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Preliminary Report RRD23LR009

This information is preliminary and subject to change.

BNSF Railway Train Derailment

Raymond, Minnesota

March 30, 2023

On March 30, 2023, about 12:58 a.m. local time, northbound BNSF Railway (BNSF) freight train L-TWI8801-29I derailed 23 mixed freight railcars on the Marshall District at milepost 11.871 in Raymond, Minnesota. (See figure.) Train L-TWI8801-29I included 14 hazardous materials tank cars, 10 of which derailed.¹ The derailed tank cars contained denatured ethanol, some of which was released and contributed to a fire.² The incident commander implemented a precautionary 1/2-mile evacuation radius, which affected about 800 residents. According to BNSF officials, the fire was extinguished on the morning of March 31, 2023. There were no reported fatalities or injuries. BNSF estimated damages to equipment and track infrastructure to be about \$1.9 million. Visibility conditions at the time of the derailment were dark and clear; the weather was 3°F with no precipitation.

¹ Under Title 49 *Code of Federal Regulations (CFR)* Part 171.8, a *hazardous material* is "a substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and has designated as hazardous under section 5103 of federal hazardous materials transportation law (Title 49 [*United States Code*] Section 5103)."

² *Denatured ethanol* is ethanol treated with gasoline to render it undrinkable. The ethanol in this derailment was being shipped as UN1987 Alcohols, N.O.S. (Ethanol, Natural Gasoline), Class 3, Packing Group II. Hazardous material classifications and packing groups for flammable liquids are based on flashpoints and overall level of hazard. See 49 *CFR* Part 173, Subpart D. In general, a flammable liquid in Packing Group II presents a medium hazard.



Figure. Aerial view of the derailment site. (Courtesy of BNSF.)

The crew of train L-TWI8801-291 consisted of one engineer, one conductor, one brakeman, and conductor trainee. The train was composed of 2 head-end locomotives and 40 loaded railcars. The train was 2,264 feet long and weighed about 5,423 tons. The maximum authorized track speed in the derailment area is 49 mph. Preliminary information from the lead locomotive event recorder showed the train's speed at the time of the derailment was about 43 mph. The derailed tank cars were constructed to specification DOT-117J100W, and each was carrying about 28,900 gallons of ethanol.³

While on scene, National Transportation Safety Board (NTSB) investigators examined railroad equipment and track conditions, reviewed the lead locomotive's event recorder and forward-facing image recorders, and completed interviews.

On April 1, 2023, BNSF shipped a section of fractured rail to the BNSF rail lab in Topeka, Kansas, for further analysis.

³ Or Department of Transportation Specification-117 tank cars. The J suffix indicates that the tank cars were built, not retrofitted, to specification DOT-117. See 49 *CFR* Part 179, Subpart D.

The NTSB completed its on-scene tank car examinations on April 1, 2023. Based on these examinations, hazardous material was released from five derailed tank cars. Two tank cars sustained punctured shells. The ethanol released through these punctures ignited and caused thermal damage to the manway gaskets of three previously unbreached tank cars, which released more ethanol through their compromised manways and spread the fire.⁴ The thermally damaged manways had been sealed with elastomeric butadiene acrylonitrile gaskets that, according to manufacturer data, had an upper-temperature performance of 225°F.

Parties to the investigation include the Federal Railroad Administration; the Pipeline and Hazardous Materials Safety Administration; BNSF; ADM; the Greenbrier Companies; the International Association of Sheet Metal, Air, Rail and Transportation Workers; the Brotherhood of Locomotive Engineers and Trainmen; and the Brotherhood of Maintenance of Way Employees Division.⁵

⁴ The Association of American Railroads' 2014 *Manual of Standards and Recommended Practices* defines *manway* as the "opening in the top of the tank to allow access to the interior for inspection and maintenance or loading and unloading." A *gasket* is a material or part used to prevent a joint from leaking. Title 49 *CFR* 179.200-15 requires that all "joints between manway covers and their seats shall be made tight against leakage of vapor and liquid by use of gaskets of suitable material."

⁵ (a) The Brotherhood of Maintenance of Way Employees Division spells *employees* in its name with one final e. (b) ADM is also known as the Archer-Daniels-Midland Company.