

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



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UNMANNED AIRCRAFT SYSTEM AERIAL IMAGERY

Specialist's Factual Report

June 3, 2022

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A. ACCIDENT

Location: Danville, AR
Date: April 23, 2021
Time: 1701 central daylight time
Airplane: Piper PA-46-310P

B. UNMANNED AIRCRAFT SYSTEM AERIAL IMAGERY PERSONNEL

Investigator in Charge (IIC)	Shaun Williams National Transportation Safety Board (NTSB) Central Region, Denver, CO
Specialist/Remote Pilot in Command (RPIC)	Catherine Gagne NTSB AS-70, Washington, DC (RPIC based in Marietta, GA)

C. SUMMARY

On April 23, 2021, about 1701 central daylight time, a Piper PA-46-310P airplane, N461DK, was destroyed when it was involved in an accident near Danville, Arkansas. The pilot and three passengers sustained fatal injuries. The airplane was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 personal flight.

The airplane was found in an area of densely forested terrain at an elevation of about 930 ft above mean sea level (msl) at latitude 34.9674° N, longitude 93.6222° W. During the on-scene portion of the investigation, it was determined that the right wing, right aileron, right horizontal stabilizer, and right elevator had separated in flight and were not located within the vicinity of the main wreckage. An initial aerial search was unsuccessful in locating these components.

The NTSB subsequently used a small UAS to search for the components but was also unsuccessful in locating them.

D. DETAILS OF UAS USE - EQUIPMENT AND PROCEDURES

UAS flights were conducted on June 1 and 2, 2021, using a DJI Phantom 4 Advanced small UAS, which was equipped an FC6310 camera (with the Sony Exmor 1" CMOS sensor with a focal length of 8.8 mm) and a dual GPS/GLONASS receiver, which provided georeferenced information on all still photographs. Each photograph was captured in jpg format with a resolution of 20 megapixels.

An NTSB Air Traffic Control (ATC) specialist provided information about the accident airplane's flight track data, based on automatic dependent surveillance-broadcast (ADS-B) data broadcast by the accident airplane, and ATC radar data showing primary returns in the vicinity of the accident site.

Based on a review of these data and the location of the accident site, the IIC and RPIC identified desired access areas from which to launch the UAS to search for airplane components. Closest possible access areas included a field about 1.25 miles northwest of the accident site, south of Arkansas State Highway 80 (HWY 80); a clearing off U.S. Forest Service Road 677 (FS 677), about 0.3 mile north of the accident site; and areas along FS 67, about 0.5 mile south of the accident site (see figure 1).

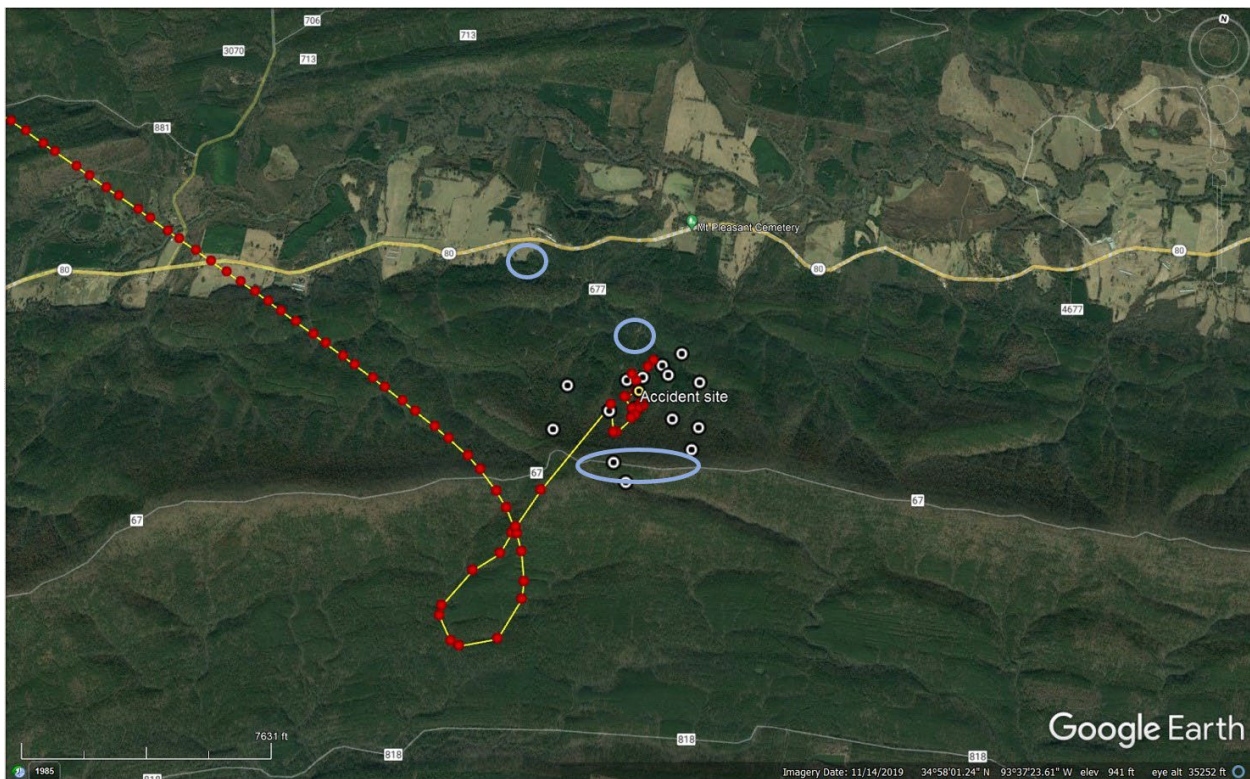


Figure 1. Relative locations of accident site (yellow dot), accident airplane's flight track based on ADS-B data (red dots), ATC primary radar returns (white dots), and potential UAS launch areas (blue circles).

The RPIC and IIC (as UAS visual observer) conducted numerous UAS launches to search for wreckage from these three locations. All flights were operated within Class G airspace under the provisions of 14 CFR Part 107. However, launches from FS 67 were conducted much farther west than desired due to the impassability of FS 67 by vehicle and a subsequent encounter with wildlife (a black bear) while hiking further east along FS 67 toward a closer desired launch area. The area searched from FS 67 was about 3.2 miles southwest of the accident site.

Potential hazards to flight operations were the presence of trees in some launch areas, which limited the areas in which the UAS could be flown due to the need to maintain visual line of sight (VLOS), and tall grass in others, which could interfere with UAS launching and landing. Flight operations mitigations in these areas included: 1) using only manual flight modes when launching from view-limited areas to actively adjust flight path and altitudes as needed to maintain VLOS with the UAS and clearance from trees, 2) using a launch pad (vehicle rubber floor mat) in grassy areas, and 3) using only hand-catch recoveries to avoid the tall grass during landing. Flights performed on June 1, 2021, were limited due to thunderstorms moving into the area.

Search flights on both days were flown primarily manually using the control application Litchi. Litchi was programmed to take photographs at 2 second intervals (due to the density of foliage), and altitudes were varied between 100 ft to 380 ft above ground level (agl), as needed, to maintain VLOS. The field south of HWY 80 allowed for a search flight to be flown in automated mode using the Capture control application for grids. All flights avoided overflight of ground personnel and HWY 80. Total flight time for all flights was about 1 hour 10 minutes.

E. DETAILS OF AERIAL IMAGERY AND PROCESSING

The UAS captured 944 high-resolution, georeferenced photographs suitable for processing in the Pix4D photogrammetry software. Before processing the imagery, the IIC and RPIC reviewed each photograph on a large screen to check for visible tree canopy or ground anomalies that could be used to inform additional UAS or ground searches for airplane components. No such anomalies were identified.

The photographs were processed using Pix4D to create a low-resolution orthomosaic map overlay in Google Earth (in kml format) to show which areas were searched using the UAS (see figure 2).

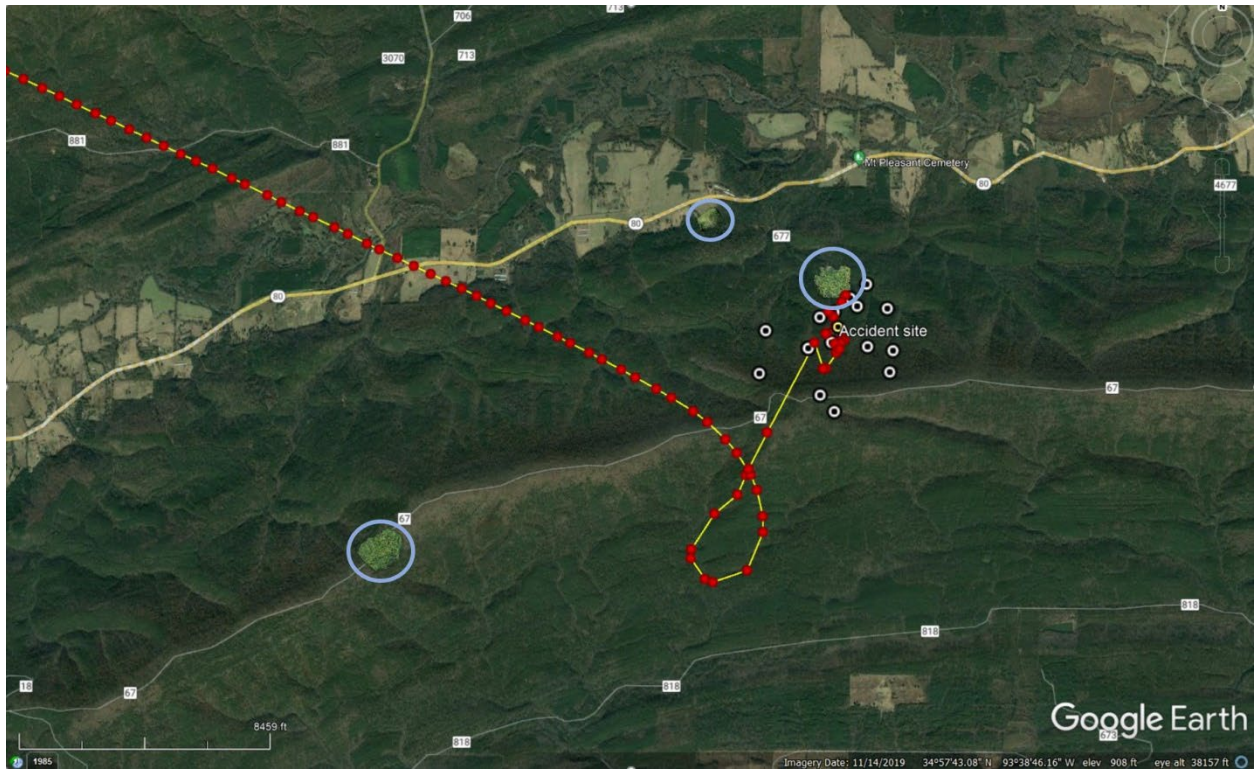


Figure 2. Low-resolution orthomosaic map overlay showing areas covered by the UAS (circled in blue) and the relative location of the accident site (yellow dot), accident airplane's flight track based on ADS-B data (red dots), and ATC primary radar returns (white dots).

Per the photogrammetry software, the total area covered by the UAS imagery was 64.6 acres. Due to the dense canopy of the forested terrain, the possibility of airplane components in the searched areas could not be ruled out.

Submitted by:

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