

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR22FA312

MEDICAL

Specialist's Factual Report

May 26, 2023

A. ACCIDENT

Location: Scio, Oregon
Date: August 21, 2022
Time: 14:03 Local
Airplane: Vans RV-8; N184DJ

B. MEDICAL SPECIALIST

Specialist Michelle Watters, MD, PhD, MPH
National Transportation Safety Board, RE-1
Washington, DC

C. DETAILS OF THE 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 Federal Aviation Administration (FAA) medical case review and the pilot's autopsy and FAA Forensic Sciences Laboratory toxicology reports¹ were reviewed. Other relevant medical and regulatory issues were reviewed.

D. FACTUAL INFORMATION–PILOT

1.0 FAA Medical Case Review

According to the FAA medical case review, the 78-year-old male pilot had an expired FAA third class medical certificate with the limitation that he must have available glasses for near vision. His most recent FAA medical certification examination was on 4/24/17. At that time, he reported 3,525 total flight hours and was 73 inches tall and weighed 190 pounds. He reported taking no medications or having any medical conditions.

2.0 Autopsy

According to the autopsy report from the Oregon State Medical Examiner, Clackamas, Oregon, the pilot's cause of death was multiple blunt force injuries, and

¹ The FAA Forensic Sciences Laboratory has the capability to test for more than 1,000 substances including toxins, common prescription and over-the-counter medications, and illicit drugs. <https://jag.cami.jccbi.gov/toxicology/>

the manner of death was accident. No significant natural disease was identified by the medical examiner.

3.0 Toxicology

Toxicology testing performed by the medical examiner's office screened positive for cannabinoids in the pilot's pericardial blood. Toxicology testing performed by the FAA Forensic Sciences Laboratory detected the inactive metabolite of delta-9-tetrahydrocannabinol (THC), carboxy-delta-9-tetrahydrocannabinol (THC-COOH), in the pilot's heart blood at 14.9 nanograms per milliliter (ng/mL) and in his lung tissue. The sedating antihistamine diphenhydramine was also detected in the pilot's liver tissue, but not in his heart blood.

Cannabis

The marijuana plant (*Cannabis species*) contains chemicals called cannabinoids; delta-9-tetrahydrocannabinol (THC) is the primary psychoactive cannabinoid compound. THC's mood-altering effects include euphoria and relaxation. In addition, marijuana causes alterations in motor behavior, time and space perception, and cognition. Significant performance impairments are usually observed for at least 1-2 hours following marijuana use, and residual effects have been reported up to 24 hours.²

THC is rapidly metabolized, but the rate of metabolism is not linear and depends on the means of ingestion (smoking, oil, and edibles), potency of the product, frequency of use, and user characteristics. Concentrations of THC peak at the end of smoking and often below 5 ng/mL at three hours. The primary metabolite of THC, 11-OH-THC, is equally psychoactive, but is rapidly metabolized to the non-psychoactive metabolite THC-COOH. THC is fat soluble, so is stored in fatty tissues and can be released back into the blood long after consumption. So, while the psychoactive effects may last a few hours, THC can be detected in the body for days or weeks. Very little THC is excreted in urine. Instead, THC-COOH can be found in urine days to weeks after the last use of the drug. Thus, both blood and urine test results do not necessarily reflect recent use and cannot be used to prove that the user was experiencing effects of the drug at the time of testing.³

Diphenhydramine is a sedating antihistamine (commonly marketed as Benadryl) and is available over the counter in many products used to treat colds,

² National Highway Traffic Safety Administration. April 2014 (revised). Drugs and Human Performance Fact Sheets. Cannabis/Marijuana.

<https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/809725-drugshumanperformfs.pdf>

³ Compton, R. July 2017. Marijuana-Impaired Driving - A Report to Congress. (DOT HS 812 440). Washington, DC: National Highway Traffic Safety Administration.

<https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/812440-marijuana-impaired-driving-report-to-congress.pdf>

allergies, and insomnia. Diphenhydramine carries the warning that use of the medication may impair mental and physical ability to perform potentially hazardous tasks. It has a half-life of 3 to 14 hours.⁴ FAA provides guidance on wait times before flying after using this medication; post-dose observation time is 60 hours.^{5,6}

E. SUMMARY OF MEDICAL FACTS

The 78-year-old male pilot had an expired FAA third class medical certificate with the limitation that he must have available glasses for near vision. At his most recent FAA medical certification examination on 4/24/17, he reported taking no medications or having any medical conditions. According to the autopsy report, the pilot's cause of death was multiple blunt force injuries, and the manner of death was accident. No significant natural disease was identified. Toxicology testing detected carboxy-delta-9-tetrahydrocannabinol (THC-COOH), in the pilot's heart blood at 14.9 nanograms per milliliter (ng/mL) and in lung tissue. Diphenhydramine was also detected in the pilot's liver tissue.

Submitted by:

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Medical Officer, RE-1

⁴ FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs.

Diphenhydramine. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=50>.

⁵ FAA. 11/13/19. OK-20-0302 [Over the Counter Medications \(faa.gov\)](https://www.faa.gov/over-the-counter-medications)

⁶ FAA. Updated 10/26/22. [AllergyAntihistamineImmunotherapyMedication.pdf \(faa.gov\)](https://www.faa.gov/allergy-antihistamine-immunotherapy-medication)