / Licensee Divisions	10	4	**14**
Woodlots	0	4	**4**
Community Forests	3	1	**4**
Market Loggers / First Nations Tenure Holders	1	2	**3**
CVSE/RCMP/ICBC/Other Organizations	4	0	**4**
Highway Haul Contractor / Public Transportation Co.	3	0	**3**
Universities/Colleges/Research Organizations	2	2	**4**
MFLNRO/Revenue Branch	3	1	**4**
Totals:	**39**	**18**	**57**

Interviewers acknowledge the significant time respondents granted (to the project); providing detailed and thoughtful input. The effort contributed by the respondents is appreciated and critical to the project.

RESULTS

All licensees and contractors report that they are seeking a solution to cycle time discussions that is "fair".

Definition of Cycle Time

Cycle time can be described as:

> *The total period of time required for a loaded log truck to travel from the log loading site to the off-loading site, have logs unloaded, return empty to the log loading site, be reloaded with logs and ready for the trip to begin again.*

The concept is simple, but the process of determining a cycle time requires significant effort.

The only public document, found for review, with a detailed definition of "log hauling cycle time" is the MFLNRO Interior Appraisal Manual (IAM). It contains a "Primary Cycle Time" definition in Section 3.5.1.1. Although cycle time is defined in the IAM, it is important to note that government survey respondents confirm the sole purpose of the IAM policy is to provide consistent methodology enabling licensees to submit information required (by government) to estimate the "winning bid" as calculated by the Market Pricing System. They report that the IAM is not in any way intended to support or influence contract negotiations between licensees and contractors.

Nevertheless, as a basis for understanding the basic elements of cycle time, the IAM Section 3.5.1.1 definition is provided below:

> *The cycle consists of loading, hauling, weighing, unloading, return time, and unavoidable delays.*

The IAM Section 3.5.1.1 further clarifies the cycle time definition in an attempt to ensure that all licensees using the policy will do so in a consistent way.

> *The cycle time will normally be determined by taking into consideration all the factors that may affect it: distance, expected rate of speed, necessary delays, expected standard of roads and their maintenance, traffic density, and seasonal weather conditions.*
>
> *Unavoidable delays are periods when the truck is on the job but not operating due to unpredictable delays such as; tightening binder chains, minor repairs made by driver, checking and adjusting brakes, minor delays prior to loading and unloading, refuelling, etc.*
>
> *Unavoidable delay time does not include any breakdown which requires shop repair, the services of a skilled mechanic, or a spilled load of logs. The time for load, unload and unavoidable delay is set at 75 minutes for cable yarding systems and 60 minutes for all other systems.*

While the IAM definition is (generally) comprehensive enough to understand what should be included in the calculation of a cycle time, its' sole purpose is to describe what information can be used by licensees and MFLNRO staff to calculate or estimate a cycle time for stumpage appraisal purposes. There is no requirement for the IAM definition or the IAM specific time estimates to be considered in any contractual relationship between log hauler, licensee or log buyer.

The Coast Appraisal Manual (CAM) does not define cycle time.

Responses indicate there are two other "cycle times" worthy of description; neither is included in either Appraisal Manual:

"Calculated or estimated" cycle time is derived prior to any logs being hauled. Most often it is a formula driven estimate of cycle time used to develop or negotiate contract payments for log hauling from a new logging site and is typically supported by a combination of various data from previous experience (e.g.: measured road distances for specific road sections, posted or estimated haul speeds along the road sections and estimates of loading, unloading and miscellaneous delay time associated with the specific log hauling project).

"Actual or experienced" cycle time is a cycle time developed using actual time recorded for trucks to complete the cycle. The data may be captured through the use of Geographic Positioning Systems (GPS), or by referring to "scale in to scale in" time at the destination scale, or by referring to detailed trucker time cards to summarize the cycle time. The actual or experienced cycle time can be calculated after a representative sample of trucks has completed the haul.

Cycle Time Components

Loaded and Empty Travel Time

- The time it takes for the loaded log truck, once it is fully secured and all systems have been checked by the driver, to haul from the cut block to the unloading site (in the case of scale sites it the time until the driver proceeds onto the scale).
- The time it takes for the empty log truck, once the trailer is reloaded and all systems have been checked by the driver, to travel from the unloading site back to the cut block, returning to its position at the loader (in the case of scaled sites the time would begin once the driver proceeds off of the scale, leaving the site).

Cycle time estimation should assess and recognise:

- Safe travel speeds for each road section on the route;
- Road features or conditions which may limit speed such as significant adverse grades, steep grades, or frequency of required stops along the route.

Loading and Unloading Time

- Trailer unloading and hook-up time at loading site (this may include unloading trailer from truck, hooking up hitch(es), airlines, electrical connections, scale connections; calibrating scales, setting up stakes, double checking gear, etc.).
- The time it takes for the log truck to be safely loaded with logs at the cut block.
- Load securing by the log loader to permit driver to safely inspect load and secure wrappers.
- Time to scale-in; this is the time period from arrival at the scale site (or log dump site) and includes time to be weighed or communicate load information and time to drive to the unloading station.
- Load securing by the loader at the unloading site to permit the driver to safely complete the removal of wrappers.
- The time it takes for logs to be unloaded at the log unloading site.
- Time required to scale-out (if scale site is the offload site); if there is a long line up, there may a delay prior to the empty truck being weighed.
- Trailer un-hooking and loading time at the log unloading site (this may include checking all gear and tires).

Unavoidable Delays

The time it takes to complete all activities to ensure compliance with safety and legal requirements for log transportation. These delays are mandatory and are therefore called "unavoidable". These delays could include:

- Drivers' visual inspection of load and securing of load wrappers (if the truck is to enter onto a highway system, it is a legal requirement for the driver to check wrappers again)
- Load painting and hammer marking as required by the forest district
- Checking and tightening wrappers a short distance from the loading sight to secure the load
- Brake checks at selected or mandatory points
- Securing and removing winter chains as required
- Traffic delays associated with industrial or non-industrial use, road maintenance or construction along the route

Avoidable Delays

Examples of avoidable delays (delays that could be eliminated, or that are not considered mandatory for completing the log hauling cycle) not typically included in cycle time estimates include, but may not be limited to:

- Time for servicing vehicles,
- Completing pre-and post-trip truck inspections,
- Completing load ticket or time card information,
- Fueling,
- Standard maintenance servicing to ensure the truck is safe to operate,
- Breakdowns requiring shop repair or the services of a skilled mechanic,
- Time associated with accidents or spilled logs.

Although some may assume these activities to be the truck owners' responsibility and not part of the paid cycle time, they should be discussed between contractor and licensee or log buyer to arrive at a mutual understanding. Under the current legislation in B.C. for log haulers (Employment Standards Regulation Section 37.2), payment for coffee breaks and lunch breaks are specifically excluded, likely this is the reason that these breaks are not specifically included in cycle time estimates.

Current Practices

The discussion below illustrates some significant differences in approach to cycle time estimation, review and revision; according to the respondents.

Cycle Time Calculation

Throughout the survey and interview process, most responses indicate two distinctly different steps in determining cycle time. Firstly, "calculated or estimated" cycle time and secondly "actual or experienced" cycle time. This distinction is an important one because it is the focus of many disagreements between licensees and contractors, or contractors and drivers.

It is important to note that there are differences in how cycle time is estimated, reviewed and revised amongst survey respondents. This was anticipated given the diversity of the industry as defined by geography (coast and interior), differing size of licensee and contractor groups, and differences in approach between contractors and licensees.

The road standard or specific road characteristics are fundamental considerations when estimating and reviewing travel time (e.g. width, surface, paved, gravel, ice or snow, steepness, number and severity of curves, adverse grades and distances, etc.). All licensees and contractors report that they assess the physical characteristics of the road making an initial estimate of cycle time for a road section. Road travel time is most often the largest component of the cycle time estimate, therefore it is a critical component in determining whether contractors can achieve the estimated cycle time.

Contract Tendering and Negotiation

Many licensees report that cycle time is seen only as the mechanical component of calculating the cost of log hauling. Rate negotiation is separate from cycle time calculation; to determine the cost of log hauling and complete contract negotiation, the hourly or tonne hour rate is applied to the total cycle time hours. Cycle time is a part of the contract value calculation; it is a financial concern to both parties and this partially explains the tension existing between contractors and licensees regarding cycle time.

Clearly, the process of cycle time estimation is a mechanical process used to arrive at an average value; cycle time should not be the negotiation point, the hourly or tonne hour rate should be the negotiation point.

Coast

Consistently, both coast contractor and licensee respondents report that cycle time is not a significant issue in contract negotiations and administration; it is calculated by both parties.

Coastal licensees often employ stump to dump contractors either through a bid or negotiated rate process. Stump to dump contracts combine harvesting and hauling into one rate expressed as dollars per cubic meter ($/m^3) of (delivered) logs. In addition, many of the contract packages are large volume with multiple blocks (and different harvest systems). They often have varied haul routes and delivery destinations.

This contract complexity appears to reduce the significance of existing cycle time discrepancies, as it creates a "blended" delivered cost estimate(s).

Bid and negotiated stump to dump rates, are largely influenced by historic rate information for similar projects (i.e.: $/m^3 of delivered logs, in previous years). Historic, overall delivered costs are cited by both contractors and licensees to be the most commonly reviewed data for new contracts. In addition, many longer term stump to dump contracts include methods to benchmark negotiated or bid rates and amend them as required for fuel rate changes and labour rate changes (e.g.: United Steel Worker collective agreement rate changes). Amendments appear to minimize mid-contract renegotiation issues (like those associated with individual route cycle time discrepancies) and likely reduce risk to the contractor.

In tendered stump to dump contracts, most respondents indicate that discussions of cycle time do not typically occur; contractors are expected to take into account all costs associated with the project and bid accordingly. In negotiated contracts, it is fairly rare to discuss individual route cycle time estimates during negotiations; particularly when licensee expectations and contractor proposals are relatively close for the entire contract package. Several contractors report that, often they bid large volume contracts (up to one years' work) many months in advance; therefore bids may not reflect the actual season or haul conditions. Generally, it appears that averaging of large volume contract packages tends to "wash out" significance of specific haul route cycle time discrepancies.

All coast respondents identified key elements of haul cost to include:

- all-found hourly rate of truck (labour and equipment costs for self-loader or other configurations);
- number of hours per day expected to be hauled (this is a function of the number of loads given the estimated cycle time and limits on maximum legal hours worked per day by the driver), and;
- average volume per load (largely a factor of species mix, log sorts and weight restrictions by configuration) which can then be used to render a $/m^3 cost estimate.

The elements stated above are used to calculate the final rate ($/m^3) paid to the contractor. A typical calculation may be determined using a formula such as:

All Found Rate * (Cycle Time * Number of Trips) ÷ (Number of Trips * Average Volume) = $/m^3

Ex. Calculation Elements:		**Answer:**
All Found Rate per hour = $130	Number of Trips/day = 2	**$130 * (4.5*2) ÷ (2*50 m^3) = $11.70/m^3**
Cycle Time in hours = 4.5	Average Volume per load = 50 m^3	

Once the final rate($/m^3) is estimated for the contract, the observed number of loads per day, and the average volume per load tend to be the only material issues monitored to ensure that the rates are reasonable (based on actual deliveries).

Interior

The interior logging industry appears to rely much less on large volume, multi-year, stump to dump contract packages and do not typically tender out large packages of volume as frequently as coastal licensees.

Historically, interior licensees negotiate rates using a more detailed review of logging and trucking costs for each block or cutting permit than coastal licensees. The process involves detailed review of the trucking cost component including cycle time associated with specific haul routes.

Cycle Time Estimation

Coast

Nearly all licensees surveyed (except the smallest licensees) employ simple spreadsheets or models (similar to those in Appendix A) to estimate cycle time; the information can be used to support negotiations or benchmark log delivery costs.

There are two road classes (paved and gravel) travel speed is different for each of these classes and could be different for each section of road. Each section of road, along a route, is assessed and an average safe travel speed designated for the section. Sections of road may have varied safe travel speed for any number of reasons e.g. steep grades, windy or narrow sections, traffic.

Loading time is typically set at 60 minutes, although estimates vary from 45 to 90 minutes. Loading time estimates tend to increase with the amount of grapple yarded wood, number of processed log sorts, smaller second growth timber, and use of self-loading logging trucks.

Miscellaneous/unavoidable delay estimates are typically minor (10-15 minutes) or zero, as these delays are assumed to be included in the load/unload time.

Interior

All licensees surveyed employ spreadsheets or models to estimate total cycle time (the sum of estimated travel and delay time) to support negotiations. Models ranged from simple spreadsheets to sophisticated customized programs that could be calibrated with actual data inputs (See Appendix A).

Travel speeds are typically specified for each definable road section along a haul route to account for differences in road condition, road class (on-block road, secondary road, Forest Service Road, highway, etc.).

Most often, historically verified sector times are used by agreement between licensees and contractors to develop cycle time estimates (sector times are agreed upon for road sections in the area – they are not renegotiated year to year unless there is enough of a change to warrant revisiting them). Lower than posted road speeds are typically used in calculations in order to account for conditions such as adverse grades, curves, bridges, etc. To resolve estimate differences road sections are assessed by licensee representatives that work or ride along with a lead driver. Some licensee and trucking contractor groups have had a third party, such as FP Innovations (formerly

Forest Engineering Research Institute of Canada (FERIC)), complete an assessment with road surface and grade measurement data analyzed in computer models such as "Otto"; providing second opinion on specific routes. The contractors and licensees review the information prior to reaching the cycle time agreement.

New road sections are reviewed for travel time; usually the road class is determined first as it is the basis for estimating road speeds. Narrower, curvier, steeper roads will have a lower road class and a slower time estimate than wider, straighter, flatter higher class roads. Again, section length and estimated loaded and empty speeds are used to estimate the new section travel time.

In one case a respondent reported providing a map of known hauling related hazards to the contractors as part of the background information used to prepare cycle time estimates.

Load and unload time estimates varied from 40-75 minutes total for long log hauls. The time estimate is typically increased for cut-to-length volume, number of log sorts, smaller log size, and use of self-loading logging trucks.

Miscellaneous/unavoidable delay time is typically estimated using historical knowledge and/or through time studies. Some larger licensees report observing and recording the time required to complete unavoidable delays tasks in order to compile time estimates. Historic times range from 15-20 minutes to account for load checking and marking, load wrapping, brake checks, attaching and removing chains, and traffic delays.

There is some use of GPS by large interior licensees in collaboration with stump to dump or hauling contractors to estimate components of cycle time. Several contractors report that they are considering purchasing GPS units to assist with both cycle time and business management related issues such as monitoring fuel consumption and speeds.

To determine average haul time a number of samples are taken and assessed. The first truck dispatched may be loaded more quickly and have fewer delays than a truck dispatched later. Some drivers may be slightly faster than others due to less traffic or other delays.

Most respondents confirm that no adjustments are made to cycle time estimates to account for differences between summer and winter season, other than the additional time associated with the use of chains.

All licensee respondents report that additional time to apply and remove chains is added to contractor cycle time, when the licensee and contractor agreed they are necessary for haul conditions. Time estimates ranged from 10-20 minutes depending on the number of sets of chains, to a more specific 6 minutes per set.

There are some activities that virtually all licensees and most contractors acknowledge are necessary to ensure a truck is ready to safely complete the job (e.g. minor truck maintenance, driver pre-trip and post trip inspections). Typically, employee drivers are paid a percentage of the gross haul for the day, and that payment includes those activities that are not typically included in cycle time.

Generally contractors report that licensee estimating procedures are tight but fair, with disagreements most often arising in the miscellaneous/unavoidable delay estimates.

Cycle Time Review

Interviews confirm that there are a number of different approaches and methods to completing an effective review of cycle time estimates. For a number of unexpected reasons actual cycle time can be higher or lower than estimates e.g. road improvements, road maintenance issues, more or less traffic impacting speeds or delays, or changes in technology (e.g. introduction of automated scales).

Once the contract cycle time estimate is completed and trucks are completing initial cycles, licensees and contractors need to review and confirm the cycle time agreement is reasonable. Inherent in this agreement is recognition that all parties must manage operations under their control in a safe and efficient manner. For example: contractors have a high degree of control over production and truck scheduling to maximize loader efficiency; drivers have the responsibility to maintain safe driving habits; and licensees have a high degree of control over unloading efficiency at the log yard.

Cycle time review may lead to discovery of inefficiencies; there might not need to be an adjustment cycle time, but rather change of an operational function to improve efficiency (e.g.: increase safe travel speed by improving road maintenance, reduce loading time by dispatching, etc.).

Coast

Licensees report that cycle time is not monitored on stump to dump contracts typically, there is no cycle time specified in the contract. If a licensee does specify a cycle time in the contract, they may periodically review or monitor cycle time comparing actual to estimated time. This does not occur when the contract is a bid rate; licensees do not regard this as their responsibility.

Actual cycle time data is obtained by averaging scale-in to scale-in time for trucks making back to back trips to the same unloading site. Contractors typically monitor cycle time using detailed time cards completed by drivers. The data is often used in future bid or negotiation processes.

Survey respondents indicate that the majority of volume is hand scaled rather than weight scaled, though weight scaling appears to more prevalent for second growth timber. Therefore to compare actual to estimated cycle time, scale in to scale in measurement is used less frequently on the coast.

GPS monitoring of cycle time was not reported by any coastal survey respondent.

Interior

All respondents report that they monitor actual cycle time and compare them to contract estimates.

To monitor cycle time, many licensees report using "scale in to scale in" time as recorded on mill load delivery tracking and payment systems. Others report that time recorded between scale-in and scale-out is very accurately attributed to the unloading time component of the cycle time.

There is concern about the absence of physical tracking and measuring of time once a truck has left the scale; it is difficult to allocate time between components, because cycle time and non-cycle time related activities are not easily tracked.

Actual travel speeds are reviewed by licensees through supervisor observations (observations ranged from supervisors using stop watches or following logging trucks in their pickups, to use of radar guns by road marshals), and increasingly by use of GPS data.

Average loading time is monitored by direct observation or data recording in the field. In one case a larger licensee reports conducting numerous annual field audits with company staff as basis for determining average loading time.

Unloading time is not frequently monitored by contractors and drivers; respondents rarely indicated that they use time cards or other notes to track waiting in line at the scale site and unloading time separately, or at all. It is more common (although not always frequent) for contractors to review scale-in/out data supplied by the licensee. Most licensees report that unloading time used in cycle time calculations is tied to average actual unloading time.

In one case, a licensee tracked scale in/ out time at each mill site. The unloading time is used directly in cycle time calculations, specific to that mill and provides each mill incentive to manage unloading time. Longer unloading time increases cycle time, which results in higher delivered log costs.

Unavoidable delays tend to be the least monitored aspect of the cycle time across all survey respondents. Although many licensees report monitoring the main components of cycle time, only one licensee reports that staff complete "productivity audits" examining the range of activities, including unavoidable delays, associated with delivery of logs to their mill. Productivity audits are considered proprietary process and were not reviewed in detail; they appear to involve licensee tracking of average time of each cycle time functions (load, unload, chaining, applying wrappers, etc.) to determine an average time for each specific function.

Several contractors identified a potential problem with delays associated with long waits at mill yards prior to scale-in. Indicating that this delay is not monitored or captured by licensees when analyzing time between scale-in and scale-out to establish average unloading time, and waiting prior to scale entry can be a persistent problem. If licensees estimate cycle time by adding loaded travel time (including unavoidable delays), loading time, and unloading time, then wait time before the scale is an unavoidable delay that is not recognized when there are consistent waits at the scales prior to weighing-in. If licensees were to estimate cycle time by using scale-in to scale-in time, this delay prior to weighing-in would be captured, and not an issue of contention.

Some licensees note a corresponding concern with using scale-in to scale-in time as a monitoring mechanism to establish or adjust cycle time, because there is uncertainty as to whether all of the activities between scale arrivals should to be recognized as part of a "fair" cycle time (i.e.: time for breakdowns).

In some cases, licensees and contractors report cost sharing for GPS units allowing the information to be used concurrently, in real time, by trucking contractor and licensee. A GPS unit mounted on the truck can track location, speed, brake applications, downtime, and other operating functions (like fuel consumption) with good accuracy. There are many types of GPS units with varying costs and capabilities (some using satellite application, some using mobile phone application), and many service providers available.

GPS has been used for a number of years by some large highway hauling contractors; it allows them to monitor all aspects of their business, including cycle time, speed, cost of operation and safety. GPS units can provide part of a solution for those struggling with work alone/check-in policies and procedures.

Cycle Time Revision

Coast

Surveys confirm that when cycle time is identified in a contract, that time may be subject to revision if delivery sites change or if assumption errors are found.

Interior

All licensees report employing processes to adjust cycle time (when it is disputed), if factual data (GPS or other) is presented; in one case, a licensee reported a formalized cycle time dispute process.

To understand the dispute or concern raised by the contractor, licensees will accept data and will diligently review to confirm or disprove the dispute. Review may include:

- data assessment;
- field check of road conditions;
- confirmation of efficient dispatch procedures (confirm orderly arrival at the loading or unloading sites); and
- review of traffic assumptions.

All licensees report that revisions to cycle time as a result of review and discussion with contractors have occurred.

Some small to mid-size licensees report a need to be responsive to cycle time concerns (in order to retain contractors) because of the shortage of trucks and drivers; consequently, unresolvable cycle time disputes are rare.

All contractors confirm that contract cycle time is revised (at times) by licensees if proven to be inaccurate. If a contractor, based on their observation, finds items in the cycle time estimate requiring adjustment, the contractor must gather and present evidence (data) to the licensee supervisor for review.

All contractors report that while there has been periodic cycle time changes made by licensees, these occurrences tend to be rare. In addition, some contractors report that building the case for change(s) to cycle time is difficult to substantiate, time consuming and often must be successfully argued within a few days of haul commencement. The tone of responses on this issue is one of frustrated resignation; many indicating that it is very difficult to meet data requirements and timelines for dispute and therefore most often did not pursue adjustments to cycle time despite observed discrepancies.

Operation Size Comparison

Small Enterprises *(woodlots, community forests, NRFL holders, smaller contractors, BCTS licensees)*

Survey responses from both the coast and interior, indicate that small licensees have processes to estimate, review and revise cycle time. However, it is apparent that small licensees use less sophisticated models and tend to be less formal in negotiations, review and amendment of cycle time. Relying more often, on historical knowledge (rather than model driven estimates) and feedback from contractors regarding experienced cycle time when finalizing contract cycle time.

Many BCTS licensees base cycle time on information provided by major licensees when hauling to those mill sites.

Small, area based, tenure licensees have fairly consistent cycle time, year to year, when compared to licensees with large operating areas that potentially move significant distances or encounter different traffic volume season to season.

Several small licensees report employing the same contractors for many years and have a high degree of trust in their judgment on cycle time issues.

Small contractors (less than 10 trucks) are often subcontractors to a stump to dump contractor or other larger clients and as a result are not normally directly involved in negotiating cycle time. They reported less leverage in negotiation of cycle time and often felt as though they are faced with a take it or leave it decision. Similar to small licensees, small contractors tend to use simple spreadsheets to estimate cycle time, while others relied primarily on historic information from timecards or other records.

All of the smaller contractors identified wait time prior to weigh-in as a frequently unaccounted for delay in cycle time estimates.

Not all small forest licensees or subcontractors surveyed are safe certified.

Not all small licensees or subcontractors participated in safety committee meetings with stump to dump and/or log hauling contractors.

Large Enterprises *(Large licensees and stump to dump contractors)*

When compared to small licensees, large licensees typically have more sophisticated estimating procedures or processes to estimate, review and revise cycle time.

Although not universally, large licensees are the only ones to implement formal cycle time monitoring practices such as hiring a Road Marshall to monitor and enforce safe road use policies; presumably this is completed as part of a larger safety program.

Many large licensee and contractors surveyed are safe certified, and appear to employ hazard assessment techniques in haul evaluations that may be used to assist negotiation of cycle time. All of the large licensees participated in safety committee meetings with stump to dump and/or log hauling contractors.

Factors Influencing Cycle Time

Safety and Due Diligence

The majority of those interviewed state that safety is a primary concern in setting cycle time (e.g.: safety is a concern when estimating safe travel speeds and accurate estimates of haul distance, loading and unloading times as parameters to estimate the contact cycle times).

On page 19, the BC Forest Safety Ombudsman 2008 report, No Longer the Road Less Travelled states:

> *Negotiating a truck rate is a business decision;* ***determining a cycle time is a safety issue.***

Most contractor respondents reported that fair cycle time would meet safety concerns and financial concerns. From the contractor's perspective, cycle time is not merely a contract negotiation issue, but a safety issue as well. Several contractors expressed frustration at licensee's belief that safety meetings are not the correct forum to discuss cycle time.

In general, respondents confirmed that adjustments are made to cycle time when evidence justifies it; several contractors reported that adjustments do not occur often enough.

Some survey responses show a clear difference in opinion between several large licensees and contractors with respect to the linkage between cycle time and safety. Several large licensees reported that they do not discuss variance between estimated and actual cycle time during safety meetings; they regard cycle time as a contract negotiation issue which should be addressed during contract discussions. Therefore, safety meeting discussions are limited to driver behavior, road conditions or other pertinent road use concerns (speeding, road use protocols, incident reports, etc.). Contractors on the other hand, report widely that they have a difficult time providing the quality of evidence required by some licensees to verify actual cycle times during or following contract cycle time negotiations. Consequently, contractors report that they have little success in making adjustments to estimated cycle time after negotiations take place. If they experience difficulty in achieving estimated cycle time during operations, they report there is a potential incentive to speed or overload to compensate for a cycle time that is not achievable. Contractors report a sense of frustration at the inability to effectively address cycle time concerns at the negotiation stage, in the monitoring stage, or in safety discussions.

Meeting the test of due diligence in setting cycle time requires review and confirmation that the estimated cycle time used in contracts are reasonable.

Like all employers, the log trucking industry must ensure safe operations are a primary objective. Simply phrased, to meet minimum WorkSafeBC (WSBC) requirements all employers must implement and maintain safety management systems (SMS). WSBC regulations and guidelines describe employer obligations; including the implementation and maintenance of safety management systems (SMS), having the ability to prove that all reasonable steps to implement the program have been taken. Safety management systems without proper implementation are ineffective. Proving that safety programs have been followed requires a written record and a filing system to retrieve the records to confirm that program activities have taken place.

Thiffault has summarized SMS components of different sized organizations in a table shown in Appendix C.

> *..we believe that while not all aspects of SC or SMS may be applicable to smaller carriers, some of the most important components are applicable, given that a tailored approached be formulated for them. Table 21 illustrates how SMS can be applied to larger (20 power units and over) and smaller (less that 20 power units) carriers.*

The BCFSC assists employers in building SMS that meet WSBC requirements, but employers must adopt and adapt SMS components to meet the specific needs of that operation. Part of the program includes orientation of drivers to ensure they are knowledgeable of the safety program, safe work procedures and standard operating procedures that the company uses to minimize the risk of accidents during operations.

All respondents reported that unsafe behaviour is not acceptable or excusable.

Speeding may in fact hide cycle time deficiencies because a scale-in to scale-in assessment may show the cycle time as correct and therefore it is difficult for the contractor to support the argument. If cycle time is set at an unachievable time and there is no effective way for both parties to review and revise them, there may be an enticement for drivers to be unsafe by speeding to meet the cycle time financial constraints.

Effective use of radios can allow all traffic to travel as efficiently and safely as possible and will likely minimize unavoidable delays in cycle time.

The Traffic Injury Research Foundation report published in 2009 titled Best Practices for Truck Safety states:

> *The primary contributors to the collisions were poor driver judgement (36%) and poor road conditions (23%). Common driver problems included alcohol use, speeding, distraction (e.g., cell phones, eating), following too closely and fatigue, particularly since logging truck drivers often operate long hours in the bush.*

Road Maintenance

Effective road maintenance programs influence safe travel speeds. Forest Service Road (FSR's) and resource road maintenance activities are typically managed by road permit holders or licensees, and normally include periodic grading or snow plowing of roads to maintain road surfaces suitable for speed and travel time used in setting cycle time. On some FSR's and all highways the MOTI has responsibility for road maintenance.

The safe haul speed on all road sections must be reviewed by the contractor and the licensee prior to hauling. In our view, this review should also include the anticipated level of road maintenance. Once speed and travel time have been agreed to, road maintenance work must also be monitored to ensure that it is maintaining road conditions at a suitable level to meet standards agreed upon.

Truck Configurations

Truck styles and hauling capacities have changed a lot over the last twenty years. There are trucks with more axles, and more bunks handling more bundles of logs. Trucks also have larger engines to accommodate hauling increased loads and have been engineered to ensure load size and weight capacity is safe. A sample of the types of highway logging trucks and load capacities for public highway roads is shown in Appendix B.

Cycle time has not changed for increased load size as increased weight capacities of the trucks have been matched by increased engine capacities to haul the larger loads safely. Although some contractors report that there has not been adequate recognition of increased cycle time associated with short log hauling, in most cases interviews confirm that cycle time has been adjusted to accommodate hauling cut to length logs. The increases to cycle time recognize extra time to load, unload, attach and remove additional wrappers. Interviews indicate extra time allowed is typically 12 to 20 minutes depending on the number of bundles.

Attitude and Behaviour

The majority of survey respondents identified driver attitude as a key influence on safety performance. Safety concerns include inconsistent completion of vehicle inspections, and exceeding legal load limits but are primarily regarding speeding. It is important to recognize that driver behaviour is an outcome of attitude which is influenced by those around the driver including management, peers, customer, government, enforcement officers, to name a few. Drivers are part of a larger system including the culture and values of the employer and industry.

Tiffault's report, Addressing Human Factors in the Motor Carrier Industry in Canada concluded that accidents are primarily the result of human errors induced by fatigue, failure in recognition of danger (due to inexperience, level of training, distraction), and driver personality traits (related to risk tolerance and aggressiveness).

The also report states that a company and industry safety culture is very important in addressing behaviour issues and provides a summary of the key elements of a Safety Management System (SMS) to promote a good working culture (see Appendix C). Employers must have safety and operational programs in place to assess qualification and experience, explain employer expectations (e.g. orientation), and actively monitor driver performance confirming that expectations are understood and goals met. The driver must be qualified and able to ask questions to ensure they understand the haul conditions (including any hazards), how they are to work with others, and communicate what their expectations of the employer are. The driver can refuse work they believe is unsafe.

Once the driver has accepted the job, they control how fast the truck travels, the final loaded weight, their reactions to incidents the road, and the identification of and response to mechanical issues as they arise. The majority of these actions are influenced by driver experience and training. Beyond training, the driver also controls their physical health (See Health and Wellness) which impacts their ability to perform tasks, such as securing chains or wrappers, and reaction time.

The supervisor influences the driver's attitude and behavior by monitoring performance, and coaching or disciplining to help the driver meet performance expectations. Two key performance expectations are meeting safety standards (no accidents or incidents) and meeting the cycle time objective for the haul, with acceptable tolerances for that time.

The licensee, or person who hires the contractor, also influences driver attitude and behaviour. The licensee is often responsible to set overall safety standards for contractors. In cases when the licensee deals directly with the contractor, who in turn works with the driver, to ensure operations are conducted in accordance with safety policy. Driver behavior can also be modified by changing the operating environment (e.g. adding technology such as GPS or Electronic Stability Control, etc.) to aid operating performance and security.

It is our view that determining cycle time, with reasonable consideration and communication of safety issues (e.g. safe travel speeds, or adequate recognition of loading, unloading or unavoidable delay time) will have a positive influence on safe driver behaviour.

Training

Driver training can improve driver skills. Improved skills assist drivers to recognize and manage hazards, and drive for road conditions. Ultimately a skilled driver is more likely to deliver loads reliably and safely than an unskilled driver.

Recently there has been a shortage of drivers available to the log trucking industry. Several contractors voiced concern about finding qualified people to fill jobs, with one respondent reluctantly admitting that there had been times when he just had to "put meat in the seat" to maintain trucking capacity. Some education facilities, like Thompson Rivers University, have been working with major licensees, trucking contractors, and others, to develop a program to assist in training drivers. The program delivers the key technical aspects of driver training related to safe vehicle operation.

Health and Wellness

Driver health has a significant influence on ability to perform job functions safely and efficiently. Dr. Delia Roberts of Selkirk College completed a study on the impact of good health on driver capacity; developing a program called "Fit to Drive" it assists drivers to achieve good health. The study was completed with logging truck drivers in the US and Canada.

The program assists drivers in developing and implementing a moderate diet and exercise regime. The outcome is drivers with more energy, better concentration, faster reaction time and overall better health. Additionally, the program suggests there may be other health benefits such as prevention of heart disease, cancer, diabetes, and depression. More information can be found at www.selkirk.ca/research/faculty/trucking .

Several studies, including Dr. Delia Robert's demonstrate a positive correlation between improved driver health and improved safety through improved ability to address unexpected or stressful events.

Government Agency and Industry Organizations Influence

Some contractor respondents express concern related to the number of organizations that have historically had a role to play in research, advocacy and certification related to safety. Concerns relate to the number of different organizations with perceived or real overlapping mandates which for some had the cumulative effect of overwhelming a contractor's capacity to understand "the rules". Other licensee and contractor respondents confirmed that they have developed a new positive relationship with local compliance and enforcement agencies by participating in committee meetings with these agencies. This type of committee may be similar to the Road Safety Management Group (RSMG) concept suggested in the Ombudsman's 2008 report.

The Cariboo-Chilcotin Trucker's Compliance Committee is one such committee; initially started in 2004 to address concerns about overweight logging trucks, it has evolved to work on a broader set of truck safety issues. The government entities participating include the RCMP, CVSE, and the MFLNRO Compliance & Enforcement (C&E) officers. The group also includes local licensees, trucking contractors, ICBC, and others who review and discuss truck safety issues identified in the Williams Lake area. The group recognizes those who are top performers.

Surveys identified that this has reportedly improved relationships between enforcement agencies and drivers leading to a stronger compliance commitment and a better basis for working together.

Compensation

Driver behaviour is an influence on safety performance and therefore is related to cycle time. Some literature reviewed suggests that there may be link between driver behaviour and the payment schemes of the driver. Tiffault's 2011 report included the following statement:

> *… the discrepancy between drivers' actions and knowledge with regards to the self-management of alertness most certainly has to do with how the macroeconomics of this industry (e.g. compensation schemes, company policies, shippers) are shaping drivers motivations and attitudes. For example, the way the pay structure is designed is most likely a significant determinant of the decision to keep driving while drowsy.*

The study did not come to a solid conclusion on any influence related to the driver pay method.

Although it was not a primary objective of our survey to explore or review pay structure, open-ended questions were asked of licensees, and specific questions of contractors and drivers which allowed respondents to provide opinions on potential safety concerns related to payment schemes. Numerous comments were received related to the potential effect of the driver payment method on driver behaviour.

Most survey respondents on the coast confirm that drivers are paid on an hourly basis which theoretically eliminated incentives to speed or skip safety checks. Despite this perceived lack of incentive, some survey respondents express concern over safe driving practices and the lack of leadership by contractors to develop a strong safety culture among log drivers.

In the Interior, surveys confirm that most drivers are paid by the tonne in some manner - usually a percentage of the gross revenue earned by the truck based on a function of trip time, load size, and dollars per tonne or cubic meter paid to the truck owner. Some respondents suggested this form of payment, particularly when it is applied to employee drivers but also to owner operators, directly links driver behavior to the economic outcome of the haul and may provide incentive for drivers to speed, overload or skip safety checks to increase their pay. If the driver is able to complete the trip, and earn their portion of the pay in less time or with a higher average payload, their hourly rate is effectively increased. Contractor respondents also noted that drivers are responsible for their own tickets (speeding or overload, etc.), so these behaviours have a negative consequence for the driver. Some licensee respondents have implemented overweight policies, not paying for any weight (volume) over the legal load limit, and report that this is an effective disincentive for overloading. Others note that drivers may be more likely to work when they are fatigued when paid by the tonne or the load than if paid by the hour.

If payment mechanism links strongly to truck revenue, but not to the cost variables of delivering the load (fines, fuel consumption, truck maintenance, increased insurance premiums, etc.), there may be little consequence for the driver to speed or overload other than direct enforcement activities or the discipline policy of the employer (if one exists and is implemented).

In some interviews, trucking contractors report cases where stump-to-dump contractors are paying less than their negotiated haul rates to subcontractors. In their view this has historically been a relatively common practice for contractors to "shave" rates and retain some portion for "administration" of the subcontractor agreement. In these cases, there may be a concern that even if the stump to dump contractor negotiated cycle time and rates are appropriate, the subcontract trucker may be paid less than what is reasonable for the cycle time and may be tempted to speed to make up for the reduced rate. Ultimately, this scenario is not a cycle time issue, but a subcontract payment issue.

Although some survey respondents felt that there may be a relationship between driver behaviour and payment schemes, it was not universal and conclusions could not be drawn. Interestingly, when asked if there is (potentially) better payment schemes, most respondents report that the tonne payment scheme is the best alternative as long as cycle time and hourly truck rate assumptions are fair.

The largest factor influencing drivers is management of driver's expectations and behaviour in a safety focused culture. The development of that culture is a shared responsibility between the driver, contractor and licensee.

Traffic

Almost all licensees and contractors surveyed report that cycle time is estimated with consideration for traffic. Traffic patterns may change due to increases in industrial volume (e.g. logging, mining) on the route, or more non-industrial usage (e.g. recreation) on the route. Several survey respondents state that resource road systems in their areas had seen significant increases in non-industrial traffic over the years, and that this traffic caused increased delays for logging trucks, and caused increased wear on roads which impacted maintenance needs and travel speeds in some cases. Although there may be the same concern for some highways, this was not identified as an issue in survey responses. If historic cycle time is used to estimate current cycle time based on a "historic" level of traffic, and the traffic pattern changes causing cycle time to increase, cycle time will need to change to reflect the increased delays.

Licensees who set cycle time stated that if there is increased traffic to the point where cycle time is longer, they review the situation and make appropriate adjustments. It is important to estimate the cycle time change as accurately as possible to meet both contractor and licensee interests.

Dispatching or Truck Scheduling

Scheduling or dispatching trucks minimizes trucks waiting to be loaded (reducing the loading component of cycle time), and ensures loaders are as productive as possible. Reportedly, dispatching minimizes delays at the unloading site as well.

Respondents indicate dispatching is less important in smaller operations (fewer daily loads) but is a significant factor for operations shipping a high number of loads per day. One large company reports instituting strict weekly dispatching protocols for each truck, balancing contractor production and unloading capacity at unloading sites. Adherence to the dispatching schedule is monitored and reports are sent to both contractor and licensee supervisors allowing real time management of variances in dispatching.

Inefficient dispatching can increase the delay time component of estimated cycle time. If tracking of cycle time shows inefficiencies in unavoidable delays, thereby increasing cycle time, the contractor and the licensee need to review, correct inefficiencies, or increase the unavoidable delay component of cycle time.

Another potential benefit of a good dispatching system is maximizing daily or weekly hauling time per driver by mixing short hauls with long hauls, providing maximum truck utilization (i.e. if "Haul A" is an 8 hour haul, and the driver can legally only drive 13 hours in a day, they cannot make two trips on "Haul A". If an available "Haul B" is less than 5 hours, it would allow the driver to combine with "Haul A" and make more than one trip in a day without breaching their maximum daily hours). This consideration reduces the perceived "need" to travel faster to ensure that the extra earning opportunity is achieved.

Coast and Interior Stumpage Appraisals: Market Pricing System

Coast licensees and contractors confirmed that CAM data is not used or referenced in any way to estimate contract cycle time on the coast.

Interviews with government respondents confirm that the sole purpose of both the CAM and IAM is to provide a consistent methodology for licensees to submit information required by government to estimate the "winning bid" value as calculated by the respective Market Pricing System. The following quote is from the survey response:

> *The purpose of the IAM calculations is to:*
>
> 1. *estimate a single volume weighted cycle time (CT) for the entire cutting authority being appraised, and*
> 2. *supply this data to the Market Pricing System (MPS) equation which has a cycle time variable, in order to come up with the Estimated Winning Bid component of the stumpage calculation.*
>
> *CT variable is only one variable of many used to estimate the MPS winning bid. Neither policies are in any way intended to support or influence contract negotiations between licensees and contractors.*

In addition to the fact that IAM data submissions are meant for stumpage determinations only, there are other limitations to the data for use in contract negotiations.

Appraisal estimates of load unload and unavoidable delay time are based on reported industry standards over a broad sample area and may not reasonably reflect current regional differences when considering specific contract negotiation conditions. In addition, the IAM sector time includes a requirement for the submitting licensee to use haul routes and corresponding sector time to what is known as the Point of Appraisal (POA): a mill capable of producing lumber and chips nearest to the timber being appraised. To ensure that the appraisal submissions result in a consistently produced cycle time for all licensees, the POA must yield the highest stumpage rate, regardless of whether it is the actual destination for the logs. In some cases, the POA is a location where a mill does not even exist (policy requires that POA's remain an appraisal option for a period of five years after a mill is closed).

Many licensees, contractors and some government contacts surveyed report that the approved appraisal sector time is no longer accurate for their district and believe they should be updated. Opinions varied, but concerns included changes to haul routes, truck configurations and unavoidable delays which have occurred since the historic sector times were established for their district. Review identified that a procedure in place since October 31st, 1994 – "Procedure for Establishing Sector Times for Log Hauling" (Appendix D) providing the framework for government and licensees to periodically review road speeds and distances to ensure they are reasonable for use in the appraisal process. If appraisal sector time is considered a problem for stumpage appraisal purposes, government and industry should be encouraged to review them within the existing framework.

While the large majority of licensees report that the CAM and IAM sector times are not used or are irrelevant with respect to contract negotiations for log hauling, there are a few licensees who report that sector times in some way influence contract negotiations related to cycle time. Leaving the impression that licensees who continue to use appraisal sector time estimates for contract negotiations either believe them to be reasonable for the area, or despite limitations of the data felt it necessary to ensure that contract haul payments are tied to, or consistent with, stumpage appraisal cost estimates. Given the limitations of the appraisal cycle time data for contract negotiation purposes and the number of survey responses expressing concern with the reasonableness of appraisal sector time we strongly recommend licensees and contractors do not use appraisal sector times as a substitute for a separate analysis and review of reasonable cycle time components specific to the haul route.

RECOMMENDATIONS

Recommended Best Practice for Estimate, Review and Revision of Cycle Time

In this section, there is no distinction between coast and interior best management practices for cycle time establishment; the following suggestions apply to any organization considering improvements to cycle time estimate, review and revision processes.

Cycle Time Estimation

Estimating log hauling cycle time is an important component of contract negotiation; cycle time must allow for safe travel on resource roads, highways, and in communities.

Based on interview and literature research, the following recommendations are suggested:

1. Licensees, contractors, and drivers should understand and identify, in writing, the legitimate components of a cycle time.
2. Licensees and/or contractors should develop a clear model outlining the components of and process used to estimate cycle time describing cycle time activity estimates and components.
3. Travel time estimates, measured road section lengths and safe haul speed for each road section should be agreed upon. Road standard and characteristics (e.g. steep, narrow, many curves, etc.), number of required stops (such as lights/stops signs, etc.); posted speeds, and the assumed standard of road maintenance should be taken into account.
4. Loading time estimates should take historic time studies, harvest system (cable versus ground-based), loading site characteristics (terrain), truck configuration (self-loaders, number of bunks, etc.), and the number of log sorts or other site specific variables into account.
5. Unloading time estimates should take in account historic scale in scale out time, or studies for historic unloading time or historic, detailed driver time card summaries.
6. Unavoidable delay time estimates should take into account historic time studies for items such as traffic, winter chaining and unchaining, safety inspections associated with brakes and loads, prolonged delays due to road maintenance or construction activity, delays in lines at the offloading site prior to entering onto the scale.
7. In the absence of more detailed, suitable information to estimate each activity included in cycle time, the use of historic scale in to scale in time, GPS data, or historic detailed driver time card summaries, could be used as a starting point, if the haul is similar. Whatever the data source, it is important for all parties to arrive at a reasonable average with data used (e.g. not base cycle time on the fastest or slowest time but on what is safely achievable).
8. Log buyers or licensees, contractors and drivers should all have access to the cycle time estimate as part of the management awareness and communication process. Wherever possible a list of known hauling related hazards or a map identifying known hazards should accompany the cycle time estimate.
9. On completion of the cycle time estimate, licensees and contractors should jointly sign off on the agreement.
10. The contractor should review the cycle time and known hazards with the driver and have the driver sign off to confirm their understanding and agreement.
11. Once the haul time is estimated, it should remain unchanged unless the monitoring and review process indicates a need to revise the estimate. For example, agreed road maintenance standards should be met.

Cycle Time Review and Revision

A fair and equitable process to monitor and revise cycle time is essential. Licensees, contractors and drivers all have responsibilities to monitor and achieve safe cycle time as efficiently as possible. The components used in setting the agreed cycle time must be managed to enable each party to achieve the cycle time.

Reviewing cycle time estimates can be done using information from sources such as detailed time card summaries, scale in to scale in data, GPS data, supervisor and contractor field review of cycle time components. The intention is not to limit the options for reviewing cycle time data but must be a fair, transparent and unbiased, whatever it may be.

Review of cycle time may identify inefficiencies in any area of responsibility, in that case there may not be a need to adjust cycle time, but rather a change in management activity to improve efficiency (e.g. increase safe travel speed by improving road maintenance, reduce loading time by dispatching, reduced waiting time at log off-loading site prior to being off-loaded or weighed-in, etc.).

Review processes should be fair for both parties; the data collected must be credible, reasonable to collect and provided to all parties within a reasonable time frame to justify cycle time changes.

Additional Recommendations

Based on the information gathered through interviews and literature reviews, some additional recommendations items that may influence or relate to cycle time became apparent:

1. Licensees and contractors should develop and employ Safety Management Systems appropriate to the scale of their operations with the objective of strengthening their overall safety culture. Licensee and Contractor Safe Certification with the BC Forest Safety Council assist this objective.
2. Encourage efficient and practical safe certification programs to meet the needs of varying sized clients, specifically small contractors and licensees.
3. Contractors and licensees should conduct joint safety meetings; sharing (making available) meeting minutes, action items and resolutions with all parties.
4. Periodically, licensees and contractors should invite representatives from government agencies such as WSBC, RCMP, CVSE, Ministry of Transportation and Infrastructure and C&E as well as, road maintenance contractors and certification agencies such as BCFSC, to safety meetings. Existing situations have shown that periodic inclusion of these organizations in safety meetings has shown improvements in the working relationship of parties involved
5. Encourage licensee and contractors to offer health and wellness incentives to employees and assist them in meeting the physical and mental challenges of the work.
6. Encourage licensees and contractors to consider employing Road Marshals to monitor and enforce road use procedures and to encourage safe behaviour when the scale of operations warrants independent enforcement.
7. Encourage MFLNRO C&E staff, RCMP and CVSE to continue efforts to enforce laws with industrial and non-industrial users. We also encourage these groups to communicate safe road use procedures in their enforcement efforts.
8. Encourage licensees and contractors to coordinate their efforts to control dispatching of trucks. Significant efficiencies may be gained in the loading phase; orderly arrival of trucks at off-loading sites allows for efficiencies in the unloading phase as well as possible reductions in unavoidable delays such as wait time at the off-loading site.
9. Encourage licensees and contractors to invest in GPS technology appropriate to their operations. At a minimum, GPS information may be useful to help resolve cycle time disputes.
10. WSBC, BCFSC and other similar organizations (Trucking Safety Council, ILA, TLA, CILA, BCTA, Trucking HR Canada, and Road Safety at Work) should coordinate research, advocacy, education and awareness programs to increase the overall effectiveness of the programs and communications.

11. MFLNRO should review and (when necessary) update cycle time (used in stumpage appraisal submissions) when the current sector time and delay time are believed to be out dated.
12. Strongly recommend licensees and contractors do not use appraisal sector times as a substitute for a separate analysis and review of reasonable cycle time components specific to the haul route.

REFERENCES

British Columbia Ministry of Forest Lands and Natural Resource Operations, Timber Pricing Branch. (2012). *Interior Appraisal Manual*. Retrieved from https://www.for.gov.bc.ca/hva/manuals/interior.htm

British Columbia Ministry of Forest Lands and Natural Resource Operations, Timber Pricing Branch. (2012). *Coast Appraisal Manual*. Retrieved from https://www.for.gov.bc.ca/hva/manuals/coast.htm

British Columbia Forest Safety Council. (2012), *Resource Road User Safety Guide*. Retrieved from http://www.bcforestsafe.org/Resource_Road_User_Safety_Guide

FP Innovations. (1993). *Otto*. [Software]. Retrieved from FP Innovations website http://www.feric.ca/en/index.cfm?objectid=02A2FBD2-BD5B-3B1F-1F788CBFAB1FEAFA

Harris, R. (2007). *Not Out of the Woods.* Retrieved from BC Forest Safety Council website http://www.bcforestsafe.org/files/files/newsroom/ombud-07-01-01-review1.pdf

Harris, R. (2008). *No Longer the Road Less Travelled.* Retrieved from BC Forest Safety Council website http://www.bcforestsafe.org/files/files/newsroom/bcfsc-ombudsreport-2008-pressready.pdf

Harris, R. (2009). *SAFE Companies Report.* Retrieved from BC Forest Safety Council website http://www.bcforestsafe.org/files/files/newsroom/publications/Ombudsmans_safeco_report.pdf

Jonah, B., Mayhew, D., Brown, S., Vanlaar, W. & Marcoux, K. (2009). *Best Practices for Truck Safety.* Retrieved from a link on the Traffic Injury Research Foundation website to the WorkSafe BC website http://www.worksafebc.com/news_room/news_releases/assets/nr_09_06_12/best_practices.pdf

Office of the Auditor General of British Columbia. (2008). *Preventing Fatalities and Serious Injuries in B.C. Forests: Progress Needed.* Retrieved from http://www.bcauditor.com/pubs/2008/report5/preventing-fatalities-and-serious-injuries-bc-forests-pro

Roberts, D, (2011) *Power Driving; Fueling Your Engine for the Future*. Castlegar, BC: Selkirk College.

Roberts, Dr. Delia (2011) *Top Ten Tips*. Castlegar, BC: Selkirk College.

Thiffault, P. (2011). *Addressing Human Factors in the Motor Carrier Industry in Canada.* Retrieved from Canadian Council of Motor Transport Administrators website http://www.ccmta.ca/english/pdf/human-factors_report_May_2011.pdf

APPENDICES

CYCLE TIME CALCULATION.

LICENCE #:
CP:
Timber Mark
Date: 22-Aug-11

WEIGHTED ROAD SPEEDS TO COMMON JUNCTION

EMPTY

Blk	Block Volume	Spur Length (km)	Spur Speed (Km/h)	Spur Time (min)	Secondary Length (km)	Secondary Speed (Km/h)	Secondary Time (min)	Length (km)	Speed (Km/h)	Time (min)	Length (km)	Speed (Km/h)	Time (min)	road 5 Length (km)	road 5 Speed (Km/h)	road 5 Time (min)	TOTAL TIME (min)	WEIGHTED TIME (By Vol)	TOTAL DISTANCE (km)	WEIGHTED DISTANCE (By vol)
1	600	4	15	16		35											16	4.80	4.00	1.20
2	200	4	15	16		35											16	1.60	4.00	0.40
3	600	5	15	20		35											20	6.00	5.00	1.50
4	300	5	15	20	0.5	35	0.857										20.857	3.13	5.50	0.83
5	300	0.75	5	9	5	35	8.571										17.571	2.64	5.75	0.86
Total:	2000																Total time (min):	**18.16**	Total dist (km):	**4.79**

LOADED

Blk	Block Volume	Spur Length (km)	Spur Speed (Km/h)	Spur Time (min)	Secondary Length (km)	Secondary Speed (Km/h)	Secondary Time (min)	Length (km)	Speed (Km/h)	Time (min)	Length (km)	Speed (Km/h)	Time (min)	Length (km)	Speed (Km/h)	Time (min)	TOTAL TIME (min)	WEIGHTED TIME (By Vol)	TOTAL DISTANCE (km)	WEIGHTED DISTANCE (By vol)
1	600	4	10	24		25											24	7.20	4.00	1.20
2	200	4	10	24		25											24	2.40	4.00	0.40
			10			25														
3	600	5	10	30		25											30	9.00	5.00	1.50
4	300	5	10	30	0.5	25	1.2										31.2	4.68	5.50	0.83
5	300	0.75	5	9	5	25	12										21	3.15	5.75	0.86
			10			25														
			10			25														
Total:	2000																Total time (min):	**26.43**	Total dist (km):	**4.79**

EMPTY SPEED WEIGHTED BY VOLUME: **15.8** **Km/h**

LOADED SPEED WEIGHTED BY VOLUME: **10.9** **Km/h**

DISTANCE TO COMMON JUNCTION: **4.79** **Km**

EMPTY TIME TO CJ: **18.16** **min.**

LOADED TIME TO CJ: **26.43** **min.**

CJ at 18.5 km on the 900 Road.

PRIMARY CYCLE TIME CALCULATION

Road ID	Primary	Secondary	Distance (Km)	Speed (km/h) Loaded	Speed (km/h) Empty	Time (0.I min) Loaded	Time (0.I min) Empty
	Y					26.4	18.2
	Y		16.0	35	45	27.4	21.3
	Y			35	45		
	Y		103.9			102.0	102.0
			119.90		Subtotal:	**155.9**	**141.5**

Cycle time (min): 297.4
Delay (min): **60**

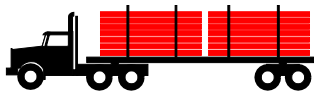
Total Cycle time (min.) **357.4** Divided by 60 = **6.0 hrs**

August 24, 2007

Short Log Truck Configurations
Central Cariboo

Ministry of Transport Tolerances: Summer - 1500 kgs
Winter - 2500 kgs from December 1 to February 28
No tolerance after 63,500 kg.

5-Axle
5A - 39500 KG - 41700 KG

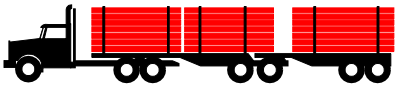


6-Axle
6A - 47100 KG - 48700 KG

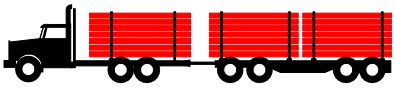
6-Axle
6B - 46500 KG

7-Axle
7A - 54100 KG - 55300 KG

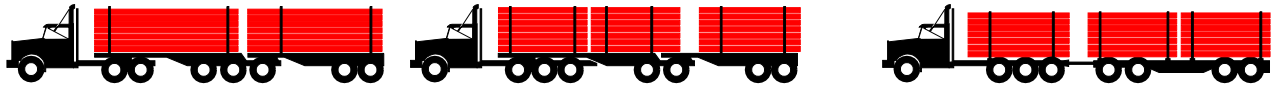
7-Axle
7B - 56500 KG



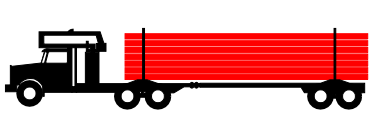
7-Axle
7C - 60100 KG



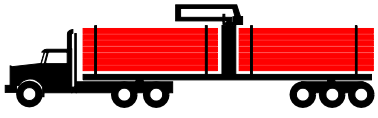
8-Axle
63500 KG
8A - ALL STEERING CONFIG.



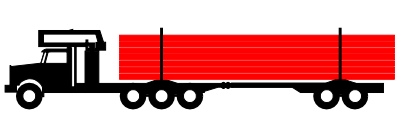
P 5-7 Axles



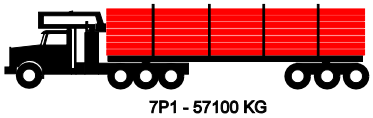
5P1 - 43100 KG



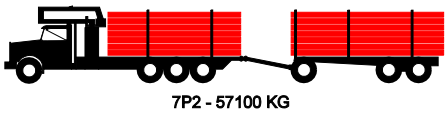
6P1 - 46500 KG



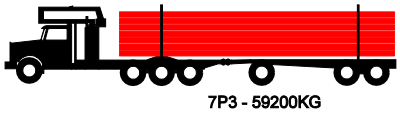
6P2 - 50100 KG



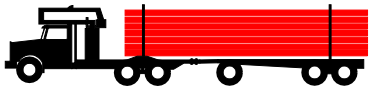
7P1 - 57100 KG



7P2 - 57100 KG



7P3 - 59200KG
VALID UNTIL 2010



6P3 - 52200 KG

In their discussions, the authors highlighted the notion that SMS was usually applied to larger organization in other modes and that their applicability to small operators, which are very prevalent in the motor carrier industry, has yet to be assessed. This conclusion was also reached by Short el al. (2007), who recommended that a study be conducted to assess to what extent a safety culture can be created within small carriers, especially those not large enough to have a safety officer or a safety department.

While the question remains open and should be investigated further, for the sake of the present discussion, it needs to be emphasized that the attitudes, values and norms that define a large part of what a safety culture is are already present at the individual level, and are directly related to safety behaviors. As such, the SC of only one individual is something that exists, it has impacts on safety and it can be modified. Hence, we believe that while not all aspects of SC or SMS may be applicable to smaller carriers, some of the most important components are applicable, given that a tailored approached be formulated for them. Table 21 illustrates how SMS can be applied to larger (20 power units and over) and smaller (less that 20 power units) carriers.

Table 21: Applicability of SMS to small and large motor carrier operations

	SMS for MC 20+	**SMS for MC 20-**
Safety commitment, policy and goals	• Emphasize measurable goals, provide examples, templates: • Meet and exceed NSC standards, aim for no accidents and violations.	½ page, simple statements: safety crucial in all activities.
Safety organization and responsibility	Senior management commitment; • Safety officer; • Safety committee.	½ page, roles of management, drivers; mechanics, dispatchers.
Safety monitoring and reporting	• Voluntary reporting of accidents and incidents, confidentiality of data. • Subcontractor's safety performance.	Simple spreadsheet, record safety data (accidents, violations, vehicle defects).
Safety assessment	Analyze trends in safety performance, take corrective action when stagnation or negative outcomes identified.	Monitor trends and take corrective actions.
Safety training	In addition to NSC training, formal SMS training.	Informal training during staff meeting or special short training sessions.
Safety audits	• Depends on implementation approach; • If regulated, government continue NSC audits and includes SMS; • If voluntary, auditing not necessary and left at carriers discretion.	*Same*
SMS communication	• Building safety culture; • Formal, with posters, newsletters etc.	• Manager communicates safety objectives, issues, plans; • Meetings, written communication.

Province of British Columbia

Ministry of Forests

MEMORANDUM

File: 21880-06-03

October 31, 1994

To: Valuation Officers
All Appraisal Coordinators
All Interior Forest Regions

From: Mike Falkiner
Manager, Timber Pricing
Valuation Branch

Re: Procedure for Establishing Sector Times for Log Hauling

At the August 31, 1994, Interior Appraisal Advisory Committee (IAAC) meeting, the Interior Lumber Manufacturers Association presented a report entitled "Methodology for Establishing Cycle Times for Appraisals".

This is essentially the procedure now in use in the Kamloops Region and it is my understanding that it is very similar to the procedure already in use in the other regions.

Both IAAC (including the Regional Timber Pricing representatives) and Valuation Branch have endorsed the attached procedures and recommend that sector time calculations in your region follow this format. The purpose of this is to ensure that all appraisals for licensees in the interior are done on a consistent basis.

Mike Falkiner
Manager, Timber Pricing
Valuation Branch

Attachment: (1)

cc: N.F.P.A.
C.L.M.A.
I.L.M.A.

October 25, 1994

PROCEDURE FOR ESTABLISHING SECTOR TIMES FOR APPRAISALS

A Comparative Value Timber Pricing System can only be equitable if the estimates developed to compare value are accurately and consistently applied. The hauling cost equation is the most statistically accurate of the woods cost estimates, largely due to the correlation between hauling cost and cycle time. However, the hauling cost estimate can only be as accurate as the estimate of cycle time. To ensure hauling cycle times are established in an accurate and consistent manner, Valuation Branch recommends the following procedure be used.

Definitions

Log hauling: is the movement of logs, by truck from the place of initial loading to the point of appraisal. Although different types of trucks are not recognized in the appraisal, the haul method is categorized as either highway or off-highway.

Sector time: is the average length of time a logging truck requires to travel (round-trip) over a particular section of road. It is based on travel while loaded and empty, as well as legal stops and routine traffic delays.

Cycle time: is the round trip travel time of the logging truck from the place of initial loading to the point of appraisal or first place of unloading and returning back to the place of initial loading.

For further information refer to Sections 4.5.1 (Truck Haul Variables) and Section 4.5.2 (Truck Haul Cost Estimates) in the *Interior Appraisal Manual*.

1. Developing Sectors

The following steps should be used as a guideline:

a. Call a joint meeting of MOF and licensees within the District with the purpose of developing and assigning road sectors. Road sectors can be delineated by junctions and landmarks.

b. Label all major haul roads and junctions on a map of the District. This map will become the reference map for all future discussions.

c. Establish wood flow patterns to the point of appraisal which produces the least total operating cost estimate. In some cases, the appraisal wood flow will be different than the actual wood flow. All species qualities and sizes of timber must be appraised to a single point of appraisal. Use road junctions or easily identifiable landmarks for establishing thresholds for wood flow to appraisal points. These thresholds will have to be tested as the sector times are established.

2. Developing Sector Times

The licensees will establish sector times for the sectors they haul on. Where more than one licensee uses a road sector, the sector time should be established jointly. The process should be as follows:

a. Establish sector distances to the nearest 1/10th of a kilometer.

b. Establish average loaded and empty haul speeds by sector, considering the following factors:

- Actual observed haul speeds,
- Type of haul being appraised (highway/off-highway),
- Season (road condition/traffic),
- Haul speeds must be based on properly built and maintained roads,
- Speed limits,
- Licensee information used to set actual hauling rate,
- Legal stops and routine traffic delays should be considered part of the average haul speed.

Make comments regarding limiting factors on sectors exhibiting extraordinary haul speeds.

The following table may be used as an example to establishing sector time.

Sector	Distance (km)	Speed (km/hr) Loaded	Speed (km/hr) Empty	Time (hrs) Loaded	Time (hrs) Empty	Total (hrs) Time
Mill to Junction Tuzo Rd & Ellis Rd	12.5	43	50	.29	.25	.54

3. Consolidation and Annual Review

Once the individual sector times are developed, they should be consolidated and submitted to the MOF for review along with the District sector map. If the District disagrees with some of the sector times, a joint meeting should be held between all licensees and the District to reach an agreement. Once agreement is reached, the report should be distributed to all licensees for use in appraisals, including the Small Business Forest Enterprise Program.

If agreement on sector times cannot be achieved by the licensees and District, the sector times should be referred to the Regional Appraisal Coordinator for adjudication and resolution. The Regional Appraisal Coordinator is responsible for setting and maintaining standards for the Region.

In cases where the licensee does not wish to participate in this process, the MOF is to proceed with the appraisal using the best information available (see Interior Appraisal Manual, Section 2.2).

At least once a year, the sector times should be reviewed by a joint MOF/Licensee committee to update existing and add any new sectors.