

LAC-MÉGANTIC ACCIDENT

What we learned

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1 - Introduction 1/7

On July 6, 2013 an unattended train carrying Bakken crude oil from North Dakota rolled down a descending grade and subsequently derailed downtown, Lac-Mégantic, a small Québec Town 48 km from the State of Maine.

1 - Introduction 2/7

- Train
 - 1 433 m (4 701 ft)
 - 10 287 tons
 - 5 locomotives
 - 1 VB car to house controls
 - 1 buffer car
 - 72 DOT 111 non pressurized tank cars
 - 1 operator
 - Cargo - Petroleum crude Class 3 PkGr 3 UN 1267

1 - Introduction 3/7

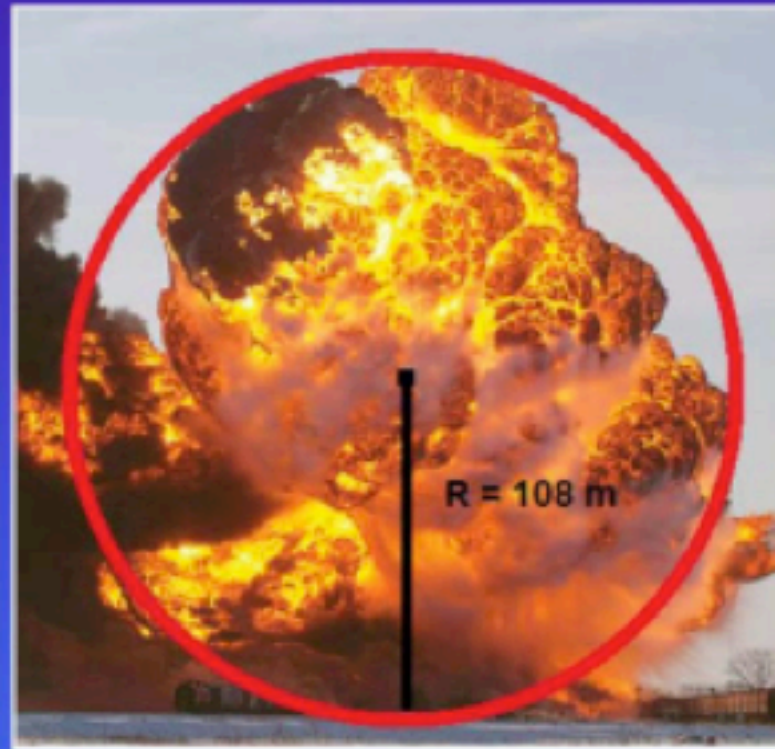
- 6 millions litres of crude oil spilled
- Fires and explosions destroyed 40 buildings
- Environmental contamination of downtown and adjacent river and lake
- 47 fatalities

1 - Introduction 5/7



- Credit Photo : David Charron/PC
- **Tank Cars in fire**

1 – Introduction 7/7



– BLEVE modeling with *PHAST* v. 7.1

- 108 m - Fire Ball radius
- 250 m - 25 kW/m²
- 560 m – 5 kW/m²

2 – Infrastructure

- Highly degraded, operator does not have money to maintain them
- Operating procedure not clear (parking on main line, number of hand brakes to apply)
- Insurance coverage 25 millions dollars

4 – Rolling Stock 1/3



- DOT 111, 69% of N-A Tank Car Fleet
- Shell 1/2 inch thick, valve improperly protected
- Scheduled for replacement 1995 Canada, 2011 US (accident investigation 1991)

4 – Rolling Stock 2/3



– DOT 111

4 – Rolling Stock 3/3

- DOT-111 housings not effective in preventing impact damage



– DOT 111

5 – Bakken Crude 1/1

- Highly volatile (Results from Transportation Safety Board Labs analysis on Lac-Mégantic Crudes, March 2014)
 - Flash Point < - 35°C
 - Initial Boiling Point 43.9 to 50.0°C
 - Reid Vapor Pressure > 10 psig
 - Flammable liquid Class 3 Packing Group IIImproperly classified as
 - Packing Group III as classified for Lac-Mégantic

6 – TSB Recommendations

1st recommendation

Replacement of DOT 111 tank cars

–Replacement of DOT 111 tank cars

- Stronger shell
- Tank car jackets
- Full height head shields
- Thermal protection

–Same standard for North America

6 – TSB Recommendations

2nd recommendation

- Conduct route planning and analysis
- Implement key operating practices
 - Speed restrictions in vulnerable areas
 - Expansion of inspection requirements
 - Risk assessment

6 – TSB Recommendations

3rd recommendation

–Implement Emergency Response Assistant Plan (ERAP)

–TC issued a Protective Direction to:

- Require an approved ERAP for the transportation of higher risk hydrocarbons and ethanol
- Establish a task force for activation process, cooperative industry approach, unified command
- Risk assessment

6 – Other Recommendations

Sampling and classification of crude oil

6 – Other Recommendations

Real time sharing of train consist with municipality.

7 – Remarks

Conflicting positions

- Railroad companies want more resistant tank cars as described previously
- Shippers want the railroad companies to prevent derailment.