

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN22LA335

MEDICAL

Specialist's Factual Report

February 16, 2023

A. ACCIDENT

Location: Parkin, Arkansas
Date: July 23, 2022
Time: 09:12 Local
Airplane: Ayres Corporation S2R-T34; N4046S

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 23-year-old male pilot held a second-class medical certificate with the limitation that he must wear corrective lenses. At his most recent FAA medical certification examination on 1/21/22, he reported 530 flying hours and was 77 inches tall and weighed 215 pounds. He reported taking no medications or having any medical conditions.

2.0 Autopsy

According to the autopsy report from the Arkansas State Crime Laboratory, Little Rock, Arkansas, the pilot's cause of death was multiple injuries, and the manner

¹ The FAA Forensic Sciences Laboratory has the capability to test for more than 1,300 substances including toxins, common prescription and over-the-counter medications, and illicit drugs.
<https://jag.cami.jccbi.gov/toxicology/>

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

3.0 Toxicology

Toxicology testing performed by the Arkansas State Crime Laboratory was positive for cannabinoids in the pilot's heart blood. Toxicology testing performed by the FAA Forensic Sciences Laboratory detected the primary major psychoactive compound of cannabis, delta-9-tetrahydrocannabinol (delta-9-THC), in the pilot's heart blood at 1.7 nanograms per milliliter (ng/mL) and in his urine at 1.4 ng/mL. Delta-9-THC's psychoactive metabolite, 11-hydroxy-delta-9-THC (11-OH-delta-9-THC), was detected in his urine at 16.4 ng/mL, but not in his heart blood. Delta-9-THC's inactive metabolite, carboxy-delta-9-tetrahydrocannabinol (delta-9-THC-COOH), was detected in his heart blood at 7.4 ng/mL and in his urine at 40 ng/mL. The psychoactive cannabinoid compound delta-8-tetrahydrocannabinol (delta-8-THC) was detected in the pilot's heart blood at 3.3 ng/mL and in his urine at 0.8 ng/mL. Delta-8-THC's inactive metabolite, carboxy-delta-8-tetrahydrocannabinol (delta-8-THC-COOH), was detected in his heart blood at 15.3 ng/mL and in his urine at 120.7 ng/mL.

Cannabis

The marijuana plant (*Cannabis species*) contains chemicals called cannabinoids; delta-9-tetrahydrocannabinol (delta-9-THC) is the primary psychoactive cannabinoid compound. Delta-8-THC is also psychoactive but less potent than delta-9-THC and is naturally found in the cannabis plant but at low concentrations. Cannabis products containing concentrated amounts of delta-8-THC are typically manufactured from hemp-derived cannabidiol (CBD).²

THC's mood-altering effects include euphoria and relaxation. In addition, THC 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.³

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. The primary metabolite of delta-9-THC, 11-hydroxy-delta-9-THC, is equally psychoactive, but is rapidly metabolized to the non-psychoactive metabolite delta-9-THC-COOH. Similarly, delta-8-THC is metabolized to the psychoactive 11-hydroxy-delta-8-THC and then to the inactive

² Food and Drug Administration (FDA) [5 Things to Know about Delta-8 Tetrahydrocannabinol - Delta-8 THC | FDA](#) Current as of 5/4/22.

³ 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>

delta-8-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.^{4,5}

E. SUMMARY OF MEDICAL FACTS

The 23-year-old male pilot held a FAA second-class medical certificate with the limitation that he must wear corrective lenses. At his most recent FAA medical certification examination on 1/21/22, he reported taking no medications or having any medical conditions. According to the autopsy report, the pilot's cause of death was multiple injuries, and the manner of death was accident. No significant natural disease was identified.

Toxicology testing detected delta-9-tetrahydrocannabinol (delta-9-THC) in the pilot's heart blood at 1.7 nanograms per milliliter (ng/mL) and in his urine at 1.4 ng/mL. 11-hydroxy-delta-9-THC (11-OH-delta-9-THC) was detected in his urine at 16.4 ng/mL, but not in his heart blood. Carboxy-delta-9-tetrahydrocannabinol (delta-9-THC-COOH) was detected in his heart blood at 7.4 ng/mL and in his urine at 40 ng/mL. Delta-8-tetrahydrocannabinol (delta-8-THC) was detected in the pilot's heart blood at 3.3 ng/mL and in his urine at 0.8 ng/mL. Carboxy-delta-8-tetrahydrocannabinol (delta-8-THC-COOH) was detected in his heart blood at 15.3 ng/mL and in his urine at 120.7 ng/mL.

Submitted by:

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Medical Officer, RE-1

⁴ 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>

⁵ Tegen, M and LE Klumpers. 2022. Review of delta-8-tetrahydrocannabinol (Δ^8 -THC): Comparative pharmacology with Δ^9 -THC. *British Journal of Pharmacology* 179:3915-3933.