Freight Rail in Minnesota

In 2014, freight rail emerged as a key transportation topic in Minnesota, in part due to increases in the amount of crude oil being shipped on Minnesota's railroads. The impact of a changing railroad industry reaches beyond the rails that trains travel on, affecting communities and the state's economy in both positive and negative ways. The recovery of Minnesota's freight rail shipping industry signals that the state's economy is healthy. Freight rail provides an efficient, safe method for moving goods over long distances. Despite this, concerns about delays and safety around at-grade crossings, access to shipping opportunities for local producers, and the impact of freight shipments on passenger rail travel all present challenges for Minnesota's rail transportation system going forward.

FREIGHT RAIL'S RESURGENCE

Freight rail continues to be a major component of Minnesota's transportation network. The state is home to 4,485 miles of freight railroads served by 21 railroad companies. Rail companies suffered a downturn during the economic recession that began in late 2007 and continued in earnest for the better part of two years. Freight railroads in the United States started to show growth in 2011;[1] however, the positive trend has reversed following the decline in coal and crude oil shipments nationwide in 2015.[2]

A Profile of Freight Rail Shipments

Understanding the types and volumes of goods that move along Minnesota's railroads can help to describe the challenges and opportunities facing the industry. Minnesota has the eighth highest number of rail miles of all states in the nation. The rail network plays an important role in providing efficient connections, not only within the state, but also to markets beyond Minnesota's borders. Figure 1 shows the top commodities moved by railroads from and to the state. There are more carloads terminating than originating in Minnesota.

Figure 1: Top commodities originating in Minnesota in 2015 (carloads)[3]

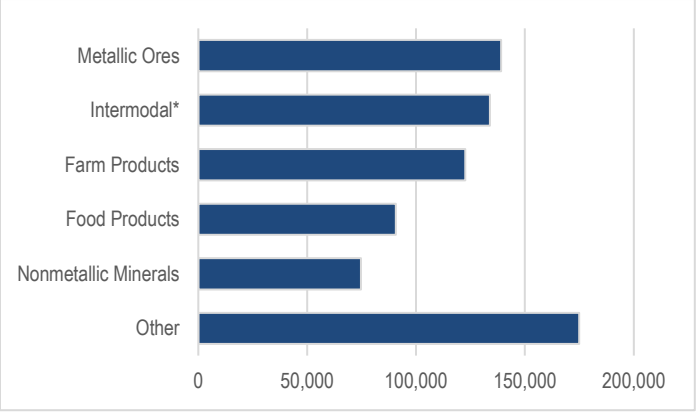
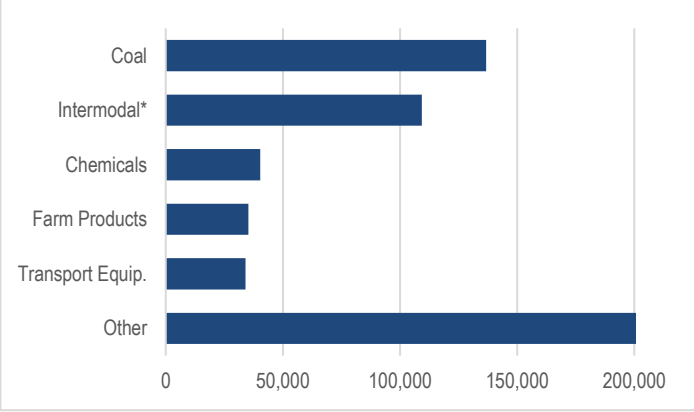


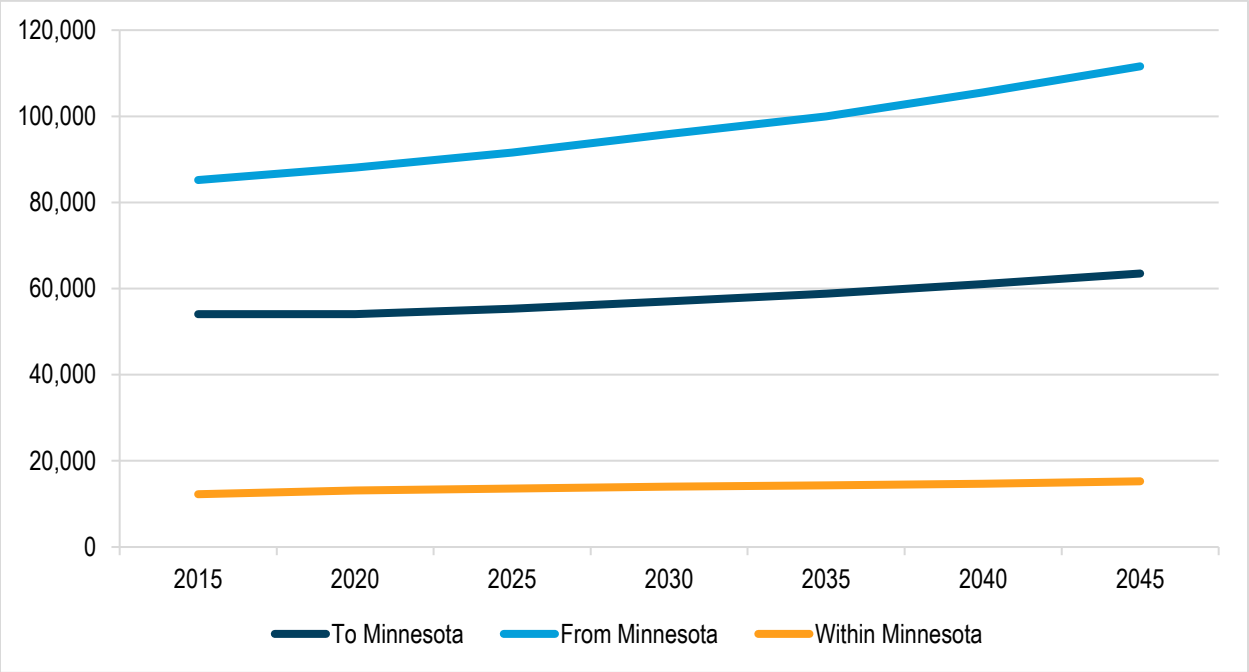
Figure 2: Top commodities terminating in Minnesota in 2015 (carloads)[4]



The Federal Highway Administration's Freight Analysis Framework (FAF) combines data from a variety of sources to provide an overview of freight movement in the United States.[5] The FAF database allows users to sort through data by geographic region, state, commodity, and mode of transportation. The dataset offers insight into forecasted trends for commodities shipped in Minnesota. Figure 3 shows the total tonnage of freight projected to be on the rails in Minnesota through the year 2045 under FAF 4.0 projections.

[1] Ibid.
[2] Ibid.
[3] Association of American Railroads, 2015
*Intermodal refers to transportation of freight in an intermodal container or vehicle, using multiple modes of transportation (rail, ship, and truck), without any handling of the freight itself when changing modes.
[4] Ibid.
[5] Freight Analysis Framework, 2010

Figure 3: Projected freight rail shipments involving Minnesota (thousands of tons)[6]



On the whole, the total tonnage of freight moving by rail is projected to increase steadily for shipments to and from Minnesota. Shipments by rail within the state are projected to increase as well, but at a slower rate.

The Rise of Crude-by-Rail

The United States has seen a dramatic turnaround in oil production during this decade. New technologies and advances in hydraulic fracturing ("fracking") and horizontal drilling have led to booming oil and gas production in shale deposits across the country.[7]

The Bakken Shale formation in North Dakota and the Canadian tar sands in Alberta, Canada are the more recent big players in oil production. Major rail routes travel from these two locations through Minnesota to refineries in the Gulf of Mexico and on the East Coast. Oil production from Canadian tar sands has increased steadily while production in North Dakota has grown at an exponential rate. In 2003, North Dakota produced 81,000 barrels of crude oil per day; in 2016 it was over 1 million barrels per day.[8] Finding ways to transport crude oil and its byproducts was a challenge for the industry given the rapid pace of growth in areas that had little oil production in the past. Freight rail became a stopgap solution intended to overcome a lack of pipeline infrastructure. Oil producers are more likely to choose to pay the higher price of shipping crude oil by rail when oil prices are high enough to offset the increased cost of transportation. During the boom in 2013, approximately three-fourths of the crude oil produced in North Dakota was shipped by rail. Oil prices began to decline in 2014 and by late 2016, less than one-third of North Dakota oil was transported by rail.

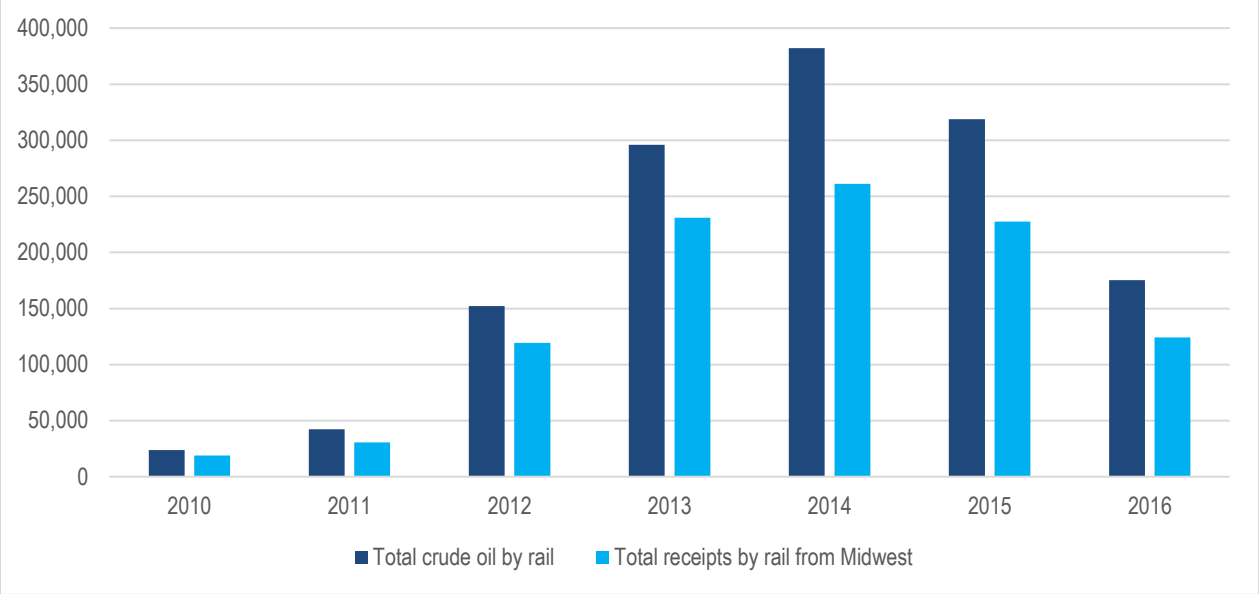
North Dakota is currently the second-largest oil producing state in the United States.[9] The formations in Bakken and surrounding areas are estimated to hold 7 billion barrels of oil;[10] most of that oil is located in North Dakota. The state's rapid growth and large reserve attract investments in oil pipelines. Energy Transfer Partners first announced the construction of Dakota Access Pipeline in 2014. The project aims to connect North Dakota through South Dakota, Iowa and down to a terminal in Illinois. Energy Transfer Partners claims that the pipeline can eliminate 500-740 rail cars

[6] Freight Analysis Framework 4.0, 2016
[7] Association of American Railroads, 2015
[8] Energy Information Administration, 2016
[9] Association of American Railroads, 2015
[10] BWAB, 2016

and/or more than 250 trucks needed to transport crude oil from the region every day.[11] The opening of Dakota Access Pipeline in June 2017 will likely diminish the use of rail for crude oil.

Despite the introduction of the pipeline, freight rail remains important in Minnesota for a number of reasons. Railroads in the Midwest Petroleum Administration for Defense Districts (Midwest PADD), in which Minnesota belongs, still has the highest traffic of oil in the nation. Figure 3 shows the movements of crude oil and selected products by rail across the United States and Canada. 70 percent of the national movements of crude oil and selected products by rail originates from the Midwest PADD.

Figure 3: Movements of crude oil and selected products by rail across the United States and Canada (in thousand barrels)[12]



Shipping by rail is appealing to producers for its adaptability to market changes. Generally speaking, railroad companies are more likely to enter into shorter-term contracts with shippers than pipelines (1-2 years as opposed to 10-15 years). Such flexibility is crucial as changes in oil price are very difficult to predict in the long term. If oil prices bounce back, shipping by rail might resurge in the future.

Another important issue in freight rail is safety. Government agencies and industry regulators have been working hard to improve the safety of railroad for crude oil movements. Bakken crude, as has been widely publicized, is highly volatile and prone to catching fire in the presence of an ignition source (sources could include sparks and heated metal that may occur at accident sites).[13] In 2014 the North Dakota Industrial Commission requires all oil producers in North Dakota to install and utilize oil-conditioning equipment to make shipping the oil less dangerous.[14] Table 3 provides an account of some recent crude-by-rail incidents in the United States and Canada.

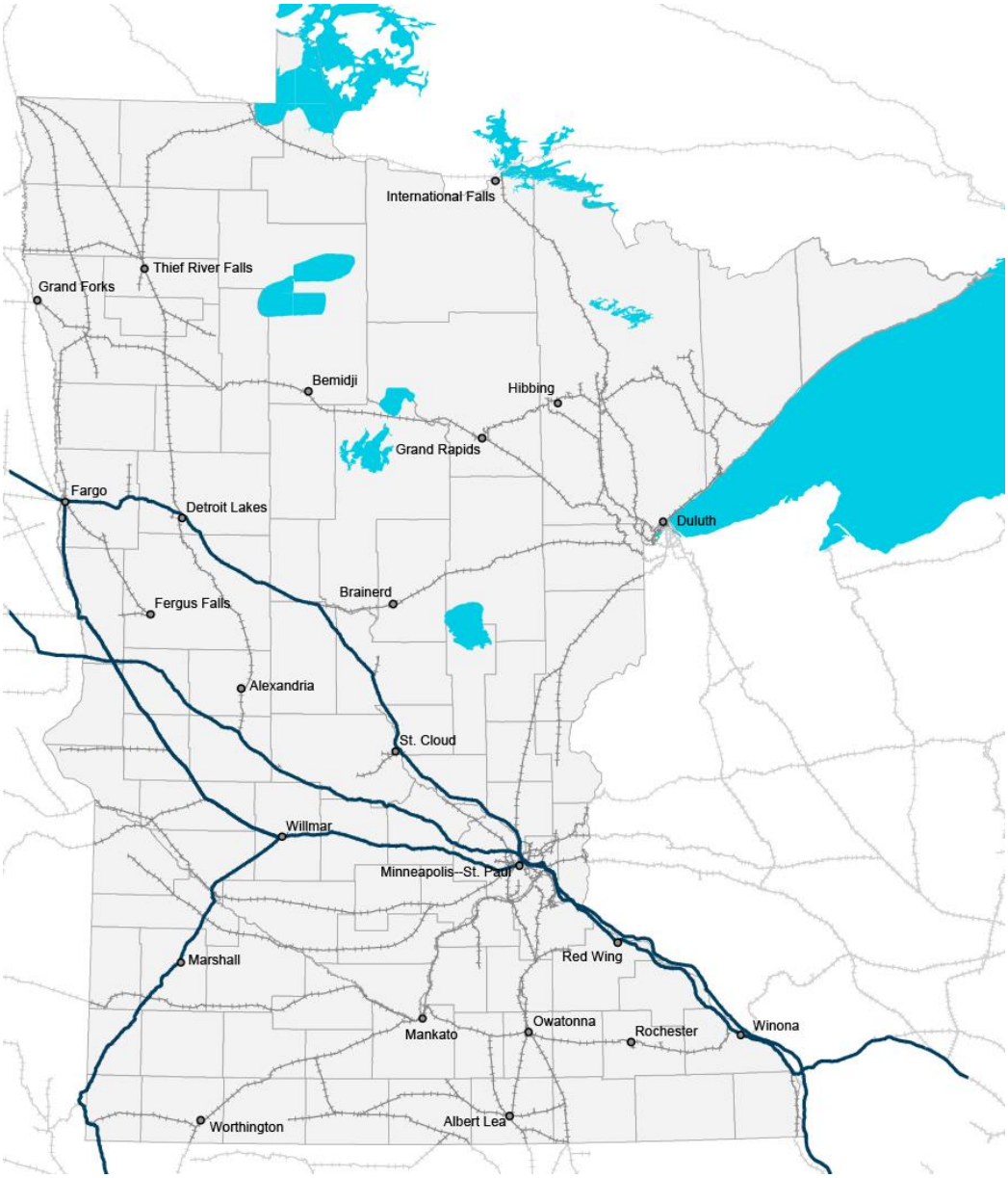
[11] Dakota Access Pipeline
[12] Energy Information Administration, 2016
[13] Minnesota Department of Transportation, 2014
[14] North Dakota Department of Mineral Resources, 2014

Table 3: Recent crude-by-rail incidents in North America

Location	Date	Description
Ellendale, MN	November 11, 2016	Derailment of 22 cars in a 146 car train. At least one of the cars was leaking liquid petroleum gas. Residents were evacuated for 7 hours.
Mosier, OR	June 3, 2016	Derailment of 11 tanker cars that caught fire in the Columbia River Gorge. 4 of them continued to burn into the evening. No oil had entered the river.
Ripley, NY	March 1, 2016	Derailment of 12 cars on the eastbound Norfolk Southern train from Ohio. 3 cars carrying hazardous liquids, including ethanol, were turned on their side in the accident.
St. Paul Park, MN	June 7, 2015	Collision between an oil train and semi-truck carrying flour in St. Paul Park, MN. No oil was spilled or ignited as a result of this incident.
Heimdal, ND	May 6, 2015	Derailment resulted in the burning of 6 rail cars. The cars were all manufactured after 2011 and have more safety features than older cars. Approximately 40 people were evacuated from the town as a result of the derailment.
Gogama, Ontario	March 7, 2015	Derailment of 10 tanker cars that caught fire, some of which entered the nearby Mattagami River system and impacted the Gogama and Mattagami First Nations.
Boomer, WV	February 16, 2015	Derailment and subsequent fire involving 16 tanker cars. The crash impacted the Kanawha River in Boomer, WV. 200 to 300 people were ordered to evacuate as a result of the incident, and local water supplies were impacted.
Vandergrift, PA	February 12, 2014	Derailment resulting in a 3,000 to 4,000 gallon spill near the Kiskiminetas River.

Concerns regarding crossings are not limited to the potential for crashes; blocked at-grade crossings can keep emergency responders from reaching their intended destinations when railroads bisect communities. While the most recent data indicates that railroads spill less oil per ton-mile than other modes of land transportation on a consistent basis, incidents like the near miss in St. Paul Park, MN continue to raise concerns about the potential consequences of an oil train incident. Figure 4 displays the rail routes that are used to ship Bakken crude oil across Minnesota.

Figure 4: Map of railroads used for Bakken crude oil shipments



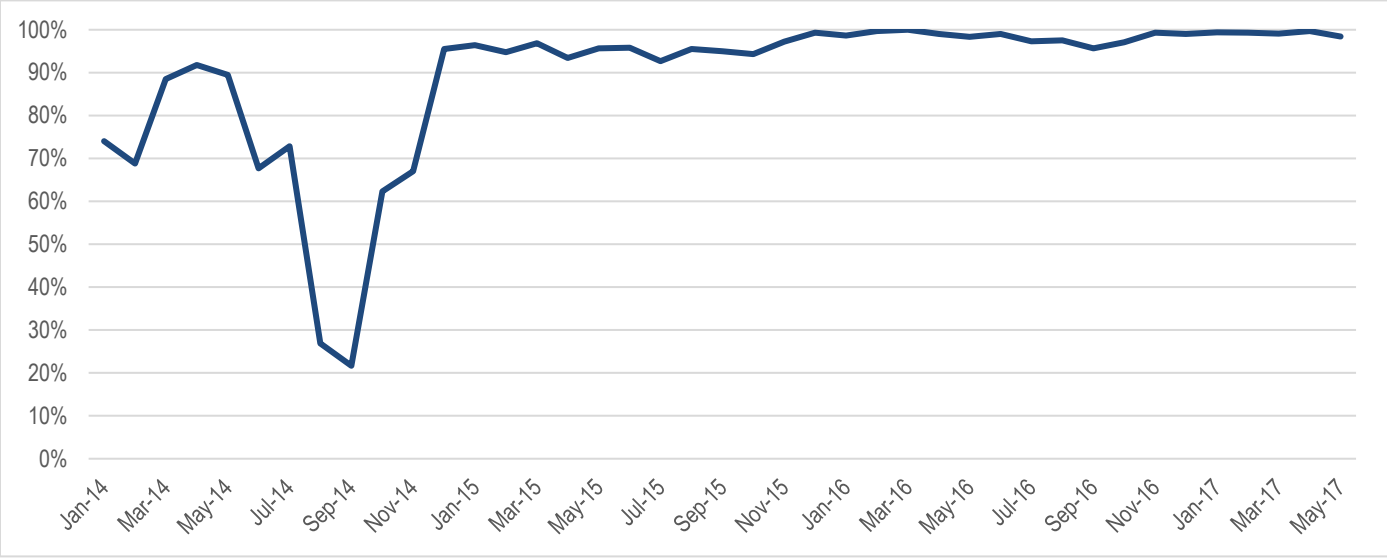
Communities along the routes shown above have expressed concerns about shipments of crude oil along railroads. There are 743 at-grade crossings of roads and railroads on the more than 700 miles of train routes that carry Bakken crude across the state, with a total financial shortfall of just under $250 million to make all crossings along the route safe. As of 2017, MnDOT has identified 16 high priority grade separation projects. The largest three projects in Moorhead, Wilmar Wye and Red Wing, respectively, are ready for construction.

IMPACT ON PASSENGER TRAVEL

Passenger Rail

Much has been made about the impact that increased crude-by-rail shipments have had on passenger rail operations. In Minnesota those impacts have been felt primarily by those traveling on Amtrak trains and the Northstar Commuter Rail line operated by Metro Transit. Figure 4 shows the on-time performance of Northstar since January of 2014. The 2014 spike in freight rail disrupted passenger service; the issue was resolved by the end of 2015 and the service has been stable ever since. This finding highlighted the potential of future freight rail growth to disrupt passenger service. Investments in the rail system, including double tracking in some shared freight and passenger corridors with heavy volumes, will be crucial in maintaining service and providing access to Minnesota's passenger and freight rail customers.

Figure 5: Northstar Commuter Rail on-time performance[15]

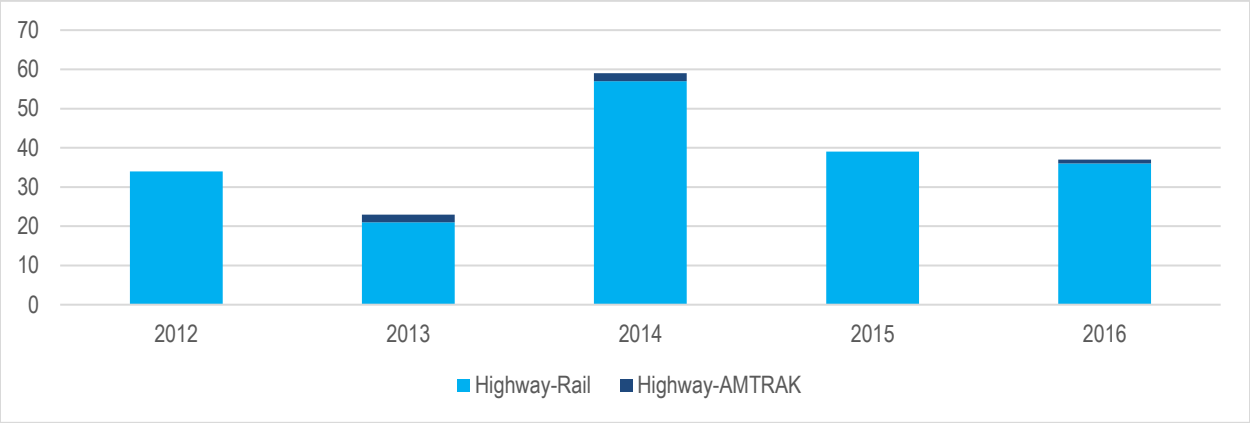


Automobile Travel

Increased train traffic along corridors that are used to ship Bakken crude oil cause delays for motorists waiting to cross the tracks. Given the extensive length of unit trains that carry Bakken crude, these delays are frequently long and present challenges to emergency response vehicles. Safety is also a key concern for travelers moving through at-grade crossings. Figure 5 shows an increase in highway and rail crossings incidents in 2014, coinciding with the peak of movements of crude oil by rail.

[15] Metro Transit

Figure 5: Highway-rail incidents in Minnesota (2016)[16]



Related Trends

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[16] Federal Railroad Administration, 2016