

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

SP-20  
Ray 1761

ISSUED: November 8, 1985

Forwarded to:

Honorable Donald D. Engen  
Administrator  
Federal Aviation Administration  
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-85-73 through -76

About 0805 Atlantic standard time on August 2, 1984, a Pilatus Britten-Norman Model BN-2A-6 Islander airplane, N589SA, crashed shortly after departing the Vieques Airport, Vieques, Puerto Rico. The airplane, which is manufactured principally in the United Kingdom, was being operated by Vieques Air Link, Incorporated, in an air taxi operation. The pilot and eight passengers were killed. The National Transportation Safety Board's findings in the accident indicate that the airplane's fuel was contaminated by water during refueling shortly before takeoff and, as a consequence, the left engine lost power shortly after takeoff. <sup>1/</sup>

The basic fuel system of this and other Britten-Norman BN-2 series airplanes consists of two integral tanks, one in the left wing and one in the right wing--each with a capacity of 68.5 gallons. A semicircular fuel sump approximately 18 inches long and 3 inches in radius is attached to the underside of the wing below each fuel tank. A fuel drain plug and a water drain valve are located at the bottom of each sump. The engine fuel supply line inlet and suction filter are located within the sump about 1 inch from the bottom and immediately adjacent to the sump's rear sealing plate. The fuel supply line includes connections which are enclosed within a detachable fairing where the line is routed between the rear sealing plate and the underside of the wing. The rear sealing plate is detachable and allows access to the interior of the sump.

The Safety Board believes that water in the left sump of N589SA entered the engine fuel supply line port at the aft end of the sump during the takeoff roll or shortly after rotation for takeoff. Because the water drain valve is located at the aft end of the sump, a quantity of water present in the sump while the airplane is parked on a downslope or in a nosedown attitude would not be drainable and would present a hazard during takeoff since the combined effects of acceleration and rotation would move the water directly aft to the fuel supply line port. In general, the presence of water in the fuel in Britten-Norman BN-2 series airplanes presents a unique design and operationally-induced risk of engine failure or malfunction since the fuel outlet line is located within the sump, the natural repository for contaminants.

<sup>1/</sup> For more detailed information, read "Aircraft Accident Report--Vieques Air Link, Inc., Britten-Norman BN-2A-6 Islander, N589SA Vieques, Puerto Rico, August 2, 1984" (NTSB/AAR-85/08).

If the preflight inspection of N589SA had included a check for fuel contamination at an appropriate time interval following refueling and while the airplane was parked in a level attitude, water should have been detected and should have been effectively removed. Therefore, the Safety Board concludes that this check for fuel contamination was not made, was made too soon after refueling, or was made with the airplane in other than a level attitude. In view of these circumstances and the unique design of the fuel tank sumps, the Safety Board believes that frequent checks for fuel contamination should be required prior to each flight and after proper settling time with the airplane in a level attitude. These procedures should be included in the Federal Aviation Administration's (FAA) operations specifications applicable to all air taxi/commuter operators using the Britten-Norman series airplanes. Since these checks cannot be made effectively unless the airplane is in a level attitude, a device to measure airplane attitude should be incorporated as an integral part of the airplane design, e.g., a small bubble-level installed near or adjacent to the protective rubber fairing on the fuel sump drain block.

The Safety Board also notes in connection with the above circumstances that in 1968 Britten-Norman developed a modification of the basic BN-2 fuel supply line and filter installation (modification NB/M/350) to ensure compliance with Australian certification requirements relative to water in the fuel. The modification relocates the engine fuel supply line by moving it forward 8.5 inches from the sump's rear sealing plate and raising it from 1.05 to 2.25 inches above the bottom of the sump. This provides increased protection against a loss of engine power due to fuel contamination since any undetected water or other contaminants tending to move toward the aft end of the sump during takeoff would move away from the fuel supply line rather than toward it. Moreover, the modification provides for a substantial additional capacity within the sump to contain water or other contaminants below the level of the fuel supply line.

There were, as of December 31, 1983, approximately 120 Britten-Norman airplanes registered in the United States, including the 10-place BN-2, BN-2A, BN-2B, and BN-2T Islander and the 18-place BN-2A Mark III Trislander, and it is estimated that there are more than 1,000 of these airplanes in operation throughout the world. They are used principally as feederline transports in air taxi/commuter operations. Except for those airplanes exported to Australia, Britten-Norman currently incorporates the fuel supply line and filter installation modification on other Islander and Trislander airplanes only as an optional item. In view of the accident involving N589SA, and because of their extensive use as feederline transports, the Safety Board believes that Britten-Norman modification NB/M/350 should be incorporated on all of these airplanes to provide additional protection from fuel contamination.

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

Issue an Airworthiness Directive applicable to Pilatus Britten-Norman BN-2, BN-2A, BN-2B, BN-2T, and BN-2A Mk III model airplanes requiring the incorporation of Britten Norman modification NB/M/350 to provide increased protection from fuel contamination. (Class II, Priority Action) (A-85-73)

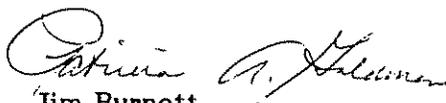
Amend the FAA's operations specifications applicable to Vieques Air Link, Inc., and other U.S. operators of Pilatus Britten-Norman BN-2, BN-2A, BN-2B, BN-2T, and BN-2A Mk III model airplanes engaged in commuter/air taxi operations, to require that preflight checks for fuel

contamination be made before the first flight of the day and after each refueling operation in strict accordance with the manufacturer's instructions. (Class II, Priority Action) (A-85-74)

Require Pilatus Britten-Norman to install a device to measure airplane attitude, e.g., a small bubble-level, on all BN-2, BN-2A, BN-2B, BN-2T, and BN-2A Mk III model airplanes delivered in the United States in order to provide a ready means for ensuring the airplane is level during preflight checks for fuel contamination. Concurrently, require Britten-Norman to develop a service kit or modification instructions to retrofit existing BN-2, BN-2A, BN-2B, BN-2T, and BN-2A Mk III model airplanes with a similar device. (Class II, Priority Action) (A-85-75)

Require Pilatus Britten-Norman to prepare and disseminate a Safety Advisory relating to water in the fuel to all operators of BN-2, BN-2A, BN-2B, BN-2T, and BN-2A Mk III model airplanes. The advisory, in addition to outlining the circumstances relating to the Vieques Air Link accident of August 2, 1984, and the criticality of proper preflight fuel tank drainage procedures, should urge operators to incorporate Britten-Norman Modification NB/M/350 in their airplanes. (Class II, Priority Action) (A-85-76)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, Member, concurred in these recommendations.

  
By: Jim Burnett  
Chairman