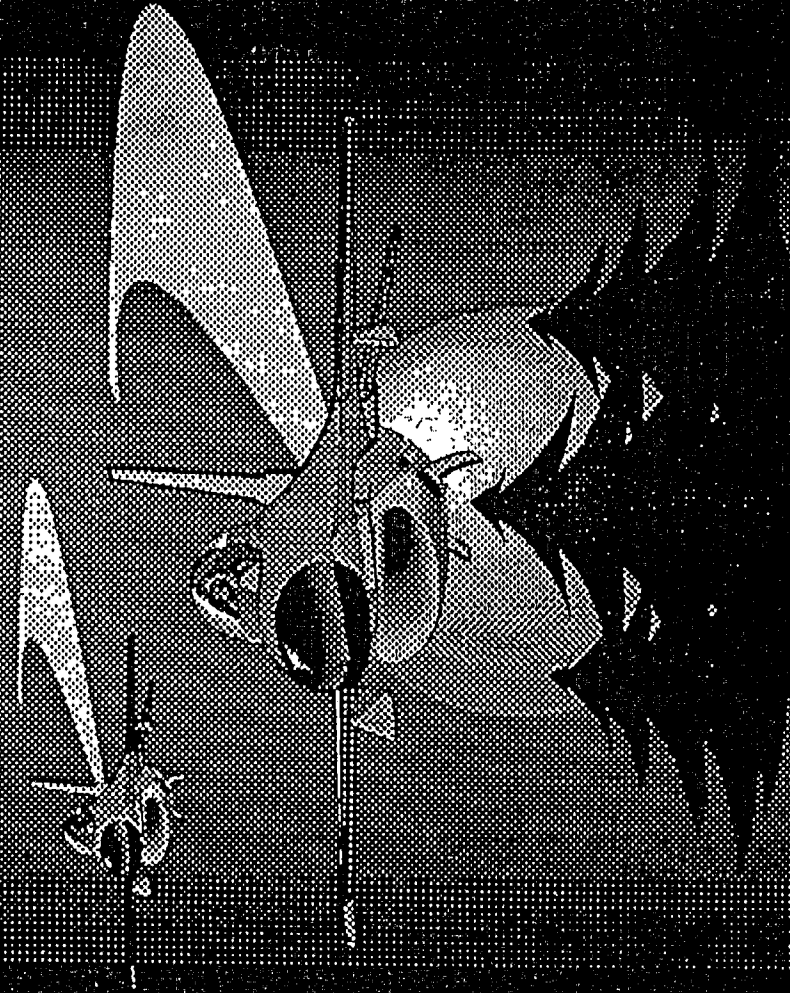


114 Fighter Squadron

Kingsley Field, Oregon



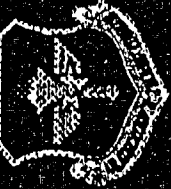
# AIRCRAFT ACCIDENT INVESTIGATION REPORT



PFS Exh: 163  
57720

Mishap Date: 29 November 1998

F-16A (ADF), S/N 81-0770



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OFFICE OF THE SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFF

NUCLEAR REGULATORY COMMISSION

Docket No. \_\_\_\_\_ Official File No. 163  
In the matter of PFS  
Staff \_\_\_\_\_ ED \_\_\_\_\_ ✓  
Applicant \_\_\_\_\_ ✓ ED \_\_\_\_\_ ✓  
Intervenor \_\_\_\_\_ CTED \_\_\_\_\_  
Other \_\_\_\_\_ WITHDRAWN \_\_\_\_\_  
DATE 7/1/02 Witness \_\_\_\_\_  
Clerk \_\_\_\_\_

## SUMMARY OF FACTS

### HISTORY OF FLIGHT:

ROGUE 2, the mishap aircraft, was the wingman in a flight of two F-16s which took off at 1332 PST from Kingsley Field, Oregon, for a student training sortie on the afternoon of November 29, 1993. The flight was planned into Varmit airspace 60 miles northeast of Klamath Falls, Oregon, for an air refueling with a KC-135 tanker, and then south into Goose airspace for an autonomous training mission involving ROGUE 1 and ROGUE 2 (mishap). Following the mission in Goose airspace, ROGUE FLIGHT planned to return to Kingsley Field for landing after approximately one hour and fifteen minutes airborne. The weather in the airspace was mostly cloudy. The surface visibility, wind and cloud ceilings were adequate for student flight operations. The mishap pilot (ROGUE 2) was on a remake sortie designed to improve his inflight administrative capabilities. After ROGUE 2 (mishap) failed to respond to

radio calls from ROGUE 1, and following an unsuccessful attempt by ROGUE 1 to locate a possible crash site underneath the weather, ROGUE 2 (mishap) was declared missing. The regional news media was informed. Information inquiries were handled by the Public Affairs Officer assigned to the Kingsley Field Survival Recovery Center, which was activated upon notification of a missing aircraft.

MISSION:

The pilot of ROGUE 2 (mishap) was 1Lt Stephen L. C. Taylor, who was learning to fly the F-16 following graduation from undergraduate pilot training at Reese AFB, Texas and Introduction to Fighter Fundamentals at Holloman AFB, New Mexico. Lt Taylor had flown a basic fighter maneuvers mission on November 19, 1993 which was graded unsatisfactory for administrative shortcomings during the flight (TAB T-7-1). The purpose of the mishap flight was to fly a relatively nondemanding mission which contained a fair amount of administrative complexity designed to prove to Lt Taylor, and to his instructor, that Lt Taylor was capable of remembering, and correctly accomplishing, a variety of details in accordance with the pre-mission briefing (Tab V-8-2). The ride itself was planned to be an advanced handling ride comprised of a variety of high performance aircraft maneuvers which required clear airspace. Lt Taylor was scheduled to fly his makeup mission on November 22 and November 23 with different instructor pilots, but was weather-cancelled on those days. Following the Thanksgiving Holiday weekend, Lt Taylor was scheduled to fly on 29 November with [REDACTED] the [REDACTED] Riding in [REDACTED] backseat was [REDACTED] a flight surgeon attending a two-week flight surgeon school at Kingsley Field.

BRIEFING AND PREFLIGHT:

The mishap student, the instructor pilot, and the flight surgeon were exceptionally well rested and prepared to fly. The mission briefing was conducted by [REDACTED]. It lasted for approximately one hour and was thorough, comprehensive and professional in every regard, including contingencies, backup missions and emergency procedures. The weather in the airspace had been questionable all morning. It was apparent to [REDACTED] and the Supervisor of Flying that the backup mission was a likely possibility. The backup mission for Lt Taylor's phase of training was intercepts. The students have achieved a level of proficiency in a previously completed block of instruction consisting of four basic intercept rides in addition to six or more simulator missions. The principles learned during intercept training are continuously applied throughout advanced training and continues for the duration of a fighter pilot's career. The Varmit Airspace and Goose Airspace were routinely used by the 114th Fighter Squadron. Goose Airspace in particular is located only 25NM east of Kingsley Field and is extensively used every day for student training. The preflight walkaround was normal with no discrepancies other than one missing static dissipater from the right wing (Tab V-5-1) which is not a safety of flight item. The briefing and preflight sequence was normal with the exception of the unknown area cloud layers.

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WEATHER:

The weather at Kingsley Field at 1325 PST was 800 feet scattered, 1,800 feet broken, 3,000 feet broken, and 5,000 feet overcast with fifteen miles visibility from Kingsley Field. The altimeter setting was 29.83 inches of mercury (Tab K-11). ROGUE FLIGHT took off eight minutes later at 1332 PST. The weather forecast for the flying period 1230 PST to 1830 PST in the Juniper/Hart/Goose Airspace was for scattered to broken layered cloud decks from 2,500 feet to 20,000 feet. Moderate turbulence was forecast from the surface to 18,000 feet. Moderate mixed icing from 3,000 feet to 14,000 feet and light rime icing from 14,000 feet to 20,000 feet was also forecast (Tab K-10). The turbulence and icing conditions were never encountered by ROGUE FLIGHT and the actual clouds were more solid than layered with no discernible horizon (Tab V-8-5 and 6). At 1439 PST (coincidentally) a light rain began to fall at Kingsley Field reducing the visibility to eight miles and by 1455 PST to six miles with the ceiling at 1,500 feet overcast (Tab K-12). This was the worst ceiling and visibility of the day and occurred after the crash. There was one clear hole at the southern part of Goose Airspace near Clear Lake where the ground could be seen from about 11,000 feet mean sea level. The bottom of the airspace is 3,000 feet above the ground so there was a little room to orbit (Tab V-8-5 and 6). The terrain near Clear Lake is about 4,500 feet above sea level, leaving about 3,500 feet of working altitude in the hole which was insufficient for the primary advanced handling ride scenario. The ceiling in the area of the impact site was reliably reported at 300 feet above the basin bottoms, with the ridges enshrouded in clouds. A snow shower was occurring at the time of impact.

FLIGHT PLAN:

The flight plan was an administratively preplanned stereo flight plan called VARGOOSE which filed ROGUE FLIGHT to Varmit Airspace in the altitude block 20,000 feet to 23,000 feet for an air refueling with CADD0 72 on air refueling track AR-645. After refueling, the flight plan continued into Goose Airspace and then back to Kingsley after a delay in Goose for the mission. The flight plan was filed with Redmond Flight Service by an air operations technician at the 114th Squadron Operations duty counter.

TERRAIN:

Kingsley Field is located in a high desert basin at 4,100 feet mean sea level on the east side of the Cascade Mountain Range foothills. The land east of Kingsley is higher in elevation and drier in climate. The ground level in the southern part of Goose Airspace (25 miles east of Kingsley) near the Clear Lake Reservoir is from 4,500 feet to 5,500 feet generally, and consists of ridges, buttes, and basins. Further north underneath Goose Airspace the terrain becomes rougher and averages higher in elevation from 5,500 feet to 6,500 feet with more vegetation. The terrain at the crash site slopes from a river bed upward toward the north, and is 4,760 feet above sea level.

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#### NAVIGATION:

Kingsley Field has a TACAN (Ch 106) and Lakeview has a TACAN (Ch 57) which can be used to navigate to the air refueling track and remain within the confines of Goose Airspace. Moreover, the F-16 has a reliable inertial navigation and computer system which accepts coordinates of airspace points and combine into a splendid system facilitating navigation with ease. The keyboardentered points are selected with a thumbwheel near your left thigh.

#### COMMUNICATIONS:

Once airborne from Kingsley, aircraft talk to Seattle Center on UHF radio frequency 351.7 until established in the working airspace. As they flew toward Varmit Airspace, ROGUE FLIGHT was handed off to Shadow Control (359.0), the tactical control radar site, who joined ROGUE FLIGHT with the tanker (Boom Freq 324.4). After completion of aerial refueling, Shadow Control directed ROGUE FLIGHT into Goose Airspace and released them, as planned, to operate autonomously without radar control on their own tactical frequency. ROGUE 2 crashed in Goose Airspace. To exit Goose Airspace, ROGUE 1 contacted Seattle Center on UHF frequency 351.7 for simple routing back to Kingsley Field. There is no approach control at Kingsley Field, which operates under visual flight rules (VFR) most of the time. The F-16s have three good radios; one UHF, one VHF, and one HF radio. The UHF radio is normally set for air traffic control, while VHF is used for interflight communications. The HF radio was not used by ROGUE FLIGHT on the mishap sortie. ROGUE FLIGHT radio transmissions were not monitored by any other aircraft or agency while they were in Goose Airspace leading up to the mishap.

#### SEQUENCE OF EVENTS:

ROGUE 1 flight took off on Runway 14 at Kingsley Field, Oregon, at 1332 PST with ROGUE 2 (mishap) taking a 20 second radar trail departure. Neither aircraft had external tanks and both aircraft carried a captive AIM-9 infrared seeking missile on the right wing tip for weapons employment evaluation purposes. ROGUE FLIGHT turned to the northeast and climbed on course to the flight-assigned altitude of 21,000 feet. ROGUE 2 (mishap) did an expeditious weapons systems check in a semi-clear area and rejoined ROGUE 1 to route formation. ROGUE FLIGHT penetrated a few more clouds with ROGUE 2 (mishap) remaining in route formation. Shadow Control vectored ROGUE FLIGHT to rendezvous with the KC-135 (CADD0 72). When they got a visual on the tanker, ROGUE 2 (mishap) went to the tanker wing position while ROGUE 1 refueled. Because the visual area was small, the tanker elected to fly a continuous circular pattern during refueling. ROGUE 2 then refueled in a smooth, constant turn and shut the air refueling door. Both aircraft took 1,500 to 2,000 lbs of fuel and left the tanker full. Rogue flight flew south at 23,000 feet under Shadow Control toward Goose Airspace with ROGUE 2 (mishap) in route formation. ROGUE FLIGHT was in and out of the clouds, while transitioning into Goose Airspace, about sixty percent clouds and forty percent good visibility. ROGUE 2 (mishap) maintained a wide route position while passing through these relatively thin clouds. The airspace limits were 3,000 feet above the ground to 27,000 feet. ROGUE FLIGHT climbed to 26,000 feet as they crossed the northern boundary of Goose and began a long, slow descent to the bottom of the airspace at the southern end, looking for a suitable clear zone

to accomplish the primary advanced handling maneuvers. ROGUE 2 (mishap) was able to remain in wide route during the entire descent. The visibility inside the clouds was about 1/2 mile with no blue spots, no layers and no discernible horizon. There were no mission-suitable VFR blocks encountered on the descent. At the southern end of Goose Airspace, ROGUE FLIGHT broke out of the bottom of the clouds into a VFR cavern which extended from the ground to 11,000 feet with enclosing clouds all around. Clear Lake Reservoir, a prominent airspace landmark, was visible below. ROGUE 1 put ROGUE 2 (mishap) into a 3,000 to 6,000 feet fighting wing position for maneuvering efficiency, and began to orbit in the VFR cavern. The Inertial Navigation Unit on ROGUE 2's aircraft (mishap) had been recently replaced, (TAB BB-2) and the airspace navigation way points normally entered into the aircraft computer had been zeroized during maintenance. While they orbited, ROGUE 2 (mishap) entered the coordinates for two points into his computer for the north point (42-10.0 N, 120-53.7 W) and the south point (41-44.7 N, 121-02.5 W). These points are 26 nautical miles apart. ROGUE FLIGHT double checked the accuracy of entered points in both aircraft. ROGUE 1 then briefed some last minute details about the backup mission scenario. [redacted] assigned start points and altitude while they orbited in the VFR hole. ROGUE 1 (flight lead) was to remain the target for the entire mission. ROGUE FLIGHT split up and entered the weather to begin the intercepts mission. ROGUE 2 (mishap) climbed to 15,000 feet and orbited for several minutes at the nearby southern point, while ROGUE 1 flew north and climbed to 20,000 feet. The first intercept was a strategic stern conversion which resulted in a nearly perfect 2-1/2 to 3-mile stern rollout by ROGUE 2 (mishap). The second intercept was a cutoff/reattack. ROGUE 2 (mishap) simulated firing a radar missile as he approached the target from the front. He then maneuvered the aircraft to obtain turning room and repositioned himself for a second shot from the stern. This intercept sequence was also well done. ROGUE 1 returned to the north point and ROGUE 2 (mishap) returned to the south point at the completion of each intercept as briefed. The third intercept was a strategic stern to a visual identification. ROGUE 1 remained at 20,000 feet and ROGUE 2 (mishap) began the intercept at 19,000 feet. ROGUE 2 was briefed to climb to 19,500 feet once comfortably established in the stern with a radar lock on, and to continue to approach closer to ROGUE 1 to get the visual identification. ROGUE 2 (mishap) was initially unsure about when to climb to 19,000 feet and a short discussion was held to resolve the question as they motored back to their respective start points to begin the third intercept. ROGUE 1 slowed to 250 knots airspeed to facilitate the visual identification scenario. ROGUE 2 (mishap) made this strategic conversion and rolled out at 1.8 miles as compared to a 2-1/2 mile perfect position, but he was under control and completed the visual identification satisfactorily. ROGUE 2 (mishap) got a tally ho at about one mile in the thin clouds and continued into 1,500 feet with both pilots in sight of the other aircraft. ROGUE 2 (mishap) did not remain at 19,500 feet during this portion, as briefed, but climbed to 20,000 as he closed to the final identification position. [redacted] (ROGUE 1) made a mental note to remind to Lt Taylor in the debrief about why it's best to remain at 19,500 in this situation, in case the target becomes re-observed due to cloud intensity changes. Up to this point in the flight [redacted] was very pleased with the performance of Lt Taylor. He had flown three good intercepts and was doing a good administrative job. He was communicating well and asking for clarification when needed. He was having a good day and [redacted] was proud of Lt Taylor's performance. The fourth (mishap) intercept was

also a cutoff reattack nearly identical to the second intercept. The only difference was that ROGUE 1 would call the front aspect radar shot and also shoot, so that both aircraft fired simulated radar missiles at the same time. ROGUE 2 (mishap) would then maneuver his aircraft, as before, to get turning room for the stern reattack. This would result in ROGUE 2's missile striking first compared to ROGUE 1's missile, which could be shown in the debrief. ROGUE 1 began target run from the north point at 20,000 feet. ROGUE 2 (mishap) began his cutoff intercept from the south point at 15,000 feet. ROGUE 1 flew at 350 knots indicated airspeed as the target (TAB HH-2-1 and HH-6-1). ROGUE 2 (mishap) had been briefed to set his attack speed at 50 to 100 knots above the target speed, which would have equated to 400 to 450 knots indicated air speed. ROGUE 2 (mishap) locked onto the target (ROGUE 1) and called his lock. ROGUE 1 locked onto ROGUE 2 (mishap) and called lock. At 10 to 12 nautical miles separation, ROGUE 1 called for the simultaneous missile launch and began to adjust heading to continuously point at ROGUE 2 (mishap). ROGUE 2 (mishap), already flying at a 30 degree offset heading in accordance with briefed tactics, turned further east to increase his offset heading to place the target near the left side of his radar scope. As ROGUE 1's radar missile neared completion of its time of flight, ROGUE 2 (mishap) stated, "I've gimbleed you off my radar." ROGUE 1 told ROGUE 2 (mishap) to terminate the intercept and return to his (southern) point, and to set it up again. As ROGUE 1 began a left hand turn back to the north point, radar displayed beam aspect indications for a few seconds which were unexpected, but possible, as ROGUE 2 (mishap) was supposedly making a right turn toward south (but was in reality descending rapidly toward the ground). After rolling out and heading north, ROGUE 1 initiated a fuel check which ROGUE 2 (already crashed) did not acknowledge. After a few more radio calls, ROGUE 1 came to realize that there was a problem. ROGUE FLIGHT's positions were later plotted with information from Seattle Center's radar. ROGUE 2's (mishap) altitude varied from 14,900 feet to 15,400 feet and back to 14,800 feet in the last 24 seconds of flight at altitude as he turned further east to place the target on the left side of the scope. His speed was 450 knots indicated and his throttle was set near full military power. Seattle Center's last radar plot was located one half mile from the impact location. Twelve seconds earlier, Rogue 2 (mishap) had been at 14,800 feet mean sea level (TAB HH-6-1).

#### IMPACT:

The impact occurred heading 340 degrees (magnetic) in descending, near wings level flight with the left wing slightly down. The flight controls were in neutral positions with a slight rudder roll in the right. The maximum calculated angle of attack (AOA) was 8.7 degrees (TAB BB-8-2). The speed was in excess of 500 knots and was not more than 540 knots. Pilot reaction time after clearing the 300 foot ceiling and entering the snow shower underneath was one second maximum at 525 knots. (TAB HH-5). Several medium sized trees were crossed without damage 3/10 of a second prior to impact. A 15 degrees descent angle or greater is sufficient dive angle to clear the trees (TAB HH-4). The aircraft struck the stone field and fractured at impact with deceleration forces greatly in excess of 350 Gs (TAB AA-7). The aircraft bounced out of the crater in a disintegrating slurry of colliding and recolliding non-aerodynamic pieces. A fuel aerosol formed and partially ignited above the ground, fuel air bomb style. One reliable witness heard the impact and fuel air burst 20 miles away. There was no fire damage to any



plant or object on the ground. The explosion further fragmented and distributed the pieces and partial components into a wide fan which covered sixty-four acres. The furthest piece located was nearly 2,000 feet from the crater. There was no emergency locator beacon reported by any source.

#### EJECTION SEAT:

Many fragments and partial components of the ejection seat were recovered. Many portions of the ejection seat were never found. There was no recovered part of the ejection seat which indicated that the ejection sequence was initiated (Tab V-4-1). If an ejection would have been attempted in the final seconds before impact, it would have been a Mode 3 ejection sequence due to high speed. It would have been out of the envelope and would not have saved the pilot (Tab FF-1). The ACES II ejection seat used in the F-16 is highly reliable. There was no known discrepancy in the ejection seat. The F-16 Pilot's Technical Order (Book) T.O. 1F-16A-1 states "To eject, grasp ejection handle using a two-handed grip..." (Tab FF-4). It also states in a warning "...or other uncontrolled flight, eject at least 10,000 feet AGL (above ground level)" (Tab FF-3).

#### PERSONAL AND SURVIVAL EQUIPMENT:

All personal and aircraft survival equipment inspections were current (Tab EE). There was no use of any personal or survival equipment.

#### RESCUE EFFORT (All times referenced are Pacific Standard Time):

ROGUE 2 crashed at 1439. ROGUE 1 (flight lead) contacted the tactical control radar site (Shadow Control) at 1443 asking for help in locating ROGUE 2 (mishap). At 1452, ROGUE 1 stated that ROGUE 2 (mishap) was suspected crashed on the Kingsley radio navigation aid (TACAN) radial 098 degrees at 40 nautical miles. ROGUE 1 attempted several times to get below the weather from the VFR hole near the Clear Lake Reservoir to search for ROGUE 2. At 1456, a flight of two F-15Es (JESTER FLIGHT) was vectored from nearby Hart Airspace into Goose Airspace to assist in the search. At 1503, ROGUE 1 accurately reported the probable crash site as "midway between the north and south points in Goose and slightly east of the centerline." ROGUE 1 returned to base and landed at 1515. JESTER FLIGHT was not able to get below the weather either, and returned to Hart Airspace at 1514. At 1520, the SOF initiated a weather recall of all remaining airborne aircraft. Other airborne search efforts began immediately. Two Siskiyou County search and rescue helicopters flew to the probable crash site and searched until nearly dark without result. The Kingsley Field Survival Recovery Center was activated at 1545 and became 24-hour operational at 1550. At 1720 the Coos Bay Coast Guard planned to use two HH54 helicopters, and a Blackhawk helicopter from Portland was confirmed. Poor weather throughout the night precluded use of these assets. Instructor pilots, student pilots and disaster response people deployed to search with night vision goggles in Army-loaded Humvees and personal four-wheel drive vehicles beginning at 1845. They arrived at the crash area after dark and searched until well after midnight. They slept in their vehicles through the early morning hours and resumed the search at first light (approximately 0715). At 0757 one of the Humvee teams located the crash site and reported the coordinates as 41-54.5 N, 120-55.4 W. This was within one-half mile of

Seattle Center's last reported position plot. At 0806 the fatality was confirmed. The extensively organized search effort arranged throughout the night involving every civilian and military organization in south central Oregon was cancelled.

#### CRASH RESPONSE:

Efforts turned to logistically supporting the recovery teams which were hampered by rough terrain, no infrastructure, poor roads, mud, snow showers and cold wind. The crash site was accessible only by Army Humvees for most of the week-long recovery effort involving hundreds of people. Most personnel who deployed to the crash site walked the last 2-1/2 miles down the muddy, boulder strewn "road," and back out at the end of long days. The normally semi-arid region had received rain and snowfall for much of the preceding week, greatly impeding the recovery teams. With each step, mud clung to people's feet which became heavier by the minute and required constant scraping. The only civilians in the crash area were Red Cross volunteers, local search and rescue volunteers, Ham radio volunteers, and an occasional forest service official. The Security Police easily secured the entire crash fan area. There were no intrusions, and no difficulty with the sparse local population. The textbook crash response plan required major modification. The aircraft was smithereens. There was nothing for EOD personnel to save. The hydrazine team found one drop after searching many hours and reduced it. The decision was made to gather as many body fragments as possible before darkness fell using all available personnel. A base camp was established where the rough road began and most vehicles remained there while the people walked to the crash site. Three Army National Guard M35 2-1/2 ton trucks provided transportation of people and equipment from Kingsley Field. Four M-885 Humvees transported essentials down the boulder-strewn road. A crash fan gridwork was established and the largest parts were plotted. The dense parts went the farthest. Over 100,000 pieces of the aircraft were loaded into 206 16" X 16" X 16" heavy cardboard boxes, approximately 500 pieces per box. No part was too heavy for one person to lift.

#### MAINTENANCE DOCUMENTATION:

The AFTO Form 781 for A/C 81-0770 was perfect and inspection-ready in every respect. There was one minor, Code 2 non-safety-of-flight writeup on the flare dispenser counter which is not related to the accident. All Time Compliance Technical Orders had been completed on the accident aircraft or were awaiting kits (Tab U-1). All scheduled aircraft inspections had been satisfactorily completed. There were no discrepancies (Tab U-3). A review of the Oil Analysis Record indicates no trends. All oil analysis readings were nominal. An oil sample was taken after the first flight of the day and was normal and completely within standards (Tab BB-5). All Time Change Requirements had been completed and none were pending. Analysis of the Equipment Review Report reveals no discrepancies. The last aircraft phase inspection was completed on 29 March 1993 at 2,591.8 hours flight time. Aircraft 81-0770 had flown 198.3 hours since the last phase and was nearing the next phase inspection. There were 9.6 hours remaining before the next scheduled phase inspection at 2,800 hours. The aircraft flight time after the 29 November 1993 morning flight was 2,790.4 hours. Aircraft 81-0770 was being held back from the daily flying schedule somewhat to insure that its remaining

flight time was utilized up to the day it was scheduled to enter phase again. A 30 day aircraft document review (ADR) was the last scheduled inspection and was accomplished on 17 November 1993. There were six unscheduled maintenance writeups between 17 November and 29 November 1993, the day of the accident. Two of the writeups were for main landing gear tire changes which were completed on 18 November 1993. Two of the writeups were minor AIM-9 boresight problems which were repaired on 18 November 1993. One writeup on 23 November, was a Code 2 (not safety-of-flight) writeup for an Inertial Navigation Unit (INU) which was not maintaining desired accuracy. While not required to be repaired before the next flight, it was replaced nevertheless with another INU from supply on 23 November 1993. The maintenance and performance history of INU 7095 was extensively analyzed for any possible accident-related circumstance, but none was found. The replacement INU #7095 had been successfully repaired from a maintenance duplicated hard break which occurred in A/C 80-0581 on 25 October 1993. This was a good fix on one of the most reliable INUs in the fleet. The accident aircraft flew one time prior to the accident with no further INU problems (Tab BB-2). The last writeup occurred on the morning of 29 November (accident day) on the first flight of the day. It was a non-safety-of-flight Code 2 for a flare counter indicator which showed there were no flares remaining, when in reality there were three. Lt Taylor's sortie did not use the flare dispenser and this was not a factor. There was one scheduled minor inspection coming due in 2.2 flight hours, a 100 hour throttle force check which would have been accomplished the evening of 29 November after daily flying was completed. The upcoming throttle check was not a factor. Aircraft 81-0770 completed its last engine overhaul on 3 November 1993. It flew twice and then required a backup full control (BUC) replacement for leaky seals as a result of conversion to the new, less volatile fuel, JP-8. This was completed on 14 November 1993 and the aircraft flew four more sorties prior to the accident with no engine related writeups. Aircraft 81-0770 was exceptionally well maintained (Tab V-5-1). It was one of the best aircraft in the fleet. No maintenance procedure, practice or performance appears related to the accident.

#### MAINTENANCE PERSONNEL AND SUPERVISION:

The preflight performed on the morning of 29 November 1994 on aircraft 81-0770 was thorough and complete. No discrepancies were found. The post-flight inspection after the first flight of the day revealed one minor, unrelated item (TAB V-5-1). The last chance inspections on both flights on 29 November revealed no discrepancies. The preflight, post-flight and last chance inspections are standardized procedures and were accomplished in accordance with Air Force technical data. The AF Form 623, On-The-Job Training Record and the CAMS Job Qualification Standard (JQS) were reviewed and found complete and current. The proficiency level of the maintenance crew chief was high. He was well-trained, a 7-level, highly experienced and capable of completing the launch and recovery tasks assigned. There is no negative evidence by any maintenance person or supervisor that is related to this accident.

#### ENGINE, FUEL, HYDRAULIC AND OIL INSPECTION ANALYSIS:

The engine inspection data was normal. The fuel truck test report was normal. The fuel test done on the tanker aircraft, C4DDG 02, was normal. The hydraulic fluid test report was normal. The oil test report was normal (TAB BB).

AIRCRAFT SYSTEMS:

The aircraft was highly fragmentized. Many parts were not recovered. There was no evidence found of any malfunction in any hydraulic, electrical, mechanical or avionics systems. The engine was operating at high RPM (86%) at impact. The fuel flow was approximately 7,000 lbs/hour. The bearings were receiving lubrication (Tab J-2). There was no evidence found of any engine anomaly problem (Tab BB-1). There is no suspected failure of any accessory system, or engine component. There is no suspected shortcoming to any repair station, overhaul, bench checking or testing of any aircraft component on this aircraft.

OPERATIONS PERSONNEL AND SUPERVISION:

The mission was conducted under authority of the Air Education and Training Command F-16 Initial Training Syllabus. The mission was briefed by [REDACTED] the [REDACTED] from a comprehensive briefing guide (TAB II) prepared for the student training syllabus in accordance with Air Force flight regulations. The briefing was exceptionally thorough and complete. The [REDACTED] was [REDACTED]. The squadron had just completed a higher headquarters staff assistance visit earlier in the month in preparation for a Quality Verification Inspection (QVI) scheduled for April 1994.

CREW QUALIFICATIONS:

The Instructor Pilot in ROGUE 1 (flight lead) was fully qualified and highly experienced. The student, ROGUE 2 (mishap), was very inexperienced. He was about halfway through the F-16 training syllabus at Kingsley Field. The following is a summary of flying experience for both pilots:

[REDACTED] (Flight Lead, ROGUE 1) (Tab T-5)

Total Hours:	4,331.6
Total Primary to Include IP:	3,195.7
Instrument:	300.4
Total F-16 Hours:	704.8
30/60/90 Flying Time:	6.8/20.2/36.2
30/60/90 Sorties:	6/14/23

Lt Stephen L. C. Taylor (Student, ROGUE 2) (Tab G-1)

Total Hours:	264.2
Pilot Training:	203.1
Total Primary:	61.1
Instrument:	1.5
Total F-16 Hours:	29.5
30/60/90 Flying Time:	17.8/29.5/29.5
30/60/90 Sorties:	8/19/19

Lt Taylor had completed 17 rides and 3 remakes in the F-16 training program.

He arrived at Kingsley to begin training on 7 September 1993. His first flight in the F-16 was 5 October 1993. He flew 11 times in October and 8 times in November prior to the accident. Lt Taylor had logged 1.5 hours of instrument time in the F-16. There is no instrument time logged at other schools. While in undergraduate pilot training, students logged only student time and no instrument time on their AF Form 781. Lt Taylor attended Fighter Fundamentals at Holloman AFB from 15 June to 4 August 1993, which was the middle of the summer in the desert. Lt Taylor logged no instrument time at Holloman AFB. Lt Taylor graduated 28th (last) among 28 American students from his pilot training class 93-10/H, Air Training Command, 64th Flying Training Wing, Reese AFB, Texas. He finished 32 out of 37 total students, including foreigners (Tab V-21-4). Lt Taylor was a below-average performer who busted four checkrides out of seven. He was sent to two Initial Progress Checks and two Elimination Checks. He busted two Emergency Procedures Quizzes and two Standup Emergency Procedures. These busts were interspaced between satisfactory events. Lt Taylor's T-38 instructor characterized him as having okay hands, but lacking in situational awareness, and a bit slow under pressure (Tab V-22). Procedural errors were common with Lt Taylor, according to his T-38 Flight Commander (Tab V-21). The commander of the 54th Flying Training Squadron at Reese AFB stated that Lt Taylor met all undergraduate pilot training standards for a universally-assignable pilot. There was no Fighter/ Attack/Reconnaissance (FAR) recommendation program in effect when Lt Taylor graduated. Lt Taylor was given a letter of reprimand for public intoxication while at Reese AFB. He was placed on special monitoring status for officer conduct by his squadron commander (Tab V-20). Lt Taylor's performance at Holloman AFB was below average. He busted four rides at Holloman for student nonprogression. He was put on marginal training status and counseled. His Flight Commander at Holloman did not know that Lt Taylor graduated at the bottom of his class at Reese AFB (Tab V-23). Lt Taylor busted three rides at Kingsley Field and passed two of the remakes. The third remake sortie was being satisfactorily flown on 29 November 1993, up until the accident. Lt Taylor's instructors at Kingsley thought Lt Taylor had a slow instrument crosscheck and became easily task saturated. Lt Taylor asked his roommate a question about the horizon line in the Radar Electro Optical Display (REO) which indicated a lack of understanding about how best to use the instrument, and when not to use it (TAB V-11-2).

#### MEDICAL:

The two pilots and one flight surgeon who were involved in Rogue Flight were medically qualified for flight in the F-16 (TAB AA). Toxicology reports were negative for all personnel (TAB AA-8). There is no evidence that any medical circumstances was a factor in this accident.

#### NAVIGATIONAL AIDS AND FACILITIES:

There were no Notices To Airman (NOTAMS) that were related to the accident.



DIRECTIVES AND PUBLICATIONS:

Applicable flight regulations and manuals included AFR 60-1, AFR 60-16, MCR 11-416, MCR 11-217, AFR 55-79, T.O. 1F-16A-1 to include AETC, ANG, and 114FS supplements to listed publications were applicable. There were no known deviations from any flight publications or directive by Rogue Flight prior to the accident.

ANALYSIS:

Considerable time and effort went into analysis of the final sequence of events. The final sequence possibilities are discussed in TAB HH-2. The Flight Data Recorder was destroyed. Airspeed analysis with wind corrections were used to produce TAB HH-6. The final descent angle was flight tested at 15 to 20 degrees (TAB HH-4). Simulator profiles were extensively flown. A special tool was constructed. A flexible wire with actual distance flown markings for each 12 second Seattle Center radar plot was scaled in conjunction with a large scale chart (1:24,000). The flexible wire was bent to conform to known (and/or probable) ROGUE 2 (mishap) maneuvers, and was suspended in 3 dimensions above the chart at scale altitude (TAB HH-8). The known heading at impact which followed the last Seattle Center Radar plot requires that a corkscrew type maneuver be flown. The exact size of the corkscrew cannot be exactly determined because a number of immeasurable variables make numerous variations of the corkscrew possible. The computer analysis in TAB HH-6 provided a reasonable certainty of speed. The Seattle Center radar plots in TAB HH-3 can now be seen as points along a maneuvering sequence, by curving the wire to approximate ROGUE 2's (mishap) flight path. Testimony from the Flight Lead (correlated in the simulator) resulted in high confidence about specific actions occurring at their respective times. There is no serious doubt about ROGUE 2 (mishap) making the maneuvers described in TAB HH-2. The exact magnitudes of the maneuvers are based on reasonable judgements which considered every available scrap of knowledge, and common sense applications of pilot thought processes. For instance; it is presumed that Lt Taylor attempted to salvage the intercept until he called on the radio "I have gimbleed you off my radar." Fighter pilots can ascertain the emotional and situational awareness state of other pilots by listening to them on the radio. They can sense discomfort when a pilot transmits. [REDACTED] testified that there was nothing unusual in Lt Taylor's voice at all (TAB V-8-15) when he made the gimbleed call. Lt Taylor was partially disoriented by this time, but it was not apparent in his voice. Spatial disorientation is insidious, and Lt Taylor wasn't aware enough, yet. Exactly why Lt Taylor pulled the aircraft so far nose low on his turn attempt toward the south is unknown. There is no evidence that the aircraft malfunctioned, but it cannot be ruled out completely. Lt Taylor had almost no weather experience (TAB G-2) and a history of task saturation when dealing with intercept instrument tasks (TAB 14-1) (TAB 15-1).

Lt. Taylor's instrument crosscheck broke down during his turn toward the southeast when he pulled his nose well below the horizon to at least 40-50 degrees nose low, and depending upon the variables, perhaps to 60-70 degrees nose low (TAB V-16-2). Lt Taylor failed to execute a proper instrument recovery from his unusual attitude (TAB HH-2-2). Additional weather experience would have reduced the likelihood of this accident.

Great thought was given to the question: "Was any deficiency in Lt Taylor's flight training a casual or substantial contributing factor in this accident?" Lt Taylor was a slow thinker at times (TAB V-22-1). He was assigned to an aircraft which requires enormous prioritization of time and rapid analysis of fluid events to be productive, and to avoid becoming task saturated. Yet every F-16 pilot has experienced task saturation; and every F-16 pilot has been disoriented many times. Lt Taylor successfully completed the curriculum at each flying school he attended. He met the standards and deserved to graduate (TAB V-20-2).

Throughout the investigation I sought to reveal weakness in the training system if it existed. On the contrary, I found thoughtful, knowledgeable, dedicated, concerned, and highly professional flight instructors at every stage of Lt Taylor's training. I am convinced that Lt Taylor received high quality flight training. I am also convinced that Lt Taylor's flight training was not a contributing factor in this accident.

In every class there must be a bottom student. Lt Taylor displayed splendid desire and talent. He wanted very much to become an American fighter pilot. No one denied him that chance, nor in hindsight shall I.

STATEMENT OF OPINION:

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 this accident investigation report may not be considered as evidence in any civil or criminal proceeding arising from the 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.

I conclude based upon clear and convincing evidence that the cause of this accident was Lt Taylor's failure to execute a proper instrument recovery after becoming spatially disoriented and inadvertently maneuvering the aircraft into a severe nose low attitude.

*Tom Tolman*  
THOMAS W. TOLMAN, LT COL, USAF, 17 March 1994  
AFR 110-14 Accident Investigation Board President