

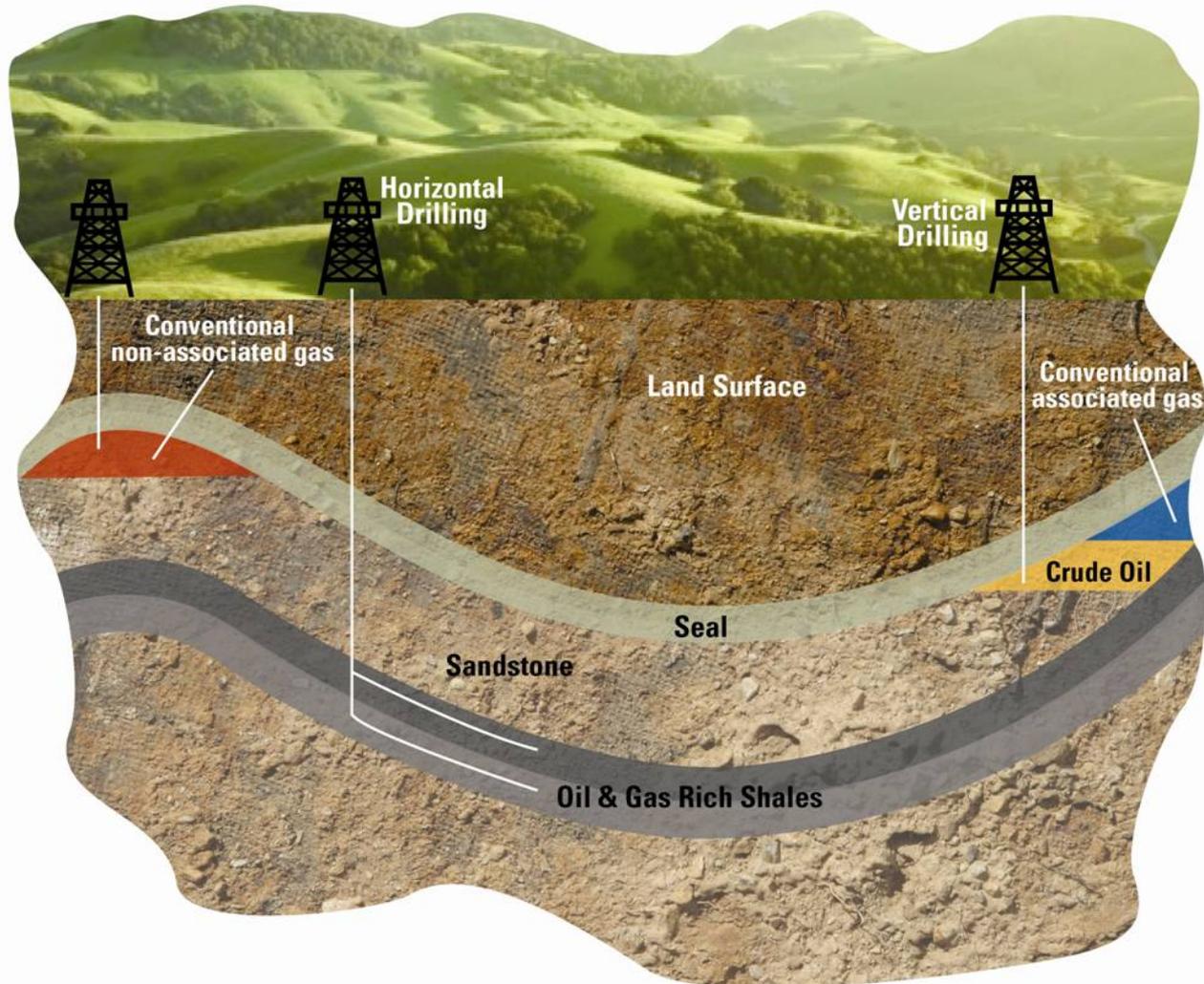
# *BNSF Crude-by-Rail*



**Patrick Brady**  
Assistant Director, Hazmat  
September 17-19, 2013

**BNSF**  
RAILWAY

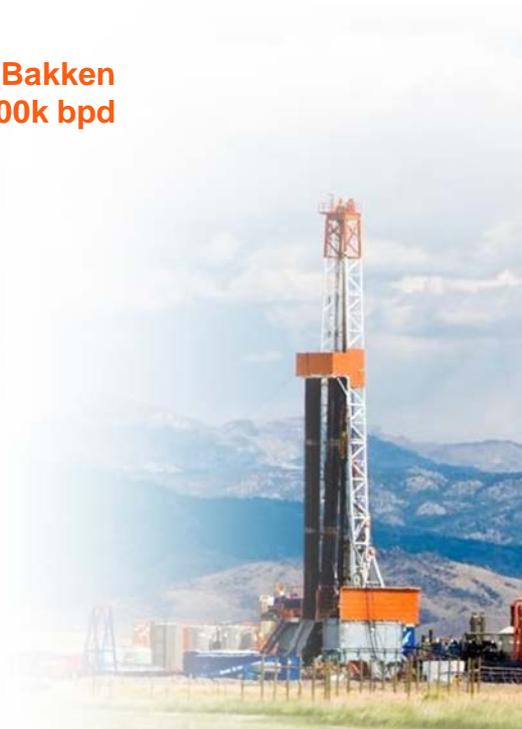
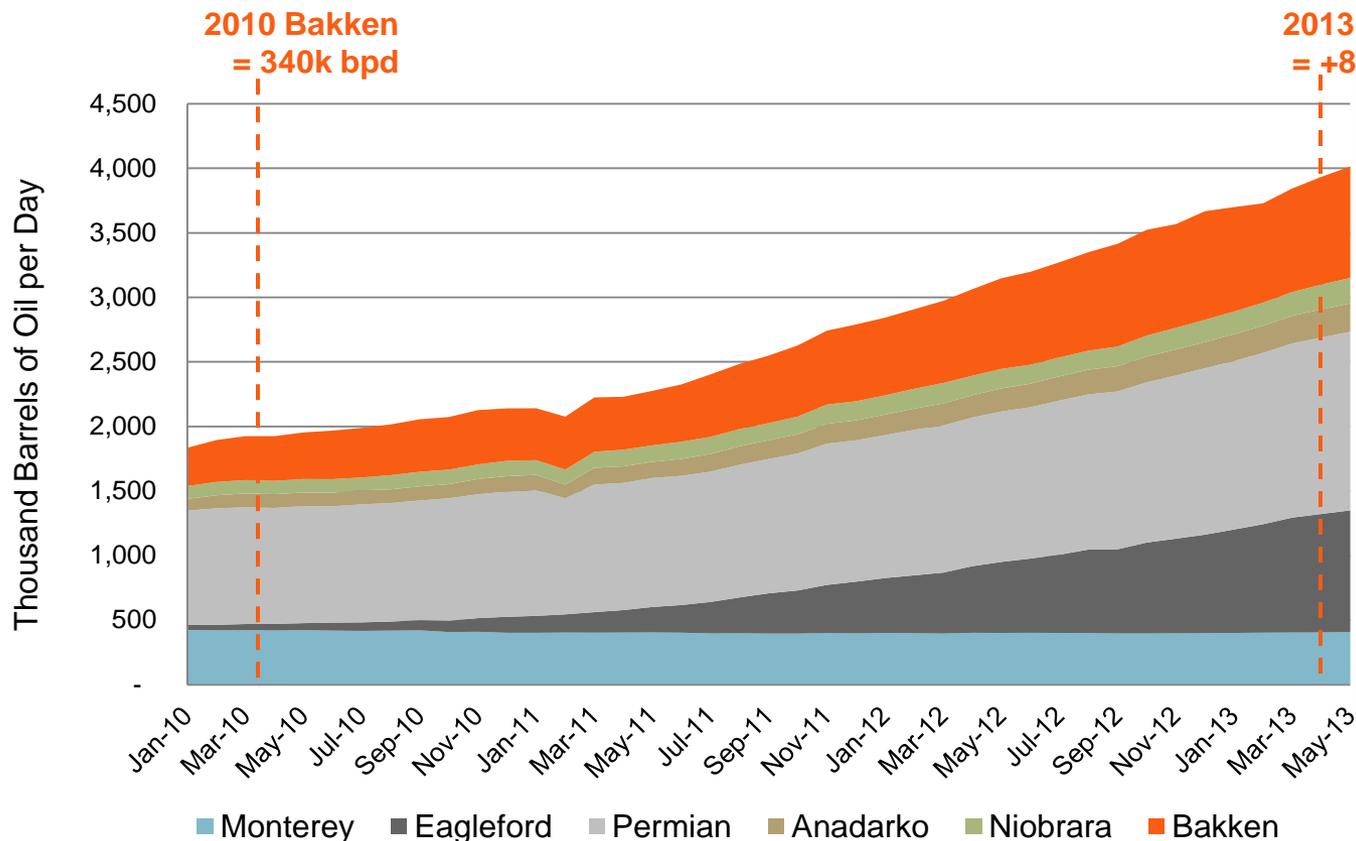
# Extraction of Crude Through Horizontal Drilling



# Growth in U.S. Unconventional Oil Production

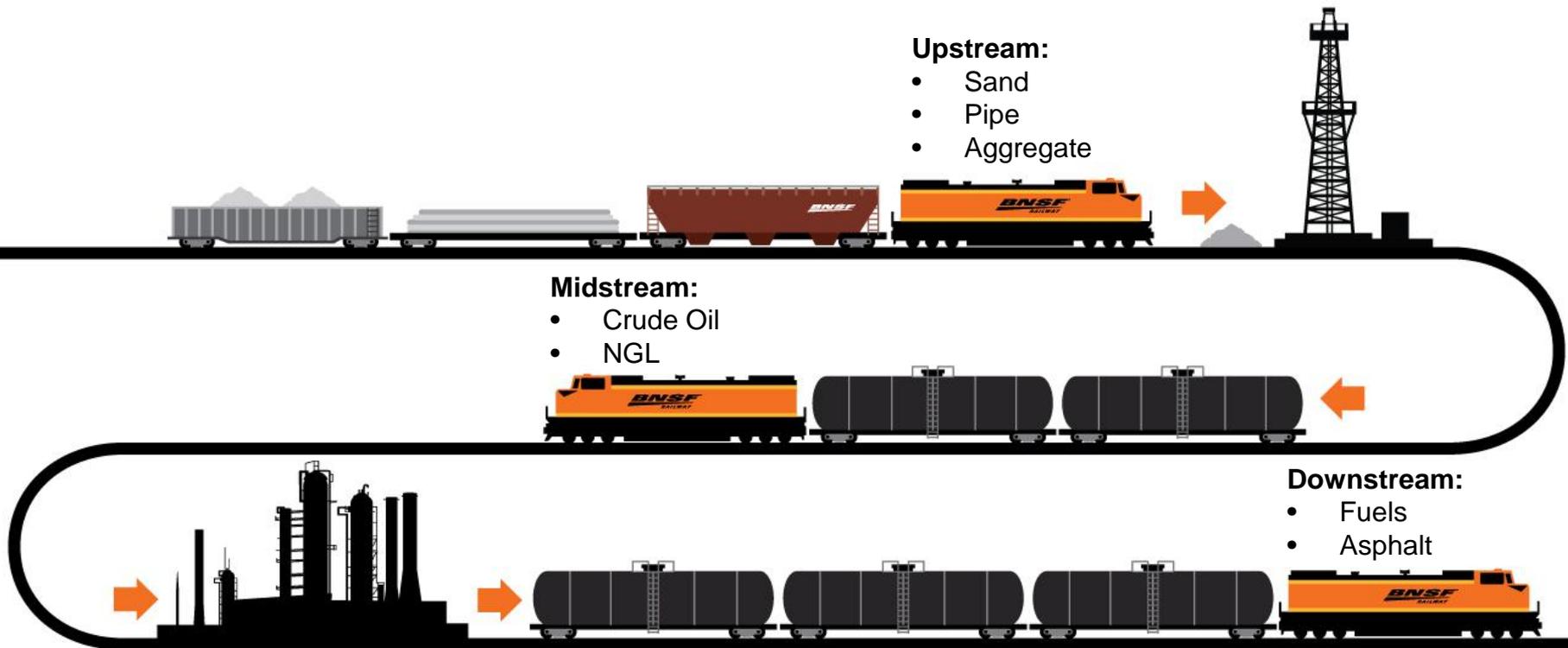
Production has **increased more than 80%** over the last two years and is approaching 850,000 barrels per day in the Williston Basin

U.S. Unconventional Crude Oil Production



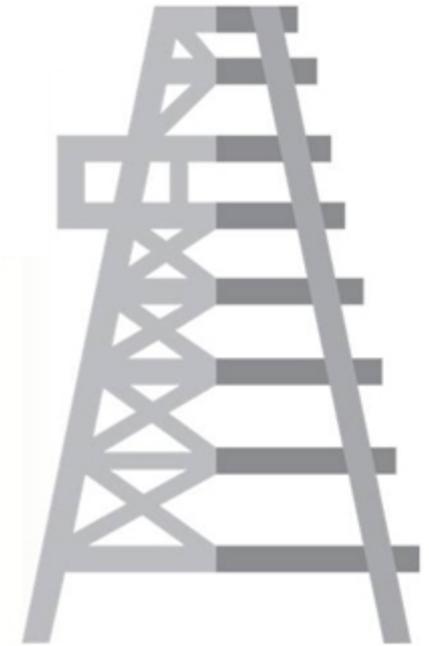
# Delivering a Total Transportation Package

Upstream, midstream or downstream, **your operations are mainstream** to the mission of BNSF Railway



# Transporting Crude Oil in the U.S.

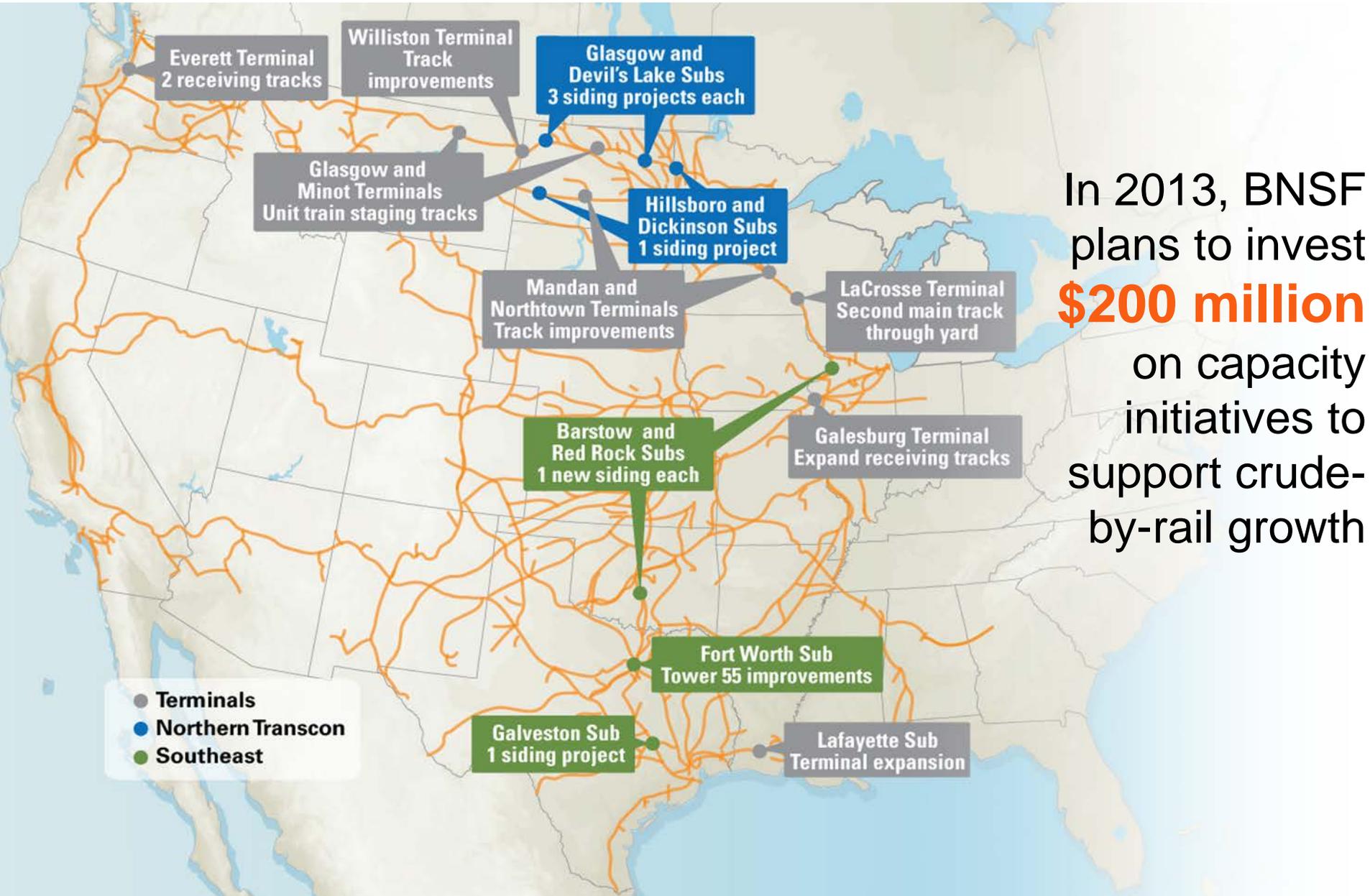
BNSF Railway is the only rail carrier to touch **all of the nation's western shale plays**



**BNSF's ENERGY ON TRACK**



# BNSF is Continuing to Invest in the Future



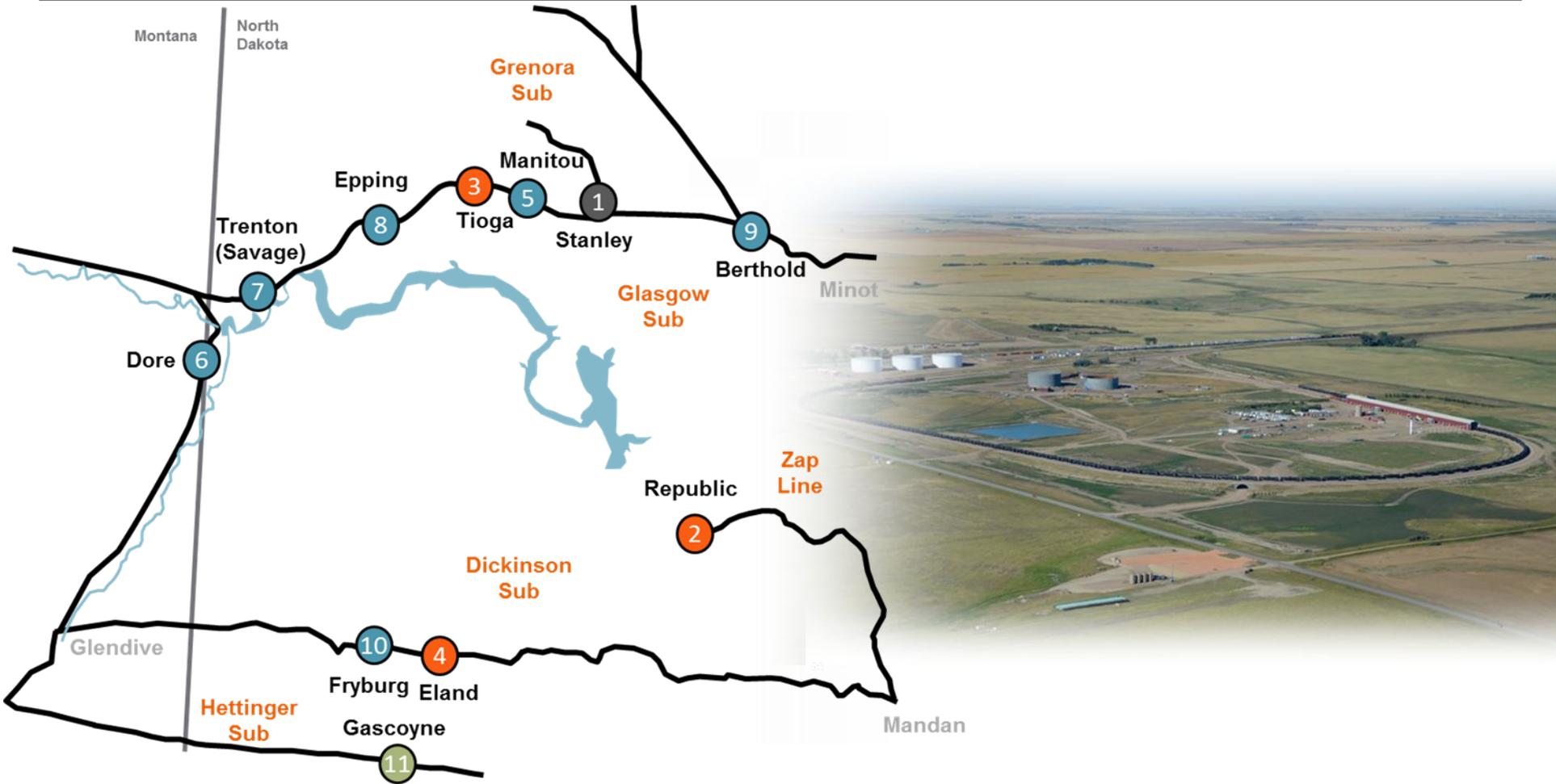
In 2013, BNSF plans to invest **\$200 million** on capacity initiatives to support crude-by-rail growth

# Crude Oil Producers are Investing in Rail

Our customers have invested more than **\$3 billion** in crude oil facilities and associated tank cars



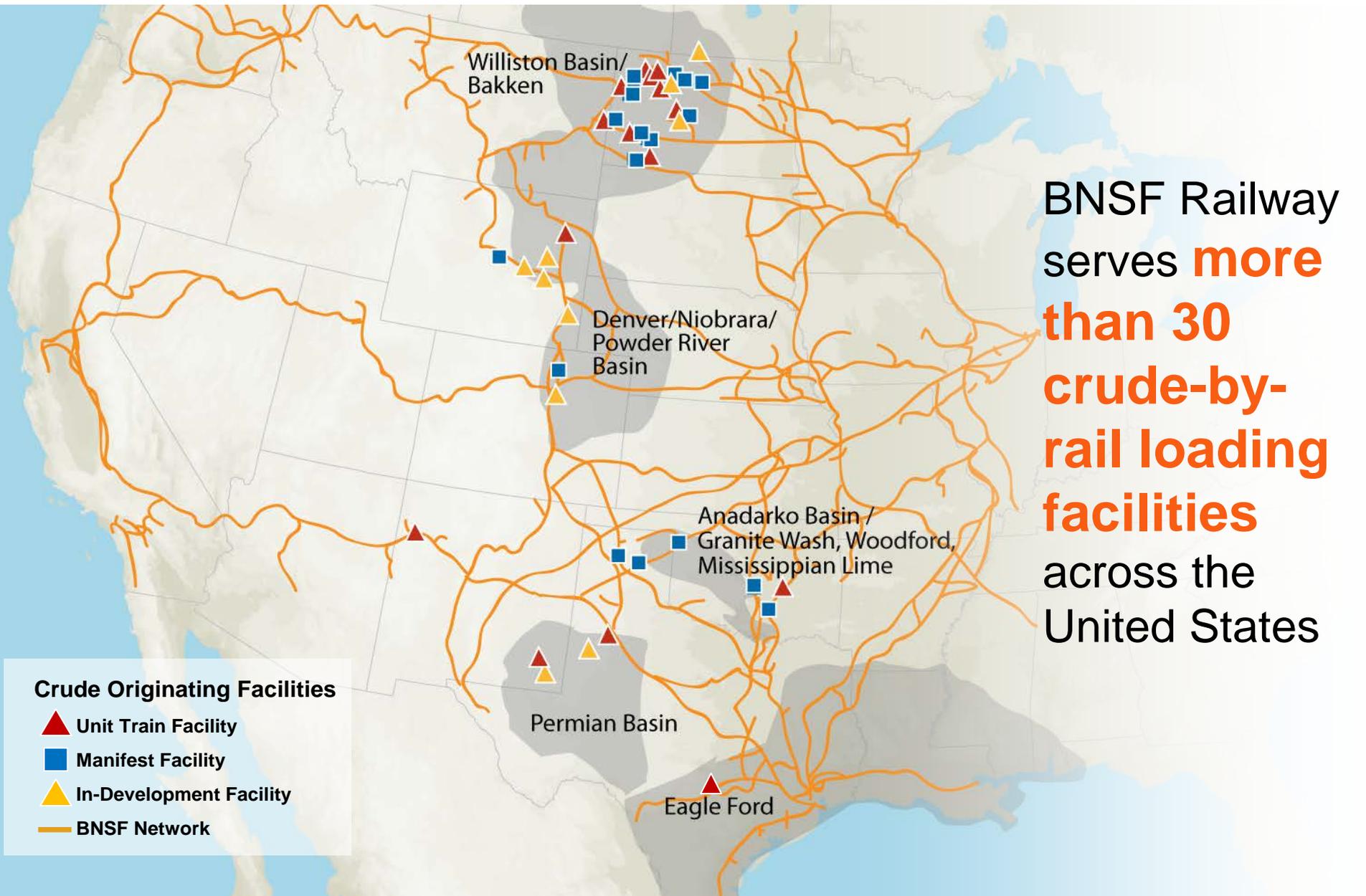
# Bakken Crude-by-Rail Origin Growth



- 1. Dec-09
- 2. Jun -11
- 3. Nov-11
- 4. Nov-11
- 5. Mar-12
- 6. Apr-12
- 7. May-12
- 8. Jun-12
- 9. Sep-12
- 10. Nov-12
- 11. Aug-13



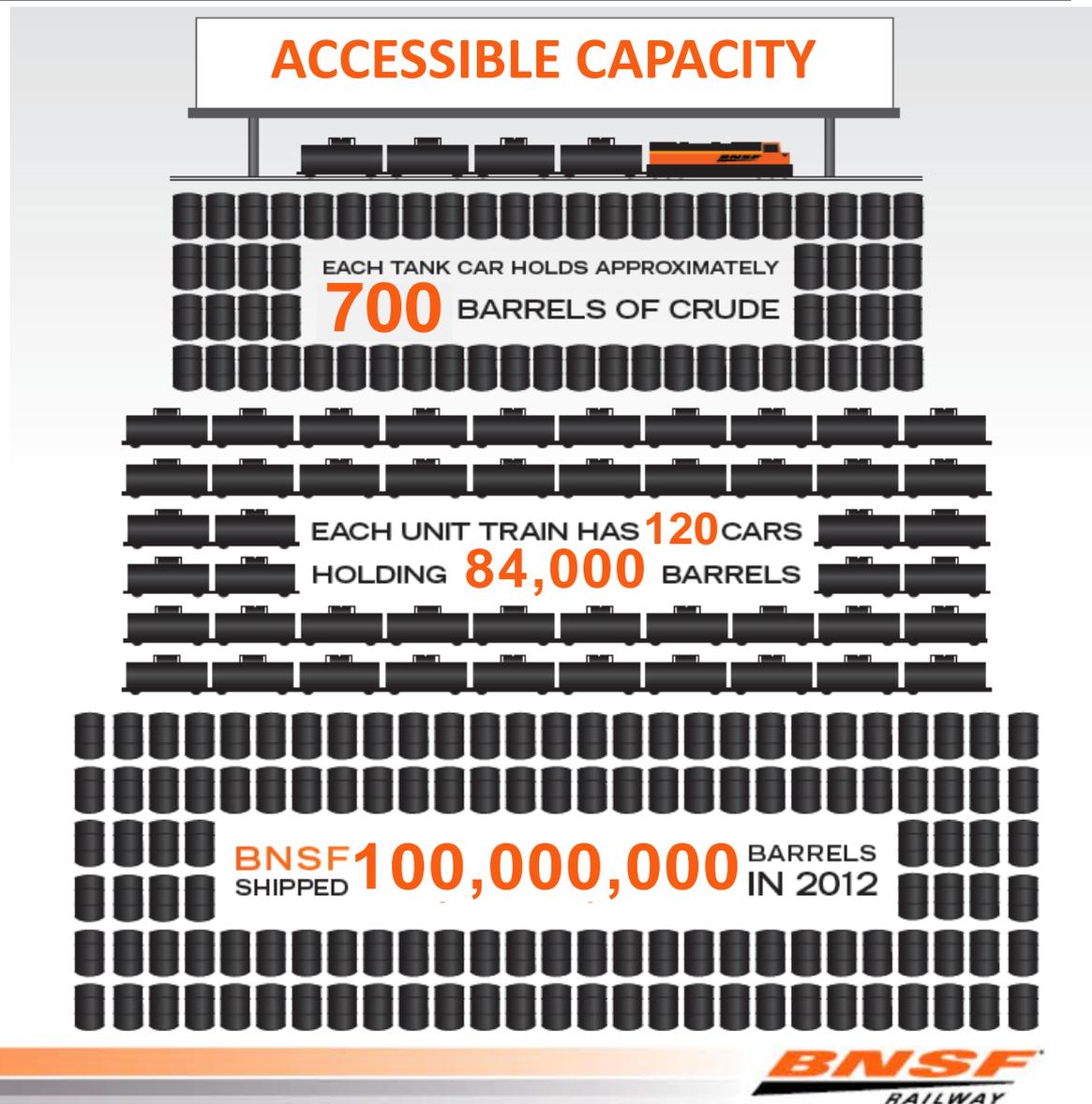
# Originating Crude-by-Rail Loading Facilities





# Vast and Readily Accessible Capacity

BNSF Railway is hauling more than **600,000 barrels per day of crude** across our network



# Competitive Transportation Solution



Capacity

Flexibility

Value



# BNSF Safety Vision

---

We believe every accident or injury is preventable. Our vision is that BNSF will **operate free of accidents and injuries.**

BNSF will achieve this vision through:

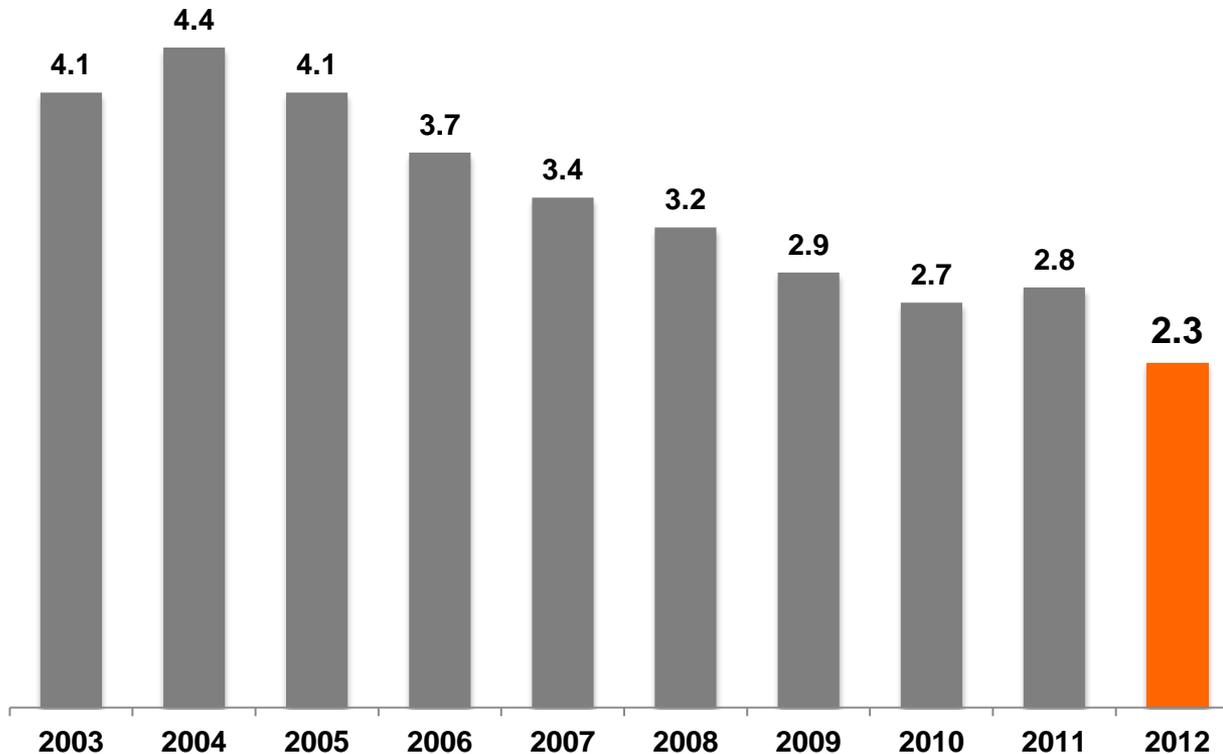
- Culture
- Work Environment
- Work Practices and Training
- Empowered Work Force



# 2012: Safest Year in History

## Reportable incidents are declining to record-low levels

Industry Reportable Rail Equipment Incident Rate *(Incidents per Million Train Miles)*



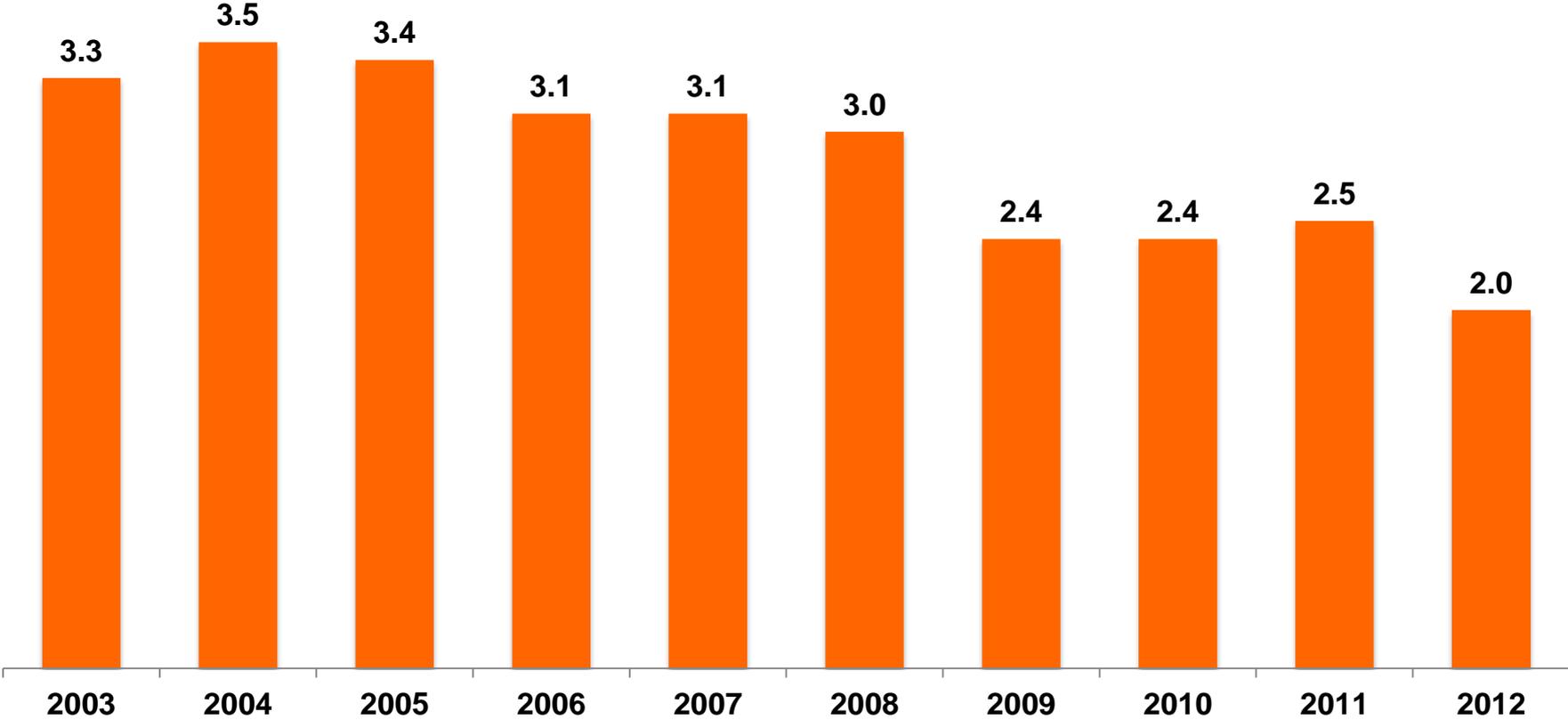
**From 1980 to 2012  
in the rail industry:**

- Train accident rates fell 80%
- Rail employee injury rates fell 84%
- Crossing collision rates fell 81%

# BNSF: A Safety Leader

## Incident rate consistently lower than industry average

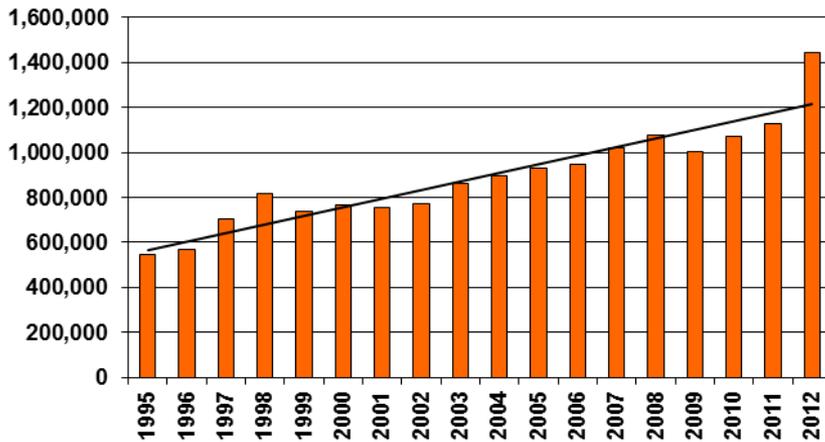
BNSF Reportable Rail Equipment Incident Rate *(Incidents per Million Train Miles)*



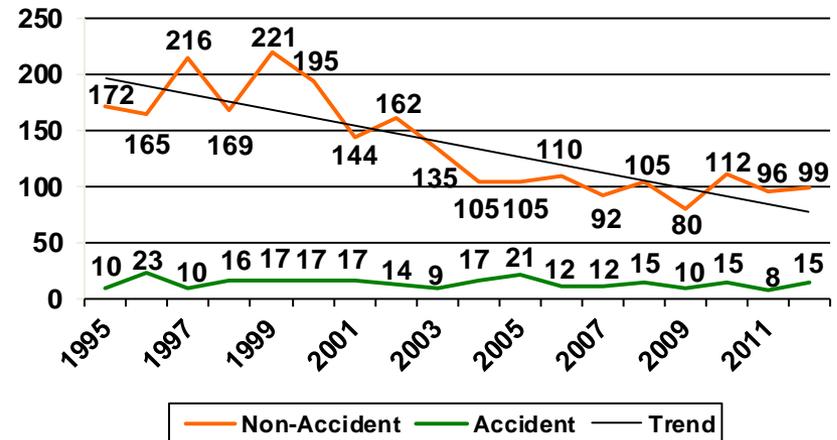
# Safe & Reliable Crude Oil Rail Transportation

- Rail is one of the safest ways to transport crude oil and hazardous materials
- 99.997% of rail industry shipments of hazardous materials reach their destination without a release caused by a train accident
- BNSF hazmat releases continue to decline even as volumes grow

**BNSF Number of Hazmat Shipments**



**BNSF Total Hazmat Releases**







# Key Train Operating Practice Changes

---

- **The FRA has issued a new Emergency Order and Safety Advisory**
- **As a result, BNSF and the rail industry will take the following additional actions:**
  - Key Trains carrying 20 loads of flammable liquids, including crude oil and ethanol, will receive the same special handling as other Key Trains
  - Key Trains will not be left unattended on main line or siding tracks
  - Lead locomotive to be locked and the operating control handle removed
  - All relevant information for the securement of Key Trains must be recorded, verified and confirmed between the train crew and dispatcher including number of handbrakes applied, the train's tonnage, weather and grade
  - Trains required to re-secured after "actions" by local responders



# DOT – FRA/PHMSA – Crude Flashpoint

---

What is a *flammable liquid*? Under US DOT Regulations a flammable liquid (Class 3) means a liquid having a flash point less than 60°C (140°F), or any material in a liquid phase with a flash point at or above 37.8°C (100°F) that is intentionally heated and offered for transportation or transported at or above its flash point. As with certain regulations there are some exceptions, which are listed in 49 CFR 173.120.

What is a *combustible liquid*? Under US DOT Regulations a combustible liquid means any liquid that does not meet the definition of any other hazard class and has a flash point above 60°C (140°F) and below 93°C (200°F). For shipments by rail and highway, a flammable liquid with a flash point at or above 38°C (100°F) that does not meet the definition of any other hazard class may be reclassified as a combustible liquid. An elevated temperature material that meets the definition of a Class 3 material because it is intentionally heated and offered for transportation or transported at or above its flash point may not be reclassified as a combustible liquid.

# DOT – FRA/PHMSA – Crude Flashpoint

What is a flash point? Under US DOT Regulations, flash point means the minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. There are several analytical methods for determining flashpoint (ASTM and ISO) .

<b>Class 3 (Flammable) Packing Groups</b>		
<b>Packing Group</b>	<b>Flash Point (Closed-Cup)</b>	<b>Initial Boiling Point</b>
<b>I</b>	NA	$\leq 35^{\circ}\text{C}$ (95°F)
<b>II</b>	$< 23^{\circ}\text{C}$ (73°F)	$> 35^{\circ}\text{C}$ (95°F)
<b>III</b>	$\geq 23^{\circ}\text{C}$ , $\leq 60^{\circ}\text{C}$ (140°F)	$> 35^{\circ}\text{C}$ (95°F)

# Tank Car Selection

<b>Hazard Class and Packing Groups</b>	<b>DOT Authorized Tank Cars</b>
Class 3, PG I	DOT 111 or 112 <sup>1</sup>
Class 3, PG II	DOT 111 or 112 <sup>1</sup>
Class 3, PG III <sup>2</sup>	AAR211, DOT 111 or 112 <sup>1</sup>
Combustible Liquids, PGIII <sup>3</sup>	AAR211, DOT 111 or 112 <sup>1</sup>

1 = DOT112 tank car is typically used in the transportation of propane and anhydrous ammonia

2 = Based on the flash point see 49 CFR 172.102(9)(B1)

3 = All Combustible Liquids are listed as PGIII see 172.101

# Tank Car Selection

---

## **Are all DOT111 tank cars the same?**

No, to develop a safer DOT 111 tank car the Association of American Railroads' (AAR) Tank Car Committee changed the requirements for the manufacture of new tank cars transporting Class 3 PG I and PG II materials.

The AAR, on behalf of the AAR-North American Tank Car Committee, petitioned PHMSA in March 2011 to adopt the Committee's new standard (CPC1232) for Packing Group I and II hazardous materials.

These standards are predicted to result in a substantial decrease in the probability of a release from a derailed tank car. Under AAR's proposal, the standards would be applicable only to new tank cars.

# Tank Car Selection

---

Recognizing that DOT action was not imminent, in July of 2011 AAR adopted the higher standards proposed to DOT as requirements for new tank cars transporting crude oil and ethanol, ordered (not manufactured) after October 1, 2011. The Tank Car Committee felt this was needed to ensure that the thousands of new tank cars being built would meet the higher safety standard.

# Tank Car Selection

---

All DOT-111 new tank cars for transporting PGI and PGII flammable liquids must meet tougher AAR Tank Car Committee standards that include:

<b>Tank Car Manufacture <u>ORDER</u> Date</b>	<b>CPC 1232 - Required Special Features</b>
Before July 1, 2010	None
After July 1, 2010 and before October 1, 2011	Top valve roll over protection
After October 1, 2011	Thicker, puncture-resistant shell, Extra protective head shields at both ends of tank car, additional protection for the top fittings, Higher flow capacity pressure release valves

# Tank Car Selection

---



# **BNSF**<sup>®</sup>

---

*RAILWAY*



[www.bnsf.com/crude](http://www.bnsf.com/crude)