

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



Medical Factual Memorandum for Record

May 29, 2025

A. CASE

NTSB ID: WPR23LA241
Location: Marana, Arizona
Date: June 23, 2023

B. MEDICAL SPECIALIST

Specialist Turan Kayagil, MD, FACEP
National Transportation Safety Board
Washington, DC

C. DETAILS

1.0 Description of Review

For purposes of evaluating the pilot for potentially impairing substances and potentially impairing medical conditions, the above Medical Specialist reviewed the following sources of medical information, along with selected relevant regulation, medical literature, and investigator reports.

- Federal Aviation Administration (FAA) medical certification file (as of April 8, 2025)
- Pinal County Sheriff's Office Incident Report
- Arizona Department of Public Safety (AZDPS) toxicology report

2.0 Summary of Medical Facts

The 31-year-old male pilot's only aviation medical examination before the crash was September 22, 2020. At that time, he reported no medication use and no active medical conditions. He reported a history of a minor medical event in 2018 and

a non-drug-related driving offense as a teenager. Based on this history, the aviation medical examiner deferred the medical certification determination to the FAA. After reviewing medical records submitted by the pilot, the FAA granted him a Letter of Eligibility and issued him a third-class medical certificate without limitation in November 2020, on the basis of the September 2020 examination.

According to the Sheriff's Office Incident Report, following the crash, the pilot was treated for minor injuries by paramedics on scene and was not transported to a hospital. A sealed package that appeared to contain tetrahydrocannabinol (THC) edibles was located in the pilot's belongings; the pilot stated the package belonged to him (Sheriff's Office personnel informed the pilot that the package was legal to possess in Arizona). The pilot told Sheriff's Office personnel that he had not used alcohol for several years and had not used prescription or illegal drugs. He stated he had last used cannabis products over a week earlier. The National Transportation Safety Board duty officer requested Sheriff's Office personnel follow usual procedures to evaluate the pilot for impairment. Standardized field sobriety testing was conducted; associated Sheriff's Office Incident Report documentation did not document a determination about impairment.¹ The pilot consented to a voluntary blood draw for toxicological testing; this blood draw was done on-scene.

At the request of the Pinal County Sheriff's Office, the AZDPS Southern Regional Crime Laboratory performed toxicological testing of the pilot's blood. This testing detected carboxy-THC, benzoylecgonine, amphetamine, and methylenedioxymethamphetamine (MDMA).²

Carboxy-THC is a non-psychoactive metabolite of THC (which was not detected in this case). THC is the primary psychoactive chemical in cannabis, including marijuana, hashish, and cannabis edibles.³ THC may be inhaled or ingested recreationally by users seeking mind-altering effects. It may also be used medicinally, such as to treat illness-associated nausea and appetite loss. Psychoactive effects of THC vary depending on the user, dose, and route of administration, and may impair motor coordination, reaction time, decision making, problem solving, and vigilance. Carboxy-THC may be detected in blood for a prolonged time (days or weeks) after last cannabis use - well beyond the typical duration of acute psychoactive cannabis

¹ The case status was noted to be pending toxicology results. No clues were observed on horizontal gaze nystagmus or walk and turn tests. During the one-leg stand, the pilot had 2-4 inches of side-to-side swaying, corresponding to one clue; two clues typically is used as the positive threshold on this test (validated for alcohol intoxication).

² AZDPS testing comprised a non-quantitative "hybrid all ions analysis" and a cannabinoid assay. Additional information about this testing, including a [standard list of tested-for substances on the hybrid all ions analysis](#), is available from the [AZDPS Toxicology webpage](#).

³ Specifically, delta-9-THC is the isomer of THC that is the primary psychoactive substance in cannabis. The AZDPS Southern Regional Crime Laboratory reported the result as carboxy-THC without specifying the THC isomer.

effects.⁴ Marijuana is a federal Schedule I controlled substance, and the FAA considers its use by pilots unacceptable, regardless of state laws.^{5,6,7}

Benzoylecgonine is a metabolite of cocaine (which was not detected in this case). The elimination half-life of benzoylecgonine is roughly 6 hours. Cocaine is a stimulant drug that is commonly used illicitly by recreational users. Cocaine users may seek euphoric effects, appetite suppressant effects, and feelings of increased alertness, strength, and decisiveness. Impairing effects that occur early after recreational cocaine use may include dizziness, restlessness, poor impulse control, and increased risk taking. Attention, perception, coordination, decision making, and task execution may be impaired by effects of cocaine and cocaine withdrawal. For multiple reasons (including issues related to cocaine stability in stored blood specimens), the concentration of cocaine in a person's blood does not reliably predict degree of impairment, which can occur even in the absence of detectable cocaine.⁴ Cocaine is a federal Schedule II controlled substance (with limited medical use in healthcare settings as a topical anesthetic and vasoconstrictor in ear, nose, and throat procedures).

Amphetamine is a central nervous system (CNS) stimulant drug. It also is a metabolite of the similar drug methamphetamine (which was not detected in this case). Both methamphetamine and amphetamine are available as federal Schedule II controlled substance prescription medications used to treat attention deficit hyperactivity disorder, narcolepsy, and occasionally obesity. As medicines, the drugs typically carry warnings that they may impair the ability to engage in potentially hazardous activities.^{8,9} The FAA considers methamphetamine and amphetamine to be

⁴ Couper F, Huestis M, Fulford J, et al. Drugs and Human Performance Fact Sheets: 2024. National Highway Traffic Safety Administration. DOT HS 813 650. December 2024 (Revised). <https://rosap.nhtl.bts.gov/view/dot/78924>. Accessed May 28, 2025.

⁵ Federal Aviation Administration. Guide for aviation medical examiners: pharmaceuticals (therapeutic medications) do not issue - do not fly. Federal Aviation Administration website. https://www.faa.gov/ame_guide/pharm/dni_dnf. Updated July 10, 2023. Accessed May 28, 2025.

⁶ Federal Aviation Administration. Aeromedical factors. In: *Pilot's Handbook of Aeronautical Knowledge*. FAA-H-8083-25C. Oklahoma City: United States Department of Transportation, Federal Aviation Administration, Airman Testing Standards Branch, AFS-630; 2023. https://www.faa.gov/sites/faa.gov/files/19_phak_ch17.pdf. Accessed May 28, 2025.

⁷ Federal Aviation Administration. Controlled substances and CBD products. Guide for Aviation Medical Examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/media/Controlled_Substances_and_CBD_Products.pdf. Updated May 25, 2022. Accessed May 28, 2025.

⁸ National Institutes of Health National Library of Medicine. Methamphetamine hydrochloride. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f31f580f-1f08-4a0f-b078-0b9e3308f712>. Updated July 5, 2023. Accessed May 28, 2025.

⁹ National Institutes of Health National Library of Medicine. Amphetamine sulfate. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=79b9db39-7cdc-5607-f0ce-ac2a2cfd59d5>. Updated June 8, 2023. Accessed May 28, 2025.

"Do Not Issue/Do Not Fly" medications.⁵ In addition to being used medicinally, methamphetamine and amphetamine may be produced illicitly and abused recreationally. At low doses used as part of appropriate medical treatment, methamphetamine and amphetamine may improve reaction time, cognitive function, and fatigue, but may cause people to make higher-risk choices. At higher doses, the drugs may have a variety of impairing effects on psychomotor function, cognition, and perception. Impairment related to methamphetamine or amphetamine use can result from drug or withdrawal effects, with features of CNS stimulation or CNS depression. A measured drug level does not indicate whether a person is experiencing early- or late-phase effects. The elimination half-life of amphetamine is roughly 7 to 34 hours.⁴

MDMA, commonly known as ecstasy, is a federal Schedule I controlled substance with no currently approved medical use in the United States. MDMA has psychedelic and CNS stimulant properties and is produced illicitly for recreational use. MDMA use may cause a variety of serious adverse cognitive and psychomotor effects, including increased impulsivity, diminished attention and cognition, and impaired perception and motor function. MDMA blood levels do not reliably predict effects. The elimination half-life of MDMA is roughly 7 hours, although non-linear elimination may occur.⁴

Submitted by:

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