

STATEMENT OF AUTHORITY AND PURPOSE

AUTHORITY An investigation of the F-16C (S/N 86-0250) mishap which occurred in Range 74 within the 4807 Restricted Area on August 10, 1993 was conducted at Nellis Air Force Base (AFB), Nevada. Major Douglas M. Harrison was appointed by the Commander, USAF Weapons and Tactics Center (USAFWTC), to conduct an AFR 110-14 investigation of the accident under authority of USAFWTC/CC letter, dated September 10, 1993 (TAB Y). The investigating officer is assigned to the 57th Operations Support Squadron, 57th Wing, at Nellis AFB, Nevada. The legal advisor was Captain Kirk Foster, assigned to USAFWTC/JA.

PURPOSE: The purpose of this accident investigation was to obtain all available evidence for use in claims, litigation, disciplinary action, adverse administrative proceedings, and for all other purposes in accordance with AFR 110-14

CLEAR REGULATORY COMMISSION

Docket No. _____ Official Exh. No. 155
 In the matter of PFS

Staff _____ IDENTIFIED
 Applicant RECEIVED
 Intervenor _____ REJECTED _____
 Other _____ WITHDRAWN _____
 DATE 7/1/02 Witness _____
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PFS Exh. 155

SUMMARY OF FACTS

- 1. HISTORY OF FLIGHT.** On August 10, 1993, Captain James H Reynolds, Jr., the mishap pilot (MP), was scheduled to fly an F-16 (S/N 86-0250) as MIG 04, the number four man in a formation of four F-16s, with three other pilots assigned to the 414th Training Squadron, Adversary Tactics Division (414 TS/AT). MIG 01, the flight lead for the mission, was Lieutenant Colonel James D Deaux. MIG 02 was Colonel William L. Schwetke. MIG 03 was Captain Robert C. Hartwig. MIG flight took off on time from Nellis AFB. The departure out to the exercise area, air refueling, marshalling of the adversary package, and all other pre-engagement portions of the flight were unremarkable. During the course of the mission, Captain Reynolds became separated from the rest of the formation (TAB V-13). After taking a simulated air-to-air missile shot against an F-15 at medium altitude (TAB V-13), the MP placed his aircraft in a near vertical dive. He held this dive for approximately eight seconds before initiating a recovery (TAB J-62). According to a computer simulation, recovery was imminent and would have occurred if there had been another 120 feet of altitude (TAB J-73-74). The mishap aircraft impacted the ground close to level flight and probably tail first, i.e. with the aircraft nose above the horizon but still descending, at 37-30.12 North latitude, 116-16 16 West longitude (TAB A-1). No ejection attempt was made (TAB J-12, J-24) and the pilot was fatally injured. News media interest was handled by the USAF Weapons and Tactics Center Public Affairs Office.
- 2. MISSION.** The mission was part of a multi-aircraft adversary ("red") package in support of a Joint Air Defense Operations/Joint Engagement Zone (JADO/JEZ) test. The adversaries were to simulate a variety of realistic fighter and bomber threats to a friendly ("blue") Integrated Air Defense System composed of F-14, F-15, and F-18 aircraft as well as Patriot and HAWK surface-to-air missile systems (TAB V-2). On the day of the mishap, MIG 04 was one of 12 red force air-to-air F-16s who were to sweep in and clear the air of blue defenders in front of a group of red force bombers, consisting of F-4G, F-18, F-111, EA-6, and Harrier aircraft (TAB V-22). Although different from the routine 414 TS/AT mission in support of a Red Flag, other AT pilots considered the mission no more complex nor more difficult (TAB V-7,V-9).
- 3 BRIEFING AND PREFLIGHT:** All flight members had adequate crew rest for the mission (TAB V-4). Captain Reynolds, an experienced squadron flight lead and instructor pilot, had also flown in a similar mission in the afternoon on the day prior (TAB V-4). A military flight plan for the mission was filed on a Nellis Air Force Base (AFB) Form 175 which served as the local flight clearance and daily flight order (TAB K-1). The exercise in-brief, the red package mass pre-mission brief, and the MIG flight brief were all complete and thorough (TAB V-2-4, V-8-9, V-12-13). The briefings were considered routine and not particularly noteworthy (TAB V-8-9). Aircraft walk-around inspection, engine start, and power-on checks were routine with no discrepancies (TAB V-20).
- 4. FLIGHT ACTIVITY.** After take off MIG flight refueled in Caliente Military Operating Area. Refueling and staging of the red force package was unremarkable. Captain Reynolds confirmed that his aircraft and all systems were nominal. MIG flight assumed its position in the southern most lane and swept from east to west across the exercise area (TAB V-4). MIG flight started its sweep still in close, visual formation until they were approximately 45 miles from a blue F-15, at 1602 PDT (TAB N-2). MIG flight then descended to low altitude and separated into two elements, MIG 01 and 02 with MIG 03 and 04 about five to ten miles behind. MIG 01 and 02 turned right to the north in an effort to decoy the F-15s and allow MIG 03 and 04 to sneak in undetected, close the gap, and shoot the F-15s. But the F-15s withdrew and MIG 01 and 02 turned left back to the west. Shortly thereafter, MIG 01 was simulated killed by a blue surface-to-air missile (SAM) and he reversed course back to the east climbing toward the air refueling tanker (TAB V-4). MIG 03 and 04 continued to the west approximately ten miles behind and slightly to the south of MIG 02. MIG 02 detected, engaged and shot another F-15 (TAB V-9) while MIG 03 and 04 became visually separated while reacting to (countering) numerous SAMs (TAB V-13). MIG 04, Captain Reynolds, detected, engaged, and called a "kill" on a blue F-15 at 25,000 feet altitude near Quartzite Mountain (TAB N-5). The maneuvering consisted of a right hand climbing conversion to valid shot parameters. He continued to pull down through the horizon to a near vertical, eighty to ninety degrees nose down, attitude where he paused and held this attitude for nearly eight seconds. Captain Reynolds initiated recovery at just over 4,000 feet above the ground (TAB J-43-44, J-57-59). MIG 03, having successfully countered his SAM, had turned back to the west and was trailing MIG 04 by nearly ten miles. MIG 03 was the first to see the crash, although he initially mistook the fireball for bomb detonation (TAB V-13).

5. IMPACT. At approximately 1610 PDT on August 10, 1993, F-16, S/N 86-0250, impacted the ground in Restricted Area 4807. The aircraft was near wings level (less than 10 degrees of bank), near level pitch attitude, and travelling at approximately 520 knots calibrated airspeed at impact (TAB J-20, J-44).

6. EJECTION SEAT: All inspections were current (TAB U-46-47). Evidence suggests that Captain Reynolds was in a normal flying posture, head erect and hands on the flight controls, at impact (TAB J-9-10). The ejection handle was still in the stowed position and the explosive initiators had not fired, indicating that no ejection attempt was made (TAB J-12, J-24)

7. PERSONAL AND SURVIVAL EQUIPMENT: All personal and survival equipment inspections were current (TAB U-48-49) Since no ejection was attempted, neither were a factor in this accident.

8/9 RESCUE/CRASH RESPONSE: Although the aircraft impacted at approximately 1610 PDT, a roll-call was not initiated until 1615 due to radio saturation as each exercise participant verbally confirmed that the engagement had ended, in accordance with established procedures. Radio call-sign of the mishap aircraft was confirmed at 1620. 554th Range Squadron notified Nellis Command Post of aircraft crash at 1622. Department of Energy was directed to launch rescue helicopter, radio call-sign RESCUE 01, at 1635. RESCUE 01 launched at 1642, rendezvoused with MIG 01 at 1651, and landed at the crash site at 1653 (TAB N-6-8). MIG 03, the first to see the crash, initially served as on-scene rescue coordinator (RESCAP commander). MIG 02 acted as a radio relay while orbiting at high altitude until reaching minimum recovery fuel for Nellis AFB (TAB V-13). MIG 01, who was enroute to the air refueling tanker when notified of the crash, refueled and returned to the crash site. MIG 01 then assumed RESCAP commander responsibilities from MIG 03. The rescue and crash response was timely and efficient (TAB V-5-6)

10. MAINTENANCE DOCUMENTATION: A review of aircraft forms showed there were no discrepancies or any unaccomplished Time Compliance Technical Orders related to the accident (TAB H-1,H-2). A review of all scheduled major maintenance inspections was accomplished and all were found to be complete and current (TAB H-2). No maintenance factors were related to the accident.

11. MAINTENANCE PERSONNEL AND SUPERVISION: All pre-flight servicing was accomplished, properly documented, and properly inspected (TAB U-43-45). All maintenance supervisors and personnel were well qualified and were not related to the accident.

12. ENGINE, FUEL, HYDRAULIC, AND OIL INSPECTION ANALYSIS. Engine, fuel, hydraulic, and oil inspection analysis factors were unremarkable and not related to the accident (TAB J-1-16).

13 AIRFRAME AND AIRCRAFT SYSTEMS: The airframe and aircraft systems were operating normally and were not factors in the accident (TAB J-17-66).

14. OPERATIONS PERSONNEL AND SUPERVISION Major Michael Jones, 414 TS/AT Assistant Operations Officer, properly authorized the mission on the Nellis AFB Form 175, Daily Flight Order (TAB K-1). Lieutenant Colonel Deaux, the MIG flight leader, conducted the flight briefing in accordance with local guides and Air Force regulations (TAB V-2-4)

15. PILOT QUALIFICATIONS: Captain Reynolds was an experienced fighter pilot with over 1,600 hours of flight time and over 1,250 hours of F-16 time (TAB G-2-3). Captain Reynolds had completed a mission qualification check ride on December 10, 1992 where he was rated "Exceptionally Qualified." He had also completed an instrument check ride on December 18, 1992 where he garnered a "Qualified -- No Discrepancy" rating (TAB T-2-4). He was qualified and current at the time of the accident (TAB G-5-13). His recent flying is summarized below (TAB G-4)

	<u>Sorties</u>	<u>Hours</u>
Last 30 days	17	31 8
Last 60 days	32	60.3
Last 90 days	51	85 6

Lieutenant Colonel Deaux (MIG 01) is an experienced fighter pilot and was qualified and current in the F-16 at the time of the accident. He is a senior supervisor in the 414 TS/AT and has over 700 hours in the F-16 (TAB V-1)

Colonel Schwetke (MIG 02) is an experienced fighter pilot and was qualified and current in the F-16 at the time of the accident. He is commander of the 414 TS and has over 360 hours in the F-16 (TAB V-8)

Captain Hartwig (MIG 03) is an experienced fighter pilot and was qualified and current in the F-16 at the time of the accident. He had one operational four year tour in F-15s and has been flying F-16s at Nellis AFB since February of 1993. He has approximately 170 hours in the F-16 (TAB V-12).

16. MEDICAL. Captain Reynolds was medically qualified for flying duties at the time of the accident (TAB T-1). The post-mortem toxicological and alcohol laboratory tests were graded non-contributory (TAB X-2). No physiological evidence was found to be relevant to the mishap.

17. NAVIGATIONAL AIDS AND FACILITIES. No Notice to Airmen bulletins were issued for the local flying area that would have affected the mission (TAB AA-1).

18. WEATHER. The weather forecast for the Nellis AFB ranges on August 10, 1993 was for two-eighths cumulus cloud coverage at 13,000 to 20,000 feet, one-eighth alto-cumulus cloud coverage at 19,000 to 24,000 feet, visibility in excess of seven miles; winds from the south-southwest at less than 10 knots; a minimum altimeter setting of 29.94; and a possibility of scattered thunderstorms over the eastern mountains. Sunset occurred at 1936 PDT (TAB W-1-3). Other pilots confirmed the forecast with some clouds in the east, near the refueling location, but clear in the vicinity of the crash site. Weather was not a factor in the mishap (TAB V-9, V-15).

19 DIRECTIVES AND PUBLICATIONS

a Directives and publications applicable to the operation of the mission were

1. AFR 60-1 Flight Management
2. AFR 60-16 Flight Rules
3. AFR 50-46, Nellis AFB Supplement 1, Weapons Ranges
4. ACC/MCR 51-50 Fighter Aircrew Training
5. MCR 55-116 F-16 Pilot Operating Procedures
6. ACCR 55-79 Aircrew/Weapons Controller Procedures for Air Operations
7. Nellis AFB Regulation 55-1 Local Operating Procedures
8. 57 WG In-Flight Guide
9. TO 1F-16C-1 F-16 Flight Manual
10. TO 1F-16C-1CL-1 Pilots Abbreviated Flight Crew Checklist
11. MCM 3-1 (S) Mission Employment Tactics: Tactical Employment
12. TO 1F-16C-6 Scheduled Inspection and Maintenance Requirements
13. TO 1F-16C-6WC-1 Preflight/Postflight Inspection Workcards
14. TO 1F-16C-6WC-2 Phase Inspection Workcards
15. TO 1F-16C-2-12JG-00-1 Servicing
16. TO 1F-16C-2-10JG-00-1 Aircraft Safety
17. TO 1F-16C-2-09JG-00-1 Towing and Taxiing
18. TO 1F-16C-2-00JG-00-1 Job Guide Index

b There were no known or suspected violations from the directives and publications by crew members or others involved in the mission.

20. STATEMENT OF OPINION (NOTE: UNDER 10 U.S.C. 2254 (D), ANY OPINION OF THE ACCIDENT INVESTIGATOR 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 The cause of this accident was that Captain Reynolds delayed his recovery from a near vertical dive beyond the point where there was sufficient altitude to recover. The exact reason for this delay is indeterminable. Possible contributing factors are as follows:

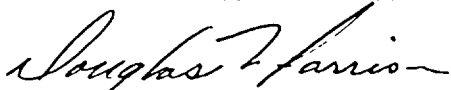
(1) Captain Reynolds may have thought he was at a higher altitude when he took his shot against the F-15 while in a climbing, right turning conversion. The F-15 was at 25,000 feet but in a right banking turn towards and into Captain Reynolds at the shot. Because of the bank, Captain Reynolds may have felt he was in a more level conversion turn and closer to 25,000 feet when he was actually nearly 10,000 feet below the F-15 (TAB AA-14-16). It is relatively common for pilots to falsely perceive their own aircraft attitude and altitude when using another aircraft for attitude reference cues. This error does not, by itself, explain the subsequent decision not to eject. However, one fact is inconsistent with this scenario. Captain Reynolds was pointing toward the northwest and the horizon should have been visible beyond the F-15 with the late afternoon sun off his left shoulder, not in his eyes. If he noticed the horizon, Captain Reynolds should not have underestimated his own altitude.

(2) Captain Reynolds may have visually underestimated his altitude in the dive. Much of the terrain near the crash site is devoid of vertical development, vegetation, structures, or other aids to depth perception. Some of the terrain was in shadows due to the afternoon low sun angle and the Quartzite Mountain range, peaking over 2,000 feet higher than the crash site elevation and located three miles to the west of the impact area (TAB R-2). This mistake would also explain Captain Reynolds' failure to eject.

(3) Captain Reynolds may have been distracted while in the steep dive. His element leader, MIG 03, asked "What DME is that 4?" 14 seconds after Captain Reynolds' radio call saying he had killed the F-15 (TAB N-5). In simpler language, MIG 03 was asking for Captain Reynolds' geographical position. Assuming that Captain Reynolds completed the kill call within 5 seconds of the shot, MIG 03's question occurred 19 seconds after the shot, i.e. just as Captain Reynolds was approaching 90 degrees of dive. Answering the question would have required Captain Reynolds to look inside the cockpit to obtain a magnetic bearing and distance from the inertial navigation system. Bearing information may have been difficult to read since the indicator tends to spin when the aircraft is in near vertical flight. Captain Reynolds started the dive recovery 30 seconds after the shot (TAB AA-14-34). However, this error does not, by itself, explain the subsequent decision not to eject.

b A gravity induced loss of consciousness (G-LOC) is not supported by the evidence. Not only was Captain Reynolds in excellent physical shape (TAB V-4), but the Flight Data Recorder measured and stored minute lateral flight stick movements, which are analogous to the small steering wheel corrections we make while driving a car, during the conversion for the attack on the F-15 and throughout the dive recovery (TAB J-37-44). Captain Reynolds' head position and posture at impact were also inconsistent with a G-LOC (TAB J-10).

c Captain Reynolds was within successful ejection parameters until approximately 1.4 seconds prior to impact (TAB J-28). Therefore, there were about five seconds starting after he had begun his late dive recovery where he could have successfully ejected. Depth perception may have been a factor as stated in paragraph 20a(2) above. Since life science models indicated normal flying posture at impact (TAB J-10), Captain Reynolds was apparently confident that he would complete the dive recovery although probably with little altitude to spare. The available evidence neither suggests nor supports any other reasons for Captain Reynolds' inability or failure to eject.



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