

**ORIGINAL**

# REPORT OF AIRCRAFT ACCIDENT INVESTIGATION



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OFFICE OF THE SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFF

**F-16D SN 90-0784**

ASSIGNED TO

**343RD WING (PACAF)**

**EIELSON AIR FORCE BASE, ALASKA**

**18 FEBRUARY 1993**

**CONDUCTED IN ACCORDANCE WITH AFR 110-14**

**APPOINTING AUTHORITY:**

ROBERT L. RUTHERFORD

General, USAF

Commander, PACAF

Hickam AFB, HI 96853-5420

**SUBMITTED BY:**

ROBERT J. TOMCZAK

Colonel, USAF

Accident Investigator

Commander, 11 Operations Group

Elmendorf AFB, AK 99506-2470

PFS Exh. 146

57541

CLERK REGISTRATION COMMISSION

Bucket No. 2FS

in the matter of

State ✓

Applicant ✓

Intervenor

RECEIVED

REJECTED

WITHDRAWN

Witness 7/11/02

DATE 7/11/02

Clerk 8

Official Exam No. 146



DEPARTMENT OF THE AIR FORCE  
PACIFIC AIR FORCES



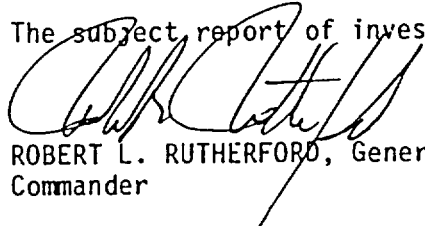
11 JUN 1993

FROM: PACAF/CC  
25 E Street, Ste G214  
Hickam AFB, HI 96853-5420

SUBJ: AFR 110-14 Report of Investigation, F-16D, SN 90-0784, Accident of  
18 February 1993

TO: 11 AF/CC

The subject report of investigation is approved.

  
ROBERT L. RUTHERFORD, General, USAF  
Commander



DEPARTMENT OF THE AIR FORCE  
PACIFIC AIR FORCES

APR 29 1993

REPLY TO 11 AF/CC  
ATTN OF 5800 G St Ste 101  
Elmendorf AFB AK 99506-2130

SUBJECT Aircraft Accident Investigation F-16D, SN 90-0784

TO HQ PACAF/JA  
PACAF/CC  
IN TURN

In accordance with AFR 110-14, PACAF Supplement 1, paragraph 9c,  
I am forwarding the subject Aircraft Accident Investigation for  
final approval.

A handwritten signature in cursive script, reading "Joseph W. Ralston", is positioned above the typed name.

JOSEPH W. RALSTON  
Lieutenant General, USAF  
Commander

**AIRCRAFT ACCIDENT INVESTIGATION**  
**CONDUCTED IN ACCORDANCE WITH AFR 110-14**

**F-16D S/N 90-0784**  
**343RD WING**  
**EIELSON AIR FORCE BASE, ALASKA 99702**

**INVESTIGATING OFFICER**  
**COLONEL ROBERT J. TOMCZAK**

**1. STATEMENT OF AUTHORITY AND PURPOSE**

a. Colonel Robert J. Tomczak was appointed Investigating Officer (IO) on 24 March 1993 under the authority of Air Force Regulation (AFR) 110-14, "Investigations Of Aircraft, Missile, and Nuclear and Space Accidents", dated 15 December 1989, for investigation of an aircraft accident that occurred on Thursday, 18 February 1993, in Restricted Area 2205, approximately 17 miles east of Eielson Air Force Base Alaska, involving an F-16D, serial number 90-0784. Four technical advisors were also appointed on the same date to assist in the investigation: Lieutenant Colonel John G. Baker, HQ 11 AF/DOR, pilot advisor; Captain Daryl L. Bell, 343 WG/JA, legal advisor; Captain James M. Bruno, HQ 11 AF/LGM, maintenance advisor; and Captain (DR.) Ronald A. Nelson, 3 Med Ctr/MGAA, flight surgeon and medical advisor.

b. The document appointing the investigating officer and technical advisors is at Tab Y. The investigation officially began on 24 March 1993. In addition to the 30 day investigation period, a two week extension was granted to complete technical analysis.

c. The purpose of this accident investigation under AFR 110-14 is to obtain and preserve evidence for claims, litigation, disciplinary and administrative actions and for all other purposes. The accident report is not privileged, and is releasable in accordance with AFR 110-14, paragraph 11.

d. A glossary of acronyms and abbreviations has been provided at Tab CC.

**2. SUMMARY OF FACTS**

**a. HISTORY OF FLIGHT**

On 18 February 1993 at 1455 (2:55 PM) Alaska Standard Time, US Air Force aircraft F-16D (a two seat F-16C), block 40 serial number 90-784, call sign "Bear 1", impacted the northwestern slope of a 2365 foot hill at 64 degrees 40 minutes 12 seconds north latitude, 146 degrees 20 minutes 52 seconds west longitude on the Yukon Range, Restricted Area 2205 (R2205), fatally injuring both crew members. Bear 1 was flown by Captain Glen S. Porter, a US Air Force pilot

assigned to the 18th Fighter Squadron, 343rd Operations Group, 343rd Wing, Eielson Air Force Base (AFB) Alaska. Major (DR.) Robert D. Verdone, a US Air Force Flight Surgeon assigned to the 343d Medical Group, 343rd Wing, Eielson AFB, Alaska, was the rear cockpit crew member (Tab A). The flight was a training mission and originated at Eielson AFB at 1349 (1:49 PM). The route of flight was from Eielson AFB to approximately 10 miles south of the base, then direct to the R2205, Yukon Range. The flight would have returned to Eielson AFB. Captain Porter and Major Verdone were in the lead aircraft in a flight of four F-16s.

Engine start, taxi and takeoff were uneventful. Bear 1 flight departed Eielson Air Force Base and flew at low altitude to R2205, located east of the base. Upon entry into restricted airspace, Bear 1 contacted Felon 1, the airborne forward air controller flying an OA-10 aircraft who would act as spotter to point out and describe targets for the fighters and coordinate between participating U.S. Army helicopters and the fighter aircraft. Participating or observing the mission were one UH-1 utility helicopter, three OH-58 observation helicopters and three AH-1 attack helicopters (Tab V-19).

Bear 1 and flight executed three successful and essentially uneventful attacks on targets in R2205 prior to the fourth attack, a reattack on the 3rd target, after which, during egress from the target area, Bear 1 impacted the ground. Both crew members died instantaneously.

The pilot of the OA-10 immediately took control of the accident scene and directed participating aircraft to respond. Army observation and utility helicopters immediately responded to the crash site, located approximately 4NM from the planned target. Weather conditions were good (Tab W).

The aircraft was configured with two 370 gallon external fuel tanks, an AN/AAQ-13 Low Altitude Navigation and Targeting Infrared for Night (LANTIRN) Navigation Pod, an ALQ-184 Electronic Countermeasure Pod, a TGM-65D Air-to-Ground Maverick training missile, an AIM-9 Air-to-Air training missile, a SUU-20 Practice Bomb Dispenser with six BDU-33 training bombs, an AIS POD and two empty Air-to-Air missile launchers. Gross weight at takeoff was 34,677 lbs (Tab L).

The crash occurred in R2205 which is government land. The aircraft belonged to the 18 Fighter Squadron (18 FS), 343 Operations Group (343 OG), 343 Wing (343 WG), 11th Air Force (11 AF), Pacific Air Forces (PACAF).

343rd Wing Public Affairs office at Eielson AFB was notified of the accident at 1505 (3:05 PM) Alaska Standard Time. The Commander, 343rd Wing, approved the initial news release at 1610 (4:10 PM). HQ PACAF Public Affairs was faxed the same release at 1615 (4:15 PM). The second news release identifying the crew members was approved at 2055 (8:55 PM). 343rd Wing Public Affairs office handled all news releases and media involvement (Tab DD-12).

b. MISSION

Bear 1 was the flight leader of a four aircraft formation of F-16s. The purpose of Bear 1's mission was to train and maintain pilot proficiency in performing Joint Air Attack Team (JAAT) Close Air Support. Joint Air Attack Team training missions are flown in concert with US Army aviation units to simulate Close Air Support (CAS) for a simulated ground unit. The mission emphasized the synchronization of Army ground unit fire support, Army rotary wing aircraft fire support, an Air Force Airborne Forward Air Controller, and Air Force fighter aircraft (Tab DD-3). On this mission, the Army ground unit fire support and Army aircraft fire support were simulated and no ordnance was expended by either. Bear 1 flight carried and expended training ordnance only.

Major Verdone routinely participated in training flights as a crew member aboard USAF Aircraft to satisfy the flight surgeon flying requirements specified by AFR 60-1 (Tab O-8) and the 343 WG Training Plan (Tabs O-9 and 10). Air Force Regulation (AFR) 60-1 requires USAF flight surgeons to participate in frequent training flights as a crew member to further their understanding of the physiological and psychological effects of flight on aircrew members. The purpose of Major Verdone's participation in this flight was to comply with AFR 60-1.

c. BRIEFING AND PREFLIGHT

Captain Porter departed the 18th Fighter Squadron on 17 Feb 93 after flying two F-16C sorties. His last known task in the squadron on 17 Feb was to talk on the phone with the Airborne Forward Air Controller for the next day's mission. This he did at approximately 1800 (6:00 PM). He called to discuss radio frequencies, contact points and other coordination items (Tab V-17).

The pilot's off duty history during the days prior to the accident was requested from his spouse; however, she declined to provide this information.

Captain Porter reported to the squadron at approximately 0710 on the day of the accident (Tab V-5). He again talked on the phone with Felon 1, the Airborne Forward Air Controller to coordinate for the morning's mission (Tab V-17).

Major Verdone departed the Flight Medicine Clinic before 1700 on 17 Feb after completing a routine day as Chief of Aeromedical Services. He was the only flight surgeon on station at Eielson AFB during the two weeks prior to the mishap (Tab V-28) and flight surgeon on call during the two weeks prior to 18 Feb. Flight surgeon on call duties include 24 hour availability for medical emergencies related to the flying squadrons and flying mission at Eielson AFB. Major Verdone arrived at the Flight Medicine Clinic at approximately 0700, on 18 Feb (Tab V-29). Flight medicine personnel noted no physical or psychological abnormalities in Major Verdone that morning (Tabs V-27 and V-9).

Routine 18 Fighter Squadron (FS) scheduling procedures were used to develop the weekly flying schedule for 15-19 February. The schedule was finalized the week prior to the mishap. At that time, Captain Porter was identified as flight leader for two four-ship missions on 18 Feb 93.

Major Verdone was not scheduled to fly with the 18FS prior to the morning of 18 Feb. He learned of the available F-16D flight, which afforded him the opportunity to fly in a rear cockpit, the morning of 18 Feb from another flight surgeon who could not fly that day (Tab V-9). He telephoned the squadron at 0830 on the morning of 18 Feb and talked to the 18 FS scheduler to request he be placed on the flying schedule (Tabs V-2 and V-32). Major Verdone was informed there was an open back seat and the flight briefing would begin in 30-45 minutes. He told the scheduler he could not make the flight briefing and the first flight because of seeing patients. He said he could make the second sortie and told the scheduler he needed to fly since his currency was running out.

The scheduler paged Capt Porter so he could talk to Maj Verdone, which he did. They agreed to meet between sorties to brief and fly. The 18 FS scheduler then entered Major Verdone on the schedule in Capt Porter's back seat for the second mission. Since Major Verdone informed the scheduler that his currency was about to expire, the scheduler did not check the flight surgeon's currency (Tab V-32). His currency had actually expired five days earlier (Tab T-13). 18 FS standards state that to fly in the back seat the individual must attend the flight briefing. If the individual could not, the squadron commander, operations officer or assistant operations officer must approve the back seat flight.

The 18th Fighter Squadron Commander was on temporary duty away from Eielson AFB. The Operations Officer was the acting Squadron Commander; however, he was in aircrew rest the morning of 18 Feb. The squadron supervisor present for duty was the Assistant Operations Officer (Tab V-3). In this case, the scheduler did not obtain approval of the Assistant Operations Officer. Rationale was that Capt Porter and Major Verdone talked on the phone and arranged a time to meet between flights to brief the second mission. Captain Porter's scheduled aircraft, 90-784, was the only two-seat F-16 on the flying schedule for 18 Feb. F-16D unique cockpit configuration information is at Tab DD-2.

The scheduling plan for flying in the 18th Fighter Squadron (FS) on 18 Feb 93 was designed as a "sortie surge" day, a method used to fly an increased number of sorties/missions per day. Sortie surges require flight leaders leading two missions flown back-to-back to brief both missions prior to the first mission. Captain Porter was designated flight leader for the two four-ship missions, and briefed both missions in one briefing at the beginning of the day. With the exception of the addition of Major Verdone to the rear cockpit of Captain Porter's aircraft, the same squadron pilots were in the same flight positions for both sorties.

The mission briefing started two hours and 15 minutes prior to the scheduled takeoff time of 1115 for the first mission and lasted for 50-55 minutes (Tab V-30). Major Verdone did not attend this mission briefing. Testimony of the flight members (Tabs V-5, 6 and 7) indicate Captain Porter's actions during the preparation for, and execution of, the flight briefing were normal. Flight members testified that all items of special interest required by HQ Pacific Air Forces (PACAF), 343 WG, and 18 FS were briefed. These items included hazards of low altitude flying, visual illusions occurring at low altitude, hazards associated with high gravity forces on aircrews ("G" forces), and proper preflight checks of aircrew oxygen masks. Two of the three wingmen specifically remembered the briefing of "G" induced loss of consciousness (Tabs V-5, 6 and 7).



The flight briefed to fly to the range using a Visual Flight Rules (VFR) flight plan (Tab K). The preflight briefing included a plan for the tactical portion of both missions, during which the flight would execute attacks on the bombing range in Restricted Area 2205.

Four types of attacks were briefed (Tab V-5). Prior to each bombing run, Capt Porter (Bear 1) would select one of the four prebriefed attacks based on the tactical situation presented by the airborne forward air controller, notify the other flight members of the attack selected, and direct the execution. The first four-ship mission briefed to execute this plan without the participation of US Army units. The second mission would include an Airborne Forward Air Controller (AFAC) flying an OA-10 aircraft and rotary-wing aircraft from the 4-9 Cavalry, Fort Wainwright, Alaska. Captain Porter emphasized during the flight briefing that if (simulated) ground threats were observed in the target area during the bomb deliveries, a "nose-low TSEM" (Turning Safe Escape Maneuver) should be executed. Aircrew weapons delivery manual 1F-16CG-34-1-1 describes this maneuver as:

1. After releasing the weapon, the pilot should use military power and a loaded roll to obtain 5 G's in 2 seconds.
2. While turning, roll as required (60-85 degrees of bank) to decrease dive angle to approximately 5 degrees.
3. Maintain 5 G's until a minimum of 60 degrees of turn.
4. After the heading change the pilot should analyze the situation and continue appropriate maneuvering

The first mission of Bear 1 flight was flown without incident. Takeoff was at 1114; land time was 1218 Alaska Standard Time. The tactical portion of the mission was executed without incident. All four aircraft returned to Eielson AFB without maintenance discrepancies.

During sortie surge days, standard practice for pilots flying two sorties back-to-back is to refuel the aircraft with the engine running after the first sortie, then taxi directly out for takeoff on the second sortie (Tab V-5). Since the engine must be shut down to allow the rear cockpit occupant to climb into his seat, Captain Porter taxied back to the original aircraft parking spot to shut down the engine and refuel. He allowed his flight members the option of either returning to the parking ramp with him, or wait with engines running at the end of runway area until takeoff time.

Bear 2 followed Bear 1 back to the ramp, while Bear 3 and Bear 4 remained at the end of the runway. Captain Porter returned to the squadron building for what Bear 2 recalled was slightly longer than the 15 minutes he (Bear 2) had spent there (Tab V-5), where he was seen eating and drinking an undetermined type of food in the squadron lounge. He was seen with Major Verdone at this time (Tab DD-6). A crew coordination briefing in accordance with 18 FS standards could not be verified. The purpose of a crew coordination briefing is to make both cockpit members fully aware of special procedures and hazards of emergency situations in a dual cockpit aircraft.

These briefing items may include, but are not limited to: emergency egress while on the ground; ejection procedures while airborne; procedures for loss of voice communication between the two crew members; selection of ejection sequence mode; and incapacitation of a crew member (Tab DD-6).

Captain Porter and Major Verdone reported to the aircraft for preflight inspections and engine start. Maintenance personnel testified there was one incident of note: Major Verdone did not buckle the leg straps of his ejection seat torso harness before he climbed into the rear cockpit. Normal procedure is to buckle the harness prior to cockpit entry. The crew chief assisting Major Verdone in buckling the torso harness and with other preflight checks indicated Major Verdone remarked that it had been "six months" since he had last flown (Tab V-14).

Bear 1 and 2 engine start and taxi to the runway were normal. The flight (Bear 1, 2, 3 and 4) joined in the arming area at the End of Runway (EOR). Ground crews and pilots indicated all ground operations were normal (Tabs V-5, 6, 7, 14, 15 and 16).

During his Before Takeoff Check, Bear 1 did not place the Stores Configuration Switch in the correct position as required by the F-16C/D Flight Crew Checklist for the external stores (load) that was carried on the aircraft (Tab DD-2). The switch should have been positioned to CAT III. Memory data in the Crash Survivable Flight Data Recorder (CSFDR) indicates that the switch was in the CAT I position (Tab BB).

A Technical Analysis of the mission impact of the Stores Configuration Switch in the CAT I versus CAT III position was conducted by the Aeronautical Systems Center (ASC/YP), Wright-Patterson Air Force Base, Ohio. ASC concluded that "...(T)he incorrect position of the Stores Configuration Switch had no significant effect on the outcome of this flight" (Tab DD-2).

#### d. FLIGHT ACTIVITY

Bear 1 flight executed single ship (individual) takeoffs and joined on departure to a tactical formation. The flight flew the planned VFR departure to a point approximately 10 miles south of Eielson AFB and then turned east toward range R2205 (Tab AA). The departure and range entry were uneventful. The flight executed a G-awareness turn upon range entry. The purpose of a G-awareness turn is to mentally and physically prepare the aircrews for the upcoming high-G maneuvers by practicing a G-straining maneuver and assuring the anti-G garment (G-suit) works properly (Tab V-5). Weather on departure and on the range was high thin broken cloud cover (Tabs K and W). It was described as "clear" by Felon 1, the OA-10 pilot (Tab V-17).

Bear 1 flight established radio contact with Felon 1, an OA-10 Airborne Forward Air Controller (AFAC). The AFAC would act as spotter to point out and describe targets for the fighters and coordinate between US Army aviation and the fighter/aircraft (Tab V-17).

The Army aviation aircraft in the range area included one UH-1 utility helicopter, with two USAF liaison officers aboard in addition to the normal crew compliment, OH-58 observation helicopters, and AH-1 attack helicopters. The OH-58 helicopters were to coordinate the firing of enemy

defense suppressive fires from a simulated ground artillery unit prior to each F-16 attack, and integrate the AH-1 attack helicopters' firepower into the effort. The mission of the AH-1 attack helicopters was to suppress the simulated enemy defenses during the F-16 egress from the target area. The UH-1 helicopter was in place as an observation aircraft only, however its radios were tuned to the tactical radio frequency used for the attack (Tab V-19). Only training ordnance was loaded and expended on this mission.

Bear 1 flight executed 3 attacks on targets in R2205 before the fourth attack after which Bear 1 impacted the ground. Of the attack options presented in the flight briefing, one attack option was used on all four attacks (Tab V-5). The attack that was flown is as follows:

1. The four-ship separated into two-ship elements, with Bear 1 and 2 in the lead element and Bear 3 and 4 approximately 6-8 nautical miles (NM) in trail.
2. Each element assumed a near-abreast formation, with the wingmen (Bear 2 and 4) approximately 6000 feet to the right of the element leaders (Bear 1 and 3) and ten degrees aft of line-abreast (Tab V-5).
3. Each element flew toward the target at 510-520 KCAS (knots calibrated airspeed) and approximately 500 feet until 4 to 5 NM range from the target.
4. At that point, each element executed a right turn of 30 degrees, and began a shallow climb called the "pop-up", to visually acquire the target and to achieve a position above the target from which weapons were to be released (Tab V-5).
5. When a predetermined altitude was reached, each flight member rolled his aircraft left toward the target and descended at a 10 degree dive angle to release its training ordnance. The delivery is called "low angle-low drag," meaning the comparatively low dive angle of 10 degrees and the type of weapon simulated does not have an additional drag device to slow the bomb after release. Bear 2 and 4 were executing an identical delivery, but were executing the attack from a higher altitude to avoid flying through the simulated bomb blast pattern of their lead aircraft. The delivery used by the wingmen is commonly called a "10-hi, low-angle, low-drag."

The first three attacks by Bear 1 flight used these procedures with only one abnormality. On the first attack, Bear 3 and 4 approached the target area from a direction from which positive separation from the Airborne Forward Air Controller (AFAC) could not be assured. They did not drop munitions on this attack. After clarification from the AFAC and movement of the AFAC to a different position, they completed the remaining attacks without incident (Tab V-6).

The accident occurred during egress from the target area after bomb release on the fourth attack of the mission. For the fourth attack, Bear 1 directed a reattack on the same target as the third attack, a convoy of vehicles at grid coordinates 267 763. There was no change in the attack plan (Tab V-5). For the reattack, Bear 1 repositioned the flight 13 miles east of the target and repeated the same attack plan as the first three attacks (Tab V-6). Eyewitnesses to portions of the fourth attack include Bear 2, 3, and 4, crew members and observers aboard the Army UH-1,

personnel manning the simulated threat sites on the bombing range, the OA-10 Airborne Forward Air Controller, and the OH-58 and UH-1 helicopter crew members (Tabs V-5, 6, 7, 17, 19, 20, 21, 22, 23 and 24). Of these witnesses to the attack, the personnel aboard the UH-1 had the least interrupted/restricted visual contact with Bear 1 after bomb release (Tabs V-19, 20).

Following is a composite of testimony given by witnesses: The run-in, pop-up, and weapons delivery by Bear 1 and 2 on this attack were consistent with the briefed attack and visually the same as the first three attacks. Bear 1 achieved pre-briefed parameters during his attack and weapons release. Bear 2 followed as briefed approximately five seconds later. Bear 1's bomb impacted directly on the target (Tab V-18). At least one threat site confirmed a radar lock on Bear 1 during the attack (Tabs V-22 and 23). At least one "Smokey SAM" (small rocket simulating a surface-to-air missile) was launched by a threat site at or near the time of Bear 2's weapons release (Tab V-22). This threat was specifically presented by the site to Bear 2 and did not physically pose a threat to the aircraft. Bear 1 was heading in a southerly direction at bomb release, remained near wings level for a few seconds, and then rolled left. Bear 3 described this maneuver as the nose low Turning Safe Escape Maneuver (TSEM) described in the mission briefing (Tabs V-6 and DD-1).

At approximately this same time, Bear 3 saw the Smokey SAM launch and called for Bear 2 to break left. Bear 2 began a +7 G left break turn to simulate attempting to maneuver his aircraft in a manner that would "out maneuver" the capability of a surface-to-air missile following him. Bear 1 turned southeast, on a heading of approximately 130 degrees (Tab V-5) on a route described by Bear 3 as going down the "south fork of the Chena river" (Tab V-6) and was seen in up-to-90 degrees of bank, direction of roll undetermined. Bear 1 continued on a southeasterly heading, rolling left and then right completing what was described as a "barrel roll" (Tab V-18). The aircraft then paused at a near wings level, slightly nose low attitude and impacted the north western slope of a 2365 foot hill at the 2106 level.

No one saw evidence of an attempt by the aircrew to eject from the aircraft or anything unusual with the aircraft itself prior to impact (Tab V-19). In addition to the information obtained from witnesses, data was also available from the Crash Survivable Flight Data Recorder (CSFDR), recovered from the crash scene. The following data was contained in the memory of the CSMU of aircraft 90-0784 (Tab BB):

Weapons release on the 4th attack occurred at 64 minutes 21 seconds after takeoff and 31 seconds prior to the end of recorded data. The aircraft was at 2100 feet mean sea level (MSL), approximately 1100 feet above the ground (using target elevation) in a 10 degree dive. After bomb release, Bear 1 continued to descend, then rolled into 90 degrees of left bank, which he held for three seconds. Heading changed from 184 to 135 degrees.

The bank angle then reversed to the right as the aircraft descended through 1600 feet MSL. Bank increased momentarily to 100 degrees right, then decreased to 70 degrees right as the nose of Bear 1 passed through level flight and the descent stopped at 1450 feet MSL. Heading was 152 degrees.

Bear 1 then rolled to 10 degrees right bank and began a pull-up during which pitch reached 32 degrees nose above the horizon and G force momentarily peaked at +7.0 G. Altitude peaked at 3700 feet MSL (approximately 2700 feet above the ground) after achieving a maximum of 140 degrees left roll during the climb.

Bear 1 then descended to 1650 feet above the ground rolling to wings level on a heading of 106 degrees, then rolled right to 100 degrees of bank and +5 to +6 G's. Airspeed was approximately 485 KCAS. Roll continued to the right and G decreased to minus 1.7 Gs. Pitch attitude was approximately minus 10 degrees (below the horizon) and heading was 140 degrees.

Bear 1 continued to roll right, past inverted flight to near upright. The last readings from the CSFDR were +3.5 G, 15 degrees right bank, 15 degrees nose down, heading 133 degrees, altitude 2250 feet mean sea level/150 feet above the ground. Bomb release to end of data was 31 seconds. A Graphic Depiction of the last 31 seconds of recorded data is at Tab DD-1.

The last data on the CSFDR is subject to the limitations described in Tab BB which includes a description of the component, instructions for the use of data and data printout for both analog and discrete Type I CSFDR information.

There are no CSFDR indications of any structural damage or aircraft malfunctions prior to the end of the data.

End of data to impact cannot be precisely determined. However, at the last point in the memory unit, the canopy is still on the aircraft (Tab J-10). Engineering analysis determined the ejection sequence had been initiated prior to impact. By totaling the time required for the ejection seat events that did occur (.75 to 1.00 sec) after canopy separation, it can be determined that impact was at least .75 to 1.0 seconds after recorded data stopped.

The following is a portion of the data retrieved from the eight minutes of memory of the Crash Survivable Flight Data Recorder:

1. The stick control switch was in the forward (FWD) position.
2. The AFT seat paddle switch had not been depressed and was not depressed at the end of data.
3. The FWD seat paddle switch had not been depressed and was not depressed at the end of data.
4. There is a positive indication that the terrain following radar of the LANTIRN Navigation Pod was not being used (not powered).
5. The throttle was retarded rapidly to idle and advanced to military (Mil) power from idle just prior to the end of data.

6. The UHF/VHF radio was keyed momentarily approximately four seconds before end of data.

7. Altitude (above sea level) continued to decrease during the last seven seconds of data.

Following is a transcript of radio transmissions (Tab N) of the last two attacks by Bear flight, with aircraft identified listed below:

<u>AIRCRAFT CALLSIGN</u>	<u>IDENTIFICATION</u>
Bear 1	Accident aircraft
Bear 2	Number two aircraft in Bear flight
Bear 3	Number three aircraft in Bear flight
Bear 4	Number four aircraft in Bear flight
Felon 1	OA-10, Airborne Forward Air Controller
Charlie 11	OH-58, Army Helicopter Mission Commander
Sabre 03	UH-1, Army helicopter observer

<u>TIME</u>	<u>AIRCRAFT</u>	<u>TRANSMISSION</u>
1448:33	Bear 1	"Bear, tapes on, pods on, master arm"
1448:36	Charlie 11	"I'd like to request option for reattack with 30 second and 1 minute calls prior to reattack"
1448:45	Felon 1	[unintelligible]"..OK..15 minutes, copy.. and, uh.. Bear's looking about the same"
1448:49		[unintelligible]
1448:59	Bear 3 ✓	"Bear 3's departed IP"
1449:00	Bear 1	"Understand the IP is 14.5 from target?"
1449:07	Bear 3	"Disregard"
1449:10	Felon 1	"Felon copies Bear 3's departed"
1449:11	Bear 1	"Disregard, disregard"

1449:15	Bear 1	"Bear 1 departed IP"
1449:20	Felon 1	"Copy, abort code same"
1449:21	Bear 1	"Affirm, mike sierra"
1449:22	Felon 1	"Copy"
1449:26	Bear 3	"4, line right"
1449:29	Bear 1	"Charlie 11, Bear's departing"
1449:30	Charlie 11	"Charlie 11, roger"
1449:44	Bear 1	"Bear's 5 seconds late"
1449:46	Felon 1	"Copy 5 seconds late for Bear"
1449:49	Bear 1	"Bear's one minute"
1449:50	Felon 1	"One minute for Bear"
1449:52	Charlie 11	"Roger, Bear"
1449:56	Bear 1	"Eight miles"
1450:02	Bear 3	"Bear 3, 1 minute"
1450:06	Felon 1	"Copy, Bear 3, one minute"
1450:12	Bear 1	"Bear 1, joker"
1450:17	Bear 1	"Action..Bear 1 action"
1450:29	Bear 1	"Bear 1's up..."
1450:29	Bear 2	"2's up"
1450:30	Bear 1	"...30 seconds"
1450:30	Charlie 11	"30 seconds"
1450:34	Bear 1	"30 sec...Bear 1 is in 30 sec"
1450:36	Bear 2	"2's in"

1450:46	Bear 1	"Bear is taking trailers"
1450:52	Unknown	"Five one three, Five one three, zero six two on UHF. If you've got (unintelligible) good transmitter, come up 38.30 Fox Mike."
1450:53	Charlie 11	"SAMs should be suppressed"
1451:01	Bear 3	"Bear 3's...in"
1451:03	Bear 1	"Bear 1...mud...6...engaged defensive"
1451:07	Bear 4	"Got a SAM launch there"
1451:17	Bear 4	"4's in...corrections"
1451:22	Bear 3	"Bear 3's off hot...Tally FAC"
1451:24	Bear 4	"4's in with corrections"
1451:27	Bear 3	"Take the leaders, 4"
1451:31	Charlie 11	"And 4 was just uh maybe 30 meters off the target there...pretty close"
1451:37	Bear 4	"4's off hot"
1451:45	Bear 3	"4, look down valley, Bear 3's defending"
1451:46	Bear 4	"Copy...Bear 4's now spiked at 6"
1451:52	Bear 2	"Bear 2's now blind"
1451:55	Felon 1	"Charlie 11, Felon 1"
1451:56	Bear 1	"Visualize left 5, left 7, coming up"
1451:57	Felon 1	"Uh...good spot in the bombs...uh...give corrections north, south, east, west in meter increments. uh...for example, if 1's bombs hits...shacks a truck and you want to move it...uh...you might say...uh...OK...50 meters north of 1's bombs and 2 will be...uh...aiming for that spot."
1452:16	Charlie 11	"Roger, understand. We'll do that next time"



1452:17	Felon 1	"OK...uh...Bear you're cleared reattack...when you got it regrouped. Call 30 seconds out and 1 minute out"
1452:25	Bear 1	"Bear wilco and 2 are you ready to go"
1452:27	Bear 2	"2's ready"
1452:28	Bear 3	"3's saddled"
<b>4th Attack Begins</b>		
1452:29	Bear 1	"Copy, let's go"
1452:32	Bear 1	"Bear 1 and 2, hook left"
1452:36	Bear 1	"Bear new bingo 1.7"
1452:37	Felon 1	"Charlie 11, Bear is coming back in for reattack. They'll call 30 seconds and 1 minute looking for corrections between bombs"
1452:44	Charlie 11	"And Charlie 11, wilco"
1452:52	Charlie 11	"Felon...uh...Charlie 11, he is going after specific vehicles, not the formation as a whole, correct?"
1452:57	Felon 1	"Well simulating the ordnance he's got he'll be...uh...dropping a string of 6... uh...Mark 82 with about..."
1453:03	Bear 1	"Bear 1 and 2 weave"
	Felon 1	"a hundred foot spread on em"
1453:04	Bear 3	"Bear 4, hook left"
	Felon 1	"It will cover a pretty good area"
1453:05	Bear 1	"medium, medium"
1453:06	Bear 4	"Understand left"
1453:07	Charlie 11	"Give 'em that. They're pretty much nailing everything they're looking at"

1453:10	Felon 1	"Roger that"
1453:13	Bear 1	"Bear 3, clear to strip back 5 miles"
1453:17	Bear 1	Bear 1 and 2, push it up, pods on, camera on, air-to-ground"
1453:25	Bear 1	"7 miles, Bear 1 is 40 seconds, 40 seconds, late call"
1453:26	Charlie 11	"Bear 40 seconds"
1453:33	Bear 1	"Bear 1, 30 sec"
1453:34	Charlie 11	"Roger 30 seconds Bear 1"
1453:41	Bear 1	"Action"
1453:46	Bear 3	"Bear 3, 1 minute"
1453:51	Bear 1	"Bear 1's up"
1453:53	Bear 2	"2's up"
1453:57	Bear 1	"Bear 1's in"
1453:59	Bear 2	"Bear 2's in"
1454:02	Bear 1	"Bear 1's sorted far"
1454:15	Bear 3	"Bear 3, 30 seconds"
1454:17	Bear 4	"SAM launch"
	Bear 2	"Bear 2's off"
	Unknown	ATC call One minute (garbled) two, direct...uh...north...uh...correction...south of Blesin (?)"
1454:35	Bear 3	"Bear 2, break left for SAM at your 6. Bear 2, break left"
1454:37	Bear 3	"3's up"
1454:39	Bear 4	"4's up"
1454:48	Felon 1	"KNOCK IT OFF, KNOCK IT OFF, KNOCK IT OFF"

1454:50	Bear 3	"Bear 1 and 2, Bear 3, 4, knock it off"
1454:51	Bear 4	"4, knock it off"
1454:52	Bear 2	"Bear 2, knock it off"
1454:53	Felon 1	"Bear...uh...2,3 and 4, hold high...I'd like you above 20, correction 10 thousand feet. Charlie 11, this is Felon 1, I think we've got an impact on range"
1454:55	Charlie 11	"Roger, what is that smoke I see"
1454:56	Felon 1	"It's impact...Bear 3 and 4, I'd like you to deconflict, egress east, Bravo 526. Bear 2, I'd like you to follow 3 and 4 out"

e. IMPACT.

Bear 1 impacted at 64 degrees 40 minutes 12 seconds North Latitude and 146 degrees 20 minutes 52 seconds West Longitude at the 2106 foot level on the north western side of a 2365 foot hill at 1455 (2:55 PM) Alaska standard time (Tabs A, R and AA). The accident occurred and all wreckage was confined to Fort Wainwright, an Army Post and federal territory. (Tab P) The aircraft was destroyed upon impact. The impact angle was 24 degrees to the face of a 16 degree upslope. The aircraft impact heading was 111 degrees. The debris pattern was on a course of 120 degrees (uphill) from the impact point. The aircraft was in 13 degrees of right bank (right wing down) and in an 8 degree descent (Tab R). Airspeed was approximately 484 knots calibrated airspeed (KCAS) (Tab BB). Both crew members were fatally injured.

Although witnesses did not observe an indication of an ejection attempt, post crash analysis of the escape system indicated that the ejection sequence had begun; however, it was interrupted and terminated by ground impact. Analysis indicates that ejection was initiated approximately 0.75 to 1.00 seconds before ground impact (Tab J). Post-mortem analysis revealed injuries to the hand of Major Verdone consistent with pulling the ejection handle at the time of impact (Tab DD-7).

Life science analysis was conducted on several aircraft components and items of personal equipment by the Human Systems Center, Kelly AFB, Texas. Based on physical evidence and results of test conducted on equipment the following conclusions were made:

While the majority of exhibits sent to the HSC for analysis bore heavy damage, there is no indication of birdstrike involvement, hydraulic misting, severe electrical arcing, unusual low/high order fire exposure patterning (not characteristic of post crash fire effects) or similar type exposures which display trace evidence (including penetration of the cockpit structure by foreign objects such as gunfire). Evidence indicates that prior to the mishap, the cockpit structure/environment was normal.

Damage to the rear seat crew members frontal helmet lobe areas as well as markings upon the back of the helmet which align to the headrest of the ejection seat indicate Dr Verdone was in a forward facing head erect attitude at terrain impact.

Analysis of the pilot's helmet indicates that Capt Porter was in a forward facing head erect posture at terrain impact.

General flight apparel/equipment break-up indicates that both crew members were correctly attired/restrained.

There is no evidence of any equipment failure, or maintenance discrepancies present on the exhibits examined. The Human Systems Center determined, after all evidence was examined, that the aircraft escape system and life sciences equipment were operational until mishap forces exceeded their structural design capabilities (Tab DD-15).

#### f. EJECTION SEATS

Aircraft 90-0784, a two place F-16D, was equipped with two Advanced Concept Ejection Seats (ACES II) (Tab DD-5). Both ejection seats were totally fragmented and scattered throughout the aircraft wreckage along with other escape system components.

The aircraft canopy was recovered intact. Post crash analysis indicated all canopy removal components had fired and both front and rear seat shoulder strap inertia reel initiators had fired. The rear seat rocket catapult and the stabilization package (STAPAC) vernier rocket had fired. The front seat rocket catapult ruptured from ground impact and the front seat STAPAC vernier rocket had not fired. Other recovered escape system components that had fired were one JAU-8 initiator (starts the sequence), one M-99 initiator (sequences the seat and canopy), and three time-delays. Recovered components that had not fired were the rear seat drogue cutters and rear seat parachute mortar (Tab J-12).

The Escape Systems Safety Manager at Norton AFB, CA determined: "...[T]he escape system was functioning as designed in Mode II prior to ground impact (Tab DD-5). The system was initiated approximately 0.75 to 1.0 seconds before ground impact" (Tab J-12). The Escape Systems Safety Manager at Norton AFB, CA determined this was an out-of-envelope (sequence terminated by ground impact) ejection (Tab J-12). The exact time before impact that the ejection was initiated could not be determined from the CSFDR discrete data; however, the canopy had not jettisoned prior to the last recorded memory data (Tab BB).

#### g. PERSONAL AND SURVIVAL EQUIPMENT

All required inspections on Capt Porter's helmet, oxygen mask, torso harness, and survival vest were current on the day of the mishap. Required inspections on Maj Verdone's helmet, oxygen mask, torso harness, two anti-G suits, and survival vest were current. Survival equipment recovered from the mishap site indicated significant damage to both Capt Porter's and Maj Verdone's personal survival equipment occurred during impact.

Life Support records indicated Capt Porter had 3 anti-G garments assigned for his use on the day of the mishap: two CSU 13B/P anti-G garments were sized medium/regular and one CSU 13B/P anti-G garment was sized large/regular. The large/regular CSU 13B/P anti-G garment was one of the 18th Fighter Squadron Life Support shop's spare anti-G garments. This large/regular anti-G garment was fitted to Capt Porter in December, 1992 according to Life Support records and testimony (Tabs V-31 and DD-16). Inspections of all three anti-G garments were up to date in accordance with T.O. 14P3-6-121.

Inspections of the front and rear cockpit ACES-II ejection seat parachutes, including the drogue chutes, for aircraft F-16D 90-0784 were current. Parachutes from both front and rear ejection seats were recovered from the mishap site. Inspections of the front and rear cockpit ACES-II ejection seat survival kits, including life rafts and medical kits, were current.

#### h. RESCUE

Bear 1 impacted the ground at 1455 hours (2:55 P.M.) Alaska Standard Time. Felon 1, the Airborne Forward Air Controller flying an OA-10 initiated a call for rescue within seconds of the crash to the Army helicopters taking part in the Joint Air Attack Team mission. Sabre 03, the Army UH-1 observing the mission was the first to respond to the call, followed closely by Charlie 11, an Army OH-58 helicopter. Both respondents were at the scene of the crash within one minute. After an aerial search of the area, both helicopters landed uphill of the crash site and an Emergency Medical Technician (EMT) on board (by coincidence) the OH-58 attempted to walk to the site. The EMT did not have snowshoes or similar equipment, and therefore was unable to get to the site on foot due to deep snow. There was no indication of survivors (Tab V-19).

#### i. CRASH RESPONSE

Felon 1, in the OA-10, orbiting the area after the crash, assumed the role of on-scene commander. He directed Bear 3 and Bear 4 to exit the area and coordinated the actions of the UH-1 and OH-58 that responded to the site. Felon 1 sent Bear 2 to orbit high over the crash site in case he required a radio relay. Felon 1 notified the Supervisor of Flying (SOF) at Eielson AFB of the accident (Tab V-8). The SOF immediately notified the Eielson AFB command post and wing supervisors, using the appropriate action checklist. The command post organized a response team which assembled at base operations (Tab DD-14). The response team was equipped with appropriate deep snow equipment and included a flight surgeon, medical technicians, and a security policeman. The 343rd Wing Office of Public Affairs was notified at 1505 (3:05 PM) via the wing command post crash phone (Tab DD-12).

Sabre 03, the Army UH-1 departed the crash site after the initial search for survivors, and flew to Eielson AFB, 17 miles away, to refuel and pick up the crash response team. When Felon 1, the OA-10, had to return to Eielson AFB, he was replaced with another OA-10. The UH-1 returned to the crash approximately one hour after the accident. The flight surgeon and medical technicians spent approximately one hour and fifteen minutes searching the scene on foot for survivors. They located the remains of both crew members. The flight surgeon officially determined there were no survivors at that time (Tab V-9).

The Rescue Coordination Center (RCC) based at Elmendorf AFB in Anchorage was notified at 1500 (3:00 PM) by the 343rd Wing Command Post (Tab DD-19). The RCC immediately diverted an HC-130 aircraft already airborne and launched an H-60 helicopter from the 210th Rescue Squadron in Anchorage. The RCC also alerted an Army UH-1 helicopter from the 283rd Medical Detachment at Fort Wainwright, and a Civil Air Patrol aircraft from Eielson AFB was also dispatched. The HC-130 and H-60 arrived at the scene and were on stand-by for air-refueling and aerial survey (Tab DD-19). Due to a forecast snow storm, immediate action was taken the next day to recover the remains of Major Verdone and Captain Porter (Tab V-9).

j. MAINTENANCE DOCUMENTATION

F-16D serial number 90-0784, a Combat Coded (CC) fighter aircraft, was accepted by the U.S. Air Force on 31 Sep 91 at General Dynamics Corporation-Ft. Worth Division, Ft. Worth, Texas, and delivered to Eielson AFB, Alaska on 22 Oct 91. At the time of the accident, it had accrued a total of 398.7 airframe flight hours (Tab D) and was described as a "good airplane" (Tab V-12).

All required Time Compliance Technical Orders due to be accomplished prior to 18 February 1993 were completed (Tab U-1).

All scheduled inspections/maintenance were accomplished (Tab U-3).

A review of aircraft records indicated all Time Change Requirements were completed (Tab U-3).

A 300 hour #2 phase inspection was accomplished on 20 Oct 92 at an aircraft time of 292.5 hours. The aircraft had flown a total of 106.2 hours since the last scheduled inspection and a total of 53 sorties (including the accident sortie) since 1 December 1992. Thirty-three sorties were Code 1, sixteen were Code 2, and four were Code 3 (Code definitions at Tab U-4). The following discrepancy summations resulted from the four Code 3 sorties since 1 Dec 92 (Tab U-5):

<u>DATE</u>	<u>DISCREPANCY</u>	<u>CORRECTIVE ACTION</u>
12 Feb 93	The fuel needles on the gauge totaled 700-800 more than the totalizer. External fuel tanks were all reading 0.	All readings read normal in all positions. Could not duplicate. (CND)
28 Jan 93	Air Abort for high iron in JOAP sample.	Red Cap ( special sample) JOAP sample checked good.

30 Dec 92	Seat Not Armed caution light burned out.	Removed and replaced light bulb.
02 Dec 92	Foreign Object (FO) in cockpit. Pilots pencil.	Removed pencil

k. MAINTENANCE PERSONNEL AND SUPERVISION

Supervision and training of individuals involved in the maintenance performed on aircraft 90-0784 from pre-flight inspection on 16 Feb 93 through the End of Runway (EOR) inspection for the accident flight revealed no deficiencies. Individuals were qualified for the work they accomplished as reflected in their AF Forms 623, On-the-Job Training Record.

l. ENGINE, FUEL, HYDRAULIC, AND OIL INSPECTION ANALYSIS

General Electric F110-GE100 turbofan engine, serial number GE-E545294, was installed in aircraft 90-0784. All inspections, time change requirements, and time compliance technical orders were met (Tab U-6).

The Oil Analysis Record for General Electric F110-GE100 engine (GE-E545294), from 14 December 1992 to the day of the accident, was reviewed with no discrepancies noted except for oil sample #3 on 28 January 1993 (air abort) which indicates an increase in iron (Fe) over previous samples. According to technical order 1F-16CG-6-11, "... (A)n engine should be allowed to fly one (but not more than one) flight before Joint Oil Analysis Program analyzes results of oil sample of a previous flight are known" (Tab U-11). The next oil sample, #4, taken the same day, indicated a return to previous levels of iron. All further oil samples taken up to and including the day of the accident indicate no discrepancies (Tab U-2).

Samples were taken and analyzed from oil servicing carts #4 and #7 (Tab U-7), hydraulic servicing cart #4 (Tab U-8), Liquid Oxygen (LOX) cart #LX09, and LOX tank #2 (Tab U-9). No discrepancies were found. Samples were taken and analyzed from fuel truck R11 89L-854 and fuel tank #2 (Tab U-10). Both samples failed to meet specification limits for workmanship, total acid number, and particulates. The Chief, Aerospace Fuels Laboratory, USAF Aerospace Fuels Laboratory, Det 35, SA-ALC/SFTLD in Mukilteo WA remarked for both samples: "Sample[s] arrived in defective containers that could have contributed to the failure of workmanship and particulates" (Tab U-10). Fuel truck R11 89L-854 and fuel tank #2 were re-sampled as requested by the Chief, Aerospace Fuels Laboratory and submitted for testing for workmanship, filtration time, and particulates. The Chief, Aerospace Fuels Laboratory determined, for both retested samples: "Material represented by this sample meets specification limits for workmanship, particulates, and filtration time. High Acid Number value of this material (reference prior report 93-F-560 [and 93-F-559]) is due to [the] inability of Alaskan suppliers to meet this specification limit. Material represented by this sample is suitable for use" (Tab U- 10).

m. AIRFRAME AND AIRCRAFT SYSTEMS

The launch crew chief, assistant crew chief, end of runway (EOR) supervisor, and EOR crew chief (technician) testified that there were no problems encountered throughout the aircraft launch and end of runway inspection just before take-off (Tabs V-13, 14, 15 and 16). A complete analysis of aircraft systems could not be made due to the extensive damage to the aircraft upon impact. Most mechanical actuation components of the flight control surfaces were recovered. The following primary flight control Integrated Servo Actuators (ISA) were analyzed at Ogden Air Logistics Center, Hill AFB UT (OO-ALC/LAATM) with flight control surface displacement as indicated (Tabs J-5, 6 and 7):

<u>COMPONENT</u>	<u>INDICATED DISPLACEMENT</u>
1. Rudder ISA	0.7 degrees trailing edge right
2. Left horizontal	3.0 degrees trailing edge up tail ISA
3. Right horizontal	1.4 degrees trailing edge up tail ISA
4. Left flaperon ISA	1.6 degrees trailing edge up
5. Right flaperon ISA	3.2 degrees trailing edge down

All eight Leading Edge Flap Rotary Actuators of the flight control system were recovered. Analysis indicated approximate deflection of 2.0 degrees down for both left and right wing leading edge flaps (Tab J-6).

The hydraulic system components and fuel system components recovered were severely damaged and no indications were obtainable. The Emergency Power Unit (EPU) was not recovered.

The Equipment Specialist, F-16 Electro-Mechanical Systems, Ogden Air Logistics Center, Hill AFB, UT (OO-ALC/LAATM) determined that: "...[T]here were no abnormalities apparent in the flight control or hydraulic systems of the mishap aircraft at impact" (Tab J-6).

An analysis was conducted at Oklahoma City Air Logistics Center, Tinker AFB, OK, (OC-ALC/MMIRIA) on several cockpit instruments and associated cockpit components recovered. Attitude Director Indicators (ADI) sustained major impact damage. Analysis indicated positions at impact to be eight degrees nose down and thirteen degrees right wing down for both ADIs. (Tab J-8) Only one severely damaged standby ADI was recovered, crew position unknown, indicated six degrees nose down. No bank angle could be obtained. Both Angle of Attack (AOA) indicators were recovered and analysis indicated four degrees AOA for both indicators. Only one Vertical Velocity Indicator (VVI), crew position unknown, was recovered. It indicated 800 feet per minute down.



One Speed Brake Indicator, crew position unknown, indicated a cross hatch presentation. The design of the indicator is such that the existing presentation will go to a cross hatch indication upon loss of electrical power, unless capture occurs as a result of impact damage (Tab J-9). The Equipment Specialist (Electronic), Oklahoma City Air Logistics Center, Tinker AFB, OK, (OC-ALC/LIINT), determined that: "Nothing was noted during this analysis that indicated instrument or instrument system failure prior to impact or loss of input signal" (Tab J-9).

The engine was destroyed and with the exception of the augmentor (afterburner), all major sections were fragmented (Tabs J-1, 2, 3 and 4). Results of the analysis at Oklahoma Air Logistics Center, Tinker AFB, OK, (OC-ALC/LPARA), estimated power at time of impact to be: "7,500 lbs thrust, 13,500 RPM core speed, and 6,900 RPM fan speed" (Tab J-4). In accordance with technical order 2J-F110-6-12, these indications correspond to an engine operating at 94 percent RPM (Tab U-12). The CSFDR last data memory for the engine indicates 93.5 percent.

#### n. OPERATIONS PERSONNEL AND SUPERVISION

The 18th Fighter Squadron is tasked by Headquarters Pacific Air Forces (PACAF) to maintain a Designated Operational Capability (DOC) of Close Air Support. Captain Porter was authorized to fly Close Air Support on the mishap flight by the 18th Fighter Squadron Operations Officer and acting Squadron Commander. The authorization was documented on Local Form 170, Local Flight Authorization/Flight Plan on 17 Feb 93 (Tab K). The flight was filed on a VFR flight plan. The date of the authorization signature (17 Feb 93) indicates it was signed prior to Major Verdone's addition to the Form 170 which occurred on the morning of 18 Feb 93. His flying currency was overdue by five days; however, there is no information in AFR 60-1, the regulation that authorizes flight surgeons to fly, on how to regain a flight surgeon's currency by other than "flying." Major Verdone's currency was not checked prior to adding him to the schedule; however, in his initial contact with the squadron he had told the scheduler he was "about to run out of currency" (Tab V-32).

The flight was briefed by Captain Porter using a combination of the squadron standard briefing guide and a personal briefing guide. Testimony indicates the briefing was thorough and adequate. No supervisory personnel attended the flight briefing. Completion of a crew coordination briefing between Captain Porter and Major Verdone in accordance with 18th Fighter Squadron standards for flying in an F-16D could not be confirmed (Tab DD-6).

#### o. AIRCREW QUALIFICATIONS

Captain Porter's total military flying time was 2145.2 hours, including the 1.1 hours of the mishap sortie (Tab T-8). He had 464.5 hours in the F-16 including 172.1 primary hours in the 2-seat F-16D. He graduated from the USAF Academy in 1985, then completed Undergraduate Pilot Training on 24 Jul 86 in the top quarter of his class at Vance AFB, OK. Following a three year tour as a T-38 instructor pilot at Vance AFB, where he accumulated 1206.0 hours as an instructor, Captain Porter transitioned to the F-16 at MacDill AFB, FL.

He completed F-16 training on 21 Feb 91 and was awarded the "Top Gun" flying award and the top academic award for his class (Tab T-8). Captain Porter accepted an operational assignment flying the F-16 with the 18th Fighter Squadron, Eielson AFB, AK and achieved Mission Ready (MR) status on 18 Sep 91 (Tab T-4). While Captain Porter attended Squadron Officer School at Maxwell AFB, AL, in accordance with standard operating procedures, he was decertified from MR status on 1 Feb 92. He recertified as MR on 26 Feb 92 after his return to Eielson AFB, according to both training records and testimony (Tabs G and V-1). He completed the academic portion of the F-16 Flight Lead Upgrade Program (FLUG) on 30 Jul 92.

On 9 Dec 92, Captain Porter was certified as a 4-ship F-16 Flight Lead limited to Air-to-Ground and similar Air-to-Air Combat Training sorties after completing all portions of the Flight Lead Upgrade Program except two sorties flying air-to-air combat with dissimilar aircraft as adversaries. This limitation was in place on the day of the mishap (Tab G).

On 10 Feb 93, Captain Porter completed Low Altitude Step Down Training for the 300 feet above the ground level qualification (LASDT A/S 2 cat II-300') (Tabs G and DD-3). He flew his last F-16D mission prior to the mishap flight earlier in the day on 18 Feb 93 in the same aircraft 90-0784, logging 1.1 hours. Captain Porter's last F-16C mission prior to the mishap flight was on 17 Feb 93, the day prior to the mishap (Tab G). The first mission of the day was Capt Porter's first mission as a 4-ship flight lead. Captain Porter's F-16 currency was as follows (Tab G):

	<u>F-16 C/D sorties</u>	<u>Flight Time</u>
Last 30 days	16	18.9
Last 60 days	21	27.1
Last 90 days	33	47.2

He completed Arctic Survival Training on 8 Nov 91 and his Emergency Egress Training and Hanging Harness Training were valid until 30 Apr 93. Captain Porter's Water Survival and Chemical Warfare Training were current. His duty Air Force Specialty Code (AFSC) was 1115Q, Aviation Service Date was 6 Aug 85 and Aviation Service Code was 1A on Aeronautical Order 0355 dated 13 Feb 87. The F-16C was Captain Porter's primary aircraft (Tab G).

Capt Porter was certified for JAAT on 13 Sep 91 which was his last upgrade mission prior to his Mission Ready flight evaluation on 18 Sep 91 (Tabs G-2 and T-4). Joint Air Attack Team (JAAT) training is described in MCR 51-50 Vol VIII (Tab DD-3). Initial JAAT qualification training is conducted with Army attack/cavalry helicopter units or equivalent units of other nations under the supervision of a squadron or JAAT-qualified flight lead. IAW MCR 51-50, Vol VIII, PACAF Chapter 7, units with close air support checkout programs do not require a separate JAAT upgrade (Tab DD-4). The 18th Fighter Squadron is this type of unit.

Major Robert D. Verdone graduated from the Philadelphia College of Osteopathic Medicine, Philadelphia, PA, on 2 Jun 85, with the Doctor of Osteopathy degree (D.O.). After completing his internship at Metropolitan Hospital, Springfield, PA, on 30 Jun 86, he entered Extended Active Duty on 1 Jul 86. The National Board of Examiners for Osteopathic Physician and Surgeons certified Dr. Verdone on 1 Jul 86.

He attended the Aerospace Medicine Primary course at the USAF School of Aerospace Medicine, Brooks AFB, TX, from 21 Jul 86 to 5 Sep 86. Upon graduation from the Aerospace Medicine Primary course, Dr. Verdone received his Flight Surgeon's insignia and accepted an operational flight surgeon assignment at Tinker AFB, OK. Following this assignment, Dr. Verdone entered the Residency in Aerospace Medicine at Brooks AFB, TX, in 1989. In the first year of this residency program, Dr. Verdone completed a Master's Degree in Public Health at the University of Texas Health Sciences Center in San Antonio, TX. He completed the clinical portion of the Residency in Aerospace Medicine on 14 Jun 91 at Brooks AFB, TX.

On 3 Feb 92, Dr. Verdone received his Board Certification in Aerospace medicine from the American Board of Preventive Medicine. He was licensed as an Osteopathic Physician and Surgeon in the Commonwealth of Pennsylvania (expiration date 31 Oct 94). His credentials record at the 343 Medical Group revealed no deficiencies in Continuing Medical Education or evidence of pending medical malpractice proceedings. USAF Flight Surgeons are rated aircrew members and must meet physical and psychological standards for flying duty applied to USAF pilots and navigators.

In accordance with AFR 60-1, flight surgeons must fly at least 12 sorties per year (6 each half year) and at least once every 60 days. In accordance with AFR 60-1, flying units "give assigned and attached flight surgeons every opportunity to fly in the unit's primary mission aircraft." Major Verdone, as a flight surgeon attached to the 18th Fighter Squadron, was authorized two sorties per month in the F-16D by an agreement with the 343rd Operations Group and the 18th Fighter Squadron dated 10 Sep 92 (Tab DD-11).

On the day of the mishap, Major Verdone's Air Force Specialty Code (AFSC) was R9356A, Flying Status Code was 8A, and Aviation Service Date was 8 Sep 86 on Aeronautical Order 0599 effective 16 Jun 90. The Aeronautical Orders stated Major Verdone was "required to perform frequent and regular flight" aboard USAF aircraft (Tab T-9). On 18 Feb 93, Major Verdone was serving as Chief of Aeromedical Services, 343 Medical Group, 343 Wing, Eielson AFB, AK, a position he held since 31 Jul 91.

Maj Verdone completed his first operational USAF flight aboard a C-130H on 30 Sep 86 and his first F-16D flight on 9 Aug 91. He had 23.9 total F-16D hours including the 1.1 hours of the mishap flight and 548.2 total flying hours in twenty-seven different aircraft models. Major Verdone's 28.8 hours of high performance aircraft flying time included 2.7 hours in the F-4D in 1987 and 2.2 hours in the T-38 in 1990. F-16D was designated as Major Verdone's primary aircraft (Tabs G and T-12). Major Verdone was working on his private pilots license (Tab V-9).

Major Verdone flew two F-16D sorties on 15 Dec 92 for a total of 2.7 hours. These sorties were his last missions prior to the mishap sortie. His flying currency expired 13 Feb 93 due to sixty days having passed without flying (Tab T-13). In accordance with (IAW) AFR 60-1 paragraph 4-9, figure 4-2 (Tab O) " . . . time between flights must not be more than 60 days. Notify the Command Surgeon when time between flights exceeds 60 days." Testimony indicated the PACAF Command Surgeon was not notified of the 65 days elapsed between Major Verdone's flights (Tab V-1). Maj Verdone completed Arctic Survival Training on 5 Mar 92 and scored 100 percent on his flight surgeon exam for the F-16D aircraft on 12 Mar 92 (Tab DD-12).

Flight record review indicated Major Verdone's Emergency Egress Training and Hanging Harness Training were accomplished on 31 Jul 92 and had expired on 31 Jan 93 (Tab G). The Flight Medicine Clinic's Stand-alone Appointment Scheduling System (SASS) computer records showed Major Verdone worked ten hours seeing patients in the Acute Care Clinic, 343rd Medical Group, on 31 Jul 92 (Tab DD-8). Review of the 18th Fighter Squadron Life Support egress training logbook showed Major Verdone's Emergency Egress Training and Hanging Harness Training were actually accomplished on 3 Aug 92 vice 31 Jul 92 (Tab G). IAW PACAFR 55-7, Maj Verdone's Emergency Egress Training and Hanging Harness Training would not have been delinquent until 1 Mar 93 for this 3 Aug 92 training date. PACAFR 55-7 states "Aircrew members who require training during any specific month may satisfactorily complete the training at any time during that month. Individuals are not considered delinquent until the first day of the following month" (Tab DD-20). Since Emergency Egress Training and Hanging Harness Training are semiannual requirements and due every six months, IAW PACAFR 55-7, Major Verdone was due for recertification in Emergency Egress Training and Hanging Harness Training during February, 1993, but not delinquent until 1 Mar 93 (Tab DD-20).

The mishap flight was Major Verdone's second flight with Captain Porter (Tab G). Their first flight together took place on 17 Nov 92. The last review of Major Verdone's training record was on 1 Apr 92 (Tab G).

p. MEDICAL

Captain Glen S. Porter's medical records indicate he was medically qualified for flying duties on the day of the mishap. His last Flying Class II physical examination was dated 17 Jul 92 and revealed no disqualifying defects for flying duties. This physical was current until 31 Jul 93. Captain Porter completed centrifuge training on 3 Aug 90 and physiological training on 8 Jun 90, (expiration date 30 Jun 93). Dental records showed Captain Porter was Dental Class I (fully qualified for duty) on 27 May 92.

Major Verdone was medically qualified for flying duty on the day of the mishap. He received his last Flying Class II physical examination on 24 Jul 92. This physical was current until 31 Jul 93. Major Verdone received physiological training on 11 Jul 90, (expiration date 31 Jul 93). On 7 Aug 86, Dr. Verdone completed centrifuge training at Brooks AFB, TX, with a relaxed G-tolerance of 6.7 G and a straining G-tolerance of 8.7 G (Tab DD-13). The flight surgeon sustained the rapid onset of 9.0 G for fifteen seconds during this same centrifuge training. Dental records showed Major Verdone was Dental Class I (fully qualified for duty) on 30 Sep 92.

The remains were identified at Bassett Army Community Hospital, Fort Wainwright, AK using fingerprints and footprints. Death for both crew members was instantaneous. Cause of death was blunt force trauma secondary to F-16 aircraft accident (Tab X). Toxicology tests performed on the remains of both Captain Porter and Major Verdone by the Armed Forces Institute of Pathology, Washington, D.C., revealed no evidence of alcohol or drugs in either crew member (Tabs DD-9 and 10). Post-mortem photographs and X-ray examinations evaluated at the Armed Forces Institute of Pathology revealed injuries to Major Verdone consistent with pulling the ejection handle between the legs at the time of ground impact (Tab DD-7). As noted elsewhere in this narrative, impact with the ground occurred before completion of the ejection sequence.

q. NAVAIDS AND FACILITIES

There is no evidence regarding malfunctioning nav aids or facilities.

r. WEATHER

Forecasted weather on R2205 for the afternoon of 18 Feb 93 was 2000 feet scattered, 8000 feet scattered, 18000 feet broken clouds with 7 miles inflight visibility. There was no predicted precipitation. Testimony indicates the only cloud cover in the area was an undefined thin broken layer well above all aircraft in the area, and that cloud cover did not hamper flight operations (Tab W).

s. DIRECTIVES AND PUBLICATIONS

1. The following applicable publications and directives were reviewed. In all cases Major Command, Numbered Air Force, and 343rd Wing supplements were also reviewed:

REGULATION

Air Force Regulation (AFR) 60-1, Flight Management, 9 Feb 90

Air Force Regulation (AFR) 60-16, General Flight Rules, 27 Jan 92

Major Command Manual 51-50, Tactical Aircrew Training, 30 Oct 85, Vol I/PACAF Ch 6

Major Command Manual 51-50, Tactical Pilot Training, F-16, 1 Aug 91, Vol VIII

Major Command Manual 51-50, Tactical Pilot Training, F-16, 22 May 92, Vol VIII/PACAF Ch 7

PACAF Regulation 55-7, PACAF Life Support Program, 10 Jun 91

AAC/11 AF Regulation 50-46, Alaskan Weapons Ranges, 28 Feb 90

AAC/11 AF Regulation 55-16, Standing Operating Procedure for Joint Close Air Support Training, 17 Oct 89

343 WG Flying Operations and Training Programs, 1 May 92

18th Fighter Squadron Standards, 9 May 92

Technical Order 1F-16CG-1, Flight Manual USAF Series Acft F-16C/D Blocks 40/42, 29 Aug 88

Technical Order 1F-16CG-1-1, Supplemental Flight Manual USAF Series Aircraft F-16C/D Blocks 40/42, 16 May 88

Technical Order 1F-16CG-1-2, Supplemental Flight Manual USAF Series Aircraft F-16C/D, 10 Oct 92

Technical Order 1F-16-CG-1CL-1, Flight Crew Checklist USAF Series Aircraft F-16C/D  
Blocks 40/41, 29 Aug 88

Technical Order 1F-16CG-34-1-1CL-1, Checklist, Non-Nuclear Weapons Delivery Flight Crew  
Procedures USAF Series Aircraft F-16C/D Blocks 40/42, 2 Dec 91.

2. The following are known or suspected violations of regulations and/or directives:

**a. Technical Order 1F-16CG-1 Flight Manual:** The Crash Survivable Flight Data Recorder indicates the Stores Configuration Switch of F-16D 90-0784 was in the Category I (CAT I) position. In accordance with 1F-16-CG-1 Flight Manual, the switch should have been positioned to Category III (CAT III) when the aircraft was loaded with the external stores carried on the accident flight (Tab L). IAW the Flight Crew Checklist, the switch is checked during the Before Takeoff Check. A description and flight manual excerpts are at Tab DD. The flight manual states on page 1-66:

**Stores Config Switch (C) (DF)**

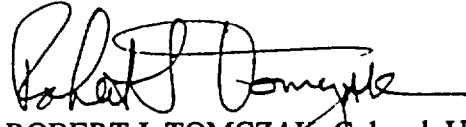
The stores config switch (Fig 1-35) has two positions, CAT I and CAT III.  
The CAT III position shall be selected when the aircraft is configured with  
a category III loading.

A technical Analysis of the mission impact of the Stores Configuration Switch in the CAT I versus CAT III position was conducted by the Aeronautical Systems Center (ASC/YP), Wright-Patterson Air Force Base, Ohio. ASC concluded that "...the incorrect position of the Stores Configuration Switch had no significant effect on the outcome of this flight (Tab DD-2).

**b. AFR 60-1 Flight Management:** PACAF Command Surgeon was not notified of Major Verdone's exceeding 60 days between flights. AFR 60-1, paragraph 4-9, Figure 4-2 (Tab O) requires the Major Command surgeon be notified "...when time between flights exceeds 60 days." The PACAF Command Surgeon was not notified. 343 WG Training Plan, Chapter 11, Part B (Tab O) states: "...Squadron commanders will notify the 343 OG/CC when time between flights exceeds 60 days. The 343 OG/CC will, in turn, notify the command surgeon." The 343 Operations Group Commander was not notified when Major Verdone exceeded the 60 day limit (Tab V-1).

**SUMMARY:**

This report is submitted as a complete document of all factual information available to the Investigating Officer in accordance with AFR 110-14 regarding the aircraft accident involving F-16D 90-0784 on 18 Feb 93.



ROBERT J. TOMCZAK, Colonel, USAF  
Investigating Officer