

**EXECUTIVE SUMMARY**  
**AIRCRAFT ACCIDENT INVESTIGATION**  
**F-16, S/N 88-0451**  
**LUKE AIR FORCE BASE, ARIZONA**  
**10 JUNE 2003**

On 10 June 2003, at 1715 local (0015 Zulu), the mishap aircraft (MA), an F-16CG, S/N 88-0451, assigned to the 310<sup>th</sup> Fighter Squadron, Luke Air Force Base, Arizona, crashed at the Barry M. Goldwater Range (Range 4), 12 nautical miles southwest of the Gila Bend Auxiliary Field (GBAF), Arizona. The MA was part of a close air support training mission. The mishap pilot (MP) was assigned to the 310<sup>th</sup> Fighter Squadron as a Flight Commander.

Shortly before impact, on final for a Low Altitude Toss (LAT) attack, the MP experienced a loud bang, aircraft vibrations and an immediate loss of thrust. The MP began an immediate climbing turn in the direction of GBAF. The MP recognized the immediate decrease in RPM, loss of thrust, and bunted the MA over to a slightly nose low position in an effort to preserve his RPM at approximately 25%. The MP also recognized the engine temperature remained high, above 900 degrees, and retarded the throttle to idle then to cutoff in an attempt to clear the stagnation. While the throttle was in cutoff, the MP realized the engine temperature remained high, only decreasing to approximately 850 degrees. The MP elected to attempt an airstart by placing the throttle back to idle. The engine did not respond. At this point the MP placed the throttle once again to cutoff and attempted another airstart. At that time, the MP's wingman informed him there was fire coming out of the back of the engine.

The MP, having confirmed the engine was unresponsive, his aircraft was trailing fire, and he was slightly below his minimum ejection altitude, safely ejected sustaining only minor injuries. The MA was destroyed on impact with a loss valued at approximately \$24 million. The impact area was uninhabited desert on Range 4.

Clear and convincing evidence establishes the root cause of this mishap was a manufacturing defect in blade 1 of the 4<sup>th</sup> stage low-pressure turbine of the PW-220 engine, which caused that blade to fail during normal engine operation. Specifically, the relevant radius of curvature of blade 1 at the fracture location was tighter than the drawing requirement reducing the strength of the blade. Because of the reduced strength of blade 1, normal operation of the engine resulted in the formation of a fatigue crack. That fatigue crack progressed until the blade could no longer withstand the stress of operation. At that time, blade 1 fractured and liberated.

Clear and convincing evidence establishes the failure of blade 1 started the chain of events that caused the MA to enter into a non-recoverable engine stagnation and crash. The blade 1 airfoil impacted the remaining 4<sup>th</sup> stage blades causing them to fracture. The liberated 4<sup>th</sup> stage blades then fractured and liberated all of the 3<sup>rd</sup> stage blades at the blade root immediately above the blade platform. The loss of all 3<sup>rd</sup> and 4<sup>th</sup> stage fan drive turbine blades resulted in an immediate decrease in fan speed, as the turbine was no longer able to drive the fan. The engine entered a non-recoverable stagnation. The MP correctly determined the aircraft could not be recovered and ejected.

Under 10 U.S.C. 2254(d), any opinion of the accident investigators as to the cause of, or the factors contributing to, the accident set forth in the accident investigation report may not be considered as evidence in any civil or criminal proceeding arising from the accident, nor may such information be considered an admission of liability of the United States or by any person referred to in those conclusions or statements.