

**Docket No. SA-540**

**Exhibit No. 2 I**

**NATIONAL TRANSPORTATION SAFETY BOARD**

**Washington, D.C.**

University of Alaska Simulator Evaluation

(10 Pages)

**Attachment 8**  
To Operational Factors Specialist Factual Report

**ANC17MA001**

**University of Alaska**  
**Simulator Evaluation**

## University of Alaska Simulator Evaluation

**Location:** University of Alaska Anchorage

**Date/Time:** May 18, 2017, 0830 AKDT

**Overall Objectives:**

- Document the capabilities of the simulator used to train Hageland pilots for CFIT avoidance
- Replicate the simulator scenarios used to train Hageland pilots for CFIT avoidance.

**Aircraft/Simulator:** Cessna 208B, Level B Simulator, equipped with a Garmin MX20 Multi-Function Display (MFD)

**Participants:**

Left seat: Marvin Frantz (NTSB, Operational Factors)  
Right seat: Katherine Wilson (NTSB, Human Performance)  
Observer: David Lawrence (NTSB, Operational Factors)  
Observer: Jeff Guzzetti (FAA)  
Observer: Adam Ricciardi (Ravn Alaska)

**Pre-simulator activities/discussions:**

The participants reviewed the Hageland CFIT-A manual and the CE208B simulator qualification (dated 5/16/2017).

Following a phone call with the Hageland director of operations, it was shared that Hageland had about nine Cessna 208 instructors for the simulator and Hageland Cessna 208 pilots received about 1.3 hours of CFIT simulator training. Hageland instructors referred to the CFIT-A manual for the three outlined scenarios (required per the Medallion CFIT star elements) – flat light, whiteout and deteriorating visibility.

Photos 1-3 show the simulator cockpit instrument panel.

**Simulator activities:**

The simulator motion was turned off for the testing to accommodate the observers. The flight began in Bethel and performed a normal takeoff. After an initial climb to 1500 feet, the airplane was repositioned on a direct route from Quinhawk to Togiak with the autopilot engaged. Approximately 50 nautical miles (nm) from Togiak, the airplane was climbed to 2500 feet so as to observe changes of the terrain warning display.

The visuals were noted as “generic” and do not accurately depict terrain. The multifunction display (MFD) displayed accurate terrain, however, no aural terrain alerts were provided in the simulator and the simulator was not equipped with a TAWS system

Approximately 20 nm out from Togiak, the airplane was descended from 2,500 to 2,000 feet and the terrain display was observed. The airplane was leveled at 2000 feet, approximately 15 nm from Togiak on autopilot.

At 12.9 nm from Togiak, the airplane approached yellow caution terrain. The simulator was frozen at approximately 12 nm to observe different MFD modes (see Photos 4-6) – Map, Terrain and Split. Terrain and split modes show terrain depicted as yellow and red based on risk of collision. A flashing terrain warning on left side upper corner of the MFD pops up where red terrain is located close to the airplane. Per a phone conversation with the Hageland director of operations, Hageland pilots typically operate the display in Map mode so that other aircraft (TCAS) will display; they might also use Terrain mode but traffic will not be displayed. They do not operate in Split mode.

The airplane was repositioned to 12 nm from Togiak at 2,000 feet. Yellow terrain was observed as the airplane reached a point about 11.3 nm from Togiak (small red terrain warning was visible in upper left corner of display).

In Split screen mode, the airplane reached red terrain as displayed on right split screen (“terrain” mode) at 10.9 nm from Togiak

CFIT scenarios: Using the guidance provided in the CFIT-A manual, the simulator operator began adjusting visibilities, first to 5 miles, then 4, 3, and 2 miles. The simulator was not able to display multiple cloud layers, or replicate flat light or whiteout conditions. For the flat light condition, the simulator operator stated he could not input multiple cloud layers.. The closest replication to a whiteout scenario was to create a layer of clouds below the altitude of the airplane; snow covered terrain could not be simulated (see Photo 7).

For the deteriorating visibility condition, the airplane was flown at 1000 feet. Terrain was observed in red on the MFD but not on the visuals in the simulator. The PIC conducted a 180-degree turn to avoid the simulated IMC.

Per a phone conversation with the Hageland director of operations, initial CFIT training was embedded into one of six simulator sessions and recurrent CFIT training was conducted every year.

### **Post-simulator activities:**

Following completion of activities in the CE208B simulator, the participants flew the accident route in a RedBird simulator, which had much more fidelity in the terrain presentation. The accident route was flown at an altitude of 2,240 feet to observe the terrain where the accident occurred (see Photos 8 and 9).



Photo 1. Cessna 208 PIC cockpit panel.



Photo 2. Cessna 208 SIC cockpit panel



Photo 3. Cessna 208 Center instrument panel and console



Photo 4. Garmin MX20 display – Map mode.



Photo 5. Garmin MX20 display – Terrain mode.



Photo 6. Garmin MX20 display – Split mode.



Photo 7. Simulated whiteout condition.



Photo 8. Distant view of accident site terrain as replicated in the RedBird simulator.



Photo 9. Close up view of accident site terrain as replicated in the RedBird simulator.