NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

January 10, 2018

Addendum 1 to Data Logger Factual Report

Specialist's Factual Addendum
By Bill Tuccio, Ph.D.

1. EVENT SUMMARY

Location:	Superior, Arizona
Date:	December 15, 2015
Aircraft:	Eurocopter AS350B3
Registration:	N74317
Operator:	Air Methods Corporation
NTSB Number:	WPR16FA040

2. GROUP

A group was not convened.

3. PURPOSE OF THIS ADDENDUM

This addendum describes the accident flight data contained in the Specialist's Data Logger Factual Report, April 20, 2017. All references to acronyms, engineering units, and figures are those contained in this original report.

4. DESCRIPTION OF PLOTS AND TABULAR DATA

Figures 3 through 5 were created using Google Earth. The weather and lighting conditions are not necessarily representative of the weather and lighting conditions at the time of the recording. Recorded data did not include any measures of GPS accuracy (known as "Dilution of Precision"), which should be considered when interpreting horizontal and vertical altitudes and calculated above ground altitude (AGL).[1] GPS altitude was measured at the location of the GPS antenna, which was reported to be below the seats, but above the skids.

The accident flight recording began at the IWA airport.

At 17:08:15 MST, the yaw rate and normal acceleration fluctuated, coincident with a negligible change in GPS altitude (fluctuating around 1,302 feet) and groundspeed becoming greater than 0; this was consistent with the helicopter leaving the ground.

[1] Langley, R. B. (1999). Dilution of Precision. *GPS World*, pp. 52-59.

By 17:08:20 MST, the groundspeed was accelerating through 5 knots and GPS altitude was 1,307 feet.

By 17:08:35 MST, the groundspeed was accelerating through 14 knots, and GPS altitude began a steady increase through 1,312 feet on a magnetic heading of about 140 degrees.

By 17:09:38 MST, the helicopter had passed the southeast boundary of the runway, travelling at 120 knots groundspeed and climbing through 1,883 feet GPS altitude.

At 17:09:53 MST, the helicopter briefly levelled off and descended slightly to about 1,905 feet GPS altitude.

By 17:10:13 MST, the helicopter began a left turn towards the northeast, a heading of about 70 degrees.

By 17:10:48 MST, the helicopter resumed its climb passing through 1,971 feet GPS altitude.

By 17:13:42 MST, the helicopter exited the lateral limits of the Phoenix Class B airspace, levelling off at about 2,470 feet GPS altitude. About this time, the helicopter turned slightly left to a heading of about 50 degrees. The new heading resulted in a course towards the southern part of Gold Canyon, Arizona.

Between 17:15:03 and 17:15:57 MST, the helicopter performed a 20-degree banked, 360-degree turn over a residential community in the southern part of Gold Canyon, Arizona. During the turn the GPS altitude decreased to a minimum of 2,174 feet (calculated to be about 350 feet AGL).

Between 17:15:57 and 17:19:20 MST, the helicopter climbed to about 3,400 feet GPS altitude, as the underlying terrain rose.

Between about 17:20:00 and 17:21:41 MST, the helicopter performed four right/left rolls, each about 30 degrees in bank, while the GPS altitude increased to about 3,700 feet. During this time, the helicopter was overflying an apparent hiking or other type of wilderness trail. Between 17:21:27 and 17:21:29 MST, the calculated AGL altitude was below 50 feet.[2]

Between 17:20:34 and 17:22:55 MST, the difference between groundspeed and true airspeed was consistent with a 2-3 knot headwind component. From 17:23:15 to 17:23:34

[2] The calculated AGL altitude is based upon a grid model of the underlying terrain compared to the recorded GPS three dimensional position; accordingly, the calculated AGL altitude may not representative of the actual AGL altitude, especially in the varying terrain the helicopter was flying over. Another factor may be the position of GPS antenna. Both these factors may make it appear the aircraft was flying through terrain rather than slightly above such terrain.

MST, the groundspeed and true airspeed were consistent with a 4-8 knot headwind component; towards the end of this period, the difference yielded a 11 knot tailwind.[3]

Between 17:21:41 and 17:23:00 MST, the helicopter climbed to 5,540 feet GPS altitude, as the calculated AGL altitude fluctuated remaining below 500 feet.

Between 17:23:00 and 17:23:30 MST, the helicopter turned right, banking as much as 48 degrees, as the GPS altitude decreased to about 5,030 feet.

Between 17:23:35 and the end of the recording at 17:23:41 MST, the pitch attitude increased to a maximum of 30 degrees, the ground speed decreased towards 0, the vertical (normal) acceleration increased to about 2.8 g, and calculated AGL altitude decreased from about 500 feet to less than 0.

[3] Groundspeed is calculated from changed in latitude/longitude over time. Over short periods and/or turning flight, groundspeed may not be accurate.