



U.S. Department of Transportation
Federal Railroad Administration

Tank Car Safety and Security

“NextGen” Project to the Present

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Annual Conference

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Federal Railroad Administration

Introduction



The FRA is the agency within the Department of Transportation responsible for ensuring the safety and security of rail chemical transportation for the protection of our nation.



90+ Safety
Professionals
Specific to HM



Overview

Presentation Approach

Motivation

Industry

Next Gen Rail Tank Car Project

Regulators

Current Efforts

Look Forward





Presentation Approach

- Review four primary efforts
- Distinct, parallel paths taken to current state (although there is some intersection/overlap)
- Review efforts individually and explain the influence of each effort on the others
- 2006 to the present
- Look at current efforts and forward





Motivation

- **Since 2001, a number of events have heightened our nation's awareness of safety and security issues related to transportation of hazardous material by rail.**
 - **September 11, 2001** demonstrated the harsh reality of the terrorist threat in this country and our vulnerability to such an attack.
 - **Minot, ND (2002), Macdona, TX (2004), Graniteville, SC (2005)** were reminders of the deadly potential of the hazardous material transported by rail around the United States.
- **The rail community, including regulators, industry organizations, shippers, builders, and service providers, have refocused their efforts to improve safety and security in transportation of hazardous material by rail.**



Motivation (cont.)

- **NTSB recommendations**
 - Minot report
 - Pre-1989 steel
 - Validate prediction model
 - Fracture toughness standard
 - Macdona report
 - Tank car positioning
 - Train speed





Introduction of Protagonists

Four primary efforts to improve the safety and security in the transportation by rail of hazardous materials.

- Industry
- NGRTC Project
- Regulators - Safety (FRA)
- Regulators – Security (DHS)



Industry

Industry effort lead by three groups

- **Tank Car Builder**
 - Understood need for improved crashworthiness
 - 105J600W tank car
 - Special Permit (286K GRL)
- **RSI Safety Project/UIUC**
 - Conditional Probability of Release (CPR)
 - Tank Improvement Factor (TIF)



Industry (cont.)

- **AAR**

- Safety & Operations Management Committee (SOMC) charge to the Tank Car Committee (TCC)
 - 65% reduction in CPR
- Casualty Prevention Circulars (CPC)
 - CPC1175 Chlorine and Anhydrous Ammonia
 - CPC1187 All other TIH Commodities (**effective April 2008**)
 - Tank car specifications
 - Implementation period
 - Retirement of pre-1989 tank cars
 - Rescinded CPC1187 after PIH rule was published



Next Gen Rail Tank Car Project (NGRTCP)

- **Original members included Dow, Union Tank Car Corporation, Union Pacific Railroad.**
- **The participant list grew to include shipping organizations, regulators and other railroads.**
- **2006 – 4Q2008**
- **Develop a tank car design with improved crashworthiness capabilities through an engineering approach**
 - Foams
 - Composites
 - Steels
 - Energy absorbing and dissipation systems
 - Design platform
 - Thermal Protection (research performed by TC)
- **Modeling, simulations, and testing (component, scale and full scale)**



Regulators - Safety

- **Department of Transportation (DOT)**
 - Federal Railroad Administration (FRA)
 - Volpe National Transportation System Center (Volpe)
- **Transport Canada (TC)**
- **Address TSB's recommendations and develop performance standards that will result in improved crashworthiness of tank cars transporting TIH commodities.**
- **Authority to develop specifications conferred on DOT**
 - Federal Railroad Safety Act
 - Hazardous Materials Transportation Act
- **Approval authority exercised by AAR was delegated to it by DOT and does not include the final approval of a new tank car specifications.**
- **FRA also concerned with the amount of improvement in crashworthiness of tank cars built per CPC-1187.**



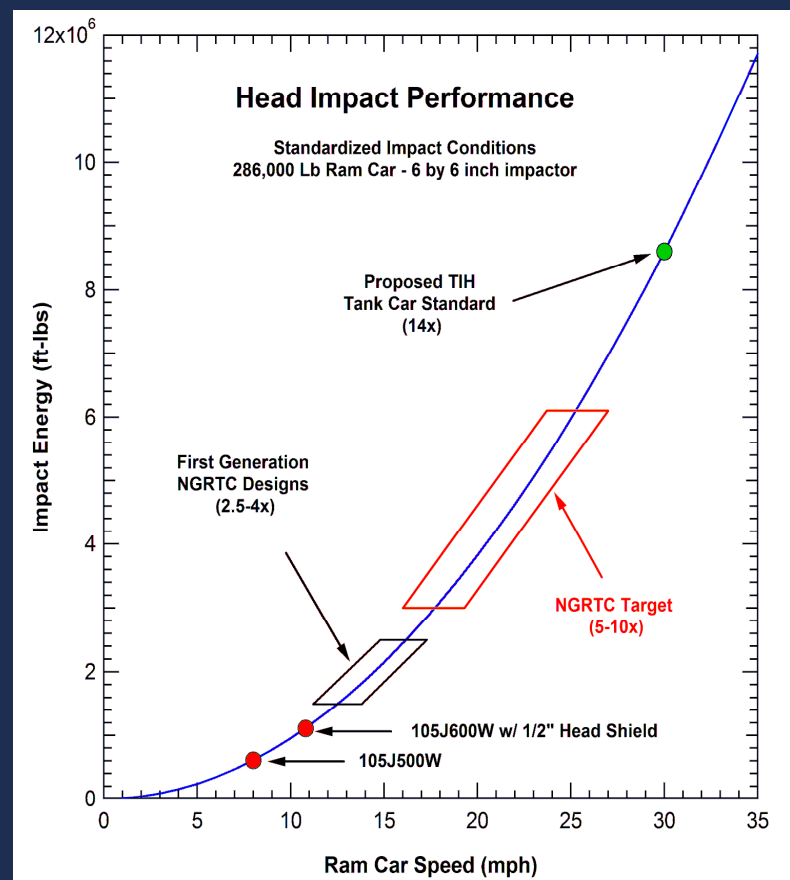
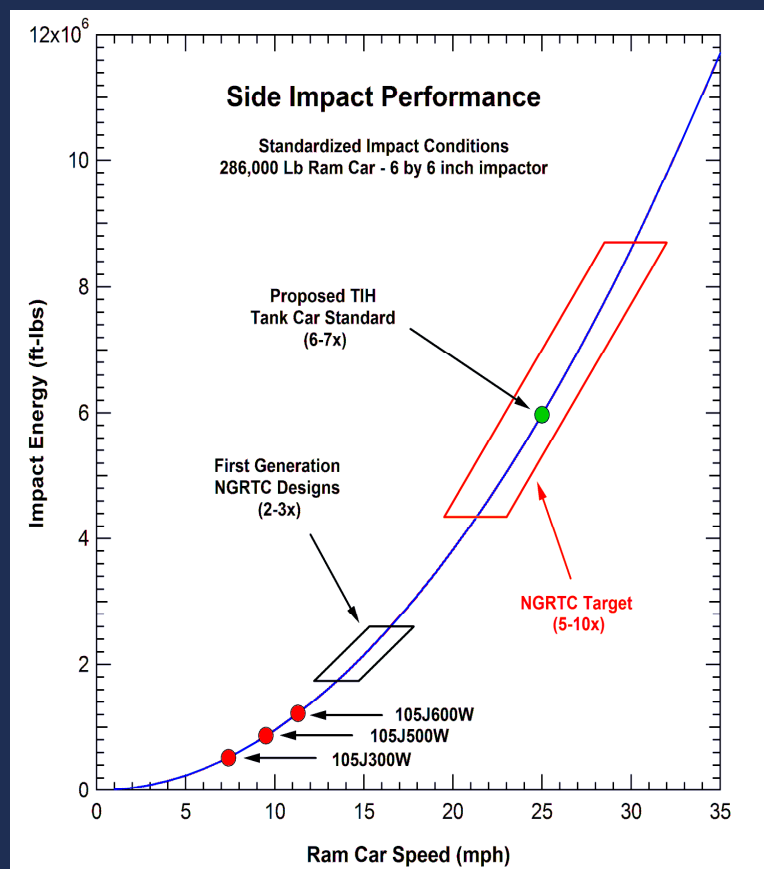
Regulators – Safety (cont.)

- **Engineering approach**
 - Energy absorption and dissipation
 - Testing performed in conjunction with the NGRTC Project
- **Volpe Concept Car**
 - Questioned by industry
 - Un-tried design, constructability, practicality, maintenance
- **NPRM HM-246 published April 1, 2008**
 - Performance Standard (1/2 initial train speed)
 - Side impact - 25 mph
 - Head Impact - 30 mph
 - Normalized steel
 - Speed restrictions



Regulators – Safety (cont.)

NGRTC Project design versus the proposed performance standard





Regulators – Safety (cont.)

- **Public Hearings in Washington, DC**
 - Proposed performance standard was prohibitive
 - Unachievable given current technology
 - Needed to replace older cars
 - Does not address the commodity specific requirements
- **Industry submitted a petition for an interim standard**
 - Existing “buildable” specification
 - Improved crashworthiness

Puncture velocity for Chlorine car	105J500W	105I600W
Head impact	13.1 mph	16.4 mph
Shell Impact	20.1 mph	22.0 mph

- **January 13, 2009 published HM-246 Interim Final Rule**
 - I-car specification
 - Similar to CPC 1187
 - Maximum speeds in signaled and non-signaled territory
 - Preferential retirement of pre-1989 tank cars
- **FRA will publish a performance standard based on current efforts.**



Regulators - Security

- **Department of Homeland Security**
 - Worked with other Agencies to identify likely terrorist threats.
 - Kinetic energy (ballistic)
 - Bulk Charge
 - Modeling, simulations and testing
 - Identified measures to defeat the suspected threats
 - Research to understand the development and movement of a plume of hazardous vapors.





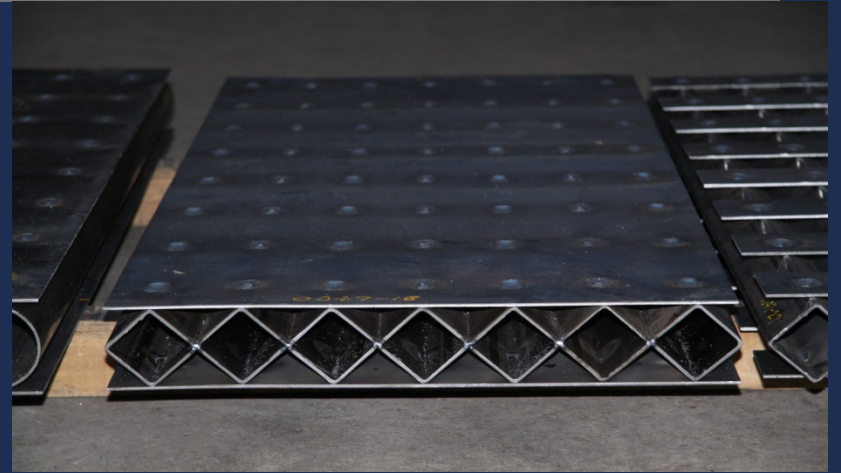
Current Efforts

- **Advanced Tank Car Collaborative Research Project**
 - Evolution of the NGRTC Project
 - Identified 3 key areas of research
 - **Puncture Scenario (items and conditions)**
 - Performance standard and Standardized modeling and testing requirements
 - Compatibility of safety and security measures
 - Correlation of steel properties with puncture performance
 - CPR/EQR
- **UTC PIH Car**



Current Research Efforts

- **FRA Research (Francisco Gonzalez)**
 - Sandwich panels
 - Roll-over protection
 - Liquid flow through relief valves (AFFTAC)
 - Risk analysis
 - Tank car operating environment/Coupling speed
 - Informed by previous TC research
- **TC Research**
 - Emissivity
 - Multiple tank car roll-over derailments





Additional Initiatives

- **Improvements of DOT111A100W tank cars**
 - Triggered by the derailment of ethanol tank cars in Rockford, IL
 - AAR Task Force 87.5





Forward

- **Continue to develop relationship between FRA/TC and the regulated community**
- **Continue current research efforts informed and guided by the expertise in the industry.**
- **Continue to advance technology regarding TC design.**
- **Pay close attention to maintenance and operation of the tank car of the future.**



Questions?

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Thank you!