Large Truck Safety in the Bakken Oil-Producing Region

BACKGROUND

The Bakken shale oil-producing region encompasses parts of North Dakota and Montana in the United States and Saskatchewan and Manitoba in Canada, with North Dakota accounting for 93 percent of the U.S. production (see Figure 1).[1] The U.S. Energy Information Administration reports that as of February 2015, the Bakken region was producing more than 1.3 million barrels of oil per day.[2]

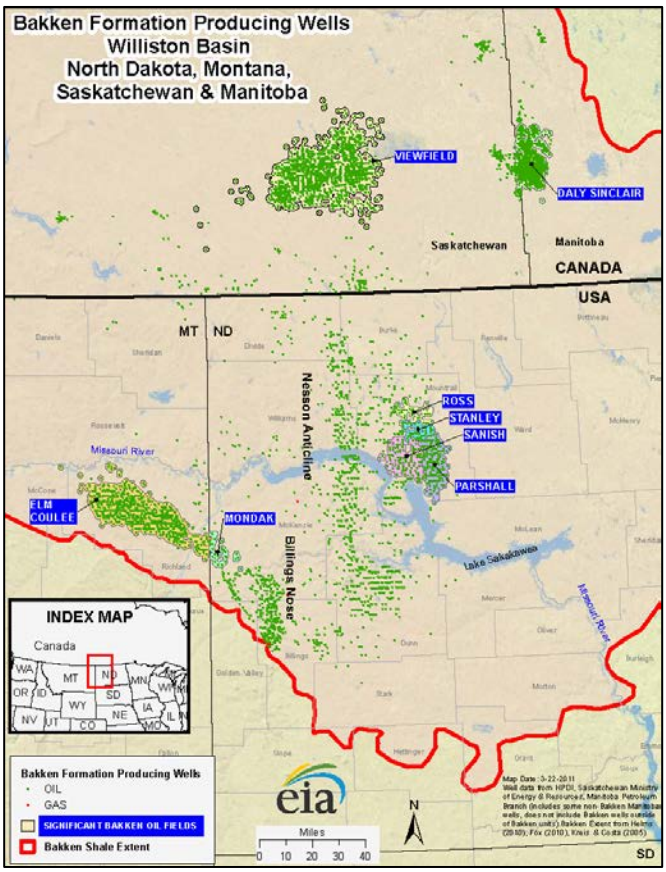

Figure 1. Map. Bakken oil-producing region.

The expansion of Bakken oil production has increased large truck traffic—specifically large trucks carrying oil, water, sand, and other materials to support drilling operations and to transport the crude oil from the wells to the rail heads and pipelines. The Upper Great Plains Transportation Institute estimates 2,300 total truck trips per well over the course of a well's production life (see Table 2). North Dakota is routinely experiencing 75 truck trips per day on county roads in the oil patch and on some days more than 1,000 truck trips.[3]

CRASHES

The increased traffic brings increased safety risk, as much of the heavy truck traffic occurs on two-lane rural roads. Since the start of the Bakken oil boom in 2007, the number of crashes involving large trucks in the counties encompassing the Bakken region has increased (see Table 1, Table 3, and Table 4).

Table 1. Large truck injury and fatal crashes and out-of-service (OOS) rates in the Bakken oil-producing counties of Montana and North Dakota, 2007 and 2013.

Crashes/OOS Rates	2007	2013
Injury crashes	47	242
Fatal crashes	7	49
OOS rate for vehicle inspection	14.40%	24.50%
OOS rate for driver inspection	3.95%	5.88%

*The Bakken counties are defined as: Daniels, Dawson, Fallon, Garfield, McCone, Prairie, Richland, Roosevelt, Sheridan, Valley, and Wibaux counties in Montana and Billings, Bottineau, Bowman, Burke, Divide, Dunn, Golden Valley, McHenry, McKenzie, McLean, Mountrail, Renville, Slope, Stark, Ward, and Williams counties in North Dakota.

Data Sources: Fatal Crashes—National Highway Traffic Safety Administration (NHTSA): Fatality Analysis Reporting System (FARS), 2013; Injury Crashes and OOS Rates—Federal Motor Carrier Safety Administration (FMCSA): Motor Carrier Management Information System (MCMIS), December 19, 2014.

The increase is most noticeable in North Dakota, where fatal crashes involving large trucks increased from 12 such crashes across the State in 2007 (with 2 of them occurring in the Bakken counties) to 54 across the State in 2013, with 45 (or 83 percent) occurring in the Bakken counties (see Figure 2).

Table 2: Drilling-related truck movements per well, over the course of the well's production life.

Item	Number of Truck Trips	Inbound or Outbound
Sand	100	Inbound
Water (Fresh)	450	Inbound
Water (Waste)	225	Outbound
Frac Tanks	115	Both
Rig Equipment	65	Both
Drilling Mud	50	Inbound
Chemical	5	Inbound
Cement	20	Inbound
Pipe	15	Inbound
Scoria/Gravel	80	Inbound
Fuel Trucks	7	Inbound
Frac/Cement Pumper Trucks	15	Inbound
Workover Rigs	3	Both
Total—One Direction	1,150	N/A
Total Truck Trips	**2,300**	N/A

Data Source: Upper Great Plains Transportation Institute, North Dakota State University: "An Assessment of County and Local Road Infrastructure Needs in North Dakota," September 20, 2012.

Table 3. Fatal large truck crashes in Bakken counties* of Montana and Statewide, 2007−13.

Year	Bakken Counties of Montana: Fatal Crashes Involving Large Trucks	Bakken Counties of Montana: Fatal Crashes Involving Cargo Tank Trucks	Bakken Counties of Montana: Percent of Fatal Crashes that Involved a Cargo Tank Truck	Statewide Fatal Crashes Involving Large Trucks	Statewide Fatal Crashes Involving Cargo Tank Trucks	Statewide Percent of Fatal Crashes that Involved a Cargo Tank Truck
2007	5	2	40.0%	29	5	17.2%
2008	1	1	100.0%	24	6	25.0%
2009	2	0	0.0%	21	1	4.8%
2010	0	0	n/a	12	1	8.3%
2011	3	2	66.7%	23	5	21.7%
2012	2	2	100.0%	11	3	27.3%
2013	3	0	0.0%	19	0	0.0%

*The Bakken counties of Montana are defined as: Daniels, Dawson, Fallon, Garfield, McCone, Prairie, Richland, Roosevelt, Sheridan, Valley, and Wibaux.
Data Source: NHTSA: FARS, 2013.

Table 4. Fatal large truck crashes in Bakken counties* of North Dakota, and Statewide, 2007−13.

Year	Bakken Counties of North Dakota: Fatal Crashes Involving Large Trucks	Bakken Counties of North Dakota: Fatal Crashes Involving Cargo Tank Trucks	Bakken Counties of North Dakota: Percent of Fatal Crashes that Involved a Cargo Tank Truck	Statewide Fatal Crashes Involving Large Trucks	Statewide Fatal Crashes Involving Cargo Tank Trucks	Statewide Percent of Fatal Crashes that Involved a Cargo Tank Truck
2007	2	0	0.0%	12	0	0.0%
2008	11	1	9.1%	19	2	10.5%
2009	10	1	10.0%	28	3	10.7%
2010	9	3	33.3%	14	3	21.4%
2011	26	9	34.6%	30	10	33.3%
2012	33	15	45.5%	40	17	42.5%
2013	45	21	46.7%	54	23	42.6%

*The Bakken counties of North Dakota are defined as: Billings, Bottineau, Bowman, Burke, Divide, Dunn, Golden Valley, McHenry, McKenzie, McLean, Mountrail, Renville, Slope, Stark, Ward, and Williams.
Data Source: NHTSA: FARS, 2013.

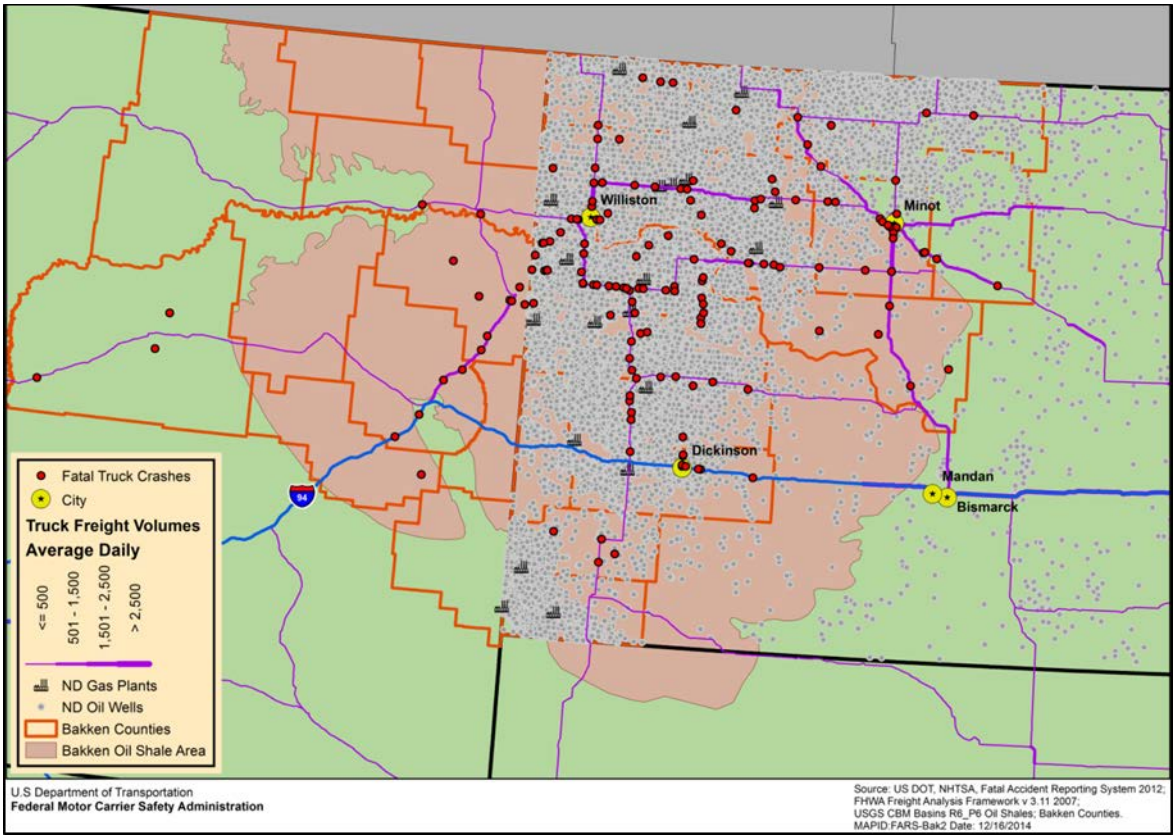

Figure 2. Map. Bakken region fatal crashes involving large trucks, 2005−13.

Crashes in the Bakken region now account for approximately two-thirds of all fatal crashes involving large trucks in Montana and North Dakota combined. In 2007, Bakken region fatal crashes accounted for less than 20 percent. Other metrics include:

- From 2007 to 2013, the population of North Dakota increased 13 percent, from 639,715 to 723,393 according to U.S. Census Bureau estimates. During that period, the rate of fatal crashes involving large trucks per million people grew from 18.8 in 2007 to 74.7 in 2013—nearly a 300 percent increase.
- From 2007 to 2013, the rate of fatal crashes involving large trucks per million large trucks registered in North Dakota rose approximately 200 percent, from 33.8 to 99.7.
- From 2007 to 2013, the rate of fatal crashes involving large trucks per million total vehicle miles traveled in North Dakota increased by approximately 250 percent, from 0.15 to 0.54.

In all three measures, North Dakota had the highest rate in the United States in 2013, two times higher than the next closest State in each measure. In 2007, at least 18 States had higher rates than North Dakota in each of these measures.

An even greater increase in injury crashes involving large trucks occurred in the North Dakota Bakken counties, growing more than 500 percent from 35 injury crashes in 2007 to 216 in 2013, with a high-water mark of 268 injury crashes in 2012 (see Table 5 and Table 6). Injury crashes in the Bakken region now account for approximately half of the large truck injury crashes in all of North Dakota and Montana, but represented 14 percent in 2007.

Over that same time period, the percentage of large truck fatal crashes in the Bakken region that involved tank trucks grew from 15 percent to approximately 40 percent, and the percentage of large truck injury crashes in the Bakken region involving tank trucks grew from 15 percent to nearly 50 percent.

Towaway crashes have also risen—about 300 percent since 2007—reaching a high of 241 in 2012. Towaway crashes in the Bakken region now represent one-third of all large truck towaway crashes in North Dakota and Montana combined, where in 2007 these accounted for 11 percent.

Table 5. Injury large truck crashes in Bakken counties* of Montana and Statewide, 2007−13.

Year	Bakken Counties of Montana: Injury Crashes Involving Large Trucks	Bakken Counties of Montana: Injury Crashes Involving Cargo Tank Trucks	Bakken Counties of Montana: Percent of Injury Crashes that Involved a Cargo Tank Truck	Statewide Injury Crashes Involving Large Trucks	Statewide Injury Crashes Involving Cargo Tank Trucks	Statewide Percent of Injury Crashes that Involved a Cargo Tank Truck
2007	12	3	25.0%	203	18	8.9%
2008	13	5	38.5%	174	20	11.5%
2009	11	1	9.1%	131	6	4.6%
2010	17	3	17.6%	145	12	8.3%
2011	33	4	12.1%	175	11	6.3%
2012	36	10	27.8%	170	17	10.0%
2013	26	4	15.4%	158	14	8.9%

*The Bakken counties of Montana are defined as: Daniels, Dawson, Fallon, Garfield, McCone, Prairie, Richland, Roosevelt, Sheridan, Valley, and Wibaux.
Data Source: FMCSA: MCMIS, December 19, 2014.

Table 6. Injury large truck crashes in Bakken counties* of North Dakota, and Statewide, 2007−13.

Year	Bakken Counties of North Dakota: Injury Crashes Involving Large Trucks	Bakken Counties of North Dakota: Injury Crashes Involving Cargo Tank Trucks	Bakken Counties of North Dakota: Percent of Injury Crashes that Involved a Cargo Tank Truck	Statewide Injury Crashes Involving Large Trucks	Statewide Injury Crashes Involving Cargo Tank Trucks	Statewide Percent of Injury Crashes that Involved a Cargo Tank Truck
2007	35	6	17.1%	136	21	15.4%
2008	55	16	29.1%	143	23	16.1%
2009	62	28	45.2%	172	46	26.7%
2010	100	33	33.0%	264	53	20.1%
2011	230	94	40.9%	364	113	31.0%
2012	268	135	50.4%	426	154	36.2%
2013	216	114	52.8%	351	133	37.9%

*The Bakken counties of North Dakota are defined as: Billings, Bottineau, Bowman, Burke, Divide, Dunn, Golden Valley, McHenry, McKenzie, McLean, Mountrail, Renville, Slope, Stark, Ward, and Williams.
Data Source: FMCSA: MCMIS, December 19, 2014.

INSPECTIONS

FMCSA and its State partners conduct roadside inspections of trucks and drivers to evaluate compliance with the Federal Motor Carrier Safety Regulations. During the Bakken oil boom period from 2007 through 2013, an average of approximately 9,300 driver inspections and 3,700 vehicle inspections were conducted annually in the oil field counties (see Table 7, Table 8, and Table 9). In that time period, driver OOS rates increased from just under 4 percent in 2007 to approximately 6 percent or higher since 2011 in the Bakken counties.

Table 7. Roadside inspections and OOS rates inside Bakken oil field counties* of North Dakota and Montana, 2007–13.

Year	Driver Inspections	Driver Inspection OOS Rate	Vehicle Inspections	Vehicle Inspection OOS Rate
2007	9,073	3.95%	4,230	14.40%
2008	8,511	4.76%	3,605	15.51%
2009	9,701	4.40%	3,348	13.95%
2010	9,631	4.79%	3,193	14.72%
2011	9,129	6.01%	3,702	21.85%
2012	9,710	6.92%	4,093	25.73%
2013	9,146	5.88%	3,743	24.50%

*The Bakken counties are defined as: Daniels, Dawson, Fallon, Garfield, McCone, Prairie, Richland, Roosevelt, Sheridan, Valley, and Wibaux counties in Montana and Billings, Bottineau, Bowman, Burke, Divide, Dunn, Golden Valley, McHenry, McKenzie, McLean, Mountrail, Renville, Slope, Stark, Ward, and Williams counties in North Dakota.
Data Source: FMCSA: MCMIS, December 19, 2014.

Table 8. Roadside inspections and OOS rates outside Bakken oil field counties* of North Dakota and Montana, 2007–13.

Year	Driver Inspections	Driver Inspection OOS Rate	Vehicle Inspections	Vehicle Inspection OOS Rate
2007	41,727	9.01%	24,619	16.73%
2008	45,497	7.87%	24,701	17.00%
2009	48,826	7.29%	21,944	17.68%
2010	44,118	8.01%	17,750	19.93%
2011	39,659	7.58%	16,620	21.19%
2012	40,235	6.37%	16,826	21.41%
2013	43,255	5.47%	19,241	20.44%

*The Bakken counties are defined as: Daniels, Dawson, Fallon, Garfield, McCone, Prairie, Richland, Roosevelt, Sheridan, Valley, and Wibaux counties in Montana and Billings, Bottineau, Bowman, Burke, Divide, Dunn, Golden Valley, McHenry, McKenzie, McLean, Mountrail, Renville, Slope, Stark, Ward, and Williams counties in North Dakota.
Data Source: FMCSA: MCMIS, December 19, 2014.

Table 9. Driver and vehicle inspection OOS rates nationally, 2007–13.

Year	Driver Inspection OOS Rate	Vehicle Inspection OOS Rate
2007	6.82%	22.28%
2008	6.38%	22.25%
2009	5.55%	21.26%
2010	5.23%	19.08%
2011	4.97%	20.35%
2012	4.89%	20.13%
2013	4.86%	19.90%

Data Source: FMCSA: MCMIS, December 19, 2014.

This increase in driver OOS rates in the Bakken region is the opposite trend from what was seen in the rest of North Dakota and Montana and nationally. Over this same time period, driver OOS rates in the non-Bakken counties of North Dakota and Montana declined from 9 percent in 2007 to 5 percent in 2013. The national driver OOS rate declined from nearly 7 percent in 2007 to slightly less than 5 percent in 2013.

Vehicle OOS rates in the Bakken region show a similar but larger increase, growing from 14 percent in 2007 to approximately 25 percent in 2013. Over this same time period, vehicle OOS rates in the non-Bakken counties of North Dakota and Montana also increased from 17 percent in 2007 to 20 percent in 2013. The national vehicle OOS rate over this timeframe showed an overall downward trend, from slightly more than 22 percent in 2007 to just under 20 percent in 2013.

SAFETY RESPONSE

FMCSA and its State partners have concentrated inspection and investigation activity in the region and will continue to do so. The Agency provided additional funding for increased enforcement efforts in fiscal year 2015, and is committed to an increased presence in the region in the future, as well.

Specifically:

- In March 2015, FMCSA safety investigators conducted special Strike Force activities focusing on Bakken oil field motor carriers in western North Dakota. In all, 10 investigations resulted in 4 motor carriers receiving proposed "Unsatisfactory" safety ratings, with another 3 carriers receiving "Conditional" safety ratings. Separately, 16 motor carriers were the subject of safety audits, with 2 carriers failing the audit and ordered to develop corrective action plans.

- In May 2015, FMCSA safety investigators, along with State law enforcement officers and inspectors, conducted a "Bakken Oil Field/Multi-Agency Strike Force Operation" focusing on unannounced roadside inspections of oil field trucks and drivers in western North Dakota and eastern Montana. The results from the Strike Force are as follows:

  – North Dakota:
    - 249 inspections.
    - 681 violations discovered.
    - 73 vehicles ordered OOS.
    - 13 drivers ordered OOS.
    - 7 hazardous materials (HM) OOS violations.
  – Montana:
    - 79 inspections.
    - 153 violations discovered.
    - 43 vehicles ordered OOS.
    - 2 drivers ordered OOS.
    - 2 HM OOS violations.

- In June 2015, FMCSA safety investigators and HM specialists conducted a "Bakken Oil Field/Cargo Tank Facility Strike Force Operation" on facilities responsible for cargo tank repairs, tests, and inspections throughout western North Dakota and eastern Montana. Nine cargo tank facility reviews were conducted, resulting in three enforcement cases for violations of Federal HM regulations.

REFERENCES

[1] Federal Reserve Bank of Minneapolis: "The Bakken Oil Boom," March 4, 2015, https://www.minneapolisfed.org/publications/special-studies/bakken/oil-production

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[3] Upper Great Plains Transportation Institute, North Dakota State University: "An Assessment of County and Local Road Infrastructure Needs in North Dakota," September 20, 2012, http://www.ugpti.org/downloads/2012_road_investment_needs_final_report.pdf