

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

UAS Aerial Imagery Factual Report

4/26/2019

A. ACCIDENT CEN19FA030

Location: Harmon, ND
Date: November 18, 2018
Time: 1040 Local Time (CST)
Event: Inflight breakup, N441CX, C441

B. PERSONNEL

UAS RPIC: Corporal Josh Selle
Morton County Sheriff's Department
North Dakota

Imagery Processing: Bill English
NTSB UAS Program Lead
Washington DC

C. ACCIDENT SUMMARY

On November 18, 2018, at 2240 central standard time, a Cessna 441, N441CX, was destroyed when it broke up in-flight and impacted an open field near Harmon, North Dakota. The airline transport certificated pilot, flight nurse, and paramedic were fatally injured. The airplane was registered to and operated by Bismarck Air Medical under the provisions of Title 14 Code of Federal Regulations Part 135. Visual meteorological conditions prevailed at the time of the accident, and an instrument flight rules (IFR) flight plan had been filed for the air medical cross-country flight. The flight originated from Bismarck Municipal Airport (BIS), Bismarck, North Dakota, at 2230, and was en route to Sloulin Field International Airport (ISN), Williston, North Dakota.

D. DETAILS OF IMAGERY

1.0 Equipment and Procedures

Equipment

The NTSB UAS team did not gather imagery data for this accident. Mapping and viewpoint flights of the wreckage area were conducted on November 20, 2018 by the Morton County Sheriff's department, using a DJI Phantom 4 Pro small unmanned aircraft

system (sUAS, commonly known as a drone), and a DJI Inspire 1 drone. The Phantom 4 Pro drone was equipped with a dual GPS/GLONASS receiver which provides georeference information on all still photos. The Phantom 4 Pro was equipped with an FC6310 camera using the Sony Exmor 1" CMOS sensor, with a focal length of 8.8 mm. Still photo resolution was 20 megapixels in JPG or RAW format. Videos were taken in MP4 format with 4K resolution at 60 frames per second. The Inspire 1 drone was equipped with the X3 FC350 camera, using the Sony Exmor 1/ 2/3" CMOS sensor. Still photo resolution was 12 megapixels. No ground control points were taken.

Procedures

The accident site was in open snow-covered fields in Class G airspace. The flight was conducted under 14 CFR 107. Weather conditions were difficult, with very low temperatures and winds up to 15 knots. The goal of the UAS imagery was to map the geographical positions of the wreckage pattern. The drone pilot was not experienced in gathering mapping data, and was instructed by the NTSB UAS Program Lead.

The sUAS were flown in overlapping grids at 120 feet above ground level (agl) over the wreckage area capturing still images to create an orthomosaic terrain map. Additional oblique stills were taken of significant pieces of wreckage, and video overviews of the area were captured.

Processing

Geo-referenced still imagery was processed using Pix4D photogrammetry software to produce a 3D point cloud and an orthomosaic map of the wreckage site. Relative accuracy (within the map) was calculated at 0.8 inches, twice the average ground sample distance. Absolute, or geographic, accuracy was dependent on the GPS geotags in the drone photographs, typically within 5-10 feet, which was consistent with the Google Earth overlay.

2.0 Imagery products

Approximately 1375 high resolution photos and videos were gathered. The orthomosaic map in Google Earth format was merged with select photos, radar data, aeronautical chart background, and is included in the accident docket. The docket file consists of a zip file containing the above items, allowing the user to display all the items in Google Earth and use the various measurement and viewing tools. Select photos and excerpts from the orthomosaic map are included below and as listed attachments.

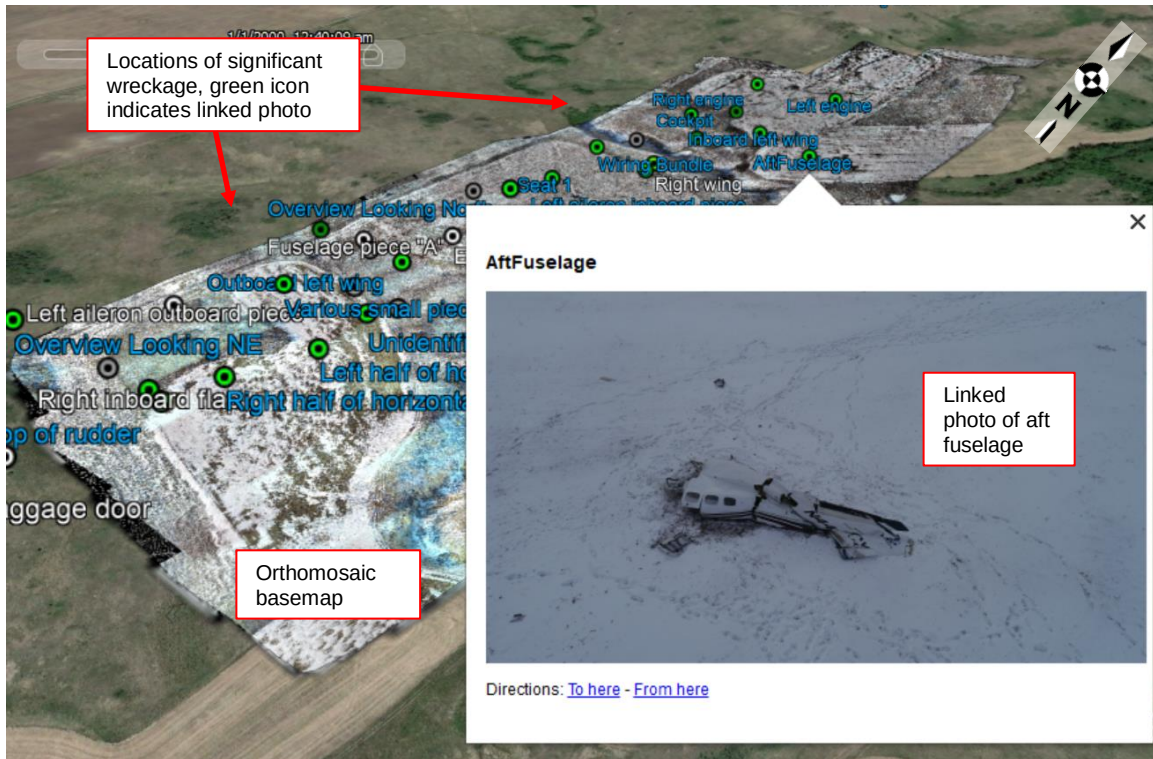


Figure 1 – Overview of Google Earth orthomosaic with sample linked photo

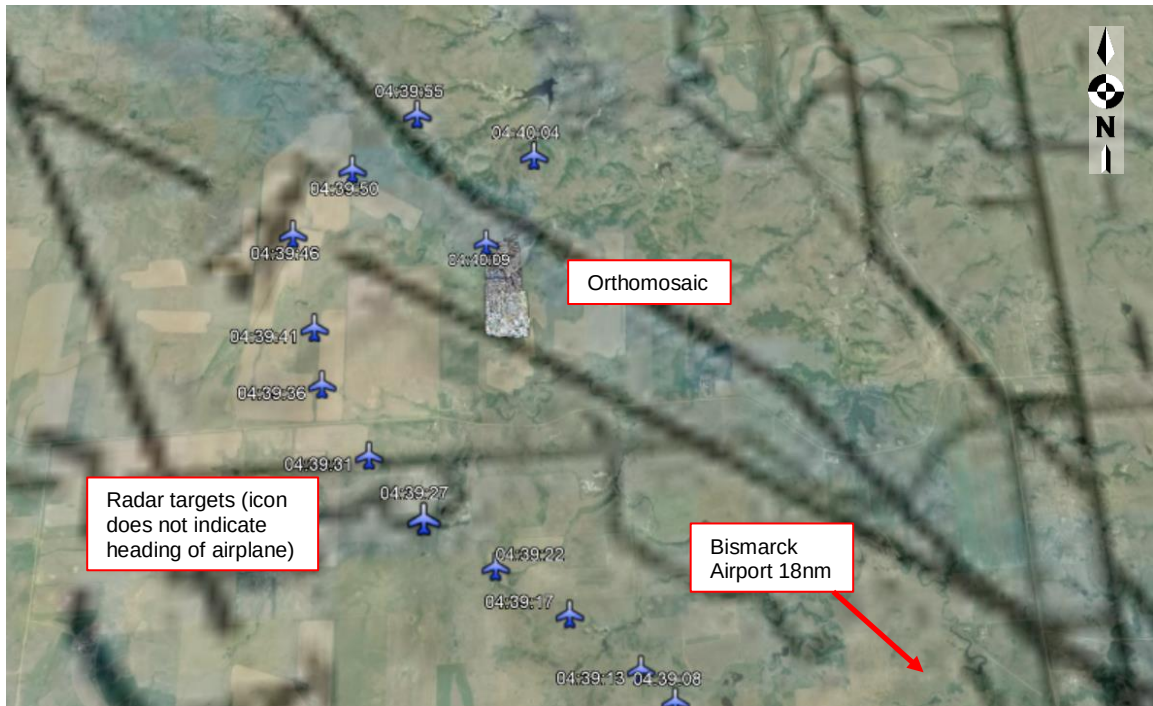


Figure 2 – Orthomosaic with radar and sectional overlay (sectional is semi-transparent)

Inboard left wing

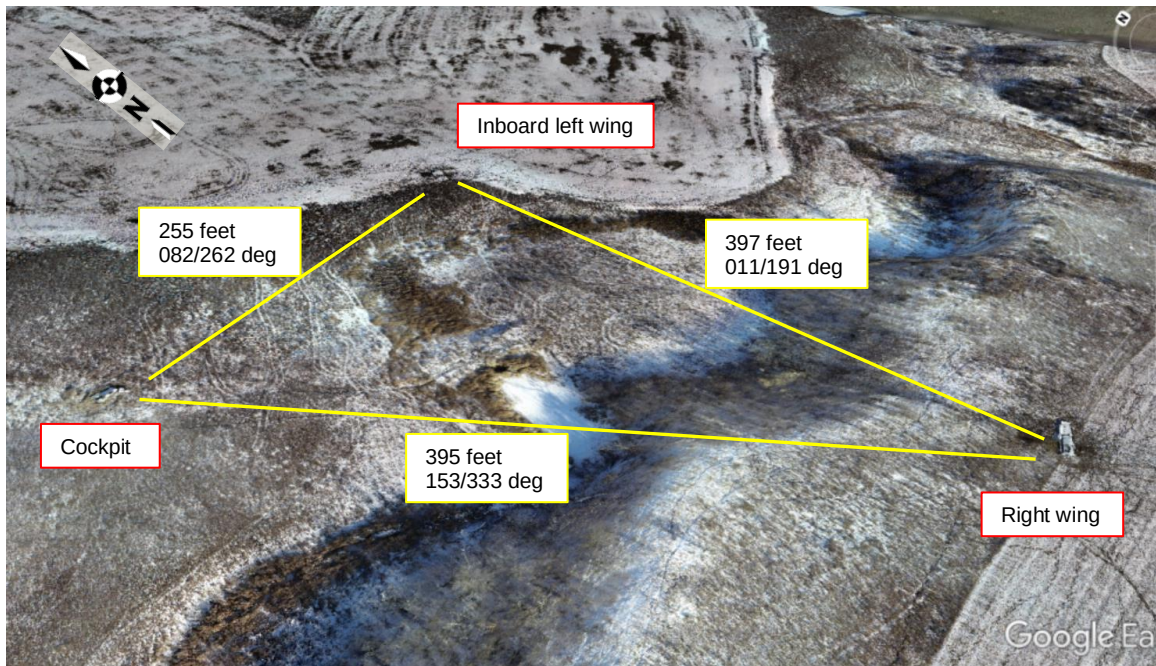


Figure 3 – Oblique view of orthomosaic, looking northeast along gully, with select measurements

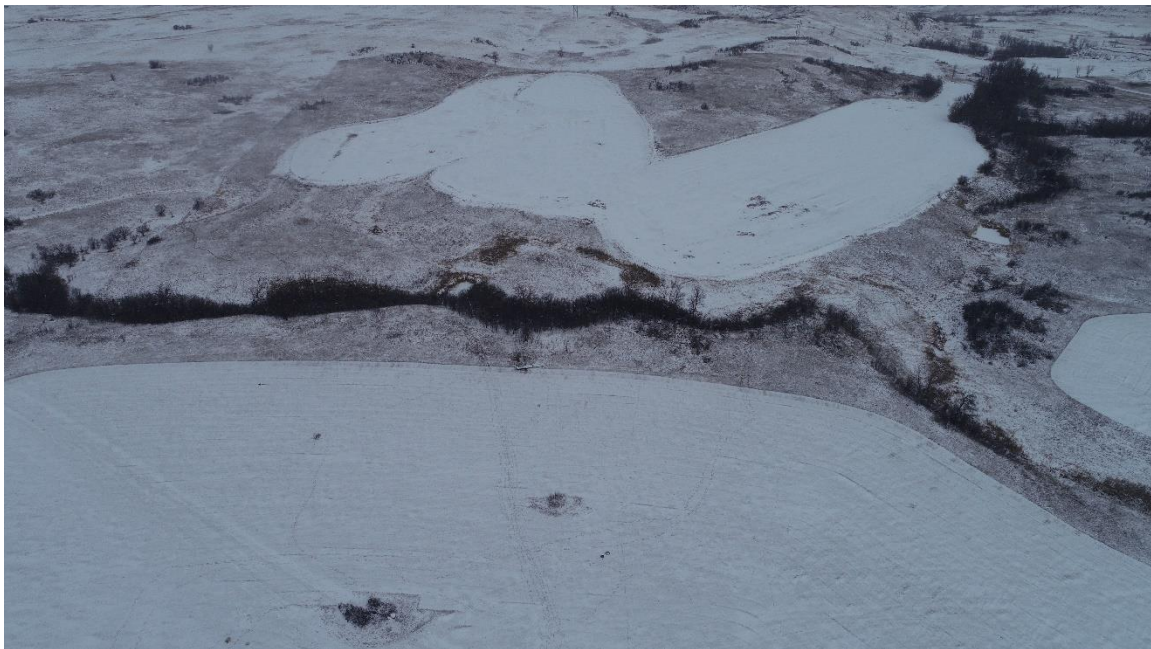


Figure 4 – Aerial overview photo, looking north. Right wing is in center of photo.

Attachment 1 – ZIP file of entire Google Earth product

Attachment 2 – PDF file containing photos used for linked waypoints

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Docket Shelf Item Cover Sheet

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B. ITEM

UAS Aerial Imagery Google Earth map with layered data.

Contact the Records Management Division for copies:

National Transportation Safety Board
Records Management Division
490 L'Enfant Plaza East, SW
Washington, DC 20594
202-314-6551/800-877-6799
pubinq@ntsb.gov

C. INSTRUCTIONS

Ensure Google Earth Pro installed on computer
Download file to a local drive
Extract (unzip) contents, open folder.
Select "clickme.kmz"
File will open in Google Earth
Note layers can be switched on and off in left side pane
Green icons indicate linked photos, click to view photo



























