



Issued: February 10, 2023

Railroad Investigation Report: RIR-23/01

BNSF Railway Conductor Fatality

La Mirada, California

March 3, 2021

1. Factual Information

1.1 Accident Description

On March 3, 2021, about 12:19 a.m. local time, a train conductor of BNSF Railway (BNSF) train H-BARLAC1-02 was killed during a shoving movement at Buena Park Yard in La Mirada, California.¹ The train conductor was riding on the side ladder of the leading end of a boxcar during the shoving movement when he was pinned between the boxcar he was riding and a locomotive parked in a location that occupied the dynamic envelope of the adjacent track.² ([See figure 1.](#)) BNSF reported damage to equipment to be approximately \$1,300. At the time of the accident, it was dark, but there was ambient light from neighboring businesses in the railyard. Visibility was clear, the temperature was 48°F, and the wind was calm.

¹ (a) All times in this report are local time unless otherwise noted. (b) Visit [ntsb.gov](https://www.ntsb.gov) to find additional information in the [public docket](#) for this NTSB accident investigation (case number RRD21FR008). Use the [CAROL Query](#) to search safety recommendations and investigations. (c) A *shoving movement* is the process of pushing railcars or to push a train from the rear with a locomotive.

² The *dynamic envelope* is the clearance needed on the track for the train to pass through the area.

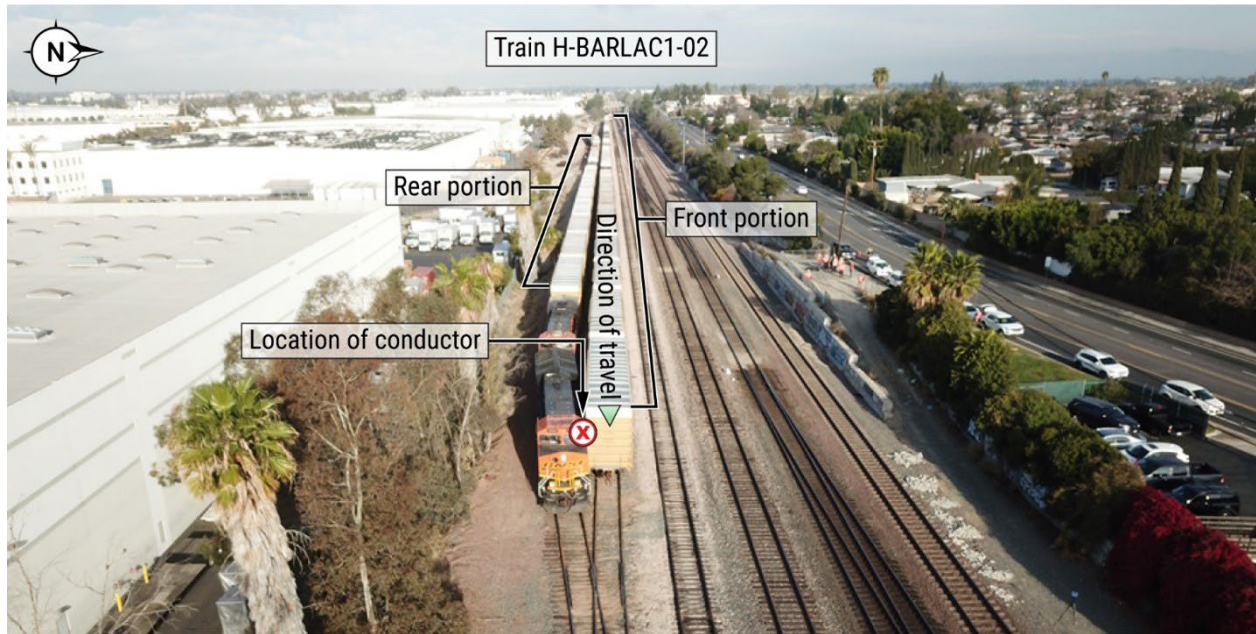


Figure 1. Overhead of accident location. (Source: BNSF Railway.)

The train crew consisted of one engineer and two conductors: one was the train conductor, and one was participating in a territory-familiarization trip (the familiarizing conductor). Train H-BARLAC1-02 consisted of 3 head-end locomotives, 81 railcars, and 2 distributed power (DP) locomotives on the rear of the train. At the accident location, there were four tangent (straight) tracks (6801, 6802, 6803, and 6804) used for railcar storage. Three BNSF mainline tracks were located north of the tangent tracks.

On March 2, 2021, about 5:00 p.m., the train crew departed Barstow Yard in Barstow, California, traveling west to Hobart Yard, located in Commerce, California. Along the way, the crew was assigned to set out 48 of the 81 railcars from their train in Buena Park Yard in La Mirada, California.³ On March 3, 2021, about 12:08 a.m., the train crew arrived at Buena Park Yard and began their assignment. The two conductors, who both had their BNSF-issued lanterns with them at the time of the accident, were to uncouple and separate the train into 2 portions: a front portion of 48 railcars and the 3 head-end locomotives, and a rear portion of 33 railcars and the 2 DP locomotives. (See [figure 2.](#))

³ To *set out* railcars is to leave them at a designated point in a railyard.

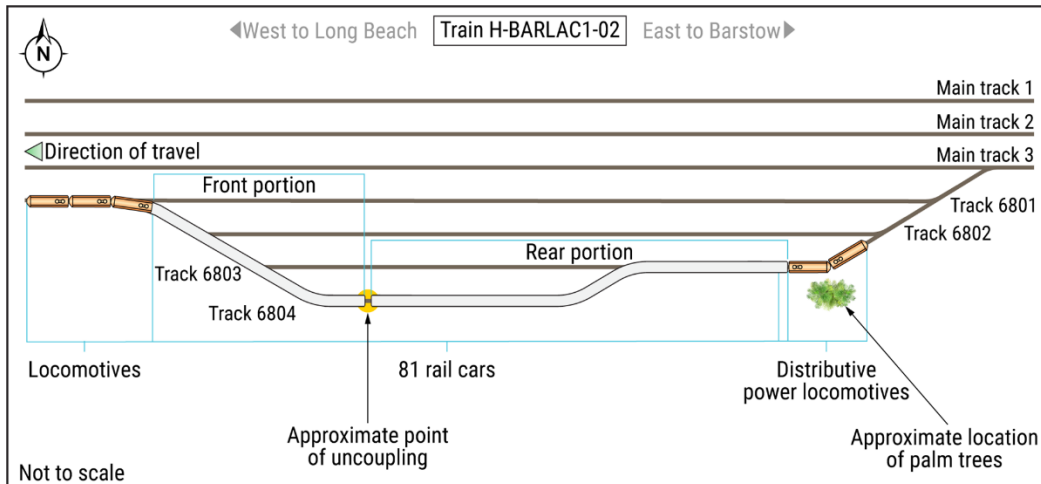


Figure 2. Buena Park Yard tracks and train H-BARLAC1-02 before the accident.

Both conductors ensured that the west-end lead switches were lined for the movement, after which the train conductor instructed the engineer to pull ahead 48 railcars. After counting 48 railcars while standing near the west-end switch, the train conductor instructed the engineer to stop the train. He then separated the train, leaving the rear 33 railcars and two DP locomotives occupying tracks 6803 and 6804, with the eastmost locomotive occupying the lead track, including the east-end switch between yard tracks 6803 and 6802.

According to the familiarizing conductor, before separating the train, he and the train conductor held a job briefing to discuss which tracks in Buena Park Yard would be used to set out the front portion of the train (the 48 railcars). The train conductor planned to set out these railcars on tracks 6801 and 6802 and told the familiarizing conductor that he would use a set of three palm trees – one short tree flanked by two taller trees – located near the tracks on the property line of an adjacent warehouse as a landmark to determine where to stop the shoving movement.

Recorded radio communications between the conductor and engineer reviewed by the National Transportation Safety Board (NTSB) indicated that, after receiving instructions from the train conductor, the engineer moved the front portion of the train westward along track 6801 to allow the conductors to line the switch for adjacent track 6802. About 12:14 a.m., after lining the switch, the train conductor climbed onto the rear ladder on the south side of boxcar TBOX 642811, and the familiarizing conductor climbed onto the rear ladder on the north side of the same railcar. About 12:15 a.m., the train conductor initiated a shoving movement into track 6802, moving about 8 mph alongside the stationary railcars in the yard with an initial railcar count of 25

railcars.⁴ The train conductor then gave the engineer additional railcar counts of 20, 15, 12, 9, and 7.

About 6 seconds after giving the 7-car count, the train conductor communicated to the engineer and requested the engineer to stop. The engineer responded accordingly by applying brakes; 4 seconds later, the train conductor yelled “stop” twice and, 2 seconds later, yelled “stop” again. During this movement, the leading end of the shoving movement approached the stationary DP locomotives attached to the end of the set-off railcars, which were occupying track 6803. Boxcar TBOX 642811 then impinged on the side of the eastmost DP locomotive (BNSF 3751), pinning and killing the train conductor riding the boxcar’s south-side ladder. (See figure 3.)

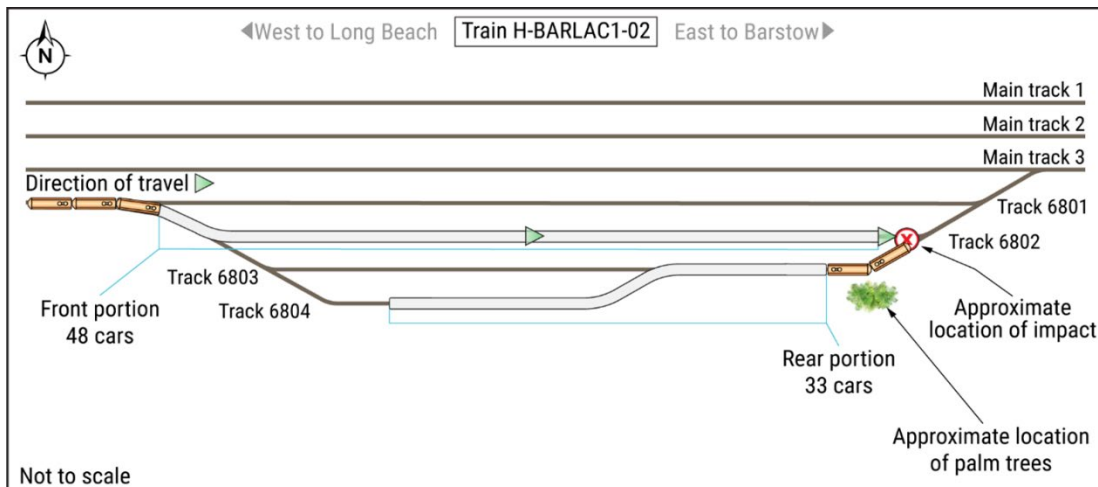


Figure 3. Accident movement.

The engineer stated in postaccident interviews with the NTSB that, after receiving the first stop command, he thought that he was just going to overshoot the area; not until the second set of stop commands did he understand that the train conductor was giving him a panicked request to stop. The familiarizing conductor told the NTSB he called out for the train conductor after the railcars came to a stop but received no response. The familiarizing conductor then dismounted the railcar and searched for the train conductor, finding him pinned between the boxcar and the rear DP locomotive. He then notified the engineer, who in turn notified the BNSF dispatcher that emergency services were needed for the train conductor.

⁴ (a) The maximum authorized speed in Buena Park Yard was 10 mph, as identified in BNSF’s System Special Instructions No. 1, Effective April 1, 2020. The train never exceeded this speed during the shoving movement. (b) Railroad personnel commonly use railcar lengths to communicate distances during switching operations. In this case, the accident conductor was communicating, and then counting down, the distance the train would cover before the engineer would need to apply brakes to slow and stop the train.

1.2 Events Before the Accident

On March 2, 2021, about 5:00 p.m., the train crew for H-BARLAC1-02 went on duty at Barstow Yard and, after a job briefing, left Barstow Yard westbound en route to Hobart Yard. On March 3, 2021, about 12:08 a.m., H-BARLAC1-02 stopped at the signal at the control point for Buena Park Yard. The crew conducted a job briefing about the plan to set out the 48 railcars in the yard. Shortly after the job briefing, the train entered Buena Park Yard.

1.3 Train Crew Employment and Training

The 46-year-old train conductor was hired by BNSF on July 26, 2013, and the conductor's certification was issued on September 7, 2018. The last computer-based rules training was completed on February 28, 2020, and the conductor was operationally tested 12 times in the year 2020.

The 45-year-old engineer was hired by BNSF on September 14, 1998. The initial engineer's certification was issued on February 20, 2004, and the current certification was valid until May 31, 2022. The last computer-based rules training was completed on February 6, 2020. The engineer was operationally tested 14 times in the year 2020. The engineer was fully qualified based on Federal Railroad Administration (FRA) regulations required by Title 49 *Code of Federal Regulations (CFR)* Part 240, Qualification and Certification of Locomotive Engineers, and BNSF's annual recertification rules.

NTSB investigators reviewed BNSF-provided training, formal familiarizing tools, and job aids. The training materials did not include palm trees as a means to determine where to stop shoving movements.

1.4 Postaccident Toxicology Testing

In accordance with 49 *CFR* 219.201, the train conductor, engineer, and familiarizing conductor underwent postaccident toxicology tests for alcohol and other drugs.⁵ The results were negative for all tested-for substances, including ethanol.

⁵ Postaccident toxicology testing required by the Federal Railroad Administration includes testing for amphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine, MDMA/MDA, methadone, opiates/opioids, phencyclidine, tramadol, ethyl alcohol, brompheniramine, chlorpheniramine, diphenhydramine, doxylamine, and pheniramine.

1.5 Close Clearance Point Standards

Because of track configuration and yard design, close clearance points, including temporary close clearances, can be encountered in rail yards.⁶ In accordance with 49 CFR 218.101(c), to mitigate this risk, railroads are required to implement procedures that enable employees to identify clearance points and a means to identify locations where clearance points will not permit a person to safely ride on the side of a boxcar.⁷

BNSF Track Engineering Standard 2508 requires that orange paint be applied to the base area of the rail in close clearance locations in yards, sidings, and secondary tracks.⁸ Distances of where the paint should be applied vary and are based on track geometry and yard configuration.

1.6 Postaccident Observations and Inspections

1.6.1 Clearance Points

On March 3, 2021, NTSB investigators conducted on-site observations during daylight hours and again during night hours. There was ambient lighting from neighboring businesses and the surrounding L.A. Basin in the yard during the night portion of the on-site observation. Investigators noted that there were no BNSF fixed overhead light poles or other rail yard lighting.

The NTSB observed that Buena Park Yard close clearance points are marked by orange paint on the base and side area of the rail. (See [figure 4](#).) The orange paint used to mark the clearance points on the side area and base of the rail was not reflective in nature and was only visible in dark conditions from a side vantage point with the use of a flashlight.

⁶ A *clearance point* is the location beyond which it is safe to pass. Clearance points can be permanent or temporary.

⁷ The regulation requires a railroad to implement procedures. The regulation does not identify how clearance areas could be marked in a railyard.

⁸ BNSF Tracking Engineering Standard, December 8, 2005.

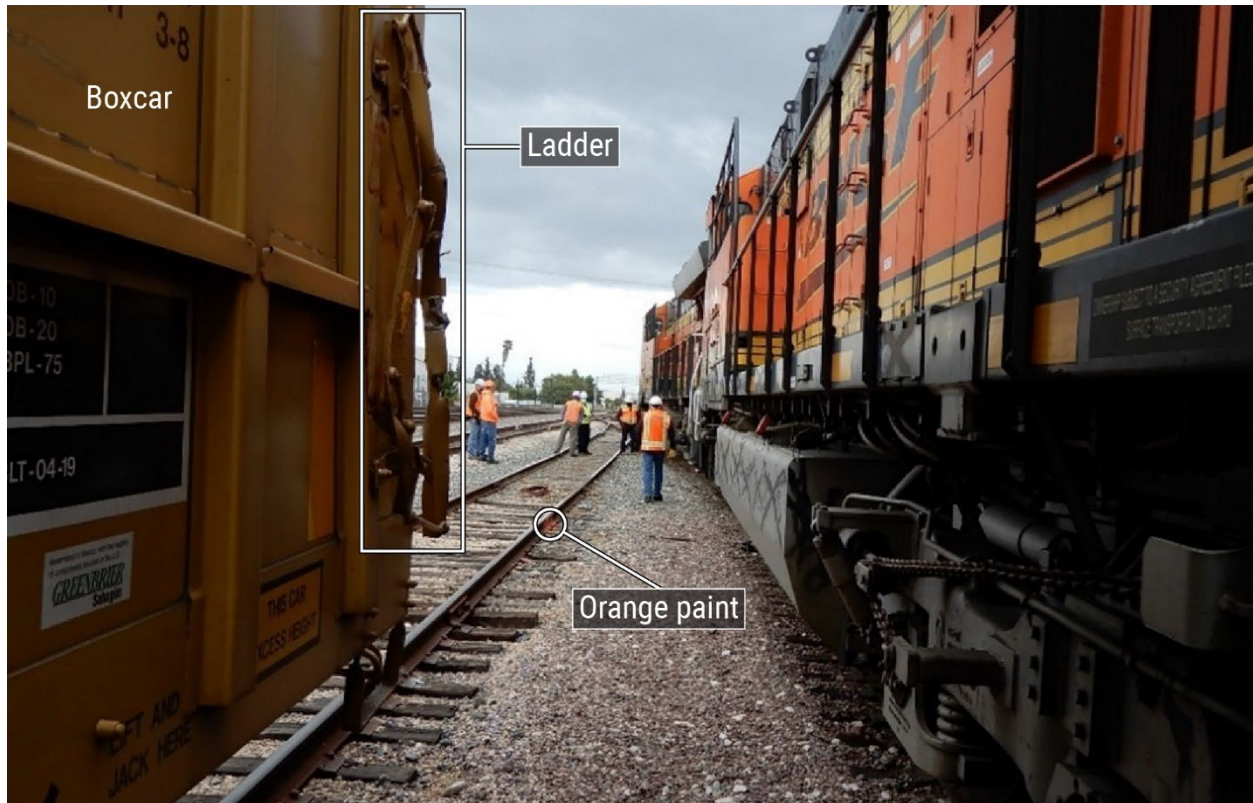


Figure 4. Accident boxcar and clearance point marked in orange paint.

The NTSB observed that the walking conditions were regular, even, and free of obstructions. Additionally, investigators observed a set of palm trees located on the east end of the rail yard, in line with the painted clearance point marker. An NTSB investigator climbed the side ladder of a boxcar on the accident train approximately 400 feet from the impact location and was unable to see the palm trees. The height of the train on track 6803 obstructed the view of the palm trees.

1.6.2 Track and Equipment

The yard track in the area of the accident was maintained by the BNSF Engineering department. On March 3, 2021, FRA performed a postaccident walking inspection of the track in the area of the accident and did not identify any exceptions.

On March 3, 2021, the NTSB inspected locomotive BNSF 3751 and boxcar TBOX 642811 after the equipment had been separated. Investigators found evidence of damage from the collision on both the locomotive and boxcar.⁹

1.7 Switching Operations Fatality Analysis Working Group

In November 2020 (four months before the accident), the Switching Operations Fatality Analysis (SOFA) working group published a SOFA alert stating that one in four switching fatalities occurs in close clearance and temporary close clearance situations.¹⁰ The alert discussed eliminating no clearance and close clearance areas through engineering, improving signage, marking all permanent and temporary close clearance areas with visible signage, and preparing employees to identify and avoid close clearance areas.

1.8 Postaccident Actions

As a result of the accident, BNSF established a pilot program to install paddle markers at designated locations in Buena Park Yard. (See figure 5.) Paddle markers are track markers placed alongside the rail and used to mark clearance points and other safety-relevant areas for employees in railyards. BNSF will monitor the paddle markers' durability and visibility over time and during seasonal weather events. BNSF will gather data from observations, crew feedback, and inspection and maintenance activities to inform decision-making on the effectiveness of the markers. BNSF indicated that the results of the pilot program could be used to establish a protocol or engineering standard for when and how to use the paddle type clearance markers.

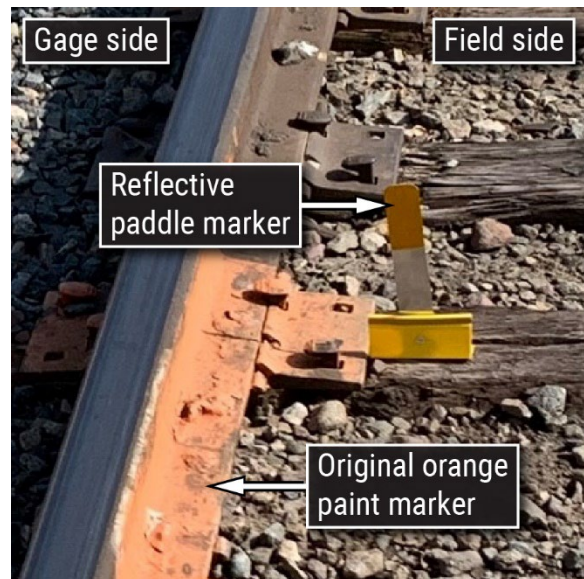


Figure 5. BNSF clearance point reflective paddle marker.

⁹ NTSB investigators found raking and scraping damage to an area on the left side of BNSF 3751, with paint loss and paint transfer between the locomotive's stairway and second axle and paint missing on the front corner of the fuel tank. The vertical stanchions of TBOX 642811's south-side ladder were bent and torn, with signs of paint transfer.

¹⁰ For more information about this alert, visit <https://railroads.dot.gov/sites/fra.dot.gov/files/2020-11/SOFA%20Safety%20Alert%20Nov%202020%20Close%20Clearance.pdf>.

2. Analysis

In this accident, a BNSF train conductor was killed during a shoving movement while riding on the side ladder of the leading end of a boxcar from train H-BARLAC1-02 when it struck the side of a locomotive parked in a location occupying the dynamic envelope of the adjacent track in La Mirada, California. Having ruled out track, equipment, training and qualification, and toxicology as causal factors in this accident, the NTSB's investigation focused on the clearance point markers used in the area of the accident and the conductor's planned use of three palm trees as a landmark for a safe stopping point instead of the marked clearance points.

BNSF engineering specifications require markings of orange paint on the base area of the rail at clearance points. NTSB investigators observed that the paint used at Buena Park Yard in La Mirada was not reflective and was only visible from certain vantage points and under the right lighting conditions. Further, the railyard had no fixed lighting, so visibility at night was reduced. For these reasons, it would have been difficult for the accident conductor to spot the clearance markings from a distance while riding the side ladder of the boxcar and using a lantern.

The train conductor's plan, which the pre-accident job briefing indicated he meant to follow, was to use a stand of palm trees as a visual cue for a safe stopping point. The use of palm trees as a landmark was not included in BNSF-provided training, tools, or job aids. NTSB investigators also observed that the stationary section of train H-BARLAC1-02 on the tangent track may have obscured these palm trees during the shoving movement, denying the conductor his planned visual reference. Between the hard-to-see orange paint markings and obscured palm trees, a lack of visual reference points may have allowed the conductor to misjudge his position relative to the clearance point and close-clearance location, causing him to give the order to stop too late to avoid entering the temporary close-clearance location created by the stationary locomotive.

As a result of this accident, BNSF established a pilot program to use paddle markers at designated locations in Buena Park Yard. BNSF intends to consider if the pilot program could be used to establish a protocol or engineering standard across their system.

3. Probable Cause

The National Transportation Safety Board determines that the probable cause of the March 3, 2021, BNSF conductor fatality was the lack of conspicuous close clearance markers in Buena Park Yard that hindered the train conductor's ability to clearly see and react to the railcars parked in a temporary close clearance location.

The National Transportation Safety Board (NTSB) is an independent federal agency dedicated to promoting aviation, railroad, highway, marine, and pipeline safety. Established in 1967, the agency is mandated by Congress through the Independent Safety Board Act of 1974, to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)).

For more detailed background information on this report, visit the NTSB investigations website and search for NTSB accident ID RRD21FR008. Recent publications are available in their entirety on the NTSB website. Other information about available publications also may be obtained from the website or by contacting—

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