National Transportation Safety Board

Office of Aviation Safety
Central Region

CEN23LA088

# WRECKAGE EXAMINATION SUMMARY

## ACCIDENT

Location: Tomball, Texas
Date: January 22, 2023
Time: 1127 central standard time (1727 UTC)
Airplane: Beech M35; Registration No. N9306Y

## PARTICIPANTS

| | |
|---|---|
| Investigator-In-Charge | Andrew Todd Fox<br>National Transportation Safety Board<br>Denver, Colorado |
| Participant | Jeffery S. Hayes<br>Federal Aviation Administration<br>Houston, TX |
| Participant | Stephen M. Horacek<br>Federal Aviation Administration<br>Houston, TX |
| Participant | Raymond Villalba<br>E&E Aviation<br>Spring, TX |

## ACCIDENT SYNOPSIS

On January 22, 2023, about 1127 central standard time, a Beech M35 Bonanza airplane, N9306Y, was substantially damaged when it was involved in an accident near Tomball, Texas. The pilot of the airplane and the driver of a semi-trailer truck were not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 aerial survey flight.

According to the airplane operator, the pilot sent a text message at 1008 stating that he was departing West Houston Airport (IWS), Houston, Texas. The pilot reported that the airplane departed with a full fuel load (103 gallons usable) and that the fuel selector was initially positioned to use fuel from the left main tank (22 gallons usable). About 45 minutes into the flight, the pilot switched to the auxiliary fuel tanks (19 gallons usable) and set a timer for 38 minutes. The pilot reported that, based on the airplane's digital engine monitor, the fuel flow was about 13.5 gallons per hour during cruise.

Based on a review of ADS-B flight track data and the pilot's statement, about 1 hour 16 minutes into the flight, the pilot entered a left 270° turn to avoid another airplane before

flying to the east toward David Wayne Hooks Memorial Airport (DWH), as shown in Figure 1. The pilot reported that the airplane had a total loss of engine power shortly after he completed the left turn and was heading east. The ADS-B track data showed the airplane about 11 miles west of DWH at 2,000 ft mean sea level before it entered a sustained descent, as depicted in Figure 2.

The pilot was unable to restore engine power after he switched from the auxiliary fuel tanks to the right main fuel tank, increased the mixture control to fuel rich, and checked magneto operation. Due to the airplane's low altitude, the pilot did not continue to troubleshoot the loss of engine power or review the emergency checklist. He declared an emergency with the DWH tower controller and made a forced landing to the eastbound lanes of Highway 99, about 1 mile west of the Telge Road exit.

During the forced landing the airplane's right main landing gear impacted the roof of a semi-trailer before the airplane rolled left wing down and descended into a concrete highway median, as shown in Figure 3. The airplane was immediately engulfed in fire after it came to rest on the highway. After the accident, the pilot unbuckled his restraints and exited the airplane.

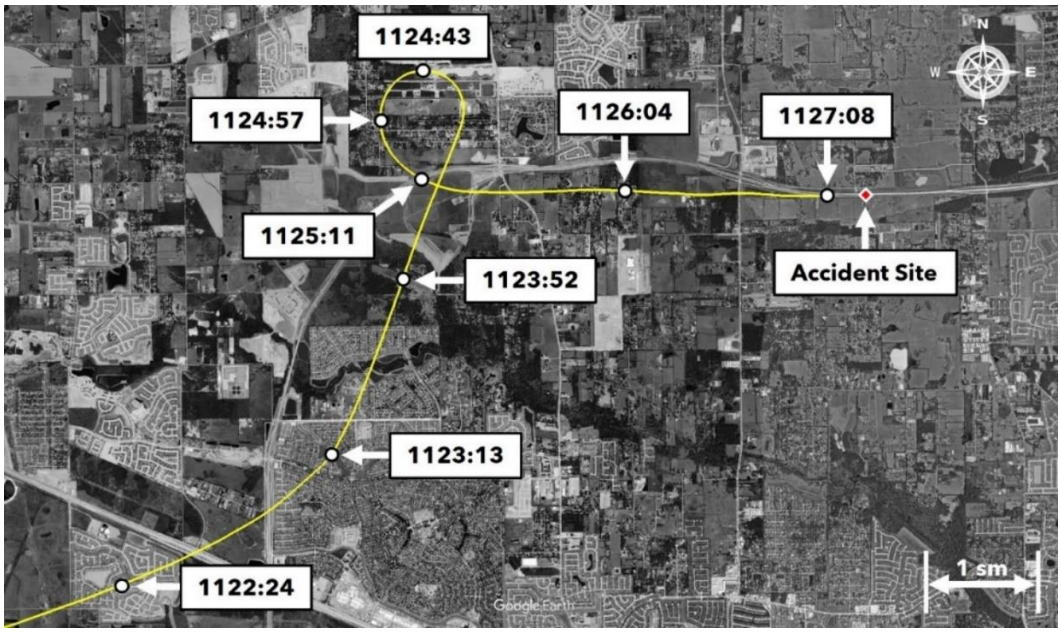


**Figure 1 –** Plot of airplane ground track.

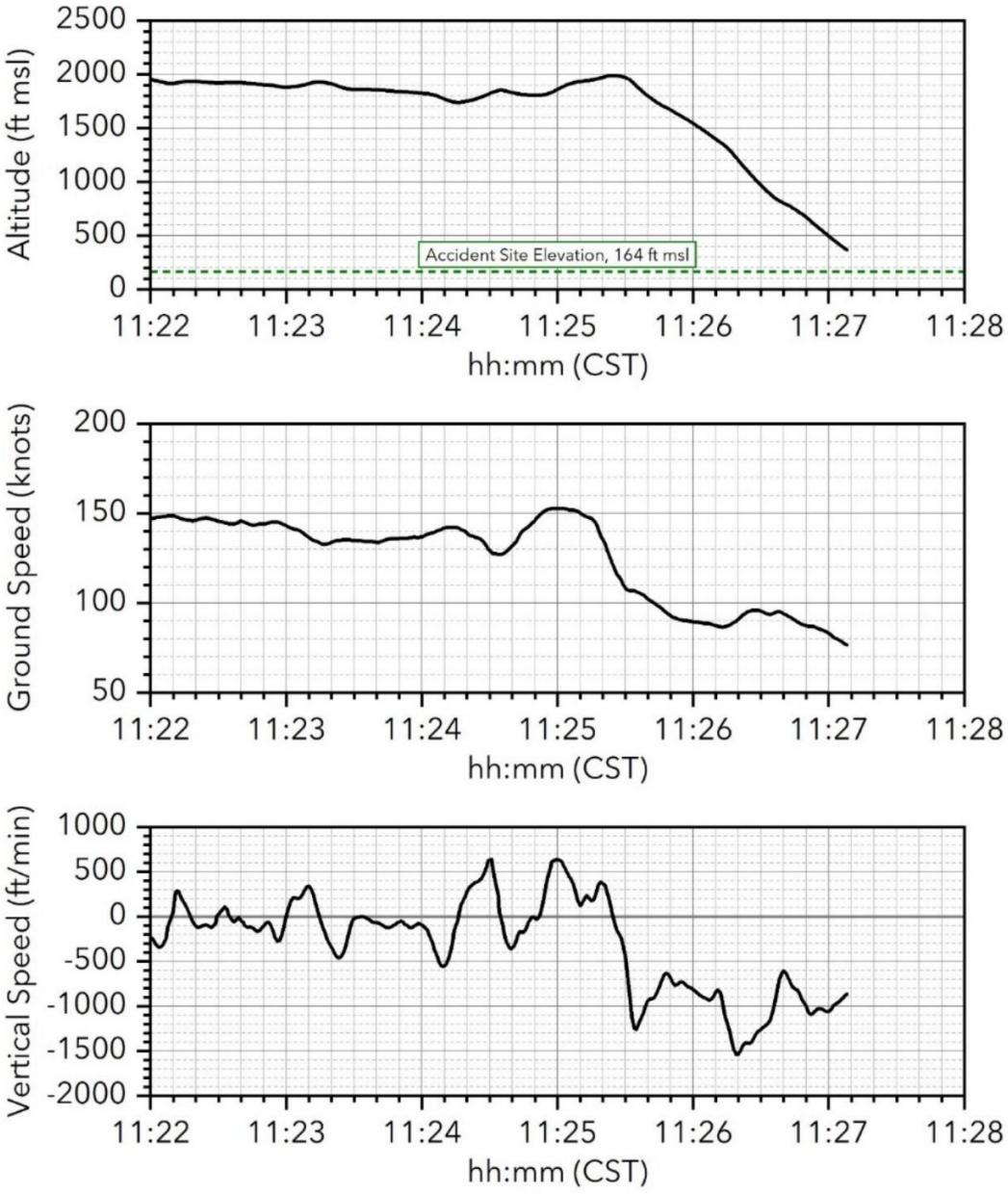


**Figure 2 –** Plot of altitude, ground speed, and vertical speed.

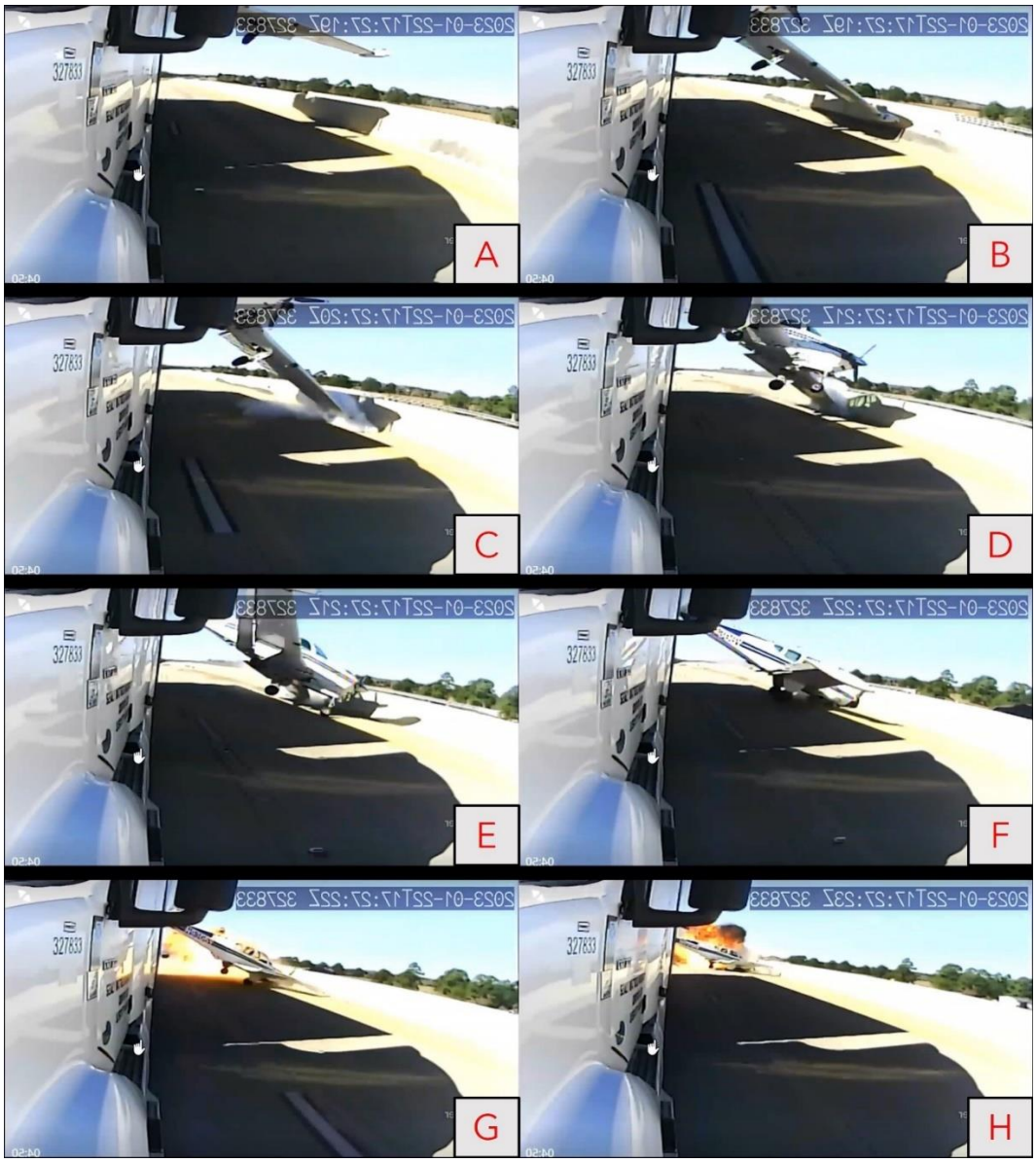


**Figure 3 –** Selected screenshots from the semi-trailer truck camera footage.

## WRECKAGE EXAMINATION TIMELINE

January 22, 2023 – The accident site and main wreckage was documented by representatives from the Federal Aviation Administration (FAA).

March 9, 2023 – The airplane wreckage was reexamined by FAA Inspectors with the assistance of an aviation mechanic with E&E Aviation, Spring, Texas.

August 2, 2023 – The engine-driven fuel pump was boxed by Air Salvage of Dallas, Lancaster, Texas, and shipped to the NTSB IIC for additional photo documentation.

## AIRPLANE DESCRIPTION

The airplane, a Beech M35, serial number D-6515, was manufactured on September 12, 1960. The airplane was powered by a 250 shaft-horsepower Continental IO-470-C reciprocating engine, serial number 72359-7-C, through a 3-blade, constant speed, McCauley 3A36C434-A propeller, serial number 982319. The airplane had a maximum allowable takeoff weight of 3,150 lbs (STC SA02722CH). The owner-of-record purchased the airplane on October 6, 2016, and subsequently completed a FAA Aircraft Registration Application on October 31, 2016.

The airplane had a 110-gallon capacity fuel storage system (103-gallons usable) and consisted of two 25-gallon main fuel tanks, two 10-gallon auxiliary fuel tanks, and two 20-gallon wingtip fuel tanks. The cockpit fuel selector could be positioned to off, left main, right main, or auxiliary. When full, each main fuel tank contained 22 gallons of usable fuel. When full, the two auxiliary fuel tanks had a combined 19 gallons of usable fuel and were interconnected to provide fuel simultaneously to the engine when the fuel selector valve is positioned to auxiliary. The fuel contained in the wingtip tanks was transferred via electric fuel pumps to their respective main tanks and was selectable by an electric switch in the cockpit. All fuel contained in the wingtip fuel tanks was considered usable.

According to the flight manual supplement for the wingtip fuel tanks, fuel transfer from the wingtip tanks should be accomplished simultaneously to maintain symmetrical wingtip tank fuel loading. Fuel transfer from wingtip tanks should begin when the left main fuel tank is half full and is feeding the engine. During the fuel transfer, the pilot should monitor fuel quantity gauges for both main fuel tanks and stop fuel transfer to a main fuel tank if its quantity gauge indicates full, which will prevent overflow of fuel through its respective main tank vent tube.

## MAINTENANCE SUMMARY

The airplane's digital engine monitor (JPI EDM-900) was destroyed during the postaccident fire and, as such, the investigation was unable to review engine parameter data for the flight or determine the tachometer time at the time of the accident. A review of the airplane maintenance logbooks revealed the last annual inspection was completed on July 8, 2022, at 9,672.76 hours total airframe time. The tachometer indicated 5,325.1 hours at the time of the annual inspection. According to the logbook documentation, the recently overhauled engine was reinstalled on the airframe during the annual inspection. According to the airplane operator, at the time of the accident, the engine had accumulated about 800 hours since the last major overhaul. A review of the available maintenance records found no history of unresolved airworthiness issues.

## EXAMINATION SUMMARY

According to the Federal Aviation Administration (FAA) inspectors who responded onsite, the airplane descended onto the eastbound lanes of Highway 99 about 1 mile west of the Telge Road exit. The landing gear and flaps were found extended. The postaccident fire destroyed most of the fuselage, cabin, and cockpit, as shown in Figure 4 and Figure 5. Both wing roots exhibited various degrees of thermal damage near the main fuel tanks. The filler caps for the two main fuel tanks and the two auxiliary fuel tanks were found properly installed. According to the FAA Inspectors, the tow truck operator reportedly drained about 25 gallons of fuel from the fuel tanks before the airplane was moved, but the amount of fuel recovered from each fuel tank was not individually documented. The tow truck operator also added an absorbent granular substance (oil dry) to the fuel tanks to prevent further fuel leaks while the airplane was transported from the accident site. The left wingtip fuel tank exhibited extensive impact and thermal damage, and there was no residual fuel within the tank. The right wingtip fuel tank exhibited extensive thermal damage, and there was no residual fuel within the tank.

Engine control continuity (throttle, mixture, and propeller) could not be established due to extensive thermal damage associated with the postaccident fire. The fuel lines within the fuselage cabin, cockpit, and engine compartment exhibited various degrees of thermal damage that precluded a comprehensive examination of the fuel system. The cockpit fuel selector valve exhibited thermal damage associated with the postaccident fire. Fuel drained from the fuel selector valve ports while it was separated from the wreckage. The fuel selector valve rotated freely, but the individual tank detents were not discernible. The airframe fuel filter contained 1/8 to 1/4 cup of fuel. The fuel strainer was largely unobstructed with only minor debris present.

**Figure 4 –** Airplane at the accident site. (Photo courtesy of FAA)

**Figure 5 –** Airplane cabin and cockpit at accident site. (Photo courtesy of FAA)

The engine remained partially attached to its engine mounts. The forward engine mounts exhibited impact-related damage. The engine crankcase exhibited various degrees of thermal damage but was otherwise intact, as shown in Figure 6. The aft portion of the engine and the rear-mounted engine components exhibited extensive thermal damage. There was no evidence of cracks or holes in the crankcase or cylinders. The exterior of the engine did not exhibit any evidence of an oil or fuel leak. The engine oil sump contained ample oil. The oil lines remained intact and attached to their respective components. The oil filter exhibited thermal damage. The oil filter element did not exhibit any evidence of metal contamination. The intake tubes and exhaust were found unobstructed.

All six engine cylinders remained attached to the engine and exhibited relatively minor thermal damage. Internal engine and valve train continuity were confirmed as the crankshaft was rotated through the propeller. Compression and suction were noted on all six cylinders in conjunction with crankshaft rotation. A lighted borescope inspection of each cylinder did not reveal any anomalies with the cylinders, pistons, valves, valve seats.

**Figure 6 –** Engine at accident site. (Photo courtesy of FAA)

The throttle and control unit exhibited thermal damage associated with the postaccident fire. The fuel inlet screen was fused inside the housing due to excessive heat from the postaccident fire, which caused it to twist/tear during removal from the

housing. The recovered portion of the inlet screen did not exhibit any evidence of contamination. The throttle cable remained attached to the throttle control arm, and the throttle plate rotated freely by moving the throttle arm. The mixture cable remained attached to the mixture arm, but the mixture arm separated from the housing and exhibited impact-related damage. The fuel manifold was found tightly installed to the top of the engine and exhibited thermal damage. Shop air flowed freely through the fuel manifold. The fuel injector lines and nozzles were clear of debris.

Both magnetos remained attached to their engine installation points and exhibited thermal damage. The magnetos were removed and rotated by hand which produced spark at each point. The spark plugs exhibited features consistent with normal engine operation.

The engine-driven fuel pump exhibited extensive thermal damage associated with the postaccident fire, as shown in Figure 7 and Figure 8. The drive coupling was found sheared, but there was no evidence of rotational damage that is typically associated with an operational failure of the pump. Additionally, disassembly of the pump revealed thermal damage to the internal components of the pump, as shown in Figure 9 and Figure 10. The rotating shaft and its associated carbon vanes remained intact but exhibited thermal damage. A dark-black resolidified material was observed within the pump chamber. Based on the thermal damage to the engine-driven fuel pump components, the drive coupling likely sheared when the propeller/crankshaft was rotated postaccident.

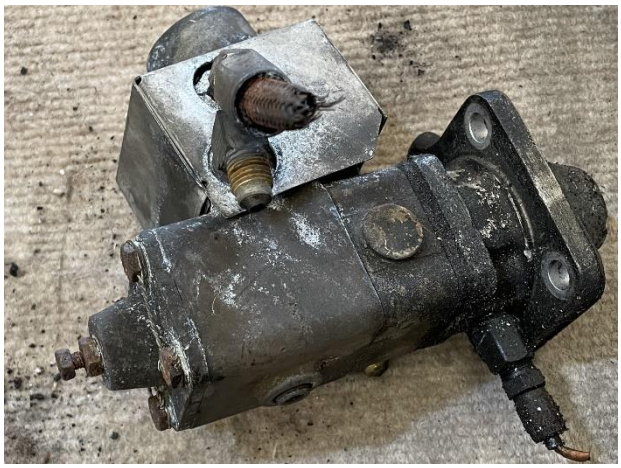

**Figure 7 –** Engine-driven fuel pump

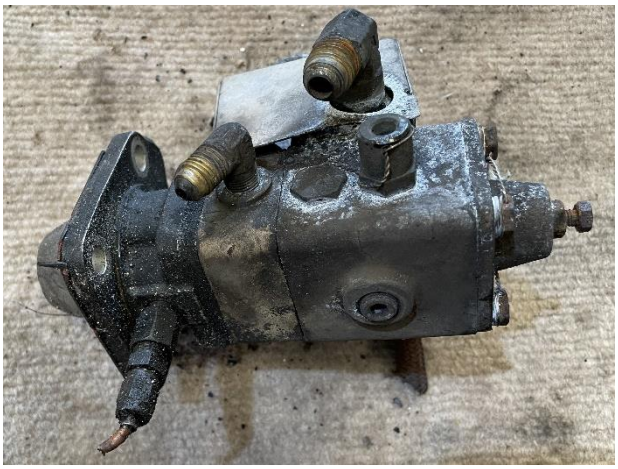

**Figure 8 –** Engine-driven fuel pump

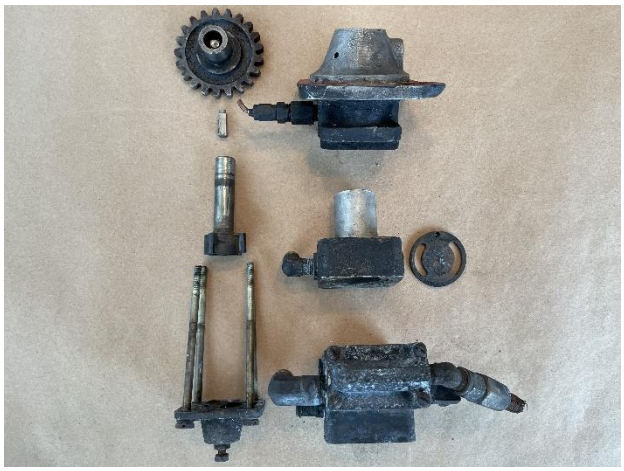

**Figure 9 –** Disassembled fuel pump

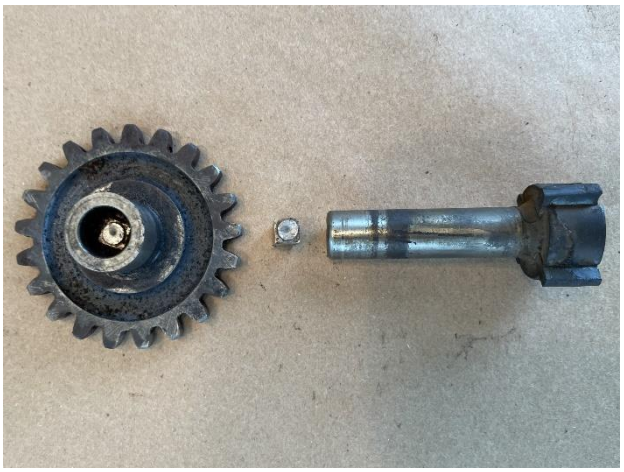

**Figure 10 –** Pump drive components

The propeller remained attached to the crankshaft flange. All three propeller blades exhibited aft bending, twisting toward low pitch, and chordwise scratching, as shown in Figure 11.

**Figure 11 –** Propeller at accident site. (Photo courtesy of FAA)

The semi-trailer truck sustained a minor puncture to the roof of the trailer but was otherwise undamaged, as shown in Figure 12.

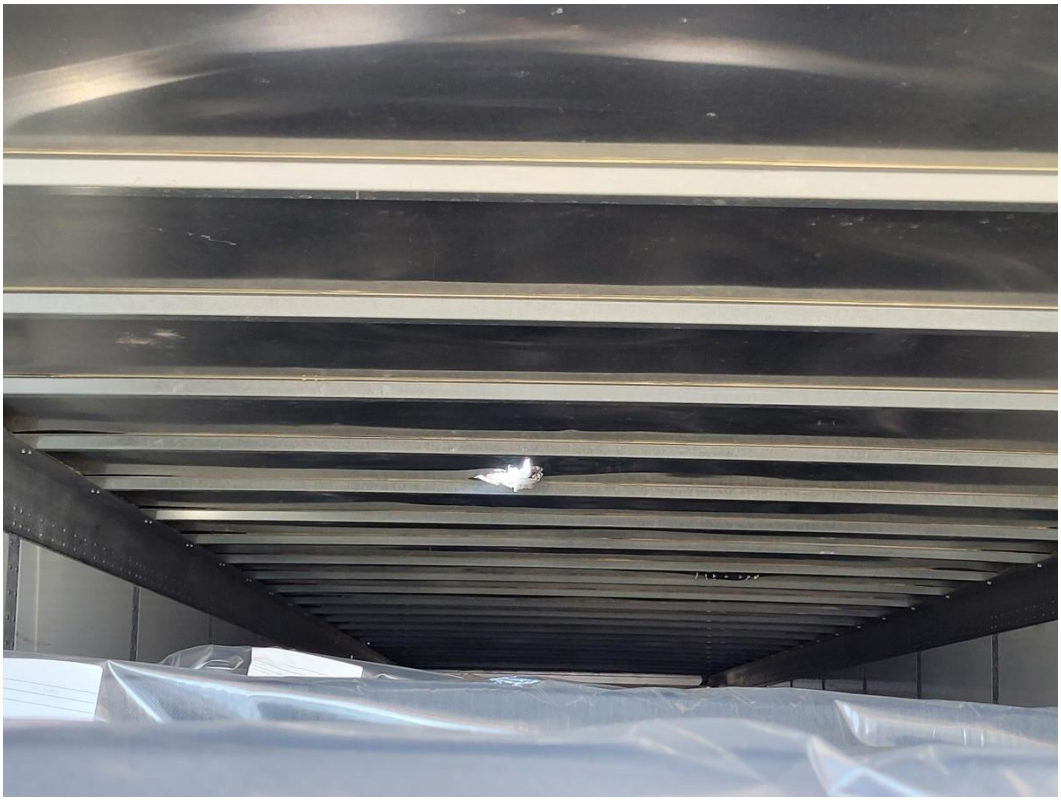

**Figure 12 –** Puncture to the roof of the semi-trailer. (Photo courtesy of FAA)