



# **NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Research and Engineering  
Washington, DC

## **Medical Factual Report**

**December 12, 2016**

Mary Pat McKay, MD, MPH  
Chief Medical Officer

### **A. ACCIDENT: CEN15FA400; Silverton, Co**

On September 5, 2015, about 1408 mountain daylight time, a Cessna 310H, N1099Q, impacted mountainous terrain at an elevation of about 11,500 feet mean sea level near Silverton, Colorado, based upon preliminary radar information consistent with the flight. Two non-instrument, single-engine land rated private pilots and two passengers were fatally injured. The airplane was destroyed by impact forces. The airplane was registered to and operated by the registered pilot under 14 Code of Federal Regulations Part 91 as a personal flight that was not operating on a flight plan and was not utilizing flight following services by air traffic control. Instrument meteorological conditions prevailed at the time of the accident. The flight last departed from Flagstaff Pulliam Airport, Flagstaff, Arizona and was destined to Amarillo, Texas.

### **B. GROUP IDENTIFICATION**

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

### **C. DETAILS OF INVESTIGATION**

#### **1. Purpose**

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

#### **2. Methods**

The FAA medical case review, toxicology results, and autopsy report, were reviewed for both pilots, as well as the investigator's reports. Personal medical records were obtained and reviewed for the pilot. In addition, the audio tapes of the ATC conversations in Flagstaff were reviewed.

## **Pilot/Airplane Owner**

### FAA Medical Case Review

According to the FAA files, the 71 year old male pilot/owner held a pilot rating for single engine, land flight. At the time of his last aviation medical exam, dated 12/17/2013, he reported 1,000 hours of flight experience. According to the records, he was 70 inches tall, weighed 165 pounds, and had reported no chronic medical conditions and no medications to the FAA. He had reported a number of previous surgical procedures and a disability related to a military gunshot wound but the aviation medical examiner noted “no residual.” He was issued a third class medical certificate limited by a requirement to wear corrective lenses.

### Autopsy

According to the autopsy performed by Rocky Mountain Forensic Services, PLLC, the cause of death was multiple injuries and the manner of death was accident.

Examination of the body for natural disease was limited by the severity of the pilot’s injuries; no organs were available for evaluation. The remains were limited to bone fragments, skin, and muscle.

### Toxicology

Toxicology testing performed on the only available specimen, muscle, by the FAA’s Bioaeronautical Research Laboratory identified ethanol at 0.015 gm/dl, as well as citalopram and its metabolite N-desmethylocitalopram in muscle.

Ethanol is the intoxicant commonly found in beer, wine, and liquor. It acts as a central nervous system depressant. After ingestion, at low doses, it impairs judgment, psychomotor functioning, and vigilance; at higher doses it can cause coma and death. The effects of ethanol on aviators are generally well understood; it significantly impairs pilots’ performance, even at very low levels.<sup>1</sup> Federal Aviation Regulations, Section 91.17 (a) prohibits any person from acting or attempting to act as a crewmember of a civil aircraft while having 0.040 gm/dl or more ethanol in the blood.<sup>2</sup> Ethanol may also be produced by microbial activity in the body after death.<sup>3</sup>

Citalopram is an antidepressant that carries a warning: “May impair mental and/or physical ability required for the performance of potentially

---

<sup>1</sup> Cook, C.C., Alcohol and aviation. *Addiction* (Abingdon, England), 1997. 92(5): 539-555.

<sup>2</sup> US Government Printing Office .eCFR- Code of Federal Regulations. 91.17. Accessed 12/16/2016. Available from: <http://www.ecfr.gov/cgi-bin/text-idx?rgn=div8&node=14:2.0.1.3.10.1.4.9>.

<sup>3</sup> Federal Aviation Administration. Forensic Toxicology Drug Information. Ethanol. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=60> Accessed 12/02/2016.

hazardous tasks (e.g., driving, operating heavy machinery)”.<sup>4</sup> However, it has not been shown to degrade performance in psychological testing experiments using healthy volunteers.<sup>5</sup>

#### Personal Medical Records

According to records obtained from the pilot’s usual Veteran’s Administration Hospital, in January 2013 he was documented as having multiple chronic medical conditions including: spinal stenosis, hypothyroidism, depressive disorder, posttraumatic stress disorder, panic disorder, gastroesophageal reflux disease, esophageal stricture, chronic neck pain, paraplegia, peptic ulcer disease, type 2 diabetes, and emphysema. In a single note from an outside physician, the pilot’s paraplegia was documented as relating to a motor vehicle accident in 1996.

In January 2015, the VA records document the pilot was hospitalized for being unable to swallow. Eventually, he had a gastrostomy tube placed for feeding. He was admitted for a rotator cuff repair in March, 2015 and remained in the hospital for rehabilitation until May, 2015. During that time, the feeding tube was removed. His active medications as of July 2015 included: albuterol, formoterol, citalopram, hydromorphone (4mg tab every 4 active hours), aspart insulin (short acting), glargine insulin (long acting), levothyroxine, lidocaine patch, prazosin, and zolpidem.

Albuterol and formoterol are beta-agonists available as inhaled medication for the short term treatment of wheezing (albuterol) and the longer term prevention of wheezing (formoterol).<sup>6,7</sup> Citalopram is described above. Hydromorphone is an opioid analgesic Schedule II controlled substance available by prescription. Commonly marketed with the name Dilaudid, it carries a warning about central nervous system depression so severe it may cause respiratory failure.<sup>8</sup>

The pilot was on two forms of injected insulin: aspart, which is short acting and glargine, which is long acting. Common names for the two are

---

<sup>4</sup> National Institutes of Health. US National Library of Medicine. DailyMed. Citalopram. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=2632b547-2e13-447f-ac85-c774e437d6a8> Accessed 12/12/2016.

<sup>5</sup> Paul MA, G.G., Love RJ, Lange M, SSRI effects on psychomotor performance: assessment of citalopram and escitalopram on normal subjects. *Aviat Space Environ Med*, 2007. 78(7): p. 693-7.

<sup>6</sup> National Institutes of Health. US National Library of Medicine. DailyMed. Albuterol. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=808e2b04-9e84-440a-b00e-2cbe858041da> Accessed 12/12/2016.

<sup>7</sup> National Institutes of Health. US National Library of Medicine. DailyMed. Formoterol. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=04212000-ec03-42a3-8b9e-3a28237f415e> Accessed 12/12/2016.

<sup>8</sup> National Institutes of Health. US National Library of Medicine. DailyMed. Hydromorphone. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=78353952-324c-4a8d-818c-6537fca21d4e> Accessed 12/12/2016.

Novolog and Lantus, respectively.<sup>9,10</sup> Levothyroxine is replacement thyroid hormone typically used to treat hypothyroidism; it is commonly marketed with the name Synthroid.<sup>11</sup> Lidocaine is a local anesthetic available in patch format to treat localized pain.<sup>12</sup> Prazosin is a blood pressure medication commonly marketed with the name Minipress.<sup>13</sup> Zolpidem is a short acting sleep aid commonly marketed with the name Ambien. It carries a warning about sedation and changes in judgment or behavior.<sup>14</sup>

Finally, in a visit from September 1, 2015, the pilot was described as having a T12 spinal cord injury, “in a wheelchair but able to transfer.”

### **Pilot (Right Seat)**

#### FAA Medical Case Review

According to the FAA files, the 67 year old male pilot held a pilot rating for single engine, land flight and reported 1,000 hours of flight experience as of his last aviation medical exam, dated 05/28/2015. At that time, he was 67 inches tall and weighed 255 pounds. He had previously reported high blood pressure to the FAA and reported using atenolol and naproxen as medications. He was issued a third class medical certificate limited by a requirement to wear corrective lenses.

#### Autopsy

According to the autopsy performed by Rocky Mountain Forensic Services, PLLC, the cause of death was multiple injuries and the manner of death was accident.

Examination of the body for natural disease was limited by the severity of the pilot’s injuries; no organs were available for evaluation. The remains were limited to bone fragments, skin, and muscle.

---

<sup>9</sup> National Institutes of Health. US National Library of Medicine. DailyMed. Novolog (insulin aspart). <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=cd88e313-6193-4413-beff-7d955580060d> Accessed 12/12/2016.

<sup>10</sup> National Institutes of Health. US National Library of Medicine. DailyMed. Lantus. Glargine Insulin. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ae27bb66-5dbe-4f01-a89e-f4fa7cb09c99> Accessed 12/12/2016.

<sup>11</sup> National Institutes of Health. US National Library of Medicine. DailyMed. Levothyroxine. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=99aebc74-0e34-4ab3-bb59-d9fb2b9a4444> Accessed 12/12/2016.

<sup>12</sup> National Institutes of Health. US National Library of Medicine. DailyMed. Lidocaine and menthol patch. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=3fe1a160-6508-62ea-e054-00144ff8d46c> Accessed 12/12/2016.

<sup>13</sup> National Institutes of Health. US National Library of Medicine. DailyMed. Prazosin. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=cd52f022-ca29-4f87-8684-da63e05b3c1f> Accessed 12/12/2016.

<sup>14</sup> National Institutes of Health. US National Library of Medicine. DailyMed. Zolpidem. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=313ccc9f-7b3e-4e42-b5d8-0e27c3c72d8e> Accessed 12/12/2016.

### Toxicology

Toxicology testing performed on the only available specimen, muscle, by the FAA's Bioaeronautical Research Laboratory identified ethanol at 0.043 gm/dl, as well as atenolol, diphenhydramine, and D-methamphetamine were identified in muscle.

Atenolol is a medication used to treat high blood pressure and prevent recurrent heart attacks. It is commonly marketed with the name Tenorman.<sup>15</sup>

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).<sup>16</sup> 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 driving simulator study, a single dose of diphenhydramine impaired driving ability more than a blood alcohol concentration of 0.100%.<sup>17</sup>

Methamphetamine is a Schedule II controlled substance and is available in low doses by prescription to treat ADHD, ADD, obesity, and narcolepsy. It is also commonly available as a street drug. The molecule can form turning right (D-isomer) or turning left (L-isomer). Methamphetamine produced for street use typically contains both isomers while the D-isomer alone is available by prescription, commonly with the name Dexedrine.<sup>18</sup> Even in prescription form, methamphetamine can cause a host of physiological and psychoactive effects.

---

<sup>15</sup> National Institutes of Health. US National Library of Medicine. DailyMed. Atenolol. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f36d4ed3-dcbb-4465-9fa6-1da811f555e6> Accessed 12/12/2016.

<sup>16</sup> 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.

<sup>17</sup> 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.

<sup>18</sup> National highway Traffic Safety Administration. Drugs and Human Performance Fact Sheets. Methamphetamine. <http://www.nhtsa.gov/people/injury/research/job185drugs/methamphetamine.htm> Accessed 12/5/2016.

#### **D. SUMMARY OF MEDICAL FINDINGS**

The 71 year old male pilot/airplane owner had not reported any chronic medical conditions or medications to the FAA but had reported a military disability from a gunshot wound. His personal records revealed multiple medical problems including: spinal stenosis, hypothyroidism, depressive disorder, posttraumatic stress disorder, panic disorder, gastroesophageal reflux disease, esophageal stricture, chronic neck pain, paraplegia, peptic ulcer disease, type 2 diabetes, and emphysema. At the time of the accident, he had been prescribed: albuterol, formoterol, citalopram, hydromorphone (4mg tab every 4 active hours), aspart insulin (short acting insulin), glargine insulin (long acting insulin), levothyroxine, lidocaine patch, prazosin, and zolpidem. The autopsy was significantly limited by the degree of damage to the body. Only muscle tissue was available for toxicology testing, which identified ethanol at 0.015 gm/dl, as well as citalopram and its metabolite N-desmethylocitalopram in muscle.

The 67 year old male pilot in the right seat had reported high blood pressure and use of atenolol and naproxen to the FAA. The autopsy was significantly limited by the degree of damage to the body. Only muscle tissue was available for toxicology testing, which identified ethanol at 0.043 gm/dl, as well as atenolol, diphenhydramine, and D-methamphetamine were identified in muscle.