

# National Transportation Safety Board

Office of Research and Engineering

Washington, D.C. 20594

## Performance Study

### Specialist Report

Marie Moler

#### A. ACCIDENT

Location: Emmett, Idaho  
Date: September 22, 2020  
Time: 18:45 mountain daylight time (MDT)  
Airplane: Air Tractor AT-802A, N836MM  
NTSB Number: WPR20LA315

#### B. SUMMARY

On September 22, 2020, about 1845 mountain daylight time, an Air Tractor AT-802A, N836MM, was substantially damaged when it was involved in an accident near Emmett, Idaho. The pilot was fatally injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 aerial firefighting flight.

#### C. PERFORMANCE STUDY

The airplane was equipped with a Garmin Aera 660, a touchscreen portable GPS which recorded the time, latitude, longitude, GPS altitude, and calculated groundspeed and track angle. The sampling rate was variable and averaged about once every five seconds. Garmin reported that the unit had an “adaptive update scheme” which varied the rate of data logging.

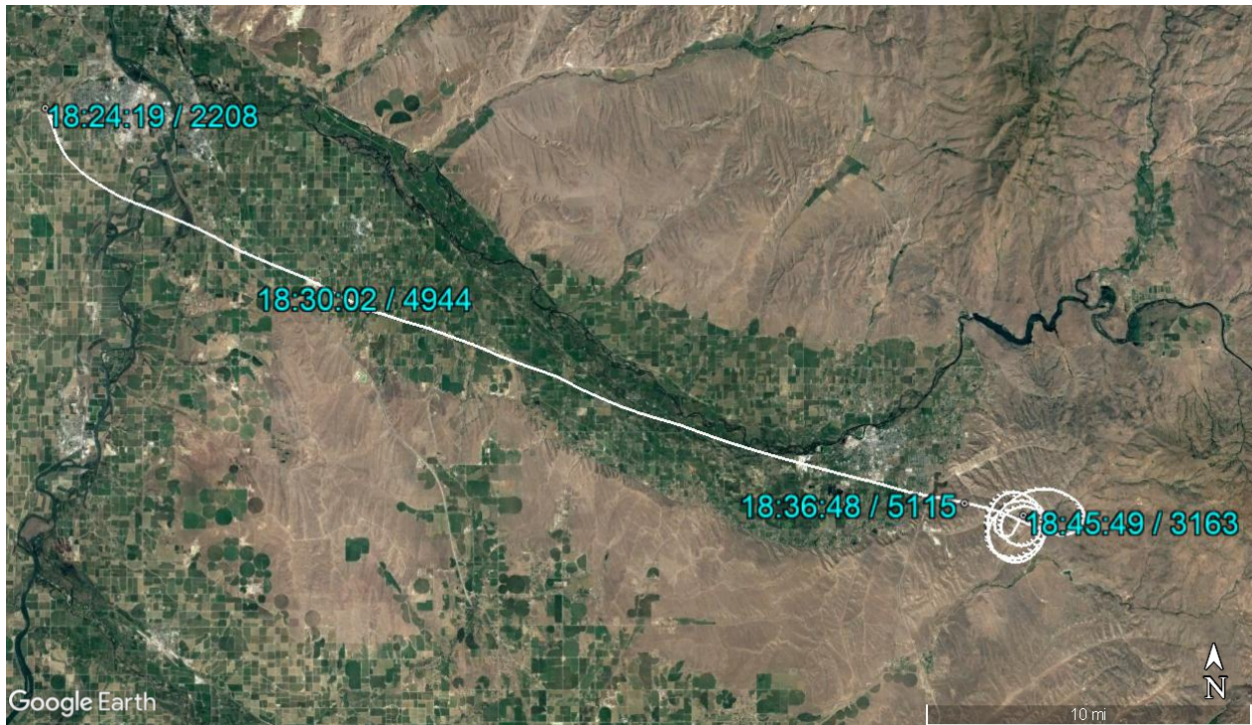
Weather was reported from Nampa Municipal Airport (KMAN), elevation 2,537 ft mean sea level, (msl), about 16 NM south of the accident location (elevation 3,200 ft msl). Conditions were clear, visibility nine statute miles, 78.8°F (26°C), dew point 41°F (5°C), and the barometric setting was 29.94 inHg. Winds were calm.

Also used in this performance study is a witness video of the airplane and its impact with terrain. The video captured the last nine seconds of flight as the airplane passed over the hillside from which the witness was filming, descended into the valley, began to climb, and then impacted the terrain of the next hillside. The rest of the video captures the wreckage of the airplane continuing over the ridgeline of the hill.

**Performance Study**  
**WPR20LA315, Air Tractor AT-802A, N836MM**

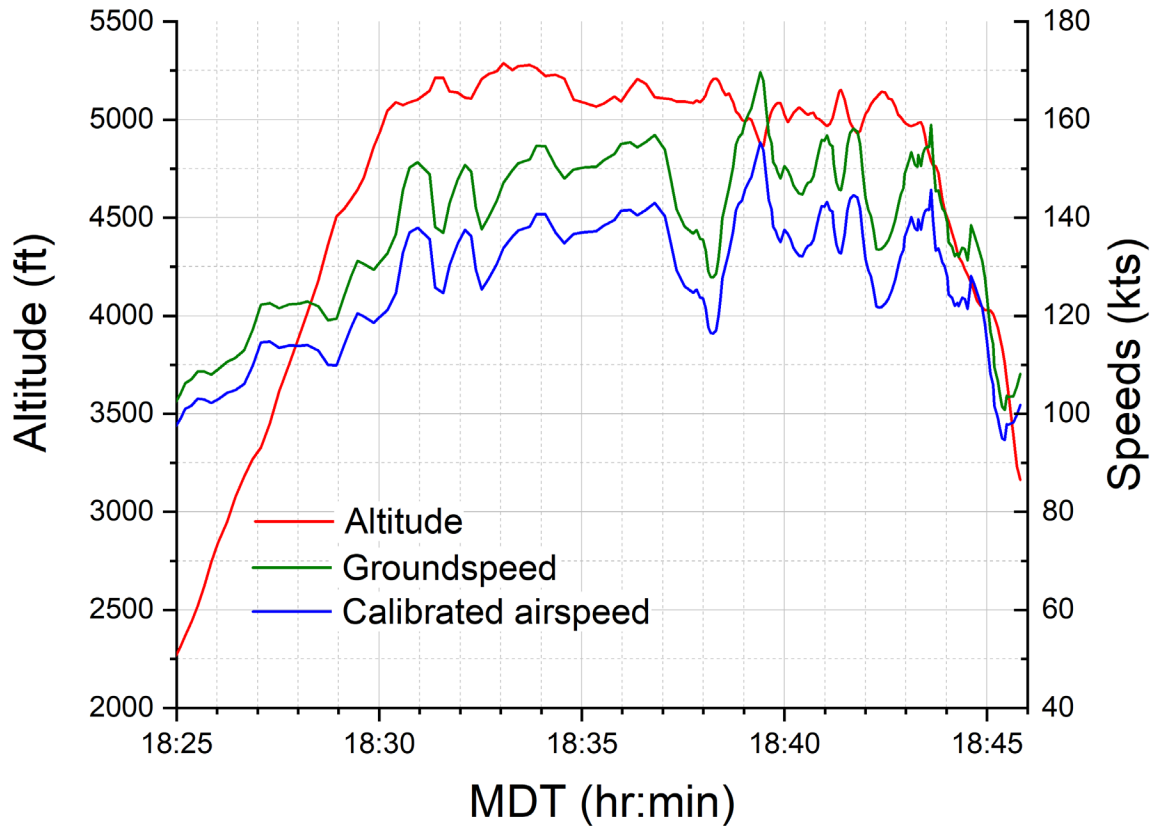
***Accident Flight***

The airplane took off from Ontario Municipal Airport in Ontario, Oregon at 18:24 MDT (Figure 1) to conduct firefighting operations in an area south-east of Emmett, Idaho. It climbed to an altitude between 5,000 and 5,500 ft msl while en route to the fire location (Figure 2). The airplane reached the area of the accident at about 18:37 and began a series of left-hand circles over the area. The airplane descended below 5,000 ft at 18:43 and slowed from about 140 kts of calibrated airspeed to 120 kts. Air Tractor, Inc. lists the AT-802A's typical working speed to be between 113 and 139 kts [1].



**Figure 1.** Accident flight in white with select times and altitudes (msl) annotated in blue.

**Performance Study**  
**WPR20LA315, Air Tractor AT-802A, N836MM**

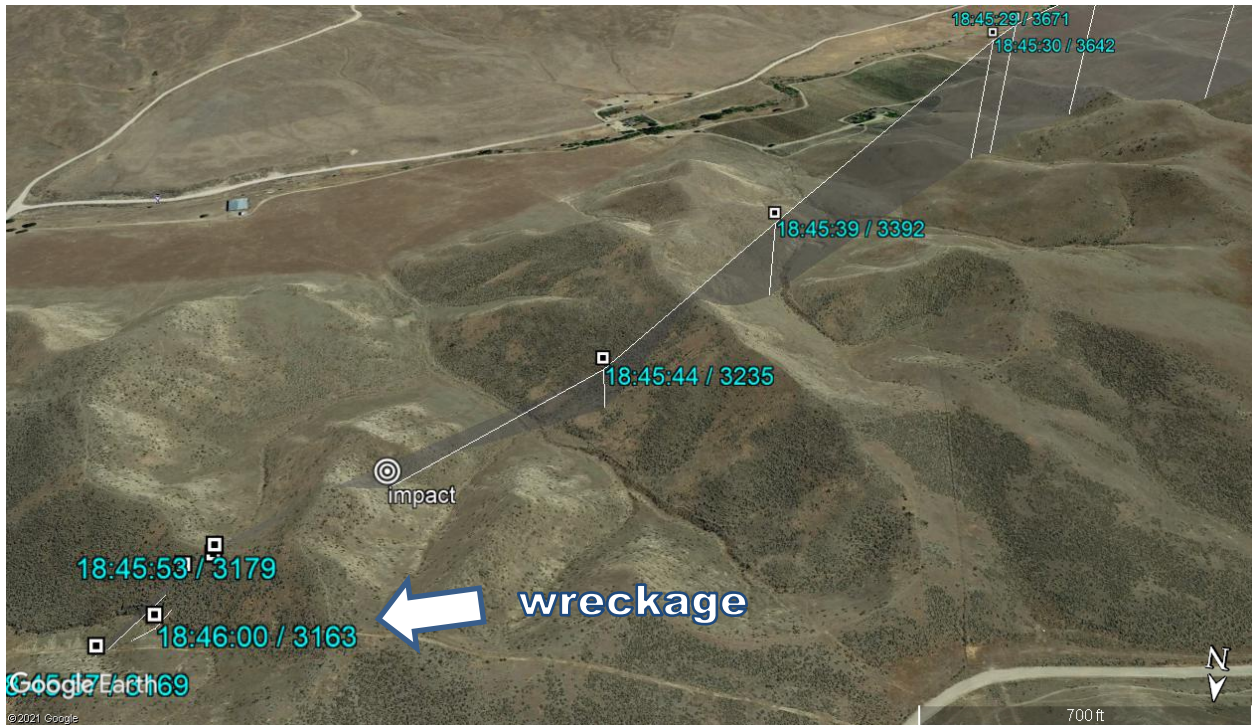


**Figure 2.** Recorded altitude (msl) and calculated groundspeed and calibrated airspeed.

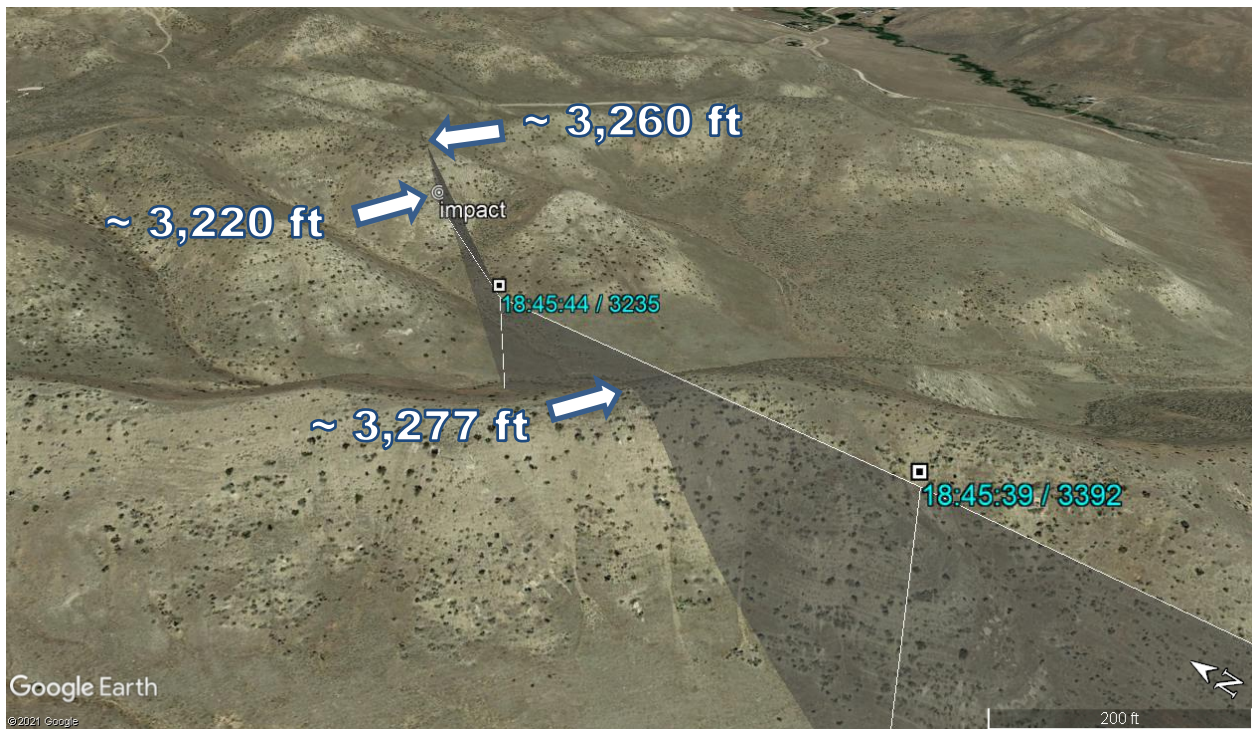
The end of the GPS data is shown in Figure 3. The airplane had descended into a small valley and was climbing when it impacted terrain. The wreckage then continued over the top of ridge and down the other side, which is reflected by the GPS data points post-18:45:52 in Figure 4. The elevation of the impact point was approximately 3,220 ft. The elevation of the top of the ridge was about 40 ft above the impact point at approximately 3,260 ft.



**Performance Study**  
**WPR20LA315, Air Tractor AT-802A, N836MM**



**Figure 3.** End of accident flight. Points after "impact" are from the airplane wreckage as it moved down the far side of the hill.



**Figure 4.** End of GPS flight data with the approximate elevations noted.

**Performance Study**  
**WPR20LA315, Air Tractor AT-802A, N836MM**

The last flying GPS data point was at 18:45:44, when the airplane was at a recorded altitude of 3,235 ft. The path between 18:45:39 and the final flying GPS point is consistent with the accident video which showed the airplane descending and passing low over the 3,277 ft ridgeline shown in Figure 5. This is the only GPS data point in the valley of the accident.



**Figure 5.** Accident airplane passing low over prior hillside.

Figure 6 shows four frames from the video that captured the accident impact. In the first, about 4 seconds before impact, the airplane was still descending. In the second, about 3 seconds before impact, the airplane has begun to climb. The frame one second before impact shows the airplane in a steeper climb as more of the top side of the airplane can be seen from the witness location.



**Performance Study**  
**WPR20LA315, Air Tractor AT-802A, N836MM**

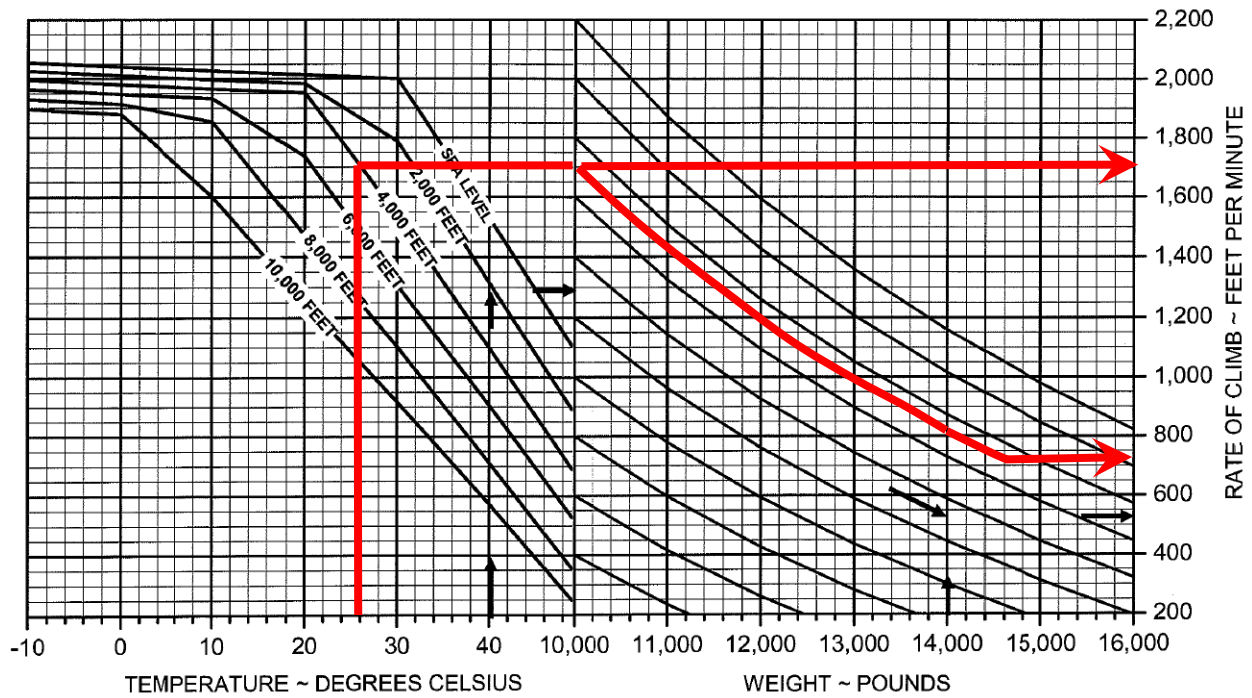


**Figure 6.** Frames from accident video showing transition from descending ( - 4s to impact) to climbing ( - 3s to impact) to impact with terrain.

The final GPS point was about 900 ft from the approaching terrain (Figure 8). At 105 kts, the last calculated groundspeed, it would take about 4.5 seconds to reach the impact location. The video indicates that the airplane did not begin climbing until about 3 seconds before impact. This is consistent with the elevation of impact location (3,220 ft) being lower than the final GPS point as the airplane was still descending.

Figure 7 shows the climb performance for an AT-802A with fire fighting equipment. On take-off, the airplane was estimated to have a gross weight of 15,890 lbs; 1,685 lbs of fuel and 6,992 lbs of fire fighting payload. The airplane at the time of the accident was likely between 14,000 and 15,000 lbs at the time of the accident and its rate of climb can be estimated to be about 700 ft/min or roughly 12 ft/s.

**Performance Study**  
**WPR20LA315, Air Tractor AT-802A, N836MM**

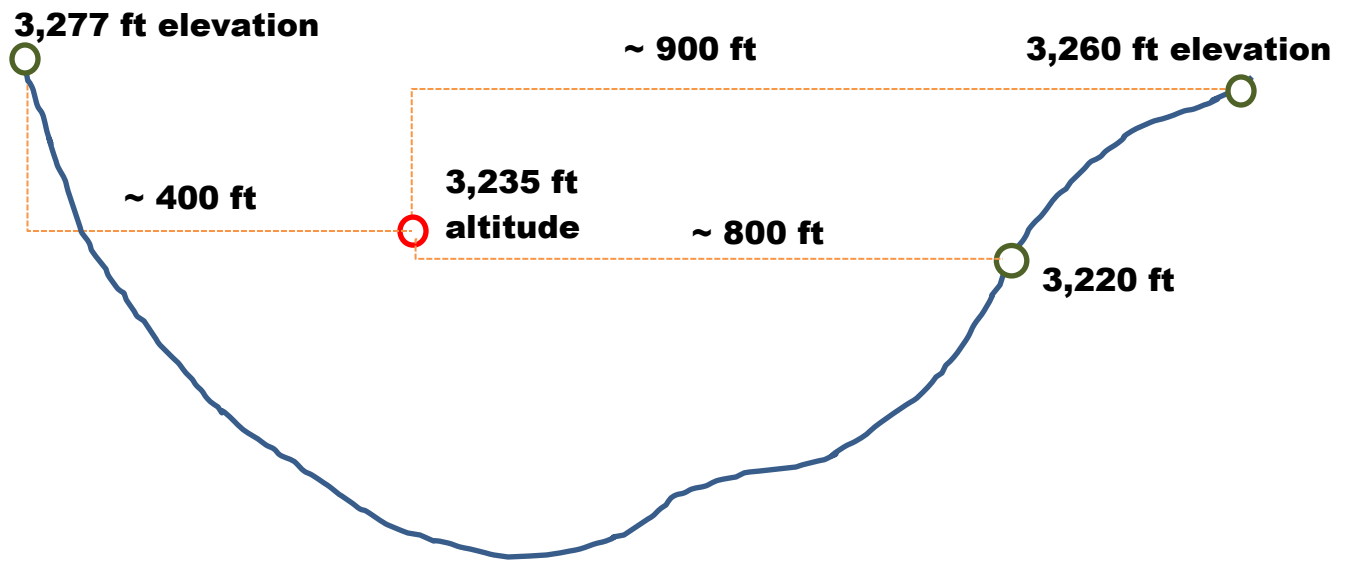


**Figure 7.** Climb performance for AT-802A with fire fighting equipment. Conditions for climb performance include maximum continuous power and flaps 10°.

At 700 ft/min, the airplane could have gained 36 ft in altitude in the three second the video shows it's climbing. To impact the hillside at 3,220 ft of elevation, the airplane's minimum altitude in the valley could have been no more than approximately 3,184 ft. This is 50 ft lower than the last reported GPS point and 75 ft lower than the oncoming terrain (Figure 8). This also indicates that the airplane was still descending at the last GPS point.

Without the firefighting payload, the airplane would have been nearly 7,000 lbs lighter. Climb performance data is not provided below 10,000 lbs gross weight, but at the recorded temperature and altitude, its climb rate could improve to greater than 1,700 ft/min or 28 ft/s, more than twice the performance of the loaded airplane. If climbing for three seconds from the same point, the airplane could have gained an extra 48 ft of altitude compared to the heavier weight climb. The airplane impacted terrain 40 ft below the top of the ridgeline.

**Performance Study  
WPR20LA315, Air Tractor AT-802A, N836MM**



**Figure 8.** Accident airplane is represented by red circle 400 ft past the prior hillside (3,277 ft high) and 900 ft from the approaching hillside (3,260 ft high).

#### **D. CONCLUSIONS**

At the end of flight, the airplane descended below surrounding terrain. The witness video showed the airplane descending into the valley and not beginning to climb until 3 seconds before impact. Three seconds was an insufficient amount of time and distance for the airplane to gain enough altitude to clear the approaching terrain.

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#### **E. REFERENCES**

1. AT-802A Performance: <https://airtractor.com/aircraft/at-802a/>