RAS 5425 72-22-ISFSI — Applicant Exhibit 204 — Rec'd 7/1/02

AUTHORITY AND PURPOSE

1. Statement of Authority: In accordance with (IAW) Air Force Instruction (AFI) 51-503, dated 29 December 1997, (*Tab BB-3*), by memorandum dated 17 August 1998, as amended by memorandum dated 18 August 1998, by memorandum dated 1 September 1998, and by memorandum dated 4 September 1998, General Patrick K. Gamble, Commander, Pacific Air Forces, Hickam Air Force Base (AFB), Hawaii, appointed Colonel Stephen M. Goldfein, Commander, 3rd Operations Group, Elmendorf AFB, Alaska to investigate a mishap which occurred on 24 July 1998, at Misawa Air Base (AB), Japan, in which an F-16CJ, tail number 90-0804, departed the end of the runway and was destroyed. *(Tab Y-2, 4, 8)*. The aircraft was assigned to the 35th Fighter Wing (35 FW), 14th Fighter Squadron (14 FS), Misawa AB, Japan. *(Tab A-2)*. Captain John T. Hammer, 3rd Wing, Elmendorf AFB, Alaska, was appointed legal advisor. Captain Randall J. Redell, 36 FS, Osan AB, Republic of Korea (ROK), was appointed as pilot advisor. Captain Stella T. Smith, 35 FS, Kunsan AB, ROK, was appointed as maintenance advisor. Staff Sergeant Christopher J. Bartlick, 80 FS, Kunsan AB, ROK, was appointed as life support advisor. Staff Sergeant Lisa R. Jones, 35th Fighter Wing (FW), Misawa AB, Japan was appointed as administrator/recorder. SrA Sergio A. Cornejo, 35 MXS (Maintenance Squadron), Misawa AB, Japan was appointed as administrator. The investigation was conducted 25 August through 5 September 1998 at Misawa AB, Japan.

2. Purpose: The investigation was conducted to obtain and preserve available evidence for claims, litigation, disciplinary and administrative matters, and for all purposes other than mishap prevention.

DOCKETED
USNRC

2003 JAN 21 PM 3:32

OFFICE OF THE SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

NUCLEAR REGULATORY COMMISSION

Docket No ____ Official Exh No. 204
In the matter of PFS
Staff ____ IDENTIFIED ✓
Applicant ✓ RECEIVED ✓
Intervenor ____ REJECTED ____
Other ____
Contractor ____ DATE 7/1/02
Other ____ Witness ____
Reporter cdt

PFS Exh. 204

58855

Template=SECY-028

SECY-02

SUMMARY OF FACTS

3. Background and Qualifications:

(a) The mishap pilot graduated from United States Air Force (USAF) Undergraduate Pilot Training on 9 May 1997 at Sheppard Air Force Base (AFB), Texas. Compared to his classmates, he performed above average in all areas of training. (*Tab T-37, 39*). Following undergraduate pilot training, the mishap pilot attended the USAF Basic Operational Training Course for the F-16C aircraft at Luke AFB,.Arizona from 3 September 1997 through 7 April 1998. At Luke AFB, he performed well above average. (*Tab T-83*). He was named a distinguished graduate of the formal training course (reserved for the top 15% of the graduating class). He was also named the Air-to-Ground "Top Gun," signifying that he was the most capable pilot in his class in delivering a variety of ordnance from his aircraft to designated ground targets. (*Tab T-83).*

(b) The mishap pilot was assigned to the 14th Fighter Squadron (FS) of the 35th Fighter Wing (FW) at Misawa Air Base (AB), Japan and arrived in May of 1998. (*Tab T-4, 8, 82*). He was formally enrolled in the Mission Qualification Training (MQT) program on 18 May 1998. (*Tab T-41*). The purpose of MQT is to prepare and upgrade new 35 FW pilots to combat mission ready (CMR) status. (*Tab BB-26*).

(c) The MQT program is governed by the 35 FW syllabus and involves completing specified academic, simulator, and flight events under the close supervision of squadron instructor pilots and supervisors. (*Tab BB-26*). The program at the 35 FW consists of 13 sorties and a certification. (*Tab BB-35*). The governing regulations require that this MQT program be completed within 90 days of assignment to the operational squadron. (*Tab BB-32*).

(d) The mishap pilot had flown 7 sorties for 7.4 hours of flying time during the 30 days prior to the mishap. He had flown 12 sorties for 14.2 hours in the previous 60 and 90 days. (*Tab G-;, T-9-14*).

(e) The mishap pilot's MQT grade folder was secured immediately after the mishap and fully complied with governing regulations. (*Tab T-41-7;, BB-30, 3; V-43*). Squadron supervision had regularly reviewed the mishap pilot's progress and there were no errors in order of progress or completion of appropriate prerequisite training items. (*Tab T-41-74*). IAW the MQT program guidelines, the mishap pilot was fully qualified to fly the assigned mission on the day of the mishap. (*Tab T-7, 48, 95-105; BB-32*).

4. Purpose of Mission: The mission was scheduled as a four-ship F-16 basic surface attack (BSA) sortie on the RIPSAW tactical bombing range near Misawa AB, Japan. (*Tab V-7*). The entire formation of aircraft was to fly a low level navigation route to a medium altitude attack of a target, followed by multiple attacks on a variety of targets at the bombing range. (*Tab V-7*). The mission was specifically designed and scheduled for the mishap pilot. It was planned to accomplish the syllabus-directed objectives for the designated MQT sortie. (*Tab V-7*).

5. Mission Designation and Objectives: The mishap mission was designated as Surface Attack Tactics Number #1 (SAT-1) in the 35 FW MQT syllabus. (*Tab BB-37*). This was the

58856

seventh of the 13 MQT flying missions in the syllabus. (*Tab BB-37*). The purpose of the mission is to demonstrate proficiency in portions of BSA and complete reorientation in the low altitude operating environment. (*Tab BB-35*). Published objectives include: (1) orientation to the conventional range and weapons deliveries, (2) completion of initial weapons qualifications in conventional events, (3) practice box patterns with climbing safe escape recoveries, and (4) practice of medium altitude initial point to target (IP-TGT) operations. (*Tab BB-37*).

6. Mission Preparation and Crew Rest:

(a) Preparation for the mishap sortie began two days prior to the mission. (*Tab V-7*). The mishap pilot met with the flight leader and the pilot of the #3 aircraft repeatedly over the ensuing two-day period. (*Tab V-7, 8*). The mishap pilot was assigned duties to prepare route maps, place target and other appropriate data into computerized mission planning programs, and assist with other portions of mission planning. (*Tab V-7, 8; BB-15; AA-3, 4*). The mishap pilot's assigned work was accurate and complete and he was well aware of the mission profile. (*Tab* V-*7, 8*). The mishap pilot was observed studying appropriate documents to assist his preparation for the mission and his assigned work was complete. (*Tab V-15*).

(b) The mishap pilot departed the squadron at approximately 1700 hours on the day prior to the mishap. (*Tab V-61*). He ate supper, visited with friends, and studied for the mission for approximately one and one-half hours that evening prior to retiring to bed at approximately 2130. (*Tab V-61*). The mishap pilot had adequate crew rest to fly the mishap sortie. (*Tab BB-20, 21*).

7. The 24 July 1998 Briefing:

(a) The mishap pilot and the other members of the flight attended two briefings prior to flying on the day of the mishap. (*Tab V-7*). The first briefing was a short routine "mass" briefing for all pilots that were scheduled to fly the morning of 24 Jul 98. (*Tab V-32*). Mass briefings are designed to discuss issues common to all missions. They also provide squadron supervision the opportunity to emphasize squadron training priorities. (*Tab V-32, 54*).

(b) The mass briefing materials included forecast weather for the air base and working airspace, Notices to Airmen (NOTAMS), overdue currencies, approaching currencies, roll call of pilots, latest Flight Crew Information File (FCIF), latest operations notes, mishap of the day, emergency procedure of the day, selected tactics topics, threat of the day, tactical topic of the day, and the 35 FW special interest item for airliner avoidance and visual flight rules operations. (*Tab V-3, 54; AA-6, 8-22; BB-24; W-11, 13, 15*). The squadron operations officer authorized the flight. (*Tab K-3; BB-20*). During the mass brief, the mishap pilot appeared attentive. (*Tab V-55*).

(c) The flight then attended a mission-specific briefing. (*Tab V-7, 14, 22*). Flight members included: Pilot A, flight lead; Pilot B, mishap pilot; Pilot C, #3 aircraft pilot, Pilot D, #4 aircraft pilot; and Pilot E, flight examiner. Pilot E was riding in the back seat of the #4 aircraft. (*Tab V-8, 22*).

58857

(d) In the opinion of Pilot C and Pilot E, Pilot A delivered an exceptional mission-specific briefing. (*Tab V-24, 55*). IAW Wing standards, the briefing addressed required administrative items, accounted for specific conditions for the flight, provided excellent instruction on the designated MQT subjects, and was almost solely focused at the mishap pilot. (*Tab V-24, 55; BB-16*). The mishap pilot was attentive and accurately answered questions posed throughout the briefing. (*Tab V-24, 55*). Pilot A emphasized takeoff and landing data (TOLD) considerations during the briefing. (*Tab V-8, 24, 55*). IAW Wing standards, the briefing started and ended on time. (*Tab V-8, 55*). After the briefing flight members had approximately 20 minutes to receive assigned aircraft tail numbers and locations and don flight gear prior to proceeding to their aircraft. (*Tab V-8, 56*).

8. **Ground Operations:** The flight pilots proceeded to their aircraft and started engines at the designated time. (*Tab V-8*). Prior to initial taxi, the mishap pilot transmitted a request over the radio for maintenance assistance to address a discrepancy with the flight control system (FLCS). (*Tab V-8, 14*). Maintenance specialists were aware of the request. (*Tab V-39*). The flight taxied from the aircraft parking areas toward the runway as scheduled. (*Tab V-56*). IAW local operating procedures, the flight members assumed that the FLCS problem, reported by the mishap pilot, had been resolved. (*Tab V-14*). No documentation of maintenance assistance with the FLCS problem on the mishap aircraft was made in the aircraft forms. (*Tab V-39*). This complies with local common practices when no maintenance action is performed and the pilot in the cockpit resolves the problem. (*Tab V-39*).

9. **Taxi and Arming:** Taxi operations from the parking area to the end of the runway were uneventful except that, during the en route taxi, the tower controller announced that the runway was wet. (*Tab N-3*). In fact, the runway was pilot-assessed as dry for TOLD consideration purposes. (*Tab J-22; V-14, 26, 47, 58; Z-11, 12*). The mishap aircraft configuration was normal for takeoff and the mishap pilot completed before-takeoff flight control checks. (*Tab V-14, 15*). While the #3 and #4 aircraft were being armed, the flight lead and mishap pilot conducted radio checks that could not be completed prior to taxi. (*Tab V-25*). The mishap pilot completed the radio checks properly, passed a "thumbs up" signaling he was ready for takeoff, and was on the proper frequencies prior to departing the arming area for the runway. (*Tab V-10, 26; BB-16*).

10. **Airfield Configuration:**

(a) The standard airfield configuration at Misawa AB is a 10,000 foot runway bracketed by 1,000 foot overruns on each side. There are sequenced above-ground approach lights, Instrument Landing System (ILS) antennas, and far field monitor structures off both ends of the runway. (*Tab BB-87; Z-18; V-18,19*). Prior to the mishap, this standard runway was normally equipped with two BAK-12 arresting cables located 2,500 feet from each end of the runway, two BAK-14 arresting cables located 1,250 feet from each end of the runway, and a SAFE-BAR web barrier located 143 feet into the overrun. (*Tab DD-27; BB-87*). See paragraph 10(c), below, for a discussion of the SAFE-BAR barrier.

(b) The airfield configuration on the day of the mishap was not standard. (*Tab W-4; BB-51-67*). Runway 10 was the active runway during the mishap sequence. (*Tab DD-25*). The first 2,000 feet of the runway were closed due to concrete repair associated with converting the west BAK-

14 to a BAK-12. (*Tab W-4; V-19*). On 20 Jul 98 (five days prior to the mishap) the west end BAK-14 to BAK–12 conversion was inspected and some problems were noted by the engineers. This resulted in a one-week delay in the plan to reopen the west end of the runway and simultaneously close the east end for the east BAK-14 cable conversion. (*Tab V-3; Z-15; DD-39*). The 35th Operations Group Commander (35 OG/CC) had not been made aware of the one week delay in accepting the west end work in time to prevent scheduled dismantling of several significant parts of the east BAK-14 which had already been removed, effectively deactivating the system. (*Tab V-3*). The 35 OG/CC decided to leave the BAK-14 down on the east end of the runway rather than attempt a significant reconstitution of the system. (*Tab V-3*). The 35 FW issued a series of FCIFs and NOTAMs to address operations with this airfield configuration. The NOTAMs and FCIFs did not mention or advice pilots that the SAFE-BAR barrier was an available or viable option in the event of an aborted takeoff. (*Tab BB-51-67*). These documents identified that, on the date of the mishap, there was 8,000 feet of useable runway and only one arresting system at the 2,500-foot remaining point on the runway. (*Tab BB-51-67; Z-17*). The FCIFs provided information on the reduced runway length and missing cables, including adjusted TOLD for various aircraft configurations. (*Tab BB-53*).

(c) <u>SAFE-BAR Arresting System.</u>

i Located in the runway 10 overrun at Misawa AB is a Safeland Barrier Webbed Net Arresting System. (*Tab DD-25, 27*). It is occasionally referred to as a "Swedish" barrier. (*Tab V-4, 48, 55*). The SAFE-BAR Arresting System is a wide mesh nylon net which, during an arrest, envelopes the wings of the aircraft and prevents it from departing the overrun. (*Tab DD-35*). An electric gear drive motor raises and lowers the net by remote activation from the Air Traffic Control Tower. (*Tab DD-34*). At Misawa AB, the tower is manned by JASDF personnel. (*Tab V-48*).

ii. The SAFE-BAR is compatible with F-16s. (*Tab DD-27*). However, at the time of this mishap, pilots and supervision at Misawa did not know the exact capabilities of the system. (*Tab V-4, 11, 16, 25, 33, 48, 55-56*). This was primarily because Misawa-based pilots believed the SAFE-BAR was for use only by JASDF aircraft. (*Tab V-4, 11*). Some published guidance specifically cautioned against using the SAFE-BAR due to lack of verified test data. (*Tab BB-90, 91*). The Dash-1 did not specifically mention by name that the SAFE-BAR was compatible with the F-16. (*Tab V-4*). Subsequent to the mishap, pilots and supervision were made aware that the SAFE-BAR is F-16 compatible. (*Tab V-4, 11, 16, 26, 48, 55*). However, some Misawa-based pilots believe they would be trapped in the cockpit once the barrier is deployed, leading to expression of some hesitancy to use of the barrier by those pilots. (*Tab V-33, 55-56*). However, there is no evidence that the pilot will be trapped in the cockpit by the net webbing. (*Tab DD-27*).

(d) <u>Runway Clear Zone.</u>

i. Air Force Bases have areas adjacent to runways identified as "clear zones". Management of these clear zones is highly regulated. (*Tab V-18*). Obstructions in these areas are considered violations of clear zone regulations. (*Tab V-18*). Violations of the clear zone are identified and submitted to higher headquarters for approval of a waiver of the regulations. (*Tab*

V-18). Since 1962, the boundaries designated as part of the clear zone have expanded so that existing structures that were not in the clear zone previously were now in the clear zone. (*Tab V-18*). The 35 FW complied with the clear zone management program. (*Tab V-18*). Violations of the clear zone regulations were noted on an annual waiver request approved by Pacific Air Forces Civil Engineer (HQ PACAF/CE). (*Tab V-18*).

ii. There are several structures in the clear zone at the departure end of runway 10: the runway approach lights system, which was installed in 1962, (*Tab V-18*), and the Instrument Landing System (ILS), which was installed in June of 1997, (*Tab V-18; DD-3*). Both systems violate the current planning criteria and waivers for airfield support facilities because they do not comply with frangibility requirements. (*Tab V-18; O-127; DD-3, 11*). It is unknown whether the approach lights complied with clear zone regulations effective in 1962. (*Tab V-18*). However, safe flying operations required the presence of the airfield approach lighting. (*Tab V-4, 18-19*). Moreover, the ILS system provided an alternative precision approach landing system for flight operations in the poor weather which typically affected operations at Misawa AB. (*Tab V-4, 19*). Common practice is to complete safety of flight requirements when funds and equipment are available and concurrently apply for clear zone waivers. (*Tab V-18*). From September 1997 to June 1998, the 35 FW repaired the approach lights. (*Tab DD-3*). When this project was completed, interim waiver requests for the approach lights and for the ILS system were submitted by the 35 FW Commander (35 FW/CC) to HQ PACAF/CE. This took place a few weeks before the mishap; however, HQ PACAF/CE had not yet approved the waiver on 24 Jul 98. (*Tab O-127, 128; DD-3*). However, HQ PACAF/CE routinely approves waiver requests submitted by the 35th Fighter Wing Civil Engineer (35 FW/CE). (*Tab V-18*).

iii. The 35 FW had questioned the frangibility of the ILS far field system prior to its installation. Following installation, 35 FW/CE sent a formal message to the 38th Engineer Installation Group (38 EIG), the engineering group who designed the system, requesting an alternative design that was more frangible. (*Tab V-19; DD-13*). The 38 EIG's response indicated that it had investigated the issue and currently, there was no such standard design in existence. This was because making the structures frangible would vitiate the rigidity needed to make the ILS structures operable and because of the difficulty of developing a standard design that would apply to all Air Force bases in light of varying soil and weather conditions. (*Tab V-19; DD-19, 20)*

11. Mishap Sequence:

(a) The mishap four-ship taxied onto the runway and positioned for takeoff as briefed. (*Tab V-9*). Tower controllers reported the winds as 110 degrees at 3 knots, signifying a 2-knot headwind for takeoff. (*Tab N-6*). Published TOLD for the mission was as follows: (*Tab AA-3*).

Aircraft Gross Weight:	36,000 lbs.
Temperature:	60 °F
Rotation Speed:	164 knots
Takeoff Speed:	179 knots
Takeoff Distance:	2,500 feet
Refusal Speed (Dry/Wet):	162/122 knots

(b) Each aircraft in the formation was briefed to make a single-ship takeoff utilizing full afterburner. Each aircraft was to commence the takeoff roll exactly 15 seconds after the brake release of the previous aircraft in sequence. (*Tab V-57*). The mishap pilot was the second of four aircraft in this sequence. (*Tab V-57*).

(c) The #1 aircraft afterburner takeoff was normal. (*Tab V-8, 47*). The mishap pilot released brakes at exactly 15 seconds after the #1 aircraft and initiated afterburner. (*Tab V-57*). The mishap aircraft achieved full afterburner three seconds after brake release and stabilized there with all engine indications normal for full afterburner operations for 12 seconds. (*Tab J-2;, V-14*). The mishap aircraft's flight controls did not move into takeoff position throughout the takeoff roll until after 15 seconds after brake release. (*Tab J-22; V-48*). The mishap pilot retarded the throttle to the idle power setting 15 seconds after brake release. (*Tab J-2; V-14*). Normal engine indications for idle power were achieved 17 seconds after brake release at approximately 164 knots. (*Tab J-7, 21*). The peak speed for the entire takeoff sequence from brake release to the end of the mishap sequence was 168 knots and was reached 19 seconds after brake release. (*Tab J-21*). The mishap pilot transmitted over the inter-flight very high frequency (VHF or Victor) radio frequency "Two's aborting" in a "calm, matter of fact" manner. (*Tab V-26*). Up until the time of abort, the mishap aircraft had traveled approximately 2,500 – 3,000 feet since brake release, and the takeoff roll appeared to be normal. (*Tab V-47, 48*).

(d) After commencing the abort, the mishap aircraft engine nozzle was in the full open position and the aircraft was at approximately 5,000 feet from the end of the runway. (*Tab O-3; V-47, 48, 51*). The mishap aircraft did not engage the BAK-12 cable at the 2,500-foot remaining point. (*Tab O-3,4,7; V-47*). The speedbrakes were deployed open on the aircraft. (*Tab S-16, 24; V-48*). The left and right horizontal stabilators never achieved maximum trailing edge up deflection during the abort. (*Tab J-22; V-48*). The arresting hook first contacted the runway 1,743 feet from the departure end. (*Tab J-13; S-3, 4*). The brakes were working normally and were applied symmetrically; however, maximum wheel braking was not applied over the full length of the abort. (*Tab DD-43; J-37, 72; S-8*). When the aircraft was approximately 1,500 feet from the end of the runway, the Japanese tower controller asked the SOF if he should activate the SAFE-BAR barrier. (*Tab V-47*). The SOF replied in the affirmative. (*Tab V-47*). It is not known for certain whether the JASDF controller activated the SAFE-BAR. (*Tab O-3, 8; V-47*).

(e) The mishap aircraft slowed as it entered the overrun area and passed over the SAFE-BAR, indicating that it had not deployed. (*Tab V-47; Z-19*). The mishap aircraft arresting hook contacted the webbing of the SAFE-BAR, dragging it into the overrun until the webbing failed. (*Tab J-13; V-48; Z-19*).

(f) As the aircraft traveled approximately two-thirds of the way into the overrun, the mishap pilot initiated ejection by pulling the ejection handle. (*Tab J-11; O-4; V-47*). TOs recommend ejecting from the F-16 prior to departing a prepared surface at greater than taxi speed. (*Tab BB-4*). Maximum taxi speed is 25 knots. (*Tab BB-8*). The canopy and the ejection seat immediately departed the aircraft in rapid sequence. (*Tab V-47*). The ejection sequence was initiated 50 seconds after brake release. (*Tab J-17*). Ground speed at the time of the ejection was 56 knots. (*Tab J-13, 17*). Crash response was notified at this time. (*Tab O-8; V-49*).

58861

(g) The mishap aircraft departed the overrun on all three wheels. (*Tab J-13; Z-3)*. The aircraft sank into the soft grassy area past the overrun as it continued eastbound. (*Tab J-13; Z-3*). The sinking aircraft nosewheel was below ground level where it impacted the concrete support structure for the runway approach lights (also below ground level) approximately 20 feet from the end of the overrun. (*Tab J-13; Z-3*). The nosewheel strut failed, causing the nose of the aircraft to fall onto the nose gear door. (*Tab J-13; Z-3*). The aircraft continued to travel east on two main landing gear and the nose gear door. (*Tab J-13; Z-3*). The nose gear door collapsed and the bottom lip of the engine intake contacted the ground. (*Tab J-14; Z-3*). The engine intake began to dig up the ground and the engine ingested four cubic feet of material. (*Tab J-14; Z-3*). The aircraft then impacted the ILS antennas and far field monitor poles located approximately 100 feet from the end of the overrun. (*Tab J-14; Z-3, 5*). At some point after the engine began ingesting debris the main landing gear collapsed. (*Tab Z-3, 5, 7*). The mishap aircraft was carrying two external 370-gallon fuel tanks. (*Tab J-14*). At the time of the mishap, they contained approximately 3,000 lbs. of JP-8 fuel (total of both tanks). (*Tab J-14*). At some point between the mishap aircraft impacting the runway lights and coming to rest, these external fuel tanks contacted the ground and ruptured. (*Tab J-14)*. The fuel ignited and a fuel rich ground fire began in the vicinity of the mishap aircraft. (*Tab J-14*). The fire was burning between 1,175 and 2,000 degrees Fahrenheit. (*Tab J-14)*. The mishap aircraft completed a clockwise yawing moment and came to rest on its belly approximately 130 feet past the end of the overrun facing back at the runway on a heading of 258 degrees. (*Tab J-14; S-3, 5, 7)*.

(h) The ejection sequence was normal, indicating that the apex of the ejection was approximately 300 feet. (*Tab J-13; V-49; Z-7*). Prior to takeoff the winds were reported as 110 degrees at 3 knots. There is no evidence whether winds affected the parachute descent. The pilot parachuted into the flames in the vicinity of the aircraft. It is not known exactly where the pilot landed, except that it was in the flames of the ground fire. (*Tab V-76; Z-7*).

12. Crash Response and Rescue:

(a) A United States Air Force (USAF) Staff Sergeant (SSgt), was driving with his wife and four children on the road directly south of the accident site at the time of the mishap. (*Tab V-76)*. His wife alerted him to fire to his left. (*Tab V-76)*. He stopped the vehicle, got out, and began sprinting toward the accident site, which was approximately 250 yards away. (*Tab V-76)*. As he approached the mishap site, he looked up and saw a parachute descending toward the mishap aircraft. (*Tab V-76)*. The mishap pilot had his arms up on the risers of the parachute and appeared to be moving. (*Tab V-76)*. The SSgt continued to sprint toward the site and lost sight of the pilot as the mishap pilot descended into the flames and the parachute canopy began to deflate. (*Tab V-76)*.

(b) Two Japanese Air Self Defense Force (JASDF) personnel were first on the scene of the mishap. (*Tab V-92)*. When they arrived the pilot was trying to pull himself from the fire. (*Tab V-92*). One JASDF member attempted to pull the pilot from the fire twice. (*Tab V-92)*.

(c) The SSgt arrived near the aircraft. (*Tab V-76)*. The SSgt was standing facing north with the nose of the aircraft to his left and the tail to the right. (*Tab V-76)*. The aircraft was burning from

below and there was fire on the ground. *(Tab V-79)*. The SSgt was standing approximately 10-20 feet from the left wing of the aircraft. *(Tab V-76)*. The SSgt tried to spot the mishap pilot but, initially, he could not. *(Tab V-76)*. At that moment he became aware of two JASDF members standing to his right. *(Tab V-76)*. Almost immediately, one of the JASDF members ran into the fire and then quickly ran back out. *(Tab V-77)*. This action helped the SSgt locate the mishap pilot. *(Tab V-77)*.

(d) The SSgt observed the mishap pilot lying face down with his upper torso out of the flames but his lower body still in the flames. *(Tab V-77)*. The pilot's arms were outstretched in front of him and partially to each side. *(Tab V-77)*. The mishap pilot's head was facing south while his feet were in the flames to the north. *(Tab V-77)*. The SSgt ran to the pilot, hooked his right arm around the pilot's left underarm area, and pulled but could not move the pilot. *(Tab V-77)*. The SSgt motioned for the JASDF members to assist and one came forward and grabbed the other arm of the mishap pilot. *(Tab V-77)*. Together they pulled the pilot away from the flames and rolled him on his back. *(Tab V-77)*. The mishap pilot's visor was up and he was not wearing his mask. *(Tab V-77)*. The SSgt used his battle dress uniform (BDU) jacket to attempt to douse flames on the mishap pilot. *(Tab V-77)*. Another Japanese person used a fire extinguisher to douse the fire on the pilot. *(Tab O-6)*. The SSgt removed the mishap pilot's helmet. *(Tab V-77)*. The mishap pilot's life preserver was inflated and the mishap pilot asked for it to be removed. *(Tab V-77)*.

(e) At this moment, a Japanese fire truck arrived and began dousing the flames on the aircraft and applied water to the mishap pilot, as requested by the USAF firefighters, who had also just arrived on scene. *(Tab V-77)*. As the USAF firefighters began to check the pilot, the others began cutting away the mishap pilot's external flight gear. *(Tab V-77)*. The mishap pilot's left flight boot was removed. *(Tab V-78)*. The canopy and lines of the parachute were wrapped around the mishap pilot's legs near the boots. *(Tab V-77)*. A Japanese ambulance arrived at this time. *(Tab V-78)*. The mishap pilot was placed on a stretcher and loaded in to the ambulance. *(Tab V-78)*. The SSgt, three JASDF personnel, and a USAF firefighter departed with the mishap pilot aboard the ambulance. *(Tab V-78)*. Within minutes, the Disaster Control Group (DCG) arrived at the mishap aircraft and executed procedures to make the aircraft safe. *(Tab V-68)*. Part of this process involves stopping hydrazine leakage from the aircraft. *(Tab V-68)*. These steps were accomplished on the day of the mishap and immediate testing confirmed that there had been no hydrazine leak at the site. *(Tab V-68)*.

(f) In the ambulance, the mishap pilot continued to ask for his boots to be removed. *(Tab V-78)*. The SSgt perceived that the mishap pilot's right ankle was broken. *(Tab V-78)*. Therefore, the SSgt suggested that the right boot not be removed to avoid further injury to the right foot. *(Tab V-78)*. It was later learned that the right ankle was not broken. *(Tab V-29, 30)*. The Japanese ambulance driver drove at a high rate of speed but began to slow at the Japanese hospital. *(Tab V-84)*. The USAF firefighter directed the ambulance driver to continue to the American hospital. *(Tab V-84)*. Upon arrival at the hospital the emergency response medical staff took charge of the mishap pilot. *(Tab V-29)*.

13. Medical: Medical and dental records revealed that the mishap pilot was fully qualified for flight duty on the day of the mishap. *(Tab T-3)*. Toxicological reports taken after the mishap

were negative for ethanol, amphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine, opiates, and phencyclidine. (*Tab X-3*). Initial post-mishap medical examination of the mishap pilot identified inhalation injuries and serious burns on his face, arms, and legs. The burns sustained by the mishap pilot were uniform in nature. There were no broken bones or other injuries. (*Tab V-29, 30, 36, 37; A-2*). Toxicology testing of maintenance personnel is addressed in paragraph 16(e), below.

14. Escape System: The F-16C aircraft is equipped with the Advanced Concept Ejection Seat (ACES II) which uses ballistic gas and explosive transfer lines to initiate the ejection sequence. (*Tab J-9*). When the pilot pulls the ejection handle the canopy is jettisoned followed very shortly by the seat being catapulted from the aircraft on a rocket seat. (*Tab J-9*). The seat has three ejection modes. (*Tab J-9*). Mode 1 operations are designed for speeds less than 250 knots and for altitudes of 0 to 15,000 feet above sea level (applicable to this mishap). (*Tab J-9*). It is designed so that, within 0.20 seconds after the pilot pulls the handle, the seat is ejected from the aircraft. (*Tab J-10*). The seat is released from the pilot at 0.45 seconds and the parachute is inflated in 1.80 seconds. (*Tab J-10*). Every component of the mishap escape system worked exactly as designed. (*Tab J-10, 11*).

15. Maintenance History of Mishap Aircraft and Engine:

(a) AFTO781 series (Aircraft Forms): The summary of the mishap aircraft forms is an accurate depiction of the contents of the actual aircraft forms. (*Tab H*). There are no abnormalities in the forms. (*Tab H*). The Core Automated Maintenance System (CAMS) data for the mishap aircraft for the time period 21 Apr 98 through 23 Jul 98 reveals no significant trends. (*Tab U-3*). The mishap aircraft had flown 60 sorties since 24 April 1998. Fifty-two of these sorties did not have any discrepancies reported (Code 1). (*Tab H-3*). Four of these sorties reported minor discrepancies after flight (Code 2) and four of these sorties reported major discrepancies after flight (Code 3). (*Tab H-3*). The four major discrepancies involved: problems with the air-to-air radar system with regard to targets appearing properly on the radar screen, flight control system computer problems, and two incidents of "hung bombs." (*Tab H-2*). A detailed review of minor open discrepancies at the time of the mishap flight, to include information-only notes, did not indicate any improper maintenance procedures and all inspections and time change items were current on the aircraft and the engine. (*Tab H-4*).

(b) Time Compliance Technical Orders (TCTO): All required TCTOs were complied with. (*Tab H-4*).

(c) Inspections: All scheduled inspections were complied with. (*Tab H-4*). The last scheduled inspection was the Phase Inspection conducted from 9-17 Jul 98. The CAMS data does not show any abnormalities in the phase inspection, (*Tab U-2*), and the Inspection Section Chief stated that there was nothing remarkable about the phase inspection. (*Tab V-65*). He specifically remembered that the mishap aircraft passed all post-phase Quality Assurance inspections and flew Code 2 (no grounding malfunctions) on its first flight after phase, 20 Jul 98. (*Tab V-65; U-21*). The only discrepancy reported from that flight was a malfunction with the global positioning system. (*Tab U-21*). The mishap occurred on the second flight after phase. (*Tab D-2*).

58864

(d) Oil Analysis: The DD Form 2027, Oil Analysis Record, covers the period 9 Jul 97 through 20 Jul 98 during which all but two of the samples were Code A , which indicates that there has been no notable change in particle content of the oil and that all levels are within published limits. (*Tab U-17-19*). The two exceptions were samples that received Code F, which is used to identify special oil samples. (*Tab U-19*). In this case they were generated from a test cell run while the engine was not installed in an aircraft, and Code F is automatically assigned to that type of sample. (*Tab BB-48*). There were no abnormalities in the JOAP data preceding the mishap. (*Tab U-17-19*).

(e) Engine Maintenance: A review by the maintenance advisor of the records for the mishap engine revealed no significant trends. (*Tab H-4*). All required inspections were conducted. (*Tab H-4*). The engine shop had previously sent two product quality deficiency reports (PQDRs) related to this engine (one each in 1996 and 1997). The deficiency in Sep 96 was a crack in the engine's front frame and the Sep 97 deficiency was reported for the engine automatically transferring to hybrid mode. (*Tab U-7-15*).

(f) Maintenance Supervision: Supervisory involvement with regard to maintenance on the mishap aircraft was appropriate. (*Tab V-39, 65, 74*). All maintenance supervision actions were performed IAW applicable guidance. (*Tab BB-43*). Training records, CAMS documentation, active aircraft forms, and the aircraft forms jacket file show no abnormalities in maintenance actions or documentation. (*Tab U*).

16. Maintenance Performed for the Mishap Sortie:

(a) Maintenance actions performed in the preparation and launch of the mishap aircraft were standard and IAW applicable technical data. (*Tab H; V-74*). SrA F completed a post flight inspection on 20 Jul 98 at 2045 and a preflight inspection on 23 Jul 98 at 1915. (*Tab U-32, 33*). His training records indicate that he was fully qualified to perform the inspections. (*Tab V-65; Tab U-26*). He was a technician with maturity and abilities above his peers. (*Tab V-65; U-24-26*). He had been entrusted with maintenance and supervisory responsibilities usually reserved for technicians of higher rank. (*Tab V-65*).

(b) MSgt G, the mid-shift production superintendent, signed the Exceptional Release (ER) certifying that the aircraft was ready for flight prior to the mishap. (*Tab U-32; V-74*). No maintenance was performed on the mishap aircraft during his shift and he did not observe anything unusual during the ER process. (*Tab V-74*).

(c) The crew chief who performed the launch duties, SrA H, was a member of the 14 FS Inspection Section. (*Tab V-65*). He was fully qualified to perform launch duties. (*Tab U-30*). He was an experienced worker with an excellent pass rate for quality assurance inspections. (*Tab V-65*).

(d) MSgt I was the day shift production superintendent who supervised the launch of the mishap aircraft. (*Tab V-39*). The mishap pilot called for "redball" maintenance assistance for the flight

control system. This is not an unusual occurrence during ground operations and does not require any documentation if it can be corrected without maintenance action on the aircraft. (*Tab V-39*).

(e) Maintenance personnel were not aware of any other problems with the aircraft and were not involved again until responding to the aircraft after the mishap. (*Tab V-65*). Urinalysis was directed for both SrA G and SrA I immediately after the mishap, (*Tab V-39*), and the laboratory report shows no substances found in either sample. (*Tab U-35-38*). Neither of the personnel involved was known to have any personal problems at the time of the incident. *(Tab V-65, 39).*

(f) All documents and equipment related to the mishap aircraft were expediently and efficiently isolated and turned over for investigators' use after the mishap. *(Tab V-39).*

17. Analysis Conducted After Mishap:

(a) Power Plant: The engine was evaluated in-place at the Jet Engine Intermediate Maintenance shop at Misawa. (*Tab J-1*). The aircraft was found lying on its belly upright and the mishap engine was still installed in the aircraft. (*Tab J-1*). The engine inlet had contacted the ground and four cubic feet of dirt, grass, and other foreign objects had been ingested and packed in the engine. (*Tab J-6*). One bird feather was found near the front of the engine. Extensive analysis of all the material found in the engine by experts found that there was no organic material in the engine other than dirt and grass. (*Tab J-6*). No bird materials were found inside any part of the engine. (*Tab M-9*). The oil tank quantity indicator was within the green acceptance zone indicating normal amounts of oil. (*Tab J-1*). There was no indication of external stress or leakage on the engine. (*Tab J-1*). Main engine sections including the fan stators, fan rotor, fan ducts, fan frame, compressor stators, compressor rotor, combuster, high pressure turbine (HPT) nozzle, HPT shroud, HPT rotor, low pressure turbine (LPT) nozzles, LPT rotor turbine frame, augmenter, and exhaust duct liner exhaust nozzle were evaluated and showed that all these systems were operating properly until the engine began ingesting debris. Any damage noted was caused by impact with the ground and the ingestion of debris or the ensuing fire. (*Tab J-1-7*). Engine external components were also evaluated and all of them were operating properly at the time of the mishap. (*Tab J-7*). These components include the fan inlet guide vane (IGV) actuator, core variable stator vane (VSV) actuators, accessory gearbox, alternating current generator, augmenter pump, lube and scavenge pump, main fuel pump, hydraulic pump and boost pump. (*Tab J-6-8*). Detailed analysis of engine electronic data was accomplished for the Engine Monitoring System (EMSC), Digital Electronic Control (DEC) memory, Signal Acquisition unit (SAU) of the Crash Survivable Flight Data Recorder (CSFDR), and Crash Survivable Memory Unit (CSMU). (*Tab J-15*). Available engineering data indicates that the engine was operating normally from brake release throughout the mishap sequence except after being damaged by impacting the ground after departing the runway. (*Tab J*). There are no indications of any engine problem and no defects were found, except those caused by the aircraft departing the runway and ingesting debris. (*Tab J*).

(b) Landing Gear Systems: The mishap aircraft's brakes, anti-skid box, brake control box, brake control valve, axle shafts, tires, and wheels were all sent to Ogden Air Logistics Center (OO-ALC) for evaluation. (*Tab I-1-16*). Landing gear, wheel and brake components showed no evidence of the heat damage expected for a high-speed aborted takeoff. (*Tab J-72*). The landing

58866

gear, brakes and wheels did not show any signs of malfunction, improper maintenance, or improper cleaning. (*Tab J-30, 72*). Both brakes successfully completed functional checks. (*Tab J-73*). All three tires were found with very good tread and normal inflation. (*Tab J-31*). Nothing abnormal was observed in any of these components. (*Tab J-73*).

(c) Hook Switch and Arresting System: The hook switch was determined to be in the down position. There were no defects with the switch. (*Tab J-75*). There were no defects with the arresting system. (*Tab J-30*).

(d) Fluid Samples:

i. A Liquid Nitrogen (LN) sample from LN cart 29 and a Liquid Oxygen (LOX) sample from LOX cart 02 used to service the mishap aircraft were sent to the San Antonio Air Logistics Center for analysis. (*Tab U-40, 41*). The LN sample met all specification requirements. (*Tab U-41*). The LOX sample met all specifications except Nitrous Oxide. The max allowable is 4ppm/vol and the sample had 5 parts per million/volume (ppm/vol). The laboratory report indicates that evaporation of oxygen during storage time between mishap and sampling could be the reason. (*Tab U-40*).

ii. Hydraulic fluid, engine oil, and aircraft fuel samples were sent to the San Antonio Air Logistics Center for analysis. (*Tab U-42; J-57-68*). Hydraulic fluid analysis indicated high water and particle contamination levels on some samples. The laboratory analysis indicates that both could be attributed to actions taken after the incident and are not unexpected. (*Tab J-57*). Furthermore, there is no technical order (T.O.) reference giving limits for periodic particle count or moisture count in used hydraulic fluid. The limits use to evaluate the samples were those normally used to evaluate hydraulic fluid taken off the shelf. (*Tab J-57*). Engine oil analysis indicated that the samples met specification requirements for all tests conducted, but the samples provided were not large enough to complete flash point and acid number tests. (*Tab J-42*). Aircraft fuel analysis indicated that all samples met T.O. specifications. (*Tab J-59-68*). The sample from the N-1 tank met all T.O. specifications for tests run, but the sample was too small to run particulate matter and filtration time tests. (*Tab J-56-68*).

(e) Data Collection Devices:

i. The Crash Survivable Memory Unit (CSMU) was hand-carried to HQ AF Safety Center's Mishap Animation and Analysis Facility at Kirkland AFB, NM. (*Tab J-15*). The Signal Acquisition Unit (SAU) and Seat Data Recorder (SDR) were hand-carried to LMTAS. (*Tab J-15*). The Digital Flight Control Computer (DFCC) and the Enhanced Central Interface Unit (ECIU) were sent to LMTAS. (*Tab J-15*). The CSFDR analysis was done by LMTAS and the data is used to determine aircraft performance. (*Tab J-15*). In this case, it only captured slightly more than two seconds of data prior to the ejection sequence because it overwrote itself. This occurred because the Signal Acquisition Unit (SAU) was still receiving inputs from the rate gyros and weight on wheels indicator so the CSFDR did not detect that the aircraft had stopped. For the time that data was captured, none of the data from these devices indicates any aircraft malfunction and identifies the canopy open caution light associated with the ejection sequence. (*Tab J-16-19; O-13-55*).

ii. Engine Data Engine Monitoring System Computer (EMSC) data shows three engine data events: (1) Normal trend points were taken at 11.5 to 13 seconds after brake release, indicating that the engine was operating normally at full afterburner, (2) (PLA) was retarded at 16 seconds after brake release (the SAU shows a normal engine roll back to idle following throttle retard), (3) 52 seconds after brake release the engine transferred to Secondary (SEC) mode due to a loss of both fan speed signals as recorded by the DEC and SAU. (*Tab J-42-53*). This was after the mishap pilot ejected from the aircraft. (*Tab J-17; O-44*). The data analyses did not give any indications of aircraft malfunction, engine malfunction or any indication as to why the abort sequence began. (*Tab J-10*).

(f) Aircraft Systems: LMTAS evaluated mishap aircraft systems. *(Tab J)*. The electrical system showed no evidence of malfunction. (*Tab J-27*). The hydraulic system showed no evidence of malfunction. (*Tab J-28, 29*). The Flight Control System showed no evidence of malfunction. (*Tab J-36*). Recorded data did not show any warning and caution lights illuminated for the two seconds of available data prior to system overwrite except for the aforementioned canopy caution light. Recorded data after the overwrite did reflect illumination of caution and warning lights following runway departure. (*Tab O-23-55)*. The aircraft fuel system showed no evidence of malfunction. (*Tab J-30*). All egress equipment was checked and inspected IAW applicable T.O.'s. (*Tab CC-1-31*).

18. Damage: Total damage to the aircraft and components attached to it was $16,997,887.54 (*Tab M-3*). Total damage to the airfield was $221,477.74. (*Tab M-5*).

19. Claims: As of 4 Aug 1998 there have been no claims made arising from the mishap. (*Tab P-1*).

20. Media Interest: Several United States and Japanese newspapers printed articles about the mishap. *(Tab EE)*. Most articles were short repeats of the USAF News Releases from Misawa AB. *(Tab EE-1-14)*. One Japanese article stated that poor maintenance or engine problems were the cause of the mishap, *(Tab EE-15)*. One article stated that the local Japanese City mayor and prefecture governor "directed" Misawa AB officials to cease flying until aircraft are inspected and operations and maintenance are reviewed. *(Tab EE-15)*. The Pacific Stars and Stripes article related a history of incidents involving Misawa F-16 aircraft dating back to 1991, while also referencing a March 1998 "close pass" with an airliner. *(Tab EE-21)*.

21. Governing Directives:

(1) AFI 11-202, Vol 3, *General Flight Rules*, 1 Jun 98, and PACAF Supplement
(2) AFI 11-401, *Flight Management*, 15 Oct 97, and PACAF Supplement
(3) AFI 21-101, *Maintenance Management of Aircraft*, 7 Jul 97, and PACAF supplement
(4) AFI 21-103, *Equipment Inventory, Status, and Utilization Reporting*, 1 Sep 97, and PACAF supplement
(5) AFI 21-104, *Selective Management of Selected Gas Turbine Engines*, 17 Jun 94
(6) AFI 21-112, *Aircraft Egress and Escape Systems*, 1 Nov 97, and PACAF supplement
(7) AFI 21-124, *Air Force Oil Analysis Program*, 1 Feb 96
(8) AFR 64-4, *Search and Rescue Survival Training*, 15 Jul 85
(9) MCI 11-F16 Volume 1, *F-16 Training*, 1 Jul 97

(10) MCI 11-F16 Volume 3, *F-16 Pilot Operational Procedures*, 21 Apr 95, and 51FW supplement
(11) PACAF Instruction 10-201, *Pacific Air Force Search and Rescue Operations*, 10 Apr 95
(12) PACAF Instruction 11-301, *Air Crew Life Support (ALS) Program*, 10 Oct 95
(13) PACAF Instruction 21-101, *Aircraft Maintenance Organization and Procedures*, 25 Dec 96
(14) PACAF Instruction 21-108, *Aircraft Flying and Maintenance Scheduling Procedures*, 2 Feb 98
(15) T.O. 1-1B-40, *Weight and Balance Data*, 1 Jan 83 (Change 14, 1 Dec 97)
(16) T.O. 1-1B-50, *Basic T.O. for USAF Aircraft Weight and Balance*, 1 Mar 83 (Change 13, 18 Jun 97)
(17) T.O. 1F-16CJ-1, Blocks 50 and 52, *Flight Manual*, 24 Jun 96 (1SS-55, 6 Jul 98)
(18) T.O. 1F-16CJ-1-1, Blocks 50 and 52, *Supplement Flight Manual*, 22 Apr 91 (Change 11, 2 Mar 98)
(19) T.O. 1F-16CJ-1-2, Blocks 50 and 52, *Supplement Flight Manual*, 1 Jul 97 (1-2S-27, 7 Oct 97
(20) T.O. 1-F16CJ-5-1, *Basic Weight Checklist*, 16 Sep 96
(21) T.O. 1-F16CJ-5-1, *Loading Data*, 16 Sep 96
(22) T.O. 1-F16CJ-6WC-1-11, *Combined Preflight/Postflight, End of Runway, Through Flight, Launch and Recovery, Quick Turnaround, Basic Postflight, and Walk-Around after First Flight of Day Inspection Work Cards*, 17 Oct 97
(23) T.O. 1F-16CJ-2-12JG-00-1, *Job Guide Servicing*, 24 Oct 97
(24) T.O. 1F-16CJ-2-95JG-00-1, *Crew Escape and Safety System*, 6 Feb 98
(25) T.O. 13A5 56-11, *Operation and Maintenance Instructions with Parts Breakdown Escape Systems*, 1 Apr 82 (Change 22, 15 Sep 97)
(26) T.O. 14D3-11-1, *Operation, Inspection, Maintenance, and Packing Instructions for Emergency Personnel Recovery Parachute (Chest, Back, Seat Style, and Torso Harness)*, 16 Jan 89 (Change 16, 1 Sep 97)
(27) T.O. 14P3-6-121, *Use, Operation and Maintenance Anti-G Cutaway Garment Types CSU-13A/P and CSU-13 B/P*, 15 Oct 76 (Change 35, 15 Jun 97)
(28) T.O. 14S-1-102, *USAF Flotation Equipment*, 1 Apr 86 (Change 21, 1 Dec 96)
(29) AFP 91-212, Bird Aircraft Strike Hazard (BASH) Management Techniques, 1 Apr 97
(30) 14th Fighter Squadron Read File
(31) 35th Fighter Wing Bird Aircraft Strike Hazard (BASH) Plan 92-202, 15 Jun 98
(32) 35th Fighter Wing Pilot Aid
(33) 35th Operations Group Flight Crew Information File
(34) 35th OGI 11-F16, *35th Operations Group Training Syllabus*, 15 Apr 97

Signed this day 25 September 1998.

STEPHEN M. GOLDFEIN, Colonel, USAF
President, Accident Investigation Board

58869

STATEMENT OF OPINION

Under 10 U.S.C. 2254(d), any opinion of the accident investigators as to the cause or causes of, or factors contributing to, the accident set forth in the accident investigation report may not be considered as evidence in any civil or criminal proceeding arising from an aircraft accident, nor may such information be considered an admission of liability by the United States or by any person referred to in those conclusions or statements.

There are two main aspects of this mishap: (a) the events leading up to the mishap aircraft leaving the runway and the overrun; and (b) subsequent events which led to release and ignition of the fuel, destruction of the aircraft, and injury to the pilot. The following addresses the contributing factors that played an important role in the sequence of events that led to the mishap; and the causes of the mishap, which causes are supported by clear and convicting evidence.

1. Mishap Aircraft Departing the Runway and Overrun.

(a) Abort Decision: The mishap sequence was initiated when the mishap pilot made the decision to abort. This decision was made for an undetermined reason. Comprehensive engineering analysis of aircraft systems and warning displays did not reveal any external evidence of an existing anomaly which would have justified the abort decision. Only the mishap pilot knows for certain why he chose to abort and I was unable to interview him. I have insufficient evidence to form an opinion whether the mishap pilot's decision to abort was proper.

(b) Abort Procedure: The mishap aircraft was located at approximately 5,000 feet remaining on the runway, and travelling at approximately 165 knots, when the abort was initiated. Multiple aborted takeoffs, practiced in the simulator under identical conditions, demonstrated that properly executing the required abort procedure steps resulted in consistently stopping the aircraft on the remaining runway without requiring the use of the arresting system. The required abort procedure steps are: (1) reduce power to idle, (2) lower the arresting hook, (3) apply full aft stick, (4) open the speedbrakes, and (5) apply maximum wheel braking. The mishap pilot reduced power to idle and opened the speedbrakes. However, despite knowing there was only one cable on the runway, and having just heard a detailed briefing on TOLD analysis, the mishap pilot failed to lower the arresting hook until the mishap aircraft was beyond the BAK-12 arresting system cable. The delayed hook deployment (over 3,000 feet after the abort decision) prevented any possibility of engaging the only available cable. Comprehensive engineering analysis concludes that the mishap pilot did not apply maximum wheel braking throughout the abort and never achieved full aft stick, which would have improved braking effectiveness. Had the mishap pilot executed the abort procedure correctly, he would have been able to stop the aircraft on the runway. Instead the mishap aircraft departed the runway into the overrun.

(c) Barriers: While the USAF SOF directed deployment of the SAFE-BAR, it is clear that it was not deployed when the mishap aircraft passed over it. The SAFE-BAR is compatible with the F-16; however, at the time of the mishap, the USAF had conflicting published guidance regarding its use. Some published guidance specifically cautioned against using the SAFE-BAR

due to lack of verified test data. This situation effectively led Misawa based F-16 pilots to believe that there was only one viable barrier system (BAK-12) available for the F-16 at the departure end of the runway on the day of the mishap, when in reality there were two. The mishap pilot did not request that the barrier be deployed, probably because he did not know that it was available and compatible with the F-16. Had the mishap pilot known that the SAFE-BAR was available and asked for it to be deployed, or if the tower controllers had deployed it earlier, it could have stopped the mishap aircraft prior to it departing the overrun. Instead, the mishap aircraft continued into the overrun at approximately 60 knots.

2. Subsequent Events.

(a) Ejection: Technical Orders recommend ejecting from the F-16 prior to departing a prepared surface at greater than taxi speed (25 knots). The mishap pilot's decision to eject from the mishap aircraft at 56 knots, just prior to departing the prepared overrun surface, was correct for the conditions. The ejection system worked exactly as designed, catapulting the pilot into the air over the eventual crash site. The mishap aircraft continued into the overrun.

(b) Fire: The mishap aircraft departed the overrun on all three wheels at approximately 50 knots. After exiting the overrun, it first collided with the concrete support structure for the runway approach lights. This caused the nose gear to collapse. The mishap aircraft later impacted the ILS antennas and far field monitor poles and a fire ensued. I have insufficient information to determine exactly what caused the fire; however, the collisions which collapsed the landing gear and ruptured the external fuel tanks most likely ignited the fuel, causing a localized ground fire in the vicinity of the mishap aircraft. I have insufficient evidence to determine whether the relative frangibility of the approach lighting and ILS systems was a contributing factor to the mishap because it is possible that the fire would have resulted even had the structures been less frangible.

(c) Injuries: Following successful ejection, the mishap pilot descended into the ground fire in close proximity to the mishap aircraft. Had the mishap pilot been able to adjust his point of landing only a few feet to the south, he would not have landed in the fire. The heat melted the parachute canopy and lines around his legs, possibly affecting mobility. The uniform nature and location of the mishap pilot's burn injuries and his fuel-soaked clothing and flight gear indicate the injuries were sustained after landing in the ground fire. The mishap pilot was found conscious, lying face down, with his lower body in the flames. The mishap pilot would have perished in the fire within moments without the heroic efforts of the volunteers and professionals who rescued him.

3. Conclusion. In my opinion, there is clear and convincing evidence that there were three causes to this mishap.

(a) Improperly Executed Abort Procedures. The mishap pilot failed to execute the abort procedure properly. Had he lowered the hook before passing over the BAK-12, applied maximum wheel braking throughout the abort, and achieved full aft stick, the mishap aircraft would not have departed the runway and the mishap would not have occurred.

58871

(b) Failure to Deploy the SAFE-BAR Arresting System. Had the mishap pilot known about the availability of the SAFE-BAR and its compatibility with the F-16, and/or had it been deployed, it would have prevented the mishap aircraft from departing the overrun. If the mishap aircraft had not departed the overrun, the mishap pilot would not have had to eject; or, if he had ejected, the resulting fire would not have occurred.

(c) Ensuing Fire. When the mishap aircraft departed the overrun, it impacted structures, which probably caused ignition of a fuel-rich fire. Had a ground fire not ignited, the pilot would likely have parachuted safely to the ground and survived with little or no injuries. Furthermore, the fire contributed in large part to the destruction of the aircraft.

Signed this day 25 September 1998.

STEPHEN M. GOLDFEIN, Colonel, USAF
President, Accident Investigation Board