

# Megantic: An Avoidable Tragedy

A Summary of the Transportation Safety Board of Canada  
Railway Investigation Report R13D0054

with added observations  
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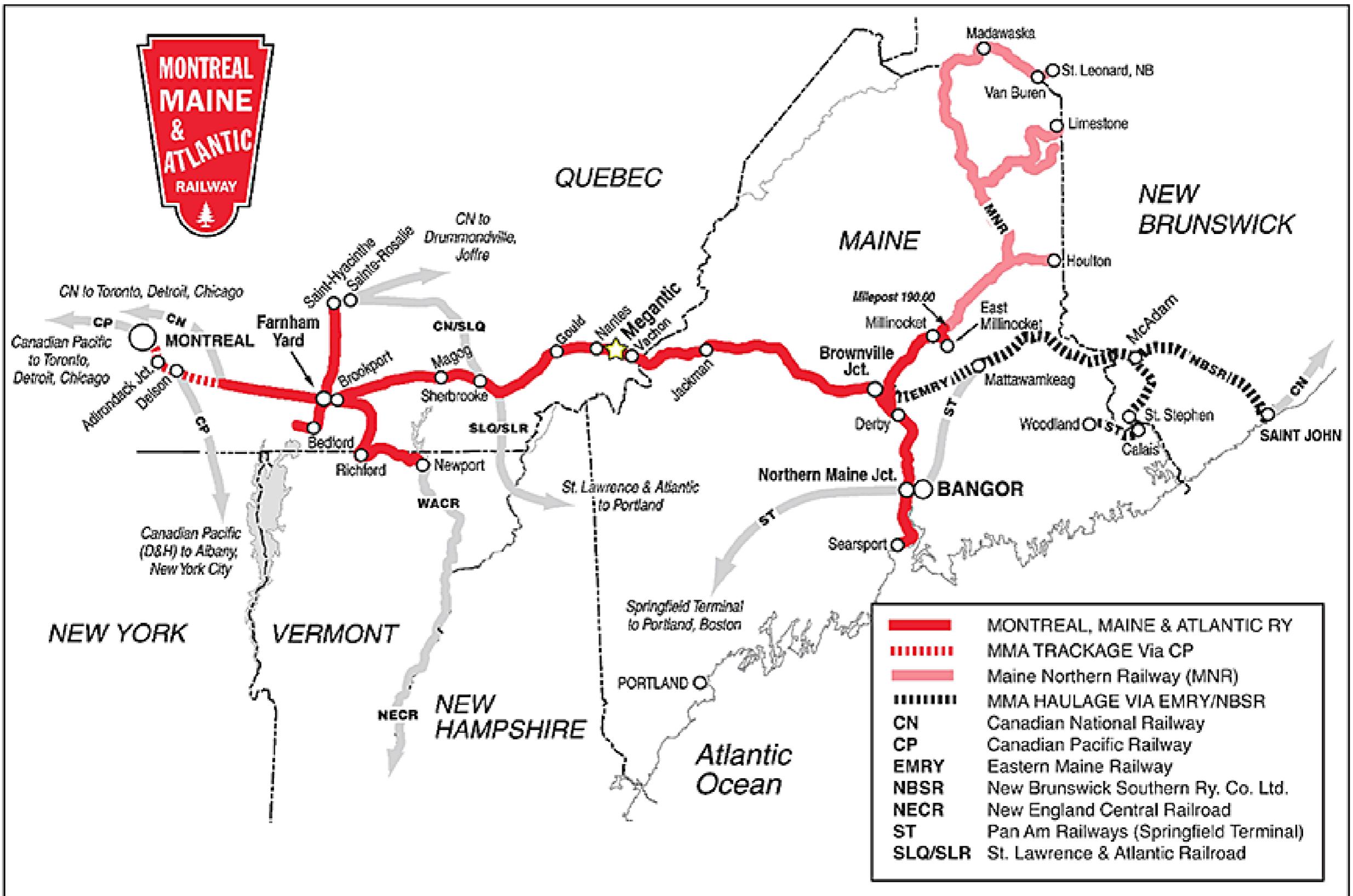
## **Summary**

**On 06 July 2013, shortly before 0100 Eastern Daylight Time, eastward Montreal, Maine & Atlantic Railway freight train MMA-002, which was parked unattended for the night at Nantes, Quebec, started to roll. The train travelled approximately 7.2 miles, reaching a speed of 65 mph. At around 0115, when MMA-002 approached the centre of the town of Lac-Mégantic, Quebec, 63 tank cars carrying petroleum crude oil (UN 1267) and 2 box cars derailed. About 6 million litres of petroleum crude oil spilled. There were fires and explosions, which destroyed 40 buildings, 53 vehicles, and the railway tracks at the west end of Megantic Yard. Forty-seven people were fatally injured. There was environmental contamination of the downtown area and of the adjacent river and lake.**



# Route of MMA-002





	MONTREAL, MAINE & ATLANTIC RY
	MMA TRACKAGE Via CP
	Maine Northern Railway (MNR)
	MMA HAULAGE VIA EMRY/NBSR
	Canadian National Railway
	Canadian Pacific Railway
	Eastern Maine Railway
	New Brunswick Southern Ry. Co. Ltd.
	New England Central Railroad
	Pan Am Railways (Springfield Terminal)
	St. Lawrence & Atlantic Railroad



1. Starting location  
(front of train)

Nantes

Mi. 8.0

Mi. 7.4

Mi. 7.0

Mi. 6.0

Mi. 5.0

Mi. 4.0

Mi. 3.0

Lac-Mégantic

Mi. 2.0

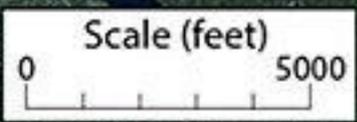
2. Derailment  
location

Mi. 1.0

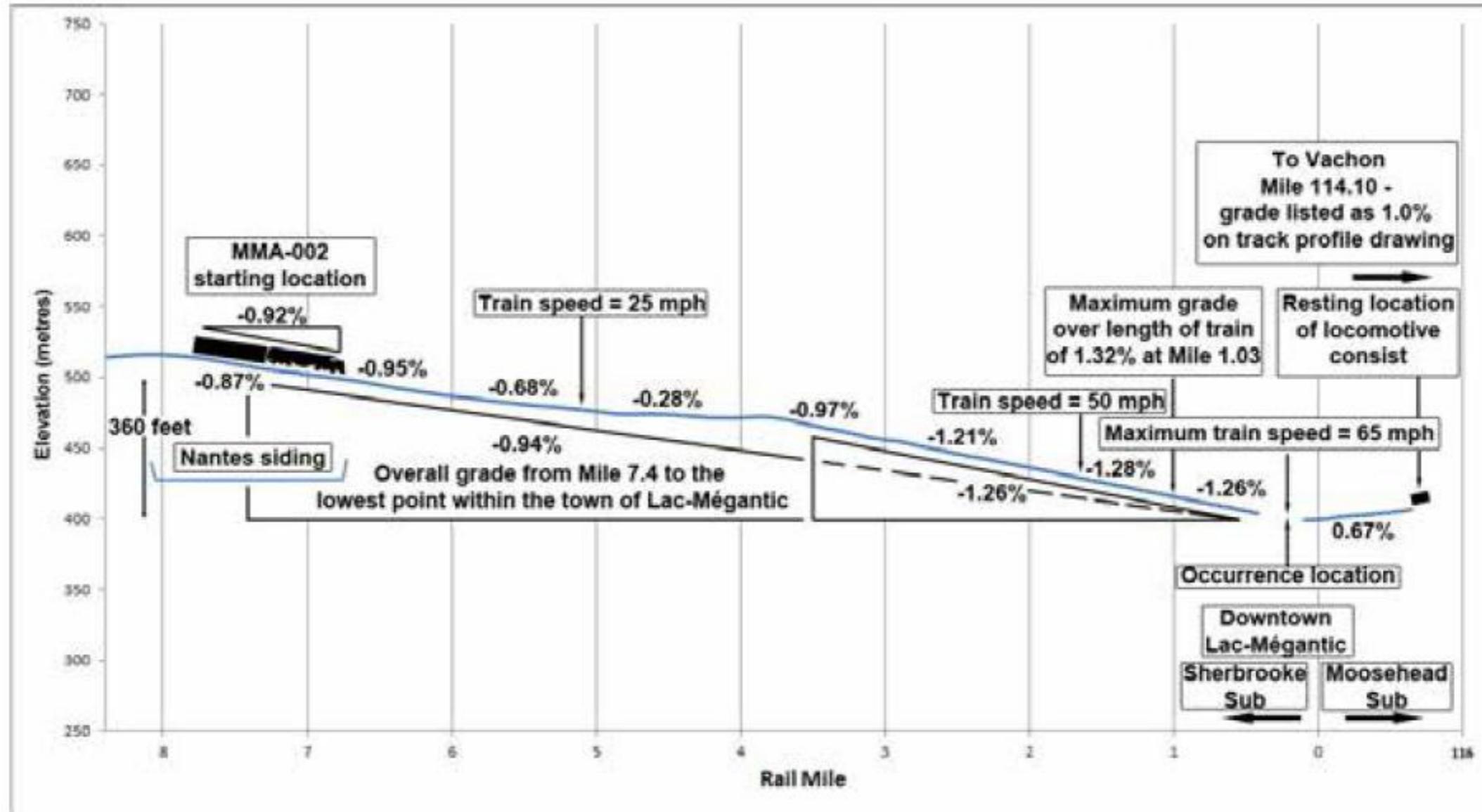
Mi. 0

Mi. 117.0

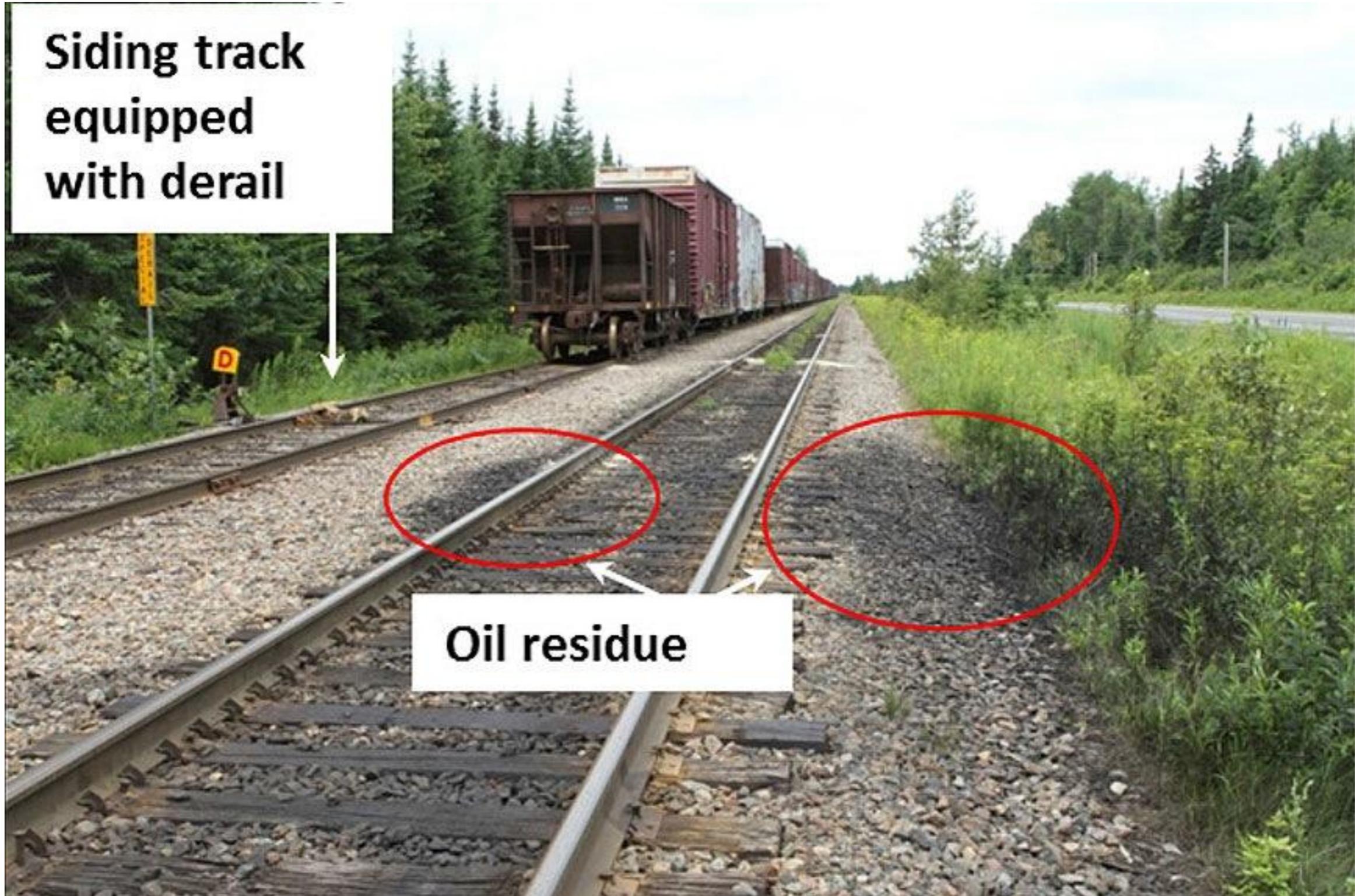
3. Resting location of  
locomotive consist  
Mi. 116.41



# Grade & Elevation between Nantes and Megantic



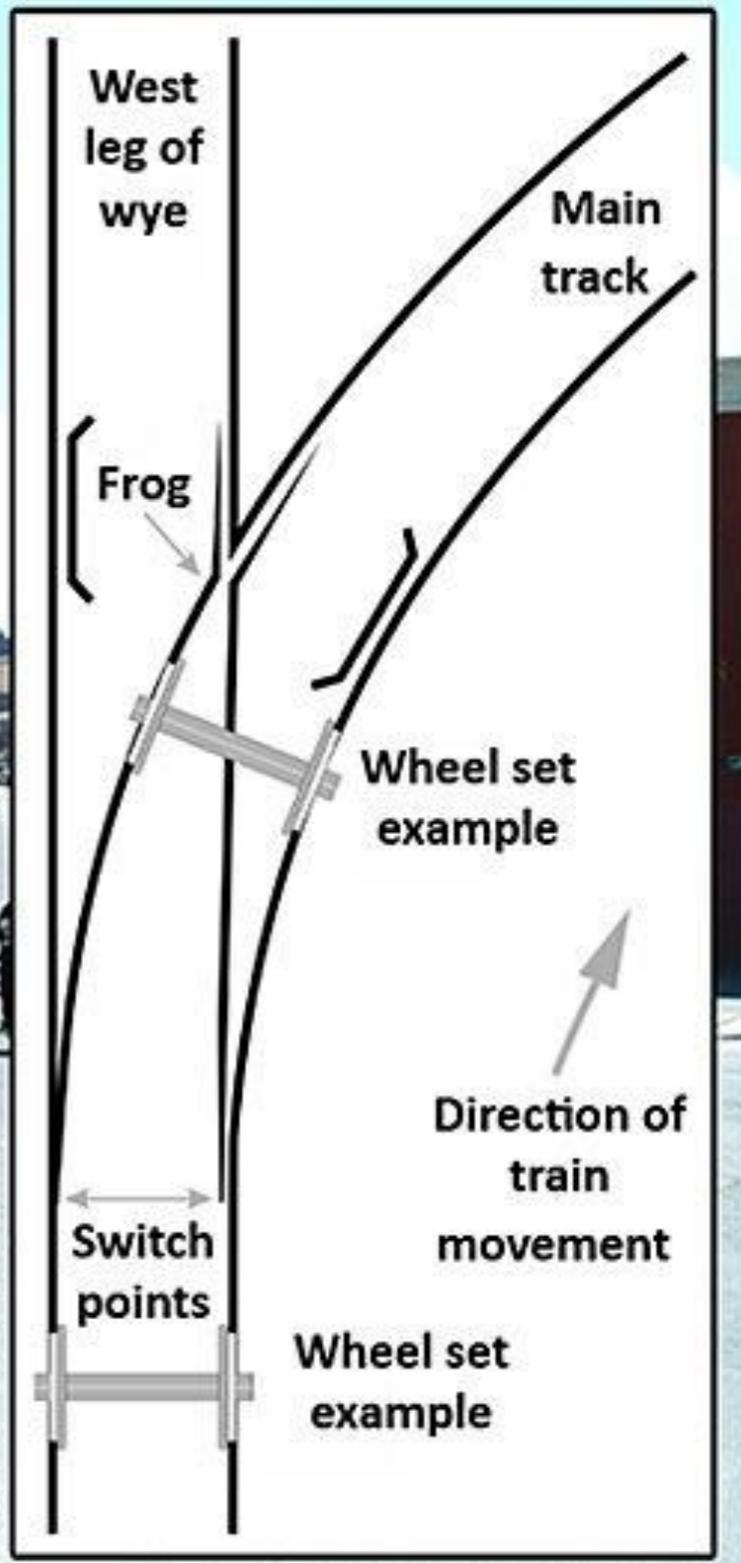
**Siding track  
equipped  
with derail**



**Oil residue**



Switch points facing west

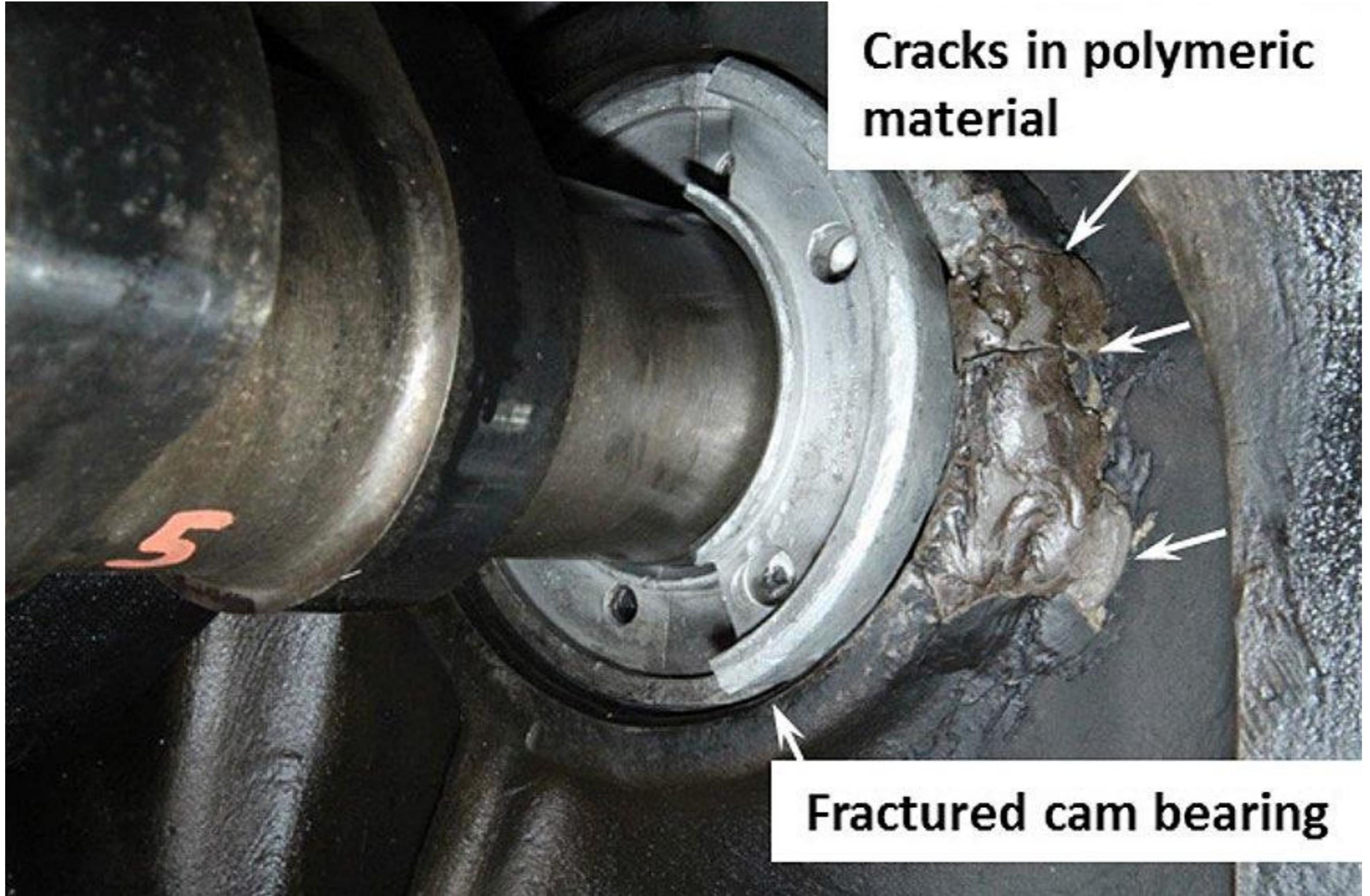






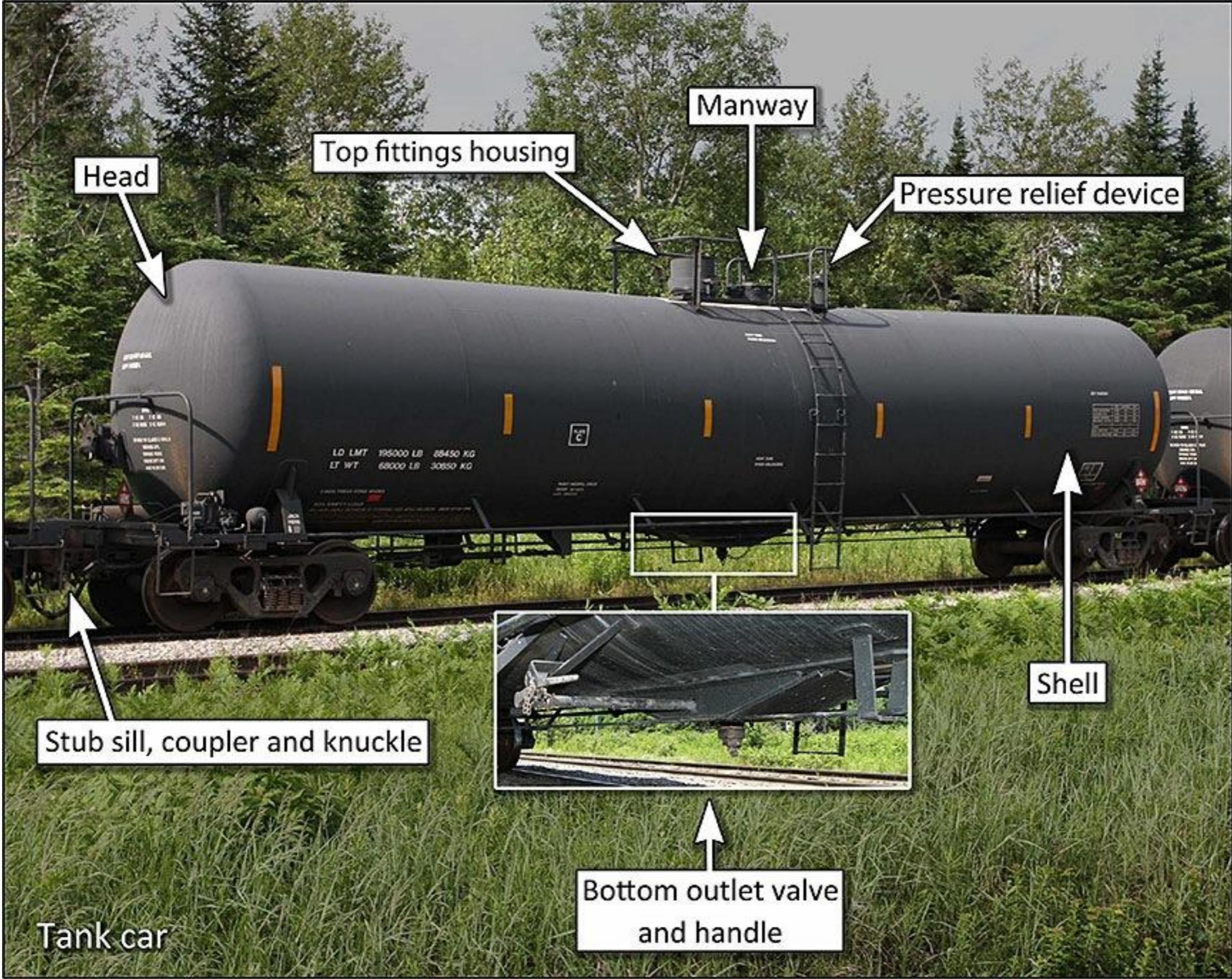


**Cracks in polymeric material**



**Fractured cam bearing**











EXTENT OF BREACH:

LARGE

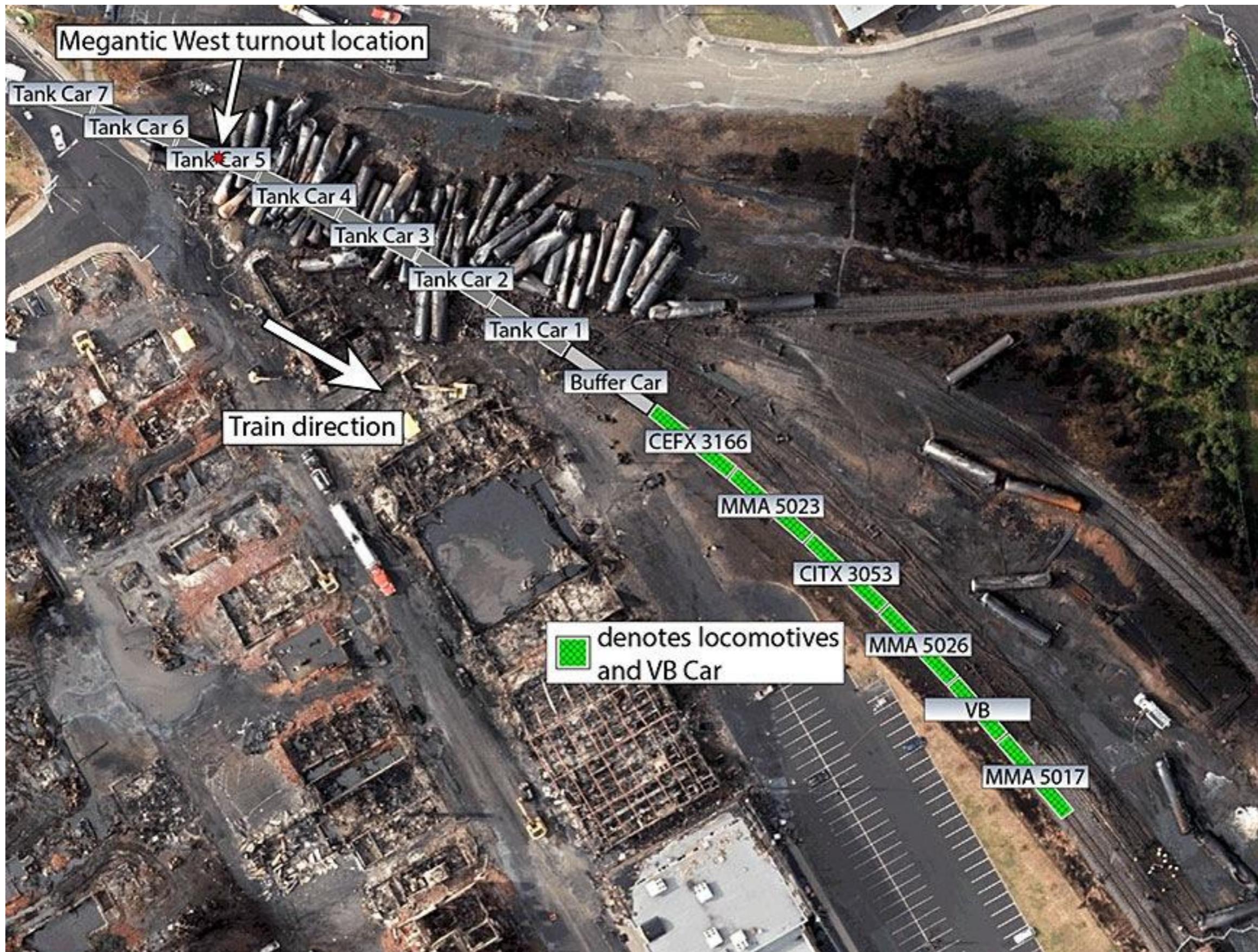
MEDIUM

SMALL

NONE







Megantic West turnout location

Tank Car 7

Tank Car 6

Tank Car 5

Tank Car 4

Tank Car 3

Tank Car 2

Tank Car 1

Buffer Car

CEFX 3166

MMA 5023

CITX 3053

MMA 5026

VB

MMA 5017

Train direction

denotes locomotives and VB Car

# Opportunities Missed

1. Repair #5017 broken connecting rod correctly (10/7/12)
2. Repair rather than patch #5017 cam bearing (3/15/13)
3. Swap better unit into lead position at Farnham.
4. Apply enough hand brakes at Nantes to hold train (5 locos + 15 cars).
5. Perform securement test correctly.
6. Apply automatic train and independent engine brakes after securement test.
7. Put another unit on standby using Hotstart feature.
8. Return to Nantes and restart another locomotive.

# Fate:

- July 5th came on Friday
- Reset Safety Control (e.g. Alertor) wired to battery
- Local MM&A engineer on vacation

# Additional Links:

- <http://www.tsb.gc.ca/eng/rapports-reports/rail/2013/r13d0054/r13d0054-res.asp>
- <http://www.tsb.gc.ca/eng/rapports-reports/rail/2013/r13d0054/r13d0054.asp>
- [http://en.wikipedia.org/wiki/Lac-M%C3%A9gantic\\_rail\\_disaster](http://en.wikipedia.org/wiki/Lac-M%C3%A9gantic_rail_disaster)

**Table 1. Locomotive event recorder information**

<b>Time</b>	<b>mph</b>	<b>Brake pipe pressure (psi)</b>	<b>Locomotive brake cylinder pressure (psi)</b>	<b>Event</b>
05 July 2013 2249:37	0	82	69	MMA-002 wa stopped at Nantes using a 13-psi automatic brake application, and the independent brakes were fully applied.
2303:48	0	94	69	The automatic brakes were released. The locomotive independent brakes remained fully applied.
2358:42	0	95	69	Lead locomotive MMA 5017 was shut down.
06 July 2013 0005:55	0	94	70	Brake pipe pressure began to decrease, and continued to decrease at an average rate of 1 psi per minute.
0013:55	0	79	69	Independent brake cylinder pressure began to decrease at the same rate as the brake pipe pressure.
0058:21	1	32	27	MMA-002 began to run away.
0115:30	65	16	14	The highest recorded speed of 65 mph was attained.
0115:31	65	0	14	Brake pipe pressure dropped to 0 psi as the cars began to derail. The locomotive consist separated into 2 sections.
0117:12	0	0	6	The first section stopped 5016 feet east of the point of derailment, at Mile 116.30 of the Moosehead Subdivision, on a 1% ascending grade.
0245:06	1	0	0	The first section of the locomotive consist began to move backwards (west) down the grade toward downtown Lac-Mégantic.
0246:23	8	0	0	The first section of the locomotive consist travelled 475 feet west and struck the stationary second section of the consist.
0246:42	0	0	0	The 2 sections rejoined and moved an additional 106 feet west before coming to a final stop.

## Appendix A – Sequence of events

Time	Description
05 July 2013, 1100	At Farnham, MMA-002 received a mechanical inspection by TC.
1300	MMA-002 received a brake continuity test with TC present.
1330	The LE reported for duty. Previously that morning, the LE had made a request to the Farnham RTC to delay the on-duty time from about 1230 to 1330.
1357	Shortly after departing Farnham, the LE advised the Farnham RTC that the lead locomotive (MMA 5017) could not attain full throttle power, and asked if anyone had reported engine surges on that locomotive.
1456	The LE advised the Farnham RTC that the train was losing speed, lead locomotive MMA 5017 could still not attain full throttle power, and it was affecting all the other locomotives in the consist.
2000 (approx.)	The LE informed the Bangor RTC of problems with the lead locomotive.
2249	MMA-002 was stopped at the east siding switch on the main track at Nantes using an automatic air brake application. The locomotive independent air brakes were applied. The LE applied hand brakes to the train and shut down the 4 trailing locomotives. When the LE returned to the lead locomotive, the automatic air brake application was released; however, the independent air brakes remained fully applied. The hand brake effectiveness test was conducted without releasing the locomotive independent air brakes.
2305	The LE called the Farnham RTC after securing the train and asked the RTC to call a taxi.
2315	<p>The LE called the Bangor RTC to tell him that the train was secured at Nantes, and that he had shut down 4 of the 5 locomotives. The LE also mentioned that, once he got to Nantes, he noted the excessive smoke from the lead locomotive, changing from black to white. The LE said that he expected it to settle on its own, but was not sure how the locomotive would be the next morning, considering the issues experienced during the day. They decided to leave the train as it was and they would deal with any locomotive performance issues in the morning.</p> <p>As per normal practice, the train was left with the lead locomotive door unlocked, as well as the reverser removed and placed on the LE seat with the train's paperwork.</p>

2325 (approx.)	The taxi arrived at Nantes. The taxi driver noted the excessive smoke and oil droplets coming from the locomotive, and asked the LE whether it should be left like that, particularly considering the environmental pollution.
2330 (approx.)	The taxi departed Nantes.
2339	The LE called the Farnham RTC to indicate his off-duty time of 2345.
2340	A 911 call was received reporting a fire on a train at Nantes. The call was assigned to the Nantes Fire Department.
2350	The Sûreté du Québec (SQ) informed the Farnham RTC of a fire on a train at Nantes. The SQ advised that firefighters and the SQ were on their way to the site. The Farnham RTC advised the SQ that the train was transporting crude oil.
2352	The Farnham RTC called the Manager of Operations to advise him of the fire at Nantes and inform him that it was a unit crude oil train. They decided that the closest MMA employee (a former LE and mechanic), residing in Marston, should be contacted and dispatched to Nantes.
2353	The Farnham RTC tried to reach the MMA employee in Marston twice on his company cellular phone, but was unsuccessful both times.
2355	The SQ called the Farnham RTC to inform him that the fire was on a locomotive and that the firefighters and SQ were on site.
2358	The Nantes Fire Department shut down the lead locomotive using the emergency fuel cut-off and opened the breakers on the back electrical panel located inside the locomotive cab. This was following an attempt to extinguish the fire using foam, which resulted in a black oily residue being dispersed onto the ground (discovered at Nantes and just east of where the locomotives were discovered on the Moosehead Subdivision).
2359	The MMA Track Manager for the Lac-Mégantic area called the Farnham RTC to advise that he had been contacted by the Nantes Fire Department, which had requested that a locomotive technician be sent to the site. After discussion with the fire department, the MMA Track Manager informed the Farnham RTC that the fire, which was on the lead locomotive, was under control, that the lead locomotive had been shut down, and that the Marston employee was on leave. The MMA Track Manager indicated that the MMA Track Foreman residing in Lac-Mégantic should be called and dispatched to the site.

06 July 2013, 0000	The Farnham RTC called the LE to ask which locomotives had been left running and to advise him of a fire, which he believed to be minor. The Farnham RTC informed the LE that the lead locomotive had been shut down. The LE advised the Farnham RTC that only the lead locomotive had been left running, and asked him if he was required to go to Nantes to start another locomotive. The LE was advised that the MMA Track Foreman was on his way and that they would wait until the morning to start the locomotives.
3	The Farnham RTC advised the Bangor RTC that the lead locomotive on MMA-002 had caught fire, that it had been shut down, and that the MMA Track Foreman had been sent on site. They concluded that the lead locomotive would need to be removed and they discussed a workaround for the next morning.
18	The SQ called the Farnham RTC to advise that the fire was under control, that the locomotive engine was stopped using the emergency fuel cut-off, and that the fire was in the smoke stack. The Farnham RTC mentioned that the lead locomotive was not usually shut down because of the air brake system. The SQ mentioned that there was damage to the lead locomotive due to the fire.
23	The Manager of Operations called the Farnham RTC for an update. The Manager of Operations questioned why the lead locomotive was left running by the LE. The Farnham RTC replied that it was left running to avoid having to perform an air brake test the following day to meet U.S. requirements.
0030 (approx.)	The MMA Track Foreman arrived at Nantes and met with 2 firefighters.
35	The MMA Track Foreman informed the Farnham RTC that the fire was extinguished, that all locomotives were shut down and that the electrical breakers in the cab of the lead locomotive had been opened. The Farnham RTC told the MMA Track Foreman to leave things as they were and leave.
0044 (approx.)	The MMA Track Foreman and the Nantes Fire Department left MMA-002.
44	The Farnham RTC advised the Bangor RTC that the fire was in the smoke stack, that it had been extinguished and that the lead locomotive was shut down. They again discussed the workaround for the next day.

58	When the air brake pressure leaked off, MMA-002 began to roll.
107	MMA-002 reached a speed of 25 mph.
114	MMA-002 reached a speed of 50 mph.
115	At Mile 0.23 of the Sherbrooke Subdivision, cars derailed at 65 mph, resulting in a large loss of crude oil and large fire.
117	A 911 call was received reporting a fire at Lac-Mégantic. The call was dispatched to the Lac-Mégantic Fire Department.
129	The SQ informed the Farnham RTC that there were explosions at Lac-Mégantic and asked him to send someone as soon as possible. The Farnham RTC asked the SQ if the fire was at Nantes or Lac-Mégantic, because MMA-002 was at Nantes. The SQ asked if the Farnham RTC was certain that the train was still at Nantes. The Farnham RTC advised that someone from MMA would be dispatched.
131	The Farnham RTC advised the MMA Track Manager of the fire at Lac-Mégantic and that the SQ thought that it involved the train from Nantes. The MMA Track Manager indicated that the MMA Track Foreman would be dispatched.
148	The LE advised the Farnham RTC that the whole downtown was on fire and wondered what other cars were in the yard. The LE said that it was not MMA-002 or MMA-001, because they were tied up at Nantes and Vachon, respectively. The Farnham RTC confirmed that there were no dangerous goods in the yard.
Starting at 0150	There were multiple telephone conversations within MMA to try to determine the cause of the fire. The Farnham RTC received reports that a train was seen travelling eastward into Lac-Mégantic.
239	The MMA Track Foreman called from Nantes and confirmed to the Farnham RTC that MMA-002 was not there.
329	The Farnham RTC told the LE that it was MMA-002 that had run away. The LE advised the Farnham RTC that the train was secured when he left Nantes, and that he had applied hand brakes on all locomotives, the VB car, and the buffer car.
0330 (approx.)	The MMA Track Manager and MMA Track Foreman arrived at the location of the locomotives at Mile 116.41 of the Moosehead Subdivision and re-tightened hand brakes on the locomotives and the VB car.
436	The Assistant Manager of Operations called the Farnham RTC who gave a summary of events and advised that hand brakes were applied on all locomotives, the VB car, and the buffer car. The Assistant Manager of Operations stated that this was not enough, and that it was supposed to be 10% + 1. The Farnham RTC mentioned that, normally, after applying hand brakes, they should be tested on the release, and if the LE had tested them, MMA-002 should have held. The Farnham RTC stated that the air likely leaked off and the emergency brakes did not apply.