# EXECUTIVE SUMMARY

On 15 April 2002, F-16CJ, tail # 92-3919, assigned to the 14th Fighter Squadron, 35th Fighter Wing, Misawa Air Base, Japan, crashed into the sea after a catastrophic engine failure. The crash occurred at 1129L approximately 1.6 nautical miles northeast of the town of Tanosawa, Japan. The aircraft was destroyed; however there were no deaths or major injuries.

The mishap occurred during a Mission Qualification Training upgrade mission for the Mishap Pilot (MP). The mission was scheduled as two sorties with hot-pit refueling between the first and second sortie. However, due to an anti-skid malfunction, the MP ground aborted the first aircraft before takeoff. The MP stepped to a spare aircraft and flew the second sortie that progressed without incident until in the training area. About 15 minutes into the flight, after completing a G-awareness exercise, the MP reported an engine problem. He immediately turned towards land and jettisoned the centerline fuel tank. The MP attempted to airstart the engine four times; however, because of a catastrophic failure, it would not restart. This failure resulted in the MP's decision to eject. Approximately five minutes after reporting the engine problem, the MP successfully ejected. The mishap aircraft was totally destroyed upon impact with the water.

Inspection of the damaged engine revealed a fatigue crack in one (1) blade of the high pressure turbine (HPT) rotor assembly. The fatigue crack propagated until the blade experienced a tensile overload failure resulting in release of a portion of the blade approximately 0.6 to 0.7 inches above the blade platform. The liberated blade section struck the adjacent blades causing a domino effect and rapid failure of all 72 HPT blades. Failed HPT blade material continued to flow rearward damaging both stages of the low pressure turbine (LPT) ultimately causing engine shutdown. The location where the fatigue crack originated or when the crack began could not be determined due to the extent of heat damage on the blade. Inspection of engine components upstream of the HPT revealed no signs of foreign object damage or pre-impact failure/damage. Metallurgical analysis did not identify any material inconsistencies in the failed blade. In the three months prior to the mishap, there were no engine performance indicators, or pilot or maintenance detectable faults, that would have alerted maintainers to borescope the turbine section and possibly detect the cracked blade.

In the Board President's opinion three causes led to the mishap: (1) for an undetermined reason, a fatigue crack developed in one high pressure turbine blade subsequent to the last borescope inspection; (2) a portion of the cracked HPT blade liberated; and (3) release of the high pressure turbine blade caused catastrophic downstream (axial) damage/failure of the remaining high pressure and low pressure turbine blades. Once the turbines failed, the engine could no longer produce thrust or continue to operate, nor could it be restarted. Regardless of pilot action, because the catastrophic engine failure occurred 40 miles from the nearest airfield, recovery to a usable runway was not possible and therefore the decision to eject was proper and correct.

The Board President noted an additional area of concern with the MP's anti-exposure suit, which leaked cold seawater and led to the MP's mild hypothermia.