National Transportation Safety Board
Office of Research and Engineering
Washington, DC 20594

RRD23LR007

MEDICAL

Specialist's Factual Report

September 26, 2023

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A. ACCIDENT

Location: Cleveland, Ohio
Date: March 7, 2023
Time: About 1:08 AM local time

B. MEDICAL SPECIALIST

Specialist: Turan Kayagil, MD, FACEP
National Transportation Safety Board
Washington, DC

C. DETAILS OF THE INVESTIGATION

1.0 Purpose

This investigation was performed to evaluate the involved train conductor, train engineer, and truck driver for potentially impairing medical conditions and substance use.

2.0 Methods

The fatally injured train conductor's autopsy and postmortem toxicology reports were reviewed, as were his occupational health records. The uninjured train engineer's occupational health records were reviewed. Reports from post-accident toxicology testing of the uninjured truck driver were reviewed, as were selected records from the urgent care clinic where the truck driver had his most recent commercial driver medical examination prior to the accident. Selected investigator reports and relevant regulation and medical literature were also reviewed.

D. FACTUAL INFORMATION

1.0 Train Conductor

1.1 Autopsy

The Cuyahoga County Medical Examiner's Office performed the train conductor's autopsy. According to the 45-year-old male train conductor's autopsy report, his cause of death was blunt force skeletal, visceral, and vascular injuries, and his manner of death was accident. The autopsy report noted obesity (body weight 265 pounds, body length 74 inches) and evidence of hypertensive cardiovascular disease; the heart was described as enlarged, with hypertrophy of both cardiac ventricles. The heart weighed 470 grams (normal heart weight is roughly 320-570

grams for a male of body weight 265 pounds). The left cardiac ventricular wall was 1.5 cm thick (normal is roughly 0.9-1.6 cm), and the right cardiac ventricular wall was 0.5 cm thick (normal is roughly 0.2-0.6 cm).[1] The remainder of the visual examination of the heart, including the coronary arteries, was unremarkable. Some abnormal microscopic heart tissue changes were present.[2] An enlarged, moderately fatty liver was also present. The autopsy did not identify other significant natural disease.

1.2 Toxicology

At the request of the Medical Examiner's Office, the Cuyahoga County Regional Forensic Science Laboratory performed postmortem toxicological testing of heart blood from the train conductor. No tested-for substances were identified.[3]

Federal Railroad Administration (FRA) post-accident toxicological testing of the train conductor was performed by CTR Laboratory. No tested-for substances were identified in blood.[4]

At the request of the NTSB, the Federal Aviation Administration (FAA) Forensic Sciences Laboratory also performed postmortem toxicological testing of specimens from the train conductor.[5] This testing identified cetirizine at 9 ng/g in liver tissue.[6] Testing of blood for cetirizine was inconclusive.

Cetirizine is a second-generation antihistamine medication that is available over the counter and is commonly used to treat allergy symptoms. Cetirizine typically carries a warning that users may experience drowsiness and should be careful when

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[1] Kitzman DW, Scholz DG, Hagen PT, Ilstrup DM, Edwards WD. Age-related changes in normal human hearts during the first 10 decades of life. Part II (maturity): a quantitative anatomic study of 765 specimens from subjects 20 to 99 years old. *Mayo Clin Proc*. 1988;63(2):137-146. doi:10.1016/s0025-6196(12)64946-5.

[2] Specifically, cardiomyocyte hypertrophy, scattered hypereosinophilic cardiomyocytes, increased perivascular and interstitial fibrosis, and rare contraction bands were present.

[3] According to the toxicology report, testing included basic drugs (including common antidepressants, opioids/narcotic analgesics, CNS stimulants, antipsychotics, antiarrhythmics, dissociative anesthetics, antihistamines, hypnosedatives/anxiolytics, muscle relaxants, cathinones, and other agents), volatiles (ethanol, methanol, isopropanol, and acetone), carboxyhemoglobin (a marker of carbon monoxide exposure), and screening for a particular set of substances (amphetamine, barbiturates, benzodiazepines, cannabinoids, carisoprodol, cocaine metabolite, fentanyl, methamphetamine, oxycodone, phencyclidine, tricyclic antidepressants, methadone, opiates, zolpidem, and buprenorphine).

[4] According to the toxicology report, testing included amphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine, MDMA/MDA, methadone, opiates/opioids, phencyclidine, tramadol, ethanol, and sedating antihistamines (brompheniramine, chlorpheniramine, diphenhydramine, doxylamine, and pheniramine).

[5] 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.

[6] In tissue, concentrations in ng/g approximate concentrations in ng/mL.

driving a motor vehicle or operating machinery.[7] Data on sedation and psychomotor impairment from cetirizine are mixed, with some studies but not others finding some sedating and impairing effects.[8,9,10] In living people, typical medicinal levels of cetirizine in plasma are about 100 ng/mL to 600 ng/mL, and the drug has an elimination half-life of about 7-10 hours.[11]

1.3 Occupational Health Records

According to Norfolk Southern Health Services records, the train conductor's last documented periodic medical fitness evaluation was on May 12, 2022. At that time, he met federal vision and hearing requirements for conductors, without the use of corrective lenses.[12] Additionally, he completed a questionnaire about his medication use and medical history, had his vital signs checked, and was evaluated by a nurse for sleep apnea risk factors.

He was 73 inches tall, weighed 240 pounds, and had a neck circumference of 17 inches. His blood pressure was 140/86.[13] He reported using the prescription blood pressure medication lisinopril (records documented a history of high blood pressure, although the conductor indicated on his questionnaire that his blood pressure had not been high since his last periodic evaluation). Lisinopril is not generally considered impairing.

The conductor's Norfolk Southern Health Services records document that the information from his last periodic medical fitness evaluation was reviewed by Norfolk Southern Health Services staff on May 17, 2022, resulting in a decision that the train conductor was medically qualified.

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[7] National Institutes of Health National Library of Medicine. Zyrtec Allergy. DailyMed. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=b165db38-b302-4220-8627-77cb07bb078c. Updated May 19, 2023. Accessed September 13, 2023.

[8] Adelsberg BR. Sedation and performance issues in the treatment of allergic conditions. *Arch Intern Med*. 1997;157(5):494-500.

[9] Moskowitz H, Wilkinson CJ. *Antihistamines and Driving-Related Behavior: A Review of the Evidence for Impairment*. National Highway Traffic Safety Administration. DOT HS 809 714. May 2004. https://www.nhtsa.gov/sites/nhtsa.gov/files/antihistamines20text.pdf. Accessed September 13, 2023.

[10] Du Q, Zhou Y. Placebo-controlled assessment of somnolence effect of cetirizine: a meta-analysis. *Int Forum Allergy Rhinol*. 2016;6(8):871-879. doi:10.1002/alr.21746.

[11] Schulz M, Schmoldt A, Andresen-Streichert H, Iwersen-Bergmann S. Revisited: therapeutic and toxic blood concentrations of more than 1,100 drugs and other xenobiotics. *Crit Care*. 2020;24(1):195. doi:10.1186/s13054-020-02915-5.

[12] See 49 Code of Federal Regulations § 242.117.

[13] There is no federal blood pressure standard for locomotive conductors. Generally, normal adult blood pressure is below 120/80.

2.0 Train Engineer

According to an FRA e-mail, the train engineer did not undergo FRA post-accident toxicological testing.

According to Norfolk Southern Health Services records, the train engineer's last documented periodic medical fitness evaluation before the accident was on June 18, 2021. At that time, he met federal vision and hearing requirements for engineers.[14] Additionally, he completed a questionnaire about his medication use and medical history, had his vital signs checked, and was evaluated by a nurse for sleep apnea risk factors. Norfolk Southern Health Services records document that this information was reviewed in October 2021, resulting in a decision that the engineer was medically qualified.

3.0 Truck Driver

3.1 Toxicology

The table shows information on the post-accident toxicology testing of the truck driver, which comprised both Department of Transportation (DOT) testing and non-DOT testing. No tested-for substances were identified by any of this testing.

[14] See 49 Code of Federal Regulations § 240.121.

Test	Performed By	Specimen Collection Date / Time	Result
Breath alcohol (DOT)	Pivot OnSite Innovations	03-27-2023 / 6:44 AM	Negative
Urine drug (DOT)	*Not submitted*[15]	*03-27-2023 / 6:58 AM*	*Not analyzed*
Breath alcohol (DOT)	USA Mobile Drug Testing	03-27-2023 / 7:28 AM	Negative
Oral fluid (non-DOT)	Alere Toxicology Services	03-27-2023 / 7:35 AM	Negative[16]
Hair drug (non-DOT)	Omega Laboratories	03-27-2023 / 7:53 AM	Negative[17]
Urine drug (DOT)	LabCorp	03-27-2023 / 8:05 AM	Negative[18]
Urine drug (non-DOT)	Clinical Reference Laboratory	03-27-2023 / 8:09 AM	Negative[19]
Urine drug (non-DOT, point-of-collection)	USA Mobile Drug Testing	03-27-2023 / 8:10 AM	Negative[20]
Urine drug (non-DOT, point-of-collection)	*Pivot OnSite Innovations*	*Unknown*	*Negative*[21]

Table: Truck Driver Post-Accident Toxicology Testing

[15] According to information provided by Pivot OnSite Innovations, Pivot collected this specimen for submission to Quest Diagnostics but did not submit it, because a urine specimen collected by a different company was being used for DOT testing.

[16] According to the laboratory and Medical Review Officer reports of this testing, tested-for substances included amphetamine/methamphetamine, barbiturates, benzodiazepines, cocaine, opiates, marijuana, methadone, and phencyclidine (PCP).

[17] According to the laboratory and Medical Review Officer reports of this testing, tested-for substances included amphetamine/methamphetamines, cocaine, opiates, phencyclidine (PCP), marijuana, benzodiazepines, meperidine, methadone, fentanyl, tramadol, zolpidem, buprenorphine, propoxyphene, barbiturates, and ketamine.

[18] Tested-for substances on DOT urine drug testing are marijuana metabolites, cocaine metabolites, amphetamines, opioids, and phencyclidine (PCP), in accordance with 49 Code of Federal Regulations § 40.82, as detailed at 49 Code of Federal Regulations § 40.85.

[19] According to the laboratory and Medical Review Officer reports of this testing, tested-for substances included amphetamines, barbiturates, benzodiazepines, buprenorphine, cocaine, marijuana, methadone, methaqualone, opiates, oxycodone/oxymorphone, phencyclidine (PCP), and propoxyphene.

[20] According to reports of this point-of-collection screening, tested-for substances included barbiturates, benzodiazepines, cocaine, marijuana, MDMA (ecstasy), methadone, amphetamines/methamphetamine, opiates, oxycodone, phencyclidine (PCP), and propoxyphene.

[21] According to information provided by Pivot OnSite Innovations, Pivot performed this point-of-collection screening on a separate urine collection. Pivot provided a photograph of a urine collection container that appeared to show negative point-of-collection results for methamphetamine, opiates, phencyclidine (PCP), benzodiazepines, tricyclic antidepressants, barbiturates, methadone, amphetamine, cocaine, and marijuana. The photograph itself was labeled with the truck driver's name. No other identifying information was visible and no additional documentation was provided.

3.2 Commercial Driver Medical Examination

According to records from the urgent care clinic where the truck driver had his most recent commercial driver medical examination prior to the accident, this examination was on November 8, 2021. Reviewed records included the Federal Motor Carrier Safety Administration (FMCSA) Medical Examination Report Form (MER form) from this examination. No significant medical conditions, medications, abnormal physical examination findings, or other concerns were identified.[22] The certified medical examiner (CME) determined that the driver met physical qualification standards for 2-year medical certification.[23]

E. SUMMARY OF MEDICAL FACTS

According to the 45-year-old male train conductor's autopsy report, his cause of death was blunt force skeletal, visceral, and vascular injuries, and his manner of death was accident. The autopsy report noted obesity and evidence of hypertensive cardiovascular disease; the heart was described as enlarged, with hypertrophy of both cardiac ventricles. Some abnormal microscopic heart tissue changes were present. The train conductor's postmortem toxicology testing identified cetirizine at 9 ng/g in liver tissue. Cetirizine testing in blood by one lab was inconclusive. No other tested-for substances were identified by the train conductor's postmortem toxicology testing. Railroad occupational health records documented that the train conductor passed his last periodic medical fitness evaluation on May 12, 2022, including meeting federal vision and hearing requirements for conductors. He had a history of high blood pressure and reported using the prescription blood pressure medication lisinopril.

The train engineer did not undergo FRA post-accident toxicological testing. Railroad occupational health records documented that the train engineer passed his last periodic medical fitness evaluation before the accident, including meeting federal vision and hearing requirements for engineers; this evaluation took place on June 18, 2021.

The truck driver's post-accident testing for alcohol and other drugs did not identify any tested-for substances. The truck driver's most recent commercial driver

[22] Visual acuity was tested with corrective lenses, although no corrective lens restriction was specifically noted on the Medical Examiner Determination section of the MER form.

[23] The Medical Examiner's Certificate was not among the records obtained from the urgent care clinic. On the MER form, the CME marked that the truck driver qualified for a 2-year certificate, which is the maximum allowable certificate duration. However, in the MER form field for Medical Examiner's Certificate Expiration Date, the CME incorrectly entered April 9, 2031. According to a search of the FMCSA National Registry website, the CME had been certified on April 9, 2021; the April 9, 2031, date on the MER form therefore may represent the expiration date of the CME's own 10-year CME certification. According to a December 2021 background screening report on the truck driver, the medical certificate expiration date recorded by the state was April 9, 2023.

medical examination prior to the accident was on November 8, 2021. No significant medical conditions, medications, abnormal physical examination findings, or other concerns were identified at this examination. The certified medical examiner determined that the driver met physical qualification standards for 2-year medical certification.

Submitted by:

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