



LAND TRANSPORT ISSUES FOR THE INDUSTRY

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ABSTRACT

Each year, several thousand packages of radioactive materials are transported by road or rail safely, securely and efficiently in countries around the world. Land transport is used to move a large variety of radioactive materials, for the medical sector, industrial uses and at various stages of the nuclear fuel cycle. It could even be said that every shipment starts and finishes its journey by being transported by land.

International transport by road and rail is by essence regional. In some instances, national requirements reflect the provisions developed in regional agreements, such as the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), contracted by forty-six states; in South America, the Mercosul/Mercosur agreement regulates the transport of dangerous goods by rail and road.

The World Nuclear Transport Institute (WNTI) represents the collective interests of the radioactive materials transport sector, with member companies drawn from a wide range of industry sectors, including major utilities, fuel producers and fabricators, transport companies, and the supply of large sources. Through its semi-annual members meeting, WNTI members have been able to share their experiences of land transport; for example in Europe and North America.

The land transport of radioactive materials faces issues specific to this mode, but which are not necessarily country or region-specific. This paper will present some of these issues which impact on transport operations and which have common features across the globe. With the North American experience as a case study, issues such as long distances through a varying landscape, driver shortages, the trade-off between road and rail, the emergency preparedness and response arrangements will be discussed, and suggestions for solutions will be given. Security and economic sustainability are also of important concern to those involved in the safe land transport of radioactive materials.

INTRODUCTION

Transport of Radioactive Materials by road and rail presents special challenges in all countries. Infrastructure in many developing countries is the greatest challenge. In developed countries, public acceptance and public perception make the routing chosen for these commodities one of the key issues. Each country and region has its own unique challenges but common issues and challenges are shared by most countries.



Rail companies in all jurisdictions have differing positions on whether they will accept certain Class 7 commodities. As well, their acceptance is based on how the commodities are stowed within the transport container and decisions can sometimes be subjectively based on the perceptions of the Hazardous Materials Manager of the company.

During a recent semi-annual members meeting of the World Nuclear Transport Institute (WNTI), various experiences around the world of the safe transport of radioactive materials by road and rail were shared by member companies. In our presentation today, we have concentrated principally on the North American land transport issues, as to address each region in the world would be overwhelming and take much longer than we have. This will allow participants to compare their specific regions with the issues within North America, principally addressing the USA and Canada as there are considerably more radioactive shipments in these countries than within or with Mexico.

ROAD AND RAIL TRANSPORT IN NORTH AMERICA

When we look at a map of North America, we can see that there are potentially large distances of travel between points in this region.

For example, within Canada, the distance from Halifax, Nova Scotia on the East Coast to Vancouver, to British Columbia on the West Coast is approximately 6,276 km (3,900 miles). When we average 800 km (500 miles) per day for a truck, this equates to a trip of approximately 8 days.

Within the USA, the distance from Miami, Florida to Seattle, Washington is about 5,470 km (3,400 miles).

In addition, Canada is the largest trading partner to the USA therefore land routes between these two countries are heavily utilized.

These distances and common routes create a difficult market for road and rail carriers. In North America, the road carrier market consists of a small number of very large carriers that cover most areas in the USA and Canada. Examples of this are Yellow-Roadways, J B Hunt, Ryder and Swift.

Furthermore, there are many smaller, regional carriers (Eastern Canada, Eastern USA, Western Canada, Western USA, Cross border long haul....) as well as concentrating on trailer fleet types such as van, flatbed, liquid bulk/dry bulk, etc.

Including Mexico into this mix adds a new dimension to the situation, as the dispute between the USA and Mexico on allowing open access for road carriers to each country is still at a stalemate more than 16 years after the North American Free Trade Agreement (NAFTA) was signed. Trucks driven by Mexican drivers are limited to a 40 km (25 mile) radius into the USA from the US/Mexican Border and Mexico has placed the same restriction on trucks driven by USA drivers coming into Mexico. This necessitates transfer of cargo or trailer interlining when destined beyond these limits. The USA has cited safety, drugs and immigration issues for this restriction.

CANADA – USA ROAD TRANSPORT



For road carriers in North America, the authorities of both countries have legislation in place to prevent cabotage. Therefore, a Canadian driver is not allowed to pickup and deliver a load within the USA and, in turn, a US driver is not allowed to pickup and deliver a load within Canada. This causes inefficiencies and certainly many extra empty miles of travel for carriers to find loads destined to return to their home country. This law is in place to prevent a foreign driver from “working” within the country.

A significant difference between Canadian and US legislation is in allowable trailer configurations and allowed total gross vehicle weights.

Within Canada, road weights for divisible loads are, in general, much higher than USA maximum road weights. For example, a tractor pulling a B-train (total 8 axles), can carry a combined cargo weight of approximately 39,460 kg (87,000 lbs). A tractor pulling a two axle trailer can load up to approximately 25,000 kg (55,000 lbs) cargo weight. Although allowable weights do differ between provinces, there is consistency in that various trailer configurations can carry similar cargo weights from one coast to the other in Canada.

In the USA, road weights are more stringent. For most interstates, unless a load is not divisible, the maximum Gross Vehicle Weight of a 5 axle unit is 80,000 lbs (36,287 kg). This equates to a maximum cargo weight of between 46,000 lbs (20,865 kg) to 52,000 Lbs (23,587 kg) depending on the weight of the tractor and trailer.

There are some highways in the US that have exceptions to this that allow B-trains, etc. but if the unit is travelling any distance, the above is the norm.

Most road carriers in North America operate on a very low margin of profit. Fixed and variable costs continue to increase. More stringent emissions legislation has caused tractor units to increase in value without much improvement in their fuel efficiency. Driver salaries are continually being forced upwards due to driver shortages.

Fuel price fluctuations have had a significant impact on financial results of road carriers. Despite fuel surcharges assessed by all carriers, the market is very competitive and fuel price fluctuations are generally not fully recoverable through the fuel surcharge.

A standard profit margin for a carrier in a good position is only 3 or 4 % of total revenue. Considering the financial risks and high capital investments required for equipment, these are very low margins.

The most recent recession has created financial difficulties with many carriers as the transport industry feels the impact in changes in economies very quickly and directly.

CANADA AND USA’S RAIL NETWORKS

When looking at a map of Canada, we can see that the majority of the population lives along the southern part of the country almost in a straight line from east to west. The rail line follows this same line with only a few off-line routes. This creates a very efficient railway system which travels long distances in literally a straight line without having many interline delays.



It is possible for a shipment by rail from western Canada to Eastern Canada to be delivered in less time than it takes for a truck to travel the same distance (unless the truck is manned by two drivers).

There are two large railways carriers in Canada who often share rail lines. CN Rail and CP Rail.

The USA rail system, as shown on a railway map, is significantly different. The rail lines cover the entire USA and are operated by several different railway companies depending often on regions. It is possible for a shipment from South-east USA to South-west USA to interline three or more times with different rail carriers. This creates additional costs, time inefficiencies and loss of control for shippers.

In the USA, shipping short distances by rail is usually not cost effective or practical (road costs at each end). Many of the tracks are operated by short line railroads that are aligned with one of the major carriers. The more interlining required, the higher the cost becomes.

RADIOACTIVE MATERIALS (RAM) TRANSPORTS BY ROAD AND RAIL

RAM Rail Carriers In Canada

CP Rail will accept RAM materials for shipment domestically. CN Rail will not accept most RAM materials.

Neither rail carrier in Canada will accept southbound shipments of RAM due to some problems which arose while authorities monitored containers which caused delays of the entire train. This means that all RAM shipments going southbound from Canada must be transported by road.

RAM Rail Carriers in USA

The majority of radioactive waste is transported by rail within the USA. This is usually large quantity, low level radioactive waste from decommissioning sites.

Due to the aforementioned issues with the USA rail systems and the number of interlines, most front end fuel cycle RAM shipments are not shipped by rail.

RAM Road Carriers in North America

In the USA, there are a few well established and well known road carriers of radioactive materials. These few are large enough to service most nuclear facilities in the USA. As well, there are some smaller carriers which service specific regions or specific nuclear facilities.

In Canada, there are a small number of regional carriers of RAM that service specific nuclear facilities.

Road Carrier Qualifications



In Canada and the USA, there are no specific governmental permits required for carriers to transport radioactive materials. Each country requires carriers to have Operating Authorities in order to operate as a road carrier for any material but these are easy to obtain and not restrictive.

In the USA, carriers must have a Federal Motor Carrier Safety Administration Hazardous Material Permit in order to carry any Hazardous Materials but these permits also are easy to obtain and not restricted.

The USA requires that carriers of Radioactive Materials which are not “Highway Route Controlled Quantities” have a minimum of \$1,000,000 in Third Party Liability Insurance. Carriers which handle “Highway Route Controlled Quantities” of Radioactive Materials must have a minimum of \$5,000,000.

2-19. Highway Route Controlled Quantity (49 CFR 173.403(1))

A highway route controlled quantity is the quantity within a single package which exceeds:

- a. 3,000 times the A1 value of the radionuclides as specified in 49 CFR 173.433 for special-form material;
- b. 3,000 times the A2 value of the radionuclide as specified in 49 CFR 173.433 for normal-form radioactive material; or
- c. 3,000 curies, whichever is least.

Considering the litigious culture of the USA, most reputable carriers have liability coverage well in excess of the minimum amount.

In Canada, it is important to note that the nuclear exclusion in insurance policies written in Canada also includes the exclusion of natural uranium such as Uranium Ore Concentrates or natural Uranium Hexafluoride.

For Canadian shippers of natural uranium, it is important to ensure that their carrier has an endorsement to their liability policies which covers natural uranium or that the shipments are covered by a Suppliers and Transporters Policy issued by the Nuclear Insurance Association of Canada (NIAC).

Canada’s minimum liability insurance requirements vary by Province but, in general, are around C\$1,000,000. Again this minimum amount is low and most carriers have higher coverage.

Driver Qualifications for RAM transport

In both the USA and Canada, drivers must have Hazardous Materials training as well as specific training for Class 7 Materials. Other than above, drivers must have a Government issued Driver’s Licence applicable to the type of equipment they are driving.

Road vs Intermodal (Road/Rail) – North America

In the USA and Canada, studies have shown that Railroads are more than three times as fuel-efficient as trucks (based on the American Association of Railroads energy efficiency statistics of



over 400 short ton-miles per gallon of diesel fuel in 2004). Therefore, utilization of rail instead of road over long distances can serve to improve the environmental “footprint” of the firm.

As well, utilizing rail increases transport safety as there are significantly less rail accidents per mile than road accidents.

Rail will, in most cases, provide lower costs particularly over longer distances but, particularly in the USA, rail can present a much longer transit time due to interline issues. As well, in the case of cargo such as RAM, rail presents more risks when the cargo is transferred between modes (road to rail) and between rail lines. This also makes for less direct control of the cargo.

Rail regulations require stronger tie-down systems than for road due to the more rough handling and shunting during rail transport.

Road carriers – Pricing

In North America, round trip shipments utilizing dedicated equipment is the easiest business for carriers to service. Road carrier pricing is based on a per mile basis unless the distance is very short and results in a flat day rate. One-way shipments where the carrier has to look for return freight provide a lot of pricing variables. How many miles will the unit have to run empty in order to pick up another load is the key pricing variable between carriers in these cases.

Emergency Response

USA – In most cases, the emergency number on the Bills of Lading is Chemtrec.

- CHEMTREC® was established in 1971 by the chemical industry as a public service hotline for emergency responders, such as fire fighters and law enforcement, to obtain information and assistance for emergency incidents involving chemicals and hazardous materials.
- Basic Registration with CHEMTREC® authorizes the Registrant to use the CHEMTREC emergency phone number on shipping documents where the origin and/or destination is in the United States or Canada.
- *Only companies registered with CHEMTREC are authorized to use the CHEMTREC emergency telephone number on their shipping documents and MSDS. Companies and entities that use the CHEMTREC number on their shipping documents without registering with CHEMTREC are subject to significant government fines and penalties.*

Canada:

- If the shipper or receiver of the Dangerous Goods is located in Canada, they must have a Transport Canada approved Emergency Response Assistance Plan (ERAP) in place for the specific commodity. Their ERAP will be the one that is utilized in the event of an incident. Bills of Lading must state the ERAP number and the Emergency Response phone number.
- If the Dangerous Goods are transiting Canada by land, a Canadian firm or citizen must have a Transport Canada approved Emergency Response Assistance Plan in place for the specific commodity. This can be the carrier, agent, transporter in the case of RAM transiting Canada.



LESSONS LEARNED

In addition to the transport regulations for road and rail, the industry's experiences could be seen as explained below as best practices for the safe and secure transport of radioactive materials by road.

Shippers of RAM have a duty of care to mitigate risks. The ways that they can do this start firstly with their selection of road carrier. The carrier's industry experience and reputation are critical as the established RAM carriers have processes, procedures and programs in place to ensure compliance with the regulations as well as specific knowledge related to the transport of RAM.

A safety and quality audit of a carrier utilized shows due diligence on the part of the shipper in their selection of carriers. Utilizing an experienced auditor with extensive knowledge of road carrier operations and regulations will provide the shipper with key information on their choice of carriers. Also, the US Department of Transport has published Safety Analysis Reports on all carriers which will indicate accident record, fines, enforcement issues and trends for each specific carrier. This information is publicly available and should be utilized by those responsible for choosing carriers

For most RAM transports it is wise to utilize the same drivers whenever possible. This expertise and knowledge becomes invaluable when the driver must deal with authorities or incidents during transport

Shipment routing is also a key issue and must comply with the relevant regulations and avoid high population areas whenever possible.

If an incident or worst case accident occurs, responsible carriers and transporters must be prepared to respond quickly and appropriately. If the quickest way to reach an accident site is by chartering an aircraft, this is what should be done as the longer an incident or accident site involving radioactive materials is allowed to be in the public eye, the more damage such an incident can do to the nuclear industry's reputation.

Although there does not appear to be a shortage of qualified road carriers of radioactive materials in Canada and the USA, shippers should be prepared to pay a premium for the carrier to transport these materials.

The nuclear industry has a much higher expectation of drivers than in the general trucking industry and the provision of reliable, experienced drivers are a higher cost to the carrier particularly with the severe shortage of drivers. Nuclear facilities react very strongly to any infraction on their facility and expect drivers to perform to the high standards of the facility. When trucks are entering nuclear facilities, the entire tractor including the driver's bunk is subject to search and this often is the home away from home for the drivers.

As well, on the public highways, the units are more often subject to being stopped by police or enforcement officers if they are carrying radioactive materials.

Incidents and accidents which involve radioactive materials can become very high profile and the authorities will be very thorough in their review of the incident, the carrier and all items related to



regulatory compliance. Therefore, the choice of carrier becomes a critical part of the nuclear facility's safety and compliance program.

Land transport is a key element in the transport chain for the radioactive materials. Through the WNTI Members Meetings and Working Groups, the industry has exchanged experiences and good practices, enhancing the safe and secure transport of radioactive materials.