BEYOND TANK CAR DESIGN

Rail operations and
Risk Management Strategies
to reduce the consequences of
hazardous liquid releases

OPERATIONAL CONSIDERATIONS

- Revise train securement rules
- Improve braking capabilities
- Reduce train speed
- Establish minimum train crew requirements

Revise train securement rules (Emergency Order 28)

Defined trains:

- Five or more tank car loads of any one or any combination of materials poisonous by inhalation as defined in 49 CFR 171.8, and including anhydrous ammonia (UN 1005) and ammonia solutions (UN 3318); or

- 20 rail car loads or intermodal portable tank loads of any one or any combination of materials listed in (1) above, or, any Division 2.1 flammable gas, Class 3 flammable liquid or combustible liquid, Class 1.1 or 1.2 explosive, or hazardous substance listed in 49 CFR 173.31(f)(2).

Revise train securement rules

The following restrictions apply when securing identified trains on mainline track or mainline sidings outside of a yard or terminal

- Plan for leaving identified trains unattended
- Processes for securing unattended trains
    - Lock cab or remove reverser of the controlling locomotive, communicate securement specifics with train dispatcher, and verify with qualified employee that securement requirements followed

Revise train securement rules (continued)

- Review, verify, and adjust if necessary, existing railroad securement procedures
- Implement operating rules and practices that require a securement job briefing
- Develop procedures to ensure a qualified railroad employee inspects equipment emergency responders have been on, under, or between for proper securement before the train is left unattended.
- Provide notice or training on requirements to all affected employees

Improve Braking Capabilities

Electronically Controlled Pneumatic brakes (ECP)

Operating Benefits of ECP Brake Technology

- Brake signal transmission rate is increased
- Brake application rate increased
- Graduated brake release
- Constant charging of reservoirs
- Reduction of undesired emergencies (UDEs)

ECP Brake System for Freight Service Final Report, Booz, Allen, and Hamilton (August 2006)

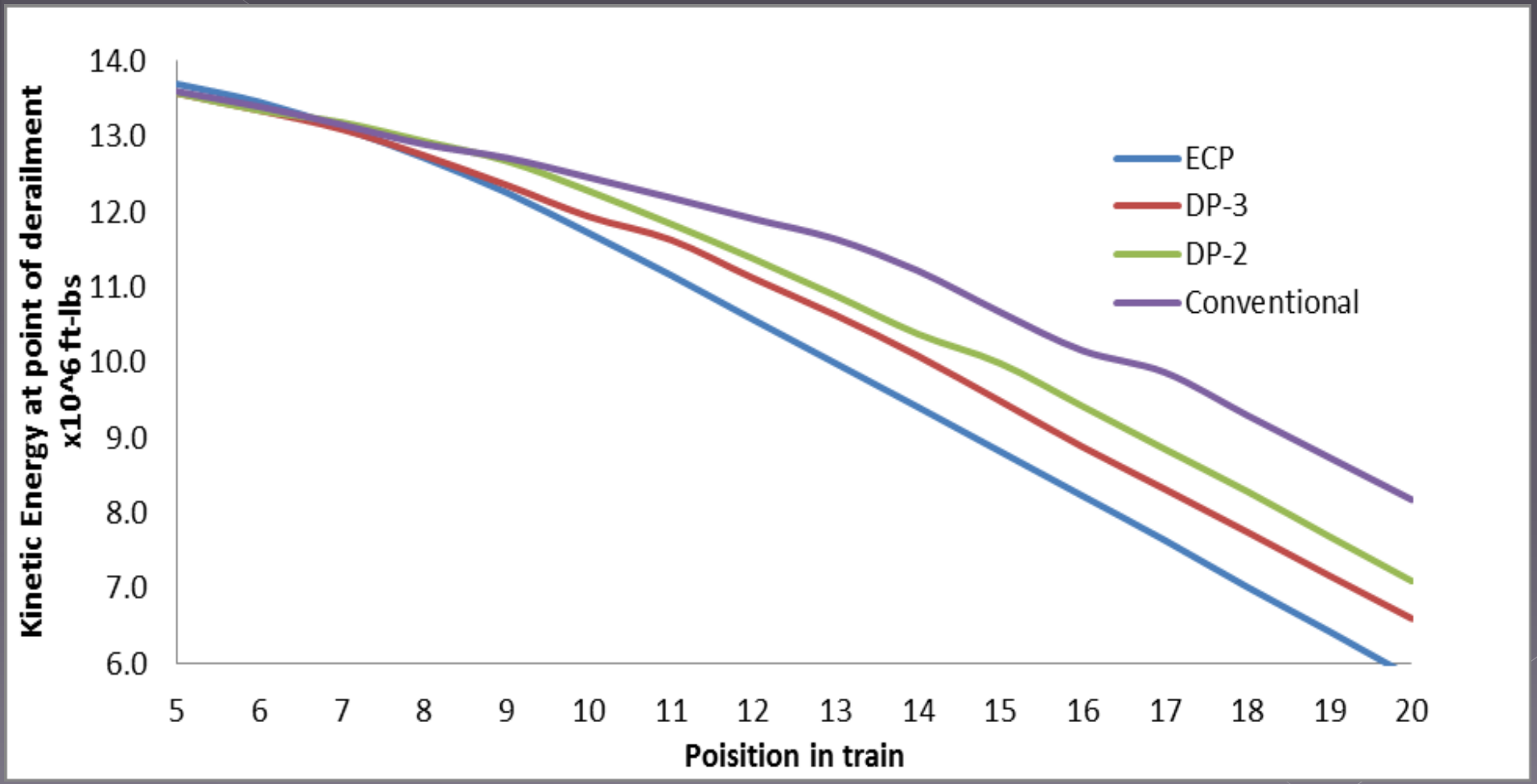
Improve Braking Capabilities

Distributed Power (DP)

Three key advantages:

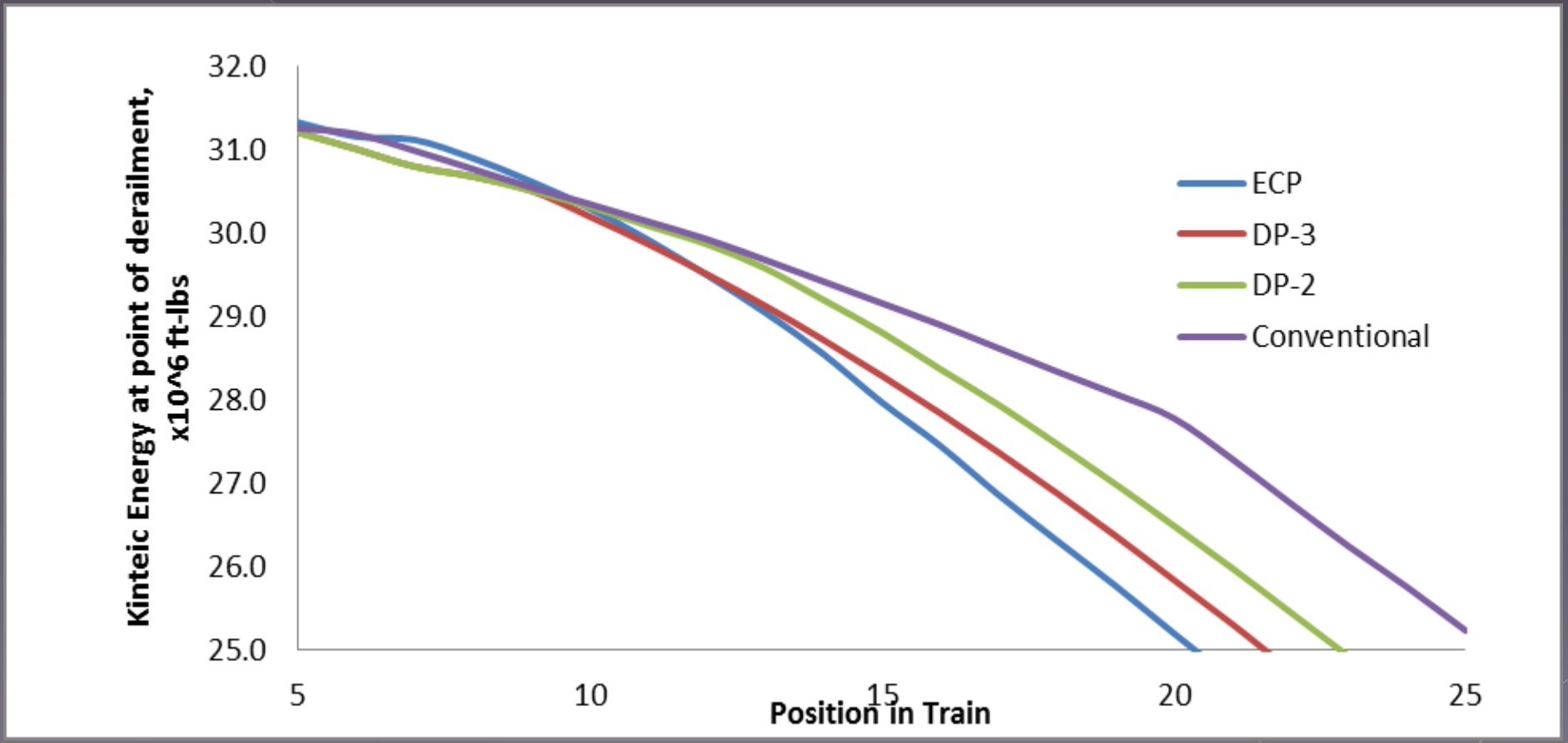
- Forces are distributed through the train, reducing drawbar and lateral forces. DP trains less prone to derailments and facilitate more even braking to reduce wheel and track wear.
- Brake application and release commands are transmitted by radio communication, significantly shortening all brake command propagation times.
- Stopping distances are reduced through faster brake application, and more rapid acceleration and deceleration is possible.

Table 7: Kinetic Energy vs. Position in train at a derailment speed of 40 mph



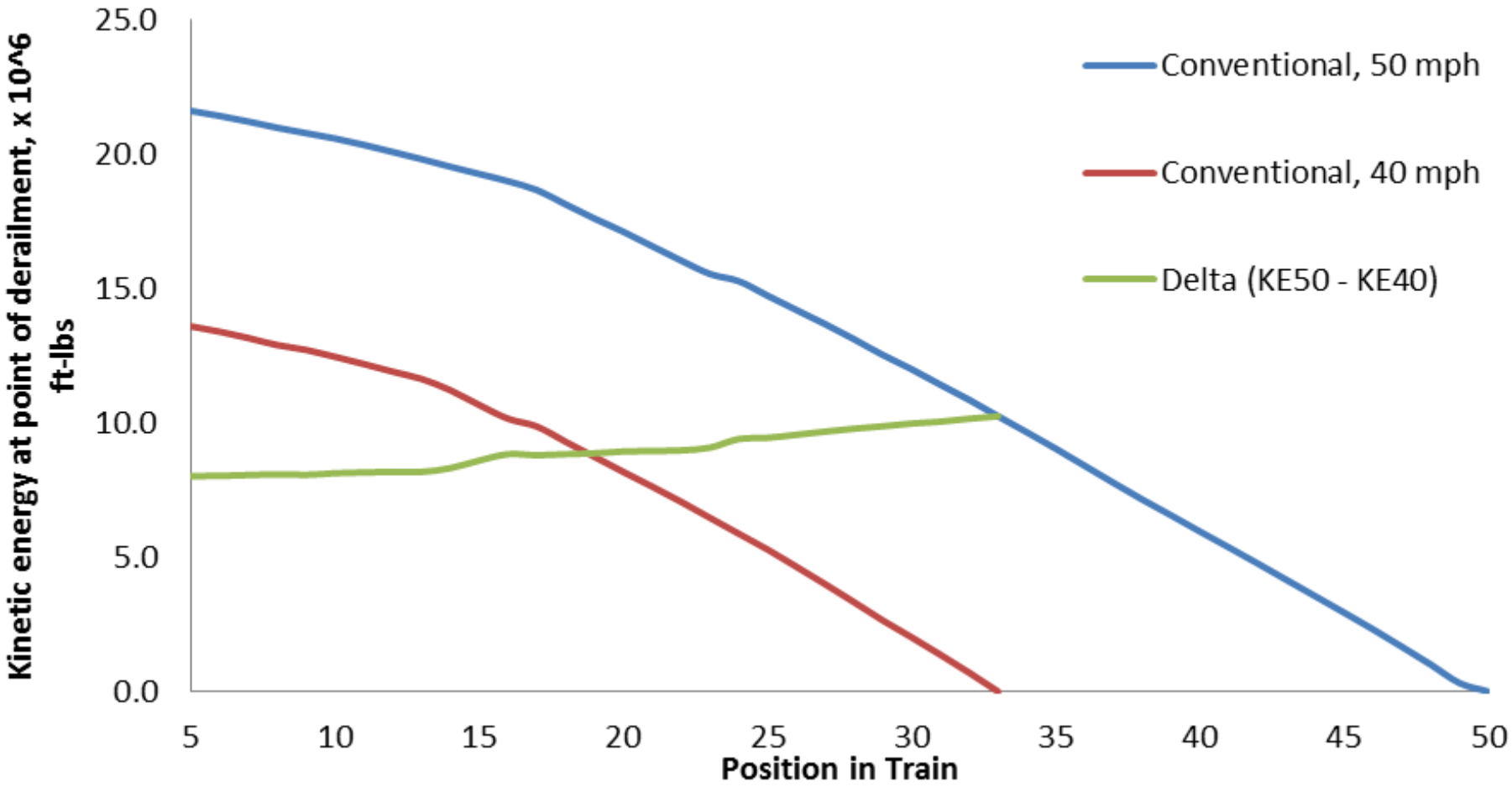
Assumptions: 2 locos (or 3 for DP-3) at 415K, 100 cars at 263K, train length 6164 ft., Emergency at lead, locos bailed off (no braking force), DP-2 has locos at front and rear of train, DP-3 has locos at front, mid-point, and rear of train

Table 8: Kinetic Energy vs. Position in train at a derailment speed of 60



Assumptions: 2 locos (or 3 for DP-3) at 415K, 100 cars at 263K, train length 6164 ft., Emergency at lead, locos bailed off (no braking force), DP-2 has locos at front and rear of train, DP-3 has locos at front, mid-point, and rear of train

Reduced Train Speeds



Possible Operational Changes

Define at risk trains

Establish speed restrictions on at risk trains

Conventional trains with EOT operate at a reduced speed

Distributed power trains less restricted than conventional

Trains with electronically controlled pneumatic brakes (ECP) least restricted, or no speed restriction

MINIMUM TRAIN CREW REQUIREMENTS

The Lac Megantic tragedy also triggered rule making on minimum train crew requirements

The RSAC working group is considering minimum crew requirements for all train operations in the US, but has yet to publish an NPRM

THE END