

UNITED STATES AIR FORCE
AIRCRAFT ACCIDENT INVESTIGATION
BOARD REPORT



B-1B, T/N 85-0085

34TH BOMB SQUADRON
28TH BOMB WING
ELLSWORTH AIR FORCE BASE



LOCATION: ELLSWORTH AIR FORCE BASE, SOUTH DAKOTA

DATE OF ACCIDENT: 4 JANUARY 2024

BOARD PRESIDENT: COLONEL ERICK D. LORD

Conducted IAW Air Force Instruction 51-307




DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE GLOBAL STRIKE COMMAND

07 JUL 2024

ACTION OF THE CONVENING AUTHORITY

The report of the accident investigation board, conducted under the provisions of AFI 51-307, that investigated the 4 January 2024 mishap near Ellsworth AFB, SD, involving a B-1, T/N 85-0085, assigned to the 28th Bomb Wing, substantially complies with the applicable regulatory and statutory guidance and on that basis is approved.


THOMAS A. BUSSIERE
General, USAF
Commander

**EXECUTIVE SUMMARY
UNITED STATES AIR FORCE
AIRCRAFT ACCIDENT INVESTIGATION**

**B-1B, T/N 85-0085
ELLSWORTH AIR FORCE BASE, SOUTH DAKOTA
4 JANUARY 2024**

On 4 January 2024, at approximately 17:47 local time, the Mishap Aircraft (MA), an Air Force B-1B, Tail Number 85-0085, assigned to the 28th Bomb Wing at Ellsworth Air Force Base, touched down at approximately 100 feet short of Runway 13. The MA's rear radome struck the ground, and the main landing gear struck the approach lighting system before the MA skidded across the runway. The Mishap Crew (MC) ejected from the MA, with all four members safely departing the MA. Two of the MC suffered injuries from the ejection sequence. The MA continued to skid across Runway 13 for approximately 5,000 feet and toward the left, eventually coming to a rest in the infield between two of the airfield's taxiways. The MA caught fire during the mishap sequence and was a total loss. The total estimated loss from the mishap is \$456,248,485.00.

As the MC conducted a low visibility approach through dense fog, the Mishap Pilot (MP) applied several engine throttle reductions to reduce the MA's airspeed and stay aligned with the Instrument Landing System glideslope. The MP did not make additional throttle adjustments to achieve the targeted airspeed, and as the MA experienced wind shear during the final minute of its approach, the MA dropped below glideslope and became thrust deficient. The MC did not recognize the resulting drop in the MA's vertical velocity before the MA became unrecoverable.

The Accident Investigation Board President found by a preponderance of the evidence that the cause of the mishap was the lack of an effective composite crosscheck by the MC. The MC failed to conduct an effective crosscheck by not recognizing the MA's decreasing airspeed, accelerating descent rate, and deficient flight path. Additionally, the Accident Investigation Board found five substantially contributing factors by a preponderance of the evidence: (1) The MC's failure to perform standard crew resource management; (2) Adverse weather conditions which included undetected wind shear that contributed to rapid shifts in the MA's airspeed on final approach and limited ceiling visibility conditions influencing a change in landing runways; (3) Ineffective flying operations supervision, as reflected by one person acting as both Supervisor of Flying and Operations Supervisor, being task saturated, having poor situational awareness of the airfield environment, and being unaware of active Notices to Airmen making the executed approach unauthorized; (4) The lack of awareness of airfield conditions, particularly amongst aircrews and their leadership of weather sensor outages that prevented requisite personnel from having accurate visibility readings for Runway 13; and (5) An unhealthy organizational culture that permitted degradation of airmanship skills, inadequate focus on governing directives, lack of discipline, and poor communication regarding airfield conditions and hazards.

Under 10 U.S.C. § 2254(d) the opinion of the accident investigator as to the cause of, or the factors contributing to, the accident set forth in the accident investigation report, if any, may not be considered as evidence in any civil or criminal proceeding arising from the 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.

SUMMARY OF FACTS AND STATEMENT OF OPINION
B-1B, T/N 85-0085
ELLSWORTH AIR FORCE BASE, SOUTH DAKOTA
4 JANUARY 2024

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ACRONYMS AND ABBREVIATIONS

28 BW	28th Bomb Wing	DNIF	Duties Not Including Flying
28 OG	28th Operations Group	DO	Director of Operations
28 OSS	28th Operations Support Squadron	DoD	Department of Defense
34 BS	34th Bomb Squadron	EFB	Electronic Flight Bag
AC	Aircraft Commander	FAA	Federal Aviation Administration
ACES	Advanced Concept Ejection System	FBWOS	Fixed Base Weather Observing System
ADO	Assistant Director of Operations		
AFB	Air Force Base	FCGMS	Fuel Center of Gravity Management System
AFE	Aircrew Flight Equipment	FDP	Flight Duty Period
AFGSC	Air Force Global Strike Command	FL	Flight Lead
AFH	Air Force Handbook	FLIP	Flight Information Publication
AFI	Air Force Instruction	FOMP	Flight and Operational Medicine Program
AFMAN	Air Force Manual		
AFSC	Air Force Specialty Code	FPA	Flight Path Angle
AFTO	Air Force Technical Order	FPM	Feet Per Minute
AGL	Above Ground Level	ft	Feet
AIB	Accident Investigation Board	GOX	Gaseous Oxygen
ALS	Approach Lighting System	GS	Ground Speed
AOA	Angle of Attack	HPO	Hourly Post Flight
ARMS	Aviation Resource Management System	IAW	In Accordance With
		ILS	Instrument Landing System
ATC	Air Traffic Control	IMDS	Integrated Maintenance Data System
ATC1	ATC Watch Supervisor	IP	Instructor Pilot
ATIS	Automatic Terminal Information Service	IQC	Initial Qualification Course
		KCAS	Knots Calibrated Airspeed
BMC	Basic Mission Capable	KIAS	Knots Indicated Airspeed
BP	Board President	kts	Knots
BS	Bomb Squadron	L	Local Time
CC	Commander	LA	Louisiana
CCIR	Commander's Critical Information Requirements	lbs	Pounds
CFETP	Career Field Education and Training Plan	LCP	Lead Co-Pilot (FELON 01 Co-Pilot)
		LP	Lead Pilot (FELON 01 Pilot)
CMA	Controlled Movement Area	MA	Mishap Aircraft
CMR	Combat Mission Ready	MAJCOM	Major Command
CRM	Crew Resource Management	MC	Mishap Crew
CWW	Cooperative Weather Watch	MDSO	Mishap Defensive Systems Operator
DA	Decision Altitude	MEF	Mission Execution Forecast
DAFB	Dyess Air Force Base	METAR	Meteorological Aerodrome Report
DAFI	Department of the Air Force Instruction	MFOQA	Military Flight Operations Quality Assurance
DAFMAN	Department of the Air Force Manual	MFOX3	Mishap FOX-3
		MIP	Mishap Instructor Pilot

MM	Mishap Maintainer	SARM	Squadron Aviation Resource
MOA	Military Operating Airspace		Management
MOSO	Mishap Offensive Systems Operator	SCDU	Signals Conditioning and
MP	Mishap Pilot		Distribution Unit
MSL	Mean Sea Level	SD	South Dakota
NH	Nose High	SFOX3	Step Brief FOX-3
NM	Nautical Miles	SII	Special Interest Item
NOTAM	Notice to Airmen	SM	Statute Miles
OG	Operations Group	SML	Single-ship Mission Lead
OH	Ohio	SNCO	Senior Non-Commissioned Officer
OK	Oklahoma	SOF	Supervisor of Flying
ORM	Operational Risk Management	SOW	Standoff Weapon
PDM	Programmed Depot Maintenance	TCI	Time Change Items
PIREP	Pilot Report	TCTO	Time Compliance Technical Order
PLA	Power Level Angle	T/N	Tail Number
PR2	Powder River Training Complex	T.O.	Technical Order
	Area 2	UHF	Ultra High Frequency
QRC	Quick Reaction Checklist	USAF	United States Air Force
RAPCON	Radar Approach Control	UTM	Unit Training Manager
RAWS	Radar, Airfield, & Weather Systems	VHF	Very High Frequency
RMK	Remarks	Vol.	Volume
rpm	revolutions per minute	VVI	Vertical Velocity Indication
Rwy	Runway	WF	Weather Forecaster
RVR	Runway Visual Range	WSO	Weapons System Officer
SAR	Search and Rescue	WXFCC	Weather Flight Commander

SUMMARY OF FACTS

1. AUTHORITY AND PURPOSE

a. Authority

On 23 January 2024, Lieutenant General Michael J. Lutton, Deputy Commander, Air Force Global Strike Command (AFGSC), appointed Colonel Erick D. Lord as Board President (BP) to conduct an aircraft accident investigation of a mishap that occurred on 4 January 2024 involving a B-1B aircraft at Ellsworth Air Force Base (AFB), South Dakota (SD) (Tab Y-3 to Y-4). The BP conducted the aircraft accident investigation in accordance with Air Force Instruction (AFI) 51-307, *Aerospace and Ground Accident Investigations*, at Ellsworth AFB, SD, from 7 February 2024 through 15 March 2024 (Tab BB-6.1 to BB-6.2). Board members included a Legal Advisor (Lieutenant Colonel), a Pilot Member (Major), a Medical Member (Captain), a Weather Member (Second Lieutenant), a Maintenance Member (Master Sergeant), and a Recorder (Staff Sergeant) (Tab Y-3 to Y-5).

b. Purpose

In accordance with AFI 51-307, this Accident Investigation Board conducted a legal investigation to inquire into all the facts and circumstances surrounding this Air Force aerospace accident, prepare a publicly releasable report, and obtain and preserve all available evidence for use in litigation, claims, disciplinary action, and adverse administrative action.

2. ACCIDENT SUMMARY

On 4 January 2024, at approximately 17:47 local time (L), FELON 02, a U.S. Air Force (USAF) B-1B aircraft, Tail Number (T/N) 85-0085, was returning from a routine training sortie to Runway (Rwy) 13 at Ellsworth AFB, SD (Tabs A-6 to A-7 and V-29.4 to V-29.5). At 17:26L, the mishap aircraft (MA) returned early from its planned mission as the weather at Ellsworth AFB worsened, with a dense fog rolling across the airfield (Tab V-28.4 to V-28.5). The MA was crewed by two members of the 34th Bomb Squadron (34 BS), including the Mishap Pilot (MP) and Mishap Defensive Systems Operator (MDSO), one member of the 28th Operations Support Squadron (28 OSS), the Mishap Offensive Systems Operator (MOSO), and one member of the 28th Operations Group (28 OG), the Mishap Instructor Pilot (MIP). As the mishap crew (MC) attempted to conduct an instrument landing, the MA made initial ground contact short of the runway overrun, and all four members of the MC ejected as the MA skidded across the runway before coming to a rest on the infield between two of the airfield's taxiways (Tabs A-6 and S-2 to S-7). The MC survived their ejections with varying injuries, but the resulting fire destroyed the MA (Tabs P-4 and X-5 to X-6). The total cost of the MA was \$450,800,000.00, and the total cost of the mishap, including damaged airfield structures and cleanup, was \$456,248,485.00 (Tab P-2 to P-4).

3. BACKGROUND

a. Air Force Global Strike Command (AFGSC)

Air Force Global Strike Command, activated on 7 August 2009, is a major command with headquarters at Barksdale AFB, Louisiana (LA), in the Shreveport-Bossier City community. AFGSC is comprised of more than 33,700 Airmen and civilians responsible for the nation’s three intercontinental ballistic missile wings, the Air Force’s entire bomber force, including B-52H, B-1B, and B-2A wings, the Long-Range Strike Bomber program, Air Force Nuclear Command, Control and Communications systems, and operational and maintenance support to organizations within the nuclear enterprise (Tab CC-2 to CC-3).



b. Eighth Air Force (8 AF)

Eighth Air Force is one of two active-duty Numbered Air Forces in AFGSC with headquarters at Barksdale AFB, LA, in the Shreveport-Bossier City community. The mission of “The Mighty Eighth Air Force” is to conduct indefinite strategic deterrence operations, and on order, neutralize the enemy through global strike to protect the United States of America. As the single bomber force provider for all combatant commands, Eighth Air Force controls long-range conventional strike and nuclear-capable bomber assets worldwide. Its flexible, conventional, and nuclear deterrence assets provide the capability to deploy forces and engage enemy threats from home station or forward positions, anywhere, anytime (Tab CC-23).



c. 28th Bomb Wing (28 BW)

The 28th Bomb Wing is located at Ellsworth AFB near Rapid City, SD, and is aligned with Eighth Air Force under AFGSC. The 28 BW guarantees combat airpower for America. The 28 BW is home to 3,700 Airmen and Department of Defense (DoD) civilians and operates over 20 B-1B Lancers. Its mission is to “Provide Combat Air Power for the Nation...Long Range Strike – Anytime, Anywhere.” Its vision is “World Class Airmen building on our Raider legacy, leading the premier bomb wing in cutting edge long-range strike!” (Tab CC-9 to CC-11)



d. 28th Operations Group (28 OG)

The mission of the 28th Operations Group, whose motto is to find and kill the enemy, is to provide combat-ready B-1B bomber aircrews for worldwide taskings, including conventional operations and power projection. Airmen in the 28 OG fly the B-1B, plan and support combat operations, and develop deployment plans. Additionally, they manage the base airfield, radar approach control facilities, and air traffic control tower. The group also includes a weather section, a life support flight, and flight and tower simulators. The 28 OG Intelligence Flight provides current intelligence information and analysis ranging from strategic intelligence for the base’s senior leadership to the tactical level required by the group’s combat aircrews. The 28 OG commands three squadrons: the 28th Operations Support Squadron, the 34th Bomb Squadron, and the 37th Bomb Squadron (Tab CC-12).



e. 34th Bomb Squadron (34 BS)

Known as the Thunderbirds, the 34th Bomb Squadron's mission is to defeat America's enemies across the globe at a moment's notice. The unit began flying the B-1B Lancer on 1 April 1994 and moved to Ellsworth AFB on 19 September 2002. Since 2003, the Thunderbirds completed numerous deployments supporting Operations Enduring Freedom and Iraqi Freedom. On 27 March 2011, the 34 BS flew the first ever B-1B combat mission launched from the United States to strike overseas targets when it participated in Operation Odyssey Dawn, flying non-stop from Ellsworth to strike targets in Libya (Tab CC-12).



f. 28 Operations Support Squadron (28 OSS)

The 28th Operations Support Squadron supports the 28 BW in all aspects of flying operations to effectively and efficiently train and conduct combat operations. A diverse squadron, the 28 OSS oversees airfield operations, weather support, intelligence analysis, combat crew communications, B-1 simulator training, aircrew flight equipment (AFE), aircrew flight records, the Belle Fourche Electronic Scoring Site, combat survival training, and weapons and tactics training (Tab CC-12).



g. B-1B Lancer

The multi-mission B-1B is the backbone of America's long-range bomber force. It carries the largest payload of guided and unguided weapons in the Air Force inventory. It can rapidly deliver massive quantities of precision and non-precision weapons against any adversary, anywhere in the world, at any time. It is operated by the 28 BW at Ellsworth AFB, SD, and the 7th Bomb Wing at Dyess AFB, Texas (Tab CC-14).



h. Airfield Weather Sensors

Ellsworth AFB has two FMQ-19 weather sensors, with one near the end of each runway (Tab V-17.5, V-17.9, V-18.4, and V-21.4). The FMQ-19 weather sensors measure wind speed/direction, rain accumulation, lightning occurrence/location/frequency, cloud height/coverage, temperature/humidity, atmospheric pressure, precipitation type/intensity, freezing rain occurrence, ambient light, and horizontal surface visibility (Tab CC-18 to CC-19). On 2 November 2023, the horizontal visibility sensor on the FMQ-19 for the Rwy 13 approach stopped functioning (Tabs V-18.4, W-22, and CC-18 to CC-19). The 28 OSS Weather Flight did not provide formal notice of this outage to other entities in the 28 OG prior to the mishap (Tabs V-9.7, V-11.12, V-18.8 to V-18.9, V-19.3 to V-19.4, V-20.25, V-21.4, V-22.17, V-24.4, V-28.4, V-29.6 to V-29.7, V-36.5, V-38.14, and V-39.18 to V-39.20).



i. Notice to Airmen (NOTAM) M0766

On 18 December 2023, Airfield Operations issued a NOTAM (M0766), which increased the minimum visibility requirement for an approach to Rwy 13 from 1/2 Statute Miles (SM) to 3/4 SM (Tab K-62). This NOTAM was not explicitly highlighted on the 34 BS “Step Brief.” As of 4 January 2024, a previously applicable “Ops Note” slide addressing reduced reflectivity for Rwy 13 and Rwy 31 centerline markings was hidden, which meant the step brief contained no information regarding increased visibility minimums for Rwy 13 (Tab K-46 to K-47).

j. FOX-3

“FOX-3” refers to a single person being assigned the combined Supervisor of Flying (SOF) and Operations Supervisor (Top-3) responsibilities (Tab BB-3.2). The SOF is a group-level position and directly represents the Operations Group Commander (OG/CC) (Tab BB-3.4). The SOF is the focal point for command and control of flight operations (Tab BB-3.4). Certain OG/CC decision authorities are delegated to this position to accomplish the mission (Tab BB-3.4). As the OG/CC’s representative, the SOF ensures weather-related mission changes reflect sound airmanship, follow established guidance, and adhere to sound Operational Risk Management (ORM) principles as per Department of the Air Force Instruction (DAFI) 90-802, *Risk Management* (Tab BB-3.4). The SOF directs appropriate actions to correct and prevent unsafe situations (Tab BB-3.4). The Top-3 is responsible for the execution of the daily flying schedule and coordination of any mission changes as needed (e.g., aircraft tail number changes, crew swaps, flight changes, and airspace changes) (Tab BB-3.7). The Top-3 is also responsible for ensuring aircrews are briefed on applicable weather, airfield conditions, and local hazards (Tab BB-3.7). A FOX-3 is permitted to sit at the squadron duty desk rather than in the air traffic control (ATC) tower (Tab BB-3.8).

4. SEQUENCE OF EVENTS

a. Mission

FELON 02’s mission on 4 January 2024 was to execute a training mission in Powder River Training Complex Area 2 (PR2) (Tab K-90 to K-91 and K-95). The tactical mission focused on large-scale Stand Off Weapon (SOW) employment. FELON 02 was number two of a two-ship formation identified as FELON Flight. The mission was scheduled to depart on 4 January 2024 at 14:30L and land at 18:15L (Tab K-95). The tactical portion of the mission was scheduled to take place entirely in PR2. FELON 02’s actual takeoff time was 16:14L, and it departed as a single ship due to the late takeoff for maintenance-related issues (Tab K-75).

b. Planning

Mission planning began at 09:00L on 4 January 2024 (Tab R-73). Both crews from FELON 01 and FELON 02 participated in mission planning that consisted of updating mission products for a mission that the FELON flight lead (FL) had previously flown (Tabs R-73 to R-74, V-34.4, and V-39.4). The mission was a “Show and Go,” meaning that the mission planning and execution of the flight would occur on the same duty day. The mission briefing occurred at 11:00L and lasted one hour (Tab V-34.9). Special Interest Items (SII) were briefed after the mission briefing (Tab V-27.4, V-29.6, and V-39.5). Based on witness testimony, the FELON flight lead pilot (LP)

spent approximately 15 minutes of the mission brief on administrative tasks relating to getting to and from the Military Operating Airspace (MOA) (Tab V-34.4).

c. Preflight

FELON 01 and FELON 02 stepped at 12:15L at the 34 BS step desk (Tabs K-91 and V-25.3). “Stepping” is when the FELON flight received vital information from the morning FOX-3 (SFOX3) regarding weather, aircraft status, airfield status, ORM, and crew flight-worthy status (Tab V-25.3). Additionally, the Squadron Aviation Resource Management (SARM) airman handed FELON 01 and FELON 02 their respective step folder (which included a copy of the flight authorization, weather, FORM F for aircraft weight and balance, and NOTAMs), and a Sentry device (which offers weather and air traffic information during flight) (Tab V-5.3). According to the system of record, SFOX3 was not current on SOF duties at the time of the FELON Flight step (Tab T-9). Additionally, SFOX3 did not “step” with the SARM as installation policy requires (Tabs V-5.7 and BB-3.5). SFOX3 identified the weather at the airfield for scheduled takeoff and land time. According to the 11:00L Mission Execution Forecast (MEF), the weather for scheduled land time was forecast to be overcast at 2,500 feet (ft) Above Ground Level (AGL) (Tab F-7). SFOX3 told the crews of FELON Flight that FELON 01 was the formation priority, and they were going to T/N 86-0129, while FELON 02 would go to the MA. T/N 86-0129 was a “hot pit,” meaning that it had flown earlier in the day and was being refueled, while the MA was a cold start. FELON 02 was originally supposed to go to T/N 86-0094, but that aircraft landed with a Fuel Center of Gravity Management System (FCGMS) malfunction and was unavailable (Tab K-75). FELON 01’s co-pilot (LCP) briefed NOTAMs but did not brief NOTAM M0766 regarding Approach Lighting System (ALS) inoperative minimums for Rwy 13 (Tab V-27.3 to V-27.4 and V-27.10). Additionally, SFOX3 was unaware of the NOTAM’s existence and did not ensure it was briefed (Tab V-25.10).

SFOX3 went through the step process via a PowerPoint briefing displayed on a television screen behind the step desk (Tab V-25.8). An Ops Note slide regarding the ALS inoperative minimums for Rwy 13 was hidden due to the publication of NOTAM M0766 (Tab K-46). SFOX3 signed off on the ORM worksheet for FELON Flight with FELON 02’s ORM score at 17 (a moderate level) (Tab K-89). Both crews went to their respective aircraft, and on the crew bus, the FELON 02 acting Aircraft Commander (AC), the MP, briefed the crew specific briefing highlighting words to honor, which are directive commands a crew member states and expects to be executed without question, such as “Climb,” “Go-Around,” “Withhold,” and “Abort” (Tab V-29.7). FELON 02 arrived at the MA, started the engines, and began to run through the checklists. Meanwhile, FELON 01 took fuel in the hot pits and took off at 14:36L. The MA experienced warnings for PITCH AUG 1, Gaseous Oxygen (GOX) tank low-pressure, and failure of the Engine Instrument Test for an engine caused by a failure of the Signals Conditioning and Distribution Unit (SCDU) (Tab K-75). The MC shut down the MA at 13:52L and returned to the 34 BS so maintenance could repair the MA. After maintenance repairs were complete, the MC returned to the MA and successfully restarted all four engines at 15:40L (Tab K-75). At 16:14L, FELON 02 took off on Rwy 31 without incident (Tab K-75).

d. Summary of Accident

(1) Tactical Mission

FELON 02's departure and subsequent arrival and rejoin with FELON 01 in PR2 was uneventful. Once rejoined, FELON flight commenced their tactical mission, which included the employment of simulated SOWs. During the tactical mission, FELON flight accomplished several of their training objectives before terminating their mission early due to concerns about deteriorating weather at Ellsworth AFB and the fuel state in FELON 01 (Tab R-68). Due to the late takeoff, FELON 02 still had 80,000 pounds (lbs) of fuel remaining, or at least two hours of fuel, before reaching fuel divert minimums (Tab R-68).

(2) Departing the MOA

FELON 01 was approaching its minimum fuel to divert to Tinker AFB, Oklahoma (OK), and the FL was concerned they might need to divert if the weather at Ellsworth AFB continued deteriorating (Tabs R-68 and V-28.6). The FL elected to terminate the tactical mission and contacted the mishap FOX-3 (MFOX3) for a weather update (Tab V-28.4 to V-28.5). Due to poor radio reception, the FL directed the FELON flight to fly south and get closer to Ellsworth AFB to improve radio reception. Additionally, the FL directed the MC to receive an update from their Electronic Flight Bag (EFB) on the weather conditions at Ellsworth AFB (Tab V-28.4). The MC complied and responded with 5/8 SM visibility and a 100ft overcast ceiling for Rwy 31 (Tab V- 28.4 to V-28.5). The Meteorological Aerodrome Report (METAR) observation utilized for this weather update indicated "VISNO" (meaning visibility unavailable) for Rwy 13 (Tab F- 4). Once FELON flight was close enough, they queried MFOX3 over the radio and requested a weather update (Tab V-22.3 to V-22.4). MFOX3 consulted with the duty weather forecaster before responding with the same information as provided by the EFB: 5/8 SM visibility and 100ft overcast Rwy 31 and 300ft overcast Rwy 13 (Tab V-22.3 and V-22.13). However, the METAR observation utilized by MFOX3 for this weather update also indicated "VISNO" for Rwy 13 (Tab F-4). The FL directed FELON 02 to retrieve the latest weather (Tabs N-3 and V-28.4). FELON 02 reported back at 17:21L with information MIKE from the Automatic Terminal Information Service (ATIS), which consisted of 7/8 SM visibility and a ceiling of 100ft for Rwy 31 (Tab N-3). For reasons the Board could not determine, there was an approximately 12-minute delay in information NOVEMBER being published by ATIS. Thus, MIKE's weather update was not current when FELON 02 heard it at 17:21L (Tab DD-4). However, FELON flight was aware that visibility conditions at Ellsworth AFB were 5/8 SM according to their EFB and MFOX3 (Tabs V-28.5, V-32.5, and V-39.17).

(3) Arrival

FELON flight aircrews discussed the required visibility for the approach collectively. They erroneously agreed that a visibility-only straight-in approach to Rwy 13 required only a minimum visibility of 1/2 SM, contrary to the 3/4 SM minimum stated in active NOTAM M0766 (Tab V- 28.7). Although recollections of the crews varied as to the weather forecast at the time they requested an approach to Rwy 13, the MIP was able to recall both the content of information MIKE and the weather relayed by MFOX3 (Tab V-39.6 to V-39.7). After check-in with Approach Control with information MIKE, FELON flight requested an approach to Rwy 13 due to the

increased ceiling reported by MFOX3 on Rwy 13 (Tabs N-17 and V-39.7). Based on the 5/8 SM visibility relayed by MFOX3 being more recent and restrictive than information MIKE's reported 7/8 SM visibility, the MIP relied upon it to commence FELON 02's approach (Tab V-39.17). At 17:26L, Approach Control passed an updated information OSCAR, which neither FELON crew acknowledged (Tab N-19). Neither FELON crew referenced the NOTAM M0766, which stated that ALS inoperative weather minimums were in effect, and therefore, the minimum visibility required had increased from 1/2 SM to 3/4 SM for Rwy 13 (Tab K-62).

FELON flight requested a flight split and the instrument landing system (ILS) approach to Rwy 13 with radar approach control (RAPCON), and both aircraft subsequently commenced the approach (Tab N-17 to N-19). Neither FELON crew applied cold weather corrections to the Decision Altitude (DA). Information MIKE reported the temperature at -5 degrees Celsius, and cold weather altimeter corrections are required below 0 degrees Celsius according to Air Force Manual 11-202, Volume 3, Air Force Global Strike Command Supplement, *Flight Operations* (Tabs F-4 and BB- 7.6). This would have increased the DA for the ILS approach to Rwy 13 from 3,476ft Mean Sea Level (MSL) to 3,496ft MSL, 20ft higher. Based on their testimony, none of the eight FELON crew members recognized that cold weather altitude corrections were required (Tabs V-27.12 to V-27.13 and V-39.8).

Radar Approach and Tower controllers approved FELON's approach to Rwy 13 as an "opposite direction approach" rather than switching the active runway (Tabs N-18 and V-11.5). The Tower Watch Supervisor (ATC1) then switched the runway approach lights from Rwy 31 to Rwy 13, automatically changing the reporting weather sensor to the Rwy 13 sensor (Tabs V-16.11, V-37.12, and V-37.14). This caused an update to the METAR, which now read "visibility missing" (Tab V- 16.22). The duty weather forecaster (WF1) was not notified of the opposite direction approach by Tower. However, WF1 believed the active runway had changed to Rwy 13 as soon as WF1 noticed the METAR update with missing visibility data (Tab V-16.3 and V-16.22). WF1 stepped outside with the Weather Flight observation binder to manually augment and verify the 5/8 SM visibility data reported by the Rwy 31 sensor (Tab V-16.12).

The only weather data the crews received was for Rwy 31 (Tabs N-3, V-39.20, and DD-4), and they did not request any weather information for Rwy 13 beyond the vertical visibility provided by MFOX3 (Tab V-28.5). Without horizontal visibility for Rwy 13, they could not verify the requisite criteria for commencing a visibility-only approach to Rwy 13. Additionally, FELON 01 and FELON 02 never discussed increasing the minimum visibility required due to the ALS inoperative NOTAM (Tab N-2 to N-24). The crews testified that if they had referenced this NOTAM, they would have applied the increased weather minima on the approach plate for the ILS approach to Rwy 13 and realized they needed 3/4 SM visibility (Tabs K-97, V-27.10, V-28.7 to V-28.8, and V-29.10). An approach to Rwy 13 would not be authorized based on the 5/8 SM visibility they understood to be current for Rwy 13. Once the flight split occurred, FELON 01 and FELON 02 were no longer a formation, and they commenced the approaches to Rwy 13 individually.

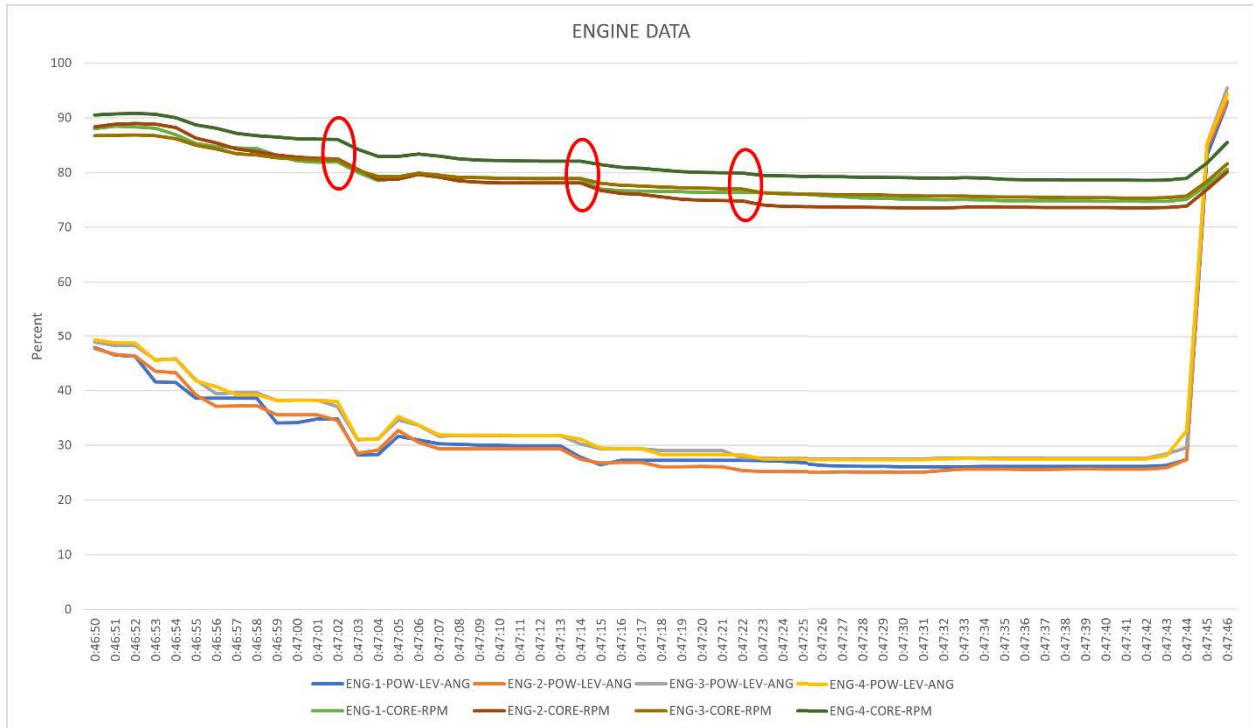
FELON 01 landed on Rwy 13 without incident, approximately 7.71 miles ahead of FELON 02 (Tabs V-22.5 and AA-17). The FELON 01 crew exercised appropriate crosschecks, with LCP calling out corrections to airspeed as the aircraft descended (Tab N-13). The LCP saw the runway lights before what they understood to be the DA and the runway markings before 100ft AGL

(Tab V-27.12). The crew subsequently described the conditions as the “minnest of mins,” but did not communicate these difficult conditions to the MC (Tab N-14). Personnel in the tower could not see FELON 01 or its landing/taxi lights (Tab V-11.3). ATC1 noted the tower was completely in the fog, unable to see the runway 5/8 mile away (Tab V-11.4). ATC1 never relayed these visibility observations to Weather Flight, MFOX3, or the MC.

(4) Final Approach

When the MC discussed the approach, the MP stated he was going to fly the approach, and the MIP agreed (Tab N-4). The MP, backed up by the MOSO, correctly calculated the approach speed at 164 knots (kts) indicated airspeed (KIAS) (Tab N-3 to N-4). During the approach brief, the MP never briefed the required vertical velocity for the approach and never set the radar altimeter to an altitude that would assist with the approach (Tabs N-3 to N-8 and V-39.8). Specifically, setting the altimeter at 200ft AGL for the approach would have provided the crew with a visual warning when descending below the DA to continue the approach (Tab AA-7 to AA-8). The MC relayed to MFOX3 their maintenance concerns from the flight, noting that their aft station MOSO altimeter was reading 1,000ft high and the MDSO communication panel was inoperative (Tabs N-7 and V-22.5). FELON 02 received vectors to the west from RAPCON for spacing between FELON 01 and FELON 02 (Tab N-17 to N-18). FELON 02 was vectored in behind FELON 01 and would be second on the approach to Rwy 13 (Tab N-18). Once established on the final course and up to the last 55 seconds of the flight, the MP was properly managing speed, altitude, and glideslope (Tab AA-6).

During the last 55 seconds while descending, the winds rapidly shifted from a 340-cardinal direction at 11 kts to a 190-cardinal direction at 5 kts within 25 seconds (Tab AA-4). This is “performance enhancing” directional wind shear. Flight data shows the MA’s airspeed increased by approximately 12 kts during this wind shear event from 164 KIAS to 176 KIAS. Performance-enhancing wind shear was evidenced by increased airspeed as the MA was now flying faster through the airmass around it (Tab AA-4). Throttle reductions are commonly required with performance-enhancing wind shear to mitigate the increasing airspeed, and this reduction in the MA’s throttles is reflected in the Military Flight Operations Quality Assurance (MFOQA) collected data (Tab AA-4). The wind data was collected from onboard tactical displays showing the wind velocity and direction readout. Flight data and engine data are derived from the MA’s MFOQA data (Tab AA-4). The MP reduced power three notable times throughout this period (Figure 1, below). The first power reduction was at 17:47:02L by approximately 5 percent core revolutions per minute (rpm), the second power reduction was at 17:47:14L and approximately 3 percent core rpm, and the final power reduction was at 17:47:22L and approximately 1-2 percent. Core rpm reductions are required to counter airspeed increases. However, once the wind stabilized at 5 kts crosswind, the MP did not increase the core rpm as the airspeed decreased toward the approach speed to “catch” the approach speed of 164 KIAS (Tab AA-5). This power input never occurred, resulting in a thrust deficient condition (Tab AA-5).



**Figure 1. MA’s MFOQA Engine Data, Core RPM and PLA.
(Each red circle corresponds to a reduction in core rpm) (Tab AA-4)**

The MA airspeed trended downward with each power pull, markedly decreasing after the third power reduction at approximately 17:47:22L (Tab AA-4). No notable power increases are recorded from that time until just before impact (24 seconds). Contrary to recorded data, the MP recalled in his testimony that they were within 3 kts of their calculated approach speed of 164 KIAS for the duration of their approach (Tab V-29.11). In Figure 2 below, the green line is the calculated approach speed, and the blue line is the kts calibrated airspeed (KCAS) (in the B-1B, KCAS is KIAS) (Tab AA-5). If the approach were flown within 3 kts of the calculated approach speed, the blue KCAS line would be approximately the same as the green calculated approach speed line in Figure 2 rather than arching above and sinking below. Additionally, Ground Speed (GS) will be approximately the same as that of KCAS when winds are calm (Tab AA-5). This is seen in Figure 2 when the blue KCAS line aligns with the yellow GS line, beginning at approximately 17:47:22L. Before this time, Figure 2 shows the yellow GS line above the blue KCAS line. This indicates a tailwind, which decreases until approximately 17:47:22L (Tab AA-5).

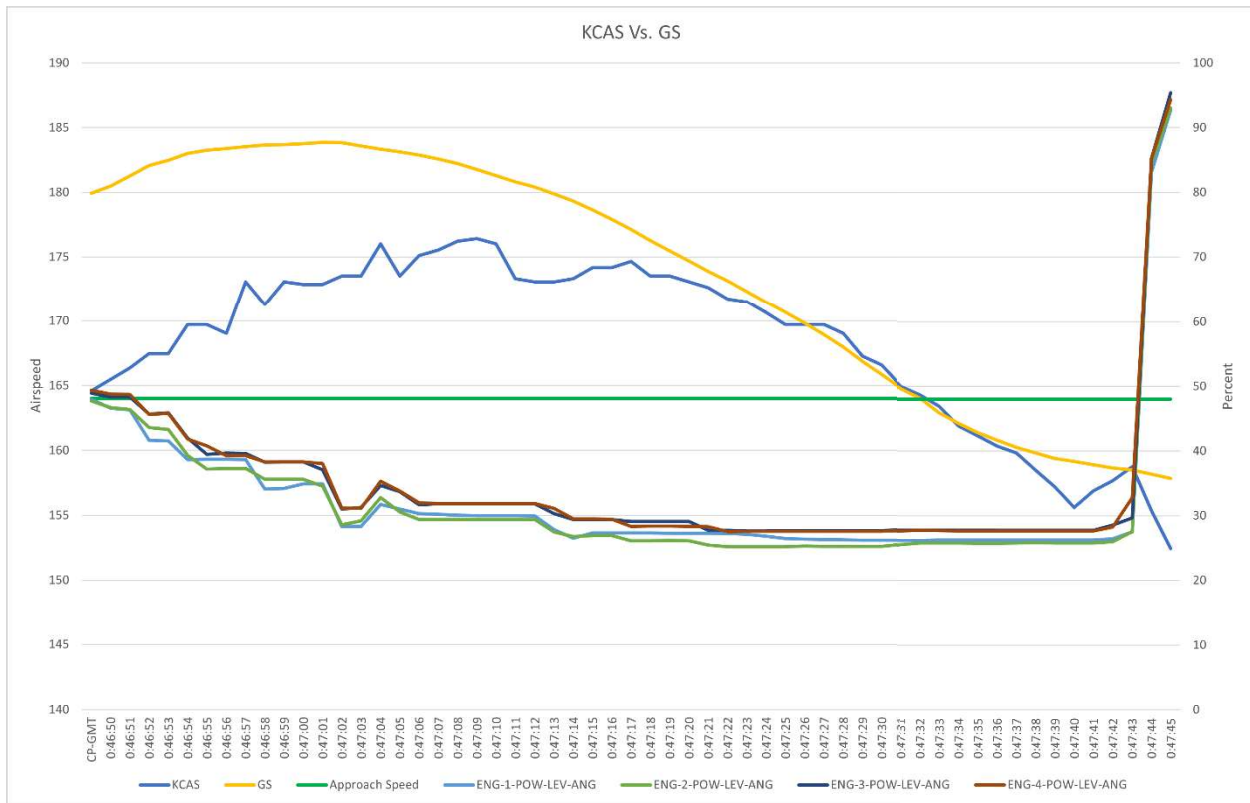


Figure 2. MA’s MFOQA Flight Data, KCAS vs. GS and PLA. (Tab AA-5)

During an instrument approach, a pilot flying incorporates various instruments into a composite crosscheck to estimate the overall perceived performance of the aircraft at any given time and uses these outputs to determine what needs to happen with the throttles and control stick to achieve the desired performance (Tab AA-5 to AA-6). An effective composite crosscheck was not adhered to by any of the MC. According to testimony from the MP, airspeed is a performance indicator that the MC incorporated into their crosscheck (Tab V-29.10). Had the MC done this, they should have recognized the MA slowing below the approach speed of 164 KIAS to ultimately 152 KIAS on final, leading to excessive negative vertical velocity and impact prior to the threshold for Rwy 13 (Tab AA-5). For reference, 152 KCAS is the approach speed for a B-1B that is 40,000 lbs lighter than the MA at the time of the mishap (Tab AA-5). The MOSO utilized the MDSO’s altimeter to back up the MP on required altitude calls (Tab V-34.6). At 17:46:50L, the MA’s airspeed was 164 KCAS (Figure 2 above), and at 17:47:32L, the MA’s airspeed was 164 KCAS (Figure 3 below). These two times were the only instances during the last 55 seconds of the MA’s flight that its airspeed was equal to the calculated approach speed of 164 KIAS. Additionally, the MA’s glideslope began to indicate it was half a dot below the ideal glideslope at 17:47:36L, 10 seconds before impact (Tab AA-6). “Dots” appear on the pilot’s display to indicate how far above or below the target glideslope the aircraft is currently traveling, and a smaller deviation has a much larger impact the closer the aircraft gets to the runway. The MA’s Flight Path Angle (FPA) began to drop below the ideal -3 degrees at 17:47:33L and reached -5.2 degrees at 17:47:44L (Tab AA-6).



Figure 3. MFOQA MA Animation. (Tab S-21)

From 17:47:30L to 17:47:44L, there was a slight aft stick motion from approximately one-half-inch aft stick deflection to one-inch aft stick deflection. During this same time, the MA's angle of attack (AOA) increased from 7.7 degrees (ideal is 7 degrees) to 9.2 degrees, and the MA's pitch indication decreased from 5.5 degrees nose high (NH) to 3.7 degrees NH (Figure 4 below and Tab AA-7). Moving the control stick aft while the AOA increases and pitch decreases indicates the aircraft is approaching stall onset due to thrust deficiency (Tab AA-6). Additionally, the MP never briefed the vertical velocity indicator (VVI) as required by the B-1B Flight Manual, so the aft station MOSO and MDSO would not have known what VVI indicates a normal VVI for the approach (Tabs N-4 and AA-7). Furthermore, they were not instructed to monitor VVI for the approach (Tab N-4). The aft station can reference VVI in "Prime Data" at the top of the tactical display but would have to select VVI to be displayed as it is normally not shown (Tab AA-7). The radar altimeter was turned on during the Descent Before Landing checklist, but the "bugged," or commanded, altitude was never changed from 400ft to an altitude that would assist on the approach in accordance with B-1B procedures, typically 200ft (the DA) (Tab AA-7). Had either pilot set the radar altimeter bug to 200ft, they would have received a MIN DESN HGT (minimum decision height) light when the radar altimeter indicated 200ft AGL, corresponding to the DA for the approach to Rwy 13 (Tab AA-7 to AA-8). Additionally, neither the MP nor the MIP bugged their altitude MSL for what they believed to be the DA for the ILS approach to Rwy 13 (Tab AA-7 to AA-8). Instead, their altitude bug was set to 5,300ft MSL, which did not assist with the final segment of the approach (Tab AA-8). The MDSO testified he was not performing a crosscheck on the final approach and, instead, referencing the After Landing checklist on his EFB (Tab V-31.10).

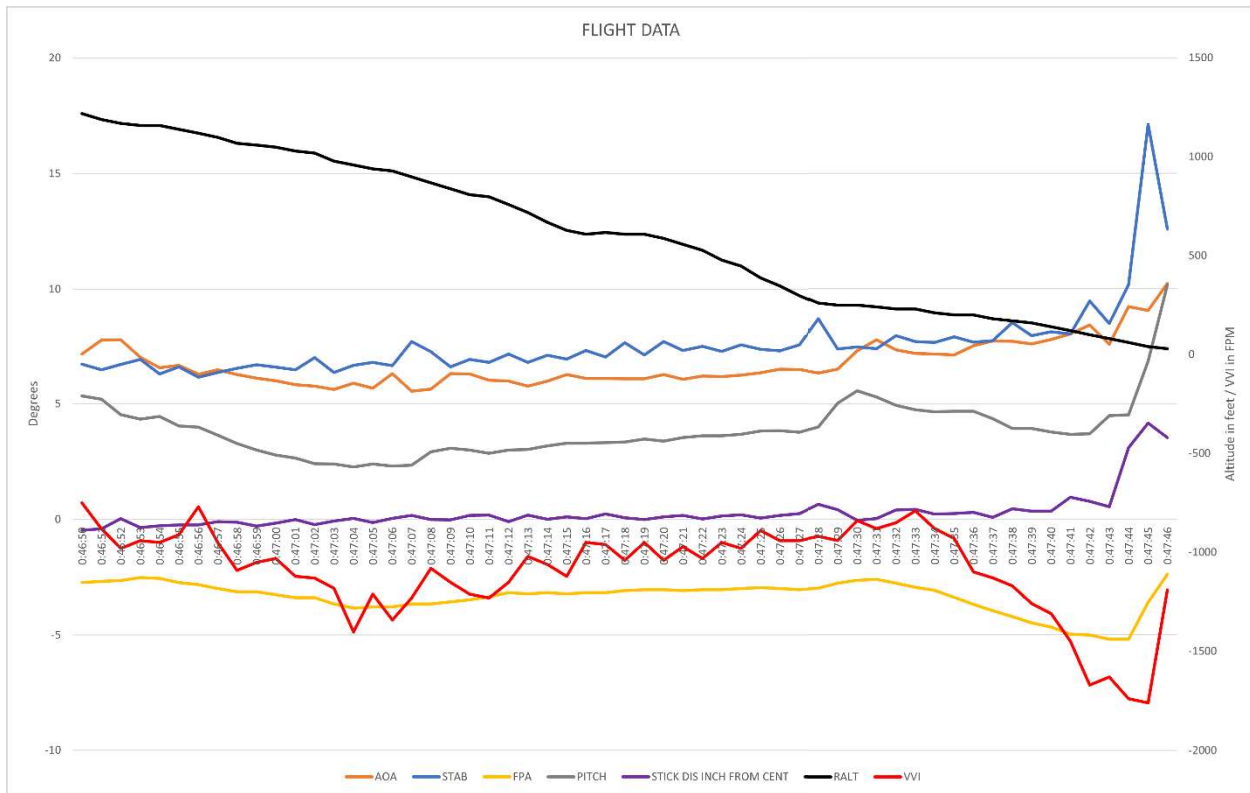


Figure 4. MA's MFOQA Flight Data. (Tab AA-7)

The MC did not use standard low visibility Crew Resource Management (CRM) communication as defined by Air Force Manual 11-2B-1, Vol. 3, Ellsworth AFB Supplement, *B-1 Operating Procedures* (Tabs N-4 to N-9 and BB-9.2 to BB-9.3). Communication such as “Continue,” “Runway in Sight,” and “Visual” alert aircrew that required landing environment visual cues are present and allow for the continuation of the approach (Tab BB-9.2 to BB-9.3). The MP testified that he transitioned visually when the MIP called “Lights” (Tab V-29.11). The MIP believed he called “continue” at 200ft, and the MOSO believed the “continue” call occurred; however, no “continue” call is audible on the cockpit voice audio recording (Tabs N-9, V-34.20, and V-39.10). Even had a “continue” call been made, the MP should not have transitioned to a visual approach until after the MIP called “Runway in Sight,” which never happened (Tabs N-9 and BB-9.2). Only the “runway in sight” call communicates that enough visual cues would allow the MP to fly the remainder of the approach visually (Tab BB-9.2). Had the MC adhered to the B-1B manual regarding low visibility approach communication, then the MIP would have called “runway in sight,” and that would have been the correct point for the MP to transition to a visual approach (Tabs AA-18 and BB-9.2 to BB-9.3). Instead, the MP failed to remain on instruments until the “runway in sight” call, which never occurred (Tabs N-9 and V-29.5). This would have extended the time his instrument crosscheck was in place – and increased the likelihood of recognizing the decreasing airspeed and increasing VVI (Tab AA-18). Additionally, if the MC adhered to the B-1B manual regarding low visibility approach communication, the MC would have called a “go-around” once they were at or below the DA without a “Continue” call (Table 1, below) (Tab AA- 18).

Required Low Vis CRM	Position Required to Comply	Correctly Applied	Incorrectly Applied
“Approaching MDA/DH”	OSO	X	
“Continue”	Pilot Not Flying		X
“Runway in Sight”	Pilot Not Flying		X
“Visual”	Pilot Flying		X
“Go Around”	Any crewmember if at or below DA and “Continue” has not been announced		X

Table 1. Performance of CRM Requirements under Air Force Manual 11-2B-1, Vol. 3, Ellsworth AFB Supplement, *Operations Procedures*, para. A3.3. (Tab AA-16)

Over the final 14 seconds of flight while on final approach, the MA’s airspeed was allowed to decrease to 12 kts below the calculated approach speed, and the aircraft began to sink (Tab AA- 5). The VVI for a precision approach should be minus 750ft per minute, according to the B-1B flight manual (Tab AA-11). The MA’s VVI was recorded at minus 1,800ft per minute just before impact (Tab S-23). The MIP called “climb, climb, climb” four seconds before impact, and again called out “climb” two seconds before impact (Tabs N-9 and AA-7). Although the MIP perceived the MP’s response to be near immediate, available data suggests the MP did not increase power until the MIP made the last “climb” call (Tabs AA-7 and V-39.13).

The MA’s rapid increase in VVI and thrust deficiency occurred just as the MP’s testimony indicates he transitioned his eyes outside the MA after hearing MIP say “lights” (Tabs N-9, V- 29.11, and AA-7). In ten seconds, the MA transitioned into a thrust-deficient state (Tab AA- 4). No crosschecks caught this rapid deterioration (Tab N-9). The MP and MIP were both looking outside the MA (Tabs V-29.11 and V-39.10). The MOSO did not identify the drop in airspeed as he was looking across the aircraft to monitor the altitude on the MDSO’s screen (Tab V-34.6). As previously noted, the MDSO was not crosschecking and stated that he began referencing his After Landing checklist (Tab V-31.10).

FELON 01’s flight data, compared to the MA’s engine data, shows a stark juxtaposition. In the final 15 seconds of flight for FELON 01, their core rpm increased and decreased several times, indicating a proper composite crosscheck from the LP (Figure 5 below) (Tab AA-7). In the final 24 seconds of the MA’s flight, their Power Lever Angle (PLA) and core rpm do not notably change, even though the MA’s performance indicators are trending in a sub-optimal direction. This indicates a lack of composite crosschecking from the MP and MIP. Figure 5, below, is FELON 01’s engine data for the last 15 seconds of their flight. Figure 6, below, is the MA’s engine data for the last 24 seconds of their flight.

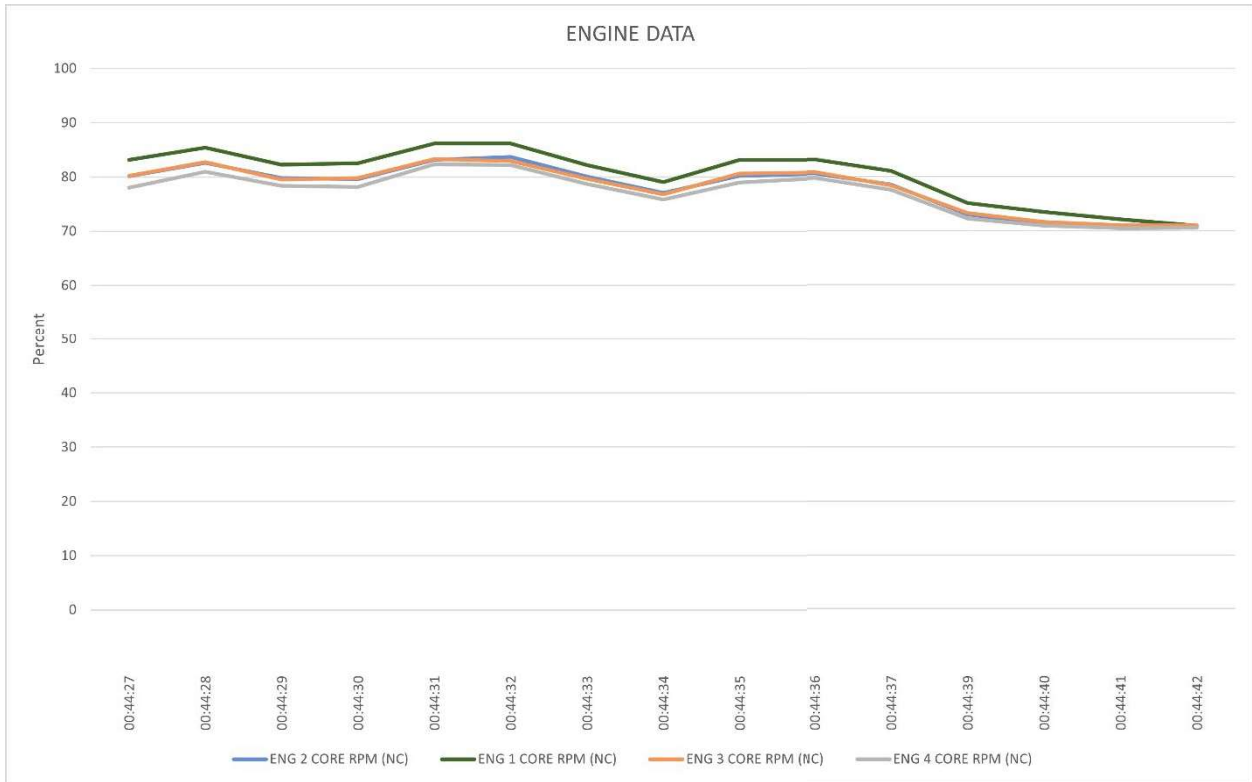


Figure 5. FELON 01 MFOQA Engine Data (Last 15 Seconds). (Tab AA-17)

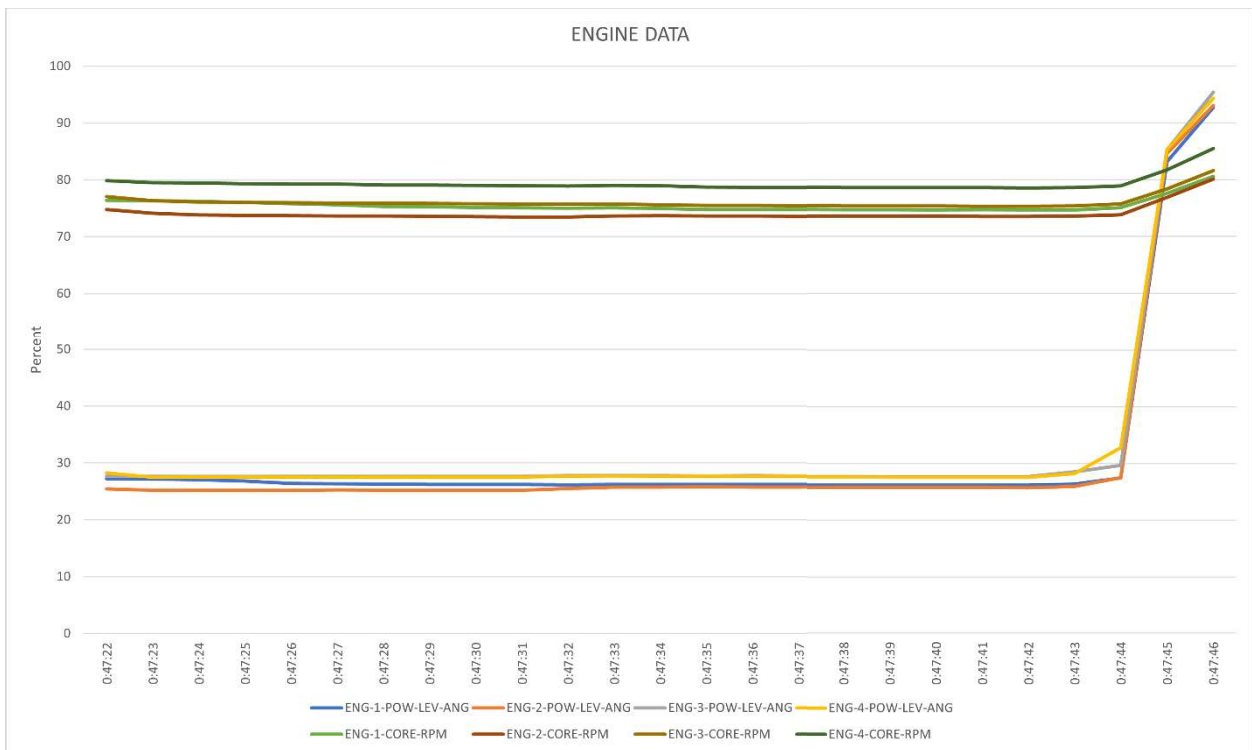


Figure 6. MA's MFOQA Engine Data (Last 24 Seconds). (Tab AA-17)

e. Impact

The MIP called “climb, climb, climb” at 17:47:42L (Figure 8, below, at Tab S-23) and again “climb” at 17:47:44L (Figure 9, below, at Tab S-23) (Tabs N-9 and V-39.12). After the final “climb” call, the MP selected MAX (afterburner) on the throttles and pulled the control stick aft at 17:47:44L (Tabs V-29.5, V-39.12, and AA-6). Due to the excessive sink rate and late recognition, the MA was unrecoverable and out of control (Tab AA-15). Based on the Board’s reconstruction in a flight simulator, as shown in Figure 7, the MA would have been recoverable had a “go around” been initiated 20ft below the DA and at 17:47:38L (Tab AA-15). In the simulator, the Board initiated the “go around” from below the appropriate glideslope but prior to excessive sink rate development (Tab AA-15). The “go around” was successful in military (MIL) power, or the highest engine power without afterburner (Tab AA-15). The aircraft’s descent was arrested at 50ft AGL, and the aircraft was able to climb away from the ground safely (Tab AA-15).

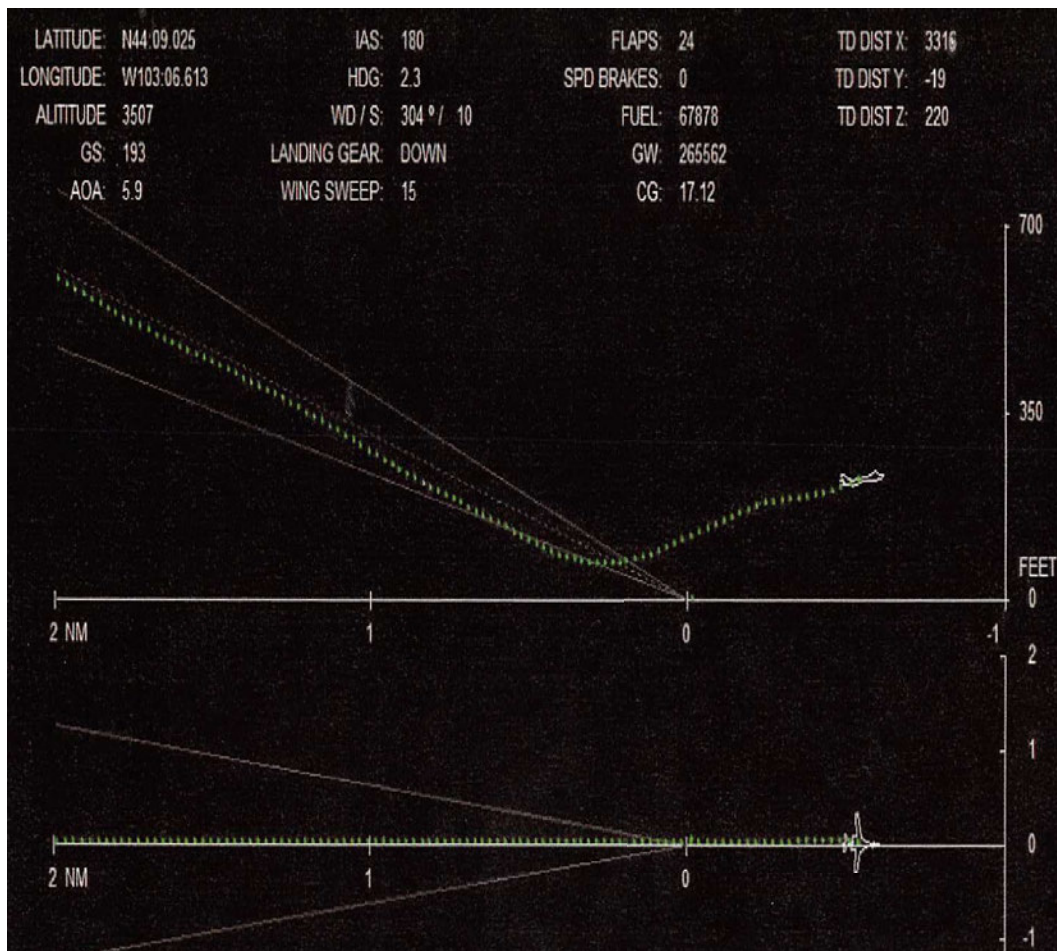


Figure 7. “Go around” simulation at 180ft AGL. (Tab AA-15)

The MA impacted the ground prior to the overrun for Rwy 13 at 17:47:45L (Tabs S-2 and AA-7). The MDSO felt two distinct impacts (Tab V-31.11). The aft radome struck the ground due to exceeding 9 degrees AOA at approximately 17:47:45L and 100ft prior to the overrun for Rwy 13 (Tabs S-2, S-9, and AA-9 to AA-10). The second impact felt by the MC was from the main landing

gear striking the ALS 90ft prior to the overrun at approximately 17:47:46L (Figure 10, below, and Tab S-2). According to testimony, the crew compartment lost power after the first impact and went dark (Tabs V-29.5 and V-31.11). The MA continued to skid along the ground, over the overrun, and onto Rwy 13. From the initial touchdown, the MA continued for approximately 5,000ft along the runway with a slight left (easterly) vector (Figure 11, below, and Tab S-7) and eventually came to a rest between taxiway Foxtrot and taxiway Delta on the infield (Figure 12, below, and Tab S-6). The aircraft fuselage was engulfed in flames, and the MA is deemed a total loss (Tab P-4).



Figure 8. MFOQA MA Animation (“climb, climb, climb” call). (Tab S-23)



Figure 9. MFOQA MA Animation (Final “climb” call). (Tab S-23)



Figure 10. Initial Touchdown Point 100 feet Prior to Rwy 13 Overrun (looking North). (Tab S-2)



Figure 11. Final Trajectory of MA (looking South). (Tab S-7)



Figure 12. Final Resting Place of MA. (Tab S-6)

WF1 heard the impact just as she was outside conducting her first augmentation of the weather visibility readings (V-16.3). She, along with numerous others in the vicinity of the mishap, could not see the aircraft through the dense fog that had settled over the airfield (Tabs V-11.3 to V-11.4, V.11-14, V-16.3, and V-27.19).

f. Egress and Aircrew Flight Equipment (AFE)

The MP decided to eject due to the MA hitting the ground and losing power, and he pulled the ejection handles shortly after impact (Tab V-29.5). Within seconds, the MP heard bangs, which were the MOSO, MDSO, and MIP hatches jettisoning and the seats firing in the automatic ejection sequence (Tab V-29.25). Finally, the MP's hatch and ejection seat departed the aircraft similarly (Tab V-29.25). The MP did not perform the entirety of the post-ejection checklist due to the short timeline after the MA struck the ground, but he performed the parachute landing fall (Tab V-29.25). The MOSO and MDSO performed the parachute landing fall (Tabs V-31.11 and V-34.7). The MIP was rendered unconscious around the time his parachute opened, and thus, the post-ejection checklist was not performed (Tab V-39.16). The Advanced Concept Ejection Seat (ACES) II ejection seat and all associated components for each crewmember performed as designed, including man-seat separation and parachute opening (Tab H-17). No "BAILOUT, BAILOUT, BAILOUT" B-1B standard communication was relayed to the crew when the decision to eject was made (Tab N-9), resulting in a sub-optimal ejection posture of the MOSO (Tab V-34.25).

g. Search and Rescue (SAR)

The MC impacted the ground approximately 1,000ft down Rwy 13 (Tab V-30.14). The MP identified the MIP was on the ground halfway between the grass and the runway concrete and was unconscious (Tab V-29.22). The MDSO yelled out to the MOSO, and they found one another and proceeded to where the MP and MIP were located (Tab V-31.11 to V-31.12). When the MDSO and MOSO arrived at the MP and MIP's location, the MIP was conscious and non-ambulatory (Tab V-31.12). The MP used his cellphone to respond to a text from an Assistant Director of Operations/Instructor Pilot (IP1) stating: "All OK" and a location pin (Tab V-30.6). IP1, another Assistant Director of Operations (IP2), and the Director of Operations (34 BS/DO) took the SOF truck out toward the mishap site, where they saw the illumination of the fire from the MA (Tab V-30.5 to V-30.6). They then proceeded to Taxiway Golf and waited for clearance from the Tower to access the Controlled Movement Area (CMA) (Tab V-30.5). Meanwhile, the MC awaited the emergency response. Emergency personnel performed initial treatment and transported the MC to the local medical treatment facility while the MIP was taken to a local civilian hospital (Tab V-22.8 and V-30.7).

h. Recovery of Remains

Not applicable.

5. MAINTENANCE

a. Forms Documentation

(1) General Definitions

Air Force aircraft maintenance actions and inspections are documented on Air Force Technical Order (AFTO) 781 series forms and digitally using the Integrated Maintenance Data System (IMDS). The AFTO Form 781 series and IMDS are used collectively to provide maintenance, inspection, service, configuration, status, and flight records for a particular aerospace vehicle for which they are maintained. Both aircrew and maintenance personnel utilize AFTO forms to report discrepancies and document corrective actions taken to resolve discrepancies (Tab BB-15.2).

Time Compliance Technical Orders (TCTOs) are time-sensitive technical orders directing inspections of aircraft systems and/or equipment alterations. These actions must be completed within a specific time frame relative to the severity of the issue as indicated by the TCTO (Tab BB-16.2).

Time Change Items (TCIs) are routine maintenance actions, specifically replacing parts at predetermined intervals (e.g., flight hours, engine operating hours, engine cycles, calendar days) (Tab BB-15.3 to BB-15.7).

(1) Documentation Review

A review of the MA's IMDS information, maintenance logbooks, and AFTO Forms 781, both active and inactive, revealed no issues relevant to the mishap.

(a) Active Forms

The active AFTO 781 forms were on the MA at the time of the mishap and were recovered post-mishap (Tab V-14.5). Maintenance documentation discrepancies were noted in the active AFTO 781 forms, none of which contributed to the mishap (Tabs D-1 to D-119, BB-15.2, BB-15.4, BB-15.5, and EE-3).

On 4 January 2024, the active AFTO 781 series forms had 24 open discrepancies (Tab EE- 3). None of the open discrepancies contributed to the mishap. Additionally, all four ejection seats had TCI service life extensions on the mortar cartridges and the cabin air dump handle. All extensions were documented properly according to prescribing technical orders and did not contribute to the mishap (Tabs D-7 to D-9, D-12, BB-15.3, and BB-15.7).

(b) Inactive Forms

The MA's inactive AFTO 781 series forms and IMDS data had documentation errors, none of which contributed to the mishap (Tab EE-3). The MA's 12-month historical files, including TCTOs, major inspections, and historical IMDS data, revealed nothing relevant to the mishap (Tabs D-27 to D-28 and EE-3).

b. Inspections

Maintenance personnel completed and documented all inspections on the MA according to scheduled inspection and maintenance requirements Technical Orders (T.O.s). All inspections were satisfactorily completed, and there were no past-due inspections at the time of the mishap (Tabs D-27 to D-28 and EE-3).

(1) Aircraft Inspections

Hourly Post Flight (HPO) inspections are scheduled based on flying hour utilization rates. The B-1B has 200-hour, 400-hour, and 800-hour HPO requirements (Tab BB-17.2 to BB- 17.4). Each inspection encompasses the preceding inspection (e.g., at 400 hours, both the 200-hour and 400- hour inspections will be accomplished simultaneously). Additionally, the B-1B undergoes a calendar-based inspection, Programmed Depot Maintenance (PDM), on a 60-month cycle (Tab BB-17.9). The 200-hour and 400-hour inspections were completed 5.6 flight hours before the mishap, and the 800-hour inspection was completed 392 flight hours prior to the mishap. The 60-month PDM inspection was completed on 6 May 2021 (Tabs D-27 to D-28 and EE-3).

(2) Engine Inspections

Maintenance personnel visibly inspect the B-1B engine inlets and exhausts before and after each flight. Additionally, the engines are inspected before and after each engine maintenance run. Each engine also requires an inspection every 100 hours, 200 hours, and 400 hours (Tab BB-17.5 to BB-17.8). AFTO 781 forms indicate all engine inspections were performed at the appropriate intervals (Tab EE-3).

c. Maintenance Procedures

Prior to the mishap sortie on 4 January 2024, Mishap Maintainers (MM) MM1 and MM2 were dispatched to the MA to diagnose one of the engine's failure to show the proper indications during the MC's After Engine Start checklist (Tab V-15.3). After the MC shut down the MA, MM1, and MM2 replaced the engine's SCDU (Tab V-14.3 to V-14.5, V-15.4 to V-15.5, and V-15.7). The SCDU operational check was turned over to MM3 (Tab V-14.3). MC and MM3 performed the operational check during the MC After Starting Engines Checklist (Tab V-13 to V-14). The MC and MM3 successfully completed the operational check (Tab V-13 to V-14). However, its completion was not documented in the MA forms (Tabs V-14.5 to V-14.6, and BB-15.4).

Prior to MM3 documenting the successful operations check, MM4 signed an exceptional release for the MA (Tabs R-33, V-10.3 to V-10.5, and BB-15.6). After MM4 completed the exceptional release, the MA's forms were returned to the MA. MM3 was unaware the MA forms were on the MA and believed they were still in the possession of MM4 (Tab V-14.3 to V-14.5). While MM3 was en route to MM4 to document the operational check, the MA departed Ellsworth AFB (Tab V-14.3 to V-14.5). The documentation error did not contribute to the mishap.

d. Maintenance Personnel and Supervision

Maintenance procedures are specific to Air Force Specialty Code (AFSC). Each AFSC maintains a Career Field Education and Training Plan (CFETP) to provide initial, upgrade, proficiency, qualification, recurring, and certification training a technician needs to perform duties in their primary AFSC. The Unit Training Manager (UTM) tracked and monitored electronically the training and qualifications for maintenance personnel using IMDS and myLearning (Tabs BB-4.2 to BB-4.3 and G-135 to G-158).

All personnel assigned to the 28th Maintenance Group, Ellsworth AFB, who maintained the MA were qualified. The training records and special certification rosters for all personnel performing maintenance on the MA reflect all necessary qualifications for the tasks accomplished (Tab G-135 to G-158). There is no evidence that the maintenance personnel's actions or omission of actions contributed to the mishap.

e. Fuel, Hydraulic, Oil, and Oxygen Inspection Analyses

Fuel samples were taken post-mishap from the fuel tank that supplied fuel to the MA. These samples were tested at Vandenberg AFB, California (Tab J-2 to J-7). The fuel analysis report shows that the fuel used on the MA met specification requirements and had no detectable contaminants (Tab J-2 to J-7).

A hydraulic fluid sample was taken after the mishap and sent to Wright Patterson AFB, Ohio (OH), for testing (Tab J-8 to J-9). The analysis reported the sample was consistent with specification requirements and that no contaminants were detected (Tab J-8 to J-9).

Two oil samples were taken post-mishap from separate servicing supply points. Both samples were sent to Wright Patterson AFB, OH, for testing (Tab J-10 to J-13). The samples' quantity was

insufficient to conduct all tests; however, the analyses of both samples reported that they were consistent with specification requirements, and no contaminants were detected (Tab J-10 to J-13).

f. Unscheduled Maintenance

A review of the 365-day history in IMDS and historical AFTO 781 series forms reflected numerous unscheduled maintenance actions (Tab EE-3). Maintenance members completed the corrective actions and associated operational checks for all the unscheduled maintenance items (Tab EE-3).

There was no evidence that unscheduled maintenance contributed to the mishap.

6. AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS

a. Structures and Systems – Instrument Landing System (ILS)

The ILS provides both vertical and lateral guidance information for pilots to allow safe approaches to touchdown. The ILS sends information to instruments in the cockpit so the pilot can maintain a predetermined flight path to the runway in low visibility. In addition, ILSs are used frequently under visual and night conditions to help pilots adhere to the runway centerline to improve safety (Tab CC-20 to CC-22).

An ILS consists of two separate facilities operating independently but coming together in the cockpit to enable lateral and vertical precision guidance. A localizer transmits Very High Frequency (VHF) signals to provide aircraft with lateral guidance that allows pilots to ensure their aircraft is properly aligned with the center of the runway during the approach and landing phases of flight. A glideslope transmits Ultra-High Frequency (UHF) signals to provide aircraft with vertical guidance, enabling a controlled descent to a runway. Working together, these two ILS facilities support a precision approach that ideally, depending on obstacles and terrain, allows aircraft to descend to a DA, at which time the pilot must visually recognize the runway environment and continue to a landing or execute a missed approach if the runway environment is not in sight (Tab CC-20 to CC-22).

b. Evaluation and Analysis – ILS

The Federal Aviation Administration (FAA) conducted a periodic inspection of the ILS glideslope for Rwy 13 on 19 December 2023, just two weeks before the mishap, which found the glideslope was functional (Tab W-25 to W-27). Following the mishap, Radar, Airfield, and Weather Systems (RAWS) personnel went back to test the ILS for Rwy 13 to verify that it was still functioning and verified there was no outage (Tabs R-167 and V-19.3). Additionally, FELON 01 successfully landed using the glideslope just prior to the mishap (Tabs V-22.5 and V-27.15). There is no evidence that the ILS was functioning improperly at the time of the mishap.

7. WEATHER

a. Forecast Weather

On 4 January 2024, the 28 OSS weather forecasters provided the MC with the initial weather forecast and updates via the MEF product. That morning, the observed weather conditions at Ellsworth AFB were visibility restricted to 1 to 2 SM by mist and a ceiling ranging from 200 to 400ft AGL (Tab F-7 to F-15). **Note: A ceiling is a height above the earth's surface of the lowest layer reported as broken or overcast, or the vertical visibility into an indefinite ceiling (Tab BB-11.2).* The weather forecaster (WF3) initially expected conditions to improve throughout the day, believing the sun would aid mist and low status burn off (Tab V-37.3).

On 4 January 2024, a weather advisory for “Observed Induction Icing Conditions Occurring (Temps $\leq 47F$ and Relative Humidity $\geq 50\%$)” was in effect. Additionally, surface temperatures were forecast to remain below freezing ($-4^{\circ}C$ to $-6^{\circ}C$) throughout the day (Tab F-7 to F-15).

The MC received several weather updates before takeoff. At 15:55L, the mission forecast significantly changed with visibility and ceiling conditions deteriorating instead of improving after takeoff (Tabs F-7 to F-15 and R-223 to R-224). Table 2, Ellsworth AFB – Mission Weather Forecast, outlines the weather information relayed to crews through the SFOX3 at 11:27L, 12:15L, 15:55L, and 16:10L (Tabs F-7 to F-15 and R-223 to R-224).

ELLSWORTH AFB – MISSION WEATHER FORECAST											
TIME	BRIEF	TAKEOFF					LANDING				
		WIND (KTS)	PRESENT WX	VISIBILITY (SM)	CEILING (FT AGL)	HAZARDS	WIND (KTS)	PRESENT WX	VISIBILITY (SM)	CEILING (FT AGL)	HAZARDS
11:27L	WEATHER OUTLOOK	INFORMATION RELAYED: CURRENT CONDITIONS: 1 1/4 SM VISIBILITY & 500 FT AGL CEILING FORECAST CONDITIONS: 3 SM VISIBILITY & 1,500 FT AGL CEILING AT SUNSET (16:27L)									
12:15L	STEP BRIEF	SOUTH-EAST (140°) AT 09KTS	MIST	1 1/2	400	LIGHT RIME ICING: 400 TO 4,400 FT AGL	VARIABLE AT 6 KTS	MIST	5	2,500	LIGHT RIME ICING: 2,500 TO 6,500 FT AGL
15:55L	WEATHER UPDATE	SOUTH-EAST (140°) AT 09KTS	MIST	1 3/8	400	LIGHT RIME ICING: 400 TO 4,400 FT AGL	VARIABLE AT 6 KTS	MIST	1	300	LIGHT RIME ICING: 300 TO 4,300 FT AGL
16:10L	WEATHER UPDATE	NO CHANGES FROM 15:55L WEATHER UPDATE – WX CONDITIONS NOT FORECAST TO GO BELOW ILS MINS.									

Table 2. Ellsworth AFB – Mission Weather Forecast – Change to Ceilings Highlighted (Tabs F-7 to F-15 and R-223 to R-224)

b. Observed Weather

Low-status cloud coverage and poor visibility continued at Ellsworth AFB into the afternoon (Tab F-3 to F-6). At takeoff, the weather conditions were calm winds, visibility restricted to 1 1/4 SM by mist, and a ceiling of 200ft AGL (Tab F-3 to F-6). Table 3, Ellsworth AFB - Observed Weather Conditions, outlines the consistent decline in ceiling and visibility over the aircrew's 1 1/2-hour flight (Tab F-3 to F-6). Table 4, Ellsworth AFB – ILS Minimums outlines the visibility and ceilings required for an approach to Rwy 13 and Rwy 31, including NOTAM M0766's restrictions (Tabs K-62 and K-97).

ELLSWORTH AFB – OBSERVED WEATHER CONDITIONS									
	ACTIVE RUNWAY	REPORTING WX SENSOR	METAR PUBLISHED	ATIS / PUBLISHED	WIND (KTS)	PRESENT WX	VISIBILITY (SM)	CEILING (FT AGL)	
TAKEOFF	RWY 31	RWY 31	16:14L	G / 16:25L	CALM	MIST	1 1/4	200	
ENROUTE	RWY 31	RWY 31	16:27L	SUNSET OCCURS					
			16:29L	H / 16:40L	CALM	MIST	1	200	
			16:39L	I / 16:50L	CALM	MIST	7/8	200	
			16:49L	J / 17:01L	CALM	MIST	1 1/8	100	
			16:55L	K / 17:07L	CALM	MIST	1 1/4	100	
			16:59L	CIVIL TWILIGHT ENDS					
			17:00L	L / 17:11L	CALM	MIST	1	100	
			17:05L	M / 17:17L	CALM	MIST	7/8	100	
			17:10L	N / 17:22L	CALM	MIST	5/8	100	
TACTICAL SCENARIO TERMINATED – AIRCREW BEGIN RETURN-TO-BASE (17:11L)									
RETURN-TO-BASE	RWY 31	RWY 31	17:11L	MFOX3 RELAYS FROM REAL-TIME WX SENSOR DISPLAY: RWY 31 (CEILING 100FT, VISIBILITY 5/8 SM) & RWY 13 (CEILING 300FT)					
			17:18L	MFOX3 RELAYS: CONDITIONS NOT FORECAST TO IMPROVE UNTIL MIDNIGHT.					
			17:25L	O / 17:37L	CALM	MIST	3/4	100	
OPPOSITE DIRECTION APPROACH APPROVED – REPORTING WEATHER SENSOR SWITCHED (17:37L) *RWY 13 VISIBILITY SENSOR INOPERATIVE – WEATHER FORECASTER AUGMENTATION REQUIRED*									
ON-APPROACH	RWY 31	RWY 13	17:43L	NOT PUBLISHED	CALM	MIST	MISSING	200	
MISHAP OCCURS (17:47L)									
POST MISHAP	RWY 31	RWY 13	17:51L	NOT PUBLISHED	CALM	MIST	5/8	100	
			17:54L	WF1 CORRECTS PREVIOUSLY DISSEMINATED 17:43L METAR TO ADD 5/8 SM VISIBILITY.					
			17:55L	P / 17:57L	CALM	MIST	5/8	100	

Table 3. Ellsworth AFB – Observed Weather Conditions (Tabs DD-4, F-3 to F-6, V-22.3, and V-28.6)

ELLSWORTH AFB - ILS MINIMUMS			
RUNWAY 13		RUNWAY 31	
VISIBILITY (SM)	CEILING HEIGHT (FT AGL)	VISIBILITY (SM)	CEILING HEIGHT (FT AGL)
>=3/4*	>=200	>=1/2	>=200
<3/4*	<200	<1/2	<200

Table 4. Ellsworth AFB – ILS Minimums (Tab K-62, K-97)

*NOTAM: M0766 – USE ALS INOP INCREASED RVR AND VISIBILITY MINIMUMS FOR RWY 13 APPROACH PROCEDURES. 18 DEC 2023 UNTIL 15 MAR 2024. (Tab K-62)

(1) Weather Observations

Two Fixed Base Weather Observing System (FBWOS) or FMQ-19 weather sensors are located at the Ellsworth AFB airfield (Tab V-17.5, V-17.9, V-18.4, and V-21.4). The FMQ-19 generates METARs containing a complete report of wind, visibility, runway visual range (RVR), present weather, sky condition, temperature, dew point, and altimeter setting, collectively called “the body of the observation” (Tab BB-10.3). Additionally, encoded and plain language information that elaborates on data in the body of the observation is appended in the METAR remarks (RMK) section (Tab BB-10.2).

On 4 January 2024, the Rwy 31 FMQ-19's visibility sensing capability was fully mission-capable. The Rwy 13 FMQ-19's visibility sensing capability was inoperative, and METARs for Rwy 13 required manual weather forecaster augmentation (Tab V-18.4).

The determination of which primary sensor group is reported in the METAR body and which discontinuity sensor group is reported in the RMK is based on the active runway (Tab BB-10.2 and BB-10.7). For example, on 4 January 2024, when the active runway was Rwy 31, the information in the METAR body was pulled from the Rwy 31 FMQ-19, and the supplemental information located in the RMK was pulled from the Rwy 13 FMQ-19 (Tab F-3 to F-6).

Air Traffic Control (ATC) may occasionally authorize an aircraft to land via an opposite-direction approach using an inactive runway (Tab V-11.5). If weather sensors are installed on the inactive runway, the ATC agency may request for observation data to control aircraft using that runway (Tab V-16.11). This is a temporary measure, and the current observation is not affected since the active runway has not changed (i.e., supplemental data is included in the remarks section of the observation and does not replace the active/primary sensor data) (Tab BB-10.7). On 4 January 2024, when the Rwy 31 FMQ-19 was the primary sensor group, the observation had no supplemental visibility data, which was indicated by the METAR remark "VISNO RWY13." (Tabs F-3 to F-6 and BB-10.13).

Prior to the mishap on 4 January 2024, there was an average 10–12-minute delay between the METAR observation and the ATIS publication time (Tab DD-4). Additionally, the METAR remarks are not stated over the ATIS (Tab DD-4).

When the MA's opposite-direction approach via Rwy 13 was approved, ATC did not request weather observation data to inform aircraft using that runway (Tab V-11.6 to V-11.7). At 17:37L, when ATC switched the airfield lighting to Rwy 13, the reporting FMQ-19 was also changed to Rwy 13 - as the two systems are interconnected (Tab V-17.6). This occurred without the WF1's awareness (Tabs V-16.3 and W-3). Just prior to the mishap, WF1 noticed the reporting FMQ-19 sensor change, as a METAR was automatically disseminated with missing visibility data (Tab V-16.9). WF1 believed the active runway had changed to Rwy 13, so she stepped outside to complete a manual observation and augment the missing visibility data for the Rwy 13 approach (Tab V-16.3). WF1 heard the MA's impact just as she went outside (Tab V-16.3). WF1, along with numerous others in the vicinity of the mishap, could not see the MA through the dense fog that had settled over the airfield (Tabs V-11.3 to V-11.4 and V-16.25).

(2) Hazards While Enroute

After takeoff, the MC relayed a Pilot Report (PIREP) from their flight's climb: visibility restricted to 1 SM, a ceiling of 200ft AGL, and the cloud layer's top at 4,000ft AGL (Tab R-223). A weather forecaster (WF2) updated the MEF to report the potential for light rime icing en route from 8,500ft to 19,000ft MSL (Tab F-7 to F-15). The MC reported the MA's ice light did illuminate throughout the flight (Tab V-29.12). However, the MC testified it did not raise concern as the ice light is sensitive, and they were able to ascend above -30°C (21,500ft MSL), where the frequency of icing becomes rare (Tabs V-29.12, V-31.9, and BB-2.3). There are no other significant factors to highlight for weather at altitude.

(3) Hazards During Descent

Atmospheric conditions were favorable for light rime icing during the aircrew's descent from 4,000ft AGL to the surface (Tab F-15 to F-17). On 4 January 2024, low-level icing presence around Ellsworth AFB was verified by two PIREPs at 13:04L and 15:58L (Tab W-9). The MA's ice light illuminated during the last 15 seconds of the flight (Tab AA-16). Testimony from the aircrews indicated that no ice accretion was noted on the windscreen of their aircraft during flight (Tabs V- 27.11 and V-29.12). FELON 01 noted no ice accretion during the post-flight inspection (Tab V-28.11). Ice accumulations on wing and tail surfaces disrupt the airflow around airfoils, resulting in a loss of lift, increasing drag, and higher-than-normal stall speeds (Tab BB-1.2 to BB-1.3).

During the MA's descent, the winds shifted from north-northwest at 15-20kts aloft to south-southwest at 0-5kts near the surface. As a result, the MC experienced a transition from a 17kt tailwind to a 4kt crosswind (Tab AA-4). When an aircraft crosses the shear plane and loses the tailwind, lift increases, and the aircraft climbs above the glide path. The pilot's reaction can be an overcorrection, which can lead to a descent below the glide path without enough altitude to correct. The result in these situations is often the classic high sink rate and hard landing (Tab W- 12 to W-21).

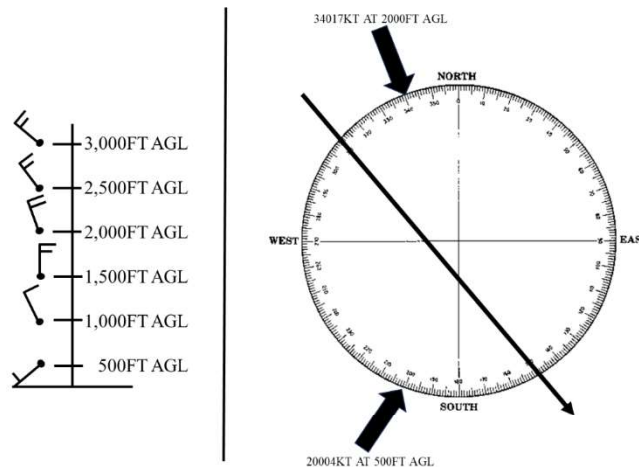


Figure 12. Performance Enhancing Wind shear (Tab AA-4)

(4) Time of Mishap

The observed weather during the mishap was calm winds, mist, and a ceiling of 200ft AGL (Tab F- 3 to F-6). Due to the Rwy 13 FMQ-19's visibility sensor outage, the exact visibility at Rwy 13 was unknown. WF1's manual visibility observation from the runway's center was 5/8 SM, the same as the Rwy 31 FMQ-19's visibility sensor (Tab F-3 to F-6). As the Rwy 13 FMQ-19 and Rwy 31 FMQ-19 are approximately two miles apart, forecasters testified it is possible to have variations in visibility at the opposing ends of the runway (Tabs V-17.5, V-21.3, and W-24). Individuals without official weather observation training who responded to the aircraft mishap recalled areas of denser fog with extremely limited visibility (Tabs V-20.4, V-30.5, and V-35.4).

The Cooperative Weather Watch (CWW) encompasses the report of tower visibility, PIREPs, and any occurrence of previously unreported conditions from ATC to the weather flight that is critical to the safety or efficiency of local operations and resources (Tab BB-10.5). Personnel in the ATC tower (elevated approximately 90ft AGL) could not see FELON 01 or its landing/taxi lights. ATC1 noted the tower was completely in the fog, unable to see the runway 5/8 miles away (Tab V- 11.4). ATC1 was aware of NOTAM M0766 but did not relay the differences in observed visibility to a weather forecaster or MFOX3 (Tabs V-11.9, V-11.12, and V-36.8). The 28 OSS/CC was unaware of the requirement to pass along observations if they were inconsistent with published, automated observations (Tabs V-38.18, W-28, and BB-20.1).

(5) Post Mishap

Weather conditions continued deteriorating after the mishap, with freezing fog decreasing visibility between 1/8 and 1/2 SM for the remainder of the evening (Tab F-3 to F-6).

c. Space Environment

Not applicable.

d. Operations

(1) Ceilings & Visibility

According to Air Force Manual (AFMAN) 11-202, Vol 3, AFGSC Supplement, *Flight Operations*, para. 14.2, “Do not begin a descent or commence an approach when the reported weather at the destination airfield is below the lowest compatible approach minimums” (Tab BB-7.10). Typically, the lowest compatible approach minimum for Rwy 13 is 1/2 SM prevailing visibility and a 200ft AGL ceiling (Tab K-97). NOTAM M0766 (valid 18 December 2023 to 15 March 2024) instructed aircrew to use the ALS inoperative increased visibility minimums of 3/4 SM (Tab K-62). The MC utilized a visibility-only approach minimum, which is allowed provided the aircrew execute a straight-in approach to the runway of the intended landing (Tab BB-7.10).

When the FELON flight requested the approach, the active runway and reporting FMQ-19 was Rwy 31 (Tab F-3 to F-6). Due to the Rwy 13 FMQ-19’s visibility sensor outage, no supplemental weather data was available. Typically, the weather forecaster will only employ backup procedures and complete manual prevailing visibility observations when the active runway and reporting FMQ-19 is Rwy 13 (Tab F-3 to F-6). Because WF1 was not notified of the opposite-direction approach, she did not complete a manual visibility observation prior to the FELON flight commencing their approach. WF1 only went outside after noticing the active weather sensor had changed (Tabs V-16.3 and V-16.9). The prevailing visibility was never observed, requested, or available during the approaches for Rwy 13.

(2) Cold Weather Altitude Correction

According to AFMAN 11-202, Vol. 3, AFGSC Supplement, *Flight Operations*, Table 4.4, aircrew are required to apply cold weather corrections to altitudes below 1,000ft AGL on an approach plate when the altimeter setting source temperature is below 0°C (Tab BB-7.7). The observed source temperature on the aircrew’s approach was -5°C (Tab F-3 to F-6). Members from both FELON

crews testified they did not apply cold weather altitude corrections to the DA for the Rwy 13 approach (Tabs V-27.13, V-29.17, and V-39.8). If they had applied cold weather altitude corrections, the DA would have been set 20ft MSL higher (Tab AA-9).

(3) Other Considerations

ATC complied with applicable wake turbulence procedures, applying the required minimum spacing distance of 4 nautical miles (NM) between aircraft, separating FELON 01 and FELON 02 by approximately 7.71 miles (Tabs AA-17 and BB-7.9). Stable conditions combined with the present 5kt crosswind could have kept the upwind vortex over the runway for up to 15 minutes (Tab BB-2.2). However, both aircrews testified they did not feel turbulence or notice any unsecured objects becoming dislodged throughout the descent (Tabs V-27.12, V-29.13, V-31.9, and V-39.11). Therefore, there is no evidence that turbulence or wake turbulence were a factor in the mishap.

No evidence to suggest that induction icing procedures were not followed (Tab AA-16).

e. Weather Equipment

Ellsworth AFB has two FMQ-19 weather sensors, which provide real-time data on wind, visibility, RVR, present weather, sky condition, temperature, dew point, and altimeter setting. This weather data generates METARs, which are relayed to aircrew via the ATIS and aviation weather websites (Tabs BB-10.3, BB-21.4, and CC-18 to CC-19). An FMQ-19 is placed at each end of the runway approach (Rwy 13 and Rwy 31) - approximately 2 miles apart (Tab W-24).

On 2 November 2023, the Rwy 13 FMQ-19's visibility sensor became inoperative (Tabs V-18.4 and W-22 to W-23). Several weather forecasters testified the Radar, Airfield, & Weather Systems (RAWS) shop was verbally notified of the outage in early-to-mid November (Tabs V-16.15, V-17.7, V-21.4, and V-37.4). RAWS, the section responsible for fixing the weather equipment, testified they were not notified of the outage until after the mishap (Tab V-19.4). The Weather Flight Commander (WXFCC) conceded no documentation of initial notification or follow-up discussion regarding the visibility sensor outage with the RAWS technicians until after the mishap (Tabs V-16.16 and V-19.5 to V-19.6).

When the active runway is Rwy 13, and the primary sensor is Rwy 13's FMQ-19, the weather forecaster must employ backup procedures for prevailing visibility observations (Tab BB-10.7). Weather forecasters may use an available Air Force-certified system to back up the primary certified observing systems (e.g., AN/FMQ-19 discontinuity sensors, AN/TMQ-53) or approved manual methods (Tab BB-10.8).

The weather flight primarily completed visibility observations via a manual observing method (Tabs V-16.5 and V-21.5). Prevailing visibility is observed with un-aided vision (i.e., no binoculars or night vision goggles) from a designated point of observation that permits the weather technician to evaluate the horizon circle at the surface (Tab BB-10.10). The weather flight's designated point of observation is toward the middle of the airfield, slightly closer to the threshold of Rwy 31 (Tab F-21 to F-32). From the observation point, weather technicians cannot see the exact touchdown zone of either runway, which has limited visibility to the northeast and southeast due

to buildings (Tab W-5). From there, a visibility reference tool is utilized to complete these manual observations where the distance and direction from the observation point are marked and whether the markers are day or nighttime aids (Tab BB-10.5).

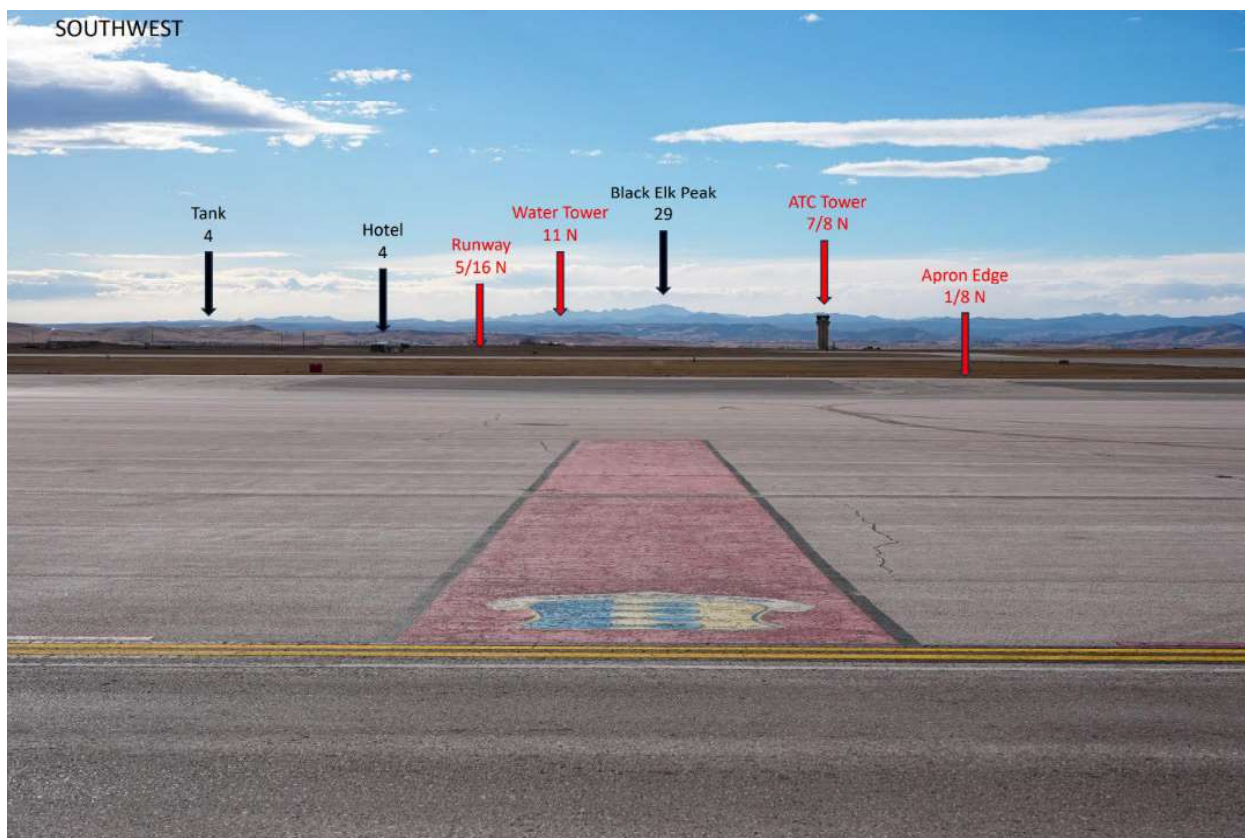


Figure 14. Weather Flight Visual References (Tab F-29)

Weather forecasters became aware of the sensor outage on 2 November 2023 based on the continuous “VISNO” readings in the METAR. Still no NOTAM was published regarding the visibility sensor outage, nor was the equipment outage documented in the Ellsworth AFB Flight Information Publication (FLIP) (Tabs V-18.6, V-21.5 to V-21.6, and W-5 to W-6). ATC, RAWs, Airfield Management, FOX-3s, the 28 OSS Commander (28 OSS/CC), 34 BS/DO, and FELON aircrew testified they were unaware of the Rwy 13 FMQ-19’s visibility sensor inoperability or any other weather sensing equipment degradation on 4 January 2024 (Tabs V-9.7, V-11.12, V-18.8 to V-18.9, V-19.3 to V-19.4, V-20.25, V-21.4, V-22.17, V-24.4, V-28.4, V-29.6 to V-29.7, V-36.5, V-38.14, and V-39.18 to V-39.20).

8. CREW QUALIFICATIONS

a. Mishap Instructor Pilot

The MIP was a fully qualified Command Pilot. He began flying the B-1B on 6 October 2006, and has accumulated 2,087.6 flight hours, 450 sorties, and 305.2 simulator hours (Tab G-29 to G-30). Of the 2,087.6 hours, 693.1 were combat hours, and 85.3 were combat support hours (Tab G-29 to G-30). The MIP achieved the Pilot rating on 14 April 2006, Senior Pilot rating on 14 April 2013,

and Command Pilot rating on 23 April 2021 (Tab G-18). The MIP completed several pilot upgrades and certifications to include the following:

- Initial Qualification Course (IQC): Completed 10 January 2007
- Mission Qualification Training (MQT): Completed 23 July 2007
- Aircraft Commander/Single-Ship Mission Lead (AC/SML): Completed 7 April 2009
- Flight Lead Upgrade (FLUG): Completed 7 September 2010
- Flight Instructor Course (FIC): Completed 4 June 2010
- Flight Instructor Course Instructor (FIC-I): Completed 30 March 2016
- TXC Requalification: Completed 17 February 2017
- Operations Supervisor (Top-3): Completed 17 May 2017
- Supervisor of Flying (SOF): Completed 23 May 2017
- TXC MQT: Completed 17 June 2017
- Evaluator: Completed 20 November 2017
- Supervisor of Flying Instructor (SOF-I): Completed 27 November 2017

	Hours	Sorties
Last 30 Days	5.6	2
Last 60 Days	5.6	2
Last 90 Days	11.7	4

Table 5. MIP’s Flight Times (Tab G-29)

The MIP’s most recent flight prior to the mishap was 21 December 2023 (Tab G-27). He has accumulated 102.3 Evaluator hours (Tab G-27).

b. Mishap Pilot

The MP was a qualified B-1B Pilot who began flying the B-1B on 29 November 2021 and has accumulated 257.8 flight hours, 63 sorties, and 151.1 simulator hours (Tab G-13). The MP achieved the Pilot rating on 22 January 2021 (Tab G-4). The MP completed two pilot upgrades and certifications to include the following:

- IQC: Completed 18 February 2022
- MQT: Completed 16 August 2022

	Hours	Sorties
Last 30 Days	13.9	3
Last 60 Days	24.5	6
Last 90 Days	36.4	8

Table 6. MP’s Flight Times (Tab G-15)

The MP’s most recent flight prior to the mishap was 13 December 2023 (Tab G-13). During IQC and MQT, several instructor comments from different flights indicate the MP had a history of unstable approaches, an early transition to visual from an ILS, shifting aim points, and excessive power pulls during crosswind landings (Tab G-70 and G-74). At the time of the mishap, the MP was enrolled in an AC/SML upgrade, and the mishap flight was his second AC/SML flight (Tab V-8.30).

c. Mishap Defensive Systems Officer

The MDSO was a qualified Combat Systems Officer who began flying the B-1B on 14 October 2020 (Tab G-53 and G-55) and has accumulated 368.4 flight hours, 109 sorties, and 200.7 simulator hours (Tab G-55). The MDSO achieved the Combat Systems Officer rating on 22 October 2019 (Tab G-44). The MDSO completed two upgrades and certifications to include the following:

IQC: Completed 5 February 2021

MQT: Completed 17 June 2021

	Hours	Sorties
Last 30 Days	4.7	2
Last 60 Days	17.1	5
Last 90 Days	28.5	9

Table 7. MDSO’s Flight Times (Tab G-55)

The MDSO’s most recent flight prior to the mishap was on 21 December 2023 (Tab G-53). During IQC, several negative trends were noted, including not backing up pilots with airspeed, altitude, and crosschecks during the landing phase of flight (Tab G-115).

d. Mishap Offensive Systems Officer

The MOSO was a qualified Senior Combat Systems Officer who began flying the B-1B on 18 December 2015 and has accumulated 1,072.9 flight hours, 267 sorties, and 211.9 simulator hours (Tab G-39). Of the 1,072.9 hours, 107.9 were combat hours, and 66.1 were combat support hours (Tab G-39). The MOSO achieved the Combat Systems Officer rating on 29 May 2015 and the Senior Combat Systems Officer rating on 29 May 2022 (Tab G-32). The MOSO completed several upgrades and certifications to include the following:

IQC: Completed 4 March 2016

MQT: Completed 14 August 2016

SML: Completed July 2019

FIC: Completed 3 April 2020

Weapons Instructor Course (WIC): Completed 11 June 2022

	Hours	Sorties
Last 30 Days	8.9	3
Last 60 Days	11.5	4
Last 90 Days	11.5	4

Table 8. MOSO’s Flight Times (Tab G-41)

The MOSO’s most recent flight prior to the mishap was 21 December 2023 (Tab G-38). He has accumulated 13.0 Evaluator hours (Tab G-39).

The MC was fully qualified for the mission at the time of the mishap, and there is no evidence that insufficient crew qualifications contributed to it.

9. MEDICAL

a. Qualifications

All FELON 01 and FELON 02 crewmembers were medically qualified per the documentation and clearance by 28th Medical Group Flight Medicine (Tab X-3). Administrative discrepancies were noted for two mishap formation crew members who received medical care without a documented aeromedical disposition or approved aviation waiver for conditions not meeting flying standards. This should have resulted in a status of “duties not including flying” (DNIF) before the mishap (Tab X-4). Flight-status personnel are required to notify Flight Medicine of all off-base medical care, and such members are administratively placed in a DNIF status until an Aeromedical Provider has adjudicated all care and makes an aeromedical disposition (Tab BB-13.3 to BB-13.4). Failure to attend directed follow-on care may also result in a duty limitation or DNIF status (Tab BB-5.3).

A mishap maintenance member was not medically qualified to complete any duties in an environment with occupational noise exposure and failed to attend follow-up care in a timely manner yet was allowed to continue duties per their squadron leadership (Tabs X-4 and BB-5.2). All other mishap maintenance members were medically qualified for their duties as per the documentation and clearance by the 28th Medical Group (Tab X-4).

Although administrative errors were made in clearing airmen, with duties including flying as per AFMAN 48-149, *Flight and Operational Medicine Program (FOMP)*, para. 3.3.1.1, and Department of the Air Force Manual (DAFMAN) 48-123, *Medical Examinations and Standards*, para. 5.5.6.6, no evidence suggests any of these administrative irregularities contributed to the mishap (Tab BB-12.2 to BB-12.3 and BB-13.4).

b. Health

All members of the MC were in good health at the time of the mishap. The MP and MDSO did not experience significant injuries from the ejection sequence (Tab X-6). The MOSO suffered injuries most likely attributable to not wearing all AFE during the landing sequence as required by AFGSC policy (Tabs V-34.29, X-6, and BB-7.5). The MIP suffered significant injuries and temporary loss of consciousness from the ejection sequence, requiring hospitalization (Tabs V-29.22, V-39.16, and X-6). An egress analysis determined improper body positioning at the time of the ejection, supported by the MIP’s testimony, and parachute opening were the primary causes of these injuries (Tabs H-17, V-39.16, and X-6). In a review of the post-mishap medical treatment records, there is evidence the weight of the MIP exceeded the maximum weight limit of the ACES II ejection seat (211 lbs) and Air Force-adjusted maximum weight limit (245 lbs) for safe and effective use (Tab X-5). During several of his medical encounters prior to the mishap, the MIP’s weight was just under the 245lb maximum, with at least one weight being the MIP’s self-reported when the measured weight was above 245 lbs (Tab X-5). In the MIP’s treatment records shortly after the mishap, the MIP’s weight was nearly 260lbs (Tab X-5). The MIP’s weight likely contributed to the severity of the injuries noted from the mishap (Tab X-5). There is no evidence to suggest that health was a factor in the mishap.

c. Pathology

Not applicable.

d. Aircrew Flight Equipment

Evidence shows that all utilized AFE functioned appropriately and as intended (Tab H-21 to H-76). Evidence shows that some members of the MC did not utilize the appropriate and required AFE (Tabs V-29.20, V-34.29, and X-6). Based on a review of ejection sequence injuries, the MP did not utilize a helmet visor, and the MOSO did not utilize an aircrew helmet or gloves (Tabs V- 29.20, V-34.29, and X-6). There is no evidence the lack of proper use of required AFE was a causal factor in the mishap. 34 BS/DO testified pilots are now only issued a dark visor, which restricts vision in a low visibility nighttime landing (Tab V-20.21); however, the 28 OSS/CC was unaware of any constraints preventing pilots from being issued clear visors (Tab V- 38.14). Additionally, the MP testified he never attempted to obtain a clear visor from AFE because changing the visors on the helmets is a “hassle” (Tab V-29.20). Squadron leadership and squadron members testified to common knowledge and squadron culture of aft station aircrew not utilizing required AFE during critical phases of flight, including visor, gloves, and helmet as required by AFGSC policy (Tabs V-20.21, V-22.16, V-25.10 to V-25.11, V-30.11 to V-30.12, V-32.3, V-34.29, V-35.8 to V-35.9, V-38.24, and BB-7.5). Although not causal or substantially contributing to the mishap, there is evidence these AFE wear concerns contributed to the severity of the injuries for the MOSO and the MP suffering minor injuries (Tab X-6).

e. Lifestyle

There is no evidence to suggest that lifestyle was a factor in the mishap (Tab X-3 to X-6).

f. Crew Rest and Crew Duty Time

Air Force crewmembers must have proper crew rest before performing flight duties, as defined in AFMAN 11-202, Vol. 3, AFGSC Supplement, *Flight Operations*, 22 December 2021 (Tab BB- 7.3). Crew rest is defined in paras. 3.1 and 3.2 as a minimum 12-hour non-duty period before the Flight Duty Period (FDP) begins. Its purpose is to ensure crewmembers are adequately rested before flight or performing flight duties (Tab BB-7.3). During this time, a crewmember may participate in meals, transportation, or rest if he or she has the opportunity for at least eight hours of uninterrupted sleep (Tab BB-7.3). The MC and MFOX3 met rest and duty time restrictions and requirements (Tabs V-22.3, V-29.19, V-34.26, and V-39.15). Throughout the investigation, there was no evidence of any additional concerns regarding crew rest. There is no evidence to suggest that rest and duty time were factors in the mishap.

g. Toxicology

Two mishap maintenance members had positive toxicology results, and all remaining toxicology results were negative (Tab X-3). No evidence suggests that toxic substances were a factor in the mishap.

10. OPERATIONS AND SUPERVISION

a. Operations

The 34 BS has 27 assigned and attached pilots, 17 experienced (Tab G-122). Designation as an experienced pilot requires AC or SML certification, 18 months B-1B CMR/Basic Mission Capable (BMC1) status, and Squadron Commander approval (Tab BB-20.2). The 34 BS has 29 WSOs, 16 experienced (Tab G-123). Designation as an experienced WSO requires SML certification, 18 months B-1B CMR/BMC1 status, and Squadron Commander approval. (Tab BB- 20.2). 14 of the 27 pilots are qualified as instructors, and 11 of the 29 WSOs are qualified as instructors (Tab G-122 to G-123).

The 28 OSS/CC testified that his manning document authorizes 17 aviators. (Tab V-38.3). During his command tenure, operational readiness remained the priority, and manning prioritization went to the B-1B Formal Training Unit (Dyess AFB), B-1B Operational Test (Dyess AFB), and the operational bomb squadrons at both Dyess AFB and Ellsworth AFB (Tab V-38.3 to V-38.4). Because of this, 28 OSS/CC acquiesced to most of the Assistant Directors of Operations (ADOs) positions, typically occupied by senior Company Grade or Field Grade Officers, being unfilled (Tab V-38.4). For eight months, one ADO oversaw seven OSS Flights (Aerospace Physiology, AFE, Weapons and Tactics, Intelligence, Airfield Operations, Weather, and Current Operations) (Tab V-38.3).

The 28 OSS/CC focused his assigned aviators on the high-priority AFE, Wing Weapons, and Weapons and Tactics positions (Tab V-38.5). The 28 OSS/CC underestimated the impact caused by the leadership vacuum and stated that manning decisions resulted in an overall loss of leadership and severing of connective tissue across his stovepiped flights (Tab V-28.4). Additionally, without the ADO leadership, the commander and director of operations quickly became overwhelmed with day-to-day decision-making. To remedy this, the Sq/CC pushed decision-making authority downward to flight commanders and Senior Non-Commissioned Officers (SNCOs) (Tab V-38.4).

b. Supervision

(1) Supervision of Flying Operations

The basic supervision structure for flying operations, applicable to all flying units at AFGSC launch and recovery airfields, consists of the OG/CC, the SOF, and the Top-3 (Tab BB-3.2). When on duty, the SOF is a group-level position and is the direct representative of the OG/CC with the commander's delegated decision authority for safe and effective flight operations while directing appropriate actions to correct and prevent unsafe situations. The SOF is the focal point for command and control of flight operations while ensuring that in-flight emergency recovery plans and weather-related mission changes reflect sound airmanship, follow established guidance, and adhere to sound ORM principles (Tab BB-3.4). The Top-3 is responsible for the execution of the daily flying schedule and coordination of any required mission changes while also serving as the primary liaison between operations and maintenance during the execution of the flying schedule. The Top-3 ensures crews' awareness of aircraft and airfield status and configuration, applicable weather, and significant local hazards (Tab BB-3.7).

The combination of Top-3 and SOF duties, when approved by the 28 OG/CC during reduced flying operations, is referred to as FOX-3. The 28 OG/CC defines reduced flying as two or fewer B-1Bs, regardless of the number of squadrons flying. The approved FOX-3 duty location on Ellsworth AFB is the squadron duty desk or tower cab unless otherwise approved by the OG/CC (Tab BB- 3.8). The 34th Bomb Squadron Commander (34 BS/CC) and 34 BS/DO stated that FOX-3 is the squadron's default scheduling solution, and they do not provide or require any specific training for FOX-3s (Tabs V-8.14 to V-8.15 and V-20.16). All 34 BS Top-3s are qualified to fulfill FOX-3 duties by default (Tabs V-8.11, V-8.15, and V-20.10). Unit supervisors and schedulers are responsible for scheduling and annotating unit flying supervision (Tab BB-3.3 to BB-3.4). The 34 BS/CC and 34 BS/DO stated that FOX-3, combining the SOF and Operations Supervisor (Top-3), is the squadron's default scheduling solution (Tabs V-8.11 and V-20.10).

The SOF currency is 90 days, and to regain currency, one must accomplish a one-hour supervised tour with a current and certified SOF. Individual squadrons are required to track SOF currencies; the preferred method is the Aviation Resource Management System (ARMS) (Tab BB-3.9). Ellsworth AFB guidance directs that SOFs must verify their currency with SARM personnel before beginning a SOF shift (Tab BB-3.9). The 34 BS/DO and all interviewed SOFs were aware of the 90-day currency requirement (Tabs V-20.10, V-22.11, and V-25.4). However, AFI 11-418's requirement to verify SOF currency before commencing duties is not implemented in practice at Ellsworth AFB (Tabs V-5.7, V-8.17, V-20.17, V-22.11, and V-25.11). The 34 BS/CC also defers the responsibility for FOX-3 scheduling and oversight to the squadron's scheduling and training flights without any command-level consideration for environmental or experience factors (Tab V-8.16).

On the day of the mishap, the 34 BS scheduled and operated under reduced flying operations authority and combined the SOF and Top-3 duties into a FOX-3 (Tabs BB-3.8 and K-74). The 34 BS scheduled two FOX- 3s for 4 January 2024, SFOX3 from 11:45L to 17:30L and MFOX3 from 17:30L to 00:00L (Tabs K-74, V-22.3, and V-25.3). Both FOX-3s were qualified (certified SOFs and Top 3s) to fulfill FOX-3 duties (Tab G-122 to G-123). However, SFOX3's 90-day currency expired on 28 December 2022, as indicated in the ARMS training database (Tab T-9). SFOX3 stated that he likely fulfilled FOX-3 duties within the past 90 days but could not recall the specific dates (Tab V-25.4). The 34 BS does not have a Top-3 specific start of the shift or shift changeover checklist (Tab V-20.18 and V-22.9). Instead, they utilize the 28 BW SOF Quick Reaction Checklists (QRC) "Opening Procedures" checklist (Tabs K-102, V-20.18, and V-22.9). Step "C" of the Opening Procedures requires all SOFs to "Check SOF currency" (Tab K-102).

SFOX3 conducted the pre-flight step brief for the MC, utilizing the approved 34 BS Step Brief (Tabs K-2 to K-61 and V-25.8). The step brief is a formal process for ensuring aircrew currency and qualifications; reviewing current and forecast weather conditions, assigned aircraft, airfield status, hazards, and NOTAMs, and verification of aircrew's mission ORM. AFMAN 11-2B-1V3, para. 2.3.2, requires that squadron supervision, normally the Top-3, will brief crews at a minimum on the items listed in para. 2.4.3.5 in AFI 11-418 (Tab BB-3.7 and BB-7.2). However, this outdated reference no longer exists in the Ellsworth AFB supplement to AFI 11-418, and the 28 BW has not published an updated reference. The 34 BS relies on a PowerPoint briefing template, updated and maintained by the 34 BS Standards and Evaluations Flight (Tab V-20.19). However, the file lacks overwrite protection, which would prevent unauthorized changes from occurring

(Tabs V- 8.21 and V-20.19). Notably, the 7th Bomb Wing at Dyess Air Force Base (DAFB) stipulates in AFI 11-2B-1, Vol. 3, DAFB Supplement Addendum-A, para. 5.12, that Top-3 will ensure a completed risk assessment before the mission step, while also verifying crewmember qualifications and briefing of weather, NOTAMs, ORM, pertinent operations notes, and status of the airfield (Tab BB-22.2).

The MC completed an ORM assessment before the step brief utilizing the 28 BW ORM Checklist (Tab K-89). ORM is a decision-making process to systematically evaluate possible courses of action, identify risks and benefits, and determine the best course of action for any given situation (Tab BB-14.2). The 28 BW requires an aircrew ORM assessment during the mission planning phase, the step-to-fly phase, and, if required, an after-step phase (Tabs K-89, V-8.22 to V-8.23, and BB-19.2). The MC's Mission Planning ORM score was 17 and notated as such on the 28 BW ORM Checklist. A score of 17 is in the middle-risk category, which requires the review and approval of a Top-3 (Tab K-89). The MC failed to complete and populate the step-to-fly column on the ORM checklist (Tab K-89). When asked, the MC could not recall the exact ORM evaluation sequence on 4 January 2024 and could not explain why the step-to-fly column was incomplete (Tabs V-25.10, V-34.15, and V-39.4 to V-39.6). Because the ORM assessment accounted for aircraft maintenance delays, it is possible that the MC omitted the mission planning assessment while incorrectly only completing the step-to-fly portion. The SFOX3 approved the MC's mission planning ORM and allowed the crew to step, contrary to the established protocol. The SFOX3 testified that he likely just saw the 17 and signed off on it (Tab V-25.22). After shutting down their MA for extended maintenance repairs, the MC eventually returned to the step desk (Tab V-29.4). The MC should have completed an additional after-step ORM assessment (Tabs K-89, V-8.22 to V-8.23, and BB-19.2). Aircraft maintenance delays, a return to the squadron, a later-than-planned takeoff time, and training profile changes would increase the initial ORM by at least three points, which would again require Top-3 review and certification. This was never completed before or after the MC returned to the MA (Tab K-89). The 34 BS/DO stated that the squadron assumes a contingency wartime risk acceptance level when participating in regularly scheduled bomber task force missions (Tab V-20.7). Additionally, when asked how the squadron assesses ORM for training missions, he replied that artificiality is built into the process, which often gets peeled back once a crew gets airborne (Tab V-20.8).

MFOX3 assumed FOX-3 duties from SFOX3 at approximately 17:09L on 4 January 2024 (Tab V-22.3). MFOX3 received a handover update detailing the squadron's airborne aircraft and crew composition status, the remaining scheduled flying activity, and the current airfield weather conditions. MFOX3 stated that the update he received was not by the book (Tab V-22.11). Notable required items not passed down include NOTAMs, airfield status, and an observation of the runway environment (Tabs K-102 to K-103, V-22.3, V-22.11, V-22.13, and V-25.3). MFOX3 stated that he immediately accessed and reviewed online weather observations for the airfield while preparing mission products for the next two-ship step brief, scheduled for 17:45L (Tab V- 22.3). MFOX3 also telephoned the 28 OSS weather forecasters to discuss the current conditions and the weather outlook for the rest of the day's scheduled flying activity (Tab V-22.3).

Since the 34 BS scheduled a FOX-3 with a shift changeover that was closely aligned with the MC's earlier than scheduled return to the local area and the scheduled step brief for two additional crews, the MFOX3 remained at the 34 BS duty desk area (Tab V-22.3 to V-22.4). This limited the

MFOX3's weather awareness because the duty desk does not afford a clear view of the airfield runway or landing environment. From the duty desk, the MFOX3 had access to a small window with a view of only a small portion of the aircraft parking area (Tab V-20.18). Although the MFOX3 elected to delay the pending step process for the next two crews, MFOX3's attention was diverted from the MC's approach to landing phase (Tabs V-22.3, V-22.5, V-30.4, and V-30.7). Leading up to the mishap, the 34 BS/DO testified that he elected to focus on administrative office work (Tab V-20.4).

The on-duty ATC1 testified that the prevailing visibility was zero SM from the Tower's vantage point but did not communicate that observation to anyone (Tab V-11.9 and V-11.11 to V-11.12). Sitting inside the squadron, the MFOX3 lacked the visibility cues to adequately fulfill his responsibility to inform aircrews of weather conditions affecting flying operations while also lacking the situational awareness to correct and prevent unsafe situations while adhering to established guidance (Tabs V-22.12 and BB-3.6). Additionally, the MFOX3 was unaware that the current airfield visibility observations from 28 OSS Weather Flight and the online Joint Environmental Toolkit observations were only valid for Rwy 31 (Tab V-22.19). MFOX3 was unaware of the inoperative visibility sensor on Rwy 13, despite the current observation indicating "VISNO" for Rwy 13, limiting his ability to provide accurate weather and hazard updates (Tabs V-22.23 and BB-3.7). MIP testified that had they known the weather visibility sensor on Rwy 13 was degraded, they would have reconsidered their decision to land on Rwy 13 by querying for additional weather data (Tab V-39.20).

When the MFOX3 offered the option of an approach to the non-active runway, Rwy 13, he was unaware of the NOTAM requiring the application of increased visibility minimums due to reduced centerline marking reflectivity and lack of current visibility assessment for Rwy 13 (Tab V-22.13 to V-22.14). Both FELON crews testified that they flew their missions without briefing or knowledge of the NOTAM (Tab V-25.10, V-27.10, and V-29.10). MFOX3, the MC, and FELON 01 all thought the required visibility minimum was 1/2 SM, which was below the required 3/4 SM visibility (Tab V- 22.19, V-27.10, and V-28.6). The MIP testified he was aware of the NOTAM; however, he failed to recognize the MA did not have the visibility minimums to commence the approach (Tab V-39.11 and V-39.18). The 34 BS/CC stated that he knew of the NOTAM. However, he argued the paint reflectivity "probably [did not] play that big of a role" (Tab V-8.29). The 34 BS/DO stated that he was also aware of the restriction. However, it was something that he did not fully understand (Tab V- 20.10).

(2) Operations Support Supervision

Post-mishap, the 28 OSS/CC discovered multiple process and communication breakdowns between the Weather and Airfield Operations flights. The 28 OSS/CC largely attributes this breakdown to young and inexperienced airmen making uninformed decisions and improper documentation and notification procedures (Tab V-38.4). The OSS utilizes a three-tiered Commander's Critical Information Reporting (CCIR) notification construct, which gets disseminated throughout the unit. Items requiring an immediate phone call include the loss of life, significant injury, or hospitalization (Tab V-38.7). The second tier, which also requires an immediate phone call, includes any loss or degradation of mission-critical capability or combat capability (Tab V-38.7). The third tier encompasses numerous less-urgent situations and scenarios (Tab V-38.7).

WF1 testified that on the mishap day, the weather sensor for Rwy 13 could not observe prevailing visibility, and internal flight documentation indicated its degraded status for months (Tab V- 16.15). The forecaster stated she communicated the outage to the RAWS technicians, who would be responsible for initiating any required repairs (Tab V-16.16). Additionally, there was conflicting testimony as to whether the WXFCC was even aware of the visibility outage, and no one could testify to squadron leadership being notified (Tabs V-18.5 to V-18.9, V-21.4, and V-37.4 to V-37.5). Despite the internal weather flight record keeping, there was no documentation with RAWS until after the mishap, approximately the 12th or 19th of January (Tab V-19.3 to V- 19.4).

ATC was also aware of the sensor degradation. Before the mishap, there was an informal arrangement between the Weather forecasters and Tower controllers regarding extended airfield closures. With the inoperative Rwy 13 visibility sensor, if the runway approach lighting remained selected for Rwy 13, the Weather Flight required manual, augmented visibility observations every 20 minutes (Tab V-16.5). WF1 testified that over the previous two months, she would regularly coordinate with Tower to switch the lighting to Rwy 31 before closing for weekends or holidays, which would relieve Weather forecasters of their manual observation duties (Tab V-16.10).

Before the mishap, the 28 OSS/CC lacked awareness of the degraded Rwy 13 weather-sensing equipment (Tab V-38.14). He stated that the inoperative visibility sensor met his CCIR criteria and that he expected communication from his Weather SNCO or WXFCC (Tab V-38.14 to V-38.15). Additionally, depending on the projected time the system was down, his squadron would consider publishing a NOTAM (Tab V-38.15). The 28 OSS/CC was also unaware of the extended closure arrangement between Weather and Tower (Tab V-38.16). Although Tower controllers were aware of the sensor degradation, there was no documentation or procedural update to address tower-assisted visibility observations in the event of an opposite-direction approach utilizing Rwy 13 (Tab V-38.14 to V-38.16).

The 28 OSS/CC was unaware that the Weather Flight did not receive a notification when Tower would switch the active lighting between the two runways (Tab V-38.17). The Ellsworth AFB airfield weather sensing equipment is tied to the active runway lighting system. In the case of the inoperative Rwy 13 visibility sensor, the Weather Flight would receive no warning or notification alerting them of the time-sensitive requirement to conduct a manual visibility observation. (Tab V- 16.10). According to the Weather Flight, Tower only recently gained the ability to control the weather sensors (Tabs V-16.10 and V-37.12 to V-37.14). A current and valid visibility observation required manual input after FELON 01 and the MC's coordination for an opposite direction approach to Rwy 13 and the Tower's activation of the Rwy 13 ALS. The Tower controller did not relay the opposite direction approval to the Weather forecasters, and he also neglected to pass along that his visibility observation was "No to very little visibility," which was inconsistent with the current published observation of 5/8 SM (Tab V-11.8 to V-11.9). Given the mishap weather conditions, the Ellsworth AFB Chief Tower Controller testified that controllers should have shared that information (Tab V-36.8). The 28 OSS CWW stipulates that certified control tower personnel will report differences in observed visibility for values below 4 miles (Tab W-28 to W-31). Additionally, FAA regulations also require crosstalk with official weather observers when differences exist between observations and automated elements (Tab BB-21.2 to BB-21.3).

The OSS/CC was unaware of any CWW policy or procedure between the Tower and Weather Flights (Tab V-38.18).

Despite manning challenges, the 28 OSS/CC stated that the Weather and Tower flights' manning levels never dropped below minimum requirements (Tab V-38.11 to V-38.12). The squadron's RAPCON section did require personnel tradeoffs with Tower controllers, and in some cases, dual qualifications, reduced operating hours, and the elevation of an NCO overseeing Tower operations (Tab V-38.12).

11. HUMAN FACTORS ANALYSIS

The Department of Defense Human Factors Analysis and Classification System 7.0 (DoD HFACS 7.0) lists potential human factors that can play a role in aircraft mishaps and identifies potential areas of assessment during an accident investigation. There is evidence to suggest that many human factors were a factor in this mishap, and the human factors identified as supporting mishap causes and substantially contributing factors are:

AE103 Procedure Not Followed Correctly: is a factor when a procedure is performed incorrectly or accomplished in the wrong sequence (Tab V-39.6).

AE104 Overcontrolled/Undercontrolled Aircraft/Vehicle/System: is a factor when an individual responds inappropriately to conditions by either over- or undercontrolling the aircraft/vehicle/system. The error may be a result of preconditions or a temporary failure of coordination (Tab AA-11).

AE105 Breakdown in Visual Scan: is a factor when the individual fails to effectively execute visual scan patterns (Tabs V-29.11 and AA-4 to AA-5).

AE201 Inadequate Real-Time Risk Assessment: is a factor when an individual fails to adequately evaluate the risks associated with a particular course of action and this faulty evaluation leads to inappropriate decision-making and subsequent unsafe situations (Tabs V-31.10, V-39.8, V-39.13, and V-39.18).

AE202 Failure to Prioritize Tasks Adequately: is a factor when the individual does not organize, based on accepted prioritization techniques, the tasks needed to manage the immediate situation (Tab V-29.16 to V-29.17).

AV001 Performs Work-Around Violation: is a factor when the consequences/risk of violating published procedures was recognized, consciously assessed and honestly determined by the individual, crew or team to be the best course of action. Routine "work-arounds" and unofficial procedures that are accepted by the community as necessary for operations are also captured under this code (Tab V-16.10).

AV002 Commits Widespread/Routine Violation: is a factor when a procedure or policy violation is systemic in a unit/setting and not based on a risk assessment for a specific situation. It needlessly commits the individual, team, or crew to an unsafe course-of-action. These violations may have leadership sanction and may not routinely result in disciplinary/administrative action. Habitual

violations of a single individual or small group of individuals within a unit can constitute a routine/widespread violation if the violation was not routinely disciplined or was condoned by supervisors (Tab V-20.21).

PC208 Complacency: is a factor when the individual has a false sense of security, is unaware of, or ignores hazards and is inattentive to risks (Tab V-31.10).

PC101 Not Paying Attention: is a factor when there is a lack of state of alertness or a readiness to process immediately available information. The individual has a state of reduced conscious attention due to a sense of security, self-confidence, boredom, or a perceived absence of threat from the environment. This may often be a result of highly repetitive tasks (Tab V-31.10).

PC102 Fixation: is a factor when the individual is focusing all conscious attention on a limited number of environmental cues to the exclusion of others (Tab V-29.12 to V-29.13).

PP101 Failure of Crew/Team Leadership: is a factor when the crew/team leadership techniques failed to facilitate a proper crew/team climate, to include establishing and maintaining an accurate and shared understanding of the evolving task and plan on the part of all crew/team members (Tab V-29.16 to V-29.17).

PP106 Critical Information Not Communicated: is a factor when known critical information was not provided to appropriate individuals in an accurate or timely manner (Tab V-18.8 to V-18.9) .

PP107 Standard/Proper Terminology Not Used: is a factor when clear and concise terms, phrases, hand signals, etc. per service standards and training were not used (Tab AA-18).

PP108 Failed to Effectively Communicate: is a factor when communication is not understood or is misinterpreted as the result of behavior of either sender or receiver. Communication failed to include backing up, supportive feedback or acknowledgement to ensure that personnel correctly understood announcements or directives (Tab V-29.11).

PP109 Task/Mission Planning/Briefing Inadequate: is a factor when an individual, crew or team failed to complete all preparatory tasks associated with planning/briefing the task/mission (Tab V-27.10).

SV001 Failure to Enforce Existing Rules (supervisory act of omission): is a factor when unit (organizational) and operating rules have not been enforced by a supervisor (Tab V-20.21).

SI001 Supervisory/Command Oversight Inadequate: is a factor when the availability, competency, quality or timeliness of leadership, supervision or oversight does not meet task demands. Inappropriate supervisory pressures are also captured under this code (Tab V-10.4 to V-10.7, V-18.8 to V-18.9, V-21.6 to V-21.7, and V-38.3 to V-38.5).

SI002 Improper Role-Modeling: is a factor when the individual's learning is influenced by the behavior of supervisors and when that learning manifests itself in actions that are either inappropriate to the individual's skill level or violate standard procedures (Tab V-34.29).

SI003 Failed to Provide Proper Training: is a factor when one-time or recurrent training programs, upgrade programs, transition programs or any other local training is inadequate or unavailable, etc. (Note: the failure of an individual to absorb the training material in an adequate training program does not indicate a training program problem) (Tab V-27.12 to V- 27.13 and V-39.8).

SI004 Failed to Provide Appropriate Policy/Guidance: is a factor when policy/guidance or lack of a policy/guidance leads to an unsafe situation (Tab BB-3.7, BB-7.2, and BB-22.2).

SI007 Failed to Identify/Correct Risky or Unsafe Practices: is a factor when a supervisor fails to identify or correct risky behaviors or unsafe tendencies and/or fails to institute remedial actions. This includes hazardous practices, conditions, or guidance (Tab V-20.21).

OP006 Inadequate Program Management: is a factor when programs are implemented without sufficient support, oversight, or planning (Tab V-7.3 to V-7.5, V-20.10 to V-20.13, and V-38.3 to V-38.5).

OC001 Organizational Culture (attitude/actions) Allows for Unsafe Task/Mission: a factor when explicit/implicit actions, statements or attitudes of unit leadership set unit/organizational values (culture) that allow an environment where unsafe task/mission demands or pressures exist (Tab V-20.21, V-22.16, V-25.10 to V-25.11, V-30.11 to V-30.12, V-32.3, V-34.29, V-35.8 to V-35.9, and V-38.24).

12. GOVERNING DIRECTIVES AND PUBLICATIONS

a. Publicly Available Directives and Publications Relevant to the Mishap

- (1) Air Force Handbook (AFH) 11-203, Vol. 1, *Weather for Aircrews*, 12 January 2022
- (2) AFH 15-101, *Meteorological Techniques*, 4 November 2019
- (3) AFI 11-2B-1, Vol. 3, Dyess Air Force Base Supplement, Addendum A, *Flying Operations*, 26 September 2017
- (4) AFI 11-418, Ellsworth AFB Supplement, *Operations Supervision*, 22 October 2022
- (5) AFI 36-2650, *Maintenance Training*, 21 June 2022
- (6) AFI 48-133, *Duty Limiting Conditions*, 6 August 2020
- (7) AFI 48-170, *Periodic Health Assessment*, 7 October 2020
- (8) AFI 51-307, *Aerospace and Ground Accident Investigations*, 18 March 2019
- (9) AFMAN 11-202, Vol. 3, AFGSC Supplement, *Flight Operations*, 22 December 2021
- (10) AFMAN 11-2B-1, Vol. 2, *B-1 Aircrew Evaluation Criteria*, 26 January 2021
- (11) AFMAN 11-2B-1, Vol. 3, Ellsworth Air Force Base Supplement, *B-1 Operations Procedures*, 27 June 2021
- (12) AFMAN 15-111, *Surface Weather Observations*, 11 March 2019
- (13) AFMAN 15-124, *Meteorological Codes*, 15 January 2019
- (14) AFMAN 48-149, *Flight Operational Medicine Program (FOMP)*, 12 October 2020
- (15) DAFMAN 48-123, *Medical Examinations and Standards*, 7 December 2020

- (16) Department of the Air Force Pamphlet 90-803, *Risk Management Guidelines and Tools: Special Management*, 23 March 2022

NOTICE: All directives and publications listed above are available digitally on the Air Force Departmental Publishing Office website at: <https://www.e-publishing.af.mil>.


b. Other Directives and Publications Relevant to the Mishap

- (1) 3-3.B-1, *BONE Employment Standards*
- (2) T.O. 00-5-1, *Air Force Technical Order System*
- (3) T.O. 00-20-1, *Aerospace Equipment Maintenance Inspection Documentation, Policies, and Procedures*
- (4) T.O. 1B-1B-1, *Flight Manual*
- (5) T.O. 1B-1B-1-1, *Flight Manual*
- (6) T.O. 1B-1B-6, *Scheduled Inspections and Maintenance Requirements*

c. Known or Suspected Deviations from Directives or Publications

- (1) AFMAN 11-202, Vol. 3, AFGSC Supplement, para. 2.3, and NOTAM M0766 – Pilot in Command failed to adhere increased visibility minimums in NOTAM before commencing approach.
- (2) Crosscheck: T.O. 1B-1B-1, *Flight Manual*; T.O. 1B-1B-1-1, *Flight Manual*; and AFMAN 11-2B-1, Vol. 2, *Evaluation Criteria*, Areas 17, 26, 27, 29, 36, 39 – MC did not conduct effective crosschecks during low visibility approach.
- (3) CRM: AFMAN 11-2B-1, Vol. 3, EAFB Supplement, *Flight Operations – B1 Operations Procedures*, A3.3 – Crew did not use proper CRM, to include not using key words at DA and before transitioning to visual approach.
- (4) FOX-3 Briefing: AFI 11-418, Ellsworth AFB Supplement, *Operations Supervision*, para. 2.5 – FOX-3’s step brief did not cover local hazards and airfield conditions or NOTAM M0766.
- (5) Cold weather altitude correction: AFMAN 11-202, Vol. 3, AFGSC Supplement, *Flight Operations*, Table 4.4 – MC did not make required cold weather altitude corrections for final approach.
- (6) AFI 11-418, Ellsworth AFB Supplement, *Operations Supervision*, para. 2.4 – ORM form was not completed properly and was not updated after maintenance delay.
- (7) FAA Order JO 7110.65 – Air Traffic Control CHG1 – Tower personnel did not report weather visibility observations that differed from reported visibility.

3 July 2024


ERICK D. LORD, Colonel, USAF
President, Accident Investigation Board

STATEMENT OF OPINION

B-1B, T/N 85-0085

Ellsworth AFB, SD

4 January 2024

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

1. OPINION SUMMARY

On 4 January 2024, at approximately 17:47 local time (L), FELON 02, a U.S. Air Force (USAF) B-1B aircraft, Tail Number (T/N) 85-0085, was returning from a routine training sortie to Runway (Rwy) 13 at Ellsworth Air Force Base, South Dakota. The mishap aircraft (MA) terminated its mission early and returned as the weather worsened, with a dense fog rolling across the airfield. The MA was crewed by two personnel from the 34th Bomb Squadron (34 BS), including the Mishap Pilot (MP) and Mishap Defensive Systems Operator (MDSO), one member of the 28th Operations Support Squadron (28 OSS), the Mishap Offensive Systems Operator (MOSO), and one member of the 28th Operations Group (28 OG), the Mishap Instructor Pilot (MIP). As the mishap crew (MC) attempted to conduct an instrument landing, the MA made initial contact short of the airfield, and all four members of the MC ejected as the MA skidded across the airfield before coming to a stop in the infield between two taxiways. The MC survived their ejections with varying injuries, but the resulting fire destroyed the MA. The total cost of the MA was \$450,800,000.00, and the total mishap cost was \$456,248,485.00, including damaged airfield structures and cleanup costs.

I identified one cause and five substantially contributing factors that led to the mishap. I also determined that 23 human factors throughout the 34 BS and nine present in the 28 OSS supported the causal and substantial contributing factors for this mishap. The four human factor categories include eight “Preconditions,” or latent failures or conditions; seven “Acts,” or active failures or actions; six “Supervision,” or chain of command decisions or policies; and two “Organizational Influences,” or the communications, actions, omissions or policies of upper-level management that directly or indirectly affect supervisory practices, conditions or actions of the operator(s). In turn, I address the cause and four substantially contributing factors and then assess how they lead to a fifth contributing factor.

2. CAUSE

I find by a preponderance of the evidence that the lack of a composite crosscheck by the MC caused this mishap. During an instrument approach, the pilot flying incorporates flight instruments into a composite crosscheck to continuously monitor the aircraft’s overall performance. Pilots use

that information to determine appropriate throttle and control stick movement to achieve desired performance. The MP did not effectively crosscheck the airspeed, descent rate, and projected aircraft flight path leading up to the mishap. By failing to crosscheck using his instruments effectively, the MP did not recognize the MA's deviations from the desired airspeed, descent rate, and aircraft flight path. Additionally, rather than maintaining his instrument crosscheck until hearing "runway in sight" from the MIP, the MP deviated from AFMAN 11-202, Vol. 3, procedures when he prematurely transitioned his eyes from the MA instruments to looking outside when hearing the MIP verbalize "lights" rather than waiting until the authorized words "runway in sight." The rest of the MC also failed to conduct an effective crosscheck by not recognizing and calling attention to the MA's decreasing airspeed, accelerating descent rate, and deficient flight path. Moreover, the MIP was ineffective in his crosscheck and supervision responsibilities by not recognizing and intervening when the MA entered an unsafe state, which resulted in deteriorating flight parameters. Because the MC did not follow established procedures for maintaining an effective crosscheck, the MA progressed to a state where it could not recover before ground impact. The MC succumbed to complacency and fixation, while the MIP was ineffective in his crew leadership and instructor supervision duties.

3. SUBSTANTIALLY CONTRIBUTING FACTORS

I find by a preponderance of the evidence that the MC's lack of effective crew resource management (CRM) substantially contributed to this mishap. Although the lack of proper CRM did not cause the mishap, effective CRM procedures could have prevented the mishap despite the ineffective crosscheck. The requirements for an effective crosscheck and CRM are closely intertwined. The MC neglected several communication and operations standards outlined in Air Force Manual (AFMAN) 11-202, Vol. 3, *Flight Operations* and AFMAN 11-2B-1, Vol. 3, Ellsworth AFB Supplement, *B-1 Operating Procedures*. The MC did not follow the low-visibility approach to land communication and flying responsibilities. Low cloud ceilings and restricted prevailing visibility conditions exacerbated the MC's deviation from established policy. The MP did not brief the MC on the expected vertical velocity for the planned approach phase, eliminating potential crosschecks from the MOSO and MDSO. Additionally, the MC did not adhere to low visibility approach communication standards, allowing the MA's descent below 200 feet above ground level without the announcement of a requisite "continue" from the MIP. The MC did not utilize the crew-briefed and AFMAN-directed low visibility approach words: "continue" (verbalized at the approach Decision Altitude (DA) indicating sufficient runway environment visual references), "runway in sight," (verbalized when enough visual cues are available for the MP's transition from instruments to visual cues), "visual," (verbalized by the pilot flying when transitioning from instruments to visual cues), and "go around," (verbalized by anyone if the conditions of "continue" are not met at or below the applicable decision height). The MC displayed human performance, judgment, and decision-making errors by not following established procedures, relying on an inadequate risk assessment, fixation, and failing in overall crew leadership. The lack of CRM and the MC's disregard for established low-visibility approach procedures and communication standards directly contributed to the MC's failure to perform the composite crosscheck, resulting in the MA descending through the authorized altitude and impacting the ground before the intended landing zone.

I find by a preponderance of the evidence that adverse weather conditions substantially contributed to the mishap. Specifically, degrading weather conditions interrupted the planned mission and favored a return to Rwy 13 instead of the anticipated Rwy 31 approach. The decision to fly the approach to Rwy 13 based on the better ceiling instead of the required visibility truncated the time for the return to base and unnecessarily induced a rushed and unauthorized approach to land. This was further complicated by poor visibility and wind shear. To mitigate the wind shear effect, the MP reduced the MA's power settings three times to maintain the proper airspeed. However, those corrections went unchecked due to the lack of proper crosscheck, resulting in an excessive sink rate and an unrecoverable condition. Icing conditions were present during the descent to land phase. However, there was insufficient evidence to determine the extent of its effect on the mishap. I also considered whether turbulence was a contributing factor, but based on the flight data and testimony, I conclude turbulence was not present during the mishap.

I find by a preponderance of the evidence that an ineffective flying operations supervision program substantially contributed to the mishap. Although the aircrew retains responsibility for adhering to all flight rules and restrictions, the Step FOX-3 (SFOX3) failed to highlight the airfield's status and hazards to the MC. The Mishap FOX-3 (MFOX3) lacked awareness and understanding that the current prevailing visibility values provided by the Weather Flight applied to Rwy 31 alone and not Rwy 13. Lacking awareness of the incomplete prevailing visibility conditions, the MFOX3 recommended an approach to Rwy 13, for which there was no valid weather observation. Using the Rwy 13 visibility observation, he mistakenly recommended an approach to a runway not authorized due to the Notice to Airmen (NOTAM)-directed increased visibility restrictions. The MFOX3 lacked awareness of the NOTAM due to an insufficient shift changeover and individual failure to review applicable airfield hazards and restrictions at the beginning of the shift. Additionally, the discretionary decision to conduct flying operations without a Supervisor of Flying (SOF) in the tower removed a critical layer of flying supervision. Undisciplined procedures by the SFOX3 and MFOX3 and the resulting lack of airfield hazard and restriction awareness, a misunderstanding of the observed weather conditions, and task saturation enabled a flawed recommendation to the FELON crews to attempt an unauthorized approach to a runway void of the required minimum visibility.

I find by a preponderance of the evidence that a lack of awareness of airfield conditions substantially contributed to the mishap. A significant degradation to the Rwy 13 weather sensing equipment went largely unnoticed across the 28th Bomb Wing for approximately two months preceding the mishap. Additionally, because of the lack of communication, there was a lost opportunity to publish a related NOTAM or update to Flight Information Publications. The FELON crews and both the SFOX3 and MFOX3 all stated they were unaware of any airfield weather sensor degradations. Even without being briefed on the degradation of weather sensors, there were missed opportunities to recognize it. The MC had access to Electronic Flight Bag data, which indicated no visibility observations for Rwy 13. Additionally, the MFOX3 had access to current Weather Flight visibility observations via the online Joint Environmental Toolkit, which also reflected missing sensor data. Collectively, the lack of degraded sensor awareness contributed to the FELON crews' decision to commence their approaches without valid weather observations for Rwy 13. Compounding the lack of awareness, the Tower Watch Supervisor did not execute cooperative weather watch procedures. The mishap Air Traffic Control Watch Supervisor noted that he had no visibility of the runway environment. He should have contacted the Weather Flight

or MFOX3 to note that his observation appeared worse than the reported 5/8 statute miles (SM) visibility, which the MC used when making their approach decision. Automated Terminal Information Service (ATIS) publishing was also delayed immediately preceding the mishap, which further reinforced the FELON crews' distorted weather mental model. Finally, while the policy does not require it, the Tower did not notify the Weather Flight when switching the approach lighting for the opposite direction approach. Switching the approach lighting also switched the weather equipment to the degraded Rwy 13 sensor, which required a manual visibility observation. Because the Weather Flight was not notified of the opposite direction approach, they did not perform the necessary manual visibility observation until after the FELON crews commenced their approaches and were still conducting their observation at the time of the mishap.

4. FINAL CONTRIBUTING FACTOR AND CONCLUSION

This investigation has shown that many failures leading to this mishap were not a one-time occurrence or an aberration. I have noted that the mishap occurred due to numerous factors, including a culture of noncompliance, widespread deviation from established policy and procedure, and several organizational influences and preconditions. The inability of the MC to conduct effective crosschecks and utilize proper CRM, along with the 34 BS's lack of effective flying operations supervision and the 28 OSS's failure to communicate airfield and weather capabilities and conditions, all speak to culture and leadership issues. After the Board's extensive investigation, I conclude the human factors causing and contributing to the 4 January 2024 mishap were not an aberration. Instead, they reflected broader trends within the 34 BS and 28 OSS. The 34 BS and 28 OSS lacked proper supervision, which set the conditions for individual causal acts and the overall mishap circumstances and events. I find by a preponderance of the evidence that these leadership and climate issues directly contributed to the mishap.

Throughout its investigation, the Accident Investigation Board found unsatisfactory levels of basic airmanship, an inadequate focus on foundational governing directive knowledge, and an overall lack of discipline throughout the 34 BS. Throughout 16 interviews with squadron assigned and attached aviators, I discovered improper understanding and application of the AFMAN 11-202, Vol. 3, Air Force Global Strike Command Supplement, *Flight Operations*, cold weather altitude corrections. None of the eight FELON crewmembers recognized or applied the required procedures, resulting in a lower-than-authorized instrument approach DA. Additionally, nearly all the aviator interviews revealed an insufficient understanding of current landing restrictions, specifically the NOTAM for Rwy 13, which increased the visibility requirements. Neither FELON crew adhered to the restriction, leading to both crews commencing an approach without the required visibility. The 34 BS/Commander (CC) stated that he knew of the NOTAM, but he opined the paint reflectivity "probably [does] not play that big of a role." The 34 BS/Director of Operations (DO) stated that he was also aware of the restriction. However, he stated the paint reflectivity issue was something that he did not fully understand. Both FELON crews testified that they flew their missions without briefing or knowledge of the NOTAM. The one outlier was the MIP, who testified that he knew the restriction. However, he failed to recognize the MC did not have the weather to commence the approach under the NOTAM and permitted the MC to commence an unauthorized approach. Aircrew interviews also revealed that no one in the 34 BS understood the current weather sensing capabilities on the airfield, which contributed to both

FELON aircrews commencing an approach without obtaining a valid prevailing visibility for the requested runway.

I also discovered a willful and accepted disregard for AFMAN 11-202, Vol. 3 Air Force Global Strike Command Supplement, *Flight Operations*, para 3.6.8. procedures, specifically the use of required Aircrew Flight Equipment (AFE). The 34 BS/DO and seven additional assigned and attached aviators testified of a known culture throughout the 34 BS where crewmembers, specifically Weapon Systems Officers (WSO), willfully disregard AFE requirements by not wearing gloves and helmets when flight conditions require. When questioned under oath, the MDSO freely admitted that in the seconds leading up to the mishap, he was referencing his After Landing Checklist instead of correcting the MOSO's aircrew discipline dereliction and not fulfilling his landing crosscheck duties. Additionally, the MIP, the most senior aviator on the MA, appears to have exceeded the maximum weight for the B-1B as an ejection seat aircraft. The MIP's medical record investigation revealed that the MIP's weight was near or above the 245 lbs limit leading up to the mishap. The MIP's records from shortly after the mishap document a weight of nearly 260 lbs. I believe the MIP's weight directly contributed to his ejection injuries, which were inconsistent with the rest of the MC's injuries. The fact that the MIP flew the MA while apparently exceeding the maximum weight further highlights the unit's degradation of culture and discipline. Interviews with the 34 BS operations supervision revealed widespread inadequate risk management practices. The 34 BS/DO stated that the squadron assumes a contingency wartime risk acceptance level when participating in regularly scheduled bomber task force missions. Additionally, when asked how the squadron assesses Operational Risk Management (ORM) for training missions, he replied that artificiality is built into the process, which often gets peeled back once a crew gets airborne. Aircrew interviews revealed a flawed risk assessment foundation underpinning all home-station operations. The 34 BS/CC and 34 BS/DO stated that FOX-3, combining the SOF and Operations Supervisor (Top-3), is the squadron's default scheduling solution. The 34 BS lacks a Top-3 shift changeover checklist, relying solely on the SOF Quick Reaction Checklist, which lacks any squadron-specific consideration items. The FOX-3 operating construct removes a layer of operations supervision, specifically the trained eyes and ears of an experienced B-1B aviator in the Air Traffic Control (ATC) tower. The 34 BS/CC also defers the responsibility for FOX-3 scheduling and oversight to the squadron's scheduling and training flights without any command-level consideration for environmental or experience factors. The 34 BS/CC stated that by default, all squadron Top-3s are assumed qualified to perform FOX-3 duties. At the time of the mishap, the 34 BS/DO testified that he was focused primarily on administrative office work despite the deteriorating weather conditions and an additional two crews attempting to receive a step brief, all while knowing that he had a junior, non-instructor pilot performing FOX-3 duties. Moreover, there is no established 34 BS procedure to verify FOX-3 currency, despite the local guidance directing otherwise, which enabled a non-current FOX-3 to brief and step both FELON crews contrary to AFI 11-418, Ellsworth Air Force Base Supplement, *Operations Supervision*, para. 2.4.2.12.

The organizational structure in the 28 OSS fostered inadequate supervision, an inability to identify and communicate airfield hazards properly, and the 28 OSS/CC's inability to recognize and control risk properly. Most of the squadron's Assistant DO (ADO) positions, typically occupied by senior Company Grade or Field Grade Officers, were unfilled due to higher priority positions outside the OSS, which forced decision-making authority downward to flight commanders and Senior Non-


Commissioned Officers (SNCOs). The 28 OSS/CC underestimated the impact caused by the leadership vacuum and stated that several manning decisions resulted in an overall loss of leadership and the severing of connective tissue across his stovepiped flights.

Approximately two months before the mishap, the weather sensor for Rwy 13 became degraded, and the system could no longer observe prevailing visibility. The degradation went largely unnoticed across the 28 BW until shortly after the mishap. The Ellsworth ATC Tower had some awareness only because of an informal agreement with the Weather Flight to activate the working sensor during airfield closures, which would eliminate the requirement for periodic manual visibility observations. FELON 01 and the MC's coordination for an opposite-direction approach to Rwy 13 necessitated a manual visibility observation. The 28 OSS lacked a procedure directing timely coordination with on-duty weather forecasters for such an instance, which resulted in inaccurate and incomplete weather observations for the approach. Additionally, the Tower Watch Supervisor did not pass on his observations, and the 28 OSS/CC was unaware of the requirement to pass along observations if they were inconsistent with published, automated observations. Had this information been relayed to the MC, they would have reconsidered their decision to land on Rwy 13 by querying for additional weather data.

The preponderance of the evidence revealed an ineffective and unhealthy culture, which directly contributed to the mishap. Specifically, the 34 BS' overall lack of discipline, inadequate focus on basic airmanship skills, and failure to properly identify and mitigate risk, coupled with the 28 OSS's ineffective communication, inadequate program management, and lack of supervisory oversight, set conditions that allowed this mishap to occur by directly leading to the mishap's cause and its three non-weather-related substantially contributing factors.

I have found a preponderance of the evidence that the MC's lack of a composite crosscheck was the main cause of the mishap. The MC's lack of effective CRM was substantially contributing. Moreover, unsatisfactory levels of basic airmanship, inadequate focus on foundational governing directive knowledge, and an overall lack of discipline throughout the 34 BS, as well as inadequate supervision, inability to properly identify and communicate airfield hazards, and the 28 OSS/CC's inability to recognize and control risk rose to the level of being substantially contributing to the mishap. Additionally, adverse weather conditions, an ineffective flying operations supervision program, and a lack of awareness of airfield conditions also contributed substantially to the mishap.

3 JULY 2024


ERICK D. LORD, Colonel, USAF
President, Accident Investigation Board

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