RAS 5436 72-22-ISFSI — Applicant Exhibit 214 — Rec'd 7/1/02

STATEMENT OF AUTHORITY AND PURPOSE

By order of the Commander, Headquarters Seventeenth Air Force, Lieutenant Colonel Steven L. Heil, 52nd Fighter Wing, Spangdahlem Air Base, Germany, was appointed by orders, dated 18 March 1994, to conduct an investigation into the crash of an F-16CG aircraft which occurred on 16 February 1994 at Portoroz, Slovenia. Captain Michael J. Andersen, 52nd Fighter Wing, Office of the Staff Judge Advocate, was detailed by the same orders as the Legal Advisor to accompany Lt Col Heil throughout the course of the investigation. Captain Jamie D. Allen, Headquarters 17th AF/LGM, was detailed by the same orders as the Technical Advisor to accompany Lt Col Heil throughout the course of the investigation.

MATTER INVESTIGATED

This is an accident investigation of a Class A aircraft accident involving an F-16CG (Serial Number 89-2134) assigned to the 86th Fighter Wing/526th Fighter Squadron, Ramstein Air Base, Germany. The aircraft departed the runway after an emergency landing at 1019 hours Central European Time (CET), 16 February 1994, at Portoroz Airport, Slovenia. The pilot successfully ejected and survived. The object of the investigation was to obtain and preserve all available relevant facts and evidence pertaining to the accident and to investigate the circumstances leading to the accident for use in claims adjudication, evaluation, litigation, disciplinary action, adverse administrative proceedings, or other purposes deemed appropriate by competent authority. Lieutenant Colonel Heil conducted the investigation under the authority of AFR 110-14, and was guided by the general procedures outlined in AFR 120-3.

SUMMARY OF FACTS

I. History of Flight

On 16 February 1994, Knight 14, the mishap aircraft (F-16CG, 89-2134), piloted by Capt George A. Uribe, departed Aviano Air Base, Italy, at about 0820 CET as number two of a two-ship formation on an Operation DENY FLIGHT mission to Bosnia-Herzegovina (Tab A-1). The flight lead, Knight 13, was Capt Paul C. Strickland (Tab V-4,5). About 1 hour and 59 minutes after takeoff, the mishap pilot ejected safely from his aircraft after flying an emergency approach and landing at Portoroz Airport, Slovenia. After landing, the aircraft exited the departure end of the runway, came to rest in a drainage ditch, and sustained major damage (Tab A-1).

Airport fire department personnel were on scene in about one minute (Tab V-3). No deaths were associated with the accident. The only damage to private property is a broken airfield approach light on top of a six foot pole located approximately 270 feet from the departure end of the runway. However, the Portoroz Airport manager has filed a claim for lost revenue due to airport closure during recovery operations (Tab P-2).

The 401st Fighter Wing Public Affairs Office submitted news releases to

PFS Exh. 214
57844

Template = SECY-028

SECY-02

NUCLEAR REGULATORY COMMISSION

Docket No _____ Official Exh No 214

In the matter of PFS

Staff _____ IDENTIFIED ✓

Applicant ✓ RECEIVED ✓

Intervenor _____ REJECTED _____

Cont'g Off'r _____

Contractor _____ DATE 7/1/02

Other _____ Witness _____

Reporter GH

all major European and United States wire services and broadcast media. It also handled all inquiries.

II. Mission

The flight was an Operation DENY FLIGHT mission to Bosnia-Herzegovina (Tab A-1).

III. Briefing and Preflight

Capt Uribe arrived at squadron operations at 0620 CET on 16 February 1994, following adequate crew rest. He immediately began briefing the mission with his flight lead, Capt Strickland (Tab V-2). The briefing covered all aspects of the scheduled mission (Tab V-2,4).

Refueling and postflight/preflight checks had been accomplished on the mishap aircraft (Tab V-7 thru V-11). Capt Uribe arrived at the mishap aircraft at approximately 0720 CET and accomplished his preflight checks with no problems or discrepancies (Tab V-2).

IV. Flight Activity

After an uneventful engine start and normal checks, Knight 14 detected a problem with his Mode IV Identification Friend or Foe (IFF) system. Maintenance technicians responded (commonly known as a redball), and the problem was corrected. Knight 14 then took off and departed Aviano Air Base with his flight lead, Knight 13 (Tab V-2,4).

The mission included air-to-air refueling prior to entering the area of responsibility (AOR) and close air support (CAS) operations in the Bosnia-Herzegovina AOR. On return to base, the flight practiced missile defense maneuvers in a lead/trail formation over the Adriatic Sea (Tab V-2,4)

At the conclusion of the maneuvers, Knight 14 was rejoining on Knight 13 at 20,000 feet mean sea level (MSL) and 350 knots when Knight 14 heard a "thump" which he thought came from the engine inlet. His aircraft's Master Caution and Secondary Engine Control (SEC) lights illuminated, and the aircraft lost thrust. Knight 14 informed Knight 13 of his indications and accomplished his SEC checklist which revealed the engine would not respond to throttle movement. Engine indications were 90% revolutions per minute (RPM) and a fan turbine inlet temperature (FTIT) of 600 degrees fahrenheit (F) (Tab V-2,4).

Knight 13 passed the flight lead to Knight 14. The flight, realizing they were not within gliding distance of the Italian coast, immediately turned right towards the Croatian coast. Knight 14 selectively jettisoned his two empty external fuel tanks and two MK-82 bombs approximately 9 nautical miles west of Croatia in the Adriatic Sea (coordinates: N 4516.6 E 1320.7) (Tab P-2, V-2) and established an optimum glide profile. Knight 14 accomplished the abnormal engine response checklist and felt an increase in thrust for approximately two seconds. The engine then returned to the

condition of insufficient thrust to maintain altitude and airspeed and no response to throttle movement. The engine indications were 85% RPM and a FTIT of 600 degrees (F) (Tab V-2).

After reaching the Croatian coast at about 8,000 feet MSL, Knight 14 and Knight 13 began looking for a suitable area for ejection. Knight 13 spotted an airfield approximately 15-20 nautical miles away and talked Knight 14's eyes onto it. Knight 13 flew ahead and accomplished a low pass over the airfield at 300-500 feet above ground level to check its suitability for an emergency landing. He reported to Knight 14 the runway was 4000-5000 feet long with a ridge off the approach end and a long canal located off the departure end of the runway. Knight 13 also informed Knight 14 that he should eject if the aircraft departed the runway (because of the canal) (Tab N-4, V-2,3,5).

Knight 14 performed an emergency approach to the runway (Runway 33) over a ridge 520 feet above field elevation and 2673 feet from the runway threshold. Knight 14 touched down 754 feet past the runway approach end at 172 knots (Tab C-1).

Knight 14 experienced directional control problems on landing roll due to strong crosswinds and used maximum braking to slow the aircraft (Tab V-3). He ejected as the aircraft departed the end of the runway at 64 knots (Tab C-1).

V. Impact

On 16 February 1994 at 1019 CET, the mishap aircraft departed the end of Runway 33 at Portoroz Airport, Slovenia, located 55 nautical miles southeast of Aviano Air Base, Italy, (coordinates: N4527.0 E1337.0) at 64 knots (Tab A-1, C-1). The aircraft's nose and main gear collapsed in the mud after runway departure (Tab M-3). It came to rest in a drainage ditch about 324 feet off the departure end of the runway (Tab R-1). The aircraft incurred approximately $3,500,000.00 in damages (Tab M-2).

VI. Ejection Seat

Ejection was initiated and occurred within the ejection seat's design operating envelope. No deficiencies were noted.

VII. Personal and Survival Equipment

All personal survival equipment inspections were current. Capt Uribe successfully used the survival radio. He was drug across the ground approximately 100 yards after having difficulty releasing one of his parachute risers. No problems were experienced with any other equipment (Tab V-3).

VIII. Rescue

The mishap occurred at 1019 CET. At 1017:44 CET, Capt Uribe directed Morpha Ground Controlled Intercept (GCI), "to get a rescue recovery truck started now." Morpha GCI immediately vectored an airborne EC-130 to the

mishap site, and it arrived overhead within minutes (Tab N-7). The mishap pilot established communications immediately after ejection with the EC-130 and Knight 13 on his survival radio (Tab V-3,5).

The Supervisor of Flying (SOF) and tower personnel at Aviano AB initiated crash recovery at 1018 CET after talking with Knight 13 on the radio (Tab N-8,9, V-4). At 1030 CET the SOF contacted a U.S. Army CH-47 helicopter holding on the Aviano AB taxiway for departure, and requested them to pick up the mishap pilot. The CH-47 agreed, subject to approval from U.S. Army Europe Headquarters. Approval was received, and the CH-47 departed for Portoroz Airport at 1056 CET, arriving at 1130 CET. They waited with the pilot until he was given permission to leave Portoroz Airport and departed at 1307 CET, arriving back at Aviano AB at 1337 CET (Tab V-6). Capt Uribe was then immediately transported to the base clinic (Tab V-3).

IX. Crash Response

After ejection, Captain Uribe landed near the wreckage and was rescued within minutes by the Portoroz Airport fire department personnel. He was taken to the airport facility and transported to Aviano Air Base about three hours later by helicopter (Tab V-3). Aircraft recovery operations were completed at Portoroz Airport on 23 February 1994.

X. Maintenance Documentation

The mishap aircraft maintenance forms were reviewed. There were three open discrepancies: 1) HUD Glareshield removed (screw on order), 2) HUD Glareshield removed (hardware and glareshield on order), 3) Three screws missing from left ventral fin (bad nut plate). These discrepancies were not related to the mishap. All inspections were current. In addition, there were no overdue Time Compliance Technical Orders (TCTOs) (Tab H-1).

The AFR 127-4 Safety Board sent the MEC, main fuel pump, and two (2) T2.5 sensors to Woodward Governor, Co., Chicago, Il., for testing and teardown analysis (Tab J-6). The VSV feedback cable and both VSV actuators were sent to General Electric Co., Cincinnati, OH., for testing and teardown analysis (Safety Board Memo for Record). These analysis results are unavailable due to their inclusion in Part II of the AFR 127-4 safety report.

The AFTC, fan speed sensor, and pyrometer were sent to OC-ALC, Tinker AFB, OK, for testing and analysis. Test results for all three parts were normal (Tab J-8,9).

XI. Maintenance Personnel and Supervision

Preflight inspection and servicing were properly accomplished. All pertinent AF Form 623s (training records) were reviewed and found satisfactory.

XII. Engine Oil, Fuel, and Hydraulic Oil Inspection Analysis

Engine oil analysis and historical records were normal (Tab D-1). Fuel, hydraulic oil, and oxygen analysis revealed nothing that would contribute to the accident (Tab J-10 thru J-15).

XIII. Airframe and Aircraft Systems

The download of Engine Monitoring System Computer (EMSC) data revealed the engine experienced an automatic transfer from the primary control mode of engine control to the secondary control (SEC) mode of engine control at 10:18:41 (hr:min:sec) local time (Tab O-13). The EMSC data also shows the pilot performed a pilot data save 38 seconds later (Tab O-21). The pilot data save produced 16 scans of engine data that provided no useful information. This was due to the transfer to the SEC mode having already taken place. The EMSC records engine data only while the engine is in the primary mode.

The automatic transfer to the SEC mode triggered Engine Monitoring System (EMS) Fault 48, which indicates a transfer to the SEC mode. As a result of Fault 48, the EMSC produced 16 scans of information. However, only the first 11 scans provided useful information. Scan 12 data was corrupted due to the transfer to SEC being in-progress. Scans 12-16 were taken after the SEC transfer was completed (Tab O-13 thru O-20).

The first seven scans of Fault 48 show NG (engine core speed that is shown on the cockpit RPM gauge) increasing while NF (engine fan speed) is decreasing (Tab O-13 thru O-16). Data from the Crash Survivable Flight Data Recorder (CSFDR) also shows NG increasing and NF decreasing at about the 110:55.063 TimSRef point (Tab O-6). For the remainder of the flight, CSFDR data shows abnormally low NG and NF readings in relation to the Engine Power Lever Angle (EPLA) (Tab O-6 thru O-12). This means the pilot was receiving less thrust than what he was asking for through throttle position inputs to the engine. An engineering analysis of the EMSC and CSFDR data performed by the F110/F118 Engineering Section, Systems Engineering Branch, OC-ALC, Tinker AFB, OK, stated there was a sudden NG increase and NF decrease while in the primary engine mode that was accompanied with a decrease in PS3 compressor discharge pressure. This was followed by abnormally low NG and NF for the remainder of the flight while in the secondary engine mode. This would be expected if the variable stator vanes (VSVs) went to the closed position. With the VSVs in the closed position, a significant thrust reduction would occur (Tab J-16). VSVs are powered and controlled by the main engine control (MEC).

To understand the relationship between the MEC and the VSVs, the following brief description is provided:

The F-110-GE-100 engine has a three-stage fan and a nine-stage compressor core. The compressor (core) variable vane system varies the angle of the core inlet guide vanes and the following three stages of core VSVs to aerodynamically match the low pressure stages of compression with the high pressure stages. This variation of VSV position changes the effective angle at which the air flow enters the compression rotor blades, thus determining the compression characteristics for any particular stage of compression. By varying the vane position in accordance with a predetermined schedule, and as a function of those parameters affecting compressor performance (fan discharge temperature and core engine speed), the critical low pressure stages are automatically aligned to maintain satisfactory airflow and compressor performance during all engine operating conditions within the physical limitations of the system.

The MEC is a fuel operated, bypassing type, electro-hydromechanical fuel flow regulator. It sets fuel flow in the primary and secondary engine modes. It also provides VSV positioning for core engine operation in both the primary and secondary modes, the MEC combines the inputs of fan discharge temperature, core engine speed (NG), VSV position feedback, throttle position, and a VSV position reset signal from the AFTC (in primary mode only). The VSVs are mechanically linked to two VSV actuators. Both VSV actuators are powered by high-pressure fuel supplied by the MEC.

The following is an analysis of components that have input to the MEC and components that receive outputs from the MEC in relation to the operation of VSVs on aircraft 89-2134:

Fan discharge temperature is taken from two (2) T2.5 sensors. The MEC contains a red failure indicator which will indicate a failure from either T2.5 sensor. The T2.5 sensor failure indicator on the MEC from aircraft S/N 89-2134 did not indicate a failure on the post accident inspection (Tab J-4).

Core engine speed (NG) is received from a direct rotational drive from the main fuel pump. A failure of the direct rotational drive would not have caused a simultaneous increase in NG and decrease in NF.

VSV position feedback is received by the MEC via a push/pull cable driven by the VSV actuating system. Post-accident evaluation of the aircraft revealed the VSV feedback cable ends were properly connected, the cable was properly rigged, and operated normally (Tab J-4).

Inputs from the cockpit throttle are received by the MEC via a push/pull mechanical linkage cable. The throttle cable was found properly connected to the MEC (Tab J-6). In addition, a throttle cable operating improperly would only affect fuel flow to the engine, and would not cause improper VSV scheduling.

The VSV position reset electrical signal from the AFTC is received by the MEC only in the primary mode of engine operation. The VSV position reset signal would not cause improper VSV scheduling while the engine was in the secondary mode.

External VSV actuating linkage was found to be in good order and properly safety wired. Actuator hydraulic lines showed no signs of looseness or leakage. In addition, the VSV actuators showed no signs of external damage. They operated normally while being "hand pumped" to the full open position, which also revealed no blockage in the fuel lines from the MEC to the actuators (Tab J-4).

The AFTC, fan speed sensor, and pyrometer all tested normal in evaluations by OC-ALC, Tinker AFB, OK (Tab J8,9).

The following is a summary of the MEC history and MEC engineering analysis from OC-ALC, Tinker AFB, OK:

History records show that a loose screw was found inside the MEC and the accompanying washer was not found during the first internal inspection of the MEC in June 1989. This internal inspection was performed by OC-ALC, Tinker AFB, OK. The MEC was then fowarded to Woodward Governor, Co., Rockford, Illinois, for repair work under a warranty contact. In December 1989, Woodward Governor, Co. verified the missing screw but did not find the missing washer (Tab O-33). A complete teardown inspection was not performed to locate the missing washer (Tab J-18). The loose screw was lost in transit from Tinker AFB, OK, to Woodward Governor, Co. The MEC passed the automated test program (ATP) and was shipped to General Electric (GE) Strother. GE Strother shipped the MEC in January 1990 to OC-ALC, Tinker AFB, OK, as serviceable. OC-ALC shipped the MEC to Moody AFB, GA, in March 1993, where it was installed on the mishap engine, S/N 509686. In October 1993, engine S/N 509686 was installed in aircraft 89-2134 and the aircraft was transferred to the 86th Wing, Ramstein AB, Germany (Tab O-33).

The engineering analysis revealed that several components of the VSV control system showed signs of damage. These components included the compressor discharge pressure and governor pilot valve body (all one part), governor ballhead, and VSV reset piston. In addition, four of the pilot valves, including the VSV pilot valve, had minute scratches and burnishings and appeared to have been operating in a contaminated environment. A thoroughly distorted small flat washer, as well as several particles of material (discovered inside the control during the initial investigation) were examined. The washer was W-shaped and had lost a good deal of mass by abrasion. The engineering analysis concluded that foreign material was being produced as the washer was abraded between the governor body and ballhead. The foreign material found its way into the extremely close fitting pilot valves. At some point, this caused the VSV pilot valve to hang up and drive the VSVs abruptly closed. The hang up of the VSV pilot valve would also explain the failure of the SEC mode to restore engine thrust (Tab J-17,18).

XIV. Operations Personnel and Supervision

The mission was tasked and authorized by 5th Allied Tactical Air Force Operation DENY FLIGHT Air Tasking Message for 16 February 1994. The flight briefing was conducted by Capt Strickland, and no supervisors were present. All required preflight supervisor briefings and actions were accomplished.

XV. Pilot Qualifications

Captain Uribe has flown over 940 hours as a military pilot, approximately 677 hours in the F-16 of which 51 hours were combat time. He was qualified and capable of flying the tasked mission (Tab G-2 thru G-4).

XVI. Medical

Capt Uribe was medically qualified for flight duty and had a current flight physical.

The findings of the post mishap flight surgeon's exam and toxicology report revealed nothing which would have adversely affected his performance (Tab O-29 thru O-32). He received minor cuts and abrasions to his left buttock from being drug across the ground by his parachute (Tab V-3).

XVII. NAVAIDS and Facilities

There were no Notices To Airmen on 16 February 1994 that were a factor in the mishap (Tab K-6).

XVIII. Weather

The Portoroz Airfield weather at the time of the mishap was CAVOK (clear and visibility OK) with worst case winds of 080 at 14 knots gusting to 22 knots (resulting in a 7 knot tailwind and a 21 knot right crosswind for landing). The temperature was 32 degrees F, and the runway was dry (Tab W-1).

XIX. Directives and Publications

The following directives, publications and technical orders were applicable to the operation of the mission:

a. Regulation and Manuals

1. MCM 3-3 Vol V, F-16 Combat Aircraft Fundamentals
2. AFR 55-27, Air Force Life Support Program
3. AFR 60-1, Flight Management
4. USAFE SUP 1 to AFR 60-1
5. USAFER 60-2, Aircrew Standardization and Evaluation Program
6. AFR 60-16, General Flight Rules
7. USAFE SUP 1 to AFR 60-16
8. USAFER 51-50 VOL XXX, USAFE Tactical Aircrew Training
9. USAFER 55-44, Life Support Program
10. USAFER 55-116, F-16 Pilot Operational Procedures
11. 5 ATAF Operation DENY FLIGHT Air Tasking Message , 16 Feb 1994
12. 5 ATAF Operation DENY FLIGHT Airspace Coordination Order
13. Operation DENY FLIGHT Special Instructions
14. 526 Fighter Squadron Operation DENY FLIGHT Standards
15. Pasta Tips Local Inflight Guide

b. Technical Orders

1. T.O. 1F-16CG-1, F16C/D Flight Manual
2. T.O. 1F-16CG-1CL-1, F-16C/D Checklist
3. T.O. 1F-16CG-1-1, F-16C/D Flight Manual
4. T.O. 1F-16CG-1-2, F-16C/D Flight Manual
5. T.O. 1F-16CG-34-1-1, F-16C/D Nonnuclear weapons delivery
6. T.O. 1-1C-1-30, Flight Crew Air Refueling Procedures With KC-135 and KC-10
7. T.O. 1F-16C-6WC-1-11, Basic Postflight/Preflight, Launch, Recovery, and End of Runway Inspection

STATEMENT OF OPINION

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 an aircraft accident, nor may such information be considered an admission of liability by the United States or by any person referred to in those conclusions or statements.

A foreign object washer inside the main engine control caused it to fail. Failure of the main ergine control caused a significant reduction in thrust available and the loss of engine response to throttle movement.

STEVEN L. HEIL, Lt Col, USAF
Accident Investigating Officer