



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: March 2, 2012

In reply refer to: R-12-3 and -4
R-07-2 (Reiteration)

The Honorable Joseph C. Szabo
Administrator
Federal Railroad Administration
Washington, D.C. 20590

About 8:36 p.m., central daylight time, on Friday, June 19, 2009, eastbound Canadian National Railway Company (CN) freight train U70691-18, traveling at 36 mph, derailed at a highway/rail grade crossing in Cherry Valley, Illinois. The train consisted of 2 locomotives and 114 cars, 19 of which derailed. All of the derailed cars were tank cars carrying denatured fuel ethanol, a flammable liquid. Thirteen of the derailed tank cars were breached or lost product and caught fire. At the time of the derailment, several motor vehicles were stopped on either side of the grade crossing waiting for the train to pass. As a result of the fire that erupted after the derailment, a passenger in one of the stopped cars was fatally injured, two passengers in the same car received serious injuries, and five occupants of other cars waiting at the highway-rail crossing were injured. Two responding firefighters also sustained minor injuries. The release of ethanol and the resulting fire prompted a mandatory evacuation of about 600 residences within a 1/2-mile radius of the accident site. Monetary damages were estimated to total \$7.9 million.¹

The National Transportation Safety Board (NTSB) determined that the probable cause of the accident was the washout of the track structure that was discovered about 1 hour before the train's arrival, and the CN's failure to notify the train crew of the known washout in time to stop the train because of the inadequacy of the CN's emergency communication procedures. Contributing to the accident was the CN's failure to work with Winnebago County to develop a comprehensive storm water management design to address the previous washouts in 2006 and 2007. Contributing to the severity of the accident was the CN's failure to issue the flash flood warning to the train crew and the inadequate design of the DOT-111 tank cars, which made the cars subject to damage and catastrophic loss of hazardous materials during the derailment.

¹ See *Derailement of Canadian National Railway Company Freight Train U70691-18 With Subsequent Hazardous Materials Release and Fire, Cherry Valley, Illinois, June 19, 2009*, Railroad Accident Report NTSB/RAR-12/01 (Washington, DC: National Transportation Safety Board, 2012) on the NTSB website at <http://www.nts.gov>.

Safety Management

Of the numerous safety issues the NTSB identified during this accident investigation, several related directly to the lack of an effective safety management system within the CN.

A safety management system is a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies, and procedures. An effective safety management system program can help companies reduce and prevent accidents and accident-related loss of lives, time, and resources. Currently, there are a number of industry sectors worldwide that have recognized the benefits of effective safety management, including aviation and the maritime communities. Moreover, the NTSB has included safety management systems for all modes of transportation on its Most Wanted List.

A safety management system provides for goal setting, planning, and measuring performance. An effective safety management system should, at a minimum:

- Define how the organization is set up to manage risk
- Identify workplace risk and implement suitable controls
- Implement effective communication across all levels of the organization
- Implement a process to identify and correct non-conformities
- Implement a continual improvement process

The NTSB investigation identified several risks and failures that had they been properly addressed may have prevented the accident. First, inadequate grade crossing identification and emergency contact information resulted in personnel failing to communicate early notifications of the track washout conditions to the proper property owners. Second, the rail traffic controller (RTC) failed to communicate the prevailing weather conditions to the crew of the accident train, and the RTC's supervisor failed to exercise sufficient oversight to ensure that he performed safety-critical tasks properly and in a timely manner. The CN failed to conduct a work-risk assessment of dispatching operations that may have identified deficiencies that resulted in these errors. Third, the CN internal communications system failed to provide timely and precise knowledge of the washed-out track conditions to the train dispatch center; in part, this failure was due to known difficulties associated with contacting personnel at the dispatch center. These considerations point out multiple failures at different levels across organizations that contributed to this accident.

In addition to these communication and emergency response failures, other potential safety-critical operations were inadequate. For instance, the vagueness of Rule X (related to severe weather warnings) did not provide the operating crew sufficient guidance for operating under severe weather conditions. Additionally, in 2006 and 2007, the CN had the opportunity to address storm water management at the crossing where the accident occurred but failed to effectively analyze and mitigate the problem. Finally, the CN also was aware of Federal regulations applicable to this accident, such as the need for accurate information on the train consist and the need to perform toxicological testing on personnel potentially involved in the accident. But the CN failed to take steps to ensure compliance with these regulations. If the

accident train had been carrying a mixture of hazardous materials, the emergency responders would not have been able to locate them based on the inaccurate train consist, and the response effort could have been hampered. Likewise, it was not possible to rule out toxicological impairment of the RTC because the tests were not performed.

These inadequacies and lapses in safety critical operations that were present in this accident suggest a lack of quality control and a weakness in the CN's safety culture. The CN was either unaware of or did not respond effectively to the existing risks and failures that ultimately led to the accident. The NTSB concluded that had an effective safety management system been implemented at the CN, the inadequacies and risks that led to the accident would have been identified and corrected and, as a result, the accident may have been prevented. Therefore, the NTSB recommends that the FRA require that safety management systems and the associated key principles (including top-down ownership and policies, analysis of operational incidents and accidents, hazard identification and risk management, prevention and mitigation programs, and continuous evaluation and improvement programs) be incorporated into railroads' risk reduction programs required by Public Law 110-432, Rail Safety Improvement Act of 2008, enacted October 16, 2008.

Pipeline Damage

At the site of the derailment was a 12-inch-diameter underground natural gas transmission pipeline operated by Nicor Gas. The pipeline exceeded Federal standards for protective ground cover by a factor of 3. It was also five times as deep as the industry-recommended protection requirement for depth of cover that was in effect at the time the pipeline was constructed. Yet, as the wreckage was removed from above the pipeline, Nicor's crews discovered that a railcar wheel and axle assembly had impinged on the pipeline. Although the pipeline was buried about 11 feet deep and protected within a 16-inch-diameter casing, the rail car wheels impacted and severely dented the pipeline. The impact caused a severe flattening of the pipe casing with sharp angular bends at two locations where it was contacted by the rail car wheel assembly. This degree of deformation to the 16-inch casing pipe likely caused similar damage to the 12-inch carrier pipe. The NTSB concluded that had the gas pipeline been installed at the railroad crossing with the minimum level of ground cover permitted by the current Federal and industry pipeline construction standards, it likely would have failed as a result of being struck by derailed equipment in this accident.

Although the pipeline did not leak as a result of this accident, even minor dents and nicks are capable of causing pipeline failures. Pipeline damage caused by an accident may result in a catastrophic pipeline failure that occurs some period of time after the damage was inflicted, as was the case following the derailment of a Southern Pacific Transportation Company freight train on May 12, 1989, in San Bernardino, California.² Thirteen days after the derailment in San Bernardino, a 14-inch pipeline at the derailment site ruptured, released gasoline, and ignited. The San Bernardino pipeline failure and subsequent fire resulted in 2 fatalities and 19 injuries and illustrates the potential outcome had a release occurred at the Cherry Valley, Illinois, derailment site.

² *Derailement of Southern Pacific Transportation Company Freight Train on May 12, 1989 and Subsequent Rupture of Calnev Petroleum Pipeline on May 25, 1989, San Bernardino, California*, Railroad Accident Report NTSB/RAR-90/02 (Washington, DC: National Transportation Safety Board, 1990). <http://www.nts.gov>

Research of pipeline incident records by the Pipeline and Hazardous Materials Safety Administration (PHMSA) found only five reportable incidents³ since 1984 in which a train derailment caused damage to pipelines crossing under the tracks. Although PHMSA does not collect data that would reflect the number of incidents in which pipelines are damaged by train derailments at locations in railroad rights-of-way other than crossings, the aforementioned San Bernardino pipeline failure illustrates that buried pipelines can be damaged when present near railroad accident scenes. Despite the infrequency of such incidents, the NTSB believes that pipeline operators and railroad companies should be informed about the potential risk of damages to pipelines whenever a train derails. Given the prevalence both of underground pipelines and aboveground railroad tracks, the two must, of necessity, cross at numerous locations. Responsible pipeline operators may wish to consider protection methods that offer a higher level of safety when installing pipelines at these critical locations. The NTSB therefore recommends that PHMSA inform pipeline operators about the circumstances of the accident and advise them of the need to inspect pipeline facilities after notification of accidents occurring in railroad rights-of-way. The NTSB also recommends that the FRA inform railroads about the circumstances of the accident and advise them of the need to immediately notify pipeline operators of accidents occurring in railroad rights-of-way and ensure that pipeline inspections have been accomplished prior to resumption of service.

Accuracy of Train Consist Information

The original consist for the accident train had only 3 of the 76 cars in their proper positions on the train. This was not the first instance in which the CN failed to comply with Title 49 *Code of Federal Regulations* 174.26, “Notice to Train Crews,” which requires that a train crew have a train consist that accurately reflects the current position of each rail car containing hazardous material in a train. In a July 10, 2005, accident in Anding, Mississippi,⁴ in which one of the train consists was destroyed in the collision of two freight trains, the CN subsequently delivered an inaccurate consist that caused confusion during the emergency response. During the FRA’s 2006 national hazardous materials audit focusing on the level of compliance with hazardous materials communications, it also found that 22.3 percent of the CN trains audited had improper hazardous materials car documentation, consist errors, train crews failing to update the train consist to reflect actual car placement, or trains dispatched with erroneous consist information.

In this accident, because the tank cars of the accident train made up a unit train consisting of a single commodity, no confusion occurred as a result of the train crew’s failure to update the train consist. If different hazardous commodities had been commingled in the train, emergency responders would have been unable to locate them based upon the train consist. The NTSB therefore concluded that the inaccurate train consist carried by the crew did not affect the emergency response to this accident; however, had a mixture of hazardous commodities been involved, the inaccurate consist information could have hampered the response effort or put the safety of emergency responders and others at risk.

³ Damage to the pipeline that does not involve the release of gas is not necessarily reported.

⁴ *Collision of Two CN Freight Trains Anding, Mississippi July 10, 2005*, Railroad Accident Report NTSB/RAR-07/01 (Washington, DC: National Transportation Safety Board, 2007). <www.nts.gov>

Electronic transmission of shipping paper information did occur in this accident, albeit about 3 hours after the train crew provided emergency responders with an inaccurate paper document, and about 4 hours after the dispatcher orally conveyed hazardous materials information to the fire department. When first contacted about the accident about 9:15 p.m. on the day of the accident, the CN could have at that time faxed or e-mailed the correctly ordered train car consist directly to incident command. Since this accident, the CN has provided its emergency responders with the capability, through e-mail, to receive the train consist, hazardous materials waybills, and material safety data sheets. Accuracy of the train consist information would be ensured through automatic equipment identification readers that relay train consist data to CN's central computer. With this increased use of technology, remote access to the CN's database should ensure that updated train car consist and hazardous materials information is available to emergency response personnel at accident scenes in a more timely manner.

As a result of its investigation of the Anding, Mississippi, train collision, the NTSB recommended that the FRA (Safety Recommendation R-07-2) and PHMSA (Safety Recommendation R-07-4) work together to develop PHMSA regulations requiring that railroads immediately provide to emergency responders accurate, real-time information about the identity and location of all hazardous materials on a train.

PHMSA, in a January 22, 2008, response to Safety Recommendation R-07-4, indicated to the NTSB that it was examining (1) ways to improve the availability of accurate and immediate information for emergency responders on the scene of an accident, and (2) strategies for enhancing emergency response planning and training efforts. Additionally, PHMSA indicated that it was evaluating the emergency response issues raised in the safety recommendation and the Federal, state, and local government, and industry programs intended to address those issues. Based on this response, the NTSB classified Safety Recommendation R-07-4 "Open—Acceptable Response."

In an October 10, 2007, response to Safety Recommendation R-07-2, the FRA noted the ongoing efforts of the Association of American Railroads, CHEMTREC,⁵ and the American Short Line and Regional Railroad Association to enhance the availability of hazardous materials information during an accident. But the FRA maintained that the current practice of requiring the physical hand-off of train consists and other hazardous materials information "remains the most accurate method of transferring this information when an accident occurs." The FRA stated that it had no reason to believe that regulatory revisions are necessary to address this issue.

In an April 12, 2011, follow-up response to the safety recommendation, the FRA noted that its regulations require that information on the identity and location of hazardous materials shipments on a train be maintained by a member of the train crew for the benefit of emergency responders. Further, with the FRA's encouragement, the Association of American Railroads issued a circular offering to provide hazardous materials information on the top 25 commodities to local emergency response organizations to assist in training and preparing for emergencies. Finally, with the FRA's encouragement, CSX Transportation, Inc. and CHEMTREC established a

⁵ CHEMTREC (the Chemical Transportation Emergency Center), is an around-the-clock service available to firefighters, law enforcement officials, and other emergency responders who need immediate response information for emergency incidents involving chemicals, hazardous materials, and dangerous goods.

real-time information process that provides car content and train consist information on a “one-call” basis. The FRA indicated that it continues to evaluate this process to determine if additional regulations are necessary.

While acknowledging the activities and contributions of the Association of American Railroads, CHEMTREC, and industry stakeholders to facilitate the rapid communication of hazardous materials information, in a January 10, 2011, letter, the NTSB reminded the FRA that the intent of recommendation R-07-2 was to require railroads to provide to emergency responders information about the identity and location of hazardous materials on a train at the time of an accident and that the FRA had not identified any initiatives it had taken to move this recommendation forward. Therefore, the NTSB continues to classify Safety Recommendation R-07-2 “Open—Unacceptable Response.”

The NTSB also supports the HM-ACCESS initiative of PHMSA, which will allow the electronic communication of shipping paper information and improve the availability and accuracy of hazard communications to emergency responders. If implemented as envisioned, railroads will be able to quickly transmit electronically updated and accurate train consist data to emergency responders when accidents occur.

However, PHMSA began its HM-ACCESS initiative with public meetings on October 13–14, 2009, to discuss an upcoming proof-of-concept study on the use of electronic documents for hazardous materials shipments, no rulemaking has been initiated by PHMSA or the FRA to require railroads to immediately provide accurate consist information to emergency responders.

Therefore, the National Transportation Safety Board makes the following safety recommendations to the Federal Railroad Administration:

Require that safety management systems and the associated key principles (including top-down ownership and policies, analysis of operational incidents and accidents, hazard identification and risk management, prevention and mitigation programs, and continuous evaluation and improvement programs) be incorporated into railroads’ risk reduction programs required by Public Law 110-432, Rail Safety Improvement Act of 2008, enacted October 16, 2008. (R-12-3)

Inform railroads about the circumstances of the accident and advise them of the need to immediately notify pipeline operators of accidents occurring in railroad rights-of-way and ensure that pipeline inspections are accomplished prior to resumption of service. (R-12-4)

Based on its findings in this accident investigation, the National Transportation Safety Board reiterates the following previously issued safety recommendation to the Federal Railroad Administration:

Assist the Pipeline and Hazardous Materials Safety Administration in developing regulations to require that railroads immediately provide to emergency responders accurate, real-time information regarding the identity and location of all hazardous materials on a train. (R-07-2)

The NTSB also issued safety recommendations to the U.S. Department of Transportation, to the Pipeline and Hazardous Materials Safety Administration, to the Association of American Railroads, to the American Association of State Highway and Transportation Officials, to the National Association of County Engineers, to the American Public Works Association, to the Institute of Transportation Engineers, to the National League of Cities, to the National Association of Counties, to the Association of State Dam Safety Officials, to the National Association of Towns and Townships, to the U.S. Conference of Mayors, and to the Canadian National Railway Company. The NTSB also reiterated a previously issued safety recommendation to the Pipeline and Hazardous Materials Safety Administration.

In response to the recommendations in this letter, please refer to Safety Recommendations R-12-3 and -4 and R-07-2. We encourage you to submit updates electronically at the following e-mail address: correspondence@ntsb.gov. If a response includes attachments that exceed 5 megabytes, please e-mail us at the same address for instructions. To avoid confusion, please do not submit both an electronic copy and a hard copy of the same response.

Chairman HERSMAN, Vice Chairman HART, and Members SUMWALT, ROSEKIND, and WEENER concurred in these recommendations.

[Original Signed]

By: Deborah A.P. Hersman
Chairman