



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

February 11, 2021

Michelle Watters, MD, PhD, MPH
Medical Officer

A. ACCIDENT: ERA19FA266; Marathon, Florida

On September 8, 2019, at 0630 eastern daylight time, a Cessna 210A, N9436X, was destroyed when it impacted the Gulf of Mexico after takeoff from The Florida Keys Marathon International Airport (MTH), Marathon, Florida. The commercial pilot and passenger were fatally injured. The personal flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91. Night visual meteorological conditions prevailed for the flight that departed MTH at 0629. An instrument flight rules flight plan was filed for the planned flight to Savannah/Hilton Head International Airport (SAV), Savannah, Georgia.

B. GROUP IDENTIFICATION

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

C. RELEVANT MEDICAL STANDARDS AND FAA GUIDANCE

Title 14 Code of Federal Regulations (CFR) Part 67 addresses airman medical standards and certification.¹ According to Subpart D, section 303 (14 CFR 67.303), a pilot issued a third class medical certificate must demonstrate distant vision correctable to 20/40 in each eye and must also not have any acute or chronic pathological condition of either eye that interferes with the proper function of an eye.

As per 14 CFR 67.401,

(a) At the discretion of the Federal Air Surgeon, an Authorization for Special Issuance of a Medical Certificate (Authorization), valid for a specified period, may be granted to a person who does not meet the provisions of subparts B, C, or D of this part if the person shows to the satisfaction of the Federal Air Surgeon that the duties authorized by the class of medical certificate applied for can be performed without endangering public safety during the period in which the Authorization would be in force. The Federal Air Surgeon may authorize a special medical flight test, practical test, or medical evaluation for this purpose. A medical certificate of the appropriate class may be issued to a person who does not meet the provisions of subparts B, C, or D of this part if that person possesses a valid Authorization and is otherwise eligible. An

¹ Electronic Code of Federal Regulations. Current as of 12/4/20. Title 14 Aeronautics and Space, Part 67 Medical Standards and Certification. <https://www.ecfr.gov/cgi-bin/text-idx?node=pt14.2.67>

airman medical certificate issued in accordance with this section shall expire no later than the end of the validity period or upon the withdrawal of the Authorization upon which it is based. At the end of its specified validity period, for grant of a new Authorization, the person must again show to the satisfaction of the Federal Air Surgeon that the duties authorized by the class of medical certificate applied for can be performed without endangering public safety during the period in which the Authorization would be in force.

(b) At the discretion of the Federal Air Surgeon, a Statement of Demonstrated Ability (SODA) may be granted, instead of an Authorization, to a person whose disqualifying condition is static or nonprogressive and who has been found capable of performing airman duties without endangering public safety. A SODA does not expire and authorizes a designated aviation medical examiner to issue a medical certificate of a specified class if the examiner finds that the condition described on its face has not adversely changed.

(f) An Authorization or SODA granted under the provisions of this section to a person who does not meet the applicable provisions of subparts B, C, or D of this part may be withdrawn, at the discretion of the Federal Air Surgeon, at any time if—

(1) There is adverse change in the holder's medical condition;

(4) The holder fails to provide medical information reasonably needed by the Federal Air Surgeon for certification under this section.

(g) A person who has been granted an Authorization or SODA under this section based on a special medical flight or practical test need not take the test again during later physical examinations unless the Federal Air Surgeon determines or has reason to believe that the physical deficiency has or may have degraded to a degree to require another special medical flight test or practical test.

According to the Federal Aviation Administration (FAA) Flight Standards Information Management System (FSIMS),² a special medical flight test may only occur after FAA medical personnel issue a letter of authorization for the test. The aviation safety inspector (ASI) must observe and evaluate the entire list of medical flight test items as described in the letter of authorization; the ASI may add test items if necessary. When conducting a special medical flight test for applicants with a visual defect (one eye missing or one eye blind) the ASI must observe the applicant demonstrating the following in an aircraft:

- The ability to select emergency landing fields at a distance, from high altitude, and preferably over unfamiliar terrain.
- The ability to simulate forced landings in difficult fields; note the manner of approach, rate of descent, and comparative distance at which obstructions (stumps, boulders, ditches, etc.) are recognized.

² FSIMS, created by Order 8900.1 and effective 9/13/07, is a repository of all flight standards policy and guidance concerning aviation safety inspector job tasks. Volume 5 Airman Certification, Chapter 8 Conduct a Special Medical Test—Title 14 CFR Part 67 (updated 12/14/18) is available at: https://fsims.faa.gov/wdocs/8900.1/v05%20airman%20cert/chapter%2008/05_008_001rev1.htm

- The ability to recognize other aircraft (which may be present by prearrangement) approaching at a collision course (particularly aircraft approaching from the far right or far left).
- The ability to judge distances and to recognize landmarks (compared with the ASI's estimate).
- The ability to land the aircraft.
- The ability to read aeronautical charts in flight and tune the radio to a predetermined station accurately and rapidly.
- The ability to read instrument panels (including an overhead panel, if any) quickly and correctly.

Once the medical flight test is completed, the ASI reports the results to FAA medical personnel for them to determine if the applicant is eligible for a medical certificate or SODA.

According to the FAA Guide for Aviation Medical Examiners,³ as part of the FAA medical certification examination, the aviation medical examiner (AME) notes on the application form (FAA Form 8500-8) whether the applicant has ever been issued a SODA (item 23) and records the nature and degree of the defect. In administering the physical exam, the AME is instructed to not issue a medical certificate if the condition has become worse.

The FAA medical certification examination includes physical examination of the eyes (item 31), ophthalmoscopy (item 32), pupils (item 33), ocular motility (item 34), distant vision (item 50), near and intermediate vision (item 51), color vision (item 52), field of vision (item 53), and heterophoria (item 54).

The ophthalmoscopic exam includes evaluating the cornea, pupils, vitreous fluid, lens, optic nerve, and retina. Ophthalmoscopic decision considerations requires submission of pertinent medical information and a current status report. Glaucoma is a condition where an AME can issue a medical certificate without a special issuance authorization if the airman meets all certification criteria from the glaucoma worksheet.⁴ If all the glaucoma worksheet criteria are not met, the AME will need to refer the case to the FAA for a decision. Macular degeneration and vascular occlusion in the eye also require an FAA decision.

The AME guide provides the examination techniques for evaluating the field of vision. Decision considerations for field of vision include ophthalmological consultation and evaluation for glaucoma if suspected. The AME guide states that "if considerable disturbance in night vision is documented, the FAA may limit the medical certificate: NOT VALID FOR NIGHT FLYING."

³ FAA Guide for Aviation Medical Examiners. Current revision date 11/25/20.

https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/

⁴ Glaucoma is a group of diseases where the optic nerve is damaged, usually by rising fluid pressure in the eye. At first there are usually no symptoms, but later people may lose their side vision and without treatment may become blind. There is no cure, but treatment with prescription eyedrops or surgery can help prevent vision loss. [National Institutes of Health. U.S. National Library of Medicine. MedlinePlus. Glaucoma. <https://medlineplus.gov/glaucoma.html> Page last updated 11/23/20.]

D. DETAILS OF INVESTIGATION

Purpose

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

Methods

The pilot's FAA medical certification file, the FAA medical case review, autopsy report, and FAA Forensic Sciences laboratory toxicology⁵ report were reviewed. Other pertinent scientific issues were reviewed.

FAA Medical Certification Files and Medical Case Review

According to the FAA medical certification files and the FAA medical case review, the 61-year-old male pilot held a third class medical certificate with the limitation that he must wear corrective lenses. His most recent FAA medical certification exam was on 2/10/18 and at that time he reported he had accrued 1,500 total flight hours. He was 75 inches tall and weighed 215 pounds. He reported taking no medications and having no medical conditions.

At the pilot's most recent exam on 2/10/18, the aviation medical examiner determined that the pilot had an abnormal field of vision and that the corrected vision in his right eye was 20/100. He was deferred to FAA to provide reports from his ophthalmologist. An ophthalmology report from 4/18/18 reported he had a central visual field defect in his right eye from chronic macular edema and glaucoma and an inferior visual field defect in his left eye from glaucoma. Based on information provided from his ophthalmologist, FAA granted a special issuance for the pilot's glaucoma that needed annual renewal. His ophthalmologist reported in a letter to FAA dated 2/23/19 that the pilot had chronic macular edema in his right eye because of a retinal vein obstruction and that he had normal tension glaucoma in both eyes. The FAA granted a special issuance for the glaucoma that would expire on 2/28/20. The pilot was also required to take a medical flight test; he was issued a SODA for his right central visual field defect on 9/25/18.

The FAA medical certification file dated back to 1978. The pilot was granted a SODA on 5/6/85 for an uncorrected distant vision of 20/200 bilaterally that was corrected to 20/20. At his 2/6/03 examination he reported having had bilateral cataract surgery the previous year; his bilateral uncorrected distant vision was 20/20. Over time, his uncorrected vision changed; at his second most recent examination on 9/2/16, both eyes had an uncorrected vision of 20/50, but could be corrected to 20/20.

Autopsy

According to the Florida Medical Examiner's Office District 16 (Monroe County), Marathon, Florida autopsy report, the cause of death was multiple blunt force injuries and the manner of death was accident. The exam was limited by injuries; however, the medical examiner reported that the pilot had a mildly enlarged heart (480 grams). No other significant natural disease was identified.

⁵ See <https://jag.camii.jccbi.gov/toxicology/> for a complete list of tested-for substances.

Toxicology

FAA laboratory testing was positive for ethanol at 0.059 grams per hectogram (gm/hg) in the pilot's muscle tissue but no ethanol was detected in his brain tissue.⁶ Acetone was also detected in the pilot's muscle but not his brain tissue. No other tested-for drugs were detected in liver tissue. Toxicology performed by the medical examiner's office detected ethanol at 0.028 grams per deciliter in the pilot's urine; testing was negative for ethanol in aortic blood and negative for other tested-for drugs in blood and urine.

Ethanol is a social drug commonly consumed by drinking beer, wine, or liquor. It acts as a central nervous system depressant; it impairs judgment, psychomotor functioning, and vigilance. Ethanol is water soluble, and after absorption it quickly and uniformly distributes throughout the body's tissues and fluids. The distribution pattern parallels water content and blood supply of the tissue. Ethanol can be produced after death by microbial activity, often in conjunction with other alcohols.⁷

E. SUMMARY OF MEDICAL FINDINGS

At the time of the accident, the 61-year-old male commercial pilot held a third class medical certificate with a limitation that he must wear corrective lenses. He held a special issuance for glaucoma that expired on 2/28/20 and was granted a statement of demonstrated ability (SODA) for his right central visual field defect on 9/25/18. His ophthalmologist reported that the pilot had chronic macular edema in his right eye because of a retinal vein obstruction and that the pilot had normal tension glaucoma in both eyes. At his most recent medical certification exam (2/10/18), the pilot reported taking no medications and having no medical conditions.

According to the autopsy report, the cause of death in the pilot was multiple blunt force injuries and the manner of death was accident. Other than a mildly enlarged heart, no significant natural disease was identified. Postmortem toxicology testing detected ethanol in the pilot's muscle tissue (0.059 grams per hectogram) and urine (0.028 grams per deciliter), but not in aortic blood or brain tissue. Acetone was also detected in the pilot's muscle tissue. No other tested-for drugs were detected in blood, liver tissue, and urine.

⁶ Grams per hectogram in tissue samples are directly comparable to grams per deciliter in liquid samples.

⁷ Kugelberg, FC and AW Jones. 2007. Interpreting results of ethanol analysis in postmortem specimens: a review of the literature. *Forensic Science International* 165(1):10-29.