Presentation to the Subcommittee on Crude Oil Transportation

David O. Willauer, Chair
TRB Crude Oil Subcommittee
Mid-Year Meeting
TRB Headquarters
June 8, 2016
Agenda

• Welcome, Introductions, Feb 22, 2016 Minutes

• TRB Update

• Subcommittee History, Mission, Updates

• Crude Oil Transportation Trends 2016

• Ideas for Workshops, Sessions 2017 Annual Mtg
Crude Oil Transportation Subcommittee
History and Mission

**History:** The TRB Crude Oil Subcommittee was formed as part of the Committee on the Transportation of Hazardous Materials on June 12, 2014 in response to concerns about how crude oil transportation will impact safety and transportation infrastructure in North America.

**Mission:** To promote research and awareness on crude oil classification, transportation by motor carrier, rail, pipeline and barge, tank car design, emergency response and public outreach.
Subcommittee Membership

- State Departments of Transportation
- State Emergency Management Agencies (EMAs)
- State Emergency Response Commissions (SERCs)
- Industry groups—AAR, AFPM, API, EIA, CTEH
- Federal agencies—DOE; DOT (PHMSA, FMCSA, FRA, FAA, MARAD); DHS (TSA, USCG); EPA (OSHA)
- Federal National Laboratories (ORNL, Sandia, Volpe)
- Universities
- Consulting firms
- Transport Canada, CCQTA
Subcommittee Presentations

• FRA Tank Car Crash Tests Findings
• EIA: New Crude by Rail Data
• DOE Tight Oil Literature Review
• Mount Carbon, WV Local Perspective
• Crude Oil Scavengers: Reducing H2S
• U.S. and Canadian Pipeline Profile
• Risk Modeling Crude Oil Releases
• Tank Cars in Flammable Liquid Fires

Heater Treaters separate oil, water and gas
Subcommittee 2016 Updates

TRB Study: Domestic Transportation of Petroleum, Natural Gas, and Ethanol
Transportation and Infrastructure Implications of Lifting Crude Oil Export Ban
7303: Emergency Response Study
7309: DOE et al Crude Oil Characteristics Study
7310: Rail Liability Study
7311: Electronically-Controlled Brakes Study
TRB Study: Domestic Transportation of Petroleum, Natural Gas, and Ethanol

Thursday, May 12, 2016 Energy Market Analysis
• Domestic energy markets: Trends for shipping energy commodities
• Crude Oil and Ethanol Shipments at Midstream Terminals and by Railroad Tank Car: Challenges and Responses

February 4–5, 2016
• Federal Agencies with Safety Responsibility
• Industry Associations
• Data and Analysis
• Emergency Management and Response
Lifting the Crude Oil Export Ban: Creative Use of Maritime Backhauls

• India and China are seeking light, sweet crude.
• Empty Very Large Crude Carriers (VLCCs) offer reduced rates rather than sail back empty to the Middle East.
• **Method 1:** Smaller vessels load in a U.S. port, then transfer the cargo to the VLCC offshore, which sails to Mexico where it can load at an offshore deep-water point in the Gulf before sailing to Asia.
• **Method 2:** Use the Caribbean as a consolidation point for crude from the Americas. One example is Houston to the Bahamas, where Brazil and Venezuela also offload crude for shipment to Asia. Another example is St. James, LA to a VLCC in the Gulf, then to Aruba, then to Singapore.
UP Derailment in Mosier, Oregon June 3, 2016

Photo: Reuters
CSX Derailment in the District May 1, 2016
CSX Derailment in the District May 1, 2016
Crude Oil Characteristics Research Sampling, Analysis and Experiment (SAE) Plan (Sandia Draft) contains recommendations on research needed to improve understanding of transport-critical crude oil and especially tight crude oil properties including:

• Identifying the most appropriate sampling and testing methods for crude oils
• Sampling, testing and compilation of data on different crude oils using those methods
• Initial combustion testing to identify relationships between a particular chemical or physical property of crude oil, or combination of such properties, and combustion properties
• Possible full-scale combustion tests
SAE Plan Tasks 2 and 3 Underway

Task 2 – Sampling Method Evaluation
Five different methods will be used to sample crude oils containing dissolved gases and volatile liquid hydrocarbons. Vapor pressure and light ends composition are the primary evaluation criteria. Samples will be collected at two tight oil rail terminals.

Task 3 – Initial Combustion Experiments and Modeling
Combustion experiments and modeling will assess combustion hazards associated with tight and conventional crude oils. Computational fluid dynamics (CFD) modeling will determine if the dispersion of light volatiles into the atmosphere from tight crude oil is different than from conventional crudes.
7310: Rail Liability Study

PHMSA formally initiated the study in April.

Step 1: Complete a data and literature review of all rail insurance and liability issues for hazardous materials.

Step 2: PHMSA will issue a non-regulatory notice requesting public comment on rail insurance and liability issues.

Per the FAST Act PHMSA has one year from study initiation to complete the study and report to Congress (expected completion April 2017)
“New tank cars built after Oct. 1, 2015, must meet design and performance requirements for a new USDOT-specified class of tank cars.....crude unit trains of 70 or more cars operating faster than 30 mph are to feature an ECP brake system by Jan. 1, 2021.”

ECP brakes issue electronic signals to simultaneously apply and release brakes throughout the length of a train instead of each car applying brakes individually.

"The U.S. Department of Transportation has until Dec. 4, 2017, to publish a ‘determination’ that the ECP mandate for new tank cars either is justified or should be repealed."

*Progressive Railroading*, April 2016
U.S. Flammable Liquid Transport by Rail

Rail shipments of liquid fuels by point of origin (2010-15)

Source: EIA
Crude Oil and Ethanol Routes
Crude Oil and Ethanol Tank Car Shipments

Source: AAR/BOE data  
* 2015 traffic data preliminary
Energy Market Analysis Shale 2.0 (RBN)

- Next Phase Shale Revolution
- Improved Producer Productivity
- Current regional crude price differentials impact crude by rail
- New Pipeline Projects continue
- Maritime Crude Backhauls for Export
Production Trends

Production of Natural Gas, NGLs & Crude Oil

Source: RBN
Estimated petroleum and natural gas hydrocarbon production in selected countries

Source: EIA
Canadian Crude Oil Trends

Canadian Crude Oil by Region: 2015 – 2016 (proj.)

Source: RBN
Crude Oil Transportation

Getting Crude To Market

- Most crude arrives by pipeline
- Next is tanker (imports)
- Barge, rail and truck are small by comparison
- Rapid growth in domestic production has spurred large scale re-plumbing of domestic crude distribution system
- Slower speed of pipeline build out in shale era lead to higher use of rail and water

Refinery Crude Receipts By Transport Mode

Source: RBN
North American Crude Oil Hubs

Source: RBN
Pipeline Flows

Source: RBN
Selected Crude Oil Pipeline Projects

Source: Pipeline Company Web Sites
Seaway Reversal 2014

**Seaway** is a joint venture between Enterprise and Enbridge---500-miles from Cushing, Oklahoma to Freeport, Texas. It originally shipped imported crudes from the Gulf Coast to Cushing but has been reversed to ship domestic and Canadian crude from the Midwest to the Gulf Coast.
Enbridge Refinery Access Initiative

The Line 9 Project extends from Sarnia Ontario to Montreal
Liquid Terminals

Terminals provide an essential link in the distribution of liquid commodities as the products move from producers to the wholesale marketplace.
Major U.S. Product Terminals

Source: IRS Active Fuel Terminals.
Shale Oil and Terminals

Not many changes in where terminals are located, but increases in capacity.

Reversals of flows via pipeline, barge, and rail.

New opportunities for third party terminal operators on the production side.
Questions and Discussion

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