

BNSF Railway

Crude by Rail Safety Overview

June 2014



California Energy Commission

DOCKETED

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BNSF
RAILWAY

Rail Transports Crude Safely

- **Record crude volumes delivered safely - 99.997% of crude shipments shipped without incident**
- **2012 and 2013 safest years on record, with rail volumes of all kinds increasing as economy recovers**



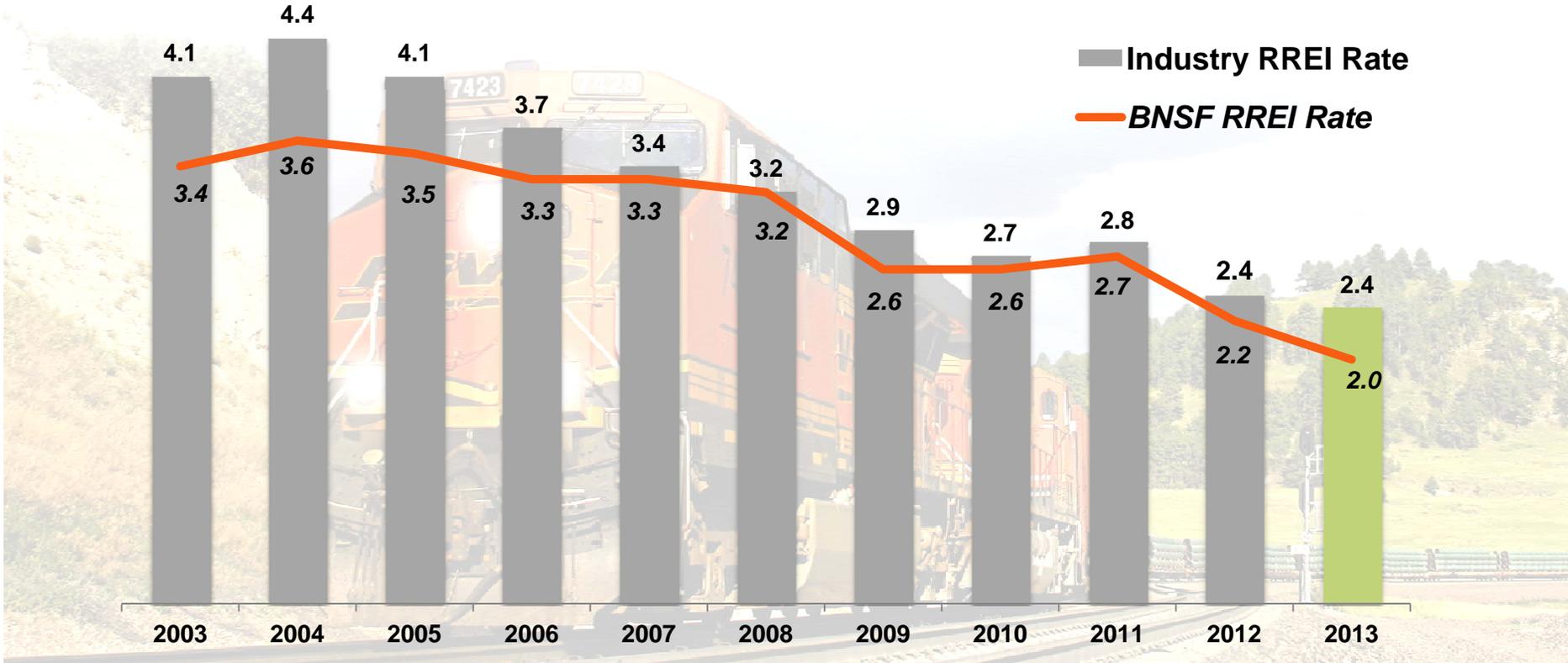
BNSF's Safety Overview

- Rail is safest mode of land transportation
- BNSF's safety vision is to prevent accidents in the first place
- BNSF has a broad-based risk reduction program



BNSF: Safety Leader for Continuous Risk Reduction

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

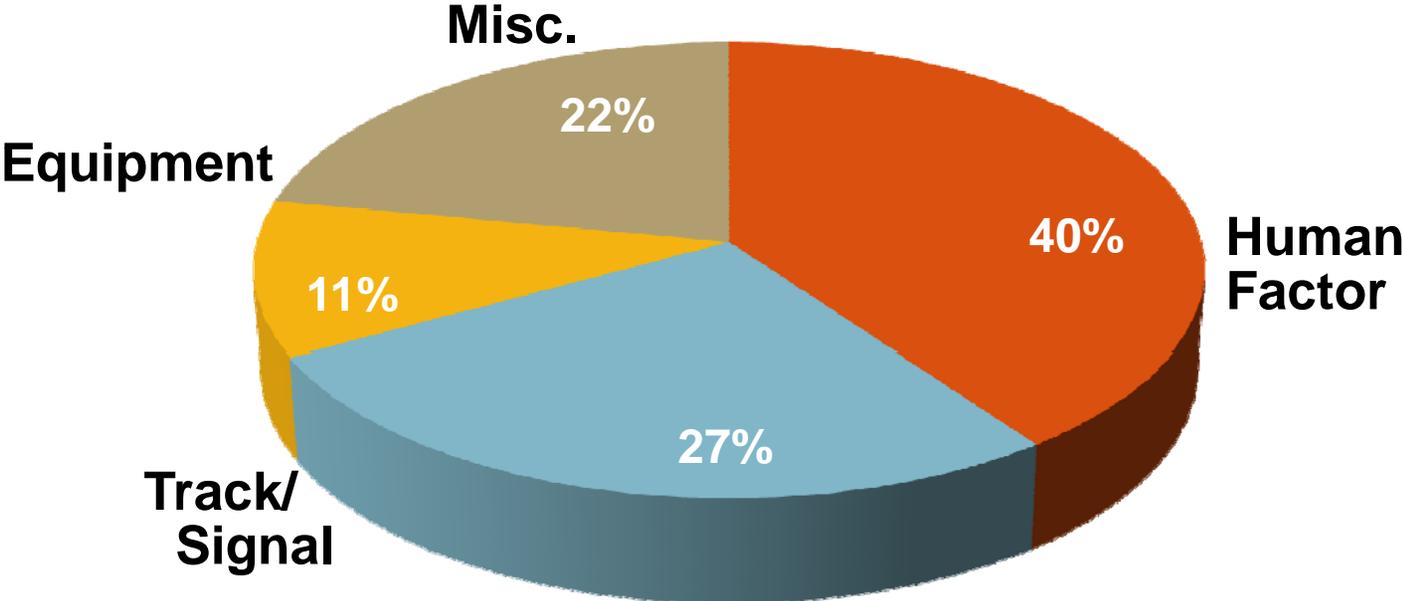


Source: FRA – Calendar Year



Prevention: Four Main Causes for Derailments

BNSF Reportable Train Accident Causes - 2013



Prevention: Action Plans To Reduce Risk

Human Factor

- Training
- Remote monitoring
- Positive Train Control
- Self reporting protocol

Equipment/Mechanical

- Ultrasonic Inspection
- Detector Network, such as:
 - Dragging equipment
- Technology, including:
 - Force-based/strain gage systems
 - Thermal/infrared scanning for warm bearing detection

Track/Signal

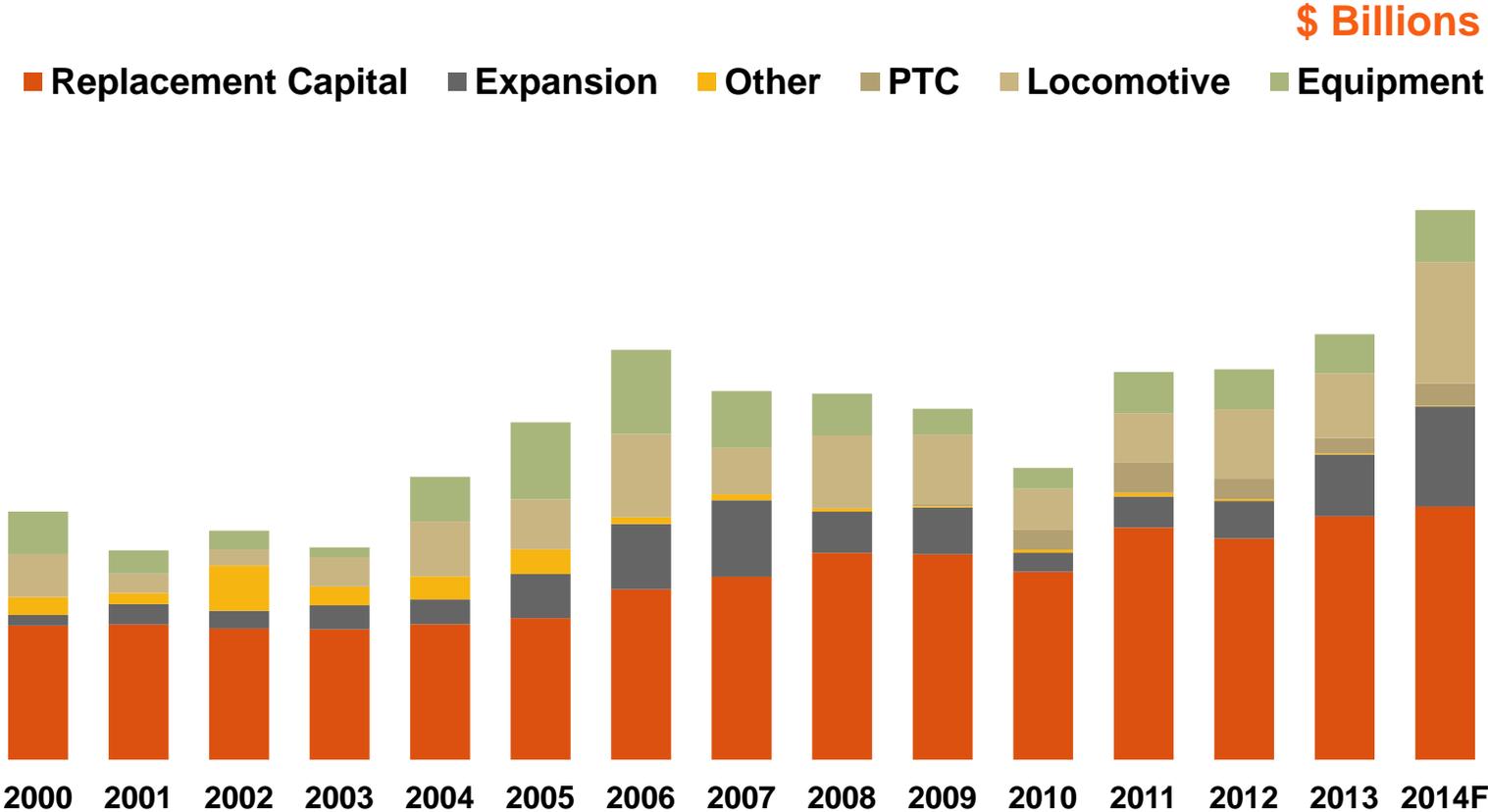
- Enhanced track inspection training
- Continued elimination of jointed rail
- Strong capital program for tie renewal
- Technology, including:
 - Ground penetrating radar
 - Enhanced geometry testing

Miscellaneous

- Operating Practices/Alerts
 - High wind: staging and/or speed requirements
 - Tornado: requirements to stop, inspect trains
 - Flood: speed restrictions, additional inspections
 - Cold weather: speed restrictions

Prevention: Record Capital Spending

- BNSF will spend a record **\$5 billion** on capital projects in 2014 to support maintenance and expansion – \$2.3 billion for network maintenance



Prevention: Inspection/Condition Based on Safety Approach

- **Bridge and Track Inspections**

- **BNSF inspects tracks and bridges more often than required by FRA**

Most key routes on BNSF are inspected 4 times per week and the busiest main lines are inspected daily

- **Track inspections include state-of-the-art technology to detect internal and external flaws in the rail and track structure**
- **Weather and earthquake inspections**

- **Proactive Rail Equipment Defect Detection Devices deployed across the network**

- **Wheel Impact Load Detector**
- **Warm Bearing Detection System**
- **Hot / Cold Wheel Detector**
- **Acoustic Bearing Detectors**



Prevention: Operating Practices for Key Trains

- Longstanding BNSF/Rail Industry best practices for special handling hazardous materials (“Key Trains”) now extend to crude and ethanol shipments
- Key Train Definition:
 - 1 or more loads of Toxic Inhalation Hazard/Poisonous Inhalation (TIH/PIH) materials
 - 20 or more tank loads of any hazardous materials
- Special Handling for Key Trains:
 - Special identification and tracking
 - Speed restrictions for ethanol & crude: 50 mph max speed limit on Key Trains
 - Key Train Routes: wayside wheel bearing detector spacing, frequency of track inspections, minimum track maintenance standards for tracks used to meet or pass Key Trains
 - Key Trains will not be left unattended on main line or siding tracks, unless a detailed briefing regarding securement procedures has taken place between train crew members and the train dispatcher. Key Trains left unattended will have reverser removed and cab will be locked when equipped

Prevention: U.S. DOT Agreement Provides Additional Operating Practice Risk Reductions

- **Speed Restrictions:**
 - Speed restrictions of 40 mph for Key Trains carrying crude in DOT-111 tank cars through High Threat Urban Areas (HTUAs) (additional 36% reduction in Kinetic Energy. 56% overall reduction in KE)
- **Risk-based Routing**
 - Apply PHMSA's *Rail Corridor Risk Management System (RCRMS)* and its 27 Risk Factors that define the "most safe and secure" route for trains carrying TIH/PIH, to the routing of unit crude trains
- **Derailment Prevention**
 - Wayside Detector Network – a max of 40 mile spacing of Defective Bearing detectors on key crude oil routes (detects flaws with equipment wheels as they pass detector device)
 - Rail Detection – At least one additional internal rail inspection than required by federal regulations
 - All key crude trains operated with Distributed Power (DP) or an operative two-way End of Train Device (ETD) - All BNSF crude trains operate with DP
- **Emergency Response (in addition to local training undertaken by BNSF already)**
 - Rail Industry commits up to \$5 million to develop and deliver crude-specific hazmat training to First Responders
 - Rail Industry commits to develop an inventory of emergency response resources

Prevention: Positive Train Control Deployment Will Enhance Safety

Digital wireless communication technology

- Prevent train-to-train collisions
- Enforce speed limits
- Protect roadway workers and equipment
- Prevent movement of train through a switch left in improper position



Interoperability allows operating on other railroads

Predictive, advanced train control safety technology

FCC has ordered railroads to cease PTC construction since May 2013 due to tribal/historical notification process concerns

Mitigation: Tank Car Standards

Rail industry voluntarily adopted stronger standards in Oct. 2011 & Nov. 2013:



DOT-111

“New” 1232 Cars vs. “Old” DOT-111 Cars

- 1/2” or 7/16” jacketed shell vs. 7/16”
- 1/2” extra protective head shield
- Roll over protection (top fitting protection)
- Larger pressure release valve
- 47 - 77% better crashworthiness

Mitigation: "Next Generation Tank Car" NGTC

EVOLUTION OF RAIL INDUSTRY TANK CAR STANDARDS FOR CRUDE OIL

The railroad industry is proposing to increase the federal tank car design and construction standards for new tank cars used to transport crude oil. This proposal comes after a previous upgrade proposal which the industry voluntarily adopted and has been observing since October 2011. This graphic shows the additional tank car components included in the latest rail industry proposal.

HIGH CAPACITY PRESSURE RELIEF VALVE

Current Standard: No requirement
Latest Rail Industry Proposal: Requires a high capacity pressure relief device to protect against a rise in internal pressure resulting from fire. Provides for faster release of product.

TOP FITTINGS PROTECTION

Current Standard: Requires top fittings protection to protect the integrity of valves and fittings used to load product in the event of an accident.
Latest Rail Industry Proposal: Contains the same requirement.

STEEL TANK

Current Standard: Requires a minimum 1/2 inch thick steel tank for unjacketed cars and a minimum 3/4 inch thick steel tank for jacketed cars.
Latest Rail Industry Proposal: Requires a minimum 3/4 inch thick steel tank.

HEAD SHIELDS

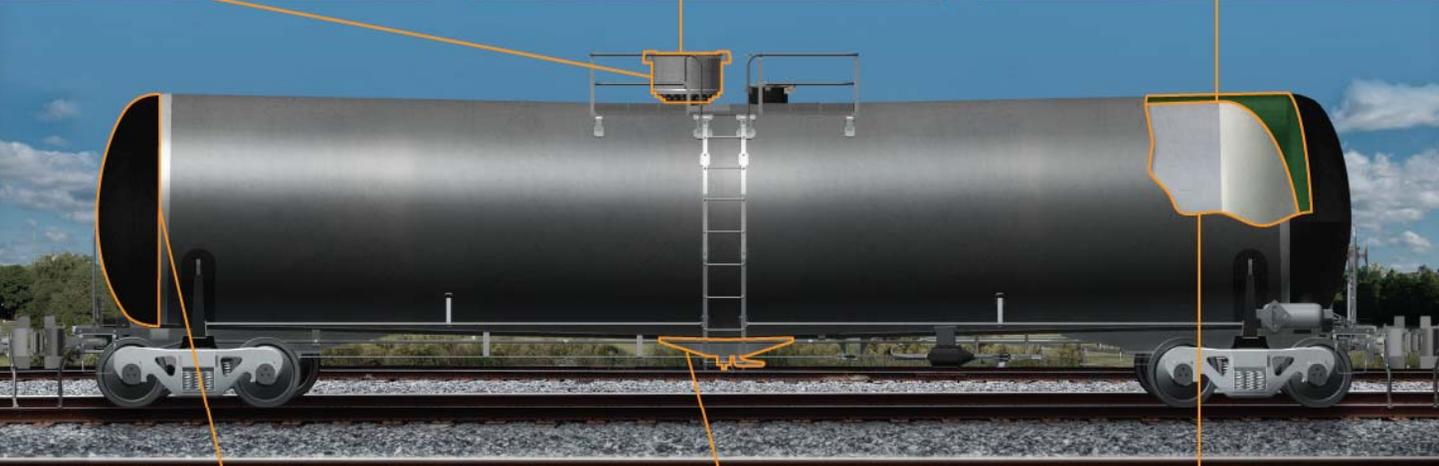
Current Standard: Requires minimum 1/2 inch thick half height head shields at both ends of the tank car to improve puncture resistance.
Latest Rail Industry Proposal: Requires 1/2 inch thick full-height head shields at both ends of the tank car.

BOTTOM OUTLET HANDLES

Current Standard: No requirement
Latest Rail Industry Proposal: Requires bottom outlet handle reconfiguration to prevent the handle from inadvertently opening the bottom outlets in the event of an accident.

JACKET AND THERMAL PROTECTION

Current Standard: Requires a minimum 1/2 inch thick steel tank OR a 3/4 inch thick steel jacket.
Latest Rail Industry Proposal: Requires the addition of both a 1/4 inch thick steel jacket around the tank car and thermal protection.



Source: Association of American Railroads, February 2014

- Require jackets and thermal protection on 1232 tank car
- BNSF NGTC RFP issued to accelerate the tank car design, production, and to bring more certainty to crude-by-rail tank car market

Mitigation: BNSF Tank Car RFP for NGTC

- **BNSF Railway has issued a request (RFP) to major railcar manufacturers to submit bids for the construction of 5,000 Next Generation Tank Cars to be used for transporting crude oil**
- **This BNSF tank car RFP is intended to help accelerate the transition to the Next Generation Tank Car**
- **It will provide tank car builders a head start on tank car design and production, even as the Department of Transportation, railroads and shippers continue to engage in the formal rulemaking process**
- **BNSF believes the RFP process will provide market participants more certainty, sooner**

Response: First Responder Coordination

- **Shipment Information Access** by First Responders
- **Training** First Responders, Employees and Customer Employees
- **Mobilizing** in the event of an incident

Response: First Responder Access to Information

BNSF already provides local first responders information about shipments upon request

BNSF provided SERCs county-by-county Bakken train counts

Meanwhile, per agreement with U.S. DOT:

- **Railroads will develop a nationwide inventory of resources for “Key Route” emergency responders**
- **Locations for staging emergency response equipment**
- **Contacts for community notification**
- **Provide to U.S. DOT and available to appropriate emergency responders**

Response: BNSF/First Responder Local Training

- **BNSF and the railroad industry train first responders in their communities under a longstanding program called “TRANSCAER” (Transportation Community Awareness and Emergency Response)**
 - **Hands-on equipment in field – Instructor lead**
 - **Train list / shipping papers**
 - **Placards**
 - **Equipment**
 - **Incident Assessment**
- **BNSF trains an average of 3,500 local emergency responders each year in communities across network**
- **More than 65,000 emergency responders trained since 1996**



Response: Training First Responders at Pueblo, CO, National Facility

- **Security and Emergency Response Training Center (SERTC) at Pueblo, Colorado, national railroad research/training facility (TTCI)**
- **In-depth hazmat emergency response training to more than 30,000 emergency responders and railroad and chemical industry employees**
- **\$5 million industry commitment to train first responders on crude oil routes**
- **BNSF is covering cost for 736 student spots for the three-day classes**
- **BNSF believes first responders must be properly trained to respond safely**

Response: Incident Mobilization

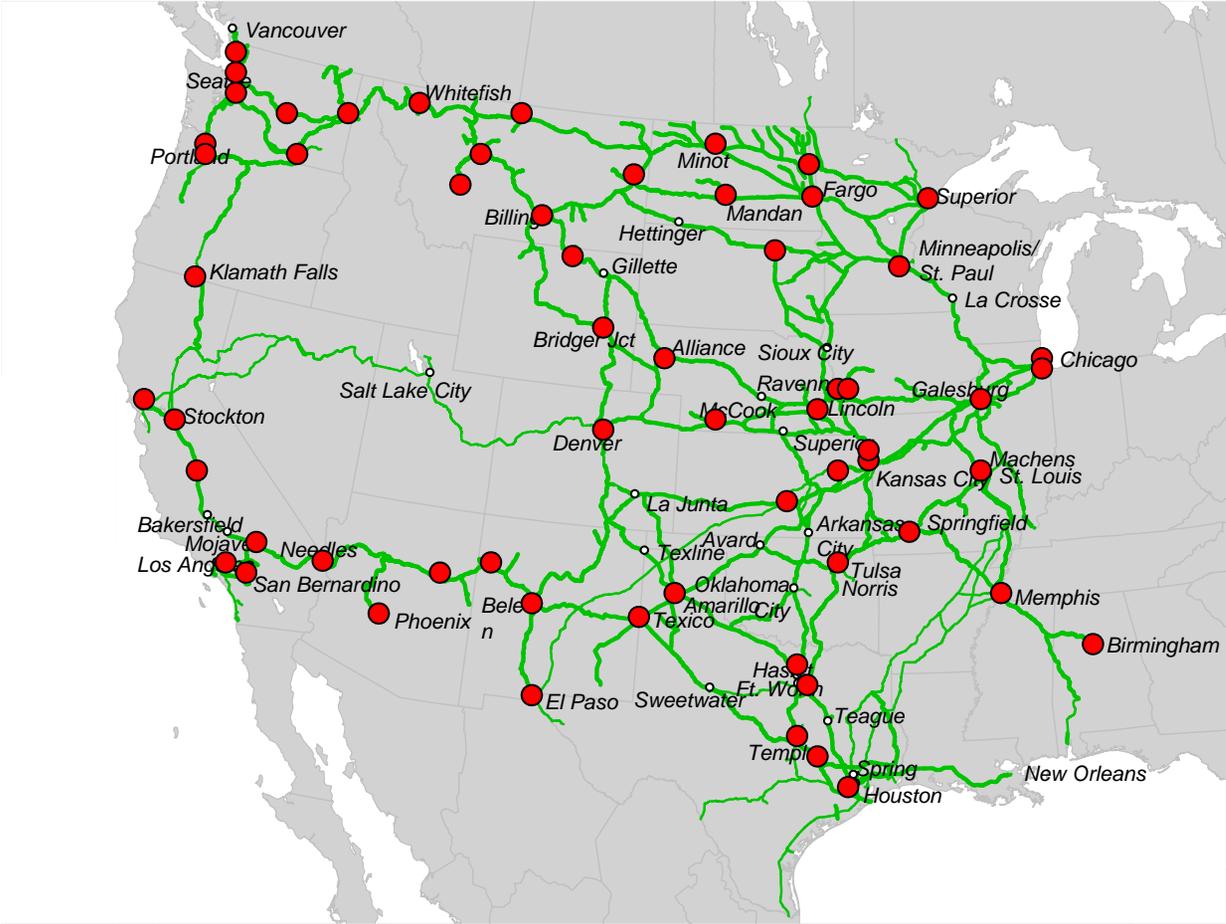
BNSF pre-positions 212 first responders and equipment at 60 locations across the network

- Industrial fire-fighting foam trailers
- Emergency breathing air trailers
- Chlorine kits
- Midland kits
- Air monitoring assets



Response: Mobilization of Prepositioned BNSF Hazmat Responders

212 responders at 60 locations



Remediation

BNSF will restore the site

- **BNSF is responsible for mitigation of the spill and any restoration tasks**
- **BNSF contracts with pre-approved consultants and contractors to perform the remediation and restoration**
- **State agencies oversee the work and BNSF must obtain their concurrence before a site is acceptably closed**



Cameron, Texas, post derailment



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