National Transportation Safety Board

Washington, D.C. 20594

Office of Railroad, Pipeline and Hazardous Materials Investigations

Memorandum

Date: October 15, 2015

To: Robert J. Hall, PE
Director, Office of Railroad, Pipeline and Hazardous Materials Investigations

From: John Vorderbrueggen, PE
Chief, Pipeline and Hazardous Materials Division

Subject: Closeout Memo - Derailment of CSX Transportation Train K08014, Mount Carbon, West Virginia, February 16, 2015 (Limited Accident Investigation)

Accident Information

Accident Number:	DCA15FR005
Investigating Agency:	Federal Railroad Administration
Accident Type:	Derailment with Hazardous Materials Release
Location:	Mount Carbon, West Virginia
Date:	February 16, 2015
Time:	1:15 p.m. Eastern Standard Time
Railroad:	CSX Transportation
Fatalities:	0
Injuries	1

Accident Description

On Monday, February 16, 2015, about 1:15 p.m. eastern standard time, eastbound CSXT crude oil unit train K08014 derailed 27 loaded tank cars (line numbers 2 through 28) in Mount Carbon, Fayette County, West Virginia. The train consisted of 2 locomotives followed by a buffer car, 107 tank cars, and a single trailing end buffer car. The train was transporting about 3.1 million gallons of Bakken crude oil, UN1267, Class 3, Packing Group I, from Manitou, North Dakota, destined for the Plains Marketing Terminal in Yorktown, Virginia. Event recorder data indicated that the train was being operated at 33 mph at the time of the accident, below the 50 mph maximum authorized speed. At the time of the accident, CSXT had a temporary 40 mph speed restriction on the territory due to cold weather. The weather was 15° F with eight inches of recent snow.

One house and an adjacent garage located about 72 feet east of the centerline of the number 2 track was destroyed by fire, and the resident sustained a minor injury while evacuating. About 300 people were evacuated from within a one-half mile radius of the accident scene.

About 378,000 gallons of crude oil were released from tank cars damaged by head and shell punctures, impacted valves and fittings, and tank car shell thermal failures. The released crude oil flowed into the Kanawha River and contaminated soil in the area of the derailment. Much of the crude oil was consumed in the postaccident fire. Emergency responders allowed the fire to burn itself out, which was reported at 8:00 p.m. on February 17, 2015, more than 30 hours after the derailment. Total equipment damage is estimated to be $2.5 million.

All of the Department of Transportation (DOT) specification 111 tank cars involved in this accident were compliant with the Association of American Railroads Casualty Prevention Circular (CPC) 1232 industry standard for tank cars transporting crude oil and ethanol that requires thicker heads and shells and half-height head shields. None of the tank cars were equipped with outer jackets or thermal protection systems.

The pileup and postaccident pool fire involved 19 of the 27 derailed tank cars. Two tank cars that were punctured during the derailment initially released more than 50,000 gallons of crude oil. Five tank cars released an additional 50,000 gallons from open bottom outlet valves and damaged fittings. The released crude oil ignited into a pool fire that caused thermally induced shell tears that breached 13 derailed tank cars that otherwise would have survived the accident intact.

On October 9, 2015, the FRA issued its accident investigation report, in which it determined that the cause of this accident was a vertical split head in the rail at the point of derailment, which was a prime factor in the degradation of the rail structural integrity.

Prior to the derailment, a CSXT contractor, Sperry, inspected the track on December 17, 2014, and on January 12, 2015. Despite indications of potential flaws at the point of derailment, the Sperry track inspector failed to conduct a required ground visual examination or hand test to confirm the presence of the flaws.

The FRA recommended the following actions:

- That CSXT routinely train operators of internal rail flaw detector cars so that they can more effectively identify and investigate non-valid testing locations and suspected rail flaws.

- That CSXT continue to use improved technology, which compares previous inspection data with data collected in real-time, increasing the likelihood of detecting rail flaws.

- That CSXT establish a plan to identify and replace track with vertical spilt heads or similar flaws on high-hazard flammable train routes, to reduce the risk of future derailments. The plan should be submitted to FRA for review.

- That Sperry work with the railroads to routinely train all operators to more effectively identify suspected rail flaws. This routine training will reduce the risk that a test operator fails to conduct a necessary hand test after digital flaw indications are received.

- That Sperry's training include review of previous digital rail flaw tests immediately before new testing is conducted and/or real-time comparison of previous results with current, incoming data so that operators can more accurately identify areas that should be hand tested.

Postaccident Action

NTSB investigators conducted a limited investigation to assess the thermal performance of the CPC-1232 tank cars involved in this accident. The Federal Railroad Administration (FRA) was the lead investigative agency that determined the cause of this accident.

On April 12, 2015, the NTSB issued four urgent safety recommendations to PHMSA that address the retrofitting of thermal protection systems for DOT specification 111 tank cars used to transport Class 3 flammable liquids. The recommendations urged PHMSA to take the following action:

> Require that all new and existing tank cars used to transport all Class 3 flammable liquids be equipped with thermal protection systems that meet or exceed the thermal performance standards outlined in Title 49 Code of Federal Regulations 179.18(a) and are appropriately qualified for the tank car configuration and the commodity transported. (R-15-14)
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> In conjunction with thermal protection systems called for in safety recommendation R-15-14, require that all new and existing tank cars used to transport all Class 3 flammable liquids be equipped with appropriately sized pressure relief devices that allow the release of pressure under fire conditions to ensure thermal performance that meets or exceeds the requirements of Title 49 Code of Federal Regulations 179.18(a), and that minimizes the likelihood of energetic thermal ruptures. (R-15-15)
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> Require an aggressive, intermediate progress milestone schedule, such as a 20 percent yearly completion metric over a 5-year implementation period, for the replacement or retrofitting of legacy DOT-111 and CPC-1232 tank cars to appropriate tank car performance standards, that includes equipping these tank cars with jackets, thermal protection, and appropriately sized pressure relief devices. (R-15-16)
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> Establish a publically available reporting mechanism that reports at least annually, progress on retrofitting and replacing tank cars subject to thermal protection system performance standards as recommended in safety recommendation R-15-16. (R-15-17).

On May 8, 2015, PHMSA published a final rule titled *Enhanced Tank Car Standards and Operational Controls for High Hazard Flammable Trains (HHFTs)*.[1] Responding to the urgent

[1] High-hazard flammable train means a single train transporting 20 or more loaded tank cars of a Class 3 flammable liquid in a continuous block or a single train carrying 35 or more loaded tank cars of a Class 3 flammable liquid throughout the train consist.

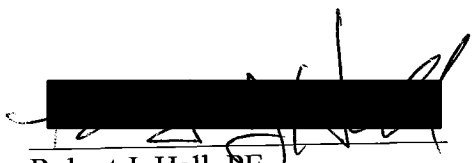
recommendations, PHMSA determined that thermal protection systems are critical in the survival of a tank car experiencing a thermal event. Thus, PHMSA adopted thermal protection requirements for the new specification DOT-117, DOT-117P, and DOT-117R tank cars. These regulations require thermal protection systems that conform to 49 CFR Part 179.18, including a reclosing pressure relief device in accordance with §173.31. In addition, tank cars built after October 1, 2015 for HHFT service will require 9/16-inch thick heads and shells for improved puncture resistance, jackets with thermal protection, full height head-shields, top fittings protection, and bottom outlet valve designed to prevent unintentional opening during derailment scenarios.

The PHMSA final rule mandated a tank car retrofitting implementation schedule for existing tank cars in HHFT service that requires the highest risk car (non-jacketed legacy DOT-111) transporting the most severe hazard packing group (PG I) to be retrofitted to DOT-117R standards first. The retrofitting implementation date that applies to non-jacketed CPC-1232 cars transporting packing group I crude oil, such as the tank cars involved in this accident, is April 1, 2020. Full implementation of retrofits for HHFT tank cars in packing group I, II, and III service is to be completed by May 1, 2025. These deadlines are closely aligned and harmonized with Transport Canada in recognition of the common North American railroad operating environment.

Rather than establishing a public reporting mechanism for all mandated retrofit target dates, the PHMSA final rule only requires fleet owners to report to the FRA the number of non-jacketed DOT-111 tank cars in packing group I service that have been retrofitted by January 1, 2017. The rule did not specify if the FRA will publish this data to the public.

The NTSB continues to urge PHMSA to fully implement the four urgent recommendations issued as a result of the Mount Carbon, West Virginia, accident.

Approved:



Date: 11-13-2015

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