Metro-North Railroad crossing catastrophe: Who is to blame?

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2015-02-12

"*Trains and cars don't mix. Never race a train to the crossing — even if you tie, you lose.*"
— Metro-North *Mileposts* publication for commuters[1]

On February 3, 2015, a northbound Metro-North Railroad commuter train struck an SUV at a grade-level road crossing near Valhalla, New York some 30 miles north of New York City. This unusual accident not only claimed the life of the vehicle driver, but also killed five train passengers in a bizarre secondary collision with the electrified third rail that powers the train. Can we write this accident off as merely another case of driver inattention at a railroad crossing?

As someone who normally deals with topics relating to Islam, Iran, the Middle East, U.S. hegemonic pursuits and the atrocities of takfiri terrorists, I really fought with myself over writing an article relating to trains. Yet since I am from New York and have ridden myself on Metro-North trains on the Hudson line—not the Harlem line where the calamity occurred—I could not resist examining this particularly macabre misfortune. That I had been to New York in April 2014 to visit the family grave in a cemetery not far from Valhalla also compelled me to write.

But there are other reasons. As a boy, I wanted to be a locomotive engineer—a train driver—but unable to meet vision requirements, I planned on a career in the engineering department of a railroad. I never attained that goal, but with my background in mathematics and physics, I landed a job with a rail car manufacturer as an engineer responsible for design of passenger railcar air brakes and trucks—bogies, as they are called in much of the world. One of my minor successes, which kept me employed for over five years through two cycles of layoffs, was a software program that I wrote to model train acceleration and braking.

The grim physics of a grade crossing accident typically involves a 4,000 lb. vehicle[2] colliding with a train weighing many times that: in the case of a 110-car loaded coal train frequently seen in the U.S., 7500 times; in this case of the 8-car Bombardier-built M7A Electric Multiple Unit (EMU) Metro-North commuter train, about 240 times. Considering the numbers, it is rare for a car driver to survive such an impact. So as the team of investigators from the U.S. National Transportation Safety Board (NTSB) sifted through the wreckage of the horrific accident at Commerce Street in Valhalla, I searched the news for clues to clarify what exactly went wrong.

Many factors contribute to a collision between a motor vehicle and a train at a crossing. In the case of the Valhalla accident, one could say everything went wrong. First on the list is the topography of the crossing itself. Approaching the Commerce Street crossing from the south, the road curves sharply to the right (east) and then crosses the double tracks at a 50-degree angle. In addition, there is a 125-ft.-long, 25-ft. wide building that parallels the southward track about 50 feet south of the crossing completely blocking the view of a train approaching from the south.[3] Visibility is so bad that Robert F. Comer, an expert on railroad crossing accidents and owner of Forensic & Electronic Research Inc.,[4] remarked, "It would be premature to the extreme to blame the driver ... That crossing in Valhalla is monumentally sight-obstructed for starters."[5]

A series of events leading to the crash that took the lives of the vehicle driver and five train passengers began at 5:27 pm with a two-car head on collision on nearby Taconic State Parkway, forcing drivers, among them Ellen Brody in her Mercedes SUV, to detour west on Lake Avenue

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to Commerce Street then turn north to return to the parkway.[6] The route crosses Metro-North tracks twice; once at Lakeview Avenue and again at Commerce Street on a curve where the combination of the 50-degree angle and the long building would have prevented Brody from seeing the approaching train until she was literally right on top of the southward track.

Metro-North Train 659 left New York's Grand Central Terminal at 5:44 pm Eastern Time and by then, the sun had set at the Valhalla crossing[7] and the time of civil twilight[8] had already passed, further obscuring visibility in darkness. By 6:25, the eight-car, 560-ton EMU[9] train with Engineer Steve Smalls at the controls and some 600 passengers on board was highballing along at 58 mph, close to the timetable maximum authorized track speed of 60, closing in fast on the crossing at Commerce Street. At 58 mph, Smalls' train was travelling at 85 feet per second—covering the length of one of the railcars in his train every second.

No reason was given why Train 659 was proceeding north on the southward main track, "against the current of traffic," in railroad parlance, but this fact can be clearly seen from the news photos. I emailed Eric Weiss of the NTSB inquiring about this and promptly received the terse reply, "Thank you for your very specific questions. The accident is still under investigation. A preliminary report is expected to be released later this month."[10] Because the southward track runs right next to the 125-foot-long maintenance building south of the Commerce Street crossing, the train was further obstructed from the vision of any driver coming from the south.

Some 39 seconds before impact, Train 659 entered the track circuit at the crossing at 6:25:42 pm, activating the signal's bright red flashing lights. What happened next is unclear. Brody had stopped her vehicle past the crossing signal, so when the crossing gate came down a few seconds later, it struck the rear of her SUV. According to witness Rick Hopes of Yorktown, whose vehicle was right behind Brody's, she got out and went back to look at the crossing gate that had hit the rear of her car and wiggled it around. Hopes said that Brody even looked at him as he motioned her to back up and get out of the way. Instead, according to Hopes, "She goes around and gets into the car and steps on the gas and goes forward 15 feet, right in front of the train."[11]

While Hopes description suggests a woman oblivious to the oncoming train, we must keep in mind that it was dark, Brody was unfamiliar with the road and may even have been unaware, due to the darkness, the angle of the road and the maintenance building, that a railroad crossing was in front of her until she stopped short of the track. When the gate on the crossing signal came down striking her SUV, she may have first thought the car behind had struck her, and she had simply gotten out to inspect the damage. Unfortunately, these actions drew her attention away from, instead of alerting her to, the rapidly approaching train.

At exactly 6:26:17 pm, when Train 659 travelling at 58 mph was about 300 feet south of the crossing,[12] Engineer Steven Smalls saw Brody's SUV and "big-holed," railroad slang for initiating an emergency brake application. He had been "whistling," sounding the train's horn — two long sounds, a short sound and a long sound— as required by railroad rules, to warn traffic at the crossing. Impact with Brody's SUV, which immediately disappeared from Smalls' view, occurred 4 seconds later at 6:26:21pm, by which time Train 659 had slowed to 49 mph.[13]

While Brody undoubtedly died instantly upon impact, five passengers in the head-end car were about to meet a gruesome death by being impaled, electrocuted and incinerated by the third rail charged to 750 volts DC, which normally supplies electric power to propel the trains.[14] After striking the SUV the train continued down the track for another 650 feet. But before finally

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coming to rest at 6:26:47 pm, the train, pushing the wrecked SUV, which by then was acting like a plow, began to sheer the third rail off its moorings from about 315 feet north of the crossing.[15] At this point, the third rail ends on the east side of the southward track and begins on the west side, placing it on the outside of an approaching curve for clearance.

For its hapless occupants inside, the lead EMU car turned into what must have seemed like a blazing hellhole, as 39-foot sections of the third rail became fiery steel spears, which rammed through the car interior, killing five passengers, igniting fires and burning their bodies beyond recognition.[16] The third rail entered the lead car through the floor behind the left side front door, stacking up in twelve 39-foot sections with one rail puncturing the second car near the roof.[17]

The bizarre nature of the accident has already sparked speculation among "experts" that possibly the design of the third rail known as "underrunning" may have been a contributing factor. One attorney even suggested that the contact shoes carrying the 750 volts DC to the car's electrical system were "pulling up on the rail, and pulled the third rail up, out of its mount and into the train itself, spearing the train."[18] This is impossible, as none of the train's contact shoes touched the third rail on the west side of the track before the wreckage forced it up into the lead car.

The accident was a rarity but has happened once before on the Harlem line when a 5-car White Plains and Brewster express train hauled by two 96-ton electric locomotives derailed on February 16, 1907 near Woodlawn, about 10 miles north of Grand Central Terminal. Twenty three people lost their lives in that accident, which was caused by a shifted outer rail on a curve. The third rail came up through the floor of the first car in a manner eerily similar to the Valhalla crash, penetrated the second car and wrapped itself around the trucks in ribbon-like fashion.[19]

Aside from this accident's primary cause, which was obstructed visibility due to the trackside building, curving road, and the 50-degree road angle with respect to the tracks, braking needs to be examined. If, according to event recorder data gathered by NTSB, the train stopped in 950 feet in 30 seconds from 58 mph, a quick calculation yields a deceleration rate of 1.9 mph/sec. This figure raises a red flag as well, since it is quite low compared with the manufacturer's specifications of 3.2 mph/sec.[20] and figures given for similar heavy-rail transit equipment. Unfortunately, even if the brakes had been functioning per manufacturer's specifications, Ellen Brody's life, and the lives of the five passengers would not have been spared.

So who is to blame? Ellen Brody? Metro-North? The drivers involved in the head-on collision that caused the detour? Given the abysmal visibility at a crossing that sees 107 trains per day,[21] the most attentive driver would be at risk. With a long trackside building blocking the view, Metro-North must share some responsibility. But the railroad depends on funding from the Metropolitan Transportation Authority (MTA) which in turn depends on federal agencies for the majority of its capital budget, which currently has a $15 billion gap.[22] Ultimately, much of the blame must fall on the U.S. government and its warped spending priorities.

One way to prevent grisly accidents like this one is to divert funds from the U.S. war chest to much-needed infrastructure upgrades, such as costly but life-saving grade crossing separation projects. Aside from creating much-needed jobs, the reduced U.S. military spending would have the added benefit of saving lives in the Middle East and in other U.S.-occupied regions.

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Endnotes

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[8] Civil twilight "is the limit at which twilight illumination is sufficient, under good weather conditions, for terrestrial objects to be clearly distinguished;" according to the US Naval Observatory.
"Rise, Set, and Twilight Definitions," U.S. Naval Observatory, Astronomical Observations Department , last modified October 7, 2011,accessed February 10, 2015, http://aa.usno.navy.mil/faq/docs/RST_defs.php
[9] This calculation is based on Bombardier data for M7 EMU power cars and 600 passengers at nominal 180 lb. each. See Electric Multiple Unit (EMU) M-7 Specifications, Bombardier, accessed February 10, 2015, http://www.sonic.net/~mly/Caltrain-Electrification/2000-08-Rolling-Stock-Draft/a6.pdf.
[10] Email from Eric Weiss dated February 10, 2015, 2:00 pm Eastern Time.
[11] Peter D. Kramer, ibid.
[12] This figure is not in the NTSB data but can be easily derived since the train stopped 650 feet north of the crossing. and the total distance travelled according to NTSB was 950 feet, hence the stop commenced 300 feet south of the crossing.
[13] Andrew Tangel and Joseph De Avila, "Engineer's Struggle to Stop Metro-North Train," *Wall Street Journal*, February 6, 2015, accessed February 10, 2015, http://www.wsj.com/articles/engineers-struggle-to-stop-metro-north-train-1423273967.
[14] "Third Rail Spiked Up into Metro-North Train in 12 Pieces After Crash: NTSB," *NBC New York*, Feb 7, 2015, http://www.nbcnewyork.com/news/local/NTSB-Briefing-Investigation-Rail-SUV-Crossing-Metro-North-Valhalla-Westchester-NY-291061711.html.
[15] This is based on a measurement on Google Maps from Commerce Street Crossing to the point where the third rail switches from the east side of the track to the west side for clearance considerations on an approaching curve.
[16] Peter D. Kramer, ibid.
[17] "Third Rail Spiked Up into Metro-North Train in 12 Pieces After Crash: NTSB," *NBC New York*, Feb 7, 2015, http://www.nbcnewyork.com/news/local/NTSB-Briefing-Investigation-Rail-SUV-Crossing-Metro-North-Valhalla-Westchester-NY-291061711.html.
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