



Log 2502

National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

Date: August 11, 1994
In reply refer to: A-94-148

Honorable David R. Hinson
Administrator
Federal Aviation Administration
Washington, D C. 20591

On August 8, 1993, at 2140 central daylight time, a Cessna 177B, N34293, sustained substantial damage during a forced landing near Grand Prairie, Texas, following a loss of engine power. The private pilot and the three passengers were not injured. Visual meteorological conditions prevailed for the personal cross-country flight.

The flight originated from Olathe, Kansas, at 1748, on an instrument flight rules flight plan. The pilot declared an emergency when a total power loss occurred at 2,500 feet above ground level about 12 miles from the destination airport. The pilot performed the emergency procedures and initiated an emergency descent. During the landing flare on an interstate highway, the airplane's right main landing gear hit a road sign. The airplane subsequently struck a construction barricade, bounced across the highway median, and came to rest nose down on the north shoulder of the interstate.

An examination of the airplane by a Federal Aviation Administration (FAA) inspector revealed leakage of the fuel pressure line to the fuel flow indicator. Following the accident, the fuel line was changed and the engine operated normally. The time since the last aircraft inspection was 28 hours.

The fuel line from the accident airplane was sent to the National Transportation Safety Board's Materials Laboratory in Washington, D.C. During a test of the fuel line, fuel bled at many points along the length of the hose. Examination of the inside diameter surface revealed multiple circumferential cracks.

The Cessna data tag on the fuel line indicated that the line was part number S1236-3-0092 and had been manufactured during the first quarter of 1989. According to the Cessna Aircraft Company, such a part number would indicate that the fuel line was made from an Aeroquip Corporation AE701 hose. However, examination of the fuel line indicated that it had been made from an Aeroquip 601 hose. In fact, Aeroquip indicated that the AE701 hose has never been offered in the "-3" size. (The "-3" in the Cessna part number indicates a fuel line nominal outer diameter of 3/8 of an inch.) A subsequent audit by Cessna revealed that the misidentification of

the fuel line resulted from its purchasing department's acquisition of Aeroquip 601 hoses for S1236-3 fuel lines (since AE701 hoses were not available) without the knowledge of its engineering and production departments.

The S1236-3 fuel line from the accident airplane was fabricated using the Aeroquip 601 hose, which was made from a nitrile rubber polymer. Aeroquip stopped producing nitrile-based 601 hoses in 1992, and the 601 hoses are now made from a chlorinated polyethylene (CPE) polymer, as are AE701 hoses. Both the 601 and AE701 hoses are now approved for use in Cessna S1236 fuel lines.

The S1236 fuel lines were the subject of a Cessna service letter (SL) and an associated FAA airworthiness directive (AD) in 1971. Cessna SL SE71-7 was issued after reports that S1236 fuel lines were leaking and stated that all subsequent S1236 lines would contain a metal identification tag indicating the manufacture date and signifying the incorporation of the AE701 hose. AD 71-24-04 incorporated the provisions of SE71-7 and mandated periodic inspections of the S1236 fuel lines until new, dated fuel lines were installed. However, due to the mix-up at Cessna concerning the availability of the AE701 hose in the "-3" size, the "-3" size of S1236 fuel lines continued to be made from the nitrile-based 601 hose. Cessna has since indicated that the "-3" size of engine primer lines (Cessna part number S2495) may also include the nitrile-rubber 601 hose. The S1236-3 and S2495-3 fuel lines were originally installed on Cessna Model 172, 177, 182, 185, 206, 207, 210, 303, 336, and 337 airplanes.

The Safety Board's concern was heightened after Aeroquip issued Service Bulletin (SB) AA135 on November 18, 1992, asking all owners/operators of general aviation aircraft using aviation gasoline to identify Aeroquip nitrile-rubber 601 hose assemblies by their Aeroquip metal tag and inspect and replace the hoses after 2 years of service. The SB was prompted by several reports of cracking of the hose during the previous 12-18 months involving such aircraft as the Cessna 177, Cessna 210, Republic Seabee, Cozy, and Long-EZ. Aeroquip has been unable to determine the cause of the cracking and stated that it doesn't appear to be specific to an airplane or installation location. Aeroquip has suggested that the degradation of the nitrile-rubber inner tube of the 601 hoses may be attributed to the continued use of low-lead aviation gasoline. Although Aeroquip no longer manufactures the nitrile-based 601 hose, it indicated that the hose may still be widely used in aviation gasoline systems.

The Safety Board believes that, due to the possibility of fuel leakage and in-flight fire from fuel lines made from Aeroquip nitrile-rubber 601 hoses in aviation gasoline applications, the FAA should issue an AD requiring replacement of fuel lines incorporating the subject hoses, including Cessna part numbers S1236-3 and S2495-3, within 2 years of their installation date. Aeroquip 601 hoses can be identified by a metal data tag containing the part number "601" and the assembly date (except those assembled by Cessna, which would have the manufacture/cure and assembly dates on the Cessna data tag). These actions would only affect 601 hoses manufactured before 1993, since the production of nitrile-based 601 hoses ended in 1992. If no records are available to indicate the installation date or the assembly date, the hose should be replaced.

Since the degradation of the hoses appears to be independent of actual service time, the Safety Board also believes that an inspection of the hoses should be required within an appropriate timeframe independent of any regular inspection currently performed.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue an Airworthiness Directive requiring an inspection, within 30 days or at the next aircraft hose inspection, whichever comes first, of all fuel lines made from Aeroquip nitrile-rubber 601 hoses, including Cessna fuel lines identified by part numbers S1236-3 or S2495-3, that are used in aviation gasoline applications, and requiring replacement of those lines that exhibit wetness or leakage or that have been installed for over 2 years. (Class II, Priority Action) (A-94-148)

Acting Chairman HALL and Members LAUBER, HAMMERSCHMIDT, and VOGT concurred in this recommendation.

By: 
Jim Hall
Acting Chairman

Brief of Accident

File No. - 0026 8/08/93 GRAND PRAIRIE, TX A/C Reg. No. N34293 Time (Lcl) - 2140 CDT

-----Basic Information-----
Type Operating Certificate-NONE (GENERAL AVIATION)

Type of Operation -PERSONAL
Flight Conducted Under -14 CFR 91
Accident Occurred During -LANDING

-----Aircraft Information-----
Make/Model - CESSNA 177B
Landing Gear - TRICYCLE-FIXED
Max Gross Wt - 2500
No. of Seats - 4

-----Environment/Operations Information-----
Weather Data
Wx Briefing - FSS
Method - TELEPHONE
Completeness - FULL
Basic Weather - VMC
Wind Dir/Speed- 120/006 KTS
Visibility - 12.0 SM
Lowest Sky/Clouds - 25000 FT SCATTERED
Obstructions to Vision- NONE
Precipitation - NONE
Condition of Light - NIGHT (BRIGHT)

-----Personnel Information-----
Pilot-In-Command
Certificate(s)/Rating(s)
PRIVATE, FLT ENG
SE LAND

-----Aircraft Damage-----
SUBSTANTIAL
Fire NONE
Crew Pass
Fatal 0
Serious 0
Minor 0
Injuries None
1
3

-----Aircraft Make/Model-----
Eng Make/Model - LYCOMING O-360-A1F6
Number Engines - 1
Engine Type - RECIPROCATING-CARBURETOR
Rated Power - 180 HP

-----Itinerary-----
Last Departure Point
OLATHE, KS
Destination
GRAND PRAIRIE, TX

-----Airport Proximity-----
OFF AIRPORT/STRIP
Airport Data
Runway Ident - N/A
Runway Lth/Wld - N/A
Runway Surface - N/A
Runway Status - N/A

-----Medical Certificate-----
Medical Certificate - VALID MEDICAL-NO WAIVERS/LIMIT
Flight Time (Hours)
Total - 178
Make/Model- 162
Instrument- UNK/NR
Multi-Eng - UNK/NR
Last 24 Hrs - 4
Last 30 Days- 26
Last 90 Days- 48
Rotorcraft - UNK/NR

-----Narrative-----
AT ABOUT 2,500 FT AGL A TOTAL LOSS OF ENGINE POWER OCCURRED. THE PILOT MADE A FORCED LANDING ON AN INTERSTATE HIGHWAY. DURING THE LANDING FLARE THE AIRPLANE COLLIDED WITH A ROAD SIGN AND A CONCRETE BARRICADE. EXAMINATION REVEALED EVIDENCE OF FUEL LEAKING FROM THE FUEL LINE GOING TO THE FUEL PRESSURE GAUGE. THE LINE WAS REPLACED, AND AN ENGINE TEST RUN WAS CONDUCTED WITH NO ANOMALIES. FURTHER EXAMINATION OF THE FUEL LINE REVEALED THAT IT HAD BEEN MISIDENTIFIED. THE CESSNA DATA TAG INDICATED THAT THE FUEL LINE WAS MADE FROM AN AEROCOUP AE701 HOSE. HOWEVER, IT HAD BEEN MADE FROM A NITRILE RUBBER AEROCOUP 601 HOSE.

Brief of Accident (continued)

File No. - 0026 8/08/93 GRAND PRAIRIE, TX A/C Reg. No. N34293 Time (Lcl) - 2140 CDT

Occurrence #1 LOSS OF ENGINE POWER (TOTAL) - MECH FAILURE/MALE
Phase of Operation CRUISE - NORMAL

- Finding(s)
- 1. FUEL SYSTEM, LINE - INCORRECT
 - 2. ACFT/EQUIP, INADEQUATE AIRCRAFT COMPONENT - MANUFACTURER
 - 3. FUEL SYSTEM, LINE - LEAK
 - 4. FLUID, FUEL - STARVATION

Occurrence #2 FORCED LANDING
Phase of Operation LANDING - FLARE/TOUCHDOWN

Occurrence #3 IN FLIGHT COLLISION WITH OBJECT
Phase of Operation LANDING - FLARE/TOUCHDOWN

- Finding(s)
- 5. OBJECT - SIGN
 - 6. OBJECT - WALL/BARRICADE

-----Probable Cause-----

The National Transportation Safety Board determines that the Probable Cause(s) of this accident was:
LOSS OF ENGINE POWER DUE TO FUEL STARVATION AS A RESULT OF A LEAKING FUEL LINE. THE FUEL LINE WAS NOT THE CORRECT PART
AS A RESULT OF A MISIDENTIFICATION BY CESSNA.