Cost & Capital

July 2014

DOT Impact on Crude by Rail

Key Takeaways

- **DOT Tank Car Regulations –** On July 23rd, 2014, US Transportation Secretary Anthony Foxx recommended two changes that will impact the cost of shipping crude by rail: speed limits for volatile crude shipments and the phase out of old tank cars.
- **DOT 111 Retrofit –** Carriers and shippers can comply with the new tank car requirements by retrofitting the current fleet of DOT 111 tank cars with thicker steel, pressure relief valves and top fitting protection.
- **Speed Limits –** The proposal would reduce the speed limit for non-DOT 111 tank cars to 50 mph and as low as 30-40 mph in populated areas.
- **Netback Effect –** Rail has been used to transport crude oil to compensate for a lack of pipeline capacity in quickly developing oil producing regions in the US. The price differential between the consumption markets of the West Coast, East Coast and Gulf Coast are affected by the cost of transporting the crude, also known as the netback.
- **Cost Impact –** The cost of complying with the regulations could increase per barrel shipping prices by 2-4%.
- **Timing –** The comment period for the new requirements will close September 2014 and if the regulations pass, the older tank cars will need to be replaced for shipment of Bakken crude oil by October 2017.

Authors

Tom Bokowy
(208) 610-0032
tbokowy@costandcapital.com

Ryan Hatcher
(617) 459-0356
rhatcher@costandcapital.com

Cost and Capital Partners *is a management consulting firm that works with companies to improve cost and capital efficiency. Our client base includes Fortune 1000 companies from the energy, transportation, industrial, automotive, electronics, hospitality, process, consumer and white goods industries. We work with clients to improve results and enhance visibility for strategy development.*

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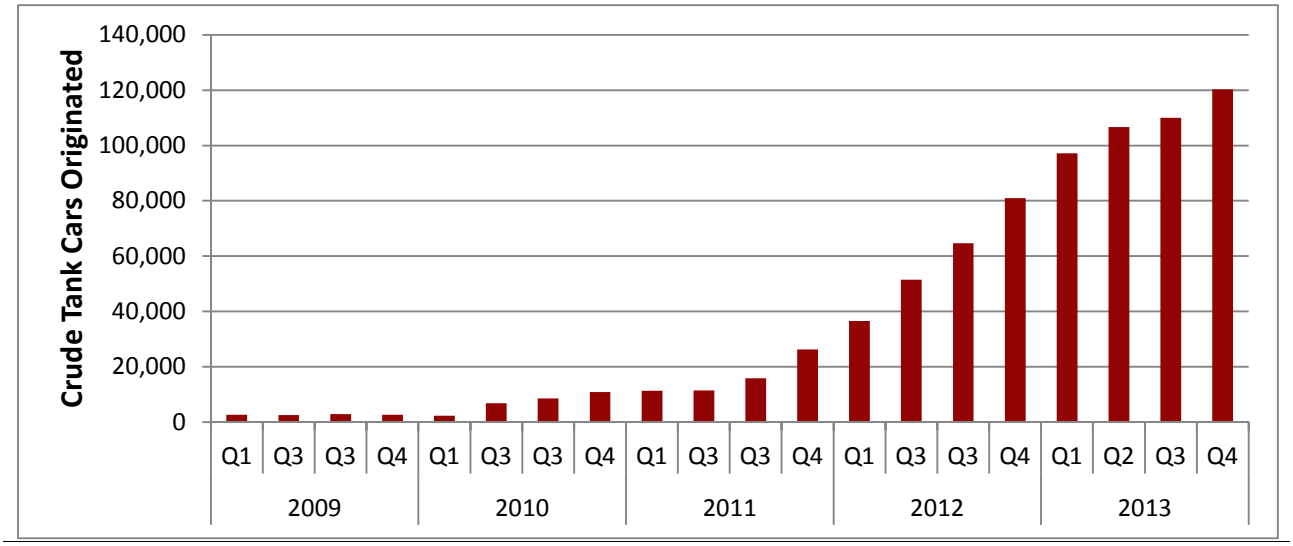
Table of contents

Introduction

Traditionally, crude oil has been shipped throughout the US via pipelines. However, as new drilling and extraction techniques open new geographies, pipelines have been slow to meet the supply from North Dakota and other shale plays. This has led to a dramatic increase in shipments via tank car and has brought attention to some of the potential hazards of transporting crude oil.

Figure 1: **Growth in Crude by Rail Shipments**



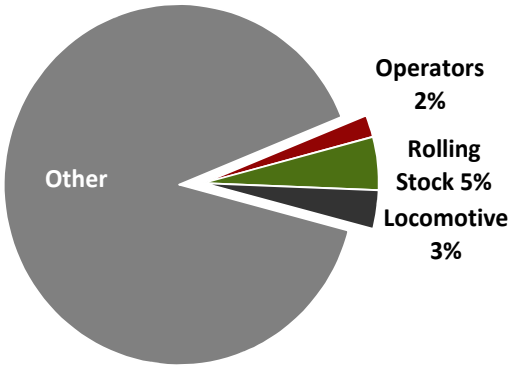
Source: AAR.

After several high-profile train derailments containing crude oil, particularly from the Bakken field in North Dakota, the US Department of Transportation has responded with a set of recommendations meant to reduce the risk of future derailments as well as reduce the severity of spills or explosions when derailments happen.

On July 23rd, 2014, U.S. Transportation Secretary Anthony Foxx, issued recommendations to improve safety when transporting crude by rail. Two of the key recommendations will affect producers, rail carriers and refineries that are involved with Bakken crude oil. The first is the recommendation to limit the top speed of unit trains (trains typically longer than 80 tank cars), to less than 50 miles per hour (or 40 miles per hour if the unit train contains at least one older DOT 111 railcar) from the current limit of 60 miles per hour. These limits will slow the trains and increase the amount of time to reach their destinations. As the trains move slower, the turnover of car and locomotive assets will reduce and the amount of crude oil inventory in transit will increase.

The second recommendation is to upgrade the current tank car fleet to include thicker steel, pressure relief valves and other safety features. Tank cars with the newer design are more costly due to the additional materials and equipment required as well as a limited number of companies currently capable of producing tank cars.

Figure 2: **Rail Price Affected by Changes**

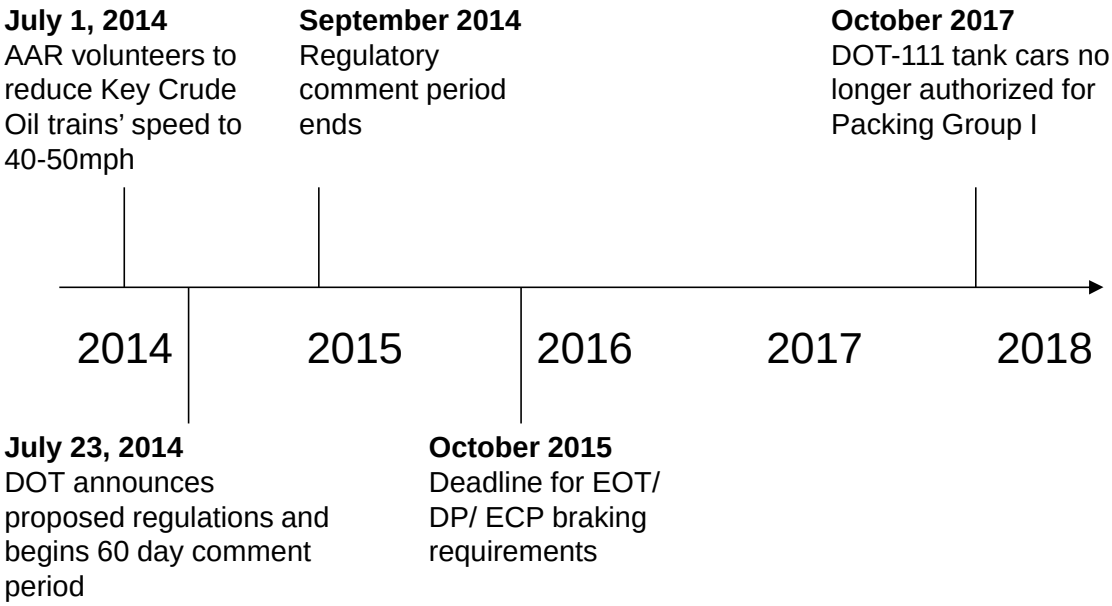


Source: Cost & Capital Analysis.

Regulations and Timing

The pending regulation has a 60 day public comment period at which point the Department of Transportation can enact the regulations. In this case, shippers and carriers will need to comply with the regulations. The first deadline, October 2015, will require locomotives to have electronically controlled pneumatic brakes (ECP Brakes). These braking systems are expected to cost $79,000 per locomotive to retrofit.

Figure 3: **Timeline of safety changes**



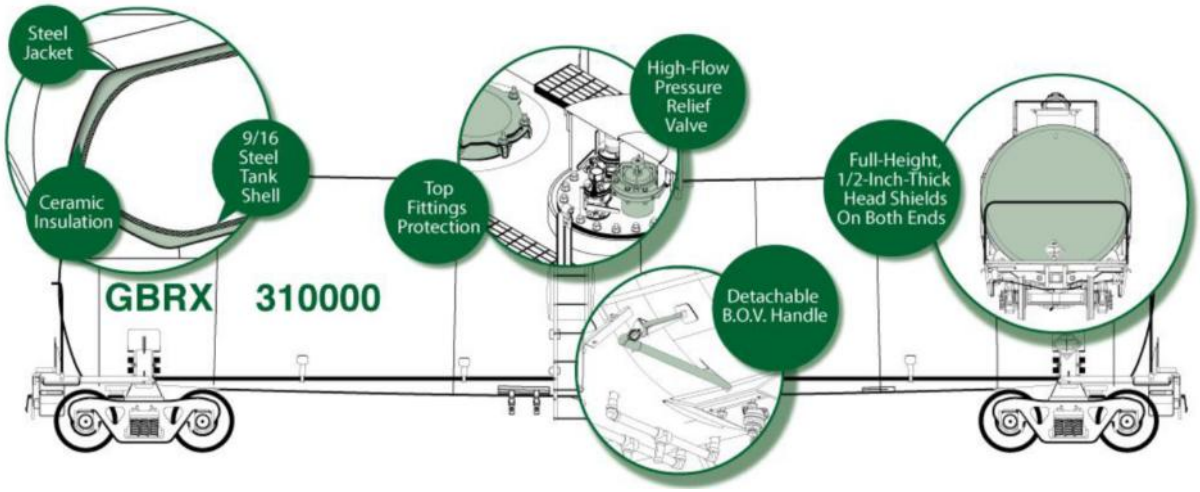
Source: US Department of Transportation.

Compliance and Estimated Costs

Tank Car Structure

To comply with the more stringent tank car design requirements, owners of the old tank cars known as DOT-111 will need to make changes to their tank cars to increase the steel thickness from 7/16" to 9/16", add updated pressure relief valves and other safety improvements. Costs for retrofitting an old DOT-111 tank car to the new standard will cost the owner of the car anywhere from $40,000 to $75,000 depending on the age

Figure 4: **Tank Car Safety Feature Illustration**



Source: Greenbrier May 2014 Investor Report.

and condition of the existing tank car. This compares to the price of a new tank car of $140,000.According to Railway Supply Institute, the industry currently has an order backlog of 58,910 tank cars. At current production levels, this backlog will be produced over a two-year period. The challenge is that the same companies that produce new tank cars are also the companies capable of retrofitting the old tank cars.

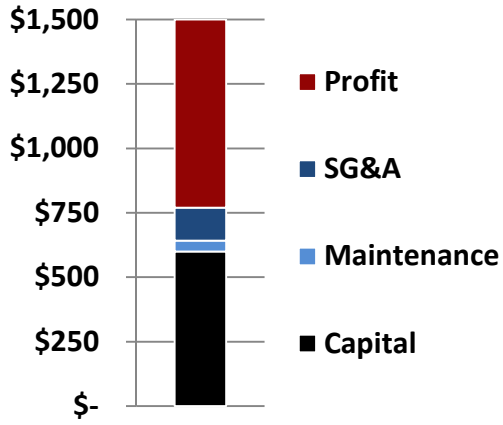
This will create a bottleneck for the supply of new and retrofitted rail cars to comply with the Department of Transportation requirement. Currently, there are four major companies capable of producing tank cars in North America: Union Tank Car, Trinity Industries, American Railcar and Greenbrier.

Car Leasing Cost Model

The cost for leasing a tank car is made up of four factors: the capital cost for the initial investment in the equipment, equipment maintenance, overhead of the leasing company and profit. As tank cars are currently in high demand, the profit premium has also been high. As seen in Figure 5, the primary cost driver for leasing a car is the cost of the capital for the initial purchase of the tank car.

The profit percentage can vary widely from one contract to another. Contracts that have been recently entered are likely to have a larger profit percentage as both the manufacturers and leasing companies know the market will bear the higher pricing. As the tank car build out balances supply and demand, the profit margins will likely come down.

Figure 5: **Car Leasing Monthly Cost Model**



Source: Cost & Capital Analysis.

Speed Limit Impact

The second requirement is the speed limit on crude oil unit trains. Unit trains are single commodity trains consisting typically of between 80 and 100 cars. Many of the unit trains originate in the oil plays such as the Bakken and travel directly to a refinery, storage or transfer to barge. For many common destinations, the speed limit will have a direct impact on costs to the rail carriers. Slower speed limits will mean that the tank cars and locomotives will make fewer trips per year. The slower speed limits will also increase the labor cost per shipment as it will take more time for trains to travel to their destinations. The following current and new travel times are based on Cost & Capital Analysis.

Table 1: **Rail Shipment Details for common Bakken Destinations**

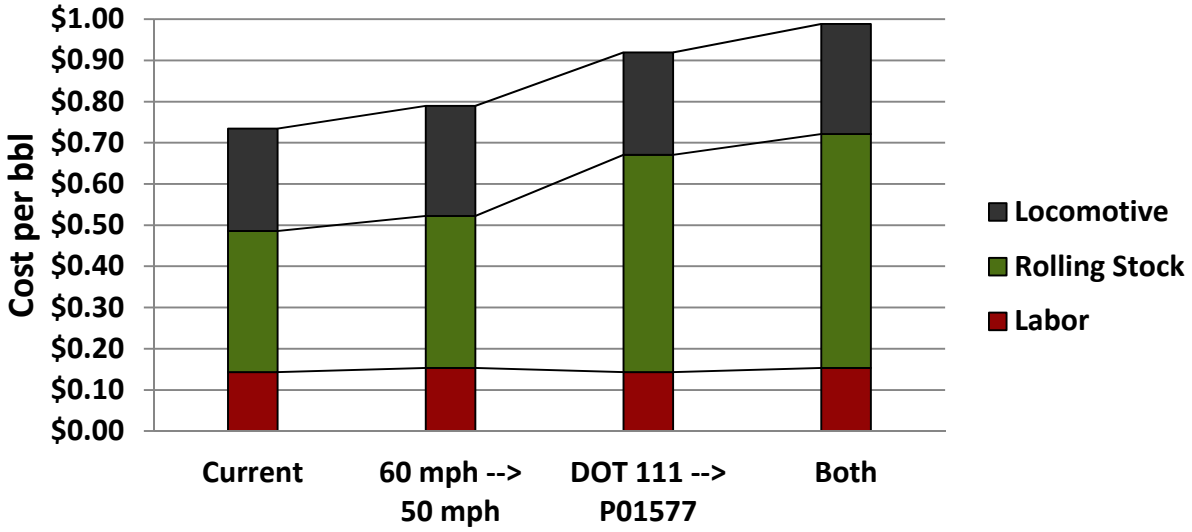
Destination	Distance (miles)	Travel Time	Current Cost	Cost Increase	Trips per Year	
					60 mph limit	50 mph limit
Anacortes, WA	1200	4.0 Days	$ 8.50	$ 0.26	30.0	27.9
USGC	1700	5.0 Days	$14.00	$ 0.31	25.7	23.7
Bakersfield, CA	1600	5.0 Days	$12.30	$ 0.30	25.7	23.8
Albany, NY	1900	5.5 Days	$ 9.00	$ 0.32	24.0	22.3
Yorktown, VA	1900	5.5 Days	$ 9.80	$ 0.32	24.0	22.3
Philadelphia, PA	1800	5.5 Days	$ 9.65	$ 0.31	24.0	22.4

Source: Cost & Capital Analysis

** Cost is based on the assumption of an 80 car unit train powered by three locomotives with a crew of three.*

To model the cost impact, Cost & Capital assessed the impact of the reduced number of trips as well as the capital costs for upgrading the current tank car fleet. The cost model is based on the assumption of an 80 car unit train powered by three locomotives with a crew of three. There are only three costs that are affected by the new regulations, the cost of the locomotives, the tank car rolling stock and the labor of the operators conducting the train.

Figure 6: **Rail Change in cost per barrel from Williston, ND to Anacortes, WA**



Source: Cost & Capital Analysis

In the following examples, the cost per barrel for delivering crude oil from the Bakken to Anacortes, WA is modeled. The first case is the cost if only the 50 mph limit is enacted. In this case, the carriers' labor cost for the conductor and car men will increase and asset turns will be reduced due to the lower number of potential trips per year. The second case models just the impact of the tank car upgrade. This will only affect the cost of the tank car as additional capital will be required for each car in service. In the final case, the cash impact per barrel is modeled based on both the speed limit restriction as well as the increased capital cost for the upgraded tank car. Figure 7 displays the net impact per barrel for major Bakken destinations.

Figure 7: **Change in rail cost per barrel based on implementation of both safety recommendations**

Conclusion

For major destinations from the Bakken, the impact of the proposed safety regulations will increase the price from $0.26 to $0.31 per transported barrel. The impact per gallon is close to $0.005 / gal. The net impact of complying with the Department of Transportation's requirements will be between 2-4% of the current cost to ship crude via train. Producers, carriers and refineries will need to incorporate the impact of these changes when calculating the netbacks for transporting crude from the Bakken to major consumption areas. These changes will affect the decisions for both where and how to transport crude oil from domestic sources to the key consumptions areas.

Figure 8: **Regulation impact on price**

Source: Cost & Capital Analysis.

Based on the proposed changes in regulations, organizations involved in the production, marketing, transporting and refining of crude oil will face changes to costs as well as demand for the crude produced. Organizations that are prepared with cost models, factual market analysis and an understanding of the changes will be able to secure the best supply agreements and transportation prices.

About Cost and Capital Partners

Cost and Capital Partners is a leader in market and cost analysis for our clients in the E&P, transportation and refining industry. Our cost models and market intelligence are used by our clients to navigate the changing dynamics of their industry. For additional information, call Tom Bokowy, at (208) 610-0032.