



## NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering  
Washington, DC

### **Medical Factual Report**

**November 18, 2021**

Michelle Watters, MD, PhD, MPH  
Medical Officer

#### **A. ACCIDENT: RRD21FR008 – La Mirada, California**

**Accident Type:** Raking collision  
**Location:** La Mirada Railyard, La Mirada, CA  
**Date:** March 3, 2021  
**Time:** 12:19 a.m. PST  
**Carrier:** BNSF Railway (BNSF)  
**Train:** Train BARLAC102A

#### **B. GROUP IDENTIFICATION**

Michelle Watters, MD, PhD, MPH  
Medical Officer  
National Transportation Safety Board

Theodore Aquino, DO, MBA, MSPH, FACOEM  
Chief Medical Officer  
BNSF Railway

#### **C. ACCIDENT SUMMARY (from Preliminary Report<sup>1</sup>)**

On March 3, 2021, at 12:19 a.m. local time, a BNSF Railway (BNSF) conductor was killed while riding on the south-side ladder of the leading end of a boxcar from train BARLAC102A when it struck the side of a locomotive in the La Mirada, California, railyard. The train crew consisted of one engineer seated at the operating controls of the lead locomotive, the conductor positioned on the south-side ladder of the rear car (leading in the direction of travel), and one conductor participating in a territory-familiarization trip positioned on the north-side ladder of the same boxcar. The crew was working to remove 48 cars from the front of the train and leave them in the La Mirada railyard. At the time of the accident, the sky was clear, the temperature was 48°F, and the wind was calm.

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<sup>1</sup> NTSB Preliminary Report: Railroad – RRD21FR008. Adopted 4/1/21. Available at: [RRD21FR008-preliminary-report \(ntsb.gov\)](https://www.ntsb.gov/pressroom/RRD21FR008-preliminary-report)

## D. DETAILS OF INVESTIGATION

### 1. Purpose of Study

This investigation was performed to evaluate the BARLAC102A train crew (engineer and two conductors) for any medical conditions, use of medications/illicit drugs, or the presence of any toxins.

### 2. Methods

BNSF occupational health records and Federal Railroad Administration (FRA) post-accident testing<sup>2</sup> toxicology reports for the fatally injured conductor, engineer, and familiarizing conductor and were reviewed. The Federal Aviation Administration (FAA) Forensic Sciences Laboratory toxicology report,<sup>3</sup> autopsy report, and personal medical records for the fatally injured conductor were reviewed. Other pertinent scientific and regulatory issues were reviewed.

### 3. Relevant regulation and protocols

#### a. Federal Regulation

Per the Code of Federal Regulations, locomotive engineers and railroad conductors are required to meet or exceed vision and hearing standards (49 CFR parts [240.121](#) and [242.117](#), respectively). The vision and hearing requirements for engineers and conductors are comparable. For distant vision, acuity must be at least 20/40 in each eye and together either with or without corrective lenses, field of vision must be at least 70 degrees in the horizontal median for each eye, and color vision must allow recognition and differentiation of the colors of railroad signals. The person's hearing acuity must meet or exceed the following threshold: the person does not have an average hearing loss in the better ear greater than 40 decibels (dB) at 500, 1000, and 2000 hertz (Hz) with or without use of a hearing aid. FRA regulations do not require any other medical evaluation, testing, or any review of medical conditions and medications in use.

#### b. BNSF Medical Protocols

In accordance with federal regulations described above, BNSF requires engineers and conductors to triennially undergo a medical evaluation in connection with initial certification and re-certification (Title 49 CFR Parts 240 and 242).

In addition to the regulatory requirements, BNSF includes guidance on medical conditions in the company safety rules, which state: "All employees are responsible to ensure their personal medical condition does not interfere with their ability to safely perform their duties. Employees with medical conditions (such as uncontrolled diabetes, high blood pressure, sleep disorders including apnea, visual impairment, hearing impairment, etc.) that may adversely affect their ability to work safely must inform their medical practitioner of their job duties. The medical provider must then determine if any prescribed treatment including medication will impair the employee from safely performing their job duties. The employee

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<sup>2</sup> As part of FRA's post-accident toxicology testing, Quest laboratory performed initial testing on urine specimens for amphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine, MDMA/MDA, methadone, opiates/opioids, phencyclidine, tramadol, brompheniramine, chlorpheniramine, diphenhydramine, doxylamine, and pheniramine and blood specimens for ethyl alcohol. No further confirmatory testing was performed since all compounds were below their cut-offs.

<sup>3</sup> The FAA Forensic Sciences Laboratory tests specimens for over 1,300 compounds including toxins, prescription and over-the-counter medications and illicit drugs; information about these compounds can be found at the Drug Information Web Site (<https://jag.cami.jccbi.gov/toxicology/>).

must also notify their personal physician/medical provider if prescribed treatment and/or medication is affecting their ability to safely perform their job duties.”<sup>4</sup>

BNSF requires employees who have been off work on a medical leave of absence for certain medical conditions or events that may adversely affect the employee’s ability to work safely in their position to complete a medical status long form and be reviewed for fitness for duty by the BNSF Medical and Employee Health Department. Heart disease or any heart surgery or procedure and absence greater than 30 calendar days require a fitness for duty review. Completion of the form requires the treatment provider to submit relevant recent office notes, diagnostic test results, lab work, and hospital discharge notes, if applicable.

## **E. FINDINGS**

### **1. Fatally injured conductor**

#### **a. BNSF Occupational Medical Records and Historical Drug Test Records**

The fatally injured conductor was 46 years old at the time of the accident.

According to his occupational medical records from BSNF, the fatally injured conductor underwent a post offer exam in April 2013 that included a series of questions about previously diagnosed medical conditions, review of recent medication use, evaluation of vital signs, hearing and vision tests, a urine dip test for sugars and protein, and a physical examination. He reported no medication use or medical conditions. It was noted that he had trace protein in his urine. The fatally injured conductor was found medically qualified but had to wear corrective lenses.

There was an occupational medical report of the fatally injured conductor having a positive COVID test with quarantine/isolation between 2/16/21 and 2/28/21. He also had a work-related injury in March 2016 where he suffered a cut to his left thigh when he fell off a locomotive; he returned to full duty in about one week. The fatally injured conductor was on medical leave for two months in spring of 2015. He had a heart attack requiring stenting and was found to have diabetes. He returned to work full duty in June 2015 and was removed from a provisional status in August 2015 having provided medical reports which showed no heart symptoms and a good ejection fraction (65-75%) and good diabetes control with medication.

The fatally injured conductor had three additional hearing and vision tests in January 2016, February 2018, and July 2019. He passed all hearing tests and required corrective lenses for distant vision. On each of the hearing questionnaires he reported taking prescription medications. At his most recent medical screening for vision in July 2019, his corrected distant vision was 20/20 bilaterally and his uncorrected distant vision was 20/60 in his right eye and 20/50 in his left eye; his visual fields were 85 degrees bilaterally and he had normal color vision.

Historical drug testing records were provided by BNSF for the fatally injured conductor that included pre-employment hair and urine drug testing in March and April 2013, respectively. He had random alcohol testing in October 2014, February 2015, January 2018, and June 2018; he had random urine drug testing in February 2015 and June 2018. All of the fatally injured conductor’s historical alcohol and urine and hair drug testing results were negative.

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<sup>4</sup> BNSF TY&E (Train Yard and Engine) Safety Rules. S-1.2.12 Medical Conditions – January 1, 2015.

#### b. Toxicology

The fatally injured conductor's FRA post-accident blood alcohol and urine drug testing were negative. The FAA Forensic Sciences Laboratory toxicology testing detected the high blood pressure medications metoprolol and losartan and the high cholesterol medication atorvastatin in the fatally injured conductor's femoral blood and urine. These medications are not considered impairing.<sup>5</sup> Glucose was detected in his urine at 7,024 milligrams per deciliter (mg/dL) and his hemoglobin A1C was 7.0%.<sup>6</sup> Testing performed by the Department of Medical Examiner-Coroner, County of Los Angeles Forensic Sciences Laboratory was negative for ethanol and tested for drugs in his chest blood.<sup>7</sup> Testing of his vitreous fluid two months after the accident showed glucose at less than 20 mg/dL and creatinine at 0.7 mg/dL.<sup>8</sup>

#### c. Autopsy

According to the autopsy report from the Department of Medical Examiner-Coroner, County of Los Angeles, California, the cause of death of the fatally injured conductor was blunt force trauma and mechanical (traumatic) asphyxia and the manner of death was accident. With the exception of a 2-centimeter metallic stent in his right coronary artery, no other significant natural disease was identified.

#### d. Personal medical records

Primary care medical records for the fatally injured conductor were obtained for the three years prior to the accident. The fatally injured conductor had two office visits in that period: October 2018 for a cough and October 2020 for a health maintenance visit, respectively. At the most recent visit, he was 77 inches tall, weighed 255 pounds, and had a body mass index of 30. He was being treated for type 2 diabetes with metformin, dapagliflozin (marketed as Farxiga),<sup>9</sup> and semaglutide weekly injections (commonly marketed as Ozempic). His cardiovascular issues were followed by his cardiologist.

Records from his cardiology clinic were also obtained for the three years prior to the accident. His last visits were in November 2020, which were a follow-up to a cardiac positron emission tomography (PET) scan<sup>10</sup> and stress test in October 2020. The PET scan

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<sup>5</sup> FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs.

Metoprolol. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=171>

Losartan. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=151>

Atorvastatin. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=312>

<sup>6</sup> Hemoglobin A1C is a measure of the percentage of hemoglobin molecules that have a glucose molecule attached to them. The test measures the average blood glucose over the past three months. Above 6.5% indicates diabetes. [National Institutes of Health (NIH). National Library of Medicine (NLM). [A1C: MedlinePlus](#) Last updated 5/5/21.]

<sup>7</sup> Toxicology testing of the fatally injured conductor's chest blood by the Department of Medical Examiner-Coroner, County of Los Angeles Forensic Sciences Laboratory included ethanol; screening for benzodiazepines, cocaine and its metabolites, codeine, fentanyl, hydrocodone, hydromorphone, marijuana, methamphetamine and MDMA, morphine, and phencyclidine; and confirmatory testing of basic drugs.

<sup>8</sup> The normal value for postmortem vitreous glucose is below 200 mg/dL; the normal range for postmortem vitreous creatinine is 0.6 to 1.3 mg/dL. [Rose KL and KA Collins. [Summary of vitreous and how it is protected \(cap.org\)](#) Accessed 6/29/21.]

<sup>9</sup> Farxiga (dapagliflozin) is a medication used to treat type 2 diabetes. It works by increasing urinary glucose excretion and can lead to a positive urine glucose test. [NIH. NLM. [DailyMed - FARXIGA- dapagliflozin tablet, film coated \(nih.gov\)](#) Updated 5/10/21.]

<sup>10</sup> A cardiac PET scan is an imaging test used to diagnose coronary artery disease and show damaged heart muscle due to a heart attack. [[Positron Emission Tomography \(PET\) | American Heart Association](#) Accessed 7/1/21.]

showed the fatally injured conductor had a left ventricular ejection fraction of 36% at rest<sup>11</sup> and a perfusion defect consistent with the inferior wall myocardial infarction he experienced in March 2015. At that time, he had undergone stenting of his right coronary artery which had been 100% occluded. At the office visits in November 2020, the fatally injured conductor reported no chest pain, syncope, palpitations, stroke-like symptoms, or other symptoms related to his cardiovascular disease. His cardiovascular treatment prescriptions included metoprolol, losartan, atorvastatin, and aspirin. He had also been prescribed nitroglycerin tablets to take as needed for chest pain. His cardiovascular conditions, which included ischemic cardiomyopathy, angina, and ventricular tachycardia, were reported as stable. His cardiac PET scan in August 2018 showed an ejection fraction of 52% and filling defects consistent with his myocardial infarction in 2015. The fatally injured conductor had an echocardiogram in July 2018 that showed he had an ejection fraction of 35 to 40%.<sup>12</sup> Holter monitoring in January 2017 was reported to show rare premature atrial contractions and rare premature ventricular contractions.

## 2. Engineer

### a. BNSF Occupational Medical Records and Historical Drug Test Records

The engineer was 45 years old at the time of the accident.

According to his occupational medical records from BSNF, the engineer underwent a post offer exam in August 1998 that included a series of questions about previously diagnosed medical conditions, review of recent medication use, evaluation of vital signs, hearing and vision tests, a urine dip test for sugars and protein, and a physical examination. He reported no medication use or medical conditions. The examining physician noted that the engineer had no physical work restrictions but needed corrective lenses.

Periodic hearing and vision testing were performed every three years; the engineer passed all hearing tests and required corrective lenses for distant vision. On his most recent hearing questionnaire in March 2019, he reported taking no prescription medications.

Historical drug testing records were provided by BNSF for the engineer that included pre-employment urine drug testing in August 1998 and reasonable cause alcohol and urine drug testing in May 2012. The engineer had random alcohol testing in December 2012, July 2015, July 2017, and July 2020; he had random urine drug testing in July 2020. All of the engineer's historical alcohol and urine drug testing results were negative.

### b. Toxicology

The engineer's FRA post-accident blood alcohol and urine drug testing were negative.

## 3. Familiarizing Conductor

### a. BNSF Occupational Medical Records and Historical Drug Test Records

The familiarizing conductor was 50 years old at the time of the accident.

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<sup>11</sup> An ejection fraction is the percent of blood that is pumped out of the left lower heart chamber (ventricle) with each heartbeat. An ejection fraction less than 40% indicates heart failure with reduced ejection fraction. [NIH. National Heart Blood and Lung Institute. [Heart Failure | NHLBI, NIH](#) Accessed 7/1/21.]

<sup>12</sup> An echocardiogram is a procedure that uses soundwaves to create pictures of the heart. [NIH. NLM. [Echocardiogram: MedlinePlus Medical Encyclopedia](#) Page last updated 7/2/21.]

According to his occupational medical records from BSNF, the familiarizing conductor underwent a post offer exam in December 2017 that included a series of questions about previously diagnosed medical conditions, review of recent medication use, evaluation of vital signs, hearing and vision tests, a urine dip test for sugars and protein, and a physical examination. He reported no medication use or medical conditions. It was noted that he had hearing loss between 3000 and 8000 hertz. The familiarizing conductor was found medically qualified but had to wear corrective lenses while on duty.

The familiarizing conductor had a three-year hearing and vision test in March 2020. On the hearing questionnaire he reported taking prescription medications; the medications or medical conditions were not specified. Results were similar to his post-offer exam findings.

Historical drug testing records were provided by BNSF for the familiarizing conductor that included pre-employment urine drug testing in December 2017 and reasonable cause alcohol and urine drug testing in August 2018. The familiarizing conductor had random alcohol and urine drug testing in August 2020. All of the familiarizing conductor's historical alcohol and urine drug testing results were negative.

b. Toxicology

The familiarizing conductor's FRA post-accident blood alcohol and urine drug testing were negative.

## **F. SUMMARY OF MEDICAL FINDINGS**

The 46-year-old male fatally injured conductor was medically certified for his duties but was required to wear corrective lenses. According to BNSF occupational medical records, the fatally injured conductor had returned to work on 2/28/21 after having been off work for two-week quarantine/isolation for a positive COVID test. He had a work-related injury in March 2016 where he suffered a cut to his left thigh when he fell off a locomotive; he returned to full duty in about one week. He was on medical leave for two months in spring of 2015 for a heart attack requiring stenting and was found to have diabetes; he returned to work full duty. All of the fatally injured conductor's alcohol and urine and hair drug testing results were negative.

Subsequent to his heart attack in 2015, the fatally injured conductor was followed by his cardiologist for ischemic cardiomyopathy, angina, and ventricular tachycardia. An October 2020 imaging study showed he had an ejection fraction of 36% and a perfusion defect from his previous heart attack. At his most recent visit to the cardiologist in November 2020, his cardiovascular conditions were reported as stable, he was asymptomatic, and he was treated with metoprolol, losartan, atorvastatin, and aspirin. He was prescribed nitroglycerin tablets to take for chest pain as needed. Additionally, the fatally injured conductor had type 2 diabetes treated with metformin, dapagliflozin (marketed as Farxiga), and semaglutide weekly injections. At his most recent visit to his primary care doctor in October 2020, he was 77 inches tall, weighed 255 pounds, and had a body mass index of 30.

According to the autopsy report, the cause of death of the fatally injured conductor was blunt force trauma and mechanical (traumatic) asphyxia and the manner of death was accident. With the exception of a 2-centimeter metallic stent in his right coronary artery, no other significant natural disease was identified.

The fatally injured conductor's FRA post-accident blood alcohol and urine drug testing were negative. The FAA Forensic Sciences Laboratory toxicology testing detected metoprolol, losartan, and atorvastatin in his femoral blood and urine. Glucose was detected in his urine at 7,024 mg/dL and his hemoglobin A1C was 7.0%. Testing performed by the Department of Medical Examiner-Coroner, County of Los Angeles Forensic Sciences Laboratory was negative for ethanol and tested for drugs in his chest blood. Testing of his vitreous fluid two months after the accident showed glucose at less than 20 mg/dL and creatinine at 0.7 mg/dL.

The 45-year-old male BNSF engineer was medically certified for his duties but was required to wear corrective lenses. His FRA post-accident blood alcohol and urine drug testing were negative.

The 50-year-old male BNSF familiarizing conductor was medically certified for his duties but was required to wear corrective lenses. His FRA post-accident blood alcohol and urine drug testing were negative.