



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Group Chairman's Report

December 16, 2015

Mary Pat McKay, MD, MPH
Chief Medical Officer

A. ACCIDENT: DCA15FMR010

Accident Type: Train Derailment
Location: Philadelphia, PA
Date: May 12, 2015
Time: 9:21 pm (EST)
Train#1: 188
Carrier #1: Amtrak

B. GROUP IDENTIFICATION:

Mary Pat McKay, MD, MPH
Group Chairman
Chief Medical Officer
National Transportation Safety Board

Paul J. McCausland, MD, MPH, FACOEM
Medical Director, Amtrak Railroad

C. DETAILS OF INVESTIGATION

1. Purpose

This investigation was performed to evaluate the engineer for any medical conditions, the use of any medications/illicit drugs, and the presence of any toxins.

2. Methods

The 32 year old male engineer's Amtrak occupational medical file and personal medical records from prior to the accident as well as post accident toxicology testing and medical evaluations were reviewed in person by each member of the group.

3. Relevant regulation and protocols

A. Federal Regulation

Per the Code of Federal Regulations (Title 49 CFR part 240.121), triennially, railroad engineers are required to meet the following criteria:

(b) *Fitness requirement.* In order to be currently certified as a locomotive engineer, except as permitted by paragraph (e) of this section, a person's vision and hearing shall meet or exceed the standards prescribed in this section and appendix F to this part.

c) Except as provided in paragraph (e), each person shall have visual acuity that meets or exceeds the following thresholds:

- (1) For distant viewing either
 - (i) Distant visual acuity of at least 20/40 (Snellen) in each eye without corrective lenses or
 - (ii) Distant visual acuity separately corrected to at least 20/40 (Snellen) with corrective lenses and distant binocular acuity of at least 20/40 (Snellen) in both eyes with or without corrective lenses;
- (2) A field of vision of at least 70 degrees in the horizontal meridian in each eye; and
- (3) The ability to recognize and distinguish between the colors of railroad signals as demonstrated by successfully completing one of the tests in appendix F to this part.

(d) Except as provided in paragraph (e) of this section, each person shall have hearing acuity that meets or exceeds the following thresholds when tested by use of an audiometric device (calibrated to American National Standard Specification for Audiometers, S3.6-1969): the person does not have an average hearing loss in the better ear greater than 40 decibels at 500Hz, 1,000 Hz, and 2,000 Hz with or without use of a hearing aid.

Federal regulations do not require any other medical evaluation or testing for safety sensitive railroad employees. In addition, individuals who do not meet these requirements may be certified to operate trains if the railroad's medical examiner determines the person has the ability to safely operate a locomotive, conditioned on any special restrictions the medical examiner determines in writing to be necessary. (49CFR 240.121(e))

Following a fatal accident on a railroad, postaccident toxicology testing of train crewmembers is required by 49 CFR 219 subpart C. (See Attachment 1 for a list of tested-for substances and reporting cut offs.)

B. Amtrak Medical Protocols

Amtrak requires that each of its train engineers undergo a pre-employment medical evaluation as well as annual periodic follow up evaluations. The evaluation consists of a medical history, a medication review, sleep apnea screening, determination of vital signs, a physical examination by a licensed health care provider, vision testing, an audiogram, a urine dip test, urine drug screen, and an electrocardiogram. (Please see Attachment 2 for Amtrak's Medical Guidelines and Protocols and Attachment 3 for Amtrak's 2014 Medical Examination forms.)

D. MEDICAL FINDINGS

1. Train Crew Postaccident Toxicology Tests

The four safety sensitive crew members on Amtrak Train 188 were tested in accordance with 49 CFR 219 subpart C; results for each were negative.

2. Train Engineer

Amtrak Occupational Medical File

The engineer underwent a pre-employment medical evaluation in June, 2006. On the history form, he checked "yes" to questions about "eye or vision problems," "surgery," and "ever been in a motor vehicle accident." He further reported that he wore glasses, had had eye surgery in the past, and had been in an accident but had not been injured. A complete physical exam, including determination of vital signs was performed. In addition, the engineer had a urine dip test, vision and hearing testing, and an electrocardiogram EKG. All of the findings were normal or negative.

In February, 2009, the engineer underwent a pre-employment exam to become an engineer trainee. The exam consisted of a complete history using a different form; the engineer answered no to any personal history questions. The physical exam, determination of vital signs, vision, hearing, and urine testing, and an EKG were normal or negative.

Annually, from 2010 through 2014 the engineer underwent a routine occupational medical examination including a medical history, physical exam, determination of vital signs, urine, vision and hearing testing, and an EKG. The medical history form varied. When asked, he reported a history of childhood asthma and vision problems. He reported no medications. Each year, the examination and test results were normal.

In April, 2015, the engineer had a routine occupational medicine examination and reported that in January, 2015, he had undergone Lasik for vision correction and visited a podiatrist for a foot rash. The physical exam, determination of vital signs, vision, hearing, and urine testing, and an EKG were normal or negative.

Pre-accident Personal Medical Records

According to records from the engineer's personal physician dating back to March 7, 2013, the engineer had a history of childhood asthma and eye surgery for strabismus.¹ He took no routine medications and had no chronic medical problems.

Emergency Department Records, May 12-13, 2015

Following the accident, the engineer was transported to the hospital by the police. The triage note states, "Left forehead laceration s/p [status post] Amtrak derailment. +Bleeding noted. +LOC [loss of consciousness]." The history of present illness note states, "Pt reports that he was the driver of the train. He does not entirely remember the event but remembers feeling the train swerve, falling out of his seat, and then thinking "it must be a dream." He believes he kept his hands on the wheel at the time of the accident, and thinks he was able to get out of the train on his own." Another physician note states, "the driver of a train involved in a derailment. Head lac [laceration]. Some retrograde and anterograde amnesia."

The engineer had negative X-Rays of his chest and right knee, and a CT scan of his brain, which was also negative. A 3 cm laceration of his left knee and a 7 cm laceration of his left forehead were repaired with sutures. He was diagnosed with an acute head injury, a left knee laceration, a facial laceration, a sprain of the right knee, and multiple abrasions were noted.

Post Accident Toxicology Testing

The engineer had blood drawn for toxicology testing at 1:05am on May 13, 2015 at the request of the City of Philadelphia Police Department. In addition, at approximately the same time, blood and urine were obtained and tested as required by 49 CFR 219 subpart C. As mentioned above, results from these tests were negative.

At the request of the NTSB, once other testing was complete, specimens from the police and FRA testing were shared with the FAA's Bioaeronautical Research Laboratory, which tested the blood and urine for more than 1300 substances. Lidocaine, an anesthetic agent used to numb the engineer for sutures in the hospital and documented in the medical record from his emergency treatment, was identified in urine and blood. No other substances were identified.

¹ Surgery to correct the muscle imbalance that causes the person to be cross-eyed.

Post Accident Medical Evaluations

The engineer underwent an evaluation by a cardiologist beginning in August, 2015, to determine if there was underlying cardiac disease that may have led to a period of unresponsiveness or fainting (syncope) at the time of the accident. The evaluation included a physical examination, placement of a Holter monitor (a 24 hour recording of heart rhythm and rate), an echocardiogram (a sonogram of the heart), and an exercise stress test. The Holter monitor did not identify any abnormal heart rhythms; the echocardiogram demonstrated the heart chambers and valves were anatomically unremarkable and filled normally; and the engineer exercised to 13 METS on the Bruce protocol, achieving more than 100% of the predicted maximal heart rate without any symptoms, abnormal beats, or abnormal electrical patterns. No cardiac problem was identified.

Beginning in September, 2015, the engineer was evaluated by a neurologist. The engineer underwent a sleep deprived awake and asleep EEG examination on 10/19/2015. The result was an “essentially normal awake and asleep EEG.” The neurologist diagnosed the engineer with a post traumatic headache syndrome and a concussion.

E. SUMMARY OF MEDICAL FINDINGS

Required postaccident toxicology tests were negative for all train crewmembers.

The 32 year old engineer in this accident had a history of childhood asthma and eye surgery. He reported no routine medications and extensive additional toxicology testing was performed. No tested-for medications or illicit drugs were identified except for lidocaine, a local anesthetic which had been administered during post-accident medical treatment.

During postaccident emergency medical treatment the engineer was noted to have some retrograde and anterograde amnesia and was diagnosed with an acute head injury, a left knee laceration, a facial laceration, and a sprain of the right knee.

Postaccident evaluations by specialists in neurology and cardiology did not identify any abnormalities other than a post traumatic headache and concussion resulting from the accident.