BNSF Railway

Future of Ammonia By Rail
“What is Your Role”

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Hazardous Materials

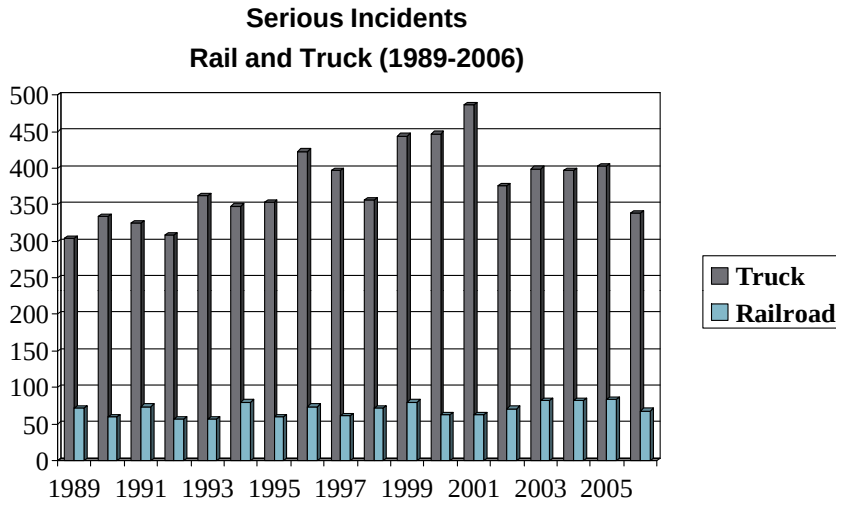
For US Railroads Hazardous Materials Account for:

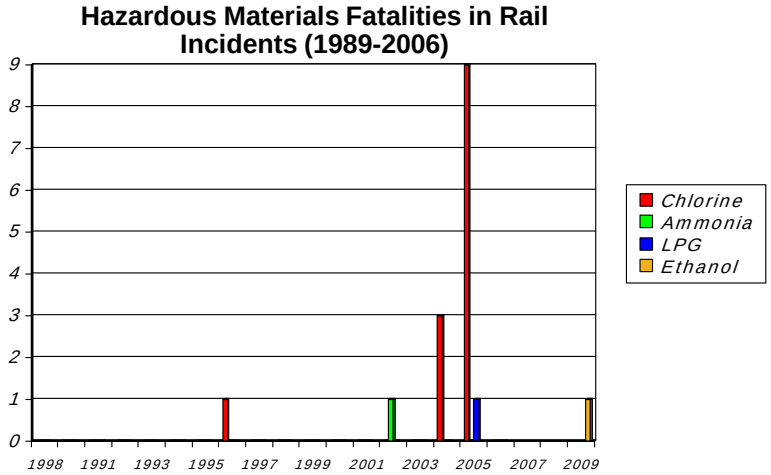
- **5% of total U.S. freight rail carloads**
- **5% of tonnage**
- **6% of ton-miles**
- **68% of rail hazmat travels in tank cars**
- **28% on intermodal flat cars, and the remainder in covered hoppers, gondolas, and other car types**
- **The most potentially hazardous materials, termed toxic inhalation hazards (TIH) are nearly all transported in tank cars. TIH materials constitutes only about 0.3% of all rail carloads, but is responsible for over 90% our insurance costs.**

Hazardous Materials Transport

As common carriers, railroads are required under federal law to move hazardous materials

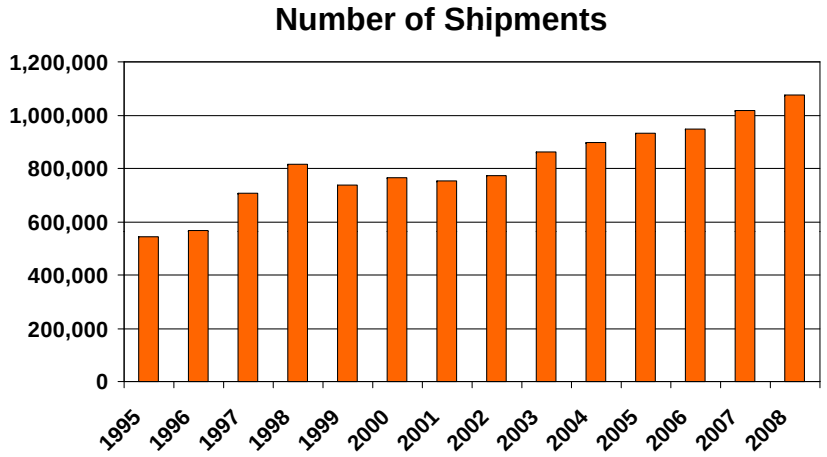
- **Virtually all are shipped without an accident release (99.998%)**
- **Hazmat accident rates have declined by 90% since 1980 and nearly 50% since 1990**
- **Moving hazardous materials by rail is 16 times safer than moving them on the roads**
- **Railroads incurred 16 fatalities in since 1989 while trucks average nearly 11 annually. BNSF had none.**

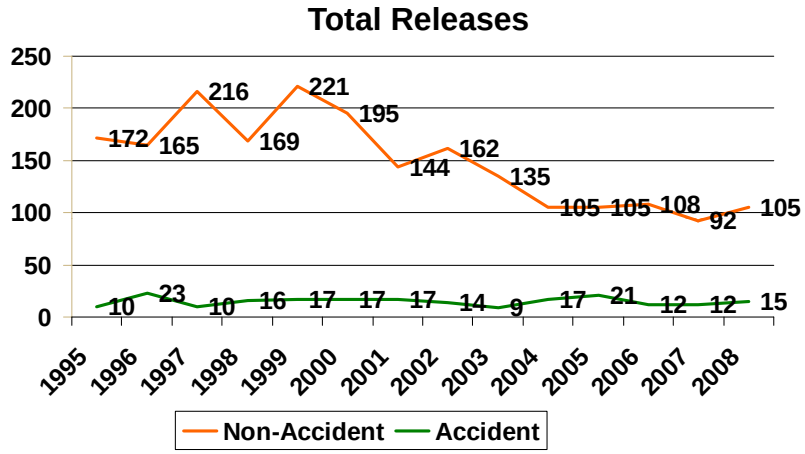




Safety Results:
BNSF Hazardous Materials Transport

Hazardous material shipments have increased on BNSF, while the number of releases has decreased.





Examples of Types of Releases

Non-Accident Release

Accident Release

Non Accidental Release

- **Employee standing outside of our rail yard in Kansas City, KS**
  - **Reports ammonia odor**
  - **Complaining of trouble breathing and headache**
- **Tank car containing ammonia is determined to be leaking**
- **Yard and mainline tracks are shut down**

Non-Accident Release

- **Notifications are made**
- **Railroad and Fire Department responders arrive**
- **A hotel, small mall, and the part of a housing subdivision are evacuated**
- **Three employees are “decontaminated” and transported to the hospital**
- **Inspection is made and the cause is determine to be a loose liquid valve plug and an open valve. Housing was sealed**

Non-Accident Release

- **Who is responsible for:**
  - **Employee injuries/FELA Claims**
  - **Evacuations and business losses**
  - **Train and switching delays. Locations with estimates of $1 million per hour**
  - **DOT/FRA Fines**
  - **Fire Department Charges**
  - **Other**

Non-Accident Release

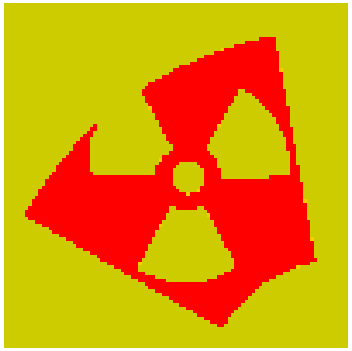
- **NAR Prevention**
  - **Training**
  - **Compliance audits**
  - **Tank Car Selection**
    - **Valves fittings**
    - **Elimination of what is not needed**
  - **Tank Car Maintenance**
    - **O-rings and gaskets**
    - **Intervals less than 10 years??**
  - **Resources see *nar.aar.com***

The 2008 the "Year of the Regulation"

- **DOT's PIH Routing Regulation**
- **DOT's Tank Car Regulation**
- **DHS/TSA Hazmat Security Regulation**
- **Rail Safety Improvement Act of 2008**

Hazardous Materials Routing Regulation

- Applicability
  - Explosives 1.1, 1.2, 1.3 (greater than 5000 lbs)
  - Bulk quantities of TIH materials (over 119 gals)
    - Includes Anhydrous Ammonia
  - High level radioactive material shipments



Hazardous Materials Routing Regulation (49 CFR 172.820)

- **Route Analysis**
  - Routes for analysis may be determined by rail carrier
  - Use data collected and Appendix D Routing Factors to analyze safety and security risks for current route
- **Alternative Route Analysis**
  - Identify at least one "commercially practicable" alternative route and analyze safety and security risks

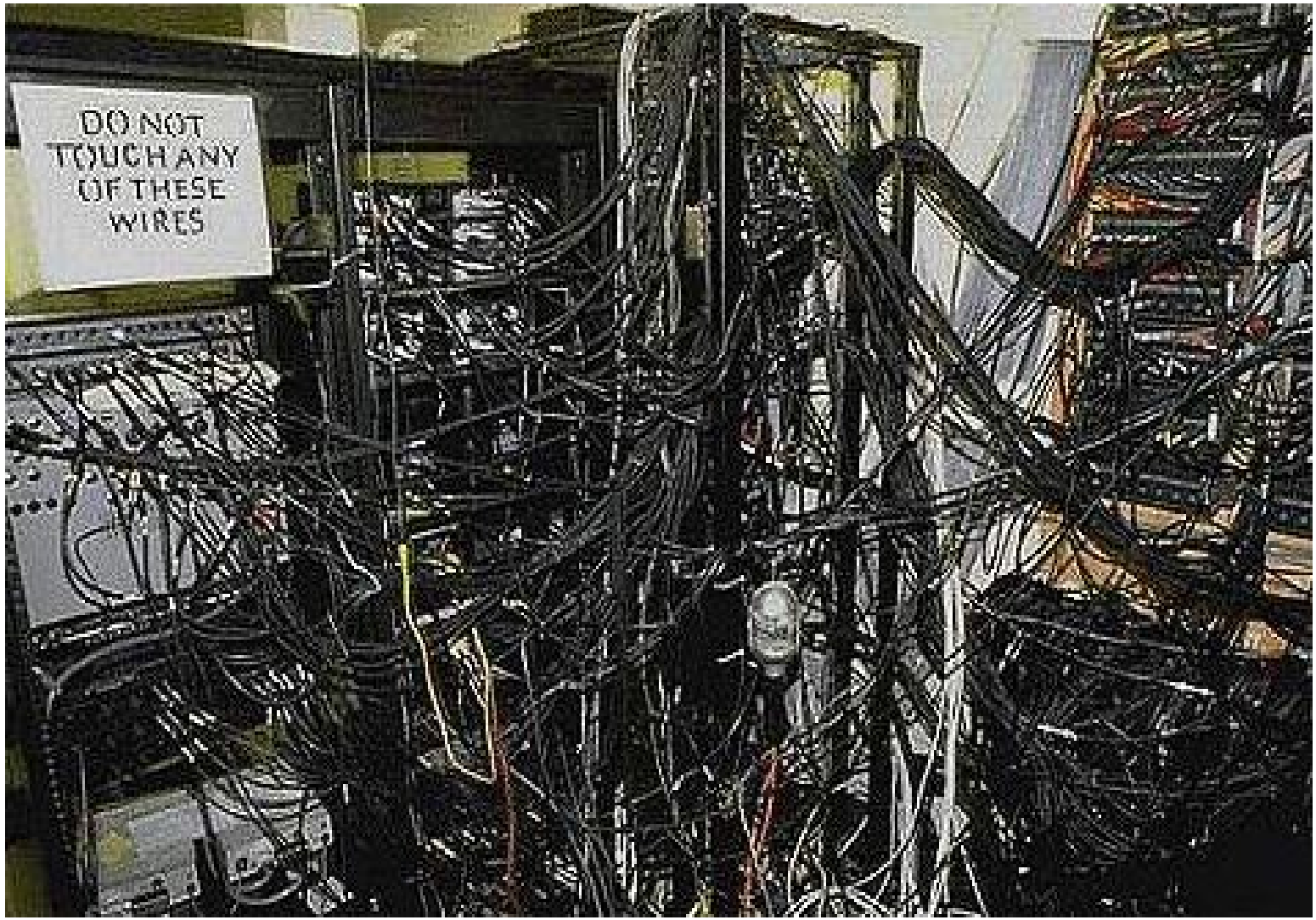
49 CFR 172.820 - *Appendix D*
"Rail Risk Analysis Factors" for Route Analyses

- Volume of hazmat
- Rail traffic density
- Trip length
- Railroad facilities
- Track type and class
- Track grade and curvature
- Signals and train control systems
- Wayside detectors
- Number and types of grade crossings
- Single vs. double track
- Frequency and locations of track turnouts
- Proximity to iconic targets
- Env sensitive areas
- Population density
- Venues along route
- Emergency response capability along route
- Areas of high consequence
- Passenger traffic
- Speed of train operations
- Proximity to enroute storage or repair facilities
- Known threats (from TSA)
- Measures in place to address safety and security risks
- Availability of alternative routes
- Past incidents
- Overall time in transit
- Training and skill level of crews
- Impact on rail network traffic and operations

Hazardous Materials Routing Regulation (49 CFR 172.820)

- **Route Selection**
  - Institute measures to address vulnerabilities and risks identified
  - Restrict distribution and access to data and routing analyses as SSI
  - Seek relevant information from State, local, and tribal officials, as appropriate, regarding security risks to high-consequence targets along or in proximity to a route used by a railroad carrier to transport security-sensitive materials

Can we bring some order to railroad risk analysis?



Example Routing Dilemma: Trade-offs Between Safety and Security”

Routing of TIH loads from Canadian origins via Everett to exit Washington to the I5 Corridor at Wishram

So, which route presents the "*least overall safety and security risk*"?

Route Comparison: Everett to Wishram

Category	Via VAW	Via YAK	Via SPO
Mileage	**303**	**411**	**576**
Population (5 mi.)	**2,531,504**	**1,731,062**	**857,348**
HTUAs on route?	**Yes = 2**	**Yes = 1**	**None**
Hazmat loads (wtd.)	**25,922**	**16,720**	**30,085**
Psgr/com traffic (wtd.)	**9.02**	**2.63**	**2.00**
Signal sys (% signal)	**100%**	**48%**	**100%**
Avg detector spcg (mi)	**19.2**	**24.9**	**24.3**
Venues on route?	**Yes = 1**	**Yes = 1**	**None**
Critical infrastructure?	**Yes**	**Yes**	**Yes**

Route Comparison: Everett to Wishram (cont'd)

Category	Via VAW	Via YAK	Via SPO
Trains used	**1**	**2**	**3**
Overall transit time	**13:15**	**43:20**	**74:00**
Accident probability	**4.83e-6**	**6.49e-6**	**9.15e-6**
Grade Crossings (#)	**224**	**230**	**320**
(avg/mile)	**0.74**	**0.56**	**0.56**
Turnouts-fcg point (#)	**119.5**	**111**	**123**
(avg/mile)	**0.39**	**0.27**	**0.21**
Turnouts-trlg point (#)	**134**	**116.5**	**124**
(avg/mile)	**0.44**	**0.28**	**0.22**
Grade (miles>1.8%)*	**0.0**	**15.2**	**16.4**
(% of route)	**0**	**3.7**	**2.8**

*** BNSF "mountain grade" criteria**

Route Comparison: Everett to Wishram

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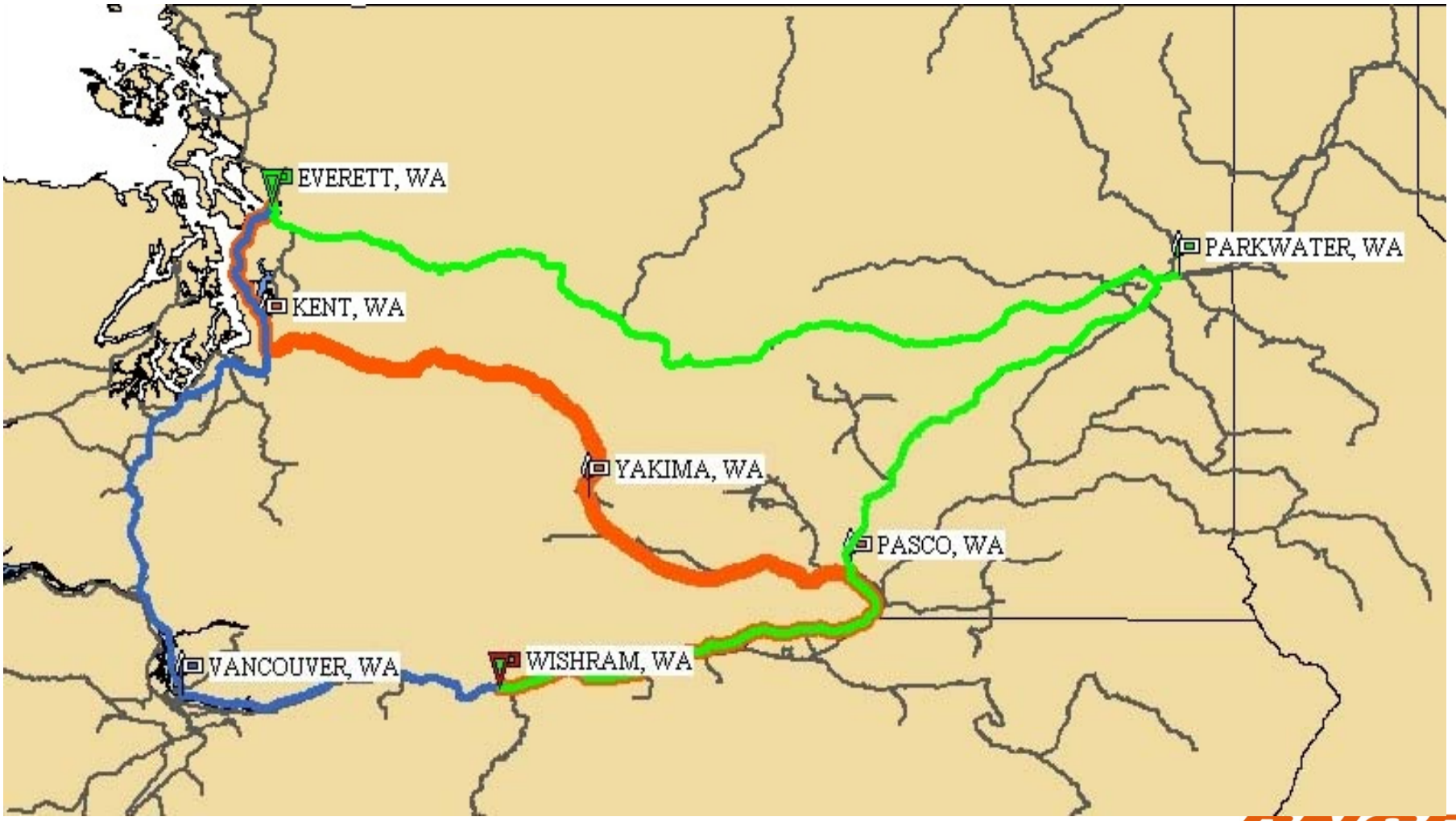
Population (5 mi.)	2,531,504	1,731,062	857,348
HTUAs on route?	Yes = 2	None	None
Venues on route?	Yes = 1	Yes = 1	None
Trains per TSP	1	2	3
Overall transit time	13:15	43:20	74:00
Accident probability*	4.83e-6	6.49e-6	9.15e-6

*** Presently is dependent on mileage and is not an independent variable.**

Routing Example:
Three Ways Through Washington



Hazardous Materials Routing Regulation (49 CFR 172.820)

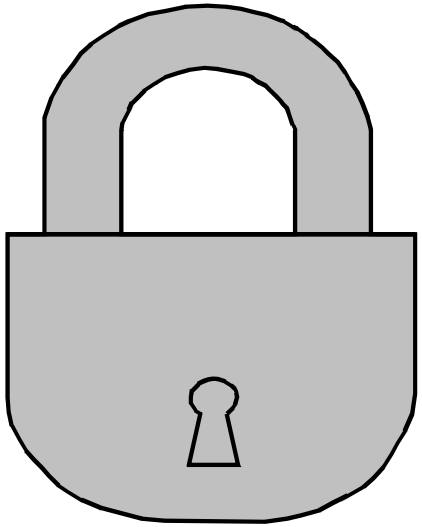
- Timetable and requirements
  - Complete analysis by end of calendar year after data collection and initial analyses
  - First analyses due 09-01-09
  - Comprehensive, system-wide review of operations (that could impact safety and security analyses) must be conducted every five years.

DHS Security Regulations

- Establishes a Rail Security Coordinator position
- Permits TSA inspections
- Mandates on-demand TIH location and shipping information

DHS Security Regulations

- **Materials**
  - 1.1, 1.2 and 1.3 Explosives 5,000 lbs
  - Toxic Inhalation Hazards (TIH) (including anhydrous ammonia)
  - High Level Radioactive Materials
- **Requires a formal chain of custody and control**
  - Picking Up loads
  - Delivering Loads in HTUA
  - Interchanges
    - Positive Handoff
    - No blind interchanges



New TIH Tank Car Design

- **Increases the crashworthiness of new TIH tank cars built after January 1, 2009 with a 25 year useful life**
  - Requires fleet phase out of all old cars within 20 years
    - Must phase out the pre1989 cars first (non-normalized steel)
    - Anhydrous Ammonia – DOT105J500l or DOT 112J500l
  - Imposes speed restrictions for all TIH loads to 50 MPH on signaled and non-signal territories

Rail Safety Improvement Act of 2008

Section 413 – Emergency Breathing Apparatus

‘‘Not later than 18 months after the date of enactment of the Rail Safety Improvement Act of 2008, the Secretary of Transportation shall prescribe regulations that require railroad carriers—

‘‘(1) to provide emergency escape breathing apparatus suitable to provide head and neck coverage with respiratory protection for all crewmembers in locomotive cabs on freight trains carrying hazardous materials that would pose an inhalation hazard in the event of release;

‘‘(2) to provide convenient storage in each freight train locomotive to enable crewmembers to access such apparatus quickly;

‘‘(3) to maintain such equipment in proper working condition; and

‘‘(4) to provide their crewmembers with appropriate training for using the breathing apparatus.’’.

Rail Safety Improvement Act of 2008

Section 104 – Positive Train Control

- **What is Positive Train Control?**
  - "Positive train control" describes technologies designed to automatically stop or slow a train **before** an accident occurs. PTC is designed to prevent train-to-train collisions, derailments caused by excessive speed, unauthorized incursions by trains onto sections of track where repairs are being made, and movement of a train through a track switch left in the wrong position. **These accidents are rare. PTC will make them even rarer.**
  - PTC systems are remarkable. When fully functional, they will be able to precisely locate trains at all times; warn train operators of potential problems; and most importantly, take action if the operator does not respond to a warning (for example, applying train brakes to stop a train before it goes through a stop signal).
- **What is the cost of Positive Train Control?**
  - Several BILLION $$ for US railroads

Future of Anhydrous Ammonia and other TIH Materials

- Product substitutions to less hazardous materials *(i.e. AA to Ammonia Solutions)*
- Risk Sharing / Indemnification
  - Customer
  - Government (Price Anderson Act)
  - Possible Change in the “Common Carrier Requirement”
- Tank Cars
  - Car of tomorrow may look very different than the car of today.

What did it look like when we got our act together?