Transport Canada | Transports Canada

Economic Analysis Directorate

Operating Costs of Trucks In Canada 2003

by

Bulk Plus Logistics

✦Transportation Services ✦Consulting ✦Freight Management
✦Transload ✦Optimization ✦E-Business

P.O. Box 3500 Calgary, Alberta CANADA T2P 2P9
Bus: (403) 298-5134 Fax: (403) 298-5258 Cell: (403) 461-4965
e-mail: lash@bulkplus.com web : www.bulkplus.com

Canada

FINAL STUDY REPORT

Bulk Plus Logistics Ltd. is responsible for the accuracy of data and analysis contained in this report. The information presented does not necessarily agree with the views of Transport Canada.

C O N T E N T S

E X E C U T I V E S U M M A R Y

This 2003 edition of Operating Costs of Trucks in Canada is the twenty-second edition in a report series published since 1972. Prior to 1993, the report was prepared every second year. Beginning in 1993, it has been issued annually. In 1998, a retrospective of reports between 1984 and 1994 was developed in machine-readable format. This is available under separate cover.

The current report presents activity based cost estimates for truck operations in various North American jurisdictions. Older reports in this series only presented operating costs within the provinces and territories of Canada. The advent of the Canada-US Free Trade Agreement (FTA) and the North American Free Trade Agreement (NAFTA) has stimulated interest in additional case studies. Currently, we report on operating cost levels for the following jurisdictional situations:

- Every Canadian Province as well as Yukon and the Northwest Territories.
- Five U.S. Regional Groupings of States.
- An Interprovincial Canadian East-West Corridor.
- Three International Canada-US Corridors (West – Central – Eastern).

Cost levels reflect mid year (July 2003) or annual weighted average prices for trucking industry inputs in major population centers within each jurisdictional region for a mid-size trucking operation (25 to 500 vehicles in a fleet).

In addition to investigating trucking operations, the report also presents a comparison of door-to-door truck transportation services with intermodal Container on Flat Car (COFC) and Trailer on Flat Car (TOFC) services. For this purpose, three demonstration corridors are considered.

Major Trucking Industry Cost and Price/Comparison Trends

Cost Trends

As noted previously, this work dates back to 1972. This has enabled development of cost trends, by vehicle type and by region, when comparing findings from each report in the series. The case study trend comparisons in question are for similar vehicle configurations operating at the same relative level of productivity. Thus the cost trends do not directly reflect possible productivity gains that may be occurring through increasing average payload utilization or by increasing the average annual utilization of vehicles (hours worked, or kilometers traveled per vehicle) by the trucking industry.

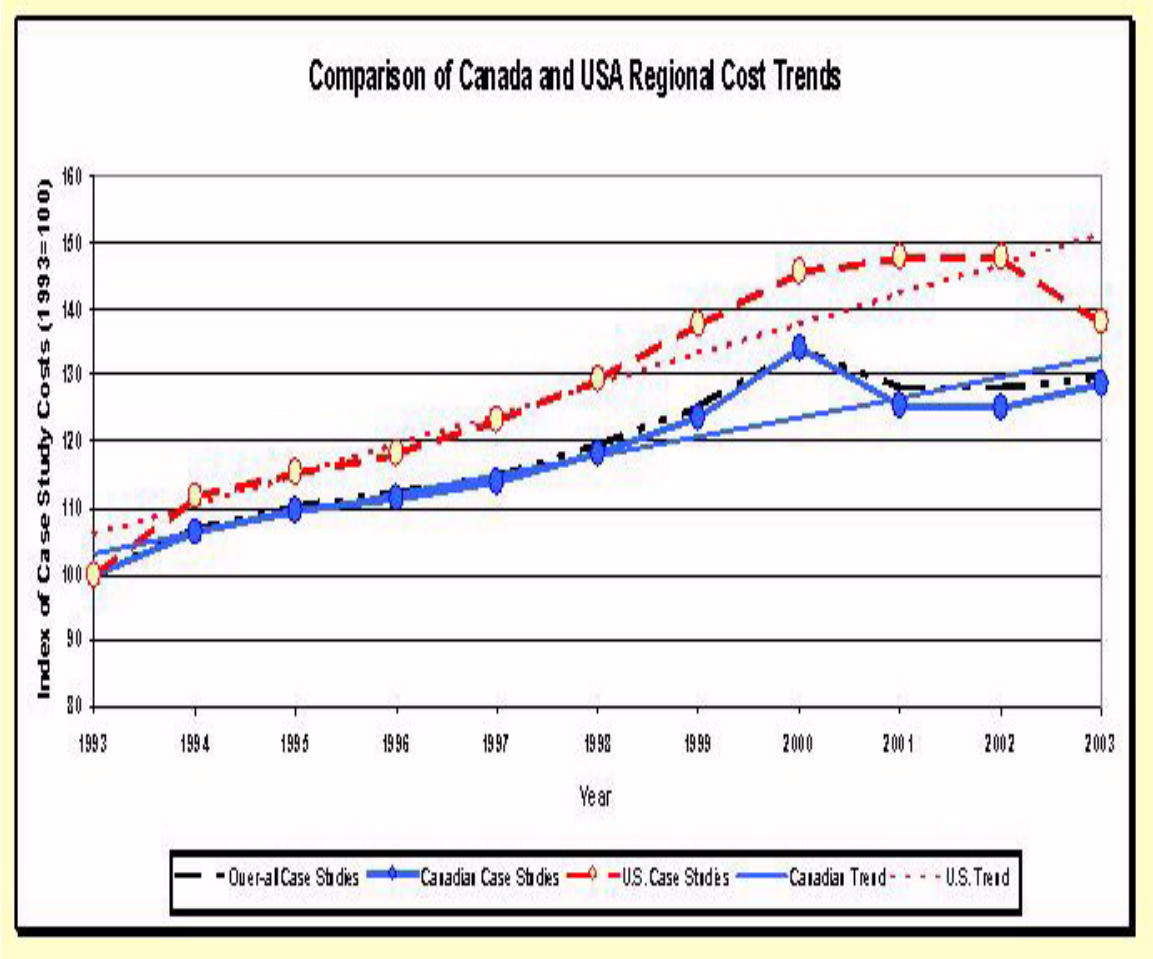
When a reader is considering truck operating costs in an individual situation, changes to annual utilization of the vehicle can be examined, as the report provides three case studies for each hauling situation: a low, a medium, and a high annual utilization scenario. However, as stated previously, trend analyses that are presented herein reflect trends within cost levels for the respective scenarios aggregated together (as opposed to being weighted according to a trend that may see changes to average industry utilization over time).

For purposes of providing a composite cost trend, individual provincial / regional / equipment configuration case studies have been aggregated as a simple arithmetic

average of the case studies, with no attempt to weight the calculation according to any hypothetical proportions of the total trucking industry represented by each case study.

The purpose of the following aggregate trend analysis is to give a high level view of the underlying cost structure for operating vehicles by the industry.

As shown above, operating costs rose after 1980 until the 1990-92 recessionary period, when a correction occurred in various input costs for the trucking industry. Note that during this time period (1980 through 1993), available data in this report series was limited to Canadian case studies only.



Since 1993, as illustrated above, unit truck operating costs (in Canada, and over-all) escalated at a compound rate of approximately 2.6% annually to year 2000, then declined slightly for years 2001 and 2002, only to rebound in 2003 due to fuel cost variations.

Since our study tracks USA truck operating costs in terms of Canadian dollar equivalent cost – although similar cost trends occurred in the USA over the same period – the net effect when expressed in Canadian dollar terms, differs due to the exchange rate variations from year to year of the U.S. to Canadian dollar. For example, the 12 percent rise in the Canadian dollar, relative to USA between years 2002 and 2003, reduced relative US costs, substantially – despite fuel increases, etc. Conversely, the reduced relative value of Canadian currency, as was the trend between 1993 and 2002, had the opposite impact (resulting in the US cost trend, in the figure above, being above the trend for the Canadian average over most of the last 10 years).

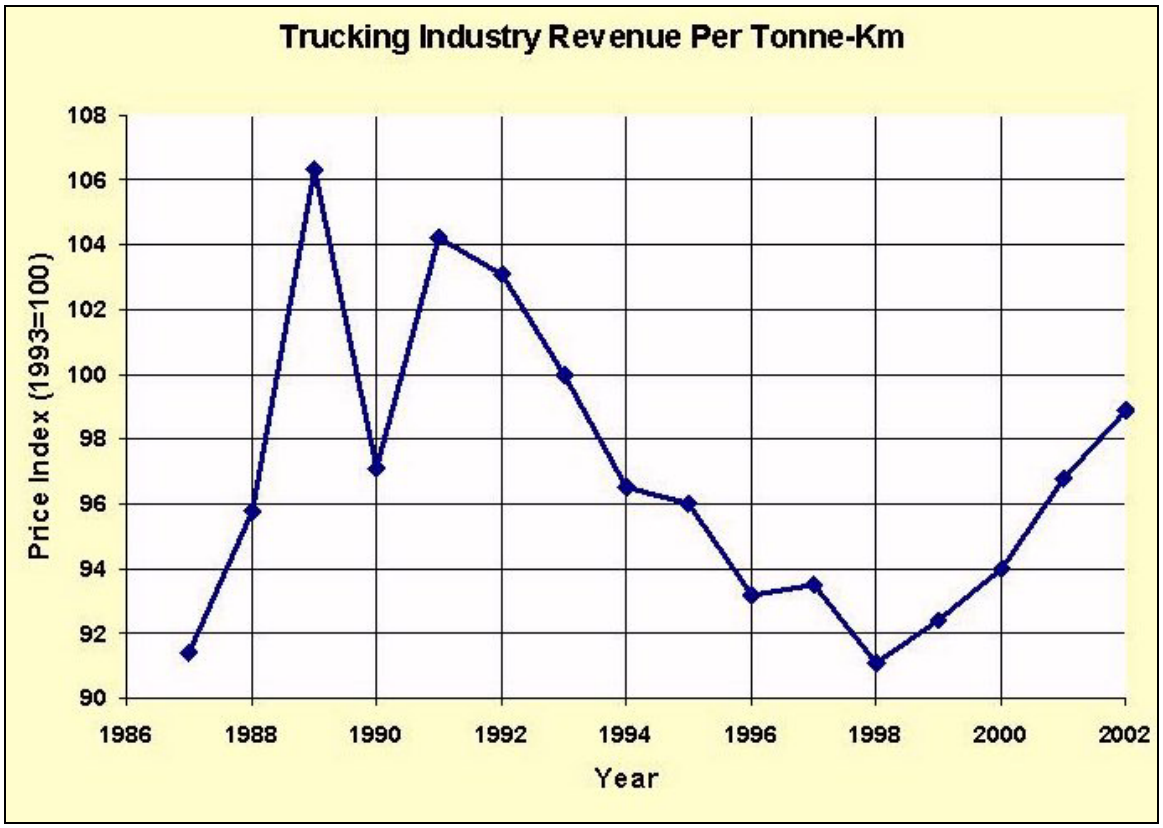
Operationally, USA based trucking operations did not experience a “cost reduction” in 2003. However the exchange rate adjustment (from 63.7 cents U.S./Cdn $ to 71.4 cents) means that USA truckers are likely to become more competitive on transborder operations between Canada and the USA than before. This trend may create a future concern for Canadian based operators who have generally enjoyed a cost advantage on these lanes over many years. Recalling the late 1980’s and early 1990’s, the Canadian

industry experienced significant loss of international freight business after the Canadian dollar, in USA terms, had risen from historic levels in the 75-83 cents U.S. range to approximately 93-95 cents U.S. While a 71.4-cent Canadian dollar is still well below these prior levels, the 12% upward adjustment for 2002-2003, relative to USA carriers, is a significant cost shift to occur over a one-year period.

Starting in 2001, recent slow economic growth has put downward pressure on all costs, both in Canada and the USA – with the only exception being the rise of fuel prices during 2003.

More specific underlying component cost trends for equipment purchase; wages, fuel and licensing components are provided in the main body of this report.

Trucking Price (Revenue) Comparison Trends



The foregoing graph of industry revenue trends was based on cost per tonne-km data supplied by Transport Canada, indexed to year 1993 = 100 cost basis.

Comparing this over-all revenue graph, with the aggregated case study cost trends shown on the prior graph, we note that for most of the years since 1993, industry revenue levels have been below the average revenue per tonne kilometer level for 1993 (as low as 92%, in 1998) although they are gradually increasing back to parity with 1993 revenue levels.

This contrasts with an industry cost base trend that has seen a 30 to 40% increase in costs for operating a vehicle, at the same relative productivity level as in 1993, over the same timeframe.

In order to cope with and survive in this apparent revenue and cost squeeze, trucking enterprises have had to:

- Become satisfied with lower industry profit margins and internal rates of return on investment.
- Make sustained efforts to remain competitive through productivity enhancing strategies such as more average payload per trip, reduced empty miles as a proportion of total miles traveled and increased annual per truck unit utilization levels expressed as operating hours or kilometers per year per vehicle.

There is further discussion of trucking industry productivity gains, beginning during the 1990's, in Transport Canada's annual publication of Transportation Trends, available from the Internet.

Note that adjustments to driver hours of service regulations, applicable in North American jurisdictions, came in to effect at the end of 2003. These are expected by the industry to reduce vehicle annual kilometers / hours worked, over prior years – which will be a "downward adjustment" in productivity, for trucks operated by a single driver. Such productivity adjustments, if the industry expectations are realized, will tend to show up in future years, beginning with 2004. This factor would not have shown up yet in this, our 2003 study report.

Results From These Investigations

This study reference is intended to be a very detailed sourcebook for use by transportation users (shippers), providers (carriers), government regulators, consultants and the academic community.

From the volume of information developed, it is therefore not possible to concisely summarize and tabulate all of results from the case studies investigated into this Executive Summary.

Detailed presentation of the case study methodology and assumptions follows in Chapters 1,2 and 3 of the report, with results of the various investigations presented starting with Chapter 4.

Results of our evaluations of mid 2003 truck operating costs are summarized in detail (total cents per kilometer) in section 4.1 (Base Cases), and chapters 5 (Canadian long haul corridor cases) and 6 (International corridors).

A detailed breakdown of specific cost components is provided in each of the case files for each province and region. These include:

- intra-regional cases, include each province or USA region. eg. BC, ALTA, etc.
- a set of Canadian long distance cases. CANEW which represents Canada-East-West, and

- six International corridor long distance cases (INWESTCA, INEASTCA, AND INCENTCA for Canadian operators on these corridors) and (INWESTUS, INEASTUS, AND INCENTUS for U.S. based operators on these corridors) as well as
- The two axle truck cases are in the file STRAIGHT.

The foregoing files were provided to Transport Canada as Excel worksheets (.XLS) as well as in Adobe acrobat (.PDF) format, under separate cover.

1 INTRODUCTION

1.1 Purpose and Objectives

The purpose of this study is to determine 2003 motor carrier operating costs for each of the provincial and territorial regions in Canada and also to develop international (U.S. based) trucker comparisons. The 2003 edition of Operating Costs of Trucks in Canada is the twenty-second edition of a report series published previously since 1972 that presents activity related estimates for the costs of operating trucks of various common configurations.

Truck operating costs vary significantly with particular circumstances associated with the specific haul, especially with:

- vehicle configuration,
- commodity and customer service characteristics
- hauling distance
- utilization efficiency (trip payload and annual truck utilization)
- region of operation (local economic cost and regulatory/taxation factors)
- right of way conditions (eg. surface, gradient, congestion, practical speeds)
- driver attitude and expertise

This study attempts to relate operating costs to these factors, where possible, to enhance the reader's understanding of representative hauling scenarios covering a wide spectrum of motor carrier activities. The intent is to support comparisons of truck operating cost levels:

- between regions of jurisdiction (10 provinces, 2 territories, and 5 aggregated U.S. regions),
- between 11 very common equipment configurations: two axle straight truck van (local p/d unit), five axle semi-trailer van (48'/53'), five axle semi-trailer flatdeck (48'/53'), five axle semi-trailer bulk liquid tanker, five axle semi-trailer bulk dry tanker, six axle triaxle-semi van (48'/53'), six axle triaxle-semi flatdeck (48'/53'), eight axle super-btrain van, eight axle super-btrain flatdeck, eight axle super-btrain bulk liquid tanker, or eight axle super-btrain bulk dry tanker (see following Figure 1),
- between commodity types: dry freight and bulk
- between low / medium / high annual kilometers utilization of a vehicle in a fleet
- for longer haul Canadian (east/west) corridors
- for longer haul International (Canada/U.S.) corridors (and comparing a Canadian versus a U.S. based operator on each of those corridors).
- for lease operators and intermodal services

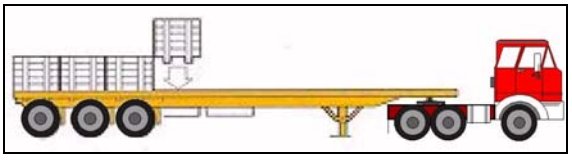
Five Axle Semi Trailer (Van)

Five Axle Semi Trailer (Flatdeck)

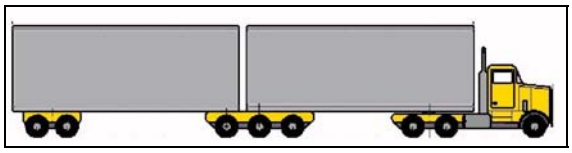
Five Axle Semi Trailer Bulk Liquid

Five Axle Semi Trailer Bulk Dry

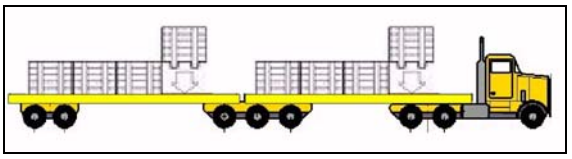
Six Axle Triaxle Semi Van



Six Axle Triaxle Semi Flatdeck



Eight Axle Super B-Train Van



Eight Axle Super B-Train Flatdeck

Eight Axle Super B-Train Bulk Liquid

Eight Axle Super B-Train Bulk Dry

(Concluded on Next Page)

Figure 1: Equipment Configurations

Figure 1: Equipment Configurations, Concluded

Two Axle Straight Truck (Van) For Local Deliveries Cases

CAUTIONARY NOTE
Although the hauling cases presented in this report are specific activity based evaluations, these evaluations still reflect broad regional and other generalized assumptions about the haul. For example, fuel, wage and other costs reflect specific major cities within the region (eg. Vancouver/Lower Mainland for British Columbia cases). These parameters may differ for other locations in the region (eg. Stewart, Kitimat, Prince George). In reviewing and using the results in this report, readers are cautioned to understand the analysis assumptions and regional generalizations before deciding whether a particular case study accurately represents a specific hauling situation.

1.2 Changes From Prior Editions

The current edition of this report generally continues and simply updates the results from consulting comparative data sources and using the same methodology as in the most recent prior edition, the Year 2002 study. From a methodology perspective, the research in this report follows the same format as the 2002 study, with no significant changes to analysis approach.

Over the “thirty-plus” years of this report series, periodic adjustments and refinement to the analysis format, or to key data assumptions, have been required. Readers who are interested in these factors, from a historical perspective, are referred to prior editions of the report in this series.

Although some “trend information” is presented, readers who are interested in a detailed comparison of trucking costs and operating factors since 1972, beyond the comparisons cited in this edition, are directed to the individual report editions for 1972 – 1992 (every second year, in the “even numbered years”), or to the annual series, in years 1993 -

2002. A retrospective compilation of reports since 1984 was developed in 1998 and is available electronically from Transport Canada.

Over this timeframe, the vehicle configurations in common usage have evolved somewhat (to generally larger Canadian configurations). Costs and payloads have become expressed in metric units of measure. Lease operator and intermodal corridor comparisons were added. In 1993, U.S. regions/comparisons were added reflecting greater interest in truck cost comparisons that are relevant for viewing continental NAFTA trading patterns. Lastly, improved energy conservation technologies used by the trucking industry have been reflected, as they became significantly implemented by the industry.

Since the 1993 Report Edition:

- 2 Axle Straight Truck (Urban) Configurations were eliminated from the study between 1994 and 1998 inclusive. They have been restored now since the 1998 edition,
- Specific Body Type (Flat Deck, Van, Liquid Tank, Dry Bulk Tank) cases are developed,
- 6 Axle Configuration (Triaxle semi-trailer) Units are added,
- Three levels of profit margin (10%, 5% and 2.5% of revenue) are evaluated (instead of only 10%) and these are presented /discussed in terms of internal rate of return on operator investment thereby derived,
-Gravel Road Conditions are eliminated from every base case (although gravel operations are still discussed),
- Longer Haul Trucking is discussed in more depth,
- Double stacked container operations are added to the intermodal discussions, and
- Lane Directionality and “time related” cost comparisons have been added since the year 2002 to the comparisons of intermodal versus door-to-door trucking.

2 OVERVIEW OF TRENDS

This report series since 1972 makes use of an activity based costing methodology that will be described in more detail in section 3. Before getting into this detailed methodological discussion on "how the Operating Costs of Trucks project is conducted", it is useful to summarize – in overview fashion – "how the conducting of this project, over several years contributes to an understanding of trends / changes affecting the industry".

2.1 Major Cost and Price/Comparison Trends for the Trucking Industry

Cost Trends

As noted previously, the "Operating Costs of Trucks In Canada" series of publications dates from the year 1972. To the extent that various "standard configurations" have been charted, in the publication, over the years – it is possible to develop, by province and by configuration of vehicle – a cost "trend" for operating each type of vehicle.

Note that such a trend analysis is NOT indexed against vehicle productivity, it simply reflects the cost level to operate a specific vehicle type, for a specific distance or unit of time, during any specific year. For this reason, consideration of cost trends from the report series DOES NOT DIRECTLY REFLECT factors which may have occurred such as:

- Changes to the average number of productive (i.e. loaded) kilometers traveled as a percentage of total miles traveled (i.e. loaded plus empty kilometers).
- Changes to the average productive payload carried (average tonnes per trip) by the trucks.
- Changes to the average numbers of kilometers of annual utilization, per vehicle in service.

These factors, together with changes to average profit margin achieved by the industry, reflect in the observed "price comparison" trends, to be discussed in the section following.

In this context, the "price" for trucking services (cents per tonne - km) is recognized to be a product of both the "cost of operating the truck" as well as the "utilization productivity" with which the truck is employed (tonnes payload, percentage of loaded miles, total annual loaded utilization, etc.)

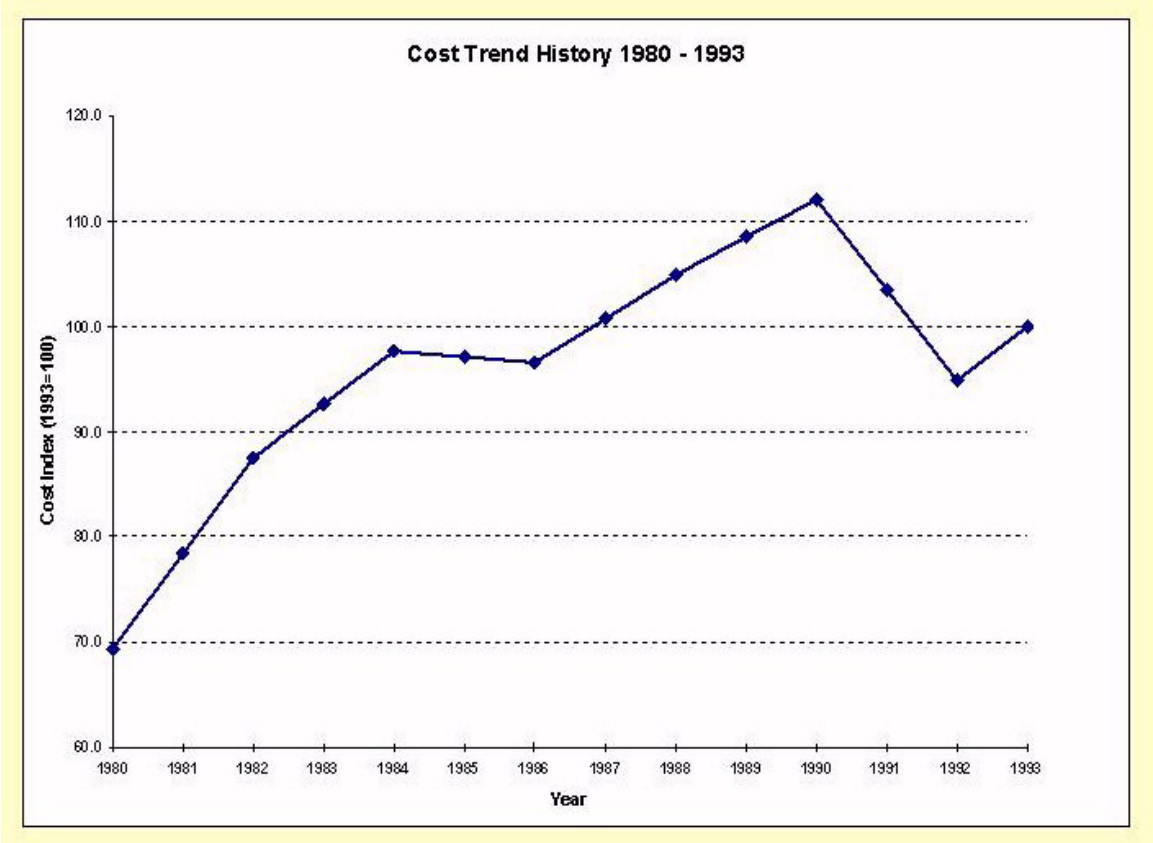
Note that a significant re-design of the case studies for the report series was undertaken beginning with the 1994 report edition. For this reason, it has been convenient to chart "cost trends" for the trucking industry indexed to a base year index of 1993=100. This enables comparison of costing levels for both "pre-1993" and "post-1993" to be undertaken directly from the case studies presented in the various report editions.

Lastly, in the interests of clarity, it should be noted that detailed investigation of "trends", beyond the aggregated information presented in this report – and including detailed consideration of industry averages / case study weightings, etc. – are beyond the terms of reference of this undertaking.

Current simplified aggregate trends are herein discussed simply as a means to understanding, and highlighting, from an overview perspective, the changes in cost

factors, as they are being developed, from one study year to the next. Readers seeking to further investigate more detailed underlying regional / equipment type factors are referred to the individual prior study reports in the series, to develop their own specific investigations.

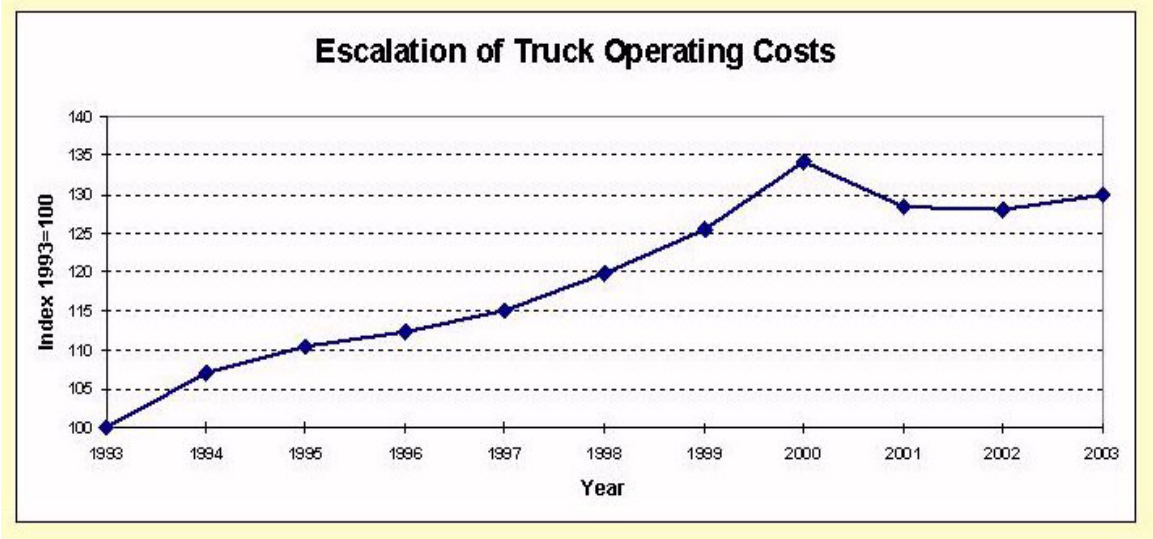
PRE 1993 VEHICLE OPERATING COST INDEX
(SIMPLE AVERAGE OF CASE STUDIES)



The foregoing figure illustrates the aggregate cost trend for Canadian operating cost scenarios summarized from the 1980 through 1993 study projects in this series. Although costs were observed to rise steadily during the timeframe from 1980 through 1990, the impact of the 1990 through 1992 recession on the trucking industry's cost structure is dramatically shown in the graph.

The more recent, over-all cost trend, is shown below.

POST 1993 VEHICLE OPERATING COST INDEX
(SIMPLE AVERAGE OF CASE STUDIES)

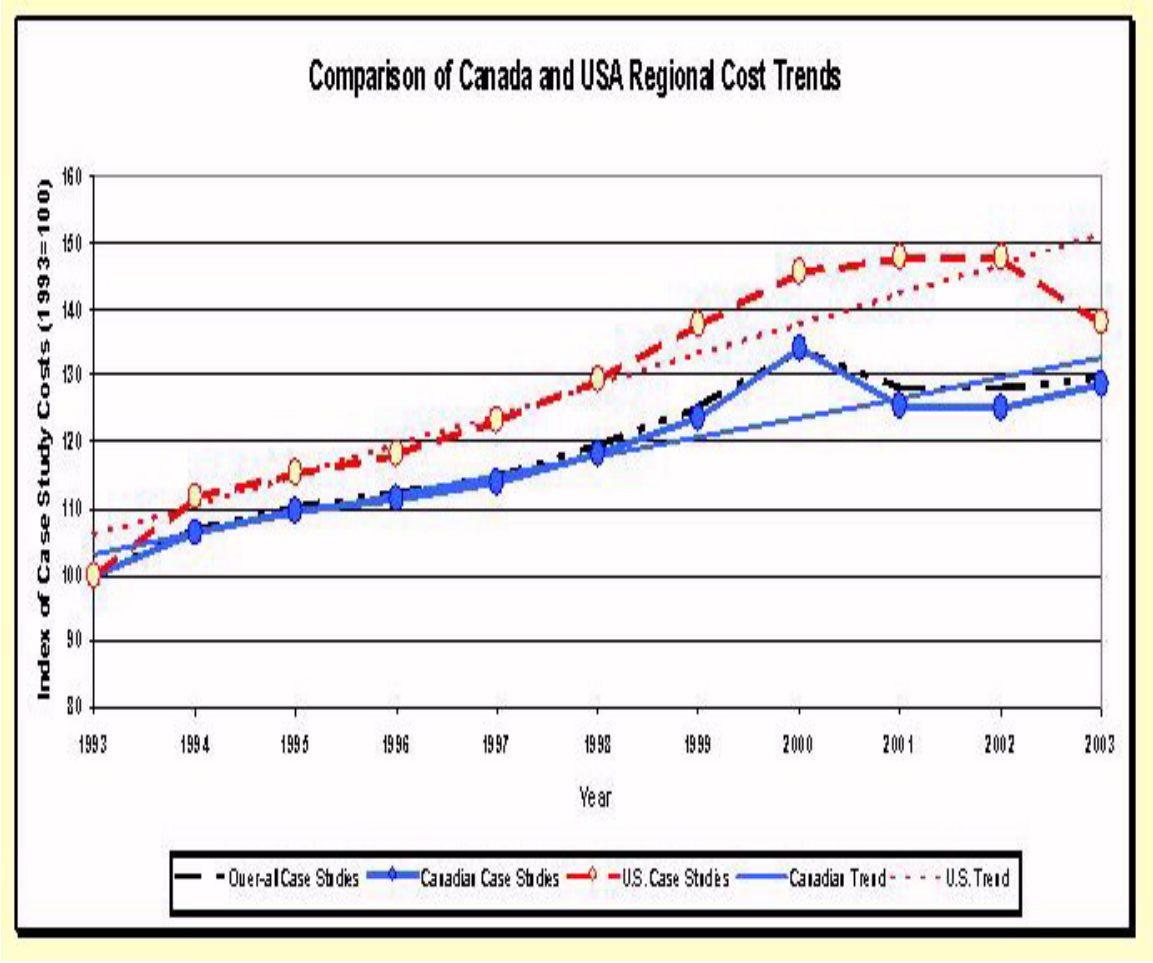


As noted in the figure, our 2003 report on Operating Costs of Trucks in Canada is showing an upturn in cost levels compared to the prior report edition. Although the reasons for this will be discussed further, in more detail, the principal factors that led to this comparative result are as follows:

- Fuel costs, which are a significant proportion of operating costs for the industry, increased significantly in 2003 in comparison to those incurred in 2002. Some operators experienced cost increases in the vicinity of 14 to 15%.
- The cost impact of this fuel price escalation was partially offset by relatively weak demand for new equipment (tractors and trailers) by the industry, driven by a slow economy and future changes to vehicle specifications that are anticipated by the industry. As a result, our unit input costs for equipment were either at the same level, or slightly decreased, from last year's study.
- Escalation in cost for other components such as driver wages and repairs have been very moderate in both Canada and the USA this past year, a factor which doubtless reflects the competitive nature of the industry together with continued (relative to prior years) weakness in the U.S.A. economy – that tends to depress factor input costs for the trucking industry.
- Another important area of cost reduction that has been occurring is the introduction of better trucking technologies, beginning three to five years ago, such as extended oil life (sampling) technologies, improvements in various mechanical components, etc. that are leading to reduced maintenance and repair costs for the industry. As our "Operating Costs of Trucks in Canada" report is to reflect average costs for operating vehicles over their useful life (in the case of power units, this is 5 years) – these underlying trends are beginning to show up in our survey of trucking operators – as largely achieved throughout the trucking industry. For this reason, beginning with the 2002 report edition, our cost levels for power repair are reduced in the vicinity of 15% compared to prior study editions.

- Lastly, and very importantly, the escalation in the value of the Canadian dollar that took place in 2003 (the average value was $.7138 U.S. in comparison to $.6368 U.S. in 2002, an increase of 12%) served to decrease – expressed in Canadian doller terms, the costs for U.S. based trucking operations. As a result, although the U.S. unit cost base was driven by similar moderate cost escalation, within the U.S. economy, to the Canadian operations – the relative cost, expressed in $Cdn for these operations was reduced, according to the exchange rate adjustment. This factor is illustrated in the following graph. Essentially the impact of exchange rate differentials, between the year 2000 and 2003, on Canadian versus USA based cost levels, is shown to have been a very dramatic factor.

MORE RECENT TRENDS BY REGION



As illustrated in the prior two charts, over-all truck operating cost changes for our case studies (mid year 2002 to mid year 2003) were relatively flat. We note also that the dramatic escalation that took place between 1999 to 2000, especially in Canada, was eased since 2000. This returned cost levels more in line with the general long term 1993 to year 2003 cost trends. As discussed previously, the return of the Canadian dollar to

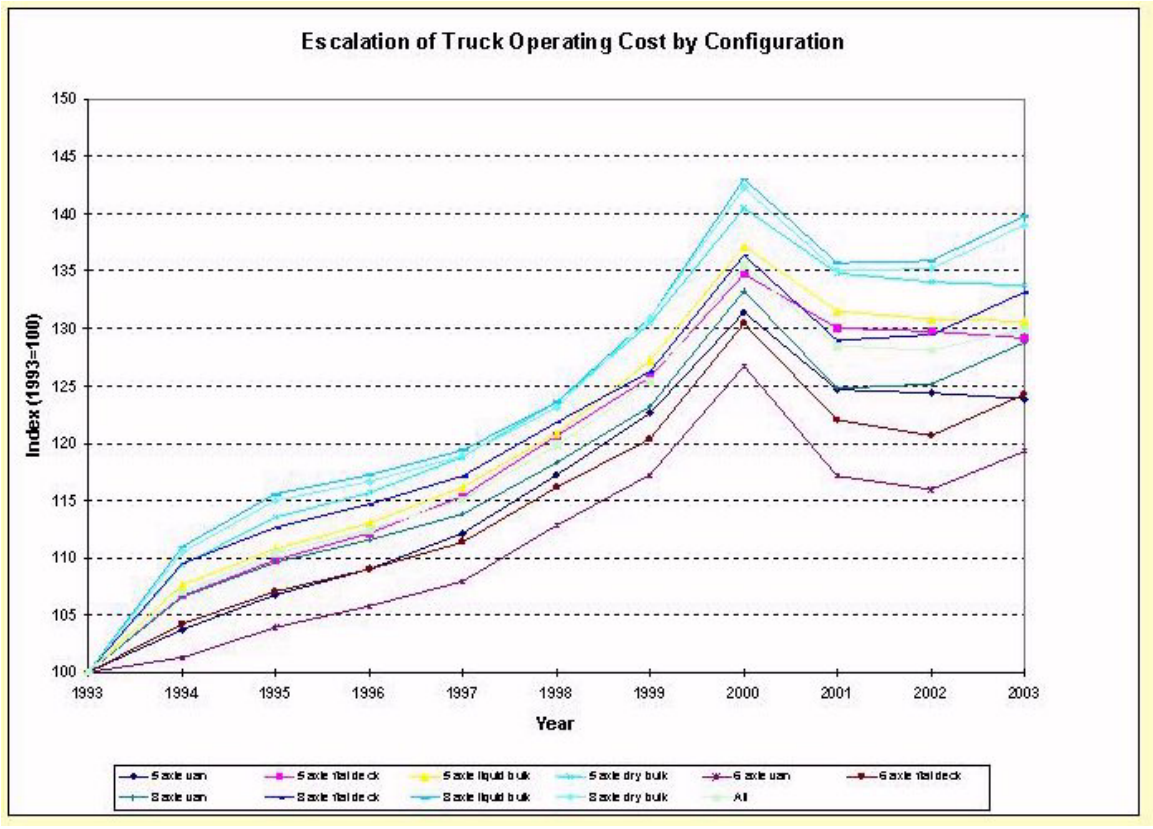
a higher level than it has seen in several years, also “corrects” USA case study costs shown in the report.

Operationally, USA based trucking operations did not experience a “cost reduction”, as the chart is simply illustrating their cost base (as does this entire study) from a Canadian perspective. A factor that will show up, in operational importance, will be improved “competitiveness” of USA based operators on transborder operations between the two countries. This may create concerns for Canadian based operators who have generally enjoyed a cost advantage on these lanes, stemming from the relative exchange rate of the two currencies.

The year 2003 saw an increase in fuel prices for the industry, but generally low cost escalations for other components.

In the year 2003, the average exchange rate between Canadian and U.S. currency was $1.00 Canadian = $0.7138 U.S., according to the Bank of Canada website. This represents roughly a 12% increase in value from the prior year’s average, for year 2002, of $1.00 Canadian = $.6368 U.S.

MORE RECENT TRENDS BY CONFIGURATION



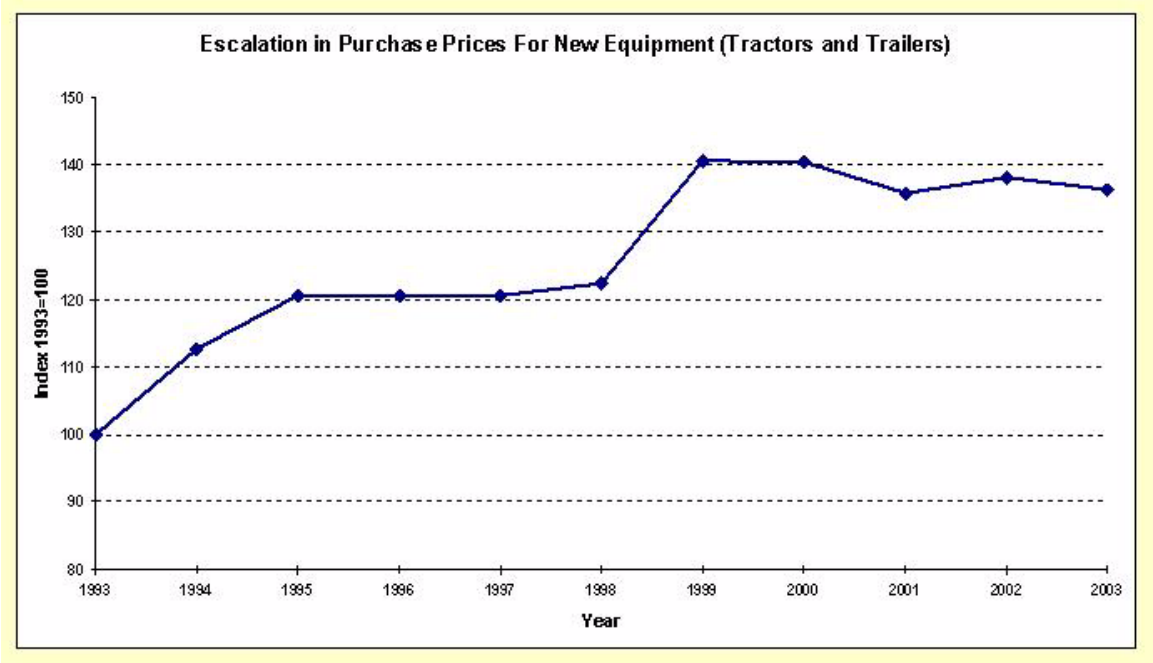
The foregoing chart illustrates the escalation of total truck operating costs by equipment body type – showing similar trends. The apparently lower cost escalation for 5 axle units since 2002 also reflects that these equipment configurations are evaluated for the

U.S. case studies – with cost levels, when they are translated in to Canadian dollar equivalent terms, significantly influenced by the U.S. dollar to Canadian exchange rate. As discussed in prior editions of this report, since 1993, and especially in year 2002, there occurred significant erosion in the Canadian dollar's relative value to U.S. and, as noted, this factor was reversed in 2003.

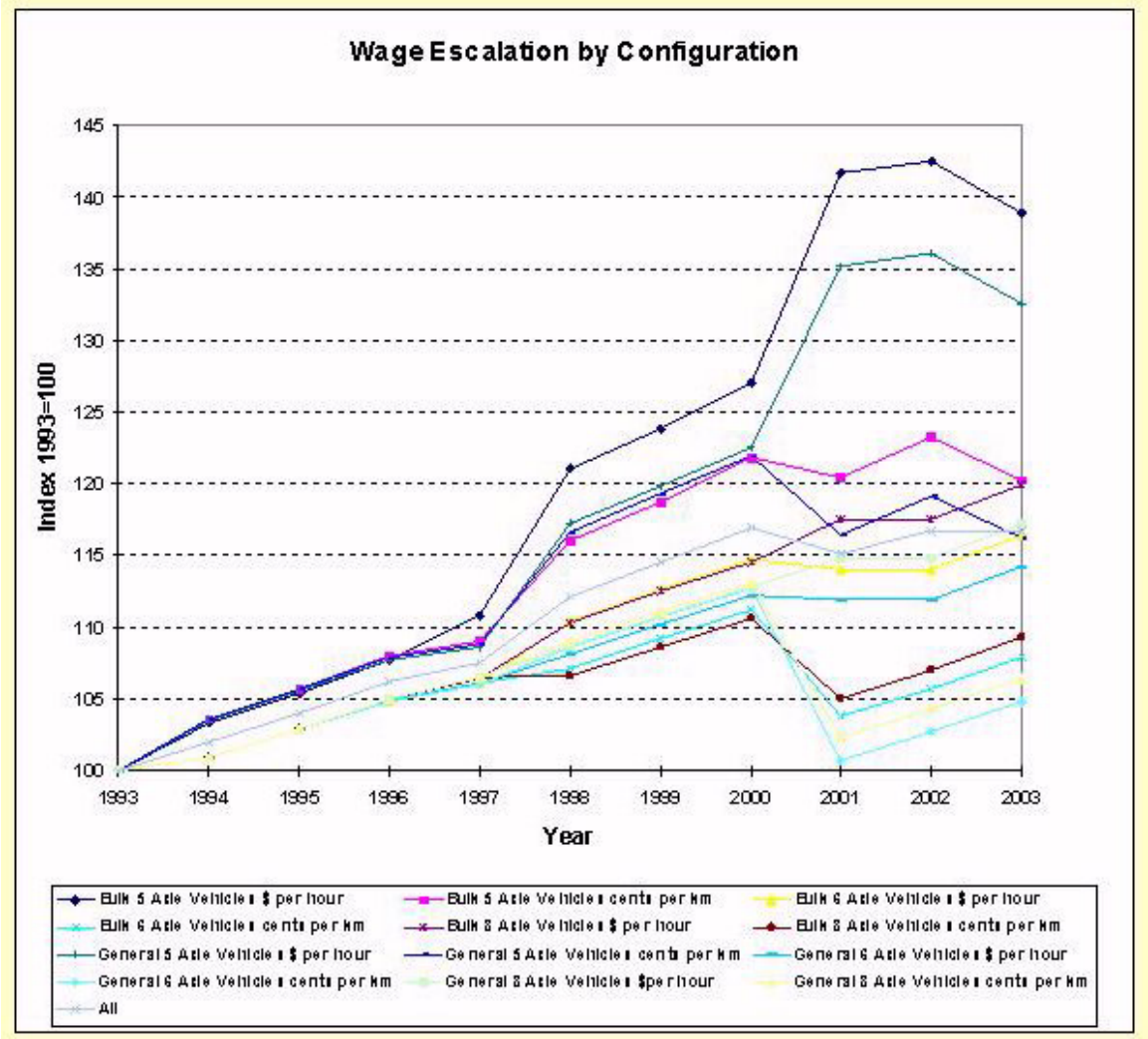
Underlying Changes From Prior Report Editions

For interested readers, changes in Equipment Purchase Costs, Wages, Licenses, and Fuel from prior report editions are briefly charted below.

Note that the section following this will also present "pie charts" that provide readers with an understanding of the relative importance, of each of these cost areas – as a share of total costs for operating a vehicle.



As noted above, equipment costs for the trucking industry have risen roughly 40% since 1993, or roughly by 2.6% compounded annually. Most of the cost increase, however, is experienced during periods of economic growth in the economy, contributing to demand for new vehicle assets. This is seen during the period 1993-1995 and again between 1998 and 1999/2000. For the remainder of the years, equipment price adjustment, year over year, is seen to be relatively flat. Comparing the year 2003 to 2002, moderate price decreases were noted, for many of our case studies – reflecting economic slowdown in the demand for new vehicles by the industry.



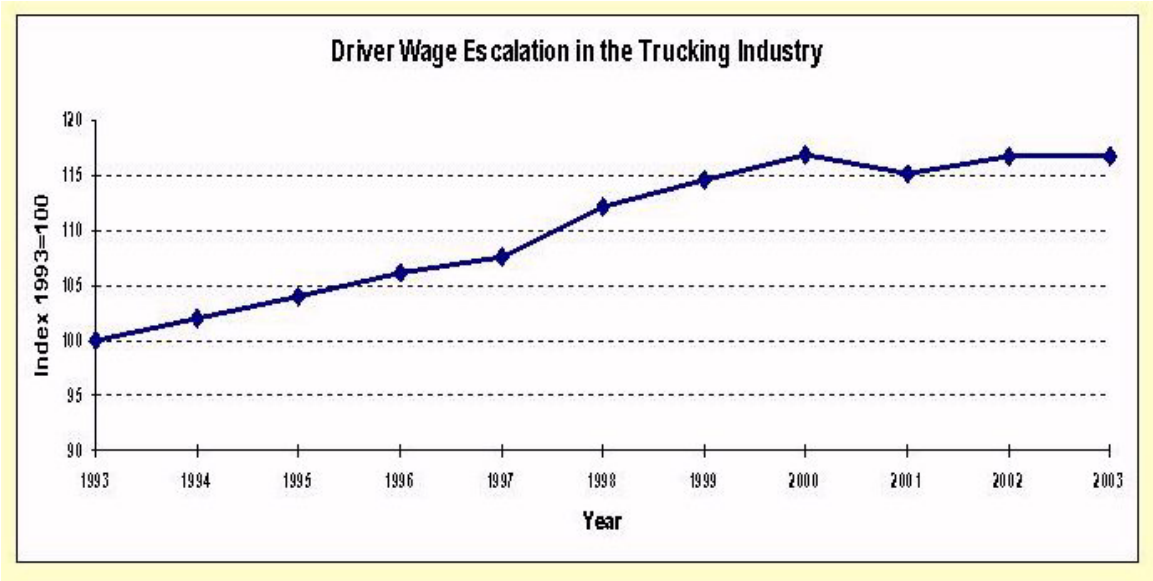
Upward driver wage adjustment in the industry has tended to be moderate in 2003, reflecting CPI changes in the 1 to 3% range. Note that the 5 axle configurations in the above graph, which include US case studies, are similarly influenced by the Canada USA exchange rate, as discussed previously.

Beyond the exchange rate, comparing our study's wage unit cost inputs with prior report editions, we note that there is an apparent exception to the generally observed "trends" in the bulk and general freight 5 axle configurations – hourly wage category, for the 2000 to 2001 timeframe. These are graphed as showing substantial increases for the year 2001 report. Rather than the graph illustrating a true change in driver hourly wage levels, in the USA, which drove the increases charted for these two categories, it would appear that the prior report editions were using erroneous values for the USA based 5 axle configuration hourly wage component. We note, for these components, that the year 2000 to 2001 adjustment in USA hourly wage levels amounted to approximately 30%, a factor further magnified by the 4.1 % decline in the relative value of the Canadian dollar posted that same year.

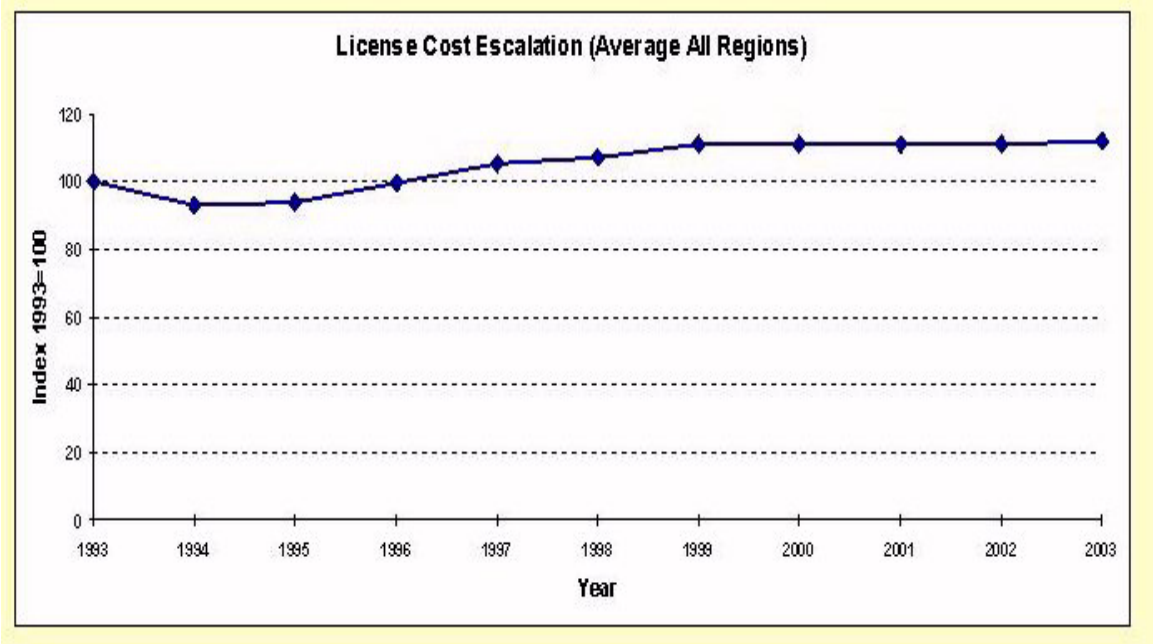
Although we appear to have identified an error in prior report editions for these cost components, because the hourly wage component only impacts the load/unloading

costs, and not the line-haul driving component of driver wage, the possible error introduced into prior report editions will have been very small. For this reason, the error was not detected until the Year 2001 edition's much more detailed re-examination and re-investigation of driver wage levels in all regions of North America.

Over all, the pattern for driver wage costs, averaged in terms of over-all cost levels across all case studies, is charted below:

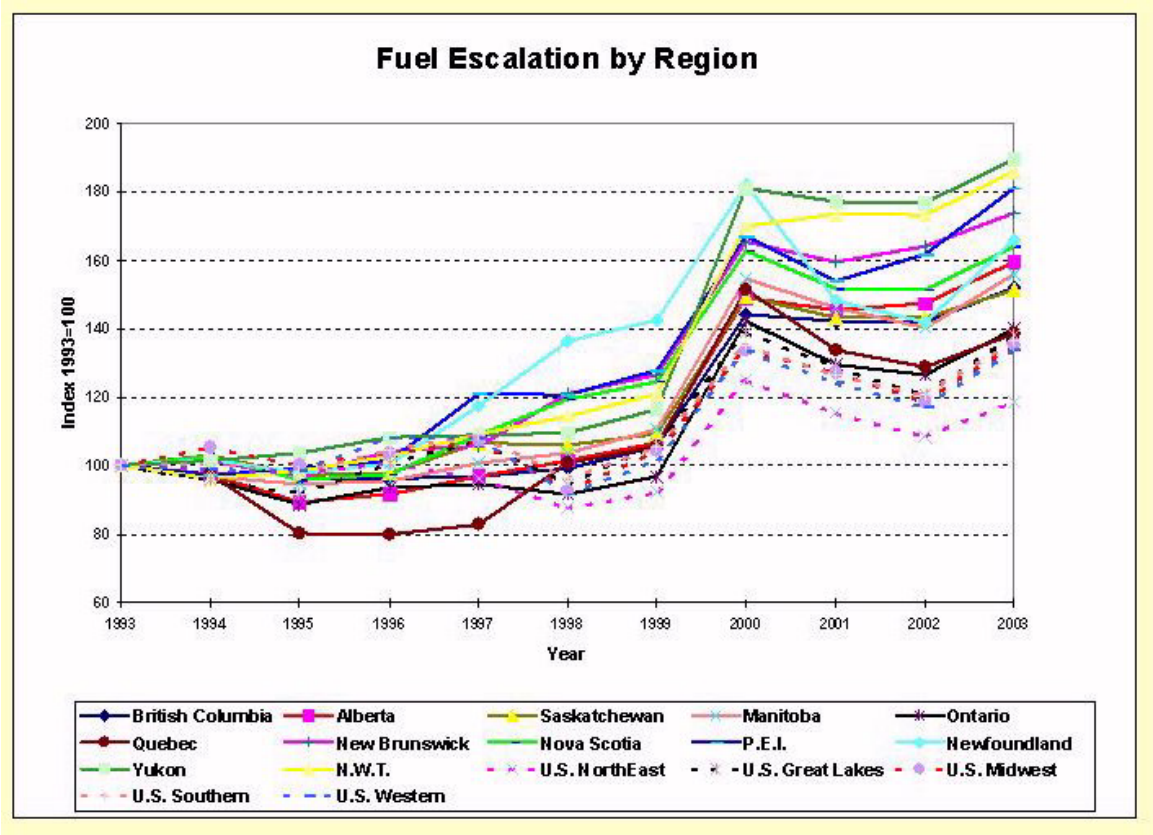


Viewed in this context, the past year's wage escalation is seen to be in line with over-all industry trends since 1993, reflecting the general steady (modest) level of inflation in the North American economy. The year 2001 report discusses individual year variations in more detail, for prior years, than is repeated here.



License costs are relatively unchanged since 1993 in most jurisdictions. In any event, as shown in the following section, these are a relatively minor share of over-all operating costs of trucks.

Fuel Cost Comparisons With Prior Study Reports

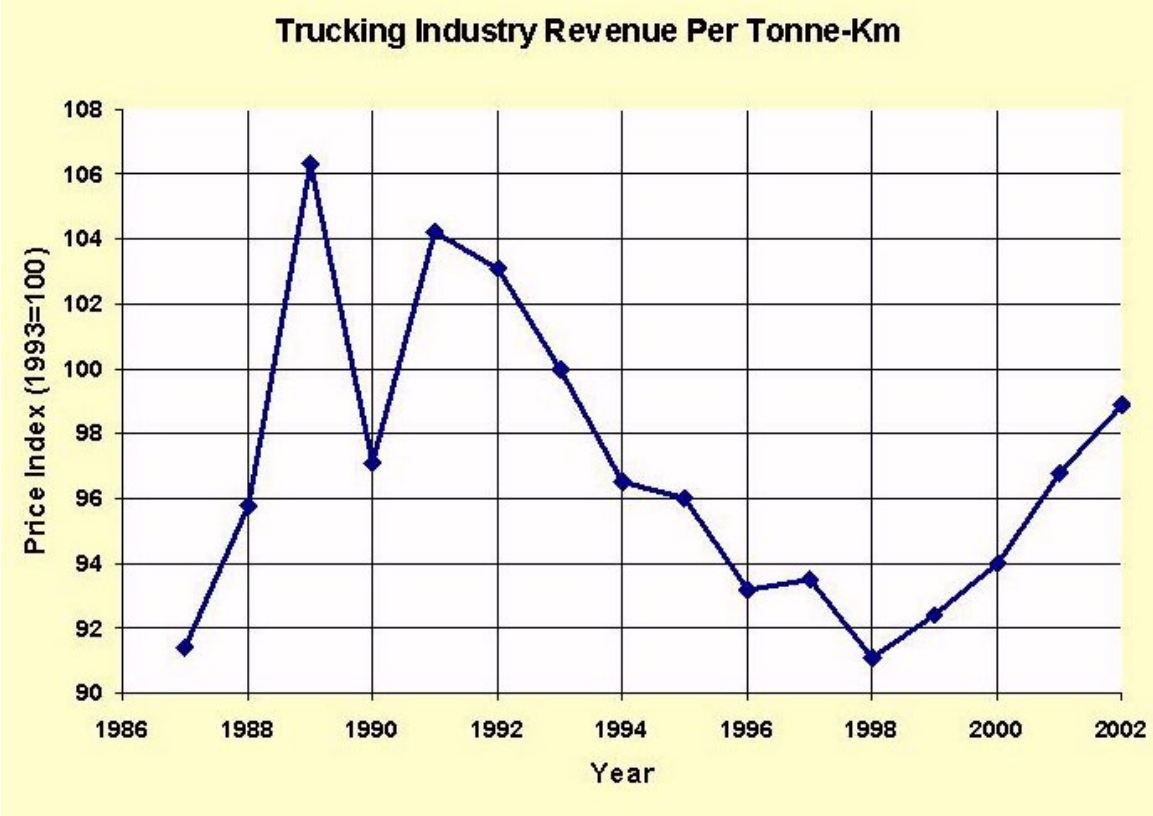


Beginning in the third quarter of 1999, diesel fuel prices for trucking businesses increased dramatically. This trend continued for most of the year 2000. The years 2001 and 2002 saw a partial reversal of this cost trend for the industry, although costs remained above the year 1999 average cost levels. The year 2003 saw fuel prices again escalate. This trend, in comparison to relative fuel price stability which preceded it, is illustrated in the graph above.

As a result of "seasonal volatility" in fuel prices that somewhat distorted our previous studies (both 1995 and 1996 saw "mid year" fuel prices at their lowest – and substantial variations during these years), since 1997 Trimac Consulting has used a blended average of the "quarterly" fuel price levels for all four quarters of the year. It is hoped that this methodology will "smooth" and remove any distortions from the study caused by arbitrarily using a "mid year" cost level for fuel.

These cost inputs and other relevant assumptions and trends are discussed in Chapter 3 of the final study report. As mentioned previously, later in Chapter 2, we will present information on the relative "cost share" for the various cost components identified in this discussion.

Trucking Price Comparison Trends



The foregoing indexed (to year 1993=100) revenue per tonne-km pricing trend was developed by Bulk Plus Logistics with the assistance of Transport Canada from Statistics Canada sources.

In comparison to the underlying case study trucking cost trends, presented previously, which reflect the cost to operate specific vehicles in specific jurisdictions, one notes that between 1988 and 1998 there was a significant general decline in revenues for the industry, when compared per unit of "output" as a cost per tonne-km charged for trucking services. This general trend has reversed somewhat since 1998, yet revenue levels for 2002 are still below year 1993 levels.

In order to sustain this pricing trend for trucking services, especially given the opposing cost trend for operating a vehicle (approximately 2.6% increase in cost, on a compound annual basis, or around 40% increase during the same negative / flat revenue situation), the following underlying factors have come in to play:

- There are reduced industry profit margins and internal rates of return on investment
- Trucking businesses have emphasized efforts to increase productivity through increasing average payloads per trip, reduced empty miles, and increased annual equipment utilization (operating hours and kilometers per vehicle, per year)

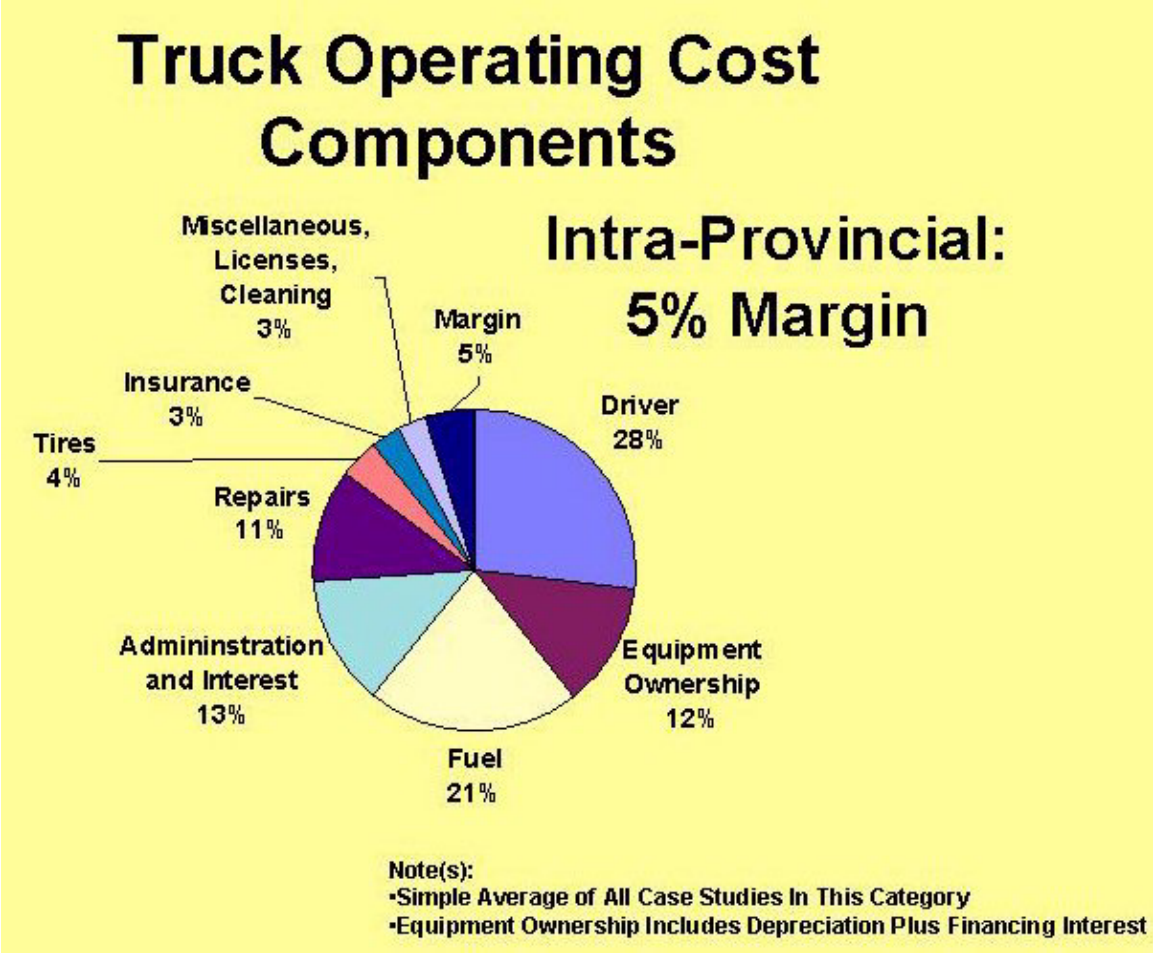
- The industry has deployed selective cost reducing strategies including greater maintenance cost efficiency and the 'averaging down' of driver wages (more entry level drivers in the mix, especially in the dry freight van and flat deck sectors).

In short, the productivity of the trucking sector has been shown to have increased substantially, when measured in aggregate, over the decade of the 1990's. These productivity gains are discussed in Transport Canada's annual publication of Transportation Trends – available from the Internet.

2.2 Component Cost Shares

The underlying comparisons of input component costs used in the report series, discussed in 2.1, should be reviewed in the context of how much each component represents as a relative "cost share" of total trucking costs. The following charts provide this information based on an "arithmetic average" of the respective case studies in each group. They illustrate the 5% operator profit scenario.

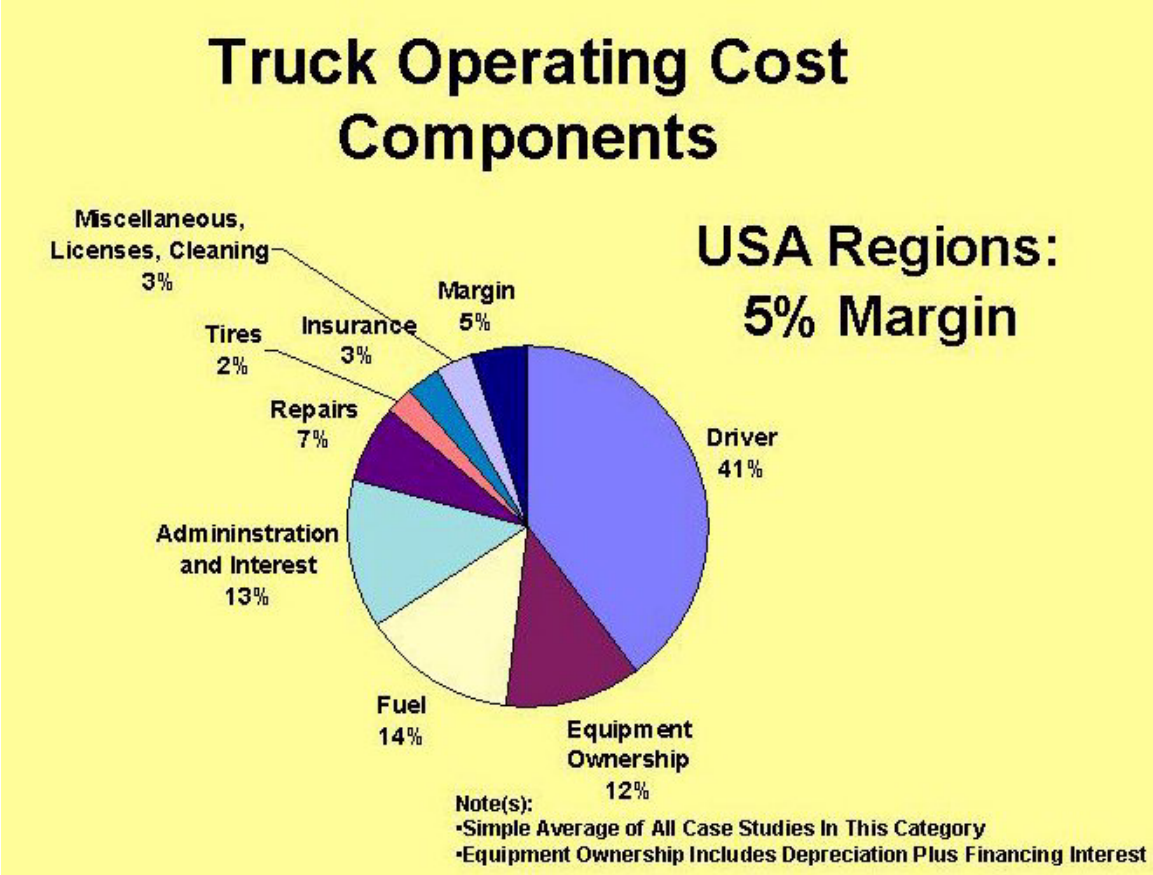
Canadian, "Intra Provincial" Regional Case Studies



Note, in the foregoing, that driver costs (at 28%) plus fuel costs (21%) are the two largest components of cost for the Canadian intra-provincial case studies. Equipment ownership (12%), administration and interest (13%) and tires & repairs (15%) are the next most important cost components. A further 11% of cost is made up of insurance (3%), miscellaneous / licenses / cleaning (3%) and operator margin (5%).

U.S. "Intra Regional" Case Studies

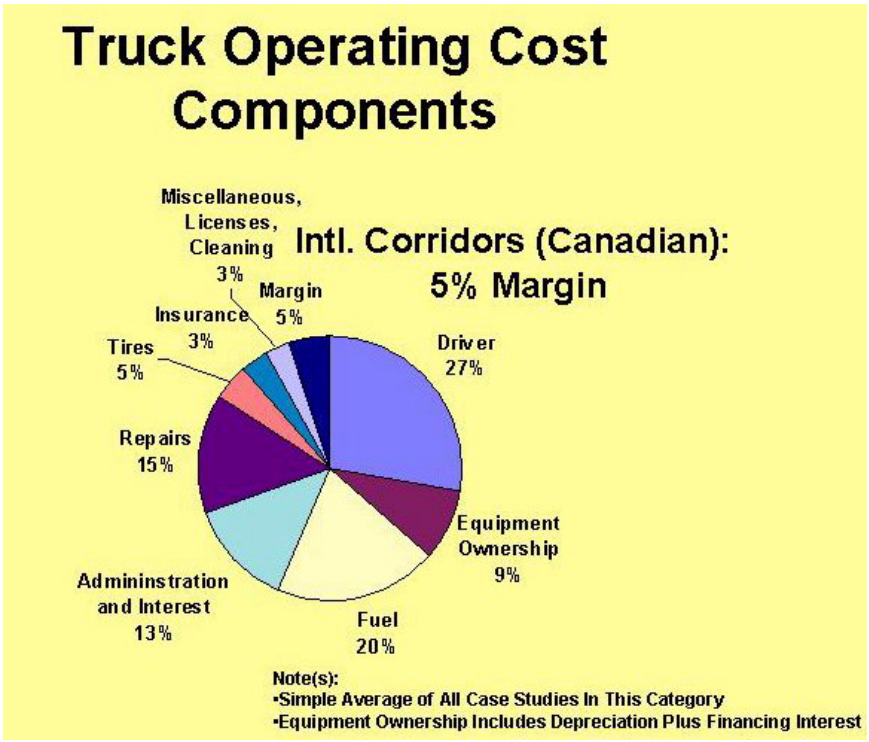
The following figure compares cost components, in a similar analysis, for the U.S. regional case studies.

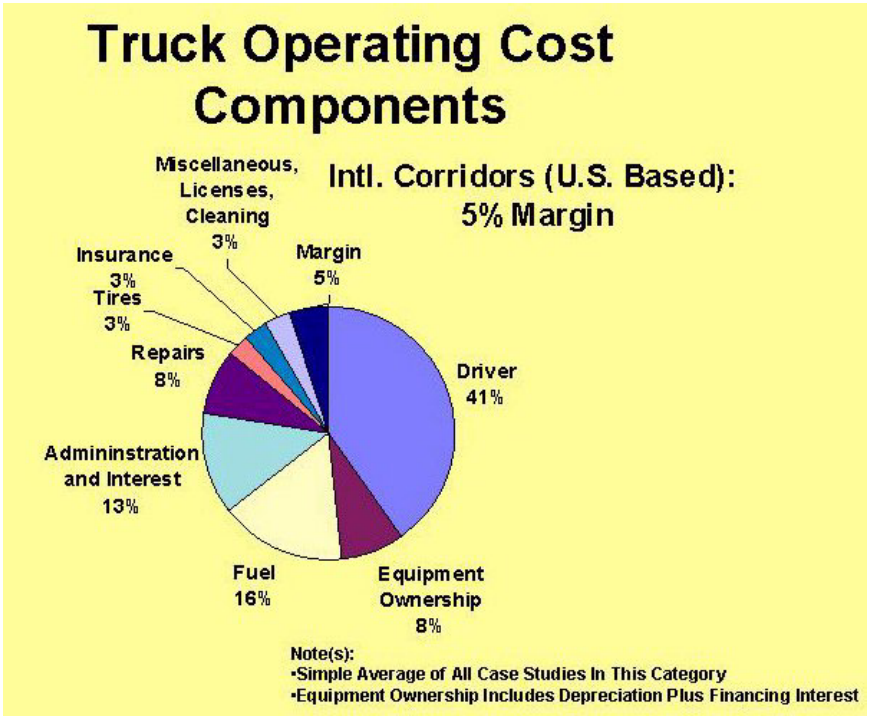


Generally, the "pattern" of component costs for U.S. regions tends to mirror the earlier Canadian proportions, with exception that the driver cost category (at 41%) is significantly more than for the Canadian case studies while fuel, at 14% of costs, is significantly less – as a cost category. U.S. repair costs and tire costs are respectively 6% and 2% of costs, in comparison to 11% and 4% for Canada, respectively. Some of this aggregate difference may represent component cost differences between the two countries, however a significant factor to consider, when comparing case studies is that the Canadian configurations reflect operation of larger (tridem semi trailer and super B-train doubles) configurations. Such configurations will tend to show a "scale economy" with respect to driver costs (this is a key element in the greater "efficiency" of these larger configurations) and they will consume more fuel per unit of distance traveled. The remainder of the cost categories are not significantly different between the Canadian and U.S. case studies, as a proportion of total costs.

International Corridor Cost Components

The following two pie charts compare the cost proportions observed for the international corridor cases, when operated by a Canadian operator and when operated by a U.S.A. operator.



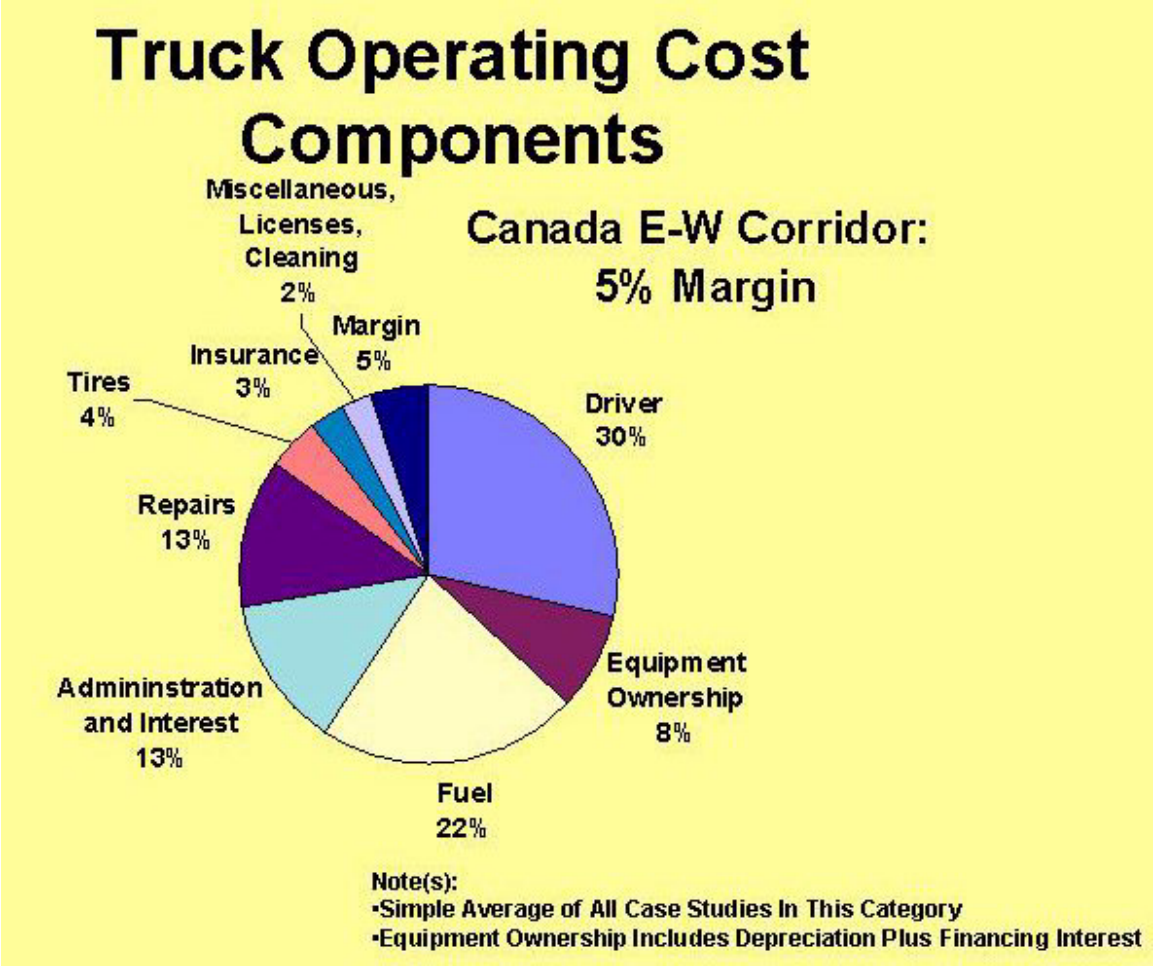


In comparing the two scenarios with each other, and with the previous "intra regional" cost proportions, we note that:

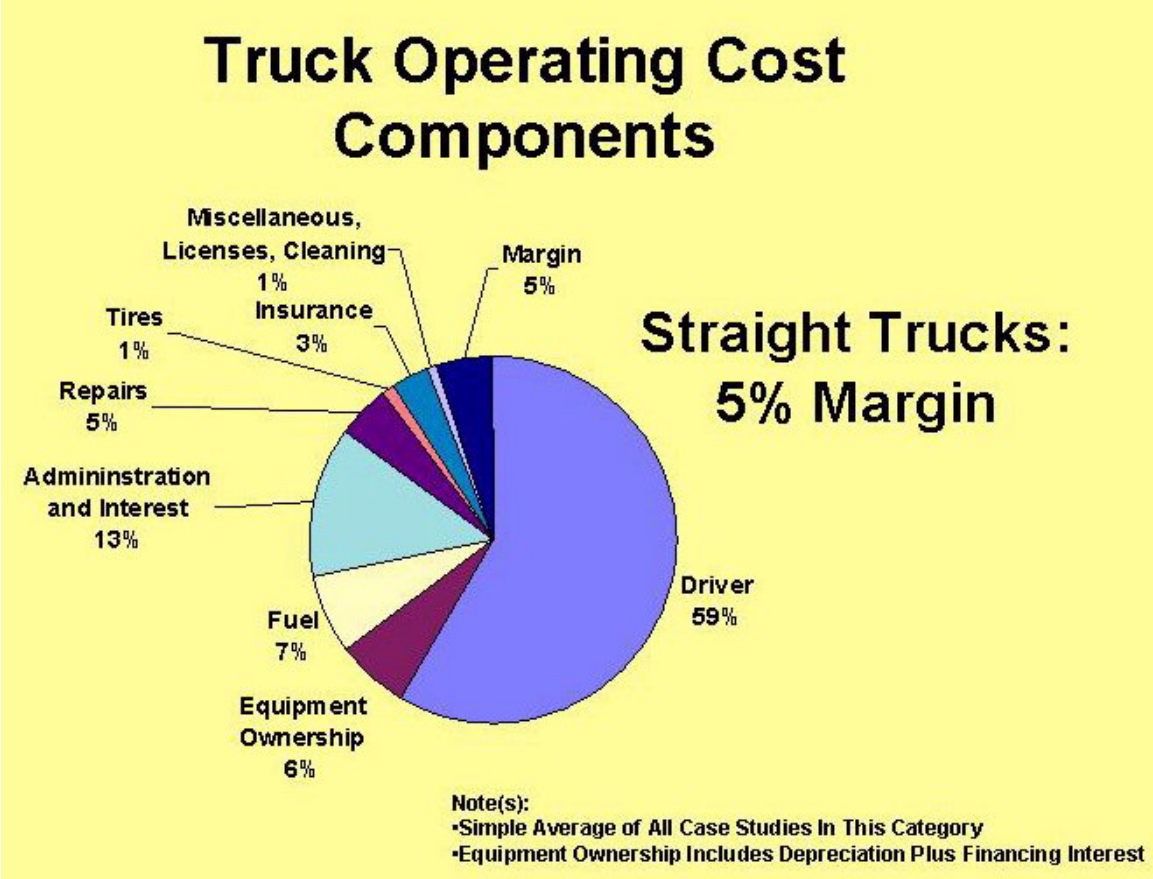
- On international corridors, driving costs, repairs and tires are larger components of cost for a Canadian operator than these are for a Canadian operator in the "intra provincial" regional case studies.
- For a Canadian operator, fuel is a reduced proportion of total cost compared to a "Canadian only" scenario (reflecting U.S. price levels for fuel, sourced en-route).
- In comparing the Canadian and U.S. based case studies, on the international corridors, generally the cost structure mirrors the earlier comparison for "intra regional" cases – that is the fact that US based operating cost scenarios show a significantly higher driver cost proportion than do the Canadian cases (41% versus 27%). At the same time, the USA based fuel costs, as a proportion of over-all costs are (only slightly) lower than for the Canadian based operator. In this case, the fuel costs on the corridors are identical for both operators – however the slightly lower Canadian cost base results in fuel representing a higher proportion of the total cost.
- Lastly, because these comparisons are for similar equipment configurations (semi trailer case studies), it appears that a significant element of driver cost difference, as a proportion of total costs, exists between the two countries. This is likely to be caused by a relatively high cost for driver "wage burden" expenses in the U.S., associated with the costs for providing healthcare and other benefits, as the base wage levels are not that different between the two countries. Finally, the erosion in relative value of the Canadian dollar, followed by a significant rise in 2003 (4.1% down in year 2001, 1.4% down in 2002, followed by an increase of 12% in 2003) has recently reduced U.S. costs generally, in comparison to Canadian levels.

Canada East-West Corridor Cases

Cost proportions shown in the following figure do not differ significantly from those cited earlier for intra-provincial regional Canadian case studies. The largest proportional difference (equipment ownership costs at 8% versus 12% for the intra-provincial cases) is explained by the longer average hauling distances for these case studies – contributing to a higher annual utilization for tractor-trailer equipment per year (more hours and kilometers operated by a truck). This factor reduces the proportional importance of equipment cost on a per hourly or per kilometer basis on these corridors.



Straight Trucks



As illustrated above, the urban straight truck case studies had a very high proportional driver wage cost (59%) as compared to the other linehaul case studies involving the larger tractor and trailer combinations. At the same time, operational factors such as repairs, tires and fuel consumption show smaller proportions than for the linehaul cases – again reflecting urban operating conditions. In essence, such vehicles spend a large proportion of their time parked, at terminals and at various customer premises, incurring a significant driver cost, yet consuming little in the form of “wear and tear” and fuel – as a proportion of their over-all total cost of operation.

3 METHODOLOGY AND INPUT DATA

3.1 General Approach

The approach used for developing motor carrier operational costs involved application of an activity based mathematical computer model to develop component and total cost estimates based upon realistic average productivity information and prevailing factor unit cost levels. This computer model permits the exploration of the impact of various operational conditions and data assumptions on costs. The computer model is a particular application of the BulkPlus Motor Carrier Fleet Systems Analysis that has been widely applied for truck operational costing and rate-making purposes. For developing factor inputs and productivities, five basic sources of information were consulted:

1) Quotations from suppliers of equipment, tires, fuel.

2) Consultation with experts concerning typical motor carrier operations within the respective jurisdictions.

3) Reference to various union agreements covering rates of pay, working conditions, benefits, bonuses, etc.

4) Consultations with various provincial regulatory agencies concerning vehicular restrictions, licence fees, fuel taxation, sales taxes, etc.

5) Review of published literature and Internet sources such as Statistics Canada, U.S. Department of Energy, Natural Resources Canada, and other data sources.

For U.S. Regions, unit costs for inputs were obtained in U.S. $. These were then converted to equivalent Canadian $ costs using the exchange rate of (1$ Cdn = 71.38 cents U.S.). This value was reported by the Bank of Canada to be the weighted average for all currency trading days for the year and is 12% higher than the weighted average value reported for year 2002 and used in the prior report edition.

3.2 Assumptions

This report's case studies are in terms of annual costs to operate a single vehicle, however the costs were developed assuming that the vehicle is part of a fleet. Cost components such as mechanic's labour and administration represent the typical proportion of same allocated to the one unit. The remainder of these costs are assumed to be allocated to the rest of the equipment in the fleet. This method allows the unit costs presented in this report to be accurately related to a complete truck fleet.

Since it is not feasible to analyze all commodities represented by "Dry Freight" and "Bulk" payload types, the report has grouped all shipments with bulk or dry freight characteristics into these two major categories. Averaged factors for density and load-unload times have been assumed to represent the wide range of commodity characteristics, and have been applied commonly to all cases to provide representative costs and an accurate mechanism for comparisons with previous reports in this series.

For this reason, however, the cost information developed herein may require adjustment for more specialized applications.

3.2.1 Terminalling Productivity Assumptions

In developing the direct effects of terminal (load-unload) productivity on costs, equipment wait time has been excluded from the analysis for the reason that the basic equipment utilization criteria, namely total kilometers traveled annually, implicitly contains this factor (see Section 3.2.2).

However, it must be recognized that the feasibility for an operator to realize a high number of kilometers annually is greatly diminished as the proportion of equipment time spent loading and unloading increases.

Terminal productivity does, however, directly influence driver wages and burden costs because whether the drivers are physically involved in commodity handling, they must be paid the representative hourly rate during the time involved for waiting to be loaded or unloaded.

The alternative (not analyzed) followed by some operators is to utilize "spare trailers", however this option has associated a trailer ownership cost and sometimes "shuttle truck service" costs to position or pick up pre-loaded trailers for the "line haul" trip portion.

Where applicable, a "wait time" hourly driver pay rate was applied for load/unload periods when the driver is not actively involved. In order to arrive at the load/unload time involved, average handling times are based on actual performances and have been uniformly applied to all cases in order that comparisons remain valid. This, of course, implies that adequate handling facilities and manpower are assumed to be in place, in all cases. These handling rates are based on the following performances that were in turn related to the payloads developed in the study.

Dry Freight in Combination Units (Assuming adequate handling resources)
One origin-destination per trip is assumed, which reduces the time required to handle one payload. Realistically, the rate of loading-unloading varies with consignment type. However, observation indicates that 4,500 kg per man-hour is representative of dry freight loading/unloading performance. Assuming an adequate availability of manpower, a handling time criteria of three hours for 27,270 kg has been applied to all applicable cases. That is, the driver will be on the job, but not driving, three hours for a 27,270 kg dry freight payload.

Bulk Commodities
A study of various bulk operations indicates that the following load/unload rates reflect a good average for bulk commodities: 40,900 kg in 1 hour and 15 minutes; 22,700 kg in 45 minutes; 9,100 kg in 15 minutes.

The above mentioned handling performances are used in the analysis to estimate the total time necessary during the operations to handle the commodities. During this time the driver is paid on an hourly rate basis. The same handling performances have been applied throughout.

We are also assuming that the only handling cost to the truck operator is the wages and burden he must pay to the driver on duty during loading and unloading. The handling facilities and manpower are considered not to be under the trucker's management, or if

so, that the costs for this operation are recovered against a “handling charge” and not included in the trucking cost.

Dry Freight in Van Straight Trucks
The time spent loading and unloading freight was assumed to be 1 man hour per 1600 kgs of consignment.

3.2.2 Operating Productivity Assumptions

Trip Distance
For the base case analyses in this report series, individual trip distances have been assumed and applied to the equipment. The combination units are assigned a round trip distance of 320 kilometers since they are assumed to be involved in predominantly "terminal-to-terminal" highway service. Urban two axle units are assigned a trip distance of 100 kms. Again, these common trip distances have been applied in all cases, to ensure significant comparisons.

In order to more fully explore the interdependence of unit costs with trip length, the foregoing trip distance assumptions were later relaxed. Sections 5 and 6 discuss longer haul trucking corridors in Canada and the U.S.

Annual Operating Distance
The basic equipment utilization criteria employed for this report is annual operating distance. This index is a convenient cost comparison in that it accurately reflects a number of inherent factors (such as seasonality, haul distance, traffic congestion, urban / inter-urban operation) and is also readily available from operators' statistical records.

Scenarios reflect:

- Low Annual Utilization (80,000 km per year, or 50,000 miles per year)
- Median Annual Utilization (160,000 km per year, or 100,000 miles per year)
- High Annual Utilization (240,000 km per year, or 150,000 miles per year)

In the case of the urban two axle trucks, the utility levels were 40,000 km; 80,000 km and 120,000 km annually.

In this context, some reviewers of the report series have questioned the achievability of the high annual distance utilization (240,000 km) -- particularly for general freight service involving intercity trips of 320 km round trip distance. Although situations involving this level of utilization are rare under such circumstances, this high utilization cost category has been retained in the study for the following reasons:

1) Bulk Plus's operations simulation model indicates that this utilization can be achieved in situations that involve "double shifted" vehicles for continuous operation round the clock -- excluding maintenance shut down, Sundays, and statutory holidays.

2) Some general freight operators report that this level of overall vehicle utilization is achieved, although it is usually not for such short round trip distances. Trip distance, however, is a variable for most operations (except perhaps fixed route/schedule situations) and most carriers allocate fixed costs on an average "per mile" or "per hour" basis to the total mileage produced by a "mix" of individual trip distances.

The presented costing situation, therefore, is usable for a carrier whose "mix" of long and short trips gives rise to 240,000 km per year, but who is hauling a particular 320 km round trip. On the other hand, if a carrier dedicated to the 320 km round trip is unable to achieve 240,000 km/year we suggest that one of the lower annual utilization cases is more appropriate. Also, for a carrier who achieves 240,000 km per year, but with a longer trip distance, Sections 5 and 6 describe the necessary adjustments.

For these reasons, together with a view to maintaining "comparability" with previous studies, the 240,000 km general freight case has been retained for use as a realistic upper limit on what may be achieved in a general freight operation. CAUTION MUST BE EXERCISED, HOWEVER, IN ATTEMPTING TO APPLY THESE COSTS TO SITUATIONS WHERE HOURS OF OPERATION, TERMINAL QUEUING, OR OTHER FACTORS MITIGATE AGAINST ACHIEVEMENT OF SUCH A HIGH LEVEL OF VEHICLE UTILIZATION.

For longer distance corridors (see Sections 5 and 6), annual kilometer utilizations have been increased, reflecting available hours and the use of long distance sleeper team operations.

Route Characteristics

In prior report editions, the cost analyses distinguished between vehicles operating over paved highways and those that travel on predominantly non-paved, gravel roads. Because of a general improvement in route infrastructure, the “gravel” cases have now been discontinued, although impacts of gravel road operations on costs are discussed in section 4.2. The principal effect that gravel road conditions have on equipment operating expense is to reduce possible speeds and to increase unit vehicle maintenance and tire costs.

General Operating Conditions

Development of unit cost data involves analyzing the effect of the diverse conditions and performances on trucking operations. This effect is evaluated in terms of the various fixed and variable cost functions, in order to obtain an accurate gauge of cost-operation relationships.

This method of cost evaluation is fairly standard. Accuracy is dependent upon the extent and reliability of available information relating to actual trucking operations. The cost data presented here is founded upon information acquired from operators of equipment identical to vehicles discussed in this report, and operating under similar conditions. This data is augmented by information obtained from the various suppliers of equipment, lubricants, and fuel and the results are correlated to develop accurate cost estimates.

The combination units will be involved in mainly highway service, except for that urban access required for load/unload facilities.

For each region, the predominant type of weather, terrain, and traffic congestion will affect equipment performance, and the costs reflect this effect. Effects of predominantly winter operation on costs are explored in Section 4.2.

Vehicle performance (fuel consumption, average speed) is related to payload weight, vehicle size and configuration, and terrain characteristics. These factors are considered when developing the equipment output. The effect on unit costs of payload variations are included in the long haul trucking section 5.1 (where loaded mile percentage increases).

For the base case analysis, all hauls are evaluated as forehauls only. Backhauls have not been assumed, and the costs represent one payload per round-trip. This is generally typical for intra-regional distribution operations involving a 320 km (200 mile) round-trip.

Before developing operating costs, it is necessary to determine the hours of operation and the tonnages moved since they affect costs, especially driver wages. Hours and weights were developed from the established annual distance, the assigned round-trip distances and the payload characteristics.

Average payload size was determined by applying the general density characteristics of the commodity type to the gross vehicle weight.

Establishment of tonnage and hourly performance provides further identity to the hauls and allows development of expected total costs.

3.2.3 Assumptions for Analytical Convenience

In addition to the operational and terminalling productivities that were assumed for the base case analysis, a number of generalizations were made in order to facilitate analytical convenience by reducing the number of permutations requiring examination.

Care must consequently be exercised, however, in applying the base case for specialized operations that deviate from these generalizations.

These base case generalizations include:

1) The major population centres of each region were assumed as the base of operation. Hence, cost factors reflect the local market in these vicinities as tabulated:

Region	**Local Market(s)**
British Columbia	Vancouver
Alberta	Calgary, Edmonton
Saskatchewan	Regina, Saskatoon
Manitoba	Winnipeg
Ontario	Toronto
Quebec	Montreal
New Brunswick	Moncton, Fredericton
Nova Scotia	Halifax
Prince Edward Island	Charlottetown
Newfoundland	St Johns
Northwest Territories	Yellowknife, Hay River
Yukon	Whitehorse
U.S. Great Lakes Region	Chicago, Detroit
U.S. North East Region	New York, Philadelphia, Boston
U.S. Midwest Region	St Louis, Kansas City
U.S. South Region	New Orleans, Houston, Mobile
U.S. West Region	Los Angeles, San Francisco, Denver, Portland

2) All highway units were assumed to be non-sleeper units (relaxed in Section 5.2).

3) All bulk trailers were assumed to be aluminum.

4) All dry freight trailers are assumed to be insulated, but non-refrigerated, vans or flatdecks.

5) For purposes of assessing equipment performance and maintenance cost levels, the equipment in the study is considered representative of the average vehicle in an actual fleet. The tractors are designated as being three years old, and the trailers five years old. Therefore, the performance factors reflect this equipment, not new or old units.

6) In respect of vehicle write off costs, depreciation was related to new 2003 replacement costs, rather than to the depreciated "book value" of used equipment. Also, for this calculation, residual life of "new" equipment was used as opposed to the shorter residual life for used equipment.

3.3 Vehicle Specifications

As noted previously, suppliers were consulted concerning typical purchasing specifications being used by the trucking industry and cost levels for equipment configurations cited in Figure 1. As a result of these consultations, the following

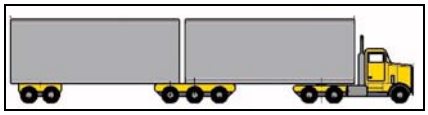
(somewhat generic) power unit and trailer specifications were devised and used for capital cost estimating purposes.

Care must be exercised, therefore, when comparing with cost levels in prior report editions, to recognize that purchasing variations occur. For example, in the 1994 report, air ride suspensions were introduced for trailer configurations, where previous editions reflected spring suspensions. This reflects an evolution that has taken place in the preferred purchasing habits of most fleet managers.

Note that all power units were costed in the regional base cases on the assumption that the standard base case hauling configuration did not require a sleeper unit (average round trip distance of 200 miles, or 320 km). Additional costs and weight for the sleeper configuration were then developed and applied to the (later) lease operator and longer distance hauling evaluations.

	TRACTOR FOR A FIVE AXLE SEMI CONFIGURATION: Conventional configuration, Caterpillar 350 engine, 13 Speed Transmission, 40,000 lbs rear end, air ride suspension, 11R24.5 tires, 209" wheel base, 12,000 lbs front axle, GVW approximately 80,000 lbs, Canada 87,100 lbs. Tractor Tare Weight: 7620 kg
	TRACTOR FOR A SIX AXLE SEMI CONFIGURATION: Conventional configuration, Detroit Series 60 Engine, 430 HP, 18 Speed Transmission, 46,000 lbs rear axle, air ride suspension, 12,000 lbs front axle, 195" to 210" wheel base, 11R24.5 tires, 4.56 gear ratio, GVW approx 100,000 lbs. Tractor Tare Weight: 7938 kg
	TRACTOR FOR AN EIGHT AXLE SUPER B TRAIN CONFIGURATION: Conventional configuration, Caterpillar Series Engine, 455 HP, 18 speed transmission, 46,000 lbs rear axle, air ride suspension, 12,000 lbs front axle, 209" wheel base, 11R24.5 tires, 4.56 gear ratio, GVW approx. 140,000 lbs. Tractor Tare Weight: 7938 kg

	FIVE AXLE SEMI VAN CONFIGURATION: Interior post insulated van, 1 1/8" - 1 ½" insulation, double doors at rear with 5 hinges per door, anti - rack door locks, vents front and back, air ride suspension, steel disk wheels, hardwood floors, undercoated, rear gear black finish, aluminum panels, prefinished white, 2 rows of cargo E-track. Trailer Tare Weight: 6,418 kg
	FIVE AXLE SEMI FLAT DECK CONFIGURATION: Outside rail construction with stake pockets and rub rail, load winches at 3'-0" centres, air suspension, steel disc wheels, hardwood floor, 1 color epoxy finish. Trailer Tare Weight: 5,897 kg
	FIVE AXLE BULK LIQUID TANKER (MC307) 6000 Imperial gallons, type 316L Stainless Steel 2 B finish, bright annealed jacketing, 5" insulation compressed to 4", dimple style hot wall, 20" manway, fort vale super vent, 1" pressurization package, 2 x 20' - 0" S.S. hose trays, spring suspension, steel disk wheels, 1 color epoxy finish, walkaround spilldam, curbside ladders, stainless steel fenders, aluminum catwalk, single compartment. Trailer Tare Weight: 5,942 kg
	FIVE AXLE BULK DRY TANKER CONFIGURATION: Aluminum dry bulk, solimar aerators (3 per hopper), 4" hot air discharge line, 6" discharge valves, 3" top air line, 20" fill covers, hot air hose (4") spring air suspension combination, steel disk wheels, 2 x 20'-0" hose trays, 2200 cu ft, radial tires. Trailer Tare Weight: 9,616 kg
	SIX AXLE TRIAXLE VAN SPECIFICATION: Interior post insulated van, 1 1/8" - 1 ½" insulation, double doors at rear with 5 hinges per door, anti-rack door locks, vents front and back, air suspension, steel disk wheels, hardwood floors, undercoated, rear gear black finish, aluminum panels prefinished white, 2 rows cargo E-track. Trailer Tare Weight: 8006 kg
	SIX AXLE TRIAXLE FLAT DECK SPECIFICATION: Outside rail construction with stake pockets and rub rail, load winches at 3' 0" centres, air suspension, steel disk wheels, hardwood floor, 1 color epoxy finish. Trailer Tare Weight: 6804 kg

	EIGHT AXLE SUPER B VAN SPECIFICATION: Interior post insulated van, 1 1/8" - 1 ½" insulation, double doors at rear with 5 hinges per door, anti - rack door locks, vents front and back, air suspension, steel disk wheels, hardwood Floors, undercoated, rear gear black finish, aluminum panels prefinished white, 2 rows cargo E-track. Trailer Tare Weight: 12,247 kg
	EIGHT AXLE SUPER B FLAT DECK SPECIFICATION: Outside rail construction with stake pockets and rub rail, load winches at 3' 0" centres, air suspension, steel disc wheels, hardwood floor, 1 color epoxy finish. Trailer Tare Weight: 8845 kg
	EIGHT AXLE SUPER B LIQUID TANK (MC 306) SPECIFICATION: Aluminum petroleum RTAC B-train, 4 compartment, double bulkheads, 20" fill covers, 4" air internal valves, 4" openable bottemload adapters, 63,500 liter capacity, four 20'-0" hose trays, prepared for vapour recovery, optic overfill sensors, 36"x30"x28" fitting box (aluminum). Trailer Tare Weight: 10659 kg
	EIGHT AXLE SUPER B DRY BULK SPECIFICATION: Aluminum dry bulk, solimar aerators (3 per hopper), 4" hot air/discharge line, 8" discharge valves, 2" top air line, 20" fill covers, hot air hose (4"), spring suspension, steel disc wheels, 2 x 20'-0" hose trays, radial tires. Trailer Tare Weight: 9980 kg
	TWO AXLE STRAIGHT TRUCK (VAN) SPECIFICATION: 2 Axle Diesel Powered Straight Truck Cab and Chassis, 24 Foot Insulated Van Box No Reefer, Rear Doors, GVW approx. 14,600 kg

3.4 Costs

Once the characteristics of each operating case are defined, the costs are developed as related factors. This section describes briefly the separate cost factors that were used to develop operating costs. Current labor costs, fuel costs, equipment purchase costs, allowable gross vehicle weight, and license fees are the dominant factors on total operating costs and are responsible for the major portion of regional costs variation.

3.4.1 Driver Costs

These costs were obtained by applying the driver wage rates prevalent in the region to the operating cases. Hourly and distance rates were obtained from reference to collective bargaining agreements and discussions with fleet managers. The wage rates used reflect Bulk Plus's best estimate of the average driver wage scale applicable to the area. Note that we also made reference to Statistics Canada regional transportation wage statistics and various Internet sources including statistics from the U.S. Department of Labor, Teamsters Wage Rates, County and State Wage Survey Statistics, and various carrier / driver pool websites that publish wage scales for highway truck drivers.

These estimated wage scales follow:

	REPRESENTATIVE DRIVER WAGES ACROSS CANADA (mid 2003)											
	BULK COMMODITY						GENERAL COMMODITY					
	5-Axle Vehicles per hr $	5-Axle Vehicles per km cents	6-Axle Vehicles per hr $	6-Axle Vehicles per km cents	7/8-Axle Vehicles per hr $	7/8-Axle Vehicles per km cents	5-Axle Vehicles per hr $	5-Axle Vehicles per km cents	6-Axle Vehicles per hr $	6-Axle Vehicles per km cents	7/8-Axle Vehicles per hr $	7/8-Axle Vehicles per km cents
British Colu	$17.43	24.89	$17.94	25.21	$19.48	27.15	$19.17	27.38	$19.73	27.73	$21.42	29.87
Alberta	$14.86	20.69	$14.86	21.01	$15.63	22.63	$16.35	22.76	$16.35	23.11	$17.19	24.89
Saskatchev	$14.28	20.27	$14.28	20.59	$14.79	21.87	$15.71	22.29	$15.71	22.65	$16.27	24.06
Manitoba	$13.77	20.27	$14.03	20.59	$14.28	21.87	$15.15	22.29	$15.43	22.65	$15.71	24.06
Ontario	$16.32	22.03	$16.32	23.32	$17.34	24.61	$17.95	24.23	$17.95	25.65	$19.07	27.07
Quebec	$15.81	22.02	$15.81	22.35	$16.83	23.97	$17.39	24.23	$17.39	24.58	$18.51	26.36
New Bruns	$13.52	18.19	$13.52	18.52	$13.52	18.52	$14.87	20.01	$14.87	20.37	$14.87	20.37
Nova Scoti	$13.52	18.19	$13.52	18.52	$13.52	18.52	$14.87	20.01	$14.87	20.37	$14.87	20.37
P.E.I.	$12.75	17.54	$12.75	17.87	$12.75	17.87	$14.03	19.30	$14.03	19.65	$14.03	19.65
Newfoundla	$13.26	18.52	$13.26	18.84	$13.26	18.84	$14.59	20.37	$14.59	20.72	$14.59	20.72
Yukon	$16.83	23.16	$17.34	23.48	$18.87	24.45	$18.51	25.48	$19.07	25.83	$20.76	26.89
N.W.T.	$14.79	21.55	$14.79	21.87	$15.56	23.16	$16.27	23.71	$16.27	24.06	$17.11	25.48

U.S. DRIVER WAGES FOR FIVE-AXLE SEMI CONFIGURATION (mid 2002) in CANADIAN $ AT $1.00 CDN = $0.7138 $ U.S.				
	BULK COMMODITY		GENERAL FREIGHT	
	5-Axle Vehicles per hr $	5-Axle Vehicles per km cents	5-Axle Vehicles per hr $	5-Axle Vehicles per km cents
U.S. North East (NY,NJ, Mass)	$25.08	32.10	$27.59	35.31
U.S. Great Lakes (Ill,Mich)	$25.08	32.10	$27.59	35.31
U.S. Midwest (Nebr,Kans,Okl)	$23.65	31.19	$26.01	34.31
U.S. South (Ark, Alab, Geo)	$22.21	30.74	$24.44	33.81
U.S. West. (Wash, Oreg, Calif)	$23.65	32.10	$26.01	35.31

Driver costs are influenced by distance, hours and tonnage associated with a haul. Larger highway vehicles are costed on the basis of calculating driver wages on either a per-kilometer rate, or an hourly rate -- whichever is highest. This is standard procedure and results in most cases in pavement kilometers being rated on a distance basis and gravel kilometers paid on an hourly basis, due to the slower vehicle speed over non-surfaced roads. The straight trucks were costed on an hourly pay basis.

Besides the wages accruing from the driving activity, the cost of driver salary resulting from loading and unloading of payloads must be included.

The wage burden has been calculated as a percent of actual wages. These burden percents were developed from observations of the records of actual truck operations.

3.4.2 Fuel Costs

Fuel costs are a result of the influence of distance traveled, vehicle fuel consumption, and of course fuel prices. A study was made of the different classifications of units in the various areas to obtain a realistic fuel consumption rate for each. For the urban conditions, the major city in each area was assumed for the study, causing a consideration of the stopping and starting required, affecting the average rate of fuel consumption.

A survey was undertaken for each quarter of 2003 wholesale fuel prices in the most heavily populated areas of each province. The quarterly prices were then averaged for the year. These costs include provincial tax. Note that the prices used are not "pump prices". The prices assume a trucker purchasing in bulk from the oil company and receiving a normal discount on the F.O.B. commercial tank wagon (plus tax) price.

Price levels used were as follows:

ESTIMATED TRUCKER FUEL COSTS BY PROVINCE (avg 2003)

	Diesel			
	Est. Purchase cents/litre (with fuel taxes)	Tank Wagon cents/litre (without fuel taxes)	Provincial Fuel Tax cents/litre	Federal Fuel Tax cents/litre
British Columbia	72.1	52.6	11.5	4
Alberta	66.9	53.9	9.0	4
Saskatchewan	70.1	51.1	15.0	4
Manitoba	68.3	53.4	10.9	4
Ontario	67.9	49.6	14.3	4
Quebec	71.5	51.3	16.2	4
New Brunswick	77.8	60.1	13.7	4
Nova Scotia	74.8	55.4	15.4	4
P.E.I.	75.9	58.4	13.5	4
Newfoundland	80.1	59.6	16.5	4
Yukon	83.1	71.9	7.2	4
N.W.T.	84.1	71.2	8.9	4

U.S. Cost Information based on U.S. DEPT OF ENERGY REPORTS

	Diesel Purchase $ CDN/ U.S. GALLON	Equivalent CDN cents/litre
U.S. NorthEast (basis NY)	2.144	56.6
U.S. Great Lakes (Michigan)	2.087	55.1
U.S. Midwest (Nebraska)	2.087	55.1
U.S. Southern (Texas)	2.031	53.7
U.S. Western (Calif,Colo)	2.256	59.6

3.4.3 Repair Costs

The repair costs shown represent the expected costs of parts, lubricants, oil, and labour associated with the maintenance and repair of the particular equipment type. As mentioned previously, the labor component includes only the portion of labor time spent working on the one particular unit. Besides the normal maintenance and repair work that is expected to be required, the analysis has assumed that a preventive maintenance program is being followed in every case. The cost of preventive maintenance on the piece of equipment is included in the total repair costs. Escalation of parts costs, which represent approximately 50% of repair costs in a normal fleet, were also reviewed and compared to Statistics Canada Industrial Price Indices.

3.4.4 Cleaning Costs

The cost of cleaning tractors, flatdeck trailers and van freight trailers has minimal effect on total operating costs.

Annual costs of cleaning bulk tanks vary with the type of commodity carried and the quantity of different bulk commodities transported during the year. An average of tank trailer cleaning costs was developed from a survey of various bulk tank truck carriers.

3.4.5 Transport Costs

The transport cost category is a miscellaneous category to reflect all those factors that may be attributed to extra equipment that are not normally viewed as part of a vehicle's standard configuration. This may represent special pumps, hoses, safety equipment, dunnage, small tools, chains, tarping, heaters* or refrigeration* equipment. These costs will vary with area of operation and also with the specific type of product hauled.

*Note: Starred items are not included for this analysis, but such items would normally be included in the category “transport costs”, when evaluating these specialized trucking applications.

In the case of bulk equipment, transport costs shown are based on the average costs obtained from a survey of bulk operations in each region. Thus, to a certain degree, the costs reflect the characteristics of the bulk commodities predominantly hauled in each particular region. For example, certain liquid products require more expensive pumps and hoses than do others and pump maintenance costs are generally higher for heavier liquids. Dry bulk pneumatic applications include operation and maintenance costs for blowers mounted on the tractor unit.

3.4.6 Tire Costs

To obtain a realistic tire cost for the various types of units in the different areas of operation, the following items were considered:

a) Cost of new tires in each area for the particular vehicle.

b) Life of tire in each area, considering road surface conditions.

c) Cost of retreading, when retreading is desirable, and life of a retread tire for each area.

d) The actual tire cost for large trucking companies in each area.

Investigation of the above information has provided a realistic cost basis for tires, that compares favorably to the tire costs of actual operations. Note that reference was also made to Statistics Canada Industrial Price Indices and the prior year's database for the study – as a cross check on pricing validity.

3.4.7 Depreciation Costs

"Normal" depreciation is used based on the 2003 equipment purchase cost obtained from dealer quotations. That is, one percent a month for trailers over a trailer life of eight years and 79.2 percent for tractors over a tractor life of five years. This assumption relates equipment write-off to current replacement cost rather than an arbitrary "book value" determination.

3.4.7.1 Purchase Costs For Typical Vehicles

For purposes of clarity, the vehicles specified in 3.2.4 were costed and the cost plus Provincial Sales Taxes, where applicable, and transportation charges are tabulated as follows:

Purchase Cost of Power Units (mid 2003)

	Tractor For Five Axle Semi Combination	Tractor For Six Axle (triaxle) Semi Combination	Tractor For Eight Axle Semi Combination	Straight Truck Two Axle Dry Freight Van
B.C.	$112,459	$121,272	$128,012	$82,689
Alberta	$105,168	$113,404	$119,703	$77,279
Saskatchewan	$111,418	$120,148	$126,825	$82,689
Manitoba	$112,459	$121,272	$128,012	$82,689
Ontario	$113,501	$122,396	$129,199	$85,621
Quebec	$112,980	$121,834	$128,605	$85,621
New Brunswick	$105,168	$113,404	$119,703	$77,279
Nova Scotia	$105,168	$113,404	$119,703	$77,279
P.E.I.	$115,584	$124,644	$131,573	$85,007
Nfld	$105,168	$113,404	$119,703	$77,279
Y.T.	$105,168	$113,404	$119,703	$77,279
NWT	$105,168	$113,404	$119,703	$77,279
U.S. North East	$128,409	$133,809	$138,438	$86,253
U.S. Great Lakes	$125,227	$130,492	$134,888	$86,253
U.S. Midwest	$125,227	$126,999	$134,736	$86,253
U.S. South	$122,045	$127,175	$131,572	$86,253
U.S. West	$127,136	$132,482	$137,065	$86,253

Footnote: Add $5000 for Sleeper

Purchase Costs For Trailers (mid 2003)

	Trailer For Five Axle Combination Semi Van	Trailer For Five Axle Combination Flat Deck	Trailer For Five Axle Combination Bulk Liquid Tanker	Trailer For Five Axle Combination Bulk Dry Tanker	Trailer For Six Axle Combination Triaxle Van
B.C.	$32,742	$28,922	$84,802	$107,616	$40,382
Alberta	$30,600	$27,030	$79,254	$99,700	$37,740
Saskatchewan	$32,436	$28,652	$84,009	$105,636	$40,004
Manitoba	$32,742	$28,922	$84,802	$106,626	$40,382
Ontario	$33,048	$29,192	$85,594	$108,955	$40,759
Quebec	$32,895	$29,057	$85,198	$108,461	$40,571
New Brunswick	$30,600	$27,030	$79,254	$101,040	$37,740
Nova Scotia	$30,600	$27,030	$79,254	$101,040	$37,740
P.E.I.	$33,660	$29,733	$87,179	$110,934	$41,514
Nfld	$30,600	$27,030	$79,254	$101,040	$37,740
Y.T.	$30,600	$27,030	$79,254	$100,690	$37,740
NWT	$30,600	$27,030	$79,254	$100,690	$37,740
U.S. North East	$30,000	$26,000	$82,000	$109,000	$37,000
U.S. Great Lakes	$30,000	$26,000	$82,000	$109,000	$37,000
U.S. Midwest	$30,000	$26,000	$82,000	$109,000	$37,000
U.S. South	$30,000	$26,000	$82,000	$109,000	$37,000
U.S. West	$30,000	$26,000	$82,000	$109,000	$37,000

	Trailer For Six Axle Combination Triaxle Flat Deck	Trailer For Eight Axle B Train Van	Trailer For Eight Axle B Train Flat Deck	Trailer For Eight Axle B Train Bulk Liquid Tanker	Trailer For Eight Axle B Train Bulk Dry Tanker
B.C.	$35,361	$72,407	$50,095	$199,543	$191,140
Alberta	$33,048	$67,670	$46,818	$186,620	$178,766
Saskatchewan	$35,031	$71,730	$49,627	$197,697	$189,372
Manitoba	$35,361	$72,407	$50,095	$199,543	$191,140
Ontario	$35,692	$73,084	$50,563	$201,390	$192,907
Quebec	$35,527	$72,745	$50,329	$200,467	$192,023
New Brunswick	$33,048	$67,670	$46,818	$186,620	$178,766
Nova Scotia	$33,048	$67,670	$46,818	$186,620	$178,766
P.E.I.	$36,353	$74,437	$51,500	$205,082	$196,443
Nfld	$33,048	$67,670	$46,818	$186,620	$178,766
Y.T.	$33,048	$67,670	$46,818	$186,620	$178,766
NWT	$33,048	$67,670	$46,818	$186,620	$178,766
U.S. North East	$32,000	$66,000	$46,000	$194,000	$183,000
U.S. Great Lakes	$32,000	$66,000	$46,000	$194,000	$183,000
U.S. Midwest	$32,000	$66,000	$46,000	$194,000	$183,000
U.S. South	$32,000	$66,000	$46,000	$194,000	$183,000
U.S. West	$32,000	$66,000	$46,000	$194,000	$183,000

Note that GST has not been added to the purchase costs for vehicles as any GST amounts paid by the fleet operators are claimed as credits. The cost evaluations in this report are all "pre-GST" which is a "bottom line" factor to be added, when estimating the amount of trucking cost that might be billed to shippers. Costs reported for USA regions reflect estimated local purchase costs in U.S.A. currency converted to Canadian equivalent costs at the prevailing exchange rate. Note that the present costs for equipment do not appear to vary significantly among USA regions.

3.4.8 Licences Costs

These costs reflect the provincial or territorial charge for licencing the alternate configurations of tractors and trailers. Charges are assumed based on an "intra" regional operation and consequently do not reflect any reciprocal fee arrangements that affect operations of "inter" regional operators when operating within each jurisdiction.

In 1988, new regulations were introduced to achieve uniformity in provincial weights and dimensions in Canada.

The maximum allowable gross vehicle weights recommended by RTAC (Road and Transportation Association of Canada) are as follows: Tractor Semitrailer 46,500 kg; A Train Double 53,500 kg; B Train Double 62,500 kg; C Train Double 53,500 kg.

For the added (in 1993) U.S. Regions, it was decided to evaluate costs for a Tractor Semitrailer configuration using the accepted interstate highway standard of 80,000 lbs (36,364 kg) gross vehicle weight.

Two axle tractors were assumed licensed at 14,600 kg in all jurisdictions.

License fee schedule that was used follows on the next page.

VEHICLE LICENSING FEES AND WEIGHTS (2003)

	GVW/GCW (kgs)	No. of Axles	($) Annual Fee for Power Unit	($) Annual Fee for Trailer
British Columbia	39,500	5	2229	30
	46,500	6	2799	30
	63,500	8	3905	60
	14,600	2	678	
Alberta	39,500	5	1809	20
	46,500	6	2377	20
	62,500	8	3314	40
	14,600	2	426	
Saskatchewan	39,500	5	2378	32
	46,500	6	2495	32
	62,500	8	4041	64
	14,600	2	672	
Manitoba	39,500	5	2236	$10 / 5 yrs
	46,500	6	2780	$10 / 5 yrs
	62,500	8	4048	$20 / 5 yrs
	14,600	2	534	
Ontario	45,000	5	1869	$35 / Life
	54,000	6	2280	$35 / Life
	63,500	8	2722	$70 / Life
	14,600	2	592	
Quebec	45,500	5	2162	42
	55,500	6	2961	42
	59,000	8	2961	84
	14,600	2	696	
New Brunswick	41,500	5	2039	16
	49,500	6	2413	16
	62,500	8	2980	32
	14,600	2	766	
Nova Scotia	40,500	5	1435	35
	53,000	6	1715	35
	58,500	8	2205	70
	14,600	2	560	
P.E.I.	40,600	5	1558	$65 / 5 yrs
	49,700	6	1884	$65 / 5 yrs
	62,500	8	2655	$130 / 5 yrs
	14,600	2	564	
Newfoundland	40,500	5	1898	25
	49,500	6	2325	25
	62,500	8	2940	50
	14,600	2	715	
Yukon Territory	43,800	5	1128	$1 / month
	53,300	6	1428	$1 / month
	63,500	8	1728	$2 / month
	14,600	2	276	
N.W.T.	39,500	5	1135	20
	46,500	6	1338	20
	63,500	8	1831	40
	14,600	2	410	

Table of License Fees, Continued

CDN EQUIV. Dollar Registration Fees For Maximum GVW
80,000 lbs on 5 Axle Semi Trailer - *

VEHICLE LICENSING FEES AND WEIGHTS (2003)

	GVW/GCW (kgs)	No. of Axles	($) Annual Fee for Power Unit	($) Annual Fee for Trailer
U.S. North East				
basis NY	36,287	5	$7,843 $0.0585/laden mi $0.015/empty mi	$28
	15,500	2	$812	
U.S. Great Lakes States				
basis Mich.	36,287	5	$3,096	$55
	15,500	2	$1,042	
U.S. Midwest				
basis Nebr.	36,287	5	$2,564	$8
	15,500	2	$762	
U.S. Southern				
basis Ark.	36,287	5	$2,662	$28
	15,500	2	$402	
U.S. Western Rocky Mtn.				
basis Wash.	36,287	5	$3,211	$50
	15,500	2	$485	

* Note: Values shown are in CDN EQUIVALENT $ and include U.S. Federal Heavy Vehicle Use Tax of $550 (U.S.) per year (resident)

3.4.9 Administration, Interest, and Insurance Costs

Administration and interest on working capital costs have been set at 12.5% of revenue and insurance costs have been set at 3% of revenue -- which seems to be the average of most operations.

Interest costs associated with financing equipment purchase reflect an assumed borrowing cost of 5.5%, loan payback period equivalent to equipment life, and an assumed 75% of equipment purchase costs financed (25% down payment required).

3.4.10 Operator Profit Margin

In prior editions of this report, a parameter of ten percent of total revenue was applied for profit (pre-tax). Prior to the 1980's, this level was viewed as a satisfactory norm for most successful truck operations. During the 1980's, a trend to much slimmer margins occurred. However, to maintain comparability with other reports in the series, the ten percent profit factor was maintained in the report analysis.

This gave rise to some criticisms of the report and to misunderstandings:

1. The first criticism of the report was that "rates" or "prices" noted in the marketplace were sometimes encountered that were less than the "total cost" taken from the report.

2. A second misunderstanding arose about the notion "profit". Many readers reasoned that this cost line was not a cost of operation and could be subtracted, for instance, if one was only interested in knowing the trucking "cost" -- for example to compare to the costs for operating a private fleet.

In order to improve clarity, the report displays three levels of operator margin (10% of revenue, for comparison to earlier report editions; 5% and 2.5%). We also provide the results of a calculation of the internal rate of return on investment associated with each of the levels of profit margin. Some explanation follows:

Internal Rate of Return on Investment in Highway Equipment

In order to clarify why it is appropriate to include "operator margin" in our determination of trucking costs, we consider the concept of "return on investment" with the example of a transportation manager considering whether to operate a private fleet of trucks to transport the goods shipped by the firm.

Such a manager might be tempted to review the case studies in the report, and consider that his "costs" to operate the trucks are equal to the reported total costs shown, minus the provision for "profit". In this case, he would have provided for all direct operating costs (items such as wages, fuel, tire wear, repairs, licenses, etc) of the trucks, but he would only have covered the depreciation costs and provision for interest charges on monies borrowed to purchase the tractors and trailers. The question still remains, "where does he get the money to purchase the trucks?" This capital investment represents an expenditure by his firm, and he will need to justify the expenditure based on computing the "internal rate of return on investment" for the capital employed. This return on investment might be viewed as a "rental cost" for the capital assets tied up in the trucking operation.

Indeed, one of the options for such a manager might be to "finance lease" his equipment. Under these circumstances, the finance leasing charges paid will cover vehicle depreciation costs, interest on monies to purchase equipment, and a provision for the leasing company to earn an "internal rate of return on investment" in the equipment.

Whether the equipment is "self financed" or "leased", one sees that it is appropriate to include a cost for the return on capital invested in the equipment.

In order to facilitate understanding by the reader of "cost of capital", a calculation has been added (for each level of profitability) of the equivalent internal rate of return on investment earned by the operator of the equipment for each of the three levels of profit margin (10%, 5% and 2.5% of revenue, respectively).

Internal Rate of Return on Investment Calculation

The calculation used to estimate this internal rate of return is to evaluate the equivalent interest earned from a cash flow series as follows:

Beginning of time period:	A negative cash flow equal to monies spent for equipment purchase
Each time period (year):	A positive cash flow equal to margin earned plus depreciation and interest on equipment purchase
End of time period:	A positive cash flow equal to monies realized as salvage on equipment disposal.

The resulting calculation is a computation of the "cash flows" (since depreciation accrual is a "non cash item" in any given year) associated with the investment and is independent of borrowed money -- hence representing a measure of the "internal rate of return" for investing money in the trucking asset.

A reader might be tempted to look at the calculated "rates of return" in this report and feel that these rates are quite high. It must be remembered, however, that the "rate of return" that is appropriate for an investment of capital also reflects the "risk factor" in owning the asset. Trucking has been historically viewed as a higher risk investment than owning shares in enterprises such as "utilities" or "bonds" -- reflecting what is usually a very competitive market situation in the trucking industry. As a result, the rates of return displayed by the model are generally appropriate for investment in trucking as viewed by the financial community.

It is also appropriate to consider the specialization or competitive factors that apply to given trucking markets (availability of capital). Many non specialized sectors (eg. Flatdeck hauling, Agricultural trucking) may provide a lower rate of return on investment than more specialized trucking equipment due to the low degree of specialization of the investment in trailer equipment and competitive factors associated with having many suppliers of these services. On the other hand, very specialized trucking services that involve expensive (single purpose) equipment (eg. A trailer for compressed gases such as anhydrous ammonia or N.G.L.'s) may dictate a higher rate of return to attract capital investment in the enterprise.

4 BASE CASE FINDINGS

4.1 Base Case Results

Total operating costs for each of the base case configurations and regions are tabulated in the pages following. For a more detailed understanding of the costs and their components, interested readers are referred to the specific provincial / U.S. regional tabulations.

All costs in cents per km

Configuration	British Columbia			Alberta		
	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
5 Axle Semi Unit (Van)						
80,000 km	192.7	182.6	177.9	167.3	158.5	154.4
160,000 km	169.9	161.0	156.9	146.2	138.5	135.0
240,000 km	162.3	153.8	149.9	139.2	131.9	128.5
5 Axle Semi Unit (Flat Deck)						
80,000 km	199.0	188.6	183.7	173.4	164.3	160.0
160,000 km	176.7	167.4	163.1	152.8	144.7	141.0
240,000 km	169.3	160.4	156.3	145.9	138.2	134.7
5 Axle Bulk Liquid Tanker						
80,000 km	193.6	183.4	178.7	170.6	161.6	157.5
160,000 km	164.5	155.8	151.8	143.6	136.0	132.5
240,000 km	154.8	146.6	142.9	134.6	127.5	124.2
5 Axle Bulk Dry Tanker						
80,000 km	199.4	188.9	184.1	175.8	166.5	162.2
160,000 km	167.5	158.7	154.6	146.2	138.6	135.0
240,000 km	156.8	148.6	144.8	136.4	129.2	125.9
6 Axle (Triaxle) Semi Unit (Van)						
80,000 km	223.4	211.7	206.2	193.7	183.5	178.8
160,000 km	197.9	187.5	182.7	170.1	161.1	157.0
240,000 km	189.4	179.4	174.8	162.2	153.6	149.7
6 Axle (Triaxle) Semi Unit (Flat Deck)						
80,000 km	222.0	210.3	204.9	193.2	183.0	178.3
160,000 km	197.1	186.7	181.9	170.1	161.2	157.0
240,000 km	188.8	178.9	174.3	162.4	153.9	149.9
8 Axle Super B Train Unit (Van)						
80,000 km	254.9	241.5	235.3	219.0	207.5	202.1
160,000 km	223.5	211.7	206.3	189.9	179.9	175.3
240,000 km	213.0	201.8	196.6	180.2	170.7	166.4
8 Axle Super B Train Unit (Flat Deck)						
80,000 km	264.7	250.7	244.3	225.7	213.8	208.4
160,000 km	236.0	223.6	217.8	199.2	188.7	183.9
240,000 km	226.4	214.5	209.0	190.4	180.3	175.7
8 Axle Super B Bulk Liquid Tanker						
80,000 km	260.2	246.5	240.2	229.0	217.0	211.4
160,000 km	213.3	202.1	196.9	185.4	175.7	171.2
240,000 km	197.7	187.3	182.5	170.9	161.9	157.8
8 Axle Super B Bulk Dry Tanker						
80,000 km	258.4	244.8	238.5	227.3	215.3	209.8
160,000 km	212.5	201.3	196.1	184.6	174.9	170.4
240,000 km	197.2	186.8	182.0	170.4	161.5	157.3

Configuration	Saskatchewan			Manitoba		
	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
5 Axle Semi Unit (Van)						
80,000 km	167.7	158.9	154.8	165.8	157.1	153.0
160,000 km	145.0	137.4	133.9	143.0	135.5	132.0
240,000 km	137.5	130.2	126.9	135.4	128.3	125.0
5 Axle Semi Unit (Flat Deck)						
80,000 km	170.5	161.6	157.4	170.5	161.6	157.4
160,000 km	148.3	140.5	136.9	148.2	140.4	136.8
240,000 km	140.9	133.4	130.0	140.8	133.4	130.0
5 Axle Bulk Liquid Tanker						
80,000 km	168.8	159.9	155.8	169.3	160.4	156.3
160,000 km	139.8	132.4	129.0	140.2	132.8	129.4
240,000 km	130.1	123.3	120.1	130.4	123.6	120.4
5 Axle Bulk Dry Tanker						
80,000 km	174.3	165.1	160.9	174.8	165.6	161.3
160,000 km	142.6	135.1	131.7	143.0	135.5	132.0
240,000 km	132.1	125.1	121.9	132.4	125.4	122.2
6 Axle (Triaxle) Semi Unit (Van)						
80,000 km	190.0	180.0	175.4	191.2	181.1	176.5
160,000 km	165.0	156.3	152.3	165.7	157.0	153.0
240,000 km	156.6	148.4	144.6	157.2	148.9	145.1
6 Axle (Triaxle) Semi Unit (Flat Deck)						
80,000 km	189.5	179.5	174.9	190.5	180.5	175.9
160,000 km	165.0	156.4	152.3	165.7	156.9	152.9
240,000 km	156.9	148.6	144.8	157.4	149.1	145.3
8 Axle Super B Train Unit (Van)						
80,000 km	215.2	203.9	198.6	215.3	203.9	198.7
160,000 km	183.9	174.2	169.8	183.8	174.1	169.6
240,000 km	173.5	164.4	160.2	173.3	164.2	160.0
8 Axle Super B Train Unit (Flat Deck)						
80,000 km	220.7	209.1	203.7	220.7	209.0	203.7
160,000 km	192.1	182.0	177.3	191.9	181.8	177.1
240,000 km	182.6	173.0	168.6	182.3	172.7	168.3
8 Axle Super B Bulk Liquid Tanker						
80,000 km	227.9	215.9	210.4	228.4	216.4	210.9
160,000 km	181.3	171.7	167.3	181.4	171.9	167.5
240,000 km	165.7	157.0	153.0	165.8	157.0	153.0
8 Axle Super B Bulk Dry Tanker						
80,000 km	226.0	214.1	208.6	226.5	214.6	209.1
160,000 km	180.4	170.9	166.5	180.6	171.0	166.7
240,000 km	165.2	156.5	152.5	165.2	156.5	152.5

Configuration	Ontario			Quebec		
	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
5 Axle Semi Unit (Van)						
80,000 km	177.9	168.6	164.2	175.9	166.6	162.3
160,000 km	155.3	147.1	143.3	153.0	145.0	141.3
240,000 km	147.7	139.9	136.4	145.4	137.8	134.2
5 Axle Semi Unit (Flat Deck)						
80,000 km	188.2	178.3	173.7	189.1	179.1	174.5
160,000 km	166.0	157.3	153.2	166.7	158.0	153.9
240,000 km	158.6	150.3	146.4	159.3	150.9	147.0
5 Axle Bulk Liquid Tanker						
80,000 km	179.1	169.6	165.3	181.1	171.5	167.1
160,000 km	150.0	142.1	138.5	151.8	143.8	140.2
240,000 km	140.3	132.9	129.5	142.1	134.6	131.2
5 Axle Bulk Dry Tanker						
80,000 km	185.0	175.2	170.8	186.9	177.1	172.6
160,000 km	153.1	145.0	141.3	154.9	146.7	143.0
240,000 km	142.4	134.9	131.5	144.2	136.6	133.1
6 Axle (Triaxle) Semi Unit (Van)						
80,000 km	213.1	201.9	196.7	214.1	202.8	197.6
160,000 km	187.8	177.9	173.4	188.3	178.4	173.8
240,000 km	179.4	169.9	165.6	179.7	170.2	165.9
6 Axle (Triaxle) Semi Unit (Flat Deck)						
80,000 km	212.5	201.4	196.2	213.5	202.2	197.0
160,000 km	187.9	178.0	173.4	188.3	178.4	173.8
240,000 km	179.7	170.2	165.8	179.9	170.5	166.1
8 Axle Super B Train Unit (Van)						
80,000 km	228.7	216.6	211.1	228.0	216.0	210.5
160,000 km	198.0	187.6	182.8	197.3	186.9	182.1
240,000 km	187.8	177.9	173.4	187.0	177.2	172.6
8 Axle Super B Train Unit (Flat Deck)						
80,000 km	239.4	226.8	221.0	233.5	221.2	215.5
160,000 km	211.6	200.4	195.3	205.5	194.7	189.7
240,000 km	202.3	191.6	186.7	196.1	185.8	181.1
8 Axle Super B Bulk Liquid Tanker						
80,000 km	239.3	226.8	220.9	238.9	226.4	220.6
160,000 km	193.0	182.9	178.2	192.6	182.4	177.8
240,000 km	177.6	168.3	163.9	177.1	167.8	163.5
8 Axle Super B Bulk Dry Tanker						
80,000 km	237.5	225.0	219.2	237.1	224.6	218.8
160,000 km	192.2	182.1	177.4	191.7	181.6	177.0
240,000 km	177.1	167.8	163.5	176.6	167.3	163.0

	New Brunswick			Nova Scotia		
Configuration	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
5 Axle Semi Unit (Van)						
80,000 km	164.7	156.0	152.0	161.3	152.9	148.9
160,000 km	143.4	135.9	132.4	140.6	133.2	129.8
240,000 km	136.3	129.1	125.8	133.7	126.6	123.4
5 Axle Semi Unit (Flat Deck)						
80,000 km	170.1	161.1	157.0	166.8	158.0	153.9
160,000 km	149.3	141.4	137.8	146.4	138.7	135.2
240,000 km	142.3	134.8	131.4	139.6	132.3	128.9
5 Axle Bulk Liquid Tanker						
80,000 km	168.7	159.8	155.7	166.0	157.2	153.2
160,000 km	141.5	134.0	130.6	139.3	131.9	128.6
240,000 km	132.4	125.4	122.2	130.4	123.5	120.3
5 Axle Bulk Dry Tanker						
80,000 km	174.2	165.0	160.8	171.5	162.4	158.3
160,000 km	144.3	136.7	133.2	142.1	134.6	131.2
240,000 km	134.4	127.3	124.0	132.3	125.3	122.1
6 Axle (Triaxle) Semi Unit (Van)						
80,000 km	191.5	181.4	176.7	188.1	178.2	173.6
160,000 km	167.8	158.9	154.9	165.0	156.3	152.3
240,000 km	159.9	151.5	147.6	157.3	149.0	145.2
6 Axle (Triaxle) Semi Unit (Flat Deck)						
80,000 km	190.8	180.8	176.1	187.5	177.6	173.0
160,000 km	167.7	158.9	154.8	164.9	156.2	152.2
240,000 km	160.0	151.6	147.7	157.4	149.1	145.3
8 Axle Super B Train Unit (Van)						
80,000 km	209.0	198.0	192.9	209.1	198.1	193.0
160,000 km	180.2	170.7	166.3	180.9	171.4	167.0
240,000 km	170.6	161.6	157.5	171.5	162.5	158.4
8 Axle Super B Train Unit (Flat Deck)						
80,000 km	213.7	202.5	197.3	210.5	199.4	194.3
160,000 km	187.5	177.6	173.1	184.9	175.2	170.7
240,000 km	178.8	169.4	165.0	176.4	167.1	162.8
8 Axle Super B Bulk Liquid Tanker						
80,000 km	223.2	211.4	206.0	220.0	208.4	203.0
160,000 km	179.9	170.4	166.0	177.3	167.9	163.6
240,000 km	165.5	156.7	152.7	163.0	154.5	150.5
8 Axle Super B Bulk Dry Tanker						
80,000 km	221.4	209.8	204.4	218.2	206.7	201.4
160,000 km	179.1	169.6	165.3	176.5	167.2	162.9
240,000 km	165.0	156.3	152.3	162.5	154.0	150.0

Configuration	Prince Edward Island			Newfoundland		
	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
5 Axle Semi Unit (Van)						
80,000 km	164.2	155.5	151.5	170.4	161.4	157.3
160,000 km	141.4	133.9	130.5	149.3	141.4	137.8
240,000 km	133.8	126.7	123.5	142.2	134.7	131.3
5 Axle Semi Unit (Flat Deck)						
80,000 km	169.0	160.1	156.0	173.6	164.4	160.2
160,000 km	146.7	139.0	135.4	152.9	144.8	141.1
240,000 km	139.3	131.9	128.6	146.0	138.3	134.7
5 Axle Bulk Liquid Tanker						
80,000 km	170.6	161.6	157.5	173.3	164.2	160.0
160,000 km	141.3	133.8	130.4	146.3	138.6	135.0
240,000 km	131.5	124.6	121.4	137.2	130.0	126.7
5 Axle Bulk Dry Tanker						
80,000 km	176.6	167.3	163.0	178.8	169.4	165.1
160,000 km	144.3	136.7	133.2	149.1	141.2	137.6
240,000 km	133.6	126.6	123.3	139.2	131.8	128.5
6 Axle (Triaxle) Semi Unit (Van)						
80,000 km	191.3	181.3	176.6	196.2	185.8	181.1
160,000 km	165.9	157.2	153.2	172.5	163.5	159.3
240,000 km	157.5	149.2	145.4	164.7	156.0	152.0
6 Axle (Triaxle) Semi Unit (Flat Deck)						
80,000 km	190.4	180.4	175.8	195.4	185.1	180.4
160,000 km	165.7	157.0	152.9	172.4	163.3	159.1
240,000 km	157.4	149.1	145.3	164.7	156.0	152.0
8 Axle Super B Train Unit (Van)						
80,000 km	213.1	201.9	196.7	213.1	201.9	196.7
160,000 km	182.0	172.4	168.0	184.3	174.6	170.1
240,000 km	171.6	162.6	158.4	174.7	165.5	161.3
8 Axle Super B Train Unit (Flat Deck)						
80,000 km	213.4	202.2	197.0	218.9	207.4	202.1
160,000 km	185.1	175.4	170.9	192.7	182.6	177.9
240,000 km	175.7	166.4	162.2	184.0	174.3	169.8
8 Axle Super B Bulk Liquid Tanker						
80,000 km	228.2	216.2	210.6	229.5	217.4	211.9
160,000 km	181.1	171.6	167.2	186.2	176.4	171.9
240,000 km	165.4	156.7	152.7	171.8	162.8	158.6
8 Axle Super B Bulk Dry Tanker						
80,000 km	226.2	214.3	208.8	227.7	215.7	210.2
160,000 km	180.2	170.7	166.3	185.4	175.6	171.1
240,000 km	164.8	156.2	152.2	171.3	162.3	158.1

Configuration	Yukon			Northwest Territories		
	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
5 Axle Semi Unit (Van)						
80,000 km	194.5	184.3	179.6	183.7	174.1	169.6
160,000 km	174.0	164.9	160.6	163.2	154.6	150.7
240,000 km	167.2	158.4	154.3	156.4	148.2	144.4
5 Axle Semi Unit (Flat Deck)						
80,000 km	200.3	189.8	184.9	187.1	177.2	172.7
160,000 km	180.3	170.8	166.4	167.0	158.2	154.2
240,000 km	173.6	164.4	160.2	160.3	151.9	148.0
5 Axle Bulk Liquid Tanker						
80,000 km	192.9	182.8	178.1	184.8	175.1	170.6
160,000 km	166.5	157.7	153.7	158.4	150.0	146.2
240,000 km	157.7	149.4	145.5	149.5	141.7	138.0
5 Axle Bulk Dry Tanker						
80,000 km	198.4	187.9	183.1	190.2	180.2	175.6
160,000 km	169.3	160.4	156.3	161.2	152.7	148.8
240,000 km	159.6	151.2	147.3	151.5	143.5	139.8
6 Axle (Triaxle) Semi Unit (Van)						
80,000 km	226.3	214.4	208.9	207.9	197.0	191.9
160,000 km	203.4	192.7	187.8	185.2	175.4	170.9
240,000 km	195.8	185.5	180.8	177.6	168.2	163.9
6 Axle (Triaxle) Semi Unit (Flat Deck)						
80,000 km	226.2	214.3	208.8	207.8	196.8	191.8
160,000 km	203.9	193.2	188.2	185.6	175.8	171.3
240,000 km	196.5	186.2	181.4	178.2	168.8	164.5
8 Axle Super B Train Unit (Van)						
80,000 km	251.9	238.6	232.5	243.1	230.3	224.4
160,000 km	224.2	212.4	206.9	215.3	204.0	198.8
240,000 km	214.9	203.6	198.4	206.0	195.2	190.2
8 Axle Super B Train Unit (Flat Deck)						
80,000 km	256.3	242.8	236.6	241.3	228.6	222.7
160,000 km	231.2	219.0	213.4	216.0	204.6	199.4
240,000 km	222.8	211.1	205.6	207.6	196.7	191.6
8 Axle Super B Bulk Liquid Tanker						
80,000 km	252.5	239.2	233.1	243.5	230.7	224.8
160,000 km	210.3	199.2	194.1	201.2	190.6	185.7
240,000 km	196.2	185.9	181.1	187.0	177.2	172.7
8 Axle Super B Bulk Dry Tanker						
80,000 km	250.8	237.6	231.5	241.8	229.0	223.2
160,000 km	209.5	198.5	193.4	200.4	189.8	185.0
240,000 km	195.8	185.5	180.7	186.6	176.8	172.2

Configuration	U.S. Northeast 10% Profit Margin Total Costs (c/km)	U.S. Northeast 5% Profit Margin Total Costs (c/km)	U.S. Northeast 2.5% Profit Margin Total Costs (c/km)	U.S. Great Lakes 10% Profit Margin Total Costs (c/km)	U.S. Great Lakes 5% Profit Margin Total Costs (c/km)	U.S. Great Lakes 2.5% Profit Margin Total Costs (c/km)
5 Axle Semi Unit (Van)						
80,000 km	211.2	200.1	194.9	205.0	194.2	189.2
160,000 km	181.5	172.0	167.6	179.8	170.3	165.9
240,000 km	171.6	162.6	158.4	171.4	162.3	158.2
5 Axle Semi Unit (Flat Deck)						
80,000 km	219.8	208.2	202.9	213.9	202.7	197.5
160,000 km	190.5	180.5	175.9	189.1	179.2	174.6
240,000 km	180.8	171.3	166.9	180.9	171.4	167.0
5 Axle Bulk Liquid Tanker						
80,000 km	200.4	189.9	185.0	193.3	183.1	178.4
160,000 km	164.3	155.7	151.7	161.7	153.2	149.2
240,000 km	152.3	144.3	140.6	151.1	143.2	139.5
5 Axle Bulk Dry Tanker						
80,000 km	207.5	196.6	191.6	200.4	189.9	185.0
160,000 km	168.1	159.2	155.1	165.4	156.7	152.7
240,000 km	154.9	146.8	143.0	153.7	145.7	141.9

Configuration	U.S. Midwest 10% Profit Margin Total Costs (c/km)	U.S. Midwest 5% Profit Margin Total Costs (c/km)	U.S. Midwest 2.5% Profit Margin Total Costs (c/km)	U.S. South 10% Profit Margin Total Costs (c/km)	U.S. South 5% Profit Margin Total Costs (c/km)	U.S. South 2.5% Profit Margin Total Costs (c/km)
5 Axle Semi Unit (Van)						
80,000 km	191.6	181.5	176.9	190.0	180.0	175.4
160,000 km	166.9	158.1	154.0	165.7	157.0	152.9
240,000 km	158.6	150.3	146.4	157.6	149.3	145.5
5 Axle Semi Unit (Flat Deck)						
80,000 km	199.3	188.8	183.9	197.4	187.0	182.2
160,000 km	175.0	165.8	161.5	173.5	164.3	160.1
240,000 km	166.9	158.1	154.0	165.5	156.8	152.8
5 Axle Bulk Liquid Tanker						
80,000 km	182.1	172.6	168.1	181.1	171.5	167.2
160,000 km	151.0	143.0	139.4	150.3	142.4	138.8
240,000 km	140.6	133.2	129.8	140.1	132.7	129.3
5 Axle Bulk Dry Tanker						
80,000 km	189.2	179.3	174.7	188.1	178.2	173.7
160,000 km	154.7	146.6	142.8	154.0	145.9	142.2
240,000 km	143.2	135.7	132.2	142.6	135.1	131.7

Configuration	U.S. West 10% Profit Margin Total Costs (c/km)	U.S. West 5% Profit Margin Total Costs (c/km)	U.S. West 2.5% Profit Margin Total Costs (c/km)
5 Axle Semi Unit (Van)			
80,000 km	205.9	195.0	190.0
160,000 km	180.3	170.8	166.4
240,000 km	171.7	162.7	158.5
5 Axle Semi Unit (Flat Deck)			
80,000 km	214.2	202.9	197.7
160,000 km	189.1	179.1	174.5
240,000 km	180.7	171.2	166.8
5 Axle Bulk Liquid Tanker			
80,000 km	195.3	185.1	180.3
160,000 km	163.3	154.7	150.8
240,000 km	152.7	144.6	140.9
5 Axle Bulk Dry Tanker			

2 Axle Straight Truck Configuration Summary

Province:	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
British Columbia			
40,000 km	347.2	328.9	320.5
80,000 km	319.7	302.9	295.1
120,000 km	310.6	294.2	286.7
Alberta			
40,000 km	300.1	284.3	277.0
80,000 km	274.8	260.4	253.7
120,000 km	266.4	252.4	245.9
Saskatchewan			
40,000 km	292.3	276.9	269.8
80,000 km	265.1	251.2	244.7
120,000 km	256.1	242.6	236.4
Manitoba			
40,000 km	289.0	273.8	266.8
80,000 km	261.8	248.0	241.7
120,000 km	252.8	239.5	233.3
Ontario			
40,000 km	329.0	311.7	303.7
80,000 km	300.8	285.0	277.7
120,000 km	291.4	276.1	269.0
Quebec			
40,000 km	320.9	304.0	296.2
80,000 km	292.6	277.2	270.1
120,000 km	283.2	268.3	261.4
New Brunswick			
40,000 km	281.0	266.2	259.4
80,000 km	255.2	241.7	235.5
120,000 km	246.5	233.6	227.6
Nova Scotia			
40,000 km	279.1	264.4	257.6
80,000 km	253.6	240.2	234.1
120,000 km	245.0	232.2	226.2
P.E.I.			
40,000 km	274.7	260.3	253.6
80,000 km	246.8	233.8	227.8
120,000 km	237.4	224.9	219.2
Newfoundland			
40,000 km	281.3	266.4	259.6
80,000 km	255.5	242.0	235.8
120,000 km	246.9	233.9	227.9
Yukon			
40,000 km	334.5	316.9	308.8
80,000 km	309.5	293.2	285.7
120,000 km	301.1	285.3	278.0
N.W.T.			
40,000 km	310.8	294.4	286.9
80,000 km	285.5	270.5	263.6
120,000 km	277.1	262.5	255.8

U.S. North East			
40,000 km	473.4	448.5	437.0
80,000 km	446.1	422.7	411.8
120,000 km	437.0	414.0	403.4
U.S. Great Lakes			
40,000 km	486.6	461.0	449.2
80,000 km	459.0	434.8	423.7
120,000 km	449.8	426.1	415.2
U.S. Midwest			
40,000 km	439.3	416.2	405.6
80,000 km	412.2	390.5	380.5
120,000 km	403.1	381.9	372.1
U.S. South			
40,000 km	426.4	404.0	393.6
80,000 km	399.9	378.8	369.1
120,000 km	391.0	370.4	360.9
U.S. West			
40,000 km	464.3	439.8	428.5
80,000 km	437.5	414.5	403.9
120,000 km	428.6	406.1	395.7

4.2 Gravel Operations

Conditions associated with operating over predominantly gravel surfaces cause vehicle operating costs to be higher than for paved roads. The extent of cost is dependent, not only upon surface conditions, but also the amount of 'gravel' kilometers traveled and the driving habits used on the route.

Prior editions of this report developed a “gravel set” of base case analyses assuming the identical trip distance for gravel road as used for paved surfaces to provide a common criteria (in addition to equipment configuration) upon which to base costs comparisons. The effect of gravel surface on operating cost was determined from a survey of records of truckers who operate over predominantly gravel roads. The information was correlated with cost data pertaining to comparative equipment operating over paved surfaces. Cost differences not attributable to gravel surface conditions (but rather due to particular characteristics of the operation) were identified before determining cost impacts of operating over gravel.

The observations demonstrated that the most significant variable cost differentials occur in the factors of maintenance, tires, and, to a lesser extent, driver salary. Statistics indicate that over an operating year there is not an appreciable difference in fuel consumption of vehicles operating over gravel and paved roads - assuming the equipment is identical. Loss factors associated with additional “wheel slip” on gravel surfaces are apparently compensated by lower speeds of operation. Of course, depreciation and licence costs are not dependent upon right-of-way surface conditions, although it can be argued that extensive use of vehicles over unpaved surfaces will escalate equipment depreciation. The increase, if any, is not significant to total operating costs.

Overhead cost of administration is greater for gravel road operations (again assuming identical sized operations) as is insurance costs to a lesser degree. The increase in administration cost is due mainly to the increased activity caused by the extra

maintenance activity and the additional time necessary to complete a trip. Cost of administration is, of course, dependent upon the structure, methods, and efficiency of a company.

Regarding the variable costs which are significantly altered due to gravel operations, the survey indicates the average increase is as follows:

Driver Costs - 8% - 12% increase over paved road operations, for long distance hauling only.

Repair Costs - 20% increase over paved road operations - for both tractors and trailers.

Tire Costs - 70% increase over paved road operations - for power units pulling trailers; 65% increase over paved road operations - for trailers.

The increase in driver costs is due mainly to the additional travel time that will result from operation over gravel roads. Often, an hourly wage is the means by which driver costs associated with gravel roads are computed, since the survey indicated that most drivers will demand an hourly rate when travelling on gravel. Note, also, that surface conditions have no significant effect on driver wages for short distance hauls.

Naturally, gravel conditions will cause higher maintenance costs due to the effect of rougher, dirtier, right-of-way surfaces. The need for maintenance is more common than for paved surfaces, as service, parts replacement, and oil and lubrication are needed more frequently. Again, the costs reflect the assumption that a preventive maintenance schedule is maintained and repair work is undertaken when required.

The extra wear on tires caused by gravel surfaces significantly affects tire life and costs. The need for rotation, recapping, and replacement is much more frequent than for equivalent vehicles operating over paved surfaces. The increase in tire cost varies by size of equipment and by power unit and trailing equipment. This variance is due to the differences in axle loadings, the tractive force applied to the tire, and of course, the size and quality of the required tire.

4.3 Winter Trucking

A review of typical motor carrier operating statistics indicated that the major features that vary for a winter operation in comparison to the balance of the year were:

a) A 20 percent climb in fuel consumed per kilometre output reflecting a combination of reduced traction, increased accessory demands, and increased idle/warm up times.

b) A 30 percent increase in per kilometre tire costs on the power unit reflecting reduced traction and costs for winter tires.

c) A 20 percent increase in per kilometre repair costs on the power unit.

As a result of detailed application of these factors, we developed resultant unit cost adjustment factors by which the base case values should be adjusted to reflect "winter-only" operations according to the formula:

Winter Cost = Base Case Cost x Cw.

Winter Trucking Unit Cost Adjustment Factors (Cw):
(National Average for All-Weather Roads)

FIVE AND SIX -AXLE SEMI-TRAILERS (Cw)

Dry Freight - 1.055
Bulk - 1.064

SEVEN/EIGHT-AXLE TRAINS (Cw)

Dry Freight - 1.051
Bulk - 1.059

e.g.- For a five-axle bulk liquid unit in Alberta (160,000 kilometres/year on paved), the base case 2003 operating cost is 143.6 cents/kilometer (10% margin).

The "winter-only" cost would be 143.6 cents/kilometer x 1.064, or 152.7 cents/kilometer (244.5 cents/mile).

5 LONGER HAUL TRUCKING IN CANADA

5.1 Effect of Increasing Loaded Miles

More loaded miles increases the productivity of truck transportation. For the Base Case scenarios discussed in Section 4, the general distance of trip (approximately 100 miles one-way, or 200 mile round trip -- expressed as 160 km and 320 km respectively) is representative of regional distribution patterns.

As trip distances increase, a significant productivity penalty is associated with empty return miles. Generally, some form of "backhaul", even if freight is at a lower freight rate, is sought. As a result, the "average cost" can be viewed in terms of the cost per mile applied to the one way trip distance.

In Canada, because of population / industrialization patterns, most business activity takes place just north of the Canada-U.S. border. Hence the most important long distance hauling corridor is the East-West corridor -- roughly paralleling the Trans Canada Highway / Yellowhead Highway routes.

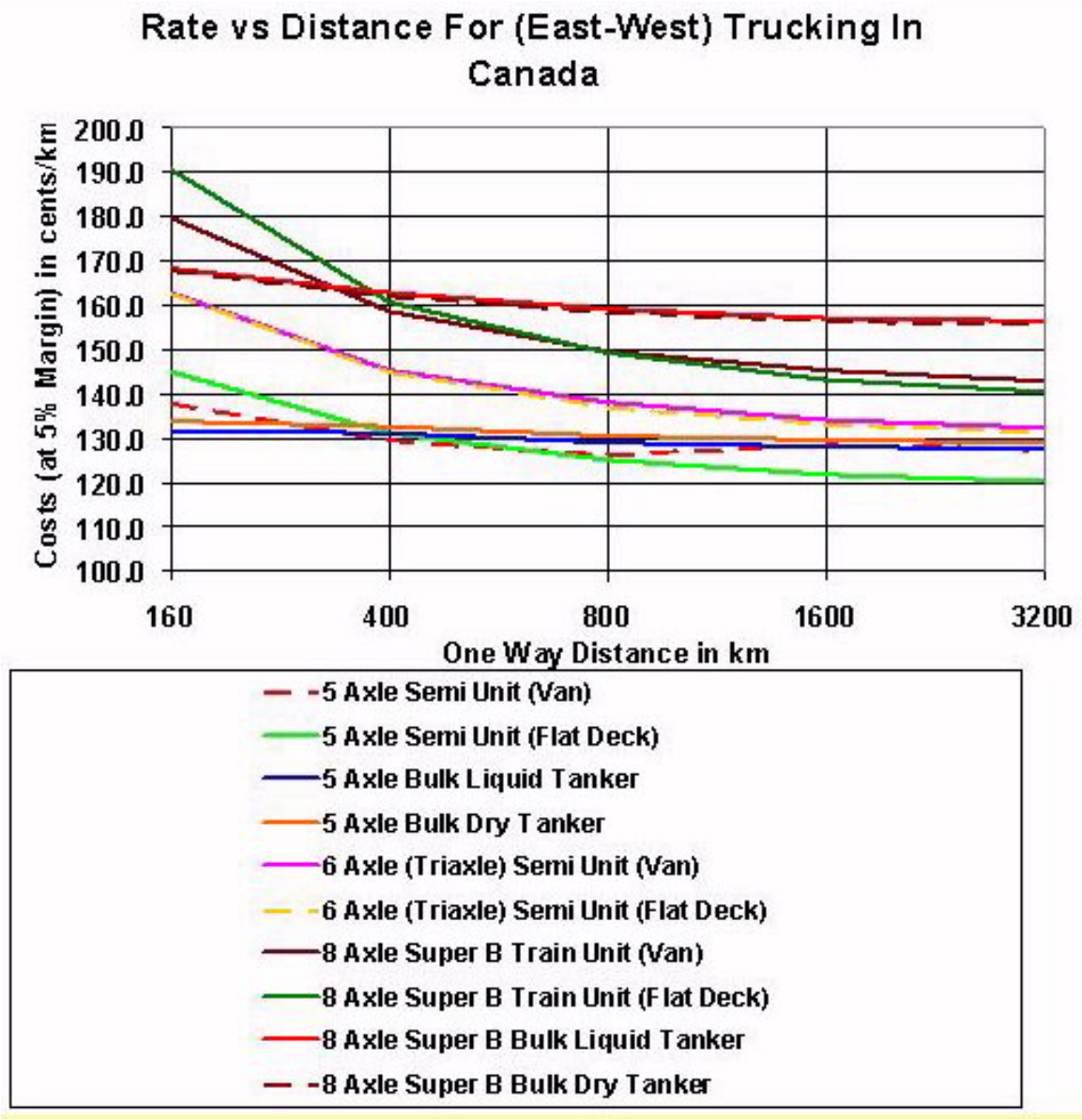
For each of the ten vehicle types investigated, a costing was undertaken for the following one way trip distances:

160 km	100 miles
400 km	250 miles
800 km	500 miles
1600 km	1000 miles
3200 km	2003 miles

Sleeper Equipped Vehicles (Over 800 km)

Although the cases costed in Section 4 for regional scenarios reflected non-sleeper equipped vehicles, for the cases developed in this chapter, the power unit tare weight and purchase price reflected a sleeper equipped power unit and, for longer distance trips, the wages were reflective of a "team driving situation".

Graphically, the results of these evaluations are shown below.



Unit cost results are also tabulated on the following page.

Province : Canada East-West Corridor

Long Distance Hauling Case

One Way Distance (km)	Configuration and Annual Distance in (km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
	5 Axle Semi Unit (Van)			
160	240,000	145.7	138.0	134.5
400	283,168	136.9	129.7	126.4
800	301,557	133.1	126.1	122.9
1600	312,205	135.7	128.6	125.3
3200	317,269	134.4	127.4	124.1
	5 Axle Semi Unit (Flat Deck)			
160	240,000	153.0	144.9	141.2
400	298,835	138.5	131.2	127.9
800	325,772	131.9	124.9	121.7
1600	341,717	128.6	121.8	118.7
3200	349,691	126.9	120.2	117.2
	5 Axle Bulk Liquid Tanker			
160	240,000	139.1	131.8	128.4
400	259,394	138.3	131.0	127.7
800	266,877	136.2	129.1	125.7
1600	271,249	135.2	128.0	124.8
3200	273,015	134.6	127.6	124.3
	5 Axle Bulk Dry Tanker			
160	240,000	141.2	133.8	130.3
400	259,933	140.1	132.7	129.3
800	267,636	137.9	130.7	127.3
1600	272,130	136.8	129.6	126.3
3200	273,958	136.3	129.1	125.8
	6 Axle (Triaxle) Semi Unit (Van)			
160	240,000	171.9	162.8	158.7
400	307,839	153.5	145.4	141.7
800	340,215	145.6	137.9	134.4
1600	359,693	141.6	134.1	130.7
3200	369,664	139.6	132.3	128.9
	6 Axle (Triaxle) Semi Unit (Flat Deck)			
160	240,000	171.9	162.9	158.7
400	309,603	152.9	144.9	141.2
800	343,091	144.8	137.2	133.6
1600	363,306	140.7	133.3	129.9
3200	373,699	138.7	131.4	128.0
	8 Axle Super B Train Unit (Van)			
160	240,000	189.9	179.9	175.3
400	312,573	167.3	158.5	154.4
800	347,969	158.0	149.6	145.8
1600	369,462	153.3	145.2	141.5
3200	380,589	150.9	143.0	139.3
	8 Axle Super B Train Unit (Flat Deck)			
160	240,000	201.3	190.7	185.8
400	332,703	169.8	160.8	156.7
800	382,250	157.5	149.2	145.3
1600	413,667	151.3	143.3	139.6
3200	430,672	148.2	140.4	136.8
	8 Axle Super B Bulk Liquid Tanker			
160	240,000	177.7	168.4	164.0
400	269,968	171.7	162.7	158.5
800	282,006	167.9	159.1	155.0
1600	288,931	166.0	157.2	153.2
3200	292,016	165.0	156.4	152.3
	8 Axle Super B Bulk Dry Tanker			
160	240,000	177.2	167.9	163.6
400	270,405	171.1	162.1	158.0
800	282,642	167.3	158.5	154.4
1600	289,680	165.3	156.6	152.6
3200	292,825	164.4	155.7	151.8

6 LONGER HAUL TRUCKING: CANADA/US INTERNATIONAL CORRIDORS

6.1 Western Corridor Analysis

Evaluations shown in Chapter 5 for long haul Canadian corridors are repeated for the Canada - U.S. Western region involving hauls between B.C./Alberta and U.S. western states of California, Oregon, Washington, Nevada, Montana, Wyoming, Colorado, Arizona, and New Mexico.

Computed unit costs, assuming a BC based trucker, are as follows:

Province : International West: Canada Based

One Way Distance (km)	Long Distance Hauling Case Configuration and Annual Distance in (km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
	5 Axle Semi Unit (Van)			
160	240,000	161.8	153.3	149.4
400	285,505	149.9	142.0	138.4
800	305,098	144.6	137.0	133.5
1600	316,472	142.0	134.5	131.0
3200	321,929	140.7	133.3	129.8
	5 Axle Semi Unit (Flat Deck)			
160	240,000	168.5	159.6	155.5
400	298,835	151.4	143.5	139.8
800	325,772	144.5	136.9	133.4
1600	341,717	146.5	138.8	135.3
3200	349,691	144.7	137.1	133.5
	5 Axle Bulk Liquid Tanker			
160	240,000	152.2	144.2	140.5
400	259,394	149.6	141.7	138.1
800	266,877	147.4	139.6	136.0
1600	271,249	146.3	138.6	135.0
3200	273,015	145.7	138.1	134.5
	5 Axle Bulk Dry Tanker			
160	240,000	154.2	146.1	142.4
400	259,933	151.3	143.4	139.7
800	267,636	149.0	141.2	137.6
1600	272,130	147.9	140.1	136.5
3200	273,958	147.3	139.6	136.0

In event that this same corridor was hauled by a U.S. Western based trucker, the unit costs (in Canadian dollar equivalent) would be:

Province : International West: USA Based

Long Distance Hauling Case

One Way Distance (km)	Configuration and Annual Distance in (km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
	5 Axle Semi Unit (Van)			
160	240,000	172.2	163.1	158.9
400	281,202	157.5	149.3	145.4
800	298,597	150.6	142.7	139.0
1600	308,650	147.1	139.4	135.8
3200	313,394	145.4	137.7	134.2
	5 Axle Semi Unit (Flat Deck)			
160	240,000	180.7	171.2	166.8
400	292,491	159.8	151.4	147.5
800	315,829	150.8	142.9	139.2
1600	329,506	149.8	141.9	138.3
3200	336,221	147.5	139.7	136.1
	5 Axle Bulk Liquid Tanker			
160	240,000	153.0	144.9	141.2
400	256,991	151.1	143.2	139.5
800	263,501	148.4	140.6	137.0
1600	267,343	147.0	139.3	135.7
3200	268,838	146.4	138.7	135.1
	5 Axle Bulk Dry Tanker			
160	240,000	155.6	147.4	143.6
400	257,537	153.3	145.2	141.5
800	264,266	150.5	142.6	138.9
1600	268,227	149.0	141.2	137.6
3200	269,782	148.3	140.5	136.9

Note that for this corridor, the U.S. based trucker is somewhat less competitive reflecting the international exchange rates, although this factor is less so in 2003 with the rise in Canadian currency value relative to U.S. Where he is able to compete, this is due to the high base wage of Canadian truckers based in B.C. as well as (probable) higher horsepower of a B.C. based tractor which can operate in mountainous terrain and haul heavier (Canadian) payloads (resulting in higher fuel consumption when assigned in the U.S. to a haul).

6.2 Central Corridor Analysis

Evaluations shown in Chapter 5 for long haul Canadian corridors are repeated for the Canada - U.S. Central region involving hauls between Ontario, Manitoba and U.S. Gulf Coast States of Texas, Louisiana and all intermediate points.

Unit costs, for a Canadian based trucker are as follows:

Province : International Central: Canada Based

Long Distance Hauling Case

One Way Distance (km)	Configuration and Annual Distance in (km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
	5 Axle Semi Unit (Van)			
160	240,000	132.3	125.4	122.2
400	268,857	126.9	120.2	117.1
800	280,395	123.7	117.2	114.2
1600	287,034	122.2	115.7	112.8
3200	289,971	121.4	115.0	112.0
	5 Axle Semi Unit (Flat Deck)			
160	240,000	143.0	135.5	132.0
400	292,491	129.3	122.5	119.4
800	315,829	123.5	117.0	114.0
1600	329,506	125.4	118.8	115.7
3200	336,221	123.8	117.3	114.3
	5 Axle Bulk Liquid Tanker			
160	240,000	130.0	123.2	120.0
400	256,991	128.5	121.7	118.6
800	263,501	126.6	120.0	116.9
1600	267,343	125.7	119.1	116.0
3200	268,838	125.2	118.6	115.6
	5 Axle Bulk Dry Tanker			
160	240,000	132.1	125.2	121.9
400	257,537	130.3	123.4	120.2
800	264,266	128.3	121.6	118.5
1600	268,227	127.3	120.6	117.5
3200	269,782	126.9	120.2	117.1

By comparison, a U.S. based carrier would have the following cost structure:

Province : International Central: USA Based Long Distance Hauling Case				
One Way Distance (km)	Configuration and Annual Distance in (km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
	5 Axle Semi Unit (Van)			
160	240,000	171.8	162.8	158.6
400	281,202	156.1	147.9	144.1
800	298,597	148.8	141.0	137.4
1600	308,650	145.1	137.5	134.0
3200	313,394	143.3	135.8	132.3
	5 Axle Semi Unit (Flat Deck)			
160	240,000	180.9	171.4	167.0
400	292,491	158.6	150.3	146.4
800	315,829	149.1	141.3	137.7
1600	329,506	147.9	140.1	136.5
3200	336,221	145.5	137.8	134.3
	5 Axle Bulk Liquid Tanker			
160	240,000	151.4	143.5	139.8
400	256,991	149.2	141.3	137.7
800	263,501	146.4	138.7	135.1
1600	267,343	144.9	137.3	133.8
3200	268,838	144.2	136.7	133.2
	5 Axle Bulk Dry Tanker			
160	240,000	154.1	146.0	142.2
400	257,537	151.4	143.4	139.8
800	264,266	148.4	140.6	137.0
1600	268,227	146.9	139.2	135.6
3200	269,782	146.2	138.5	134.9

Again, generally the specific unit costs are lower for the Canadian based operator than for his U.S. counterpart, reflecting the impact of exchange rates and specific cost components.

6.3 Eastern Corridor Analysis

Evaluations shown in Chapter 5 for long haul Canadian corridors are repeated for the Canada - U.S.Eastern region involving hauls between Quebec and the Maritime Provinces and U.S. Southern States of Florida, Alabama, Georgia and all intermediate points.

Unit costs for the Canadian based operator on these routes are as follows:

Province : International East: Canada Based

One Way Distance (km)	Long Distance Hauling Case Configuration and Annual Distance in (km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
	5 Axle Semi Unit (Van)			
160	240,000	121.4	115.0	112.0
400	275,703	115.5	109.4	106.6
800	290,408	112.3	106.4	103.7
1600	298,872	110.7	104.9	102.2
3200	302,769	109.9	104.1	101.5
	5 Axle Semi Unit (Flat Deck)			
160	240,000	127.2	120.5	117.4
400	292,491	116.6	110.4	107.6
800	315,829	111.8	105.9	103.2
1600	329,506	114.0	108.0	105.2
3200	336,221	112.7	106.8	104.0
	5 Axle Bulk Liquid Tanker			
160	240,000	118.8	112.5	109.6
400	256,991	117.9	111.7	108.9
800	263,501	116.4	110.3	107.5
1600	267,343	115.6	109.5	106.7
3200	268,838	115.3	109.2	106.4
	5 Axle Bulk Dry Tanker			
160	240,000	120.7	114.4	111.4
400	257,537	119.6	113.3	110.4
800	264,266	118.0	111.8	108.9
1600	268,227	117.2	111.0	108.2
3200	269,782	116.8	110.6	107.8

By comparison, a U.S. based carrier on the same corridor, would have the following cost structure.

Province : International East: USA Based Long Distance Hauling Case				
One Way Distance (km)	Configuration and Annual Distance in (km)	10% Profit Margin Total Costs (c/km)	5% Profit Margin Total Costs (c/km)	2.5% Profit Margin Total Costs (c/km)
	5 Axle Semi Unit (Van)			
160	240,000	172.1	163.0	158.8
400	281,202	156.4	148.2	144.4
800	298,597	149.2	141.3	137.7
1600	308,650	145.5	137.9	134.3
3200	313,394	143.7	136.2	132.7
	5 Axle Semi Unit (Flat Deck)			
160	240,000	180.8	171.3	166.9
400	292,491	158.7	150.3	146.5
800	315,829	149.3	141.4	137.8
1600	329,506	148.1	140.3	136.7
3200	336,221	145.7	138.1	134.5
	5 Axle Bulk Liquid Tanker			
160	240,000	152.6	144.6	140.9
400	256,991	150.2	142.3	138.7
800	263,501	147.4	139.7	136.1
1600	267,343	146.0	138.3	134.7
3200	268,838	145.3	137.6	134.1
	5 Axle Bulk Dry Tanker			
160	240,000	155.3	147.1	143.3
400	257,537	152.4	144.4	140.7
800	264,266	149.5	141.6	138.0
1600	268,227	147.9	140.2	136.6
3200	269,782	147.2	139.5	135.9

The (substantial) cost premium of a U.S. over a Canadian operator is due primarily to the Canada / U.S. exchange rate as well as the comparison of New Brunswick based operators (and cost levels) to those of North Eastern U.S. (New York / New Jersey).

7 LEASE OPERATOR AND INTERMODAL OPTIONS

Especially for long distance corridors, trucking services to be considered must take note of the following options: lease operators, intermodal trailer on flat car (T.O.F.C.) and intermodal container on flat car (C.O.F.C.) services. It is not the intention of this chapter to fully explore, document, and survey exhaustively these services -- which would represent a major undertaking. The intent is to make for a more complete understanding for these service options and the situations to which they might be applicable.

7.1 Lease Operator Trucking

In this service option, the motor carrier firm provides all administrative services (including marketing, operations management, documentation, accounting, invoicing, etc.), generally "dispatches and manages" the haul from it's field branch locations, and (usually) provides the trailer unit to use for the haul.

In a less common hauling situation, the lease operator also is responsible for providing the trailer to be used for the haul. For example, many "produce haulers" provide both a power unit and a refrigerated van trailer and this type of arrangement is also sometimes seen for flat deck equipment. As noted previously, the more usual service option is where the lease operator provides the power unit and the carrier provides the trailer.

The power unit (and driver) is a sub-contracted service, independently owned, and "leased" by the carrier to provide tractor service in connection with the haul.

Advantages to the carrier in using this type of service option, as opposed to a company owned unit and a company driver are as follows:

- Fleet capacity flexibility. The carrier can more readily adapt to short term increases and decreases in traffic volumes, without maintaining an excessive capital investment. If the "lease operator" is successful in obtaining additional work that is complementary to the carrier's activity -- efficiency benefits accrue to all concerned.

- Simplicity. Often, use of "lease operators" will diminish the need for many administrative and maintenance functions. Some companies are known to operate selected "branch terminals" with 100 percent leased power, thereby eliminating the need to provide maintenance and other services that might be required to operate a small fleet in that market location.

- Cost productivity. Many "lease operators" are more efficient than company driven units because the operator has a greater "stake" or "incentive" to keep utilization high. These "savings" can make for a more efficient operation. Further, the "owner-operator" has a direct incentive to care for his unit.

Difficulties, or disadvantages to use of "lease operators" include:

- Non-Standardization. It is more difficult, if not impossible, to provide "standard" equipment and service using "lease operators" compared to company power. The market is generally in a state of flux that sees "lease operators" move about between assignments with various carriers. In some situations, "lease equipment" is to a

company "standard" -- even down to being painted in company colors. These are usually the exceptional situations.

- Service Reliability. When a company driver "resigns", the carrier needs to locate a replacement. When a lease operator "resigns", a replacement driver and truck must also be found. Thus, in situations where high service availability / reliability of dedicated transport equipment is required, the "basic fleet" should generally consist of company units, with an additional percentage that can be "lease operator". This provides a useful "gauge" for the company units' cost efficiency performance, yet assures dedicated customer service by the "core fleet".

- Customer Contact. For hauls where considerable driver-customer contact is required (eg. driver provides order taking and other "sales/service" functions), it is usually better to have a carrier employee act as representative for the firm, than to have a "sub-contracted" driver-owner do these functions.

Lease Operator Compensation

The "price" for lease operator services is somewhat more complicated than is the "wage market" for drivers as depicted in Chapter 3.

In order to understand "pricing", it is first important to know what is being provided by the lease operator and what is being provided by the carrier. This can vary from carrier to carrier, lease operator to lease operator, and also with the given haul / distance / commodity situation.

For example, in some instances the carrier supplies fuel and maintenance services to the lease operator at a reduced price (reflecting corporate discounts and preventive maintenance standards). In addition, the carrier or the lease operator may pay for the licenses, permits, and tolls incurred in hauling. Another question to be understood is "who provides what portion of the required insurance?" In some applications, the power unit must be provided with extra equipment such as blowers, pumps, hydraulic lift equipment. These can be either lease operator or carrier supplied and will be reflected in the "price". In other situations, the lease operator may have the option of joining and participating in a company benefit program.

After addressing the issue of "what the compensation covers", there are numerous "units of compensation" in common use. In a review of compensation agreements for a major carrier in Canada, it was found that the same carrier had agreements in place that required payment to lease operators using "$ per trip", "$ per hour", "cents per mile", "$ per unit quantity hauled", and "percent of haul revenue". Each of these was specific to a particular hauling market/product situation. In addition to "basic payment for the service", there were also a variety of "incentive" systems such as a flat payment per load for backhaul (to cover additional load / unload time delay involved) plus a "cents per mile" bonus for return miles with backhaul involved.

All of this information serves to illustrate the difficulties that will need to be addressed if a national "survey" of lease operator "costs" or "pricing" is ever undertaken to develop useful and reliable information about this segment of the industry.

If a reader wishes to make adjustments for the trucking cost examples in this report, the lease operator compensation schedule is substituted for the tractor power unit costs (and any other required cost lines included in the base case, such as insurance, or licenses, as applicable).

In conclusion, care must be taken in evaluating lease operator costs, and in comparing these with the base case situations presented in this report -- that tend to reflect fleet company operations, not the lease operator market. In doing any such comparisons, it is important to consider all cost components (such as licenses, insurance, transport, fuel, repairs, wage benefits/burdens) and who is responsible for each. Further, the lease operator compensation schedule must be known for the specific haul in question. It is not easy to generalize "costs" or "prices" for this market, as lease operator compensation schedules are variously set in terms of $/trip, $/hr, cents/mile, $/unit quantity hauled, or as a percent of haul revenue.

7.2 Intermodal T.O.F.C.

In 1985, Trimac Consulting Services was retained by Transport Canada to investigate and evaluate the energy and economic implications of TOFC (Trailer on Flat Car) services in Canada. A key finding of this study was that for hauls less than 350 miles (565 km), direct truck was generally more economical than TOFC under various assumed conditions of utilization and "lane balance".

In this earlier study, "service characteristics" were not investigated, although it was noted that TOFC is primarily oriented to "trailerable finished goods" not requiring "express", or "fast freight" service.

Example corridors, amenable to TOFC, that were investigated in the previous study included:

- Toronto to Montreal
- Toronto to Winnipeg
- Toronto to Vancouver

Bulk Plus Logistics undertook a time and distance investigation of the transit times between the main intermodal rail yards in the cities serving these three corridors, the results of which are tabulated below:

Intermodal and Trucking Time Comparisons

						Normal Scheduled Service				Savings by Truck			
		Transit Time (Hr)	Headway (Hr)	Pick	Deliver	Best Door to	Average Door to	Worst Door to	Truck Transit	Least Savings	Average Savings	Most Savings	Lane Distance
Origin	Dest	Avg	Avg	Up / (Hr)	(Hr)	Door (Hr)	Door (Hr)	Door (Hr)	Time (Hr)	(Hr)	(Hr)	(Hr)	(Mi)
Toronto	Montreal	21:00:00	24:00:00	2:00:00	2:00:00	25:00:00	37:00:00	49:00:00	6:00:00	19:00:00	31:00:00	43:00:00	340.1
Montreal	Toronto	17:00:00	24:00:00	2:00:00	2:00:00	21:00:00	33:00:00	45:00:00	6:00:00	15:00:00	27:00:00	39:00:00	340.1
Toronto	Winnipeg	66:00:00	24:00:00	2:00:00	2:00:00	70:00:00	82:00:00	94:00:00	38:00:00	32:00:00	44:00:00	56:00:00	1294.7
Winnipeg	Toronto	67:00:00	24:00:00	2:00:00	2:00:00	71:00:00	83:00:00	95:00:00	38:00:00	33:00:00	45:00:00	57:00:00	1294.7
Toronto	Vancouver	140:00:00	24:00:00	2:00:00	2:00:00	144:00:00	156:00:00	168:00:00	87:00:00	57:00:00	69:00:00	81:00:00	2698
Vancouver	Toronto	131:00:00	24:00:00	2:00:00	2:00:00	135:00:00	147:00:00	159:00:00	87:00:00	48:00:00	60:00:00	72:00:00	2698

Note: Analysis by Bulk Plus Logistics Based on Published Rail Schedules (Internet) and Consultations with Carriers

Information Updated: 3/29/2004

Note that for all three corridors, it would appear that the “headway” (interval between scheduled train services) is 24 hours, that is – service is generally once per business day.

In the foregoing table, the estimated door to door transit times for intermodal services (shown as “best”, “average” and “worst”) reflect the following assumptions:

- The “best” door to door time that will be achieved is when the shipper knows the rail schedule and dispatches the load “just in time” to catch that day’s train. In the receiving city, it is assuming that the delivery unit “meets” the train and is loaded expeditiously. Assuming minimal queueing / delays at the terminal, this best time will equal the scheduled train transit time, plus the pick up time, plus the delivery time.
- The “worst” door to door time was estimated on the basis that the shipper dispatches the load and “just misses the train”. Hence, this column adds the train headway time to the foregoing scenario…in this case, an additional 24 hours. In this scenario, it is still assumed that the delivery city truck “meets” the train, once the shipment is en-route.
- The value shown for “average” transit time, door-to-door, is exactly half way between the two values, previously listed.

Assuming a pickup and delivery time at each end of the rail journey of 2 hours (including delays/transfer time at the intermodal yard), we can see from the preceding analysis table that “on average”, the door-to-door trucking service is expected to be faster than a rail service, simply based on “headway” and published transit times for the service – for all the corridors.

The shown tabulated door-to-door transit time for direct trucking was computed by Bulk Plus using preferred roads on “all Canadian routings”. Note that mileage via the USA is shorter, from Toronto to Western Canada, although border clearance delays and uncertainties mitigate against using this option. We further assumed a single driver obeying “hours of service” regulations. Just for comparison, a “team driven” truck should be able to transit from Toronto to Vancouver, over the same route, in a time somewhat under 3 days.

Thus, by neglecting the speed of travel of team drivers, and by assuming negligible “wait time” for transfer in the terminals, the foregoing analysis should be considered favorable to rail -- in reality, an “expedited truck service” would be faster than shown and an intermodal rail service would be expected to be “in transit” somewhat longer than tabulated in our three scenarios.

TOFC Plan 1 tariffs (see the 1985 study report for a discussion of TOFC "Plans") for these corridors were secured in 1985 and have been "updated" for purposes of illustrating the comparison between TOFC and direct trucking services in the form of "worked examples" for these corridors.

Note that in consultation with rail carriers and freight forwarders, it was found that tariffs on these lanes are not the same amount for each direction of shipping, presumably reflecting market conditions and the degree of lane balance at time of investigation (February 2003).

In doing these comparisons, it should be noted that TOFC is a railway provided service. It is therefore mandatory that the analyst be familiar with railway pricing strategy and options, which underlay the tariff structure in order to develop similar cost "comparisons" to the example corridors that are discussed herein.

Note that Plan 1 is "exclusive" of costs for local trailer pick up and delivery to customer premises from the railway intermodal yards, that must be "added", together with "trailer ownership costs", to compute the total transportation costs "door to door". The Plan 1 TOFC tariffs that were secured for the corridors in question (and updated for this analysis) are as follows:

All values in $ per trailer load one-way

Plan 1 Tariff For Corridor Tariff Item	48 Foot or 53 Foot Trailer
Toronto – Montreal / Montreal -- Toronto Confidential Quotation (Carrier)	$325
Toronto – Winnipeg Winnipeg – Toronto Confidential Quotation (Carrier)	$3,142 $1,636
Toronto – Vancouver Vancouver – Toronto Confidential Quotation (Carrier)	$6,156 $4,004

Using this information, together with long distance Canadian East-West trucking corridor information in this report, the economic cost of TOFC services can be compared with general freight trucking services.

In addition, assuming a pick up and delivery round trip time of 2 hours at each major delivery centre (for a low utilization truck), the hourly costs in the base case may be used to estimate local pick up and delivery costs to apply to the TOFC option. Hourly equivalent "trailer ownership costs" (depreciation and licenses) can also be estimated.

In addition, on the basis of estimated transit time, and the value of a trailer load shipment, applying “time value of money” and “required inventory” calculations, a full “logistics cost” borne by a shipper, for their supply chain, can be computed for using either TOFC or “door to door” trucking service.

Although the value of a shipment can vary widely, for purpose of analysis, Bulk Plus made use of the reported average value of a highway shipment as determined recently by the Ohio Department of Transportation in a detailed commodity transportation survey, adjusted to Canadian dollars and adjusted for inflation (from the survey year 1998) using CPI. The value used by us for our calculations was $75,000 Cdn. for our representative sample trailer load of freight.

7.2.1 Time Value of Shipment Determination

The time value of money determination, under the foregoing scenario reflects two components of cost:

- The first component of cost is the dollar value of shipment ownership, discounted using an assumed annual interest rate for time value of money, divided by 365 to represent a daily cost of shipment ownership, and further divided by 24 to represent the ownership costs per hour associated with delays to a shipment. Essentially, this cost component reflects the time value of money tied up owning a shipment for additional time, in transit, between the source and destination.

  (Hourly time value of money cost = Value of shipment x annual interest rate divided by (365 x 24) 8760 hours per year.

- The second component of cost is the dollar cost for additional inventory that must be maintained, at the destination, to "cover" delays in receiving "re-stock inventory", if a slower mode of transportation is used for replenishing stocks. Essentially, this cost -- when restated back to a "per shipment" basis, is independent of the annual number of shipments involved…and it can be derived by dividing the value of a single shipment by the number of hours in a year (i.e.

  (Hourly shipment inventory cost = Value of a shipment divided by (365 x 24) 8760 hours per year.)

The foregoing calculations are provided at the bottom of the following table, in terms of the hourly "time value" for a typical $75,000 shipment.

7.2.2 Logistics Cost Comparisons of Intermodal TOFC and Direct Trucking Options

The following analysis tabulates the full logistics costs for the TOFC and direct truck options, respectively for these corridors, under the “best”, “worst” and “average” travel time assumptions for intermodal services door to door.

Comparison of Logistics Costs For T.O.F.C. and Direct Trucking

T.O.F.C.						T.O.F.C.					
1) Toronto to Montreal	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**	**1) Montreal to Toronto**	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**
Rail Transit Cost (Terminal to Terminal)		$325		=	$325.00	Rail Transit Cost (Terminal to Terminal)		$325		=	$325.00
Pickup in Toronto:	2:00:00		$94.63	=	$189.27	Pickup in Montreal:	2:00:00		$93.54	=	$187.08
Trailer Ownership En Route (Avg Case):	33:00:00		$0.97	=	$31.94	Trailer Ownership En Route (Avg Case):	29:00:00		$0.97	=	$28.07
Trailer Ownership En Route (Best Case):	21:00:00		$0.97	=	$20.33	Trailer Ownership En Route (Best Case):	17:00:00		$0.97	=	$16.46
Trailer Ownership En Route (Worst Case):	45:00:00		$0.97	=	$43.56	Trailer Ownership En Route (Worst Case):	41:00:00		$0.97	=	$39.69
Delivery in Montreal:	2:00:00		$93.54	=	$187.08	Delivery in Toronto:	2:00:00		$94.63	=	$189.27
Time Value of Shipment (Avg Case)	37:00:00		$9.03	=	$334.20	Time Value of Shipment (Avg Case)	33:00:00		$9.03	=	$298.07
Time Value of Shipment (Best Case)	25:00:00		$9.03	=	$225.81	Time Value of Shipment (Best Case)	21:00:00		$9.03	=	$189.68
Time Value of Shipment (Worst Case)	49:00:00		$9.03	=	$442.59	Time Value of Shipment (Worst Case)	45:00:00		$9.03	=	$406.46
TOTAL LOGISTICS COST/TRAILER (ONE WAY)						**TOTAL LOGISTICS COST/TRAILER (ONE WAY)**					
	37:00:00	**Average Case**			**$1,067.50**		33:00:00	**Average Case**			**$1,027.49**
	25:00:00	**Best Case**			**$947.49**		21:00:00	**Best Case**			**$907.49**
	49:00:00	**Worst Case**			**$1,187.50**		45:00:00	**Worst Case**			**$1,147.50**
DIRECT TRUCKING COST						**DIRECT TRUCKING COST**					
1) Toronto to Montreal	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**	**1) Montreal to Toronto**	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**
547.3 km @		$1.30		=	$709.79	547.3 km @		$1.30		=	$709.79
Time Value of Shipment (Avg Case)	6:00:00		$9.03	=	$54.20	Time Value of Shipment (Avg Case)	6:00:00		$9.03	=	$54.20
TOTAL LOGISTICS COST/TRAILER (ONE WAY)					**$763.98**	**TOTAL LOGISTICS COST/TRAILER (ONE WAY)**					**$763.98**
Savings In Comparison to Rail	**31:00:00**	**Avg Rail Scen.**			**$303.51**	**Savings In Comparison to Rail**	**27:00:00**	**Avg Rail Scen.**			**$263.51**
Savings In Comparison to Rail	**19:00:00**	**Best Rail Scen.**			**$183.51**	**Savings In Comparison to Rail**	**15:00:00**	**Best Rail Scen.**			**$143.50**
Savings In Comparison to Rail	**43:00:00**	**Worst Rail Scen.**			**$423.52**	**Savings In Comparison to Rail**	**39:00:00**	**Worst Rail Scen.**			**$383.52**

Comparison of Logistics Costs For T.O.F.C. and Direct Trucking

T.O.F.C.						T.O.F.C.					
2) Toronto to Winnipeg	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**	**2) Winnipeg to Toronto**	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**
Rail Transit Cost (Terminal to Terminal)		$3,142		=	$3,142.00	Rail Transit Cost (Terminal to Terminal)		$1,636		=	$1,636.00
Pickup in Toronto:	2:00:00		$94.63	=	$189.27	Pickup in Winnipeg:	2:00:00		$88.17	=	$176.34
Trailer Ownership En Route (Avg Case):	78:00:00		$0.97	=	$75.50	Trailer Ownership En Route (Avg Case):	79:00:00		$0.97	=	$76.47
Trailer Ownership En Route (Best Case):	66:00:00		$0.97	=	$63.88	Trailer Ownership En Route (Best Case):	67:00:00		$0.97	=	$64.85
Trailer Ownership En Route (Worst Case):	90:00:00		$0.97	=	$87.12	Trailer Ownership En Route (Worst Case):	91:00:00		$0.97	=	$88.08
Delivery in Winnipeg:	2:00:00		$88.17	=	$176.34	Delivery in Toronto:	2:00:00		$94.63	=	$189.27
Time Value of Shipment (Avg Case)	82:00:00		$9.03	=	$740.67	Time Value of Shipment (Avg Case)	83:00:00		$9.03	=	$749.70
Time Value of Shipment (Best Case)	70:00:00		$9.03	=	$632.28	Time Value of Shipment (Best Case)	71:00:00		$9.03	=	$641.31
Time Value of Shipment (Worst Case)	94:00:00		$9.03	=	$849.06	Time Value of Shipment (Worst Case)	95:00:00		$9.03	=	$858.09
TOTAL LOGISTICS COST/TRAILER (ONE WAY)						**TOTAL LOGISTICS COST/TRAILER (ONE WAY)**					
	82:00:00	**Average Case**			**$4,323.77**		83:00:00	**Average Case**			**$2,827.77**
	70:00:00	**Best Case**			**$4,203.77**		71:00:00	**Best Case**			**$2,707.77**
	94:00:00	**Worst Case**			**$4,443.78**		95:00:00	**Worst Case**			**$2,947.78**

DIRECT TRUCKING COST						DIRECT TRUCKING COST					
2) Toronto to Winnipeg	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**	**2) Winnipeg to Toronto**	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**
2083.6 km @		$1.29		=	$2,678.62	2083.6 km @		$1.29		=	$2,678.62
Time Value of Shipment (Avg Case)	38:00:00		$9.03	=	$343.24	Time Value of Shipment (Avg Case)	38:00:00		$9.03	=	$343.24
TOTAL LOGISTICS COST/TRAILER (ONE WAY)					**$3,021.85**	**TOTAL LOGISTICS COST/TRAILER (ONE WAY)**					**$3,021.85**
Savings In Comparison to Rail	**44:00:00**	**Avg Rail Scen.**			**$1,301.92**	**Savings In Comparison to Rail**	**45:00:00**	**Avg Rail Scen.**			**($194.08)**
Savings In Comparison to Rail	**32:00:00**	**Best Rail Scen.**			**$1,181.91**	**Savings In Comparison to Rail**	**33:00:00**	**Best Rail Scen.**			**($314.09)**
Savings In Comparison to Rail	**56:00:00**	**Worst Rail Scen.**			**$1,421.92**	**Savings In Comparison to Rail**	**57:00:00**	**Worst Rail Scen.**			**($74.07)**

Comparison of Logistics Costs For T.O.F.C. and Direct Trucking

T.O.F.C.						T.O.F.C.					
3) Toronto to Vancouver	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**	**3) Vancouver to Toronto**	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**
Rail Transit Cost (Terminal to Terminal)		$6,156		=	$6,156.00	Rail Transit Cost (Terminal to Terminal)		$4,004		=	$4,004.00
Pickup in Toronto:	2:00:00		$94.63	=	$189.27	Pickup in Vancouver:	2:00:00		$102.50	=	$205.01
Trailer Ownership En Route (Avg Case):	152:00:00		$0.97	=	$147.13	Trailer Ownership En Route (Avg Case):	143:00:00		$0.97	=	$138.42
Trailer Ownership En Route (Best Case):	140:00:00		$0.97	=	$135.51	Trailer Ownership En Route (Best Case):	131:00:00		$0.97	=	$126.80
Trailer Ownership En Route (Worst Case):	164:00:00		$0.97	=	$158.74	Trailer Ownership En Route (Worst Case):	155:00:00		$0.97	=	$150.03
Delivery in Vancouver:	2:00:00		$102.50	=	$205.01	Delivery in Toronto:	2:00:00		$94.63	=	$189.27
Time Value of Shipment (Avg Case)	156:00:00		$9.03	=	$1,409.08	Time Value of Shipment (Avg Case)	147:00:00		$9.03	=	$1,327.78
Time Value of Shipment (Best Case)	144:00:00		$9.03	=	$1,300.68	Time Value of Shipment (Best Case)	135:00:00		$9.03	=	$1,219.39
Time Value of Shipment (Worst Case)	168:00:00		$9.03	=	$1,517.47	Time Value of Shipment (Worst Case)	159:00:00		$9.03	=	$1,436.17
TOTAL LOGISTICS COST/TRAILER (ONE WAY)						**TOTAL LOGISTICS COST/TRAILER (ONE WAY)**					
	156:00:00	**Average Case**			**$8,106.48**		147:00:00	**Average Case**			**$5,864.47**
	144:00:00	**Best Case**			**$7,986.47**		135:00:00	**Best Case**			**$5,744.47**
	168:00:00	**Worst Case**			**$8,226.48**		159:00:00	**Worst Case**			**$5,984.48**

DIRECT TRUCKING COST						DIRECT TRUCKING COST					
3) Toronto to Vancouver	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**	**3) Vancouver to Toronto**	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**
4341.9	km @	$1.27		=	$5,529.69	4341.9	km @	$1.27		=	$5,529.69
Time Value of Shipment (Avg Case)	87:00:00		$9.03	=	$785.83	Time Value of Shipment (Avg Case)	87:00:00		$9.03	=	$785.83
TOTAL LOGISTICS COST/TRAILER (ONE WAY)					**$6,315.52**	**TOTAL LOGISTICS COST/TRAILER (ONE WAY)**					**$6,315.52**
Savings In Comparison to Rail	**69:00:00**	**Avg Rail Scen.**			**$1,790.95**	**Savings In Comparison to Rail**	**60:00:00**	**Avg Rail Scen.**			**($451.05)**
Savings In Comparison to Rail	**57:00:00**	**Best Rail Scen.**			**$1,670.95**	**Savings In Comparison to Rail**	**48:00:00**	**Best Rail Scen.**			**($571.06)**
Savings In Comparison to Rail	**81:00:00**	**Worst Rail Scen.**			**$1,910.96**	**Savings In Comparison to Rail**	**72:00:00**	**Worst Rail Scen.**			**($331.05)**

Note(s)											
			Basis Value of Shipment			**$75,000**					
			Time Value of Money			**5.50%**					
		Equals Annual Time Value of Shipment				$4,125.00					
		Equals Daily Cost (Divided by 365)				$11.30					
Equals Hourly Time Value of Money Cost (Divided by 24)						**$0.47**					
	Basis Shipments Per Week (Annual Volume)					52					
		Annual Value of Shipments				$3,900,000					
		Equals Daily Value of Shipments				$10,684.93					
		Equals Hourly Value of Shipments				$445.21					
		Hourly Shipment Inventory Cost				**$8.56**					
TOTAL SHIPMENT INVENTORY COST (HOURLY)						**$9.03**					

In the foregoing analysis, it would appear that TOFC is only cost competitive with trucking for the longer distance corridors (Winnipeg and Vancouver to Toronto) in the eastbound direction of travel for moving a $75,000 shipment door to door.

This results primarily because of the relatively high tariff for westbound TOFC movements from Toronto, coupled with the “time value of shipment” cost computed under our assumptions.

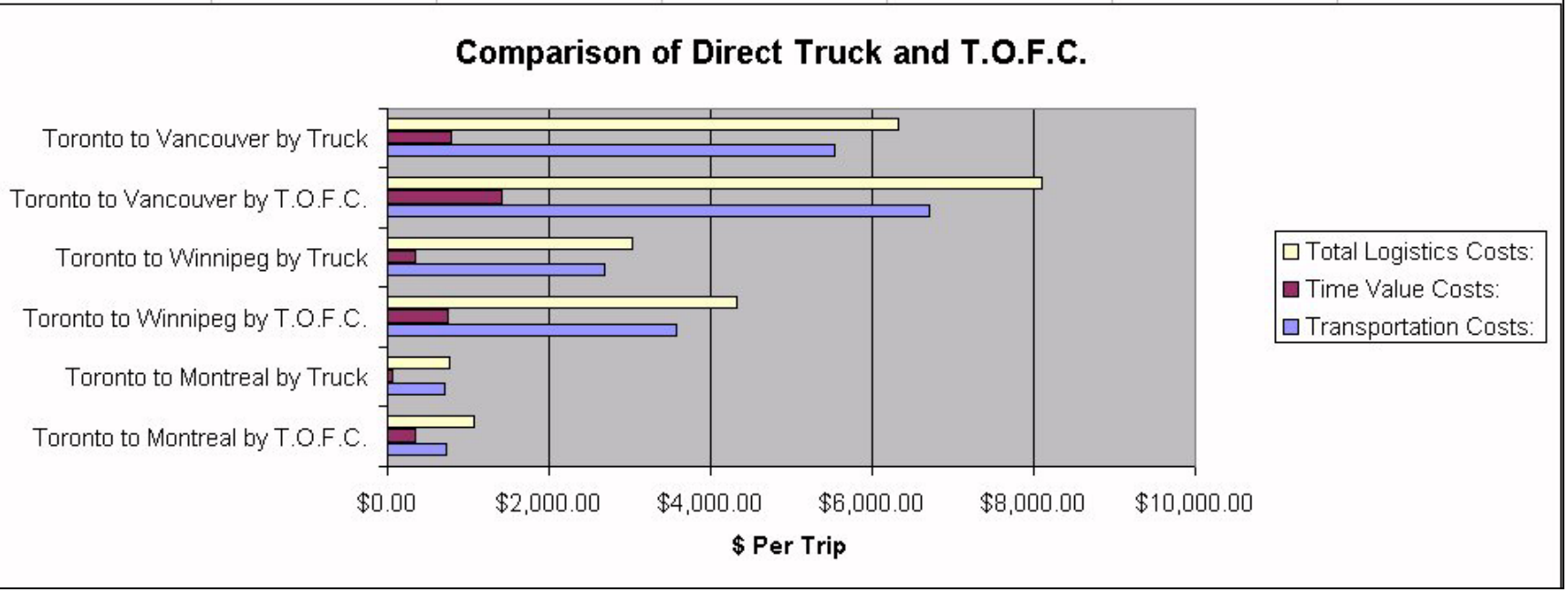
Note that in situations where the shipment value is less than the assumed $75,000 value, or where there are no additional inventories required on the part of the shipper or consignee (i.e. not for regularly occurring replenishment of a commercial process), the competitiveness of the rail intermodal services can be adjusted to be better than shown in the previous table by adjusting the “time value” entries shown in it.

Conversely, for a higher valued shipment (greater than $75,000 per trailer load), on a regularly occurring basis, the time value components would need to be adjusted upward, thus showing a greater advantage to direct trucking than depicted.

Graphically, the following two graphs illustrate comparatively, for Toronto originated, and for Toronto destined shipments, the over-all, direct transportation charges, and “time value costs” comparisons of the two alternatives.

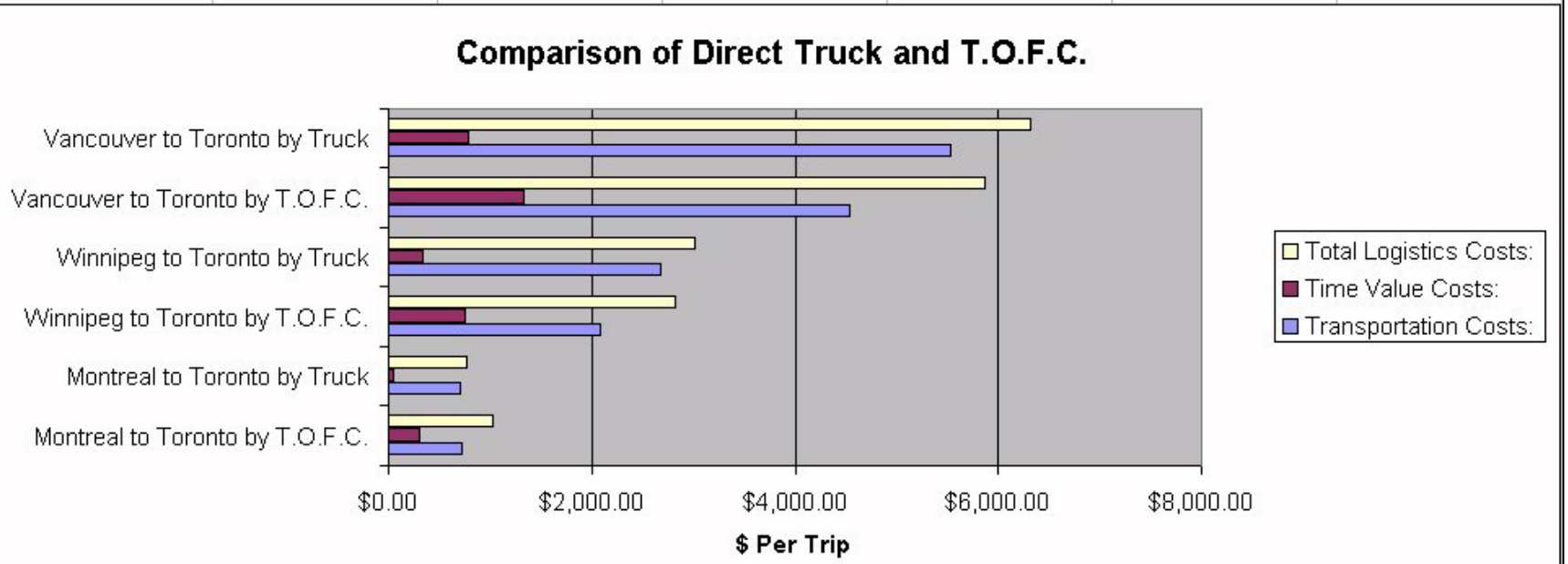
Toronto Outbound by T.O.F.C.

	Toronto to Montreal by T.O.F.C.	Toronto to Montreal by Truck	Toronto to Winnipeg by T.O.F.C.	Toronto to Winnipeg by Truck	Toronto to Vancouver by T.O.F.C.	Toronto to Vancouver by Truck
Transportation Costs:	$733.29	$709.79	$3,583.11	$2,678.62	$6,697.40	$5,529.69
Time Value Costs:	$334.20	$54.20	$740.67	$343.24	$1,409.08	$785.83
Total Logistics Costs:	$1,067.50	$763.98	$4,323.77	$3,021.85	$8,106.48	$6,315.52
Line Haul Costs:	$325.00	$709.79	$3,142.00	$2,678.62	$6,156.00	$5,529.69
Pick Up/Dely Costs:	$408.29	$0.00	$441.11	$0.00	$541.40	$0.00



Toronto Inbound by T.O.F.C.

	Montreal to Toronto by T.O.F.C.	Montreal to Toronto by Truck	Winnipeg to Toronto by T.O.F.C.	Winnipeg to Toronto by Truck	Vancouver to Toronto by T.O.F.C.	Vancouver to Toronto by Truck
Transportation Costs:	$729.42	$709.79	$2,078.07	$2,678.62	$4,536.69	$5,529.69
Time Value Costs:	$298.07	$54.20	$749.70	$343.24	$1,327.78	$785.83
Total Logistics Costs:	$1,027.49	$763.98	$2,827.77	$3,021.85	$5,864.47	$6,315.52
Line Haul Costs:	$325.00	$709.79	$1,636.00	$2,678.62	$4,004.00	$5,529.69
Pick Up/Dely Costs:	$404.42	$0.00	$442.07	$0.00	$532.69	$0.00



In general, we see that TOFC is not a particularly attractive intermodal option, except on the Montreal / Toronto corridor where the technology assumed is a RoadRailer type of service. In this situation, the transportation charges are approximately equal to direct trucking costs, although time – value costs do tend to favor the door-to-door trucking movement.

In consultation with industry sources, it was noted that there is a preference to use containers rather than trailers for intermodal services on longer corridors because:

- Use of double stack railcars enables significant rail cost savings, reflected in a more competitive rate structure than for TOFC.
- Trailers shipped by TOFC service experience significantly increased maintenance costs due to premature anchor pin corrosion on the brakes, increased incidence of wheel bearing damage, damage to air bags on the trailer air ride suspensions, etc. arising from the service characteristics of shipping trailers by this mode.

Carriers who are significantly involved in intermodal service (eg. TransX, Yanke, Vitran, and Canadian Freightways) now have developed significant volumes of intermodal transportation business, sufficient for them to maintain their own fleet of domestic intermodal containers.

These comparisons, on the same corridors, are developed in more detail in the next section.

7.3 Intermodal C.O.F.C.

Use of intermodal container on flat car service is increasing for domestic traffic in Canada. A significant stimulant is the introduction of "double stack" container services which, after provision for investment in new container handling infrastructure (capital) is estimated to represent a net savings for shippers of between 10 and 20 percent.

Example of "Double Stack" Container on Flat Car Configuration (left)

The Plan 1 intermodal COFC tariffs secured by Bulk Plus for the corridors in question as of February 2003 are as follows:

All values in $ per container load one-way

Plan 1 Tariff For Corridor Tariff Item	48 Foot or 53 Foot Domestic Container
Toronto – Montreal / Montreal - Toronto Confidential Quotation (Carrier)	$325
Toronto – Winnipeg Winnipeg – Toronto Confidential Quotation (Carrier)	$1,571 $818
Toronto – Vancouver Vancouver – Toronto Confidential Quotation (Carrier)	$3,078 $2,002

Using this information, together with long distance Canadian East-West trucking corridor information in this report, the economic cost of COFC services can be compared with general freight trucking services.

Employing a similar calculation method to that described for evaluating door-to-door TOFC shipments, the tabular results of Bulk Plus's logistics cost analysis follow:

Comparison of Logistics Costs For C.O.F.C. and Direct Trucking

C.O.F.C.						C.O.F.C.					
1) Toronto to Montreal	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**	**1) Montreal to Toronto**	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**
Rail Transit Cost (Terminal to Terminal)		$325		=	$325.00	Rail Transit Cost (Terminal to Terminal)		$325		=	$325.00
Pickup in Toronto:	2:00:00		$94.63	=	$189.27	Pickup in Montreal:	2:00:00		$93.54	=	$187.08
Container Ownership En Route (Avg Case):	37:00:00		$1.04	=	$38.54	Container Ownership En Route (Avg Case):	33:00:00		$1.04	=	$34.38
Container Ownership En Route (Best Case):	25:00:00		$1.04	=	$26.04	Container Ownership En Route (Best Case):	21:00:00		$1.04	=	$21.88
Container Ownership En Route (Worst Case):	49:00:00		$1.04	=	$51.04	Container Ownership En Route (Worst Case):	45:00:00		$1.04	=	$46.88
Delivery in Montreal:	2:00:00		$93.54	=	$187.08	Delivery in Toronto:	2:00:00		$94.63	=	$189.27
Time Value of Shipment (Avg Case)	37:00:00		$9.03	=	$334.20	Time Value of Shipment (Avg Case)	33:00:00		$9.03	=	$298.07
Time Value of Shipment (Best Case)	25:00:00		$9.03	=	$225.81	Time Value of Shipment (Best Case)	21:00:00		$9.03	=	$189.68
Time Value of Shipment (Worst Case)	49:00:00		$9.03	=	$442.59	Time Value of Shipment (Worst Case)	45:00:00		$9.03	=	$406.46
TOTAL LOGISTICS COST/Container (ONE WAY)						**TOTAL LOGISTICS COST/Container (ONE WAY)**					
	37:00:00	**Average Case**			**$1,074.10**		33:00:00	**Average Case**			**$1,033.80**
	25:00:00	**Best Case**			**$953.20**		21:00:00	**Best Case**			**$912.91**
	49:00:00	**Worst Case**			**$1,194.99**		45:00:00	**Worst Case**			**$1,154.69**
DIRECT TRUCKING COST						**DIRECT TRUCKING COST**					
1) Toronto to Montreal	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**	**1) Montreal to Toronto**	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**
547.3 km @		$1.30		=	$709.79	547.3 km @		$1.30		=	$709.79
Time Value of Shipment (Avg Case)	6:00:00		$9.03	=	$54.20	Time Value of Shipment (Avg Case)	6:00:00		$9.03	=	$54.20
TOTAL LOGISTICS COST/Container (ONE WAY)					**$763.98**	**TOTAL LOGISTICS COST/Container (ONE WAY)**					**$763.98**
Savings In Comparison to Rail	**31:00:00**	**Avg Rail Scen.**			**$310.11**	**Savings In Comparison to Rail**	**27:00:00**	**Avg Rail Scen.**			**$269.81**
Savings In Comparison to Rail	**19:00:00**	**Best Rail Scen.**			**$189.22**	**Savings In Comparison to Rail**	**15:00:00**	**Best Rail Scen.**			**$148.92**
Savings In Comparison to Rail	**43:00:00**	**Worst Rail Scen.**			**$431.00**	**Savings In Comparison to Rail**	**39:00:00**	**Worst Rail Scen.**			**$390.71**

Comparison of Logistics Costs For C.O.F.C. and Direct Trucking

C.O.F.C.						C.O.F.C.					
2) Toronto to Winnipeg	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**	**2) Winnipeg to Toronto**	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**
Rail Transit Cost (Terminal to Terminal)		$1,571		=	$1,571.00	Rail Transit Cost (Terminal to Terminal)		$818		=	$818.00
Pickup in Toronto:	2:00:00		$94.63	=	$189.27	Pickup in Winnipeg:	2:00:00		$88.17	=	$176.34
Container Ownership En Route (Avg Case):	82:00:00		$1.04	=	$85.42	Container Ownership En Route (Avg Case):	83:00:00		$1.04	=	$86.46
Container Ownership En Route (Best Case):	70:00:00		$1.04	=	$72.92	Container Ownership En Route (Best Case):	71:00:00		$1.04	=	$73.96
Container Ownership En Route (Worst Case):	94:00:00		$1.04	=	$97.92	Container Ownership En Route (Worst Case):	95:00:00		$1.04	=	$98.96
Delivery in Winnipeg:	2:00:00		$88.17	=	$176.34	Delivery in Toronto:	2:00:00		$94.63	=	$189.27
Time Value of Shipment (Avg Case)	82:00:00		$9.03	=	$740.67	Time Value of Shipment (Avg Case)	83:00:00		$9.03	=	$749.70
Time Value of Shipment (Best Case)	70:00:00		$9.03	=	$632.28	Time Value of Shipment (Best Case)	71:00:00		$9.03	=	$641.31
Time Value of Shipment (Worst Case)	94:00:00		$9.03	=	$849.06	Time Value of Shipment (Worst Case)	95:00:00		$9.03	=	$858.09
TOTAL LOGISTICS COST/Container (ONE WAY)						**TOTAL LOGISTICS COST/Container (ONE WAY)**					
	82:00:00	**Average Case**			**$2,762.69**		83:00:00	**Average Case**			**$2,019.76**
	70:00:00	**Best Case**			**$2,641.80**		71:00:00	**Best Case**			**$1,898.87**
	94:00:00	**Worst Case**			**$2,883.58**		95:00:00	**Worst Case**			**$2,140.65**

DIRECT TRUCKING COST						DIRECT TRUCKING COST					
2) Toronto to Winnipeg	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**	**2) Winnipeg to Toronto**	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**
2083.6	km @	$1.29		=	$2,678.62	2083.6	km @	$1.29		=	$2,678.62
Time Value of Shipment (Avg Case)	38:00:00		$9.03	=	$343.24	Time Value of Shipment (Avg Case)	38:00:00		$9.03	=	$343.24
TOTAL LOGISTICS COST/Container (ONE WAY)					**$3,021.85**	**TOTAL LOGISTICS COST/Container (ONE WAY)**					**$3,021.85**
Savings In Comparison to Rail	**44:00:00**	**Avg Rail Scen.**			**($259.16)**	**Savings In Comparison to Rail**	**45:00:00**	**Avg Rail Scen.**			**($1,002.09)**
Savings In Comparison to Rail	**32:00:00**	**Best Rail Scen.**			**($380.06)**	**Savings In Comparison to Rail**	**33:00:00**	**Best Rail Scen.**			**($1,122.98)**
Savings In Comparison to Rail	**56:00:00**	**Worst Rail Scen.**			**($138.27)**	**Savings In Comparison to Rail**	**57:00:00**	**Worst Rail Scen.**			**($881.20)**

Comparison of Logistics Costs For C.O.F.C. and Direct Trucking

C.O.F.C.						C.O.F.C.					
3) Toronto to Vancouver	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**	**3) Vancouver to Toronto**	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**
Rail Transit Cost (Terminal to Terminal)		$3,078		=	$3,078.00	Rail Transit Cost (Terminal to Terminal)		$2,002		=	$2,002.00
Pickup in Toronto:	2:00:00		$94.63	=	$189.27	Pickup in Vancouver:	2:00:00		$102.50	=	$205.01
Container Ownership En Route (Avg Case):	156:00:00		$1.04	=	$162.50	Container Ownership En Route (Avg Case):	147:00:00		$1.04	=	$153.13
Container Ownership En Route (Best Case):	144:00:00		$1.04	=	$150.00	Container Ownership En Route (Best Case):	135:00:00		$1.04	=	$140.63
Container Ownership En Route (Worst Case):	168:00:00		$1.04	=	$175.00	Container Ownership En Route (Worst Case):	159:00:00		$1.04	=	$165.63
Delivery in Vancouver:	2:00:00		$102.50	=	$205.01	Delivery in Toronto:	2:00:00		$94.63	=	$189.27
Time Value of Shipment (Avg Case)	156:00:00		$9.03	=	$1,409.08	Time Value of Shipment (Avg Case)	147:00:00		$9.03	=	$1,327.78
Time Value of Shipment (Best Case)	144:00:00		$9.03	=	$1,300.68	Time Value of Shipment (Best Case)	135:00:00		$9.03	=	$1,219.39
Time Value of Shipment (Worst Case)	168:00:00		$9.03	=	$1,517.47	Time Value of Shipment (Worst Case)	159:00:00		$9.03	=	$1,436.17
TOTAL LOGISTICS COST/Container (ONE WAY)						**TOTAL LOGISTICS COST/Container (ONE WAY)**					
	156:00:00	**Average Case**			**$5,043.85**		147:00:00	**Average Case**			**$3,877.18**
	144:00:00	**Best Case**			**$4,922.96**		135:00:00	**Best Case**			**$3,756.29**
	168:00:00	**Worst Case**			**$5,164.74**		159:00:00	**Worst Case**			**$3,998.07**

DIRECT TRUCKING COST						DIRECT TRUCKING COST					
3) Toronto to Vancouver	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**	**3) Vancouver to Toronto**	**Hours**	**$ Cost**	**$ / Hour**		**Item Cost $**
4341.9 km @		$1.27		=	$5,529.69	4341.9 km @		$1.27		=	$5,529.69
Time Value of Shipment (Avg Case)	87:00:00		$9.03	=	$785.83	Time Value of Shipment (Avg Case)	87:00:00		$9.03	=	$785.83
TOTAL LOGISTICS COST/Container (ONE WAY)					**$6,315.52**	**TOTAL LOGISTICS COST/Container (ONE WAY)**					**$6,315.52**
Savings In Comparison to Rail	**69:00:00**	**Avg Rail Scen.**			**($1,271.68)**	**Savings In Comparison to Rail**	**60:00:00**	**Avg Rail Scen.**			**($2,438.34)**
Savings In Comparison to Rail	**57:00:00**	**Best Rail Scen.**			**($1,392.57)**	**Savings In Comparison to Rail**	**48:00:00**	**Best Rail Scen.**			**($2,559.23)**
Savings In Comparison to Rail	**81:00:00**	**Worst Rail Scen.**			**($1,150.79)**	**Savings In Comparison to Rail**	**72:00:00**	**Worst Rail Scen.**			**($2,317.45)**

Note(s)		
	Basis Value of Shipment	**$75,000**
	Time Value of Money	**5.50%**
	Equals Annual Time Value of Shipment	$4,125.00
	Equals Daily Cost (Divided by 365)	$11.30
Equals Hourly Time Value of Money Cost (Divided by 24)		**$0.47**
	Basis Shipments Per Week (Annual Volume)	52
	Annual Value of Shipments	$3,900,000
	Equals Daily Value of Shipments	$10,684.93
	Equals Hourly Value of Shipments	$445.21
	Hourly Shipment Inventory Cost	**$8.56**
TOTAL SHIPMENT INVENTORY COST (HOURLY)		**$9.03**

In this analysis, the longer distance corridors (Toronto to Winnipeg and Toronto to Vancouver) show a distinct advantage to use of containerized intermodal services – both in terms of direct transportation costs as well as when "time value" costs for shipments (in both directions) are included.

This possibly explains why there appears to be a significant market for shipping freight using this method over such distances. The introduction of C.O.F.C. services, in the "double stack" configuration, has greatly increased the "mode share" for this type of long distance door-to-door service.

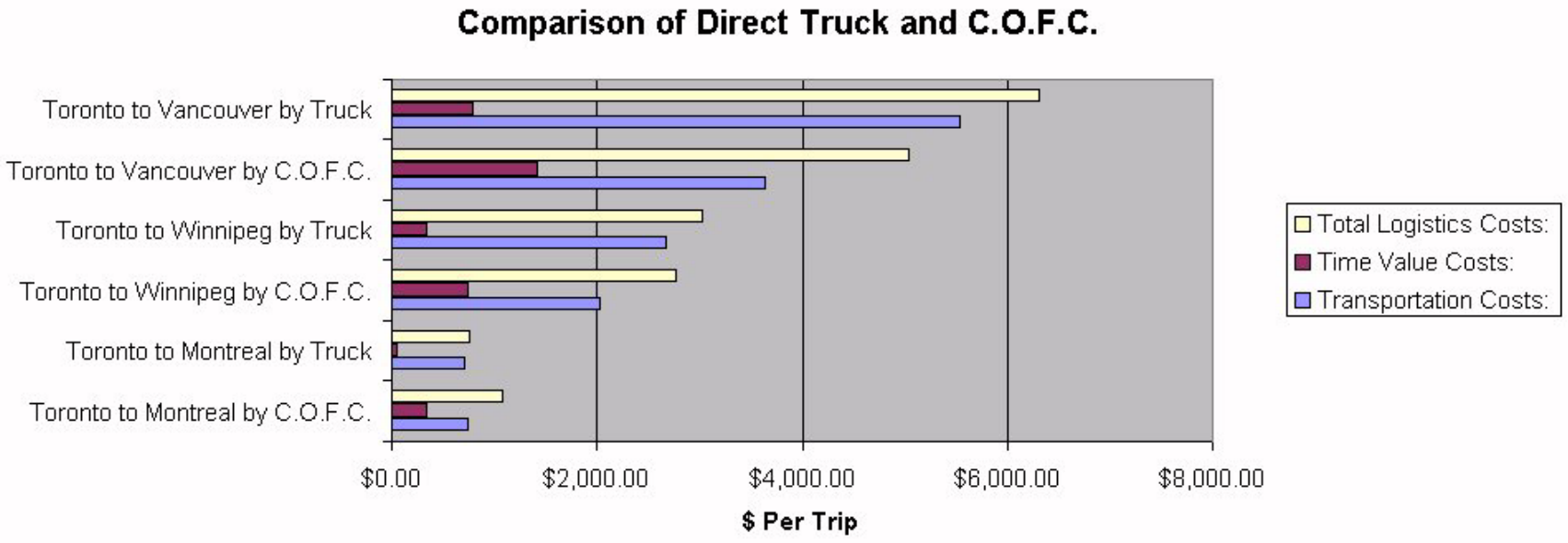
Clearly, only very high value / expedited shipments would be moved by direct trucking for these distances.

An interested reader, can, through adjusting the value of the shipment used for the "time value of shipment" computation at the bottom, develop sensitivity to the comparisons tabulated.

Graphically, COFC and direct trucking door-to-door compares as follows:

Toronto Outbound by C.O.F.C.

	Toronto to Montreal by C.O.F.C.	Toronto to Montreal by Truck	Toronto to Winnipeg by C.O.F.C.	Toronto to Winnipeg by Truck	Toronto to Vancouver by C.O.F.C.	Toronto to Vancouver by Truck
Transportation Costs:	$739.89	$709.79	$2,022.02	$2,678.62	$3,634.77	$5,529.69
Time Value Costs:	$334.20	$54.20	$740.67	$343.24	$1,409.08	$785.83
Total Logistics Costs:	$1,074.10	$763.98	$2,762.69	$3,021.85	$5,043.85	$6,315.52
Line Haul Costs:	$325.00	$709.79	$1,571.00	$2,678.62	$3,078.00	$5,529.69
Pick Up/Dely Costs:	$414.89	$0.00	$451.02	$0.00	$556.77	$0.00



Toronto Inbound by C.O.F.C.

	Montreal to Toronto by C.O.F.C.	Montreal to Toronto by Truck	Winnipeg to Toronto by C.O.F.C.	Winnipeg to Toronto by Truck	Vancouver to Toronto by C.O.F.C.	Vancouver to Toronto by Truck
Transportation Costs:	$735.72	$709.79	$1,270.06	$2,678.62	$2,549.40	$5,529.69
Time Value Costs:	$298.07	$54.20	$749.70	$343.24	$1,327.78	$785.83
Total Logistics Costs:	$1,033.80	$763.98	$2,019.76	$3,021.85	$3,877.18	$6,315.52
Line Haul Costs:	$325.00	$709.79	$818.00	$2,678.62	$2,002.00	$5,529.69
Pick Up/Dely Costs:	$410.72	$0.00	$452.06	$0.00	$547.40	$0.00