

TRUCKING INDUSTRY RESPONSE TO RTAC WEIGHT AND DIMENSION REGULATIONS

prepared for:
Second International Symposium on Heavy Vehicle Weights and Dimensions
Kelowna, June, 1989

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Acknowledgements: Funding for this research was provided by the Roads and Transportation Association of Canada, the Natural Sciences and Engineering Research Council of Canada, and the authors.

ABSTRACT

RTAC weight and dimension regulations for large trucks were agreed to by all provinces and territories on February 12, 1988. They should be fully in place by the end of 1989. The implementation process has been difficult and elements of non-uniformity are developing: 14.65 versus 16.2 m semitrailers, 23 versus 25 m overall lengths, etc.

This paper describes the industry's initial reaction to the new regulations based on a series of interviews from March to May 1989. The reactions are "initial" because aspects of the regulations are still imperfectly understood, fleets have not yet adjusted, provinces are still finalizing details, new standards are being developed, and industry is still pressing for changes.

Carriers in Western Canada, especially on the Prairies, are operating many RTAC trucks (and ordering more). This is using the term "RTAC" loosely to include many of the qualifying pre-RTAC configurations and many of the special permit large trucks which comply with elements of the February 12th agreement. Carriers in Eastern Canada, on the other hand, have done little in reaction to the RTAC regulations; few are ordering RTAC trailers. This is because: the regulations are not yet in place in some provinces (although RTAC trucks are allowed under permit); carriers still hold out hope of convincing provinces to adopt the 25-metre length limit and are putting off any decision to buy new trailers or tractors; and, carriers prefer aspects of their local regulations over the RTAC regulations.

There is just the beginnings of some evidence to suggest that RTAC regulations will facilitate the interprovincial movement of trucks. Some carriers are now operating more efficient RTAC configurations across borders where previously such equipment could not operate; others are beginning to think in terms of being able to "float" equipment from province-to-province according to the market; and some trailer manufacturers are now planning "national" models.

There is also just the beginnings of some evidence to suggest that the RTAC regulations are having their intended effect of encouraging some types of configurations over others: B-trains instead of the A-train, tractor-semitrailer instead of doubles, and the RTAC tridem instead of other multiple axle groups. But these "shifts" are small and there are many reasons why the effort to encourage the use one type of configuration over another is less successful than it might otherwise be.

A well-rounded criticism of the implementation process cannot be made here for the simple reason that no attempt has been made to investigate provincial procedures. Nevertheless, as the purpose of the work is to gauge the initial reaction to the RTAC regulations, it would be remiss not to report that a large component of this reaction has been in response to a widely-held perception that there have been problems.

Finally, the survey uncovers a long list of more minor points about the reaction to the regulations: everything from why the industry believes it will always use A-trains to more technical matters such as problems with overloads on the B-train tridem, difficulties in designing trailers for a C-train within the allowed 18.5 metres, and the inability of the RTAC A-train to handle two heavy containers.

1. Introduction

On February 12, 1988, the provinces and territories signed a Memorandum of Understanding which will result in (almost) uniform truck weight and dimension regulations across Canada. These RTAC regulations are detailed; however, in essence they permit the operation of four trucks on designated highways:

Tractor-semitrailer: This will be limited to a maximum of six axles, a semitrailer length of 14.65 metres (48'), and a gross vehicle weight (GVW) of 46.5 tonnes (102,500 lbs). In the text, the most common varieties are referred to as the 3-S2 (ie, a 3-axle tractor and a tandem-axle semitrailer) and the 3-S3 (ie, with a tridem-axle semitrailer).

A-train and C-train: A- and C-trains are allowed the same dimensions and weights: a length of 18.5 metres from the front of the first semitrailer to the back of the second (the "box length"), and a GVW of 53.5 tonnes (118,000 lbs). The most common A-trains are the 3-S2-A1-S1 and 3-S2-A1-S2 ("A" indicating an A-dolly) and the most common C-trains are the 3-S2-C1-S1 and 3-S2-C1-S2 ("C" indicating a C-dolly—a double drawbar dolly).

B-train: B-trains are allowed a maximum box length of 20.0 metres (65'7") and a GVW of 62.5 tonnes (137,800 lbs). The two most common B-trains are the 3-S2-S2 and 3-S3-S2. The B-train has both greater cube (20 m box length) and GVW than other doubles in an effort to encourage its use.⁽¹⁾

There are additional details to this description of the regulations. The most important are: there will continue to be trucks operating under local regulations (some are larger/heavier than RTAC trucks); there is an important regional variation (Western provinces allow 25 metres (82') in length and 16.2 metres (53') for semitrailers); there are many special permit trucks exceeding either the RTAC or local regulations (larger and/or heavier); and, there is a possibility that the regulations for C-trains will be modified.⁽²⁾

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TABLE 1 RTAC WEIGHT & DIMENSIONS REGULATIONS, 1989

	Maximum Limits	Commonly Used Units of Measurement
Height	4.15 m	13'6"
Width	2.6 m	102"
Length - combinations	23.0 m	75'6" (25.0 m or 82' West. Can.)
- semitrailers	14.65 m	48' (16.2 m or 53' West. Can.)
Box Length - tractor-semitrailer	14.65 m	48'
- A- & C-train	18.5 m	60'8" (2 X 28' possible)
- B-train	20.0 m	65'7" (2 X 31' possible)
Axle Loads - front, steering	5.5 t	12 kips (thousand pounds)
- single	9.1 t	20 kips
- tandem	17.0 t	37.5 kips
- tridem	24.0 t	53 kips (varies with spread)
GVWs - tractor-semitrailer	46.5 t	102.5 kips
- A- & C-train	53.5 t	118 kips (2nd pup limited to 16.0 t or 35 kips)
- B-train	62.5 t	137.8 kips

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The RTAC regulations are shown on Table 1. They will be in effect by the end of 1989, although in some provinces have had them in place since mid-1988, often on a permit basis. They are more complex than this: axle spreads, interaxle spacings, wheelbases, drawbar lengths, overhangs, and other features of the truck are regulated. Further, some regional and/or provincial variations are creeping into the final version of the regulations.

The purpose of this paper is to describe the industry's reaction to the new regulations. This is based on a series of interviews carried out from March to May 1989. Obviously only initial reactions are measured here: aspects of the regulations are still imperfectly understood; many fleets have not yet adjusted; some provinces are still finalizing details; and industry groups are still lobbying for changes and/or modifications to the regulations (which tempered their views during the interviews).

2. Comparison of Truck Types and Impact on Trucking Costs

To understand the industry's reaction, it is helpful to analyze the capacity changes that will occur. Table 2 shows the largest trucks prior to the RTAC regulations--there are qualifications to this information, such as special permit trucks, that are being overlooked. "Optimal" means the largest truck allowed under the regulations. These may not be optimal when purchase price, operating costs, and manoeuvrability are considered. In fact, some of these other factors are so important that the information shown has to be qualified.

In Atlantic Canada the 3-S2 with a 14.65-metre semitrailer is the largest truck for most operations. While doubles are possible, there are problems: the regulations only allow B-trains (without a permit) which are awkward with some freight; and, double 8.2-metre trailers under the pre-RTAC 21.0-metre length limit require the use of short wheelbase tractors.

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TABLE 2 OPTIMAL TRUCK CONFIGURATIONS, 1987

	<u>Cube-Out Freight</u>	<u>Weigh-Out Freight</u>
Nfld	double (2 X 8.2 m)	7 axles (52.5 t)
PEI	semi (14.65 m)***	6 axles (53.5 t)
NS	double (2 X 8.2 m)	6 axles (50.0 t)
NB	double (2 X 8.2 m)	7-axle B-train (56.5 t)
Que	semi + drome (14.7 + 5.5 m)*	6 axles (57.5 t)**
Ont	semi + drome (14.7 + 5.5 m)	8 axles (63.5 t)
Man	double (2 X 8.5 m)*	8-axle A-train (56.5 t)
Sask	double (2 X 8.5 m)*	7-axle double (53.5 t)**
Alta	double (2 X 8.5 m)*	7-axle double (53.5 t)**
BC	double (2 X 8.5 m)	8-axle double (63.5 t)
Yukon	semi (13.5 m)***	8 axles (63.5 t)
NWT	double (2 X 9.8)	7-axle double (54.5 t)

* long-combination trucks by permit

** heavier trucks by permit

*** doubles by permit

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The other region is from Quebec west where the double 8.5-metre (28') is the standard high cube truck. Although the use of dromes (freight-carrying boxes or platforms on the tractor) in Ontario and Quebec is, strictly, the method to maximize cube, for operational reasons the number of such trucks is limited.

So, considering standard vans, with nothing special such as drop frames or insulation, cube available in 1987 was roughly 99 m^3 ($3,500 \text{ ft}^3$) in Atlantic Canada and 115 m^3 ($4,070 \text{ ft}^3$) elsewhere. This overlooks complications involving larger combinations and/or special-permit requirements in the territories; and, it ignores long-combination trucks on some highways.

For weigh-out freight, where just the number of axles is indicated on Table 2, the highest GVW may be reached with either a tractor-semitrailer or a double. In Atlantic Canada, GVWs of this magnitude on tractor-semitrailers require the use of heavy (over 6 t) front axles which are not common except in operations such as dump trucks. B-train doubles and/or truck-plus-trailers are used more commonly for maximum GVWs. In three cases (Quebec, Ontario, the Yukon), tractor-semitrailers are registered at, or close to, the maximum GVW. Although these, too, have heavy steering axles (6 - 8 t), the more general reason why they can be used to reach maximum GVWs is that there are no restrictions on the number of axles on semitrailers (although in Quebec, a permit is needed for 4-axle semitrailers).

Given typical tare weights, then, maximum payloads under the standard regulations range from about 34 tonnes (75 kips) in Nova Scotia to about 45 tonnes (99 kips) in Ontario, British Columbia, and the Yukon.

The RTAC B-train will change the nature of "optimal" trucks in Canada, as shown in a recent analysis ⁽³⁾ and in Table 3. Actual variations in payload are easily +/- 10% of the values shown given variations in tare weight and body type. Further, calculations are based on a change from one optimal configuration to another where "optimal" is based only on weight and dimension regulations: the RTAC A-train and the 16.2-metre semitrailer do not even enter this discussion as they are not optimal under this criterium. The results shown for low-density freight must be qualified: in four provinces, long-combination trucks with as much as 199 m^3 ($7,000 \text{ ft}^3$) operate. The RTAC B-train with 128 m^3 ($4,500 \text{ ft}^3$) offers no payload increase, although it will sometimes be allowed to operate over a greater network of highways.

To summarize, the RTAC B-train will increase cubes by 12.5 m^3 or 10.8% in most parts of Canada. In Atlantic Canada, the increase will be 28.5 m^3 or 28.7%. If the RTAC A-train is used for low-density freight, then the only change is a 15.9 m^3 increase in Atlantic Canada as the rest of the country now has 8.5-metre doubles. Further, if current users of 14.65-metre semitrailers in Western Canada switch to the new 16.2-metre semitrailers, there will be a 10.4 m^3 cube increase in this region for some hauls. In terms of weight, the RTAC B-train will not increase loads in Ontario, British Columbia, or the Yukon, where the pre-RTAC GVW limit of 63.5 tonnes will be retained. Elsewhere, payloads will increase by anywhere from 3 to 10 tonnes. The increase of 7.2 tonnes across the Prairies is important not only because of trucking within the region, but also because the Prairies connect Central Canada with British Columbia. The most important increase in Atlantic Canada is Nova Scotia (9.6 t) not only because of the size of the increase, but also because Nova Scotia acts as a bridge between Newfoundland and the rest of the continent.

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TABLE 3 IMPACT OF RTAC B-TRAIN

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INCREASE (DECREASE) IN PAYLOADS

	Cube (m ³)			Weight (tonne)		
	Intra	Inter		Intra	Inter	
		E/S	W/N		E/S	W/N
Nfld	28.5	28.5	—	8.2	8.2	—
PEI	28.5	28.5	—	6.1	6.1	—
NS	28.5	28.5	28.5	9.6	9.6	8.2
NB	28.5	28.5	28.5	4.2	9.6	4.2
Que	12.5	28.5	12.5	3.2	4.2	3.1
Ont	12.5	12.5	12.5	(1.8)	3.2	4.7
Man	12.5	12.5	12.5	4.7	4.7	7.2
Sask	12.5	12.5	12.5	7.2	7.2	7.2
Alta	12.5	12.5	12.5	7.2	7.2	7.2
BC	12.5	12.5	12.5	(1.8)	7.2	(1.8)
Yukon	12.5	12.5	12.5	(1.8)	(1.8)	—
NWT	12.5	12.5	12.5	6.2	7.2	—

DECREASE (INCREASE) IN COSTS PER TONNE-KM (% Change in \$/tonne-km)

	Low-Density Freight			High-Density Freight		
	Intra	Inter		Intra	Inter	
		E/S	W/N		E/S	W/N
Nfld	10	9	—	17	23	—
PEI	8	8	—	15	23	—
NS	8	9	8	23	23	23
NB	8	8	9	8	23	8
Que	9	9	9	6	8	7
Ont	9	9	9	(5)	7	9
Man	9	9	9	8	9	15
Sask	9	9	9	15	15	15
Alta	9	9	9	15	15	16
BC	9	9	9	(5)	16	(5)
Yukon	9	9	9	(5)	(5)	—
NWT	9	9	9	13	15	—

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"Intra" = intraprovincial routes

"Inter, E/S" = interprovincial routes from the east or south

"Inter, W/N" = interprovincial routes from the west or north

"—" = not applicable

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The lower part of Table 3 shows the expected changes in trucking costs. These are the changes that occur as a carrier switches from the pre-RTAC optimal truck to the RTAC B-train. Obviously not all trucks prior to the RTAC regulations were "optimal" as that term is used here and obviously not all trucks after the introduction of the RTAC regulations are going to be RTAC B-trains. The figures shown on Table 4 are not a forecast of the changes in average trucking; they are the change in trucking costs if a carrier switches from one particular combination to another.

3. Survey Results

There is no importance to the order of the following subjects. An attempt has been made to group similar subjects together and to list material in a descending order of detail.

The information was collected during a difficult time. Regulations were in the process of change; many respondents were still holding out hope for changes; carriers had heard a number of stories about aspects of various equipment; many had not had experience with equipment on which they offered opinions. Obviously, under such circumstances, care has to be taken in interpreting the results. The authors have used judicious interpretations of the information received before reporting it. But all this care aside, the following may still contain superficial or "mis-informed" points. Some of it is still subject to change as the new regulations gradually take hold.

3.1 National Uniformity

One of the goals of the RTAC regulations was to facilitate the interprovincial movement of trucks by allowing them to move within a uniform regulatory environment. Prior to the RTAC regulations, there were only two ways of moving a truck across provincial borders: adopt the "lowest common denominator" truck, which, for coast-to-coast operations was the 3-S2 with a 14.64 metre semitrailer and axle loads and spacings set to those prevailing in the Prairies; or use a truck that could change as it crossed borders—"change" could include anything from a simple decrease in load to elaborate mechanisms for shifting axles, kingpins, and fifth wheels.

A few respondents saw the importance of national configurations but were so preoccupied with problems in the implementation of the regulations or so uncertain about their final form that they did not speak enthusiastically about the advent of such equipment. The reluctance to see the benefits of the new flexibility is also based on the fact that few carriers had yet undertaken steps to use a national fleet (it is still early; the regulations are not yet fully in place; there is uncertainty about aspects of the regulations). Also, many respondents operate only regionally and therefore do not see the importance of the "coast-to-coast" issue, and many carriers intend to retain existing equipment under local regulations. Only isolated instances of where the RTAC regulations have led to the more efficient movement of trucks across borders were uncovered during the interviews: one carrier is considering an RTAC 3-S3 for runs from Atlantic Canada to Western Canada (with an increase in potential payload of roughly 7 t over what was possible with single-trailer equipment previously); several carriers are beginning to operate 3-S3-S2 equipment across the British Columbia/Alberta border (petroleum products) and across the Manitoba/Ontario border (cement)—in both cases, trucks of this size could not operate across these borders under pre-RTAC regulations.

Despite the reluctance to see the advantages of the new uniformity, flawed as it may be, several carriers did note that they are now planning to buy equipment (dry and liquid bulk trailers) that could "float" from province-to-province as market forces dictate. Prior to the RTAC regulations, this was difficult to do—at least across the five major regulatory regions. But this ability to float equipment is flawed: differences are creeping into the RTAC

regulations as each province implements them which makes it difficult to "spec" the large bulk trailers for all provinces.

3.2 Vehicle Markets

Under pre-RTAC regulations, markets for equipment--mainly trailers, and more particularly the large bulk-hauling or specialty trailers--were fragmented. With the RTAC regulations, manufacturers will be able to build national models; carriers will be able to sell used vehicles in a wider market. All of this should make the market for vehicles (used or new) more efficient.

Although this is an important issue, it is too early to find many changes as a result of the RTAC regulations. One respondent, a manufacturer of tank trailers, noted that he lost his Western Canadian market some years ago and now builds primarily for the Ontario-Quebec market. As a result of the RTAC regulations, he is planning to build a standard RTAC B-train set and hopes to recapture some of the Western market. To this end, he has already placed advertisements in Western trucking magazines.

3.3 Differences Between Canada and the U.S.

One respondent, with operations on both sides of the border, noted that there appears to be a growing divergence in regulations in Canada and the United States: the Americans appear to be heading towards considerably lower axle loads and even longer axle spacings than the RTAC configurations.

3.4 International Operations

Canada-United States trucking is an important, and because of free trade, a growing part of trucking in Canada: it accounts for 14% of Canadian for-hire trucking revenues and 60 - 70% of all trade between the two countries (by value) is handled by the trucking mode.⁽⁴⁾ Not surprisingly, some shippers indicate they are now looking at ways of using the RTAC B-train to lower their transportation costs into American markets.

However, few carriers are planning to operate the RTAC 3-S3, the B-train, or the C-train on international operations: they assume there are too many regulatory constraints south of the border. While the RTAC regulations might facilitate some aspects of international trucking--for example, the standard RTAC A-train with double 28-foot (or sometimes 28'6") pups meets American regulations--most Canada-United States operations will be unaffected by the advent of the regulations. In some cases, because of the importance of these operations, the incompatibility between the regulations in Canada and the United States will affect a carrier's response: they will not switch to RTAC configurations--particularly the B-train and the 3-S3.

3.5 RTAC Configurations versus Local Configurations

From the information provided in Table 3, one would expect that the switch to RTAC configurations--primarily the B-train--would be greatest in Atlantic

Canada, followed by the Prairie provinces. The potential increase in payloads and decrease in trucking costs as a result of using the B-train, primarily for denser freight, is greatest in these regions. The results of the survey, however, suggest there are no plans (yet) for large-scale conversions to RTAC equipment:

- o Carriers operating international routes generally cannot switch to RTAC configurations (the A-train being the exception).
- o Carriers on the Prairies, while the most active in terms of purchasing new RTAC equipment, will continue to operate many special permit trucks: long-combination vehicles, special A-trains in Saskatchewan at 62.5 t, A- and C-trains in Alberta and Saskatchewan at 60.5 t. Admittedly, there is a semantic problem here as many of these permit trucks incorporate elements of the RTAC regulations.
- o Carriers in Eastern Canada prefer trucks complying with local regulations which are either heavier, larger, or more operationally efficient (with left/belly axles) than RTAC trucks.
- o Many carriers are adopting a "wait and see" attitude until they know the final form of the regulations: the designated roads, the overall length limit, the semitrailer length limit, the compatibility of RTAC regulations with new standards (four provinces) for long-combination vehicles, and proposed new limits for the RTAC C-train.

3.6 RTAC Tractor-Semitrailers

The RTAC regulations governing 5-axle tractor-semitrailers are compatible with a large number of existing configurations, particularly on the Prairies. The regulations governing the 3-S3 with its 21 - 24 tonne tridem axle are quite different than anything that has gone before. Factors affecting the use of tractor-semitrailer configurations are: the 53-foot semitrailers; designated roads; and the spread requirements for tridem axles.

The results of the survey suggest there is little interest in the RTAC 3-S2, but this is because it is not really new or because local 3-S2s (Eastern Canada) will continue to be more popular. The RTAC 3-S3 only appears to be of interest on the Prairies, which is not unexpected given that region's previous non-recognition of 3-axle groups and given other provinces' more generous allowances for other 3-axle groups under the continuing local regulations. As long as higher loadings--27 tonnes being common--are available on 3-axle groups in Eastern Canada, there is not much chance of the RTAC 3-S3 becoming popular east of Manitoba. The exception might be those (few) carriers who want to conduct East-West operations where doubles are not suitable.

Initial evidence from the Prairies suggests that the 3-S3 is used primarily by general freight carriers (where volumes or operations are not suitable for doubles), carriers operating on designated roads (Manitoba), container haulers, dump trucks, and some flatdeck or dropdeck operations. Interest in the RTAC tractor-semitrailers would change, however, if the 53-foot semitrailer were allowed in all provinces. It would allow carriers now operating doubles to look more favorably on tractor-semitrailer possibilities.

3.7 RTAC A-trains

RTAC regulations standardize a series of pre-RTAC features about the A-train: axle loads, box length, axle spacings, etc. Of most importance, they formalize the acceptance of the American A-train (2 X 28'), something the provinces were evolving towards in any case.

Many respondents still view A-trains as the most desirable double-trailer configuration given cost and operational characteristics or given routes into the United States. The RTAC regulations, by giving B-trains a payload advantage and by controlling more tightly the loading of an A-train, are having an impact on these views: a few carriers are switching from A- to B-trains. Several respondents expressed bitterness about this: they feel they are being unfairly forced out of A-trains; the "unfairness," in their view, is that government officials are mistaken about the safety of A-trains.

One large general freight carrier is considering switching back to a fleet of mainly 48-footers from its current fleet of over 100 A-trains. The reason is the rear-pup weight limit: RTAC regulations limit the weight of the second trailer in an A-train to 16,000 kg or the weight of the lead semitrailer, whichever is lowest. With a tandem-axle pup, freight with a density of over 187.2 kg/m³ (11.7 lbs/ft³) will weigh-out on these trailers (ie, hit the weight limit of roughly 10.8 t of payload before filling the cube of the trailer). Many general freight commodities have densities higher than this.

3.8 RTAC B-trains

B-trains were introduced in the early 1970s and have since become popular in for hauls involving generally large volumes of freight with dedicated equipment: petroleum products to retail outlets, potash on the Prairies; feeds, fertilizers, grains, and other agricultural commodities handled in dry bulk equipment; wood chips (hopper bottom), lumber (flat deck) and other forest products; tank operations where the equipment does not have to be split and reassembled. One of the goals of the RTAC regulations is to encourage truckers to switch from A-trains to B-trains as these are considered more stable vehicles. Accordingly, the regulations allow a 20-metre box length and a 62.5 tonne GVW—versus the A- and C-trains' 18.5 metres and 53.5 tonnes.

From the survey, there is a clear sense that the RTAC regulations are encouraging the use of B-trains:

- Respondents from British Columbia indicate that the RTAC regulations have boosted the popularity of B-trains (at the expense of the A-train), particularly for hauls such as wood chips, petroleum, and lumber.
- Respondents from the Prairies indicate there has been an increase in the number of B-trains, particularly the 3-S3-S2 (the "Super B") as a result of the RTAC regulations. Trailer manufacturers confirmed this, particularly for dry and liquid bulk carriers.
- There are few indications in Ontario that the RTAC regulations have done anything for the use of RTAC B-trains (one carrier has ordered one RTAC B-train, another is considering double 31' B-trains). Carriers have been

able to use the Ontario B-train at 63.5 tonnes for a long time. To date, there is no reason to switch to the RTAC B-train (the exceptions being those carriers operating Western routes).

- In Quebec, there are some heavy "old" B-trains operating under permit. Some carriers are now ordering new RTAC B-trains; two cases uncovered in the survey were vans with box lengths of 19.55 metres. They will be used to haul food products, beer, and metal products on intra Quebec routes. In terms of the "economics" of B-trains, one respondent reported a 14% increase in payload with these new B-trains (in comparison with the old B-trains which were shorter) and (roughly) 7% decrease in costs.
- In Atlantic Canada, a few carriers are beginning to consider the use of B-trains for heavy, bulk hauling applications.
- One carrier provided details on the only instance uncovered where freight (silica sand) is shifting from rail to truck as a result of the RTAC regulations. The shipper formerly shipped by both truck and rail, but found aspects of the rail service unsatisfactory. Apparently, the introduction of the 62.5 tonne B-train was enough to tip the scales: the shipper will now ship exclusively by truck. The haul is long (800 to 1600 km being a good guess); the carrier has managed to find a backhaul; and, the one annoying feature of the new regulations is that to load the sand the carrier has to take each trailer individually into the origin point for the last 16 km because of the policy on designated highways.

While the RTAC regulations are encouraging the use of the B-train, there are also a series of issues working against the faster introduction of RTAC B-trains: more popular local configurations (eg, the Atlantic 3-S3), special permit trucks on the Prairies (and in particular the high GVW A- and C-trains), problems with the designated roads (mainly Manitoba), the high cost of equipment and the less expensive alternatives of converting existing equipment into C-trains and even 3-axle semitrailers, indecision arising from the implementation process (the time it is taking, the belief that some governments will still change their minds, the guesswork about the future C-train, etc), and the different standards being adopted (primarily the 23/25 metre issue, but also the 53-foot semitrailer issue).

3.9 RTAC C-trains

The agreement of February 12th, 1988 gave C-trains the same box length (18.5 m) and the same GVW (53.5 t) as the A-train. Proposals to revise these limits are now being considered: RTAC is considering a GVW of 58.5 tonnes and Alberta and Saskatchewan are already permitting them at 60.5 tonnes. The advantages of C-trains are that they combine the flexibility of an A-train with the stability of a B-train. The flexibility is related to: lead and rear trailers may be switched; rear pup trailers may be dropped (unhooked) without having to lower landing gear; the lead semitrailers (just as in an A-train, but unlike a B-train) may be backed up to a dock.

Although many respondents had no experience operating C-trains, they still had negative views on the subject (excluding those in Saskatchewan or Alberta). Here is one more-or-less typical response: "C-trains just aren't worth the

expense and trouble. A C-dolly costs \$14,000, plus the cost of an extra pintle hook (\$500), plus the extra maintenance cost." The respondent was comparing a C-train with an A-train at the same GVW (53.5 t).

One respondent put the issue of A-, B-, and C-trains this way: "if a carrier needs the weight, he'll go for the B-train; but, if he can retrofit an A-train in the interim and gain a payload advantage, it's a lot cheaper than going out to buy a new B-train set." To interpret: the respondent prefers A-trains for operational and cost reasons, particularly where cube is the issue; if he really needs a configuration to haul heavy freight, he will chose the B-train (although he does not see anything wrong with a reasonably heavy A-train). Given the cost of a new B-train, though, he will use a C-train as an interim measure as long as he gets some payload advantage over the A-train.

In both Saskatchewan and Alberta C-trains are being registered at 60.5 tonnes. Given the difference in tare weight (the C-train is lighter), the C-train can be as productive as the B-train in these two provinces. This probably accounts for the greater enthusiasm for C-trains in these provinces.

3.10 23- versus 25-metre Overall Length Limit

The result of RTAC's technical studies was a recommendation for a 25-metre overall length limit. However, the February 12th agreement only went as far as 23-metres: there were pressures in Eastern Canada from automobile associations, railways, and municipalities that made the adoption of 25 metres politically difficult. The six Western jurisdictions, however, have proceeded to adopt the original 25-metre limit. This issue is now the most contentious aspect of the implementation of the RTAC regulations. At the time this paper was being prepared, Eastern provinces were planning to stay with 23 metres, although as late as May 1, 1989 Ontario and Quebec were still meeting to discuss the subject.

There are a few background points to establish. First, no carrier is actually penalized by 23-metres: 23-metres was the pre-RTAC limit for most configurations everywhere except Atlantic Canada, which had shorter limits.

Second, the difference between 23 and 25 metres does not affect the carrying capacity of trailers. Under either limit the largest unit, the RTAC B-train, has 4,500 to 4,600 ft³ of space or 95,000 lbs of carrying capacity. What the length limit does, is control the size (wheelbase and bumper-to-back-of-cab) of tractors and, in some cases, the centre of gravity. At 23 meters, a carrier has to use short wheelbase cab-over-engine (COE) tractors or certain short conventional tractors to pull the largest trailers allowed.

Third, haulers of dense commodities (roughly anything over 20 - 21 lbs/ft³) do not need full-length trailers with the RTAC B-train. They can easily use RTAC B-trains which weigh-out long before short-wheelbase tractors have to be used. In these cases, though, trailers that use less than the full 20 metres will have higher centres of gravity than they would otherwise.

Fourth, excluding these centre-of-gravity cases, carriers affected by the 23/25-metre issue are primarily those hauling low-density freight: they need the cube. There are also some carriers hauling denser commodities, usually on

a TL basis, between Ontario and Western Canada who may be affected: here, to take advantage of the increased GVW on the Prairies, RTAC B-trains have to be used; many of these carriers haul LTL freight as a headhaul and need the full-length B-train trailers.

The most frequent response to the 23/25 metre issue, from all parts of the country, is that this is the reason carriers are delaying making any decision about new configurations. There is a reluctance to purchase short wheelbase tractors required to haul the full-length B-trains within the 23-metre limit. The short wheelbase (and particularly COE) tractors have certain disadvantages: they are not popular with drivers; they only allow for cramped sleepers; they may cost more to operate than conventional tractors; some popular tractor makes cannot be used in these configurations; and, as reported by one respondent, the resale market for COE tractors is poor, particularly because of the absence of a second-hand market for them in the United States.

3.11 Forty-eight versus 53-foot Semitrailers

The regulations as originally proposed recommended 16.2 metres as the limit on semitrailer lengths. However, the final limit agreed to in February 12, 1988 was the (already standard) 14.65 metre semitrailer. The six Western provinces and territories have since adopted the 16.2 metre (53') limit.

The reason for the switch from 16.2 to 14.65 metres was a sharp division of opinion within the trucking industry. Some carriers, primarily in Central Canada, were strongly opposed to the introduction of the 53-foot semitrailer; others were in favour of them. The first group, in combination with rail interests, automobile associations, and municipal representatives convinced the provinces in Central Canada to stay with 48-foot trailers. (5)

The results of the survey suggest that carriers are still divided on this issue. Most of the strong opposition comes from carriers in Central Canada who feel they cannot afford to "be forced by competitive pressures" to re-equip with new 53-foot semitrailers. Other carriers offer this view: it is a serious mistake not to allow 53-foot trailers if, by allowing them, more general freight carriers could be induced to abandon their current A-trains.

3.12 Box Length Limit and the C-train

There is a problem with the current RTAC C-train as shown in the following. The example depends in part of the tandem axle spreads chosen and the fifth wheel offsets; it is understood these are needed to achieve the correct axle-load distribution (all units in inches):

		347" chassis		319.75" chassis	
		+-----+-----		+-----+-----	
axles	0	0---0	0---0	0	0---0
kingpin		36		18	
5th wheel		-18		-1	
tandems		54	50		50
spacings		+ 301 . .+ 118		+ 280 . .+	

The first axle spacing shown (301") results from the minimum interaxle spacing limit of 5.0 m between tandems ($197 + 54 + 50 = 301$). This also complies with the wheelbase requirement for the trailer of 6.5 metres. The second spacing shown is a result of the minimum interaxle spacing requirement of 3.0 (118") between single axles and tandems. The third interaxle spacing shown is a result of the minimum wheelbase requirement (6.5 m), less the one inch offset, plus half the tandem spread ($256 - 1 + 25 = 280$).

The problem is, with a box length of 18.5 m (728"), and with the front of the first trailer protruding 27 inches in front of the first drive tandem ($36 - 54/2 + 18 = 27$), there are only two inches left at the rear of the unit—that is, two inches from the centre of the last axle to the end of the allowed box length ($728 - (27 + 301 + 118 + 280) = 2$). A tire with a radius of 21.5 inches will protrude 19.5 inches beyond the end of the rear semitrailer.

3.13 Designated Highways

RTAC configurations are allowed to operate on a network of designated highways. For a variety of reasons—not covered here because the details are not known—RTAC trucks will be able to operate province-wide (or close to it) in many places. The most notable exception is Manitoba, although Nova Scotia may be similar. In earlier situations where provinces have allowed larger and/or heavier trucks to operate on a narrowly defined system of highways, it has been shown that many shippers cannot benefit from the more productive trucks.⁽⁶⁾ In particular, in regions where the hauling of resource-based commodities is important many origins and destinations lie off the primary highway network. In some cases, the origins and destinations lie "just off" the designated roads so that, for the sake of a few miles of secondary roads, the truck haul over many hundreds of kilometres of primary highways is restricted to a sub-optimal truck.

With one exception, the only problems with designated highways that have been confirmed in this survey occur in Manitoba. At least one major shipper, potentially one new meat processing plant, and several carriers are not planning to or cannot take advantage of the new RTAC B-train because of the inability to use these efficiently off the designated road system.

3.14 Loading Problems with the B-train

The RTAC B-train is difficult to load properly because of wheelbase and inter-axle spacing requirements. The following shows the nature of the problem.

required B-train load distribution

		+-----+-----	+-----+-----
axles	0	0--0	0--0--0
maximum loads (tne)	5.5	17.0	23.0

Actual load distributions (some freight)

		+-----+-----	+-----+-----
axles	0	0--0	0--0--0
maximum loads	5.0	17.0	24.5

With a minimum wheelbase for the second semitrailer of 6.25 metres and with the interaxle spacing requirement of at least 5.5 metres between a tandem and a tridem axle group, the last tandem is "shoved" well to the back. The result is that for some freight it is difficult to arrange to have 17 tonnes on the last tandems. Trailer designs can correct for this problem by having large kingpin setbacks (this moves the weight forward onto the tractor); this works better for some trailers (say, tanks) than others (vans) because of the maximum 2.0 metre radius limit on the kingpin setback. Other trailer designs have to ensure that the freight loads in the correct part of the trailer.

3.15 The RTAC Tridem

The February 12th agreement established the following limits for tridem axles:

<u>tractor-semitrailer</u>			
spread (m)	2.4 to , 3.0	3.0 to , 3.6	3.6 to 3.7
load (tne)	21.0	23.0	24.0
<u>B-train</u>			
spread (m)	2.4 to , 3.0	3.0 to 3.1	
load (tne)	21.0	23.0	

Here are what appear to be the deviations from the above limits.

British Columbia	24.0 tonne on <u>any</u> spread between 2.4 to 3.7 m
Quebec	25.0 tonne on a spread of 3.6 to 4.2 m (this is the old Quebec limit)
New Brunswick	it is understood that NB is "considering" the issue of 27 tonnes on a 3.6 - 3.7 m (12') spread.
Nova Scotia	27.0 tonne on a 12-foot spread (this may be on a special permit basis)
Prince Edward Island	it is understood that PEI will allow 27 tonne on a 12-foot spread.
Newfoundland	27.0 tonne on a 12-foot spread

The Atlantic provinces (possibly excluding New Brunswick) are retaining their old limit of 27.0 tonnes which had been permitted on a 4.8 m spread. It is assumed that the reason for doing so is to make the choice between the RTAC tridem (3.6 - 3.7 m) and the existing tri-axle (4.8 m) neutral with respect to load allowed. The problem with this strategy, according to respondents, is that it makes no sense to switch to the tridem as long as Quebec and Ontario do not allow 27 tonnes on 12 feet (which they do not).

The different standards are creating problems: Alberta notes that trucks from British Columbia are turning up at scale sites with overloaded tridems; the railways report they anticipate problems if carriers turn over tridem-axle piggyback trailers with weights not legal in the destination province.

On a more positive note, respondents report that the RTAC tridem has allowed wood chip haulers, and possibly other bulk carriers in British Columbia, to use a more convenient and efficient trailer. The RTAC tridem allows a larger "belly" to be built under the trailer. The old 3-axle groups in British Columbia had to have spreads of up to 5.3 metres for maximum loads. With the

tridem, and British Columbia's decision to allow up to 24 tonnes on anything over 2.4 metres, there is more room under the frame of a trailer. There may also be some improvements in the design of wood chip trailers in Atlantic Canada, although this depends in part on the load allowed on an RTAC tridem (ie, 27 t on 3.6 metres) and on the tolerances given to wood chip trucks.

Reaction to the tridem from an operational perspective have been mixed. In British Columbia, carriers prefer them to the tri-axle (with a self-steer) they replace; on the Prairies, carriers are unhappy about their performance given the spreads required (3.0 m tridems cause tire scrub, and even a few cracked frames on B-trains; 3.6 m tridems are "impossible" in the words of the respondents); in Central Canada carriers are indifferent (some already are using them, others having no plans to); and, in Atlantic Canada there is skepticism about the perceived operational costs and loss of manoeuvrability. There was a very strong feeling in Atlantic Canada that the existing tri-axles are far preferable to the RTAC tridems--even if they are allowed the RTAC tridem at 27 tonnes.

3.16 Load Sharing

One requirement of the RTAC regulations is that axles within a group (tandem, tridem) share loads in the sense that the load between adjacent axles "must not vary by any more than 1,000 kg." Respondents to the survey report that, in those provinces where scales are weighing individual axles within an axle group, many suspension systems cannot, in fact, share loads this accurately. It is understood that some provinces have stopped trying to enforce this aspect of the regulations.

3.17 Containers

Given the pre-RTAC axle loads and spacing requirements of Ontario and/or Quebec, loads of up to 32.3 tonnes (71,000 lbs) for one 40-foot container or loads of up to 48.1 tonnes (106,000 lbs) for two 20-foot containers in an A-train are easily accommodated. It will not be possible to use double 20-foot chassis in an A-train under RTAC regulations. The following shows why (note that the smallest deck under the RTAC regulations is about 7.57 m (24'10"); and that the spacings shown are the minimum possible with 1.5 m tandems):

		24'10" chassis		24'10" chassis	
		+-----+-----		+-----+-----	
axles	0	0---0	0---0	0	0---0
metres	+. . 3.0.	+ 8.0 . . .	+. 3.0	+ . . 7.25 . . .	+
	+ 21.25	+
loads:					
	GW		53.5 t		
	tare (approx)		14.0		
	payload		39.5		(87,100 lbs, which is not enough to handle two heavy 20' containers)

4. Summary

The main points arising from this survey are:

- 1/ Western Canada: Carriers, especially on the Prairies, are operating many RTAC trucks (and ordering more). However, in saying this, two points have to be noted: first, much of the existing equipment was easily accommodated under the RTAC regulations; second, many of the larger trucks are not strictly "RTAC configurations" in the sense of being one of the four outlined in the February 12, 1988 Memorandum (the long-combination vehicles, the heavy A-and C-trains do, however, incorporate aspects of the RTAC regulations).
- 2/ Eastern Canada: Carriers have done little in reaction to the RTAC regulations (few are ordering RTAC trailers). This is, in part, because the regulations are not yet in place in some provinces (although RTAC trucks are allowed under permit). Also, many carriers still hold out hope of convincing provinces to adopt the 25-metre length limit (they are, therefore, putting off any decision to buy new trailers or tractors); and many carriers prefer aspects of their local regulations over the RTAC regulations (the Atlantic tri-axle or Ontario's multi-axle trailers being good examples).
- 3/ National Uniformity: If one of the purposes of developing the RTAC regulations was to facilitate the interprovincial movement of trucks, there is just the beginnings of evidence to suggest this goal will be realized. Some carriers in Atlantic Canada are thinking of using the RTAC 3-S3 on hauls to/from Western Canada (with a consequent payload increase of up to 7 t). In the West, 8-axle RTAC B-trains are now operating between Alberta and British Columbia (previously, the largest feasible truck on this route before was a Prairie 3-S2-S2). In Central Canada, one carrier is operating out of Winnipeg into Northern Ontario with 8-axle B-trains, and respondents told of another carrier operating RTAC B-train vans on the Winnipeg-Toronto lane (full 20-metre box length, within the 23-metre length limit). Wood chip and petroleum haulers are beginning to think in terms of floating equipment from province-to-province as market forces dictate. Equipment manufacturers are beginning to make plans for national models.
- 4/ Impact on Configuration Types: If another goal of the RTAC regulations is to encourage the use of certain configurations instead of others, there is again just the beginnings of evidence that this is happening. A large general freight carrier is considering getting rid of its A-trains and replacing them with 48-foot semitrailers. Some carriers in Atlantic Canada are beginning to think of using B-trains. Many bulk haulers on the Prairies are using or are planning to use the Super B (the RTAC 3-S3-S2). Wood chip haulers, petroleum haulers, and lumber haulers in British Columbia are buying the RTAC 3-S3-S2.

However, there are reasons why the effort to encourage the use one type of configuration over another (the B-train instead of the A-train, tractor-semitrailer instead of the double, and the RTAC tridem instead of other multiple axle groups) is less successful than it might otherwise be: (a) Canada/United States operations; (b) different standards creeping

into the RTAC regulations; (c) indecision in Eastern Canada while carriers wait to see if they can convince governments to change their minds about 25 metres; (d) the split at the Manitoba/Ontario border on overall lengths and trailer lengths; (e) the high regard for the tri-axle in comparison to RTAC tridems in Eastern Canada; (f) policies in Saskatchewan (A- and C-trains) and Alberta (C-trains) that allow heavier doubles to compete with the B-train; and (g) the inability of the industry to adopt a common view on 53-foot semitrailers (which has an impact on the use of tractor-semitrailers instead of doubles).

5/ Implementation Problems: A well-rounded criticism of the implementation process cannot be made here for the simple reason that there has been no investigation of provincial procedures. Nevertheless, as the purpose of the work is to gauge the reaction to the RTAC regulations, it would be remiss not to report that a large component of this reaction has been in response to a widely-held perception that there have been problems. These, according to respondents, account for some of the indecision evident in Eastern Canada and they account for some of the equipment choices made by carriers in Western Canada. The perceived problems are that the implementation process has not been as smooth and orderly as it could have been: (a) there has been large timing differences (some provinces began to implement what they guessed to be RTAC regulations two years ago; others will not make the July, 1989 deadline); (b) the uniformity called for in the February 12th agreement has disappeared (23/25 metres, 48/53 feet, wheelbases, spread and load limits for the tridem, GVW limits for the C-train); (c) the wait for more permanent limits for the C-train and the policies in Alberta and Saskatchewan (60.5 t) have created confusion; and (d) some carriers are waiting to make a decision on future trailers needs until they know what the provinces are going to do with long-combination vehicles.

6/ Other Observations: Finally, the survey uncovered a long list of more minor points about the industry's reaction to the RTAC regulations: (a) the A-train is still highly favored (especially for international operations); (b) there are a few signs that some general freight operations (vans) will switch to B-trains; (c) the RTAC 3-S3 is mainly of interest to carriers on the Prairies; (d) there are problems in using RTAC B-trains in Manitoba because of the designated road policy; (e) some operational aspects of the RTAC tridem are creating problems (tire scrub, manoeuvring) and it does not appear that the 3.6-metre tridem will ever become very popular; (f) there are aspects of the RTAC regulations that will create problems for intermodal services; (g) aspects of the RTAC regulations (the tridem) have facilitated the design of some trailers; (h) other aspects of the RTAC regulations (box length limit) have made the design of other trailers more difficult; (i) the RTAC A-train will not be able to handle heavy 20-foot containers; (j) the load-sharing aspects of the RTAC regulations appear to be creating problems; and (k) there is a tendency for overload problems to occur on the tridem of an RTAC B-train.

REFERENCES & NOTES

1. Information on the regulations and the technical research backing up the RTAC standards is from:
 - o Council of Ministers Responsible for Transportation and Highway Safety, 1988, "Interprovincial Vehicle Weights and Dimensions Requirements Approved by Ministers of Transportation," Feb 12/89.
 - o Vehicle Weights and Dimensions Study Implementation Planning Subcommittee, 1987, Recommended Regulatory Principles for Interprovincial Heavy Vehicle Weights and Dimensions, Roads and Transportation Association of Canada, Ottawa.
 - o Canroad Transportation Research Corporation, 1986, Vehicle Weights and Dimension Study: Technical Steering Committee Report, Roads and Transportation Association of Canada, Ottawa.
2. John Woodrooffe, of the National Research Council, is reporting his findings in another paper: "Development of Design and Operational Guidelines for the C Converter Dolly," Second International Symposium on Heavy Vehicle Weights and Dimensions, June 1989. As this paper was being prepared, there was a proposal to increase the GVW of the C-train to 58.5 tonnes from the 53.5 t agreed to in the Feb 12/1988 agreement.
3. Nix, F.P., 1989, "Impact of RTAC Regulations on Trucking in Canada," TRB, Washington.
4. Statistics Canada, Trucking in Canada, cat # 53-222.
5. Details on each views of each group are documented in: Ontario Advisory Committee on Vehicle Weights and Dimensions, 1988, Report to the Minister, Toronto
6. Sparks, G.A., Courturier, R., Clayton, A.M., 1983, "Increasing Allowable Gross Vehicle Weights on Secondary Highways", Proceedings, CTRF, 18th annual meeting, Regina, pp. 27-1 - 27-28.
7. op. cit., CanRoads Study. In the 25,000 to 32,000 kg range, a tri-axle with an overall spread of 4.9 m and a tandem spread of 1.8 m is approximately 15% more destructive than an equally loaded, symmetrical tridem with a 3.7 m spread.
8. The Ontario Advisory Committee's report of February 1988 discusses the possibility of doing away with belly/lift axles.