

LAC-MÉGANTIC ACCIDENT

What we learned

Jean-Paul Lacoursière, P. Eng.
University of Sherbrooke
jpla@sympatico.ca

Presentation Content

- 1- Introduction
- 2 - Operator
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1 - Introduction 1/8

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

- Chain of events
 - July 5 , 23:00, Trains stop in Nantes 12 km from Lac Mégantic, operator quits for shift change, leaves train on main track
 - July 5, 23:50, Local resident calls 911 for a fire on train
 - July 6, 00:00 Fire department responds and shutdown lead locomotive and leaves at 12:15
 - July 6 after midnight, train losses braking system and start rolling until it derails in Lac-Mégantic

1 - Introduction 4/7



1 - Introduction 5/7



- Credit Photo : David Charron
- **View from church Porch**

1 - Introduction 6/7



- Credit Photo : David Charron
- **BLEVE of Tank Car containing Bakken Crudes**

1 - Introduction 7/7



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

2 – The operator

- Montreal Maine & Atlantic
 - Class II freight railroad
 - Head office, Vermont Maine (Registered in Maine)
 - Operates in Maine, Vermont, Quebec and New Brunswick
 - Operated 2002 to 2014
 - In financial difficulties from day 1
 - Got permission from Transport Canada to operate with only 1 person on board of the train
 - Liability insurance \$25 000 000
 - File for Chapter 11/CCAA bankruptcy protection in August 2013

3 – 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)

4 – Rolling Stock 1/4



- 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 2/4



– DOT 111

4 – Rolling Stock 3/4



– DOT 111

4 – Rolling Stock 4/4

- DOT-111 housings not effective in preventing impact damage

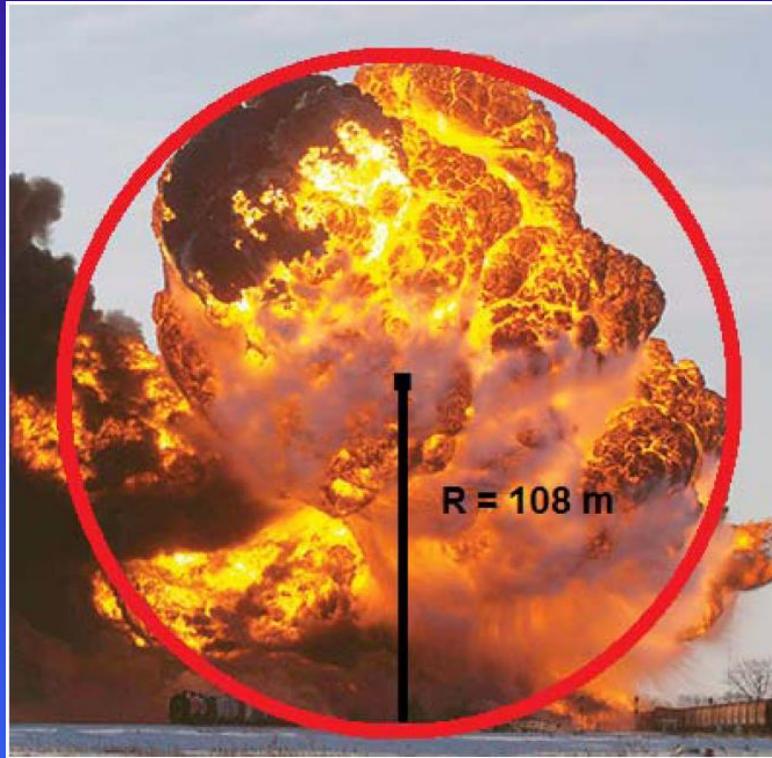


– DOT 111

5 – Bakken Crude 1/2

- Highly volatile (Results from Transportation Safety Board Labs on Lac-Mégantic Crudes, March 2014)
 - Flash Point < - 35°C
 - Initial Boiling Point 43.9 to 50.0°C
 - Flammable liquid Class 3 Packing Group II
 - Not
 - Packing Group III as classified for Lac-Mégantic

5 – Bakken Crude 2/2



– BLEVE modeling with *PHAST* v. 7.1

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

6 – Regulations

The pressure to transport crude oil has forced shippers to:

- Improperly classify the crude

And use

- Fragile transportation rolling stock

- Financially fragile transporters

- Poorly maintained infrastructures

7 – Conclusions 1/4

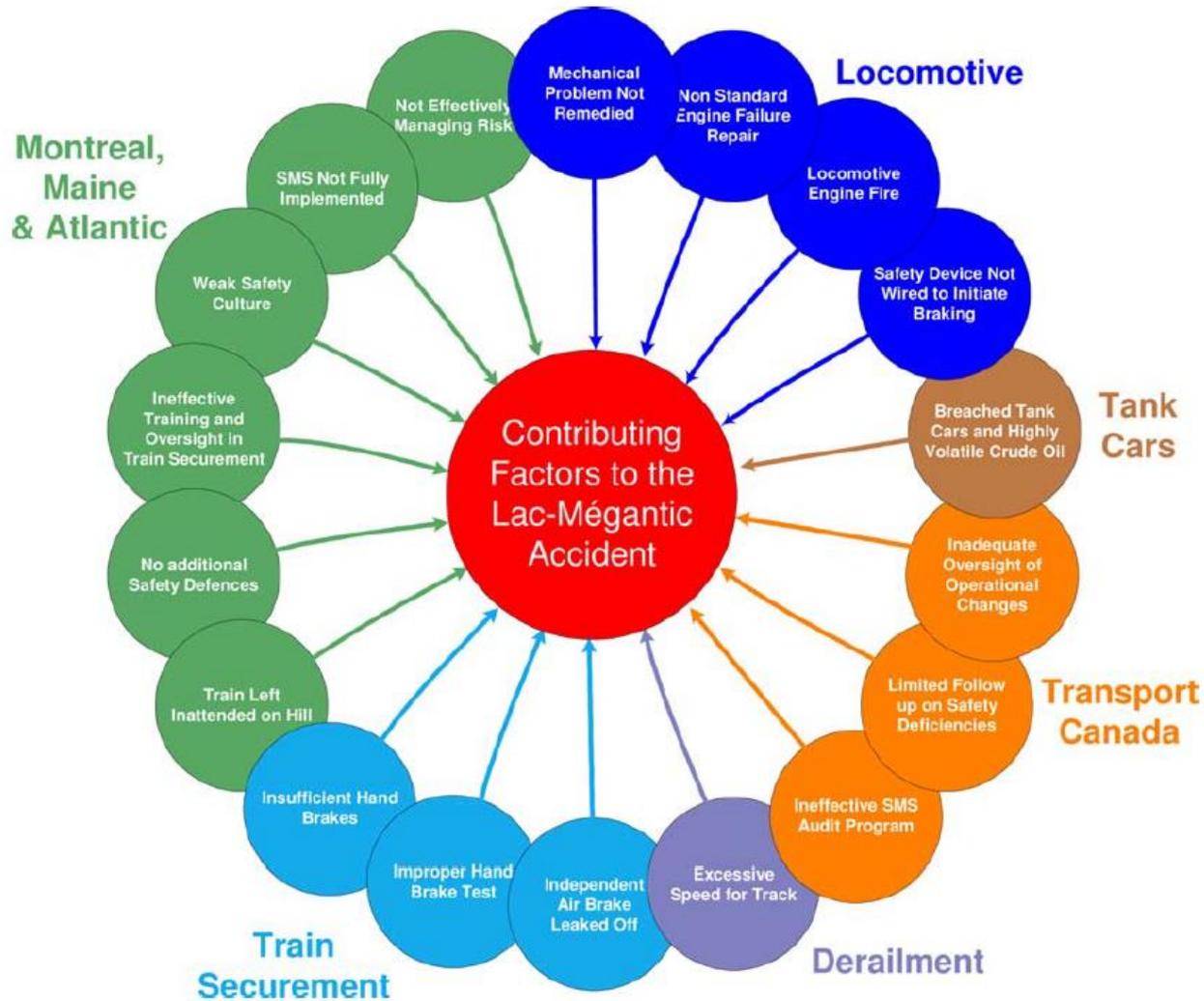


Figure 5. Summary of findings. Credit TSB. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

7 – Conclusions 2/4

- Regulations were upgraded in Canada and US
 - Two drivers on board of train
 - Parking of train
 - Securing train
 - Replacement of DOT 111 fleet
 - Sampling of crude oil
 - Real time declaration of dangerous good to municipalities

7 – Conclusions 3/4

As a result:

- Fatalities
- Loss of property
- Clean up cost
- Long term damages to the railcar industry

7 – Conclusions 4/4

- There is a need for transportation risk analysis:
 - Route selection (What is the safest way to ship?)
 - Mode selection (Should the shipment be by truck, rail, barge or pipeline?)
 - Facility location (Where should a new plant or warehouse be built?)
- Need for CCPS/AICHE to reflect on this transportation problem and be present in the public debate

8 – Discussion

YOUR INPUT

8 – Rai Safety Act

- ***safety management system*** means a formal framework for integrating safety into day-to-day railway operations and includes safety goals and performance targets, risk assessments, responsibilities and authorities, rules and procedures, and monitoring and evaluation processes
- (<https://laws-lois.justice.gc.ca/eng/acts/r-4.2/>)