



**MEDICAL FACTUAL REPORT**

**Oakland, Iowa**

**HWY18MH003**

**Report Date: August 27, 2018**

(8 pages)



**NATIONAL TRANSPORTATION SAFETY BOARD  
OFFICE OF RESEARCH AND ENGINEERING  
WASHINGTON, D.C.**

**MEDICAL FACTUAL REPORT**

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**A. CRASH INFORMATION**

Location: 17000 Block 480<sup>th</sup> St, Oakland, Pottawattamie County, near Oakland, Iowa  
Vehicle: 2004 IC, Model 3S530, 65 passenger school bus  
Operator: Riverside Community School District  
Date: Tuesday, December 12, 2017  
Time: Approximately 06:52 a.m. (CST)  
NTSB #: **HWY18MH003**

**B. GROUP IDENTIFICATION**

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

**C. CRASH SUMMARY**

For a summary of the crash, refer to the *Crash Summary Report* in the docket for this investigation.

**D. RELEVANT STATUTE AND REGULATION**

1. Federal Regulation

According to Title 49 Code of Federal Regulations, Section 391.41a (3):

A person is physically qualified to drive a commercial motor vehicle if:

(i) That person meets the physical qualification standards in paragraph (b) of this section and has complied with the medical examination requirements in §391.43; or

(ii) That person obtained from FMCSA a medical variance from the physical qualification standards in paragraph (b) of this section and has complied with the medical examination requirement in §391.43.

(b) A person is physically qualified to drive a commercial motor vehicle if that person—

(1) Has no loss of a foot, a leg, a hand, or an arm, or has been granted a skill performance evaluation certificate pursuant to §391.49;

(2) Has no impairment of:

(i) A hand or finger which interferes with prehension or power grasping; or

- (ii) An arm, foot, or leg which interferes with the ability to perform normal tasks associated with operating a commercial motor vehicle; or any other significant limb defect or limitation which interferes with the ability to perform normal tasks associated with operating a commercial motor vehicle; or has been granted a skill performance evaluation certificate pursuant to §391.49.
- (3) Has no established medical history or clinical diagnosis of diabetes mellitus currently requiring insulin for control;
- (4) Has no current clinical diagnosis of myocardial infarction, angina pectoris, coronary insufficiency, thrombosis, or any other cardiovascular disease of a variety known to be accompanied by syncope, dyspnea, collapse, or congestive cardiac failure.
- (5) Has no established medical history or clinical diagnosis of a respiratory dysfunction likely to interfere with his/her ability to control and drive a commercial motor vehicle safely;
- (6) Has no current clinical diagnosis of high blood pressure likely to interfere with his/her ability to operate a commercial motor vehicle safely;
- (7) Has no established medical history or clinical diagnosis of rheumatic, arthritic, orthopedic, muscular, neuromuscular, or vascular disease which interferes with his/her ability to control and operate a commercial motor vehicle safely;
- (8) Has no established medical history or clinical diagnosis of epilepsy or any other condition which is likely to cause loss of consciousness or any loss of ability to control a commercial motor vehicle;
- (9) Has no mental, nervous, organic, or functional disease or psychiatric disorder likely to interfere with his/her ability to drive a commercial motor vehicle safely;
- (10) Has distant visual acuity of at least 20/40 (Snellen) in each eye without corrective lenses or visual acuity separately corrected to 20/40 (Snellen) or better with corrective lenses, distant binocular acuity of at least 20/40 (Snellen) in both eyes with or without corrective lenses, field of vision of at least 70° in the horizontal Meridian in each eye, and the ability to recognize the colors of traffic signals and devices showing standard red, green, and amber;
- (11) First perceives a forced whispered voice in the better ear at not less than 5 feet with or without the use of a hearing aid or, if tested by use of an audiometric device, does not have an average hearing loss in the better ear greater than 40 decibels at 500 Hz, 1,000 Hz, and 2,000 Hz with or without a hearing aid when the audiometric device is calibrated to American National Standard (formerly ASA Standard) Z24.5—1951.

(12)(i) Does not use any drug or substance identified in 21 CFR 1308.11 Schedule I, an amphetamine, a narcotic, or other habit-forming drug.

(ii) Does not use any non-Schedule I drug or substance that is identified in the other Schedules in 21 CFR part 1308 except when the use is prescribed by a licensed medical practitioner, as defined in §382.107, who is familiar with the driver's medical history and has advised the driver that the substance will not adversely affect the driver's ability to safely operate a commercial motor vehicle.

(13) Has no current clinical diagnosis of alcoholism.

Drivers must undergo a medical examination including a medical history, review of medications, and physical examination to demonstrate they have met these requirements. Beginning in 2014, health care providers performing these examinations are required to have been certified by FMCSA to perform these examinations (per Title CFR 49 Part 390).

## 2. Iowa Regulation of Bus Drivers

According to the Iowa Administrative Code school bus drivers in Iowa must obtain and submit to the applicant's employer the signed medical examiner's in compliance with 49 CFR Sections 391.41 to 391.49 every 24 months indicating among other requirements sufficient physical capacity to operate the bus effectively and to render assistance to the passengers in case of illness or injury, and freedom from any communicable disease, such as tuberculosis.<sup>1</sup>

## **E. DETAILS OF THE INVESTIGATION**

### **1. Purpose of Study**

This investigation was performed to evaluate the driver involved in this accident for any medical conditions, the use of any medications/illicit drugs, and the presence of any toxins.

### **2. Methods**

The following records were reviewed: the school bus driver's personal medical records, Federal Motor Carrier Safety Administration (FMCSA) commercial driver's license (CDL) examinations, autopsy, and toxicology reports.

### **3. Bus Driver - Fatal Injuries**

#### 3.1. Personal Medical Records

##### 3.1.1. Primary Care Medical Records

Medical records for the bus driver's visits to his primary care providers from August 1996 through December 2017 were reviewed. The 74-year-old male bus driver's active medical conditions and medications as documented by his primary care provider are listed in Table 1.

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<sup>1</sup> Iowa Administrative Code Title VIII, Chapter 43 Pupil Transportation. - IAC 12/24/2014

**Table 1.** Bus Driver's Active Medical Conditions and Treatment.

<b>Medical Condition</b>	<b>Treatment</b>
Chronic pain / degenerative disc disease	Acetaminophen - pain reliever Gabapentin - chronic pain medicine
Depression	Bupropion - antidepressant
Diabetes	Diet
High blood pressure	Diet
High cholesterol	Simvastatin - cholesterol lowering medication
Gastric reflux	Pantoprazole - acid reducing medication

Acetaminophen, pantoprazole and simvastatin are generally considered not to be impairing. Bupropion is a prescription medication for depression and helps patients quit smoking and is often marketed with the names Wellbutrin and Zyban. Its drug information warns of a dose dependent risk of seizures and advises patients not to drive or use heavy machinery until the medication's effects are known.<sup>2</sup>

Gabapentin is an anti-seizure medication also used to treat chronic pain and is marketed under various names including Neurontin. It is a central nervous system depressant and may cause somnolence, dizziness, ataxia, nystagmus, and fatigue. It carries the warning "Prescribers and patients should be aware that patients' ability to assess their own driving competence, as well as their ability to assess the degree of somnolence caused by gabapentin, can be imperfect."<sup>3</sup> It is not a scheduled substance but is only available by prescription. The accepted half-life of gabapentin is from 5 to 9 hours and the therapeutic range is from about 2 to 20-30 ug/ml.<sup>4,5</sup>

The bus driver's last medical visit was December 8, 2017 (four days before the accident.). The visit was a preoperative evaluation prior to spinal surgery scheduled for December 14, 2017. The driver was 5 feet 10 inches tall, weighed 180 pounds, and had a body mass index (BMI) of 25.9 kg/m<sup>2</sup>.<sup>6</sup> The driver had had successful lower back spinal fusion (L3-L5) in January 2017 but had developed recurrent debilitating pain radiating down both legs and was scheduled for surgery to fuse additional lower back vertebra (L2-L3). The physical examination documented the driver had symmetric strength in the lower extremities but required a walker to get around. The examining

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<sup>2</sup> National Institutes of Health. US National Library of Medicine. *DailyMed*, 2018. Wellbutrin - bupropion. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=cbc8c074-f080-4489-a5ae-207b5fadeba3> Accessed 04/20/2018.

<sup>3</sup> National Institute of Health, National Library of Medicine (U.S.). *DailyMed* 2018. Bethesda, MD. Neurontin - gabapentin. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ee9ad9ed-6d9f-4ee1-9d7f-cfad438df388> Accessed 06/06/2018

<sup>4</sup> Baselt RC *Disposition of Toxic Drugs and Chemicals in Man*, 10<sup>th</sup> Edition. Copyright 2014, Biomedical Publications, Seal Beach, California. Gabapentin, Page 925.

<sup>5</sup> Schulz M. et al. Therapeutic and toxic blood concentrations of nearly 1,000 drugs and other xenobiotics. *Schulz et al. Critical Care* 2012, 16: R136

<sup>6</sup> A body mass index of 30 or above is considered obese. People who are obese have a large amount of body fat for their height and are at higher risk for many diseases including: heart disease, high blood pressure, type II diabetes, and sleep apnea. [https://www.nhlbi.nih.gov/health/educational/lose\\_wt/bmitools.htm](https://www.nhlbi.nih.gov/health/educational/lose_wt/bmitools.htm) Accessed 08/24/2017

health care provider made no comment about the driver's ability to operate a school bus.<sup>7</sup>

### 3.1.2. Neurosurgical Records.

Spine specialist records from April 2014 to November 14, 2017 (one month prior to the accident) documented a history of progressive lumbar disc degeneration, spinal stenosis, progressive back pain with radiation down the legs, and stable right lower leg weakness.

One month prior to the accident the bus driver reported that he could walk if he used canes or crutches, and pain prevented sitting for more than 30 minutes or standing for more than ten minutes. Even with medication, he was sleeping less than four hours at a time. On examination he had stable mild right dorsiflexor weakness with otherwise normal strength.<sup>8</sup> His sensory exam was intact to light touch. Additionally, he used a 4-wheeled walker, walked with about a 15-degree forward stoop, and had pain when transferring from sitting to standing.

Imaging studies showed degenerative changes in the area of the L2-3 disk along with the progressive deformity and stenosis with progression over the preceding ten-months.<sup>9</sup> The neurosurgeon recommended surgical intervention since physical therapy had been ineffective and the driver was reaching the point where he was having difficulty performing activities of daily living. Surgery was scheduled for two days after the accident.

### 3.2. CDL Medical Examinations.

Five annual FMCSA CDL medical examinations from 2009 to 2017 were reviewed. The most recent examination, dated March 6, 2017, documented the bus driver's height as 5 feet 9 inches and weight as 184 pounds. The driver reported only taking medications for elevated cholesterol and a history of cataracts but denied any neck or back problems (despite having had spinal surgery two months earlier.) The examining certified medical examiner, a chiropractor, documented a normal physical examination including normal back, spine, and neurological exams, recorded the driver met the requirements established by 49 CFR 391.41 and qualified him for 2 years.

His 2016 CDL exam was conducted by the same chiropractor. At that time the driver reported high blood pressure, high cholesterol, diabetes, and previous surgery for neck and back problems. He reported the use of metformin a blood glucose lowering medication, simvastatin a cholesterol lowering medication, and lisinopril a blood pressure medication. At that time, he was found qualified, but his medical certificate was limited to one year because of high blood pressure.

His 2013 CDL exam was performed by his primary care provider, a physician's assistant (PA-C). The driver reported no concerns in his health history but reported taking the medications simvastatin, bupropion, pantoprazole, gabapentin (all described earlier in this report), and the non-impairing blood pressure medicine lisinopril. The PA-C found no

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<sup>7</sup> This provider had performed the driver's 2013 CDL examination.

<sup>8</sup> This is weakness pulling the toes up toward the knee at the ankle.

<sup>9</sup> Spinal stenosis is a narrowing of spaces in the spine (backbone) that results in pressure on the spinal cord and/or nerve roots. (See - <https://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0024991/>.)

abnormalities on physical examination, made no comments concerning the medications, and certified the driver for two years.

### 3.3. Autopsy.

The autopsy conducted by the Iowa Medical Examiner's Office documented the cause of death was smoke and soot inhalation with thermal injuries and the manner was accident. The report documented incidental coronary artery disease and the presence of stabilization hardware in the inferior lumbar vertebral column.

### 3.4. Toxicology.

Forensic toxicological testing conducted by NMS Laboratory as part of the autopsy detected carboxyhemoglobin at 6 percent and cyanide at 0.79 mg/ml in femoral blood.<sup>10</sup> Testing of urine and femoral blood for drugs of abuse and vitreous for ethanol was negative.<sup>11</sup>

Forensic toxicological testing conducted by the FAA's Bioaeronautical Sciences Research Laboratory did not detect ethanol in the urine and carbon monoxide was less than 10 percent in femoral blood.<sup>12</sup> Testing detected 19.39 ug/ml of acetaminophen in urine; bupropion in urine but inconclusive results in femoral blood; dextromethorphan and its metabolite dextropropion in urine and femoral blood; and gabapentin in urine and at 7.517 ug/ml in femoral blood. Bupropion and gabapentin are described earlier in this document.

Acetaminophen is a non-sedating pain and fever reducing medication sold alone or combination with cough and cold treatments and marketed as under many names including Tylenol.<sup>13</sup>

Dextromethorphan is a cough medication often market in combination cough and cold medications such as Triaminic.<sup>14</sup> It is generally not considered impairing when taken as directed but may produce sedation when used in excess, its metabolite is dextropropion.<sup>15</sup>

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<sup>10</sup> Carbon monoxide is a product of combustion, carboxyhemoglobin occurs when carbon monoxide binds to hemoglobin. Blood levels are generally considered normal up to 3.5 percent in nonsmokers and up to 8 percent in smokers. Cyanide is a toxic byproduct of burning plastics. Concentrations in fire victims range from 0.17 to 2.2 mg/ml.

<sup>11</sup> Tested for substances included: acetone, amphetamines, barbiturates, benzodiazepines, buprenorphine / metabolites, cannabinoids, cocaine / metabolites, cyanide, carboxyhemoglobin, ethanol, fentanyl / metabolites, isopropanol, methadone / metabolites, methamphetamine / MDMA, methanol, opiates, oxycodone / oxymorphone, and phencyclidine.

<sup>12</sup> The Bioaeronautical Sciences Research Laboratory tests specimens for over 1300 compounds including toxins, prescription and over-the-counter medications and illicit drugs; information about these compounds can be found the Drug Information Web Site (<http://jag.cami.jccbi.gov/toxicology/>.)

<sup>13</sup> National Library of Medicine (U.S.). 2018. *DailyMed*. Bethesda, MD. Tylenol - acetaminophen. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=5d7d1300-bcb8-466a-880b-310b360ee132> Accessed 04/20/2018.

<sup>14</sup> National Library of Medicine (U.S.). 2018. *DailyMed*. Bethesda, MD. Triaminic cough and sore throat - acetaminophen, dextromethorphan. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f61a3668-1526-4124-b203-dc51bc33c201> Accessed 04/20/2018.

<sup>15</sup> Federal Aviation Administration, Bioaeronautical Sciences Research Laboratory, Forensic Toxicology's WebDrugs 2017: Dextromethorphan <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=42> Accessed 04/20/2018.

## **F. SUMMARY OF FINDINGS**

The 74-year-old male bus driver had a history of high blood pressure, high cholesterol, depression, diabetes, and gastric reflux controlled with diet and medication. Additionally, he had recurrent, progressive low back pain with neurologic symptoms previously treated with spinal fusion surgery. He was found qualified for a commercial driver's license on an exam dated March 6, 2017; the certificate was valid for 2 years. However, since the exam he had developed worsening of his degenerative disc disease resulting in stable mild right dorsiflexion weakness and debilitating pain that resulted in the driver's inability to walk without the use of a cane or walker. He was scheduled for additional back surgery 2 days after the accident.

The autopsy conducted by the Iowa Medical Examiner's Office documented the cause of death was smoke and soot inhalation with thermal injuries and the manner was accident. The report documented incidental coronary artery disease and the presence of stabilization hardware in the inferior lumbar vertebral column.

Toxicological testing conducted in two labs identified 6 percent carbon, cyanide at 0.79 mg/ml, the non-sedating cough medicine dextromethorphan and its metabolite dextrorphan in urine and femoral blood, the potentially impairing seizure / pain control medication gabapentin in urine and at 7.517 ug/ml in femoral blood, 19.39 ug/ml of the non-sedating pain medicine acetaminophen in urine, and the antidepressant bupropion in urine but inconclusive results in femoral blood,

END OF REPORT

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(Nicholas Webster, MD, MPH)

(Medical Officer)