NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

August 23, 2016

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Medical Officer

A. **ACCIDENT: DCA15FR014**

Accident Type:	Side collision between two Union Pacific trains at an interlocking
Location:	Texarkana, Texas
Date:	September 8, 2015
Time:	00:34 a.m.
Vehicle #1:	(Striking train) AMNML-07 westbound train
Vehicle #2:	(Struck train) ALDAS-06 northbound train

B. **GROUP IDENTIFICATION:**

No group was formed for the medical evaluation in this accident.

C. **RELEVANT REGULATIONS**

Per Title 49 *Code of Federal Regulations* (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.

Per 49 CFR 242.117, triennially, railroad conductors are required to meet the following criteria:

> (g) *Fitness requirement.* In order to be currently certified as a conductor, except as permitted by paragraph (j) of this section, a person's vision and hearing shall meet or exceed the standards prescribed in this section and Appendix D to this part.

Federal regulations do not require railroad engineers or conductors to report a medical history, describe their use of medications, or undergo any other physical examination, additional testing or review of their health.

D. DETAILS OF INVESTIGATION

Purpose

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

Methods

The crews' occupational health records, Federal Railroad Administration (FRA) post-accident toxicology reports, and the investigator's report were reviewed.

Engineer Striking train

Union Pacific Medical File

A pre-employment physical examination and health questionnaire dated 12/19/2003 did not identify any significant medical conditions.

According to occupational medicine records obtained from the Union Pacific Railroad, the 33-year-old engineer's most recent examination was dated September 4, 2015 and no abnormalities were noted on his hearing test. Vision testing recorded the engineer's uncorrected visual acuity as 20/25 in both eyes, 20/100 in right eye and 20/25 left eye. [1] No abnormalities were identified in visual field or color vision testing. The record from the most recent examination does not include height, weight, vital signs, review of medications, medical history, or evaluation of sleep apnea risk.

A Union Pacific memorandum of review of the September 4, 2015 occupational medical exam, dated September 9, 2015 (one day after the accident) states the engineer "…had an FRA certification exam on 9/4/2015. He did not pass the minimum visual acuity criteria, since his far visual acuity was 20/25 both eyes, 20/100 right eye, and 20/25 left eye. These are tests of uncorrected vision, and it is noted he does not wear glasses or contact lenses. The exam was deferred in to HMS [Union Pacific Railroad Health and Medical Services] and the results were received here today. A review of prior vision testing for FRA certification shows he had acceptable far visual acuity of no worse than 20/25 in the right eye when examined in 2006, 2009 and 2012..." The letter further states the engineer "…does not meet the FRA minimum visual acuity criteria in the right eye. This appears to be a change from prior years, and we have no explanation for the change at this time. He should be considered not Fit-for-Duty and held off work until we obtain more information…"

The Union Pacific occupational health record contains a note from a board certified ophthalmologist dated October 5, 2015 recorded the engineer's distant vision as 20/30 right and 20/20 left with no glasses. Additionally, the physician diagnosed the engineer as having mild right eye amblyopia (lazy eye) since childhood and Bell's palsy (facial palsy due to trauma to the facial nerve) since 2001, an inability to completely close right eye, and a dry right eye.[2,3] The

[1] According to 49 CFR 240.121(c), 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] National Institute of Health, National Eye Institute, Bethesda MD, Facts About Amblyopia. https://nei.nih.gov/health/amblyopia/amblyopia_guide Accessed 08/15/2016

examination did not identify additional ocular pathology and stated "no glasses needed."

Toxicology

FRA post-accident toxicology testing did not detect alcohol with breath testing. Urine and blood testing conducted by Quest laboratories not identify any tested for drugs.

Conductor Striking Train

Union Pacific Medical File

According to occupational health records, the 34-year-old male conductor's most recent medical certification examination was performed on October 18, 2013. His corrected distant vison was recorded as 20/20 both eyes, 20/20 right and 20/25 left. No abnormalities were identified in visual field or color vision testing. The record from the most recent examination does not include height, weight, vital signs, review of medications, medical history, or evaluation of sleep apnea risk.

Previous examinations included a return to work examination form dated March 29, 2010 that documented a height of 71 inches and weight of 186 pounds and documents no abnormalities on physical examination. Additionally his pre-employment examination dated, May 16, 2008 did not identify any medical conditions or medications.

Toxicology

FRA post-accident toxicology testing did not detect alcohol with breath testing. Urine and blood testing conducted by Quest laboratories found diphenhydramine in the urine but not in the blood. The blood was collected at 05:00; about 4.5 hours after the accident. The FRA reporting cutoffs for diphenhydramine are 50 ng/ml in urine and blood.

Diphenhydramine is a sedating antihistamine used to treat allergy symptoms and as a sleep aid. It is available over the counter under the trade names Benadryl and Unisom. Diphenhydramine carries the following FDA warning: may impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery). The accepted half-life for diphenhydramine ranges from 3 to 14 hours and the therapeutic range is from 25.0 to 112.0 ng/ml.[4] Typical blood levels within 2-3 hours after oral ingestion of 50-100 mg are about 100 ng/ml.[5] Compared to other antihistamines, diphenhydramine causes marked sedation; it is also classed as a CNS depressant and this is the rationale for its use as a sleep aid. Altered mood and impaired cognitive and psychomotor performance may also be observed. In fact, in a

[3] National Institute of Health, National Institute of Neurological Disorders and Stroke, Bell's Palsy Fact Sheet http://www.ninds.nih.gov/disorders/bells/detail_bells.htm Accessed 08/15/2016

[4] Federal Aviation Administration. Civil Aerospace Medical Institute. Toxicology Drug Information: Diphenhydramine. Available from: http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=50 . Accessed 11/12/2013.

[5] National Highway Traffic Safety Administration. Drugs and Human Performance Fact Sheets: Diphenhydramine. http://www.nhtsa.gov/people/injury/research/job185drugs/diphenhydramine.htm. Accessed 11/12/2013.

driving simulator study, a single dose of diphenhydramine impaired driving ability more than a blood alcohol concentration of 0.100%.[6]

Engineer Struck Train

Union Pacific Medical File

According to occupational medicine records, the 43-year-old engineer's most recent examination was dated December 18, 2014 and no abnormalities were noted on the hearing test or vision testing. Vision testing recorded the operator's uncorrected visual acuity as 20/15 in both eyes, 20/20 in right eye and 20/20 left eye. The record from the most recent examination does not include height, weight, vital signs, review of medications, medical history, or evaluation of sleep apnea risk.

Toxicology

FRA post-accident toxicology testing did not detect alcohol with breath testing. Urine and blood testing conducted by Quest laboratories not identify any tested for drugs.

Conductor Struck Train

Union Pacific Medical File

According to occupational medicine records, the 41-year-old conductor's most recent examination prior to the accident was dated March 31, 2014 records included a hearing test and no abnormalities were noted. According to an email from the UP Medical Officer dated September 19, 2016, vision testing was not required at that time of the conductor's prior occupational medicine certification examination. Additionally, a routine scheduled occupational hearing and vision examination dated November 15, 2015 documented that the conductor met FRA standards. The record from the most recent examination does not include height, weight, vital signs, review of medications, medical history, or evaluation of sleep apnea risk.

Toxicology

FRA post-accident toxicology testing did not detect alcohol with breath testing. Urine and blood testing conducted by Quest laboratories not identify any tested for drugs.

[6] Weiler JM, B.J., Woodworth GG, Grant AR, Layton TA, Brown TL, McKenzie DR, Baker TW, Watson GS., Effects of fexofenadine, diphenhydramine, and alcohol on driving performance. A randomized, placebo-controlled trial in the Iowa Driving Simulator. Ann Intern Med 2000. 132(5): p. 354-63.

E. **SUMMARY OF FINDINGS**

The striking train engineer's uncorrected distant visual acuity conducted 4 days before the accident was recorded as 20/25 in both eyes, 20/100 in his right eye and 20/25 his left eye. Subsequent evaluation by an ophthalmologist recorded the engineer's vision as 20/30 right and 20/20 left with no glasses and diagnosed amblyopia since childhood, Bell's palsy, inability to completely close right eye, and a dry right eye.

The striking train conductor's toxicology testing detected diphenhydramine in the urine but any diphenhydramine in the blood was below the reporting cutoff and the result was reported as negative.

No alcohol, tested for drugs, or abnormal vision or hearing tests were identified in the crew of the struck train.