5.0 Automotive Fuels – Distribution

With the expansion and improvement in the highway system throughout Newfoundland and Labrador during the past three decades, the distribution of petroleum products has evolved from a network of marine terminals into one where imported product is stored in larger primary terminals and then trucked throughout the province. This has resulted in the closure of a number of smaller marine terminals, which had previously been the lifeline supply of petroleum products in many regions. Whereas it may first appear that using tractor-trailers to haul over long distances compared with delivery from local marine terminals is a more costly proposition, mitigating factors include:

- Higher thruputs at primary marine 'mother' terminals, which reduce costs on a CPL thruput basis.

- More centralized control and efficiencies in scheduling deliveries to retail gasoline outlets.

- Cost reductions in closing lower thruput marine terminals, including all operating costs and the high cost of insurance and liability claims and potential remediation operations.

Moreover, the major oil companies have gradually moved from operating their own tractor-trailer fleets to contract carriers, a process that is now practically universal in the province.

5.1 Costs of Land Transportation

The development of an accurate but flexible tractor-trailer costing model is therefore one of the more important elements in quantifying the costs of distribution of petroleum products throughout the province.

Costing Model for Tractor Trailer Transport of Petroleum Products

Some of the input factors considered in constructing a cost model for tractor-trailers (T/Ts) are:

- Total Load (litres) per T/T
- Loading and discharge times
- Distance travelled from the source terminal to the destination location including:
    - Distance travelled on Class A paved highways (TCH standard built and maintained highways)
    - Distance travelled on Class B paved highways (paved highways - good condition)
    - Distance travelled on Class C Roads (paved highways - fair condition)
    - Distance travelled on Class City/Town local roads
- Average speed attained on each road class
- Number of drops made per load
- Driver break-time and other delays
- T/T positioning cost at loading terminal
- Ferry crossing charges, where applicable
- Overnight accommodations for driver if applicable
- Other non-travel costs and idle time for T/T and driver, where applicable
- Diesel Fuel Surcharge* (DFS) applied as % of CPL haulage rate

  * See Table C-1, Appendix C for description of Diesel Fuel Surcharge

5.2 Tractor Trailer Deliveries of Gasolines to Bulk Plants

A basic costing model for full load tractor-trailer deliveries from specific marine terminals to specific bulk plants for gasolines was first developed. Proprietary T/T transportation rates were obtained from several of the prominent contract haulers operating in the province. A tractor-trailer costing model was then developed through a process of iteration using the input variables listed above in various formula structures. Known proprietary rates were used as reference markers, however, the nominal proprietary rates obtained did not always agree with each other and therefore a degree of judgement had to be employed in fine-tuning the costing model. The final model was applied to each instance where tractor-trailer transfers of gasolines from marine terminals to bulk plants would logically occur. These are summarized in Appendix C Table C-1. Sample detail calculation sheets using the developed costing model for three representative deliveries are also included in Appendix C as Tables C-2 and C-3. These rates compare favourably with proprietary rates obtained. Table 6 below gives a summary of the T/T rates to bulk plants where trucking operations for automotive fuels are currently in use.

Storage and Distribution Study

Table 6

Tractor Trailer Costs - Gasoline to Bulk Plants where Applicable

Zone	Sub	Zone Description	Originating Storage Terminal	Bulk Plant Location	T/T Freight To Bulk Plants (See Appendix C, for details) CPL
3	a	St. Brendan's from Avalon Peninsula	Avalon Marine Terminals	Gander	1.98
3	b	Fogo Island from Avalon Peninsula	Avalon Marine Terminals	Fogo Island	4.61
3	c	Change Islands - from Fogo BP via TW	Avalon Marine Terminals	Fogo Island	4.61
4		Connaigre Peninsula from Avalon	Avalon Marine Terminals	Pool's Cove Crossroads	3.56
4	a	Gaultois-McCallum-Rencontre East from BP (Drums)	Avalon Marine Terminals	Pool's Cove Crossroads	3.56
5		Springdale-Baie Verte from Corner Brook via BP	Corner Brook Marine Terminal	Springdale	1.44
5	a	Long Island via T/W Ex Springdale Bulk Plant	Corner Brook Marine Terminal	Springdale	1.44
5	b	Little Bay Islands via T/W ex Springdale BP	Corner Brook Marine Terminal	Springdale	1.44

5.3 Tractor Trailer Deliveries of Gasolines Direct to Retail Outlets

This was the most significant part of the Study with respect to evaluating automotive fuel zone boundaries and the pricing differentials between them.

The initial methodology employed was to use the T/T costing model to determine the cost of T/T deliveries to specific cities or towns and then to compare these rates with the cost of deliveries to adjacent communities. If these differences were not significant, and/or if there was no sparsely inhabited area or natural geographic boundaries between them, then the adjacent communities and areas would be annexed in turn to the hypothetically developing 'Pricing Zone'. In the case of the Avalon Peninsula, currently designated as Zone 1 by the PPPC, this procedure was incrementally advanced to the conclusion that except for Zone 1a (Bell Island) there was no reasonable or easily recognized intra-dividing geography between populated areas within the entire zone. The pricing of automotive fuels in a relatively continuously populated area means that there are usually no differences between pricing at

outlets in adjacent communities because the consumer can easily drive to the area of lower pricing for fuel purchases.

Each existing zone and sub-zone for automotive fuels within the province was subsequently analysed and tested in a similar manner with similar results.

An analysis was undertaken on an alternative-costing model for retail gasoline on the Avalon Peninsula whereby the larger centres were linked by a high population density 'geographic ribbon' that comprised the vast majority of high volume retail outlets throughout the zone. Whereas it made some sense to test the technical validity of this approach, it was eventually abandoned due to the perennial problem of deciding where a pricing zone or sub-zone boundary could reasonably be established in an area of adjoining and continuously populated geography.

It was finally concluded that the existing automotive fuel pricing zone boundaries were established as reasonably as they could be around the entire province. Another practical reason for not recommending any changes to these boundaries was that information gathered through field trips by the Consulting Team demonstrated that there were no negative comments or problems with the current boundaries and the existing zonal structure for automotive fuels.

The next task was to examine price differentials between the automotive fuel zones. A method to determine an average cost of product delivery to and within a zone or sub-zone was first necessary. The approach used identified T/T delivery costs to a particular city, town, or cluster of smaller communities in contiguous areas within the zone. These delivery rates were weighted by product volume consumption applicable to the each cluster and a final average delivery rate was then calculated for the zone in question. The database listing of retail outlets created and supplied by the PPPC was helpful but no detailed volume information by outlet was available from that, nor any other source.

The latest Statistics Canada Census (2001) was obtained and broken down by census sub-division. The populations of the larger centres and of clusters of communities within contiguous areas were determined. The selected area or 'sub-region' was then compared with the retail outlet listing provided by the PPPC and the number of outlets was noted for each sub-region. This was also an iterative process since if an identified sub-region had no outlets, then it would be included with the adjacent one where outlets did exist.

The number of outlets was also compared against the population to calculate the population per outlet for the sub-region. While this was of no meaningful value to the zone delivery rate calculation process, it did highlight the difficulty some of the smaller rural outlets might have in maintaining their economic viability for fuel sales in servicing a relatively small population.

Overall provincial gasoline consumption, numbers of motor vehicles, kilometres of roads and other information was sourced through Statistics Canada and the Economics and Statistics Branch of the Newfoundland & Labrador Statistics Agency. An analysis of these data showed that there was a direct and quantifiable relation between the population of areas connected by roads and the average consumption of automotive gasoline. Thus, in lieu of product consumption by retail outlet or area, which was unavailable, one could alternately use populations of identified 'clusters' of communities in zonal sub-regions for the purpose of arriving at a weighted average T/T delivery rate for the zone.

Appendix D Table D-1 uses the existing PPPC Zone 6 [Deer Lake/ Corner Brook/ Bay of Islands/ Gros Morne] as an example of the process undertaken for all zones in the determination of population by cluster and also gives the important average distance from the source terminal for all communities (and outlets) in each cluster. Appendix D Table D-2 applies the tractor-trailer costing model to the sample Zone 6 by cluster and then weights the delivery rates according to the percentage of the zone population within each cluster. The resultant calculated average CPL delivery rate should therefore be appropriate for the zone being considered. The model was adjusted to provide for cases where there would normally be more than one drop per T/T load. In fact, two or three drops were used in each case for all tractor-trailer deliveries.

Using the above methodology, the weighted average T/T delivery rates were calculated for each automotive fuel zone throughout the Island portion of the province. A summary of truck delivery rates for all applicable zones and sub-zones is presented in Appendix D Table D-3. It is concluded that same zone rate differentials are also applicable for diesel fuel; notwithstanding that only a very small number of retail outlets in the province carry diesel fuel for sale. (The vast majority of diesel is sold through Cardlock / Keylock facilities as commercial transactions)

Gasoline delivery rates for many of the sub-zones and for the Labrador areas had to be calculated using rates developed for tank-wagons (either tandem or single axle). These rates are also included in Appendix D Table D-3 however the process for these calculations is described in the next section of this Report.

5.4 Tank Wagon Deliveries of Gasolines to Retail Outlets

The approach to developing a costing model for the delivery of products by tank-wagon (straight truck) vehicles was quite different than that used for tractor-trailers. No proprietary carrier rates for tank-wagon deliveries were available for reference or comparison. The approach used was one of building up a delivery cost model using capital replacement costs and operating cost variables, employing methodology similar to that previously used for bulk plants.

Capital replacement costs for both single axle and tandem axle tank-wagons (T/W) completely equipped with cab and chassis, tank, pumping equipment, meter, hose reel, etc were obtained from local vehicle suppliers. Current costs (2004) were averaged at $195,000 for a fully equipped tandem axle with a 20,000-litre tank and $160,000 for a single axle with an 11,500 litre-tank.

Operating costs for each or these vehicles were then estimated using data from truck suppliers, some of the smaller petroleum companies in the province, and delivery agent owner/ operators. A summary of these costs is presented In Appendix E as Table E-1.

Each identified case where tank wagons are used to deliver gasoline or diesel fuel to retail outlets was addressed individually. Each tank-wagon delivery cost is calculated and included in separate sheets in Appendix E. In a few cases with confined geography, such in Zone 10 (Labrador Straits), there is insufficient retail outlet gasoline volume demand for the full time operation of even a dedicated single axle tank wagon. In such cases the dedicated vehicle is considered to be on a standby basis at a reduced cost during the periods it is not in use. (The changeover of tank trucks in gasoline service to carry distillate fuels is an extremely dangerous practice and is discouraged in the industry due to the potential of an

explosion caused by static electricity). The standby or idle time cost is therefore calculated and factored into the average gasoline delivery cost for the specific area as detailed in Appendix E.

Table 7 below summarizes all cents per litre cost estimates for T/T and T/W deliveries of gasoline to retail outlets in the applicable zones.

Storage and Distribution Study

Table 7

Trucking Costs of Automotive Fuels to Retail Outlets

Zone	Sub	Zone Description	Originating Storage Facility	Estimated Average T/T Freight from Marine Terminals to Retail Outlets (See Appendix D for Details) CPL	Estimated Average T/W Freight from Bulk Plants to Retail Outlets (See Appendix E for details) CPL
1		Avalon	St. John's / Holyrood Terminals	0.68	-
1	a	Bell Island	St. John's / Holyrood Terminals	1.42	-
2		Burin-Bonavista Pens	St. John's / Holyrood Terminals	2.11	-
3		Central Newfoundland from Avalon Peninsula	St. John's / Holyrood Terminals	2.62	-
3	a	St. Brendan's from Avalon Peninsula & Gander	Holyrood Marine Terminal	-	3.88
3	b	Fogo Island from Avalon Peninsula (Existing)	Holyrood Marine Terminal	-	0.92
3	c	Change Islands - from Fogo BP via TW (Existing)	Holyrood Marine Terminal	-	4.96
4		Connaigre Peninsula from Avalon (Existing)	Holyrood Marine Terminal	-	0.81
5		Springdale-Baie Verte from Corner Brook via BP	Corner Brook Marine Terminals	-	1.05
5	a	Long Island via T/W from Springdale Bulk Plant	Corner Brook Marine Terminals	-	4.69
5	b	Little Bay Islands via T/W from Springdale BP	Corner Brook Marine Terminals	-	5.04
6		Corner Brook Area	Corner Brook Marine Terminals	0.56	-
7		Stephenville-Port aux Basque - Burgeo	Corner Brook Marine Terminals	1.25	-
7	a	Ramea	Corner Brook Marine Terminals	4.05	-
8		Northern Peninsula South	Corner Brook Marine Terminals	1.39	-
9		Northern Peninsula North	Corner Brook Marine Terminals	2.93	-
10		Labrador-The Straits - Gasoline	Area Marine Deports	-	2.18
10		Labrador-The Straits - Arctic Diesel	Area Marine Deports	-	0.88
11		Labrador Coast South - Gasoline	Area Marine Deports/ Bulk Plants	-	2.49
11		Labrador Coast South - Arctic Diesel	Area Marine Deports/ Bulk Plants	-	1.65
12		Central Labrador (Goose Bay) - Gasoline	Goose Bay Marine Terminal	-	0.98
12		Central Labrador (Goose Bay) - Arctic Diesel	Goose Bay Marine Terminal	-	0.85
13		Western Labrador - Gasoline & Arctic Diesel	Labrador City Rail Car Bulk Plant	-	0.63
13	a	Churchill Falls - Gssoline & Arctic Diesel	Labrador City Rail Car Bulk Plant	-	2.72

5.5 Drum Deliveries of Gasoline to Isolated Communities

Drum deliveries for retail sales take place in three areas of the Island part of the province and potentially one location in Labrador. On the south coast of the Island, drums of gasoline and furnace oil are delivered by freight ferry from ports on the Connaigre Peninsula; Pool's Cove to Rencontre East; and from Hermitage to Gaultois and McCallum. Drum deliveries are also made from Burgeo to Grey River and Francois and can be made from Burgeo to Grand Bruit and La Poile. Alternately, drums can be shipped via freight ferry from Rose Blanche to supply Grand Bruit and La Poile.

There is also a freight ferry service that could supply fuel in drums from Petite Forte on the Burin Peninsula to the small community of South East Bight in Placentia Bay. It is understood, however, that petroleum product supply to South East Bight is provided by a

commercial enterprise to consumers there who, in turn, supply raw material for the enterprise and these particular transactions are not currently part of the petroleum pricing regulatory system.

With respect to drums delivered from ports on the Connaigre Peninsula, they are filled via tank-wagon at dockside either at Pool's Cove or Hermitage. When they arrive at the destination port and are unloaded, this is considered to be the 'Wholesale Point of Sale' for gasoline (or diesel fuel) in the community. From there, the distribution and sale by drum or other means to the end consumer would comprise the retail margin for the transaction. Appendix E, Table E-13 details the calculations involved in arriving at the cost of drums delivered to dockside in the destination communities from the bulk storage plant on the Connaigre Peninsula. This calculation generates part of the supply chain cost to arrive at a wholesale price for gasoline at the ports of delivery. The currently established retail margin for drums from dockside to the dispensing point of gasoline consumers is 10.0 cpl or $20.50 per drum. This margin is considered to be reasonable in all cases where drums must be handled. The same filling, handling and shipping costs would apply to diesel fuel supplied in drums to these communities, and therefore the landed cost for diesel in drums would be the same as that for gasoline.

With respect to drums of gasoline delivered to Grey River and other isolated south coast (western) ports, it is understood that these are currently loaded on an open truck and filled at a service station outlet in Burgeo. (There is no tank-wagon delivery of gasoline available in Burgeo on an ongoing basis, nor at Rose Blanche) The cost at the Burgeo retail outlet for the drums supplier is therefore the first link in the remaining supply chain to Grey River, Francois and the other communities. Appendix E, Table E-14 details the calculations involved in arriving at an average cost for drums of gasoline delivered to the destination communities via freight ferry from Burgeo. Dockside at the receiving communities would again be the 'Wholesale Point of Sale' for drums of gasoline. Diesel fuel delivered by drums to these communities would have the same freight ferry and handling cost as is calculated for heating fuel later in this report. (Appendix H, Table H-7b gives the calculation for furnace oil, and the same numbers would apply for diesel since the bulk plant at Burgeo would have storage for diesel).

An available freight ferry delivery service in Labrador could potentially service the small communities of Williams Harbour and Norman Bay on the South Labrador Coast. For some years up until 2002, it is understood that these communities were serviced via coastal marine tanker with small marine depots located in each. However, low sales volumes and the high cost of marine freight made continued operations uneconomical. Since deliveries ceased, the residents have apparently managed to service themselves by shipping fuel in drums or in other containers from Charlottetown or Port Hope Simpson. The freight ferry does, however, provide an alternate means to service these locations via drums. The calculation of the freight cost involved is quite different and much more expensive than that for the ferries on the south coast of the Island. For palletized freight such as drums the transportation cost is based on the actual weight or the cubic weight, whichever is greater. For full drums, the actual weight is used; while for empty drums returned, the cubic weight would be greater and thus would be used in the freight calculation. The landed costs in cents per litre is summarized in Appendix E, Table E-15, while the detailed calculation of freight for drums shipments to these communities is outlined in the Table E-15 Supplement. Separate Tables are presented for gasoline and for diesel fuel, since the ferry freight for diesel is higher. If the freight rates for drums on this ferry service were calculated the same as that for the ferries on the south coast of the Island, the shipping rates would be approximately 9.5 cpl lower than that those shown in these Tables.

5.6 Summary of Automotive Fuel Costs to the Wholesale Point of Sale

Table 8 below presents a summarized format of each identified cost in the supply chain to the wholesale point of sale for gasolines in each pricing zone. The ex-tax wholesale point of sale price to the retailer is taken as the standard reference price for automotive fuels. The retail margin add-on differs by the grade of gasoline and whether it is a self-serve or full-serve sale to the consumer. Unless otherwise noted in Table 8, the laid-in zone costs for diesel fuel can be taken to be the same as those for gasolines.

In Appendix F, supply chain diagrams depict more clearly how each element of the laid-in cost figures are applied for each zone and sub-zone as listed in Table 8.

Storage and Distribution Study

Table 8

Laid-in Cost of Automotive Fuels to Wholesale point of Sale

Zone	Sub	Automotive Fuels Calculated Laid-In Cost to Retail Outlet or Wholesale Point of Sale by Zone Zone Description	Estimated Marine Freight & Terminal / Depot Operating Cost (Table 5)	T/T Freight To Bulk Plants where Applicable (Table 6 & Table 9)	Associated Average Bulk Plant Operating Costs (Table 3 & Table 4)	Average T/T Freight to Retail Outlets (Table 7)	Average T/W Freight from BP to Retail Outlets where Applicable (Table 7)	Cost of Handling and Filling Drums at Loading Port (Appendix E)	Freight Cost Drums Delivered to Dockside Destination Port (Appendix E)	Total Laid-in Cost to Retail Outlets or Wholesale Point of Sale
			CPL	CPL	CPL	CPL	CPL	CPL	CPL	CPL
1		Avalon	1.66	-	-	0.68	-			**2.34**
1	a	Bell Island	1.66	-	-	1.42	-			**3.08**
2		Burin-Bonavista Pens	1.66	-	-	2.11	-			**3.77**
3		Central Newfoundland from Avalon Peninsula	1.66	-	-	2.62	-			**4.28**
3	a	St. Brendan's from Avalon Peninsula (Existing)	1.66	1.98	0.67	-	3.80			**8.11**
3	b	Fogo Island from Avalon Peninsula (Existing)	1.66	4.61	1.51	-	0.92			**8.70**
3	c	Change Islands - from Fogo BP via TW (Existing)	1.66	4.61	1.51	-	4.96			**12.74**
4		Connaigre Peninsula from Avalon (Existing)	1.66	3.56	1.03	-	0.81			**7.06**
4	a	Gaultois-McCallum-Rencontre East from Zone 4 (Drums)	1.66	3.56	1.03	-	-	2.97	0.97	**10.19**
5		Springdale-Baie Verte from Corner Brook via BP	2.41	1.44	0.71	-	1.05			**5.61**
5	a	Long Island via T/W Ex Springdale Bulk Plant	2.41	1.44	0.71	-	4.69			**9.25**
5	b	Little Bay Islands via T/W from Springdale BP	2.41	1.44	0.71	-	5.04			**9.60**
6		Corner Brook Area	2.41	-	-	0.56	-			**2.97**
7		Stephenville-Port aux Basque - Burgeo	2.41	-	-	1.25	-			**3.66**
7	a	Ramea	2.41	-	-	4.05	-			**6.46**
7	b	Grey River/La Poile/Grand Bruit/Francois - Gasoline (Drums)	2.41	-	-	1.25	-	8.98	1.37	**14.01**
7	b	Grey River/La Poile/Grand Bruit/Francois - Diesel (Drums)	2.41	2.05	2.35			2.75	1.52	**11.08**
8		Northern Peninsula South	2.41	-	-	1.39	-			**3.80**
9		Northern Peninsula North	2.41	-	-	2.93	-			**5.34**
10		Labrador-The Straits - Gasoline	6.87	-	-	-	2.18			**9.05**
10		Labrador-The Straits - Arctic Diesel	6.87	-	-	-	0.88			**7.75**
11		Labrador South - Lodge Bay to Cartwright - Gasoline	14.41	-	-	-	2.49			**16.90**
11		Labrador South - Lodge Bay to Cartwright - Arctic Diesel	14.03	-	-	-	1.65			**15.68**
11	a	Labrador Coast- South (Isolated Communities) - Gasoline	22.23	-	-	-	-			**22.23**
11	a	Labrador Coast- South (Isolated Communities) - Arctic Diesel	20.73	-	-	-	-			**20.73**
11	b	*Labrador Coast- South - (Drums- Freight Ferry) - Gasoline*	14.41	-	-	-	-	3.06	10.80	**28.27**
11	b	*Labrador Coast- South - (Drums- Freight Ferry) - Arctic Diesel*	14.03	-	-	-	-	3.06	11.48	**28.57**
12		Central Labrador (Goose Bay Area) - Gasoline	4.51	-	-	-	0.98			**5.49**
12		Central Labrador (Goose Bay Area) - Arctic Diesel	4.51	-	-	-	0.85			**5.36**
13		Western Labrador (Labrador City) - Gasoline & Artic Diesel	6.50	-	-	-	0.63			**7.13**
13	a	Churchill Falls - Gasoline & Arctic Diesel	6.50	-	-	-	2.72			**9.22**
14		Labrador Coast-North (Isolated Communities) - Gasoline	22.23	-	-	-	-			**22.23**
14		Labrador Coast- North (Isolated Communities) - Arctic Diesel	20.73	-	-	-	-			**20.73**

Note: The laid in cost for drums at dockside is used as the wholesale price to retailers at the destination community.