

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



RRD23FR016

MEDICAL

Specialist's Factual Report

December 12, 2023

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A. ACCIDENT

Location: Cumberland, Maryland
Date: August 8, 2023

B. MEDICAL SPECIALIST

Specialist JE Tuttle MD MHA FACS
National Transportation Safety Board
Washington, DC

C. DETAILS OF THE INVESTIGATION

1.0 Purpose

This investigation was performed to evaluate the fatally injured conductor trainee and the uninjured conductor and engineer for potentially impairing medical conditions and substances.

2.0 Methods

The conductor trainees' occupational health records as well as his sleep study and CPAP usage records were reviewed. The conductor trainee's autopsy report and its toxicology report from the Maryland OCME was reviewed, as was his Federal Railroad Administration (FRA) post-accident toxicology report. At the request of the National Transportation Safety Board (NTSB), the Federal Aviation Administration (FAA) Forensic Sciences Laboratory also performed toxicological testing on postmortem specimens from the conductor; these results were reviewed.

The FRA post-accident toxicology reports for the conductor and engineer were reviewed, as were records from their most recent occupational health evaluations.

Selected NTSB investigator reports, and relevant regulation and medical literature were also reviewed.

D. FACTUAL INFORMATION

1.0 Conductor Trainee

The 40-year-old male conductor trainee's occupational health records were reviewed. As part of the pre-employment process, he underwent evaluation via a medical questionnaire and physical exam on May 5, 2023. The conductor trainee

reported a history of high blood pressure and reported using lisinopril, a prescription medicine commonly used to treat high blood pressure. Lisinopril is not generally considered impairing. He also answered "yes" to a question about whether he snored; however, he denied fatigue or daily sleepiness. He indicated that he did not have any other long-term health problems or adverse physical conditions, and that he did not have any restrictions or limitations upon his physical activities.

According to the reviewed occupational health records, the conductor also underwent a pre-employment medical physical exam for the conductor position at the same time. For this evaluation, the conductor underwent vision and hearing testing, a standard physical examination, and a urine test for blood, sugar, and protein. At the time of his pre-employment physical examination, he was noted to be 69 inches tall and weighed 349 pounds. His neck circumference was measured at 18.9 inches.¹ The conductor's body mass index (BMI) was calculated to be 51.5 kg/m².² His blood pressure was 132/86.³ Vision and hearing testing results met federal standards for conductors.⁴ No mention of functional capacity or limitations were documented at the time of exam. The examiner indicated that no findings on the examination required further investigation.

The conductor trainee was evaluated for sleep apnea by a home sleep study on June 13, 2023, and was found to have severe obstructive sleep apnea (OSA).⁵ A continuous positive airway pressure (CPAP) machine was ordered, and the conductor

¹ Larger neck circumference is associated with increased risk for having obstructive sleep apnea. Guidelines widely used in the United States define a neck circumference of over 17 inches as abnormal for purposes of evaluating obstructive sleep apnea risk in men. [Epstein LJ, Kristo D, Strollo PJ, et al. Clinical guideline for the evaluation, management, and long-term care of obstructive sleep apnea in adults. *J Clin Sleep Med*. 2009;5(3):263-276.]

² BMI is calculated as body weight divided by the square of height. Based on WHO definitions, BMI of 25 kg/m² to less than 30 kg/m² is considered overweight, and BMI above 30 is considered obese. Obesity may be further classified as: BMI 30 - 35 kg/m² Class I, BMI 35-40 kg/m² Class II, and BMI > 40 kg/m² Class III (severe) obesity.

³ Current US guidelines define normal blood pressure as less than or equal to 120/80.

⁴ FRA medical fitness standards for conductors consist of vision and hearing requirements that must be met by conductors prior to each certification/recertification (49 Code of Federal Regulations § 242.117).

⁵ According to an e-mail from CSX legal, CSX utilizes a third-party company (iSleep Home Sleep Solutions) to screen examinees for OSA if the examinees have a BMI of 40 kg/m² or greater or are noted by the examiner to be a candidate for possible OSA due to neck circumference > 17 inches. If this screening identified OSA risk, CSX pays for the third-party company to arrange an in-home sleep study and suggest treatment.

trainee was cleared for employment on the condition that he was compliant with the prescribed CPAP therapy.⁶ He was released to work July 7, 2023.

1.1 CPAP Record

At the request of the NTSB, CSX produced CPAP usage reports for the conductor trainee for the dates July 7, 2023, to August 5, 2023. According to those reports, the conductor trainee used CPAP on 97% of nights with an average usage of 6 hours 19 minutes per night on nights used. His apnea-hypopnea index (AHI) for this period was 0.2.⁷ He used CPAP for more than 4 hours on 87% of nights. In the week leading up to the accident date, the conductor trainee used CPAP on all seven nights for an average of about 6 hours per night, including 6 hours the night before the accident.

1.2 Autopsy

The Office of the Chief Medical Examiner (OCME) for the State of Maryland performed the conductor trainee's autopsy. According to the conductor trainee's autopsy report, his cause of death was multiple blunt force injuries, and his manner of death was accident. His length (height) at autopsy was 70 inches and his weight was 410 pounds (corresponding to BMI 58.8 kg/m²). His autopsy did not otherwise identify significant natural disease.

1.3 Toxicology Result

1.3.1 Autopsy Toxicology Results

The OCME performed toxicological testing of postmortem specimens from the conductor trainee. Ethanol was detected at 0.05 g/dL in heart blood and was not detected in urine or vitreous fluid. No other tested-for substances were detected.

⁶ There are no FRA standards for CPAP adherence. Commonly, adherence to CPAP treatment is defined as CPAP use for at least 4 hours per day on at least 70% of days.

⁷ In OSA, a person's upper airway soft tissues collapse during sleep, causing the person to have repeated episodes during which breathing temporarily stops (apnea) and/or becomes ineffective (hypopnea). Generally, the severity of OSA is classified by the AHI, which is the number of apnea and hypopnea episodes that occur per hour of sleep. An AHI of less than 5 is normal. Mild OSA corresponds to an AHI of 5 to less than 15, moderate OSA corresponds to an AHI of 15 to 30, and severe OSA corresponds to an AHI of more than 30.

1.3.2 FRA Toxicology Results

The conductor trainee underwent FRA post-accident toxicological testing.⁸ This testing revealed ethanol at 0.031 g/dL in blood. Ethanol was not detected in urine.

1.3.3 FAA Toxicology Results

At the request of the NTSB, the FAA Forensic Sciences Laboratory performed postmortem toxicological testing of the conductor trainee's urine specimen.⁹ No tested-for substances (including ethanol) were detected in urine. No blood was available for FAA testing.

1.3.4 Description of Detected Substance

Ethanol is a type of alcohol. It is the intoxicating alcohol in beer, wine, and liquor, and, if consumed, can impair judgment, psychomotor performance, cognition, and vigilance.¹⁰ Consumption, however, is not the only possible source of ethanol in postmortem specimens. Ethanol can sometimes be produced by microbes in a person's body after death. Postmortem ethanol production is made more likely by severe trauma.

2.0 Conductor

2.1 Occupational Health Record

The 30-year-old conductor's occupational health records were reviewed from his last CSX medical examination dated August 11, 2022. Documented vision and hearing testing met federal standards for locomotive conductors.⁴

2.2 Toxicology Report

The engineer underwent FRA post-accident toxicological testing. This testing did not identify any tested-for substances.⁸

⁸ The FRA toxicology report listed tested-for substances in urine as amphetamine, barbiturates, benzodiazepines, cannabinoids, cocaine, MDMA/MDA, methadone, opiates/opioids, phencyclidine, tramadol, sedating antihistamines (brompheniramine, chlorpheniramine, diphenhydramine, doxylamine, and pheniramine), and ethanol.

⁹ The FAA Forensic Sciences laboratory has the capability to test for around a thousand substances including toxins, prescription and over-the-counter medications, and illicit drugs.

¹⁰ Cook CCH. Alcohol and aviation. *Addiction*. 1997;92(5):539-555.

3.0 Engineer

3.1 Occupational Health Records

The 51-year-old male engineer's occupational health records were reviewed from his last CSX medical exam on October 7, 2022. Documented vision and hearing testing met federal standards for locomotive engineers.¹¹

3.2 Toxicology Results

The engineer underwent FRA post-accident toxicological testing. This testing did not identify any tested-for substances.⁸

E. SUMMARY OF MEDICAL FACTS

1.0 Conductor Trainee

The 40-year-old conductor trainee was evaluated by a pre-employment medical exam on May 5, 2023. At that time, he reported having high blood pressure and using the prescription blood pressure medication lisinopril. Lisinopril is not generally considered impairing. At the time of his physical exam, the conductor trainee was noted to be 69 inches tall and weigh 349 pounds. His neck circumference was 18.9 inches. The remainder of his exam was unremarkable. He completed a home sleep study on June 13, 2023. He was diagnosed with obstructive sleep apnea and was started on continuous positive airway pressure (CPAP) therapy. He was released to work on July 7, 2023.

At the request of the NTSB, CSX produced CPAP usage reports for the conductor trainee for the dates July 7, 2023, to August 5, 2023. According to those reports, the conductor trainee used CPAP on 97% of nights with an average usage of 6 hours 19 minutes per night on nights used. His apnea-hypopnea index (AHI) for this period was 0.2. He used CPAP for more than 4 hours on 87% of nights. In the week leading up to the accident date, the conductor trainee used CPAP on all seven nights for an average of about 6 hours per night, including 6 hours the night before the accident.

¹¹ FRA medical fitness standards for engineers consist of vision and hearing requirements that must be met for a person to be currently certified as a locomotive engineer (49 Code of Federal Regulations § 240.121 (b)).

According to the conductor trainee's autopsy report, his cause of death was multiple blunt force injuries, and his manner of death was accident. His height at autopsy was 70 inches and his weight was 410 pounds, corresponding to a BMI of 58.8 kg/m². His autopsy did not otherwise identify significant natural disease.

Toxicological testing by the Office of the Chief Medical Examiner identified ethanol in heart blood at 0.05 g/dL and did not detect ethanol in urine or vitreous fluid. Federal Railroad Administration (FRA) testing detected ethanol 0.031 g/dL in blood and did not detect ethanol in urine. Federal Aviation Administration (FAA) testing of urine did not detect ethanol. Blood was not available for FAA testing.

2.0 Conductor

At the 30-year-old conductor's last medical evaluation on August 11, 2022, he met federal vision and hearing standards for locomotive conductors. His FRA post-accident toxicological testing was negative for tested-for substances.

3.0 Engineer

At the 51-year-old engineer's last medical evaluation on October 22, 2022, he met federal vision and hearing standards for locomotive engineers. His FRA post-accident toxicological testing was negative for tested-for substances.

Submitted by:
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