DEPARTMENT OF THE AIR FORCE

PACIFIC AIR FORCES

Joint Base Pearl Harbor-Hickam, Hawaii

OCT 1 1 2011

MEMORANDUM FOR HQ PACAF/JA

FROM: PACAF/CC

ACTION OF THE CONVENING AUTHORITY

The report of the accident investigation board, conducted under the provisions of AFI 51-503, *Aerospace Accident Investigations*, that investigated the 29 July 2011 mishap at Kunsan Air Base, Korea, involving two F-16CM aircraft, T/N 90-0717 and 90-0703, assigned to the 8th Fighter Wing, Kunsan Air Base, Korea complies with applicable regulatory and statutory guidance. Accordingly, the report is approved.

GARY L. NORTH
General, USAF
Commander

EXECUTIVE SUMMARY AIRCRAFT ACCIDENT INVESTIGATION

F-16CM, T/N 90-0717 AND 90-0733
KUNSAN AIR BASE, REPUBLIC OF KOREA
29 JULY 2011

On 29 July 2011, at approximately 0700 hours local time (L), an F-16CM, tail number 90-0717 (MA1) assigned to the 80th Fighter Squadron (FS), 8th Fighter Wing (FW), Kunsan Air Base (AB), Republic of Korea (ROK), ran into F-16CM, tail number 90-0733 (MA2) also assigned to the 80 FS. The pilot of MA1, Mishap Pilot 1 (MP1), failed to notice MA2 had stopped in front of him until immediately prior to impact. After the impact, both aircraft were shut down and both pilots egressed. There were no injuries or fatalities. Both mishap aircraft were damaged.

MP1 (a Captain assigned to the 35 FS) was number four in a flight of four F-16s flying a training mission as part of an 8 FW Operational Readiness Exercise (ORE). While taxiing to the runway for takeoff on the first of three scheduled sorties for the day, the first aircraft of the four-ship (Mishap Flight Lead (MFL)) stopped on the taxiway as part of a standard check of the Radar Warning Receiver (RWR). The second and third aircraft in the four-ship stopped behind the first. However, MP1 was accomplishing additional aircraft systems checks while taxiing and failed to notice the aircraft in front of him had stopped. When MP1 realized the aircraft in front of him had stopped, it was too late to avoid colliding with MA2.

MA1 received extensive damage totaling $2,041,997.17. This included damage to the nose cone, nose radome, FCR antenna, targeting pod, forward fuselage, bulkhead, canopy, equipment bay door and side access door. MA2 received damages totaling $589,321.74, including damages to the wing box assembly, horizontal stabilizer, fuel tank, pylon assembly, and targeting pod. There was no damage to private property or any other aircraft. The total cost to the US government is $2,631,318.91.

The board president found, by clear and convincing evidence, the cause of the mishap was negligence by MP1. MP1 suffered a breakdown in his visual scan resulting in a failure to properly monitor his aircraft's position relative to the aircraft in front of him. MP1 also experienced task mis-prioritization and channelized attention. These factors were determined by the board to be causal in this mishap. The board found overconfidence and excessive motivation to succeed to be contributory factors in this mishap.

SUMMARY OF FACTS AND STATEMENT OF OPINION
F-16CM, T/N 90-0717 and 90-0733
29 JULY 2011

TABLE OF CONTENTS

COMMONLY USED ACRONYMS AND ABBREVIATIONS

AB	Air Base
AF	Air Force
AFB	Air Force Base
AFE	Air Flight Equipment
AFI	Air Force Instruction
AFMES	Armed Forces Medical Examiner System
AGL	Above Ground Level
AIB	Accident Investigation Board
BACU	Brake/Anti-Skid Control Unit
BSD	Battle Staff Directive
DED	Data Entry Display
DO	Director of Operations
DoD	Department of Defense
ECM	Electronic Counter Measures
EOR	End of Runway
EPU	Emergency Power Unit
FDP	Flight Duty Period
FL	Flight Lead
FRC	Fault Reporting Codes
FS	Fighter Squadron
ft	Feet
FW	Fighter Wing
GBU	Guided Bomb Unit
G-EX	Gravitational Force Awareness Exercise
GO	General Order
GPS	Global Positioning System
HAS	Hardened Aircraft Shelter
HFACS	Human Factors Analysis and Classification System
HUD	Heads Up Display
IAW	In Accordance With
IP	Instructor Pilot
JDAM	Joint Direct Attack Munition
kts	Knots
L	Local
LFE	Large Force Exercise
MA	Mishap Aircraft
MAJCOM	Major Command
MCC	Mishap Crew Chief
MF	Mishap Flight
MFL	Mishap Flight Lead
MMC	Modular Mission Computer
MP	Mishap Pilot
MQT	Mission Qualification Training
MS	Mishap Sortie
NAF	Numbered Air Force
NOTAMS	Notices to Airmen
ORE	Operational Readiness Exercise
ORI	Operational Readiness Inspection
PACAF	Pacific Air Forces
PHA	Preventative Health Assessment
PIC	Pilot in Command
QC	Quality Control
ROK	Republic of Korea
RWR	Radar Warning Receiver
SAR	Search and Rescue
SMS	Storage Management System
SOF	Supervisor of Flying
T/N	Tail Number
TOT	Time on Target
UFC	Up Front Controls
UPT	Undergraduate Pilot Training
VDO	Vault Duty Officer

The above list was compiled from the Summary of Facts, the Statement of Opinion, the Index of Tabs, and Witness Testimony (Tab V).

SUMMARY OF FACTS

1. AUTHORITY AND PURPOSE

a. Authority

On 8 August 2011, in accordance with AFI 51-503, *Aerospace Accident Investigations*, and the Pacific Air Forces supplement thereto, General Gary L. North, Commander Pacific Air Forces (PACAF), Convened an Accident Investigation Board (AIB) to examine the 29 July 2011 crash of two F-16CM aircraft, serial numbers (S/N) 90-0717 (Mishap Aircraft 1 (MA1)) and 90-0733 (Mishap Aircraft 2 (MA2)), on Kunsan Air Base (AB), Republic of Korea (ROK). (Tab Y-1) On 10 August 2011, General North signed an amendment to the original Convening Order, replacing the originally appointed Board President with Colonel Matthew R. Dana. The previously appointed Legal Advisor and Recorder remained the same. (Tab Y-2) On 17 and 19 August, respectively, amended Convening Orders were issued appointing a Medical Member and a Pilot member to the board. (Tab Y-3 and Y-4) The investigation was conducted at Kunsan AB, ROK, from 31 August 2011 through 9 September 2011.

b. Purpose

This is a legal investigation convened to inquire into the facts surrounding the aircraft or aerospace accident, to prepare a publicly releasable report, and to gather and preserve all available evidence for use in litigation, claims, disciplinary actions, administrative proceedings, and for other purposes.

2. ACCIDENT SUMMARY

MA1 impacted MA2 on the ground while taxiing on Kunsan AB taxiway P (Papa) (Tab R-4). The aircraft were preparing for takeoff when the accident occurred. (Tab R-4) MA2 had stopped on the taxiway awaiting a final check of its Radar Warning Receiver (RWR). (Tab R-4) MA1 failed to stop after MA2 came to a stop, and MA1 collided with MA2. (Tab V-1.6) The pilots of both aircraft were uninjured and safely exited the aircraft after the mishap (Tab R-4). Both aircraft were damaged with the combined loss valued at $2,631,318.91. (Tab P-6) MA1 received extensive damage totaling $2,041,997.17, including damage to the nose cone, nose radome, FCR antenna, targeting pod, forward fuselage, bulkhead, canopy, equipment bay door and side access door. (Tab P-5) MA2, received damages totaling $589,321.74, including damage to the wing box assembly, horizontal stabilizer, fuel tank, pylon assembly, and targeting pod. (Tab P-6) There was no damage to private property or any other aircraft. There were no civilian casualties. There has been no media interest.

3. BACKGROUND

a. Major Command (MAJCOM)

Pacific Air Forces, with headquarters at Hickam Air Force Base (AFB), Hawaii, is a MAJCOM of the U.S. Air Force (AF) and is the air component of the U.S. Pacific Command.

PACAF's primary mission is to provide U.S. Pacific Command integrated expeditionary AF capabilities to defend the homeland, promote stability, dissuade/deter aggression, and swiftly defeat enemies.

The command's vision is to bring the full power of America's AF and the skill of its Airmen to promote peace and stability in the Asia-Pacific region.

PACAF's area of responsibility extends from the west coast of the United States to the east coast of Africa and from the Arctic to the Antarctic, covering more than 100 million square miles. The area is home to 50 percent of the world's population in 36 nations and over one-third of the global economic output. The unique location of the Strategic Triangle (Hawaii-Guam-Alaska) gives our nation persistent presence and options to project U.S. airpower from sovereign territory. (Tab BB-1.1)

b. Unit Information

(1) Numbered Air Force (NAF)

Seventh Air Force (7 AF) headquartered at Osan AB, ROK, is one of four numbered Air Forces in PACAF. Organizations assigned to 7 AF include the 51st and 8th Fighter Wings, and the following direct reporting units: 607th Air Operations Group, 607th Air Intelligence Group, 607th Air Support Operations Group, 607th Air Support Group, 607th Air Communications Squadron, 554th RED HORSE Squadron and 607th Training Squadron.

The mission of 7 AF is to plan and direct air component operations in the ROK and in the Northwest Pacific in support of U.S. Pacific Command, United Nations Command, U.S. - ROK Combined Forces Command and U.S. Forces Korea. The numbered air force develops the total air campaign and reinforcement plans for ROK defense and sustains mission readiness of 117 operational units and 8,300 U.S. AF personnel. (Tab BB-2.1)

(2) Wing

The 8th Fighter Wing (8 FW) is the host unit at Kunsan AB, and consists of more than 2,600 active duty personnel, four groups and 15 squadrons, including two F-16 fighter squadrons. The mission of the 8 FW is to defend the base, accept follow-on forces, and take the fight north. The 8 FW plans, supports, and executes military operations to include counter air, interdiction, and close air support.

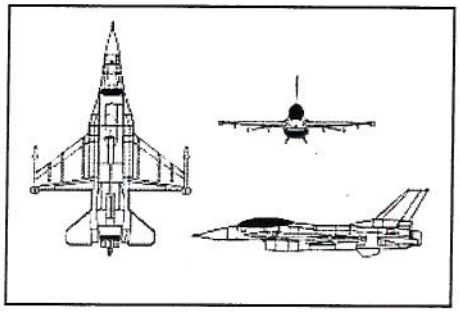
The 8th Operations Group provides the aircrews who fly the wing's F-16 Fighting Falcon aircraft, and is comprised of the 35th and 80th Fighter Squadrons, as well as the 8th Operational Support Squadron. The 8th Mission Support Group consists of five squadrons that support the base with civil engineering, communications, base defense, logistic readiness and force support. The 8th Maintenance Group provides on- and off-equipment maintenance on Kunsan's F-16 Fighting Falcons. The group also provides munitions, aircraft maintenance and maintenance operations support. The 8th Medical Group offers outpatient services including family practice, dental, internal medicine, aerospace medicine, physical therapy, and optometry. (Tab BB-3.1)

(3) Squadron

The 35th Fighter Squadron (35 FS), nicknamed "Pantons," is one of two fighter squadrons assigned to the 8 FW at Kunsan AB, ROK. The Pantons perform both air-to-ground and air-to-air missions in support of Pacific theater taskings and operations. The 35 FS employs the Block 40 variant of the F-16, equipped with avionics, sensors, and weapons that give it a day and night, all-weather employment capability. (Tab BB-4.1)

c. Aircraft

The F-16 Fighting Falcon is a compact, multi-role fighter aircraft. It is highly maneuverable and has proven itself in air-to-air combat and air-to-surface attack. It provides a relatively low-cost, high-performance weapon system for the U.S. and allied nations. Since September 11, 2001, the F-16 has been a major component of the combat forces, flying thousands of sorties in support of Operations NOBLE EAGLE (Homeland Defense), ENDURING FREEDOM in Afghanistan, and IRAQI FREEDOM. (Tab BB-6.1)



4. SEQUENCE OF EVENTS

a. Mission

The Mishap Sortie (MS) was scheduled as part of an 8 FW Operational Readiness Exercise (ORE) on 29 July 2011. (Tab V-1.3) The sortie was planned and briefed as a four-ship air interdiction sortie as part of a Large Force Exercise (LFE) package. (Tab V-1.4) The package included F-16s and F-15Es, including 2 F-15Es simulating adversary aircraft. (Tab V-1.4) The mission was planned to simulate delivering two GPS guided munitions on the western range complex in the ROK. (Tab V-1.4) MP1 was number four in the four-ship. (Tab V-1.4) Mishap Pilot 2 (MP2) was number three in the four-ship. (Tab V-1.4)

b. Planning

Because there is limited time to conduct briefings during an ORE, all members of the squadron participating in the ORE received a brief the week prior to the ORE on the administrative

portions of the missions. (Tab V-1.8) This brief covered items such as the standard start, taxi, and ground check procedures, as well as departure and recovery procedures, and special interest items. (Tab V-1.8, TAB AA-1.1) An experienced squadron Instructor Pilot conducted this brief. (Tab AA-1.1)

As part of the ORE scenario, pilots were bused from their dorms to the squadron facility each day. (Tab V-1.3) MP1 and other squadron members were picked up at 0515 local time (L) at their dorm building and arrived at the squadron approximately 10 minutes later. (Tabs R-3, V-1.3) After arriving at the squadron, the mishap flight (MF) members donned their flight gear, retrieved their M-9 weapons from the Aircrew Flight Equipment (AFE) section, and received their mission materials for the three sorties they were to fly that day. (Tab V-1.3 - V-1.4) At 0530L, the MF attended the mass brief for all the day flyers. (Tab V-1.4) This brief consisted of a review of exercise Battle Staff Directives (BSDs), the weather and applicable Notices to Airmen (NOTAMS), airfield status, a review of the flying schedule, as well as intelligence and package briefings for the missions to be flown. (Tab V-1.4, Tab AA-2.1) The brief was conducted by a qualified squadron supervisor (pilot) referred to as the "Top-3". (Tab V-1.4) The term "Top-3" is used to describe any of the individuals occupying one of the top three leadership positions in the squadron. These positions include the director of operations, the assistant directors of operations, or the flight commanders.

Following the mass brief, the MF conducted their own flight brief reviewing the details of their specific missions. (Tab V-1.4) Here the flight reviewed all their mission materials, briefed the sequence of events for the flights, and studied and briefed their specific targets and tactics. (Tab V-1.4) Although very time constrained compared to a normal training mission, these flight-planning procedures were standard for ORE sorties.

c. Preflight

At approximately 0605L, the MF received their "step brief" from the Top-3. (Tab R-3) Here they received updated weather and airfield status information, were assigned their specific jets, verified their flight plans, and received updates on the exercise status. There were no non-standard factors briefed at this time. (Tab AA-3.1) MP1 arrived at his aircraft at approximately 0610 and found the Mishap Crew Chief (MCC) was receiving a shift change brief from the outgoing crew chief. (Tab V-1.9) This delayed MP1 from beginning his preflight procedures for approximately five minutes. (Tab V-1.9) However, MP1 stated he was able to start his aircraft at the scheduled time. (Tab V-1.9)

After engine start, MP1 accomplished all his normal ground checks, including aircraft system power-ups and checks, loading mission data into the Modular Mission Computer (MMC), and verifying target coordinates and simulated weapons status. (V-1.4) After accomplishing all normal pre-taxi checks, the aircraft was "armed" at its parking location. (Tabs V-1.4, BB-5.3) Normally aircraft are armed at the end of the runway just prior to takeoff. (Tab BB-5.3) However, as part of 8 FW standard ORE procedures, aircraft are armed in their parking location prior to taxi. (Tab BB-5.3) Arming an aircraft prior to launch simply involves removing safety pins from the chaff and flare dispenser as well as any actual ordnance (if carried).This operation

typically takes less than 5 minutes per aircraft. MA1 reported he was ready to go at the scheduled taxi time. (Tab V-1.9)

Prior to takeoff, pilots are required to do what is referred to as a "tape title." (Tab V-1.8) During a tape title, the pilot will activate his video and audio recording equipment and confirm certain data for the mission. This includes the date, the pilot's name, the tail number of the aircraft, the mission type and the simulated (or actual) ordnance for the mission, the scheduled "Time Over Target" (TOT) for the mission, and the specific coordinates for the target to be struck. (Tabs BB-5.2, V-1.5) During normal training sorties, the 8 FW local procedures state the tape title is to be done at the End of the Runway (EOR) just prior to takeoff. (Tab BB-5.2) These procedures were briefed prior to the ORE as "standard", and the importance of doing the tape title was emphasized. (Tab V-1.8) (If a pilot fails to properly title his tape, the pilot and squadron are not given credit for a successful mission, regardless of the pilot's performance in the air. This information is derived from 8 FW exercise evaluations that are not releasable to the public but that were reviewed by the AIB president) Because of this, MP1 stated he chose to begin his tape title prior to taxi. (Tab V-1.10) At 0650L, the flight lead initiated the "check in" and called for taxi. (Tab V-1.4) MP1 stated he did not feel behind at this time and was ready for taxi at check in. (Tab V-1.9)

d. Summary of Accident

The MF began taxiing at approximately 0655L. (Tab V-1.4) The route of taxi was from the south loop, to taxiway C (Charlie), to taxiway P (Papa), to runway 18 (the north end of the airfield, see Figure 1). (Tab R-4) The standard spacing between aircraft while taxiing during the day is 150 feet. (Tab BB-5.2) After the turn from taxiway C to taxiway P, MP1's spacing behind MP2 was between 150 and 200 feet. (Tab V-1.4, R-4) After turning from taxiway C to taxiway P, MP1 stated he resumed his tape title. (Tab V-1.5) As part of the tape title procedure, MP1 compared the target coordinates listed on his mission data card to the coordinates loaded into the aircraft's MMC, which is displayed on a screen just above the pilot's right knee. (Tab V-1.5)

As per the ORE instructions, RWR checks were to be accomplished at the north end of taxiway P while taxiing en route to the runway. (Tab BB-5.2) In accordance with (IAW) local procedures, pilots are to stop for the RWR checks if so signaled by the marshaler. (Tab BB-5.2-5.3) While MP1 was checking his coordinates, he noticed the flight approaching the RWR check area, but stated he felt he had enough time to complete this task prior to reaching the RWR check area. (Tab V-1.6)

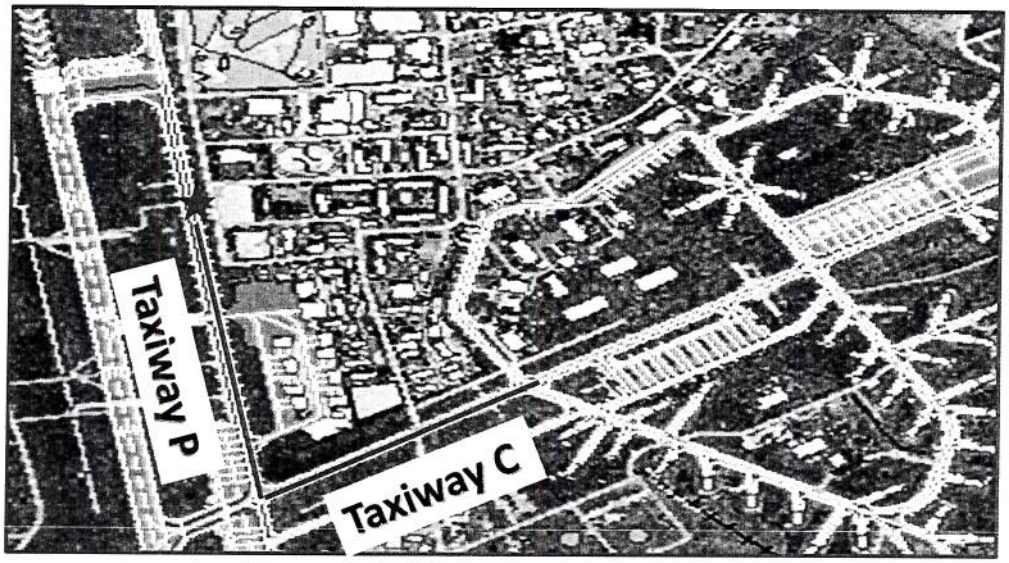


Figure 1. Mishap Flight route of taxi.

MP1 stated he checked the first of four sets of target coordinates, and then looked up to verify his taxi path and spacing. (Tab V-1.6) MP1 stated he then looked down to confirm the remaining three coordinate sets. (Tab V-1.6) He stated he did not re-verify his spacing or taxi path while checking the final three coordinate sets, but examination of the video from his Heads Up Display (HUD) tape shows minor course corrections during this time, with the last noticeable correction occurring 6 seconds prior to impact. (Tab V-1.6) It should be noted the board could not confirm this change in direction was caused by pilot input vice normal drift while taxiing.

As the Mishap Flight Lead (MFL) reached the RWR check area, he stopped his taxi to allow the ground crew to complete the check. (Tab R-4) Numbers 2 and 3 of the flight stopped behind the MFL. (Tab R-4) MP1 stated after he finished checking his last coordinate set, he looked up a split second prior to impact. (Tab V-1.6) He immediately applied full brakes while simultaneously impacting MA2. (Tab V-1.6) MA1 impacted the left rear of MA2 at 06:59:20L, causing extensive damage to MA1. (Tabs V-1.6, P-6) MA1 stopped 63 feet from the point of first brake application. (Tab S-3, see Figure 2).

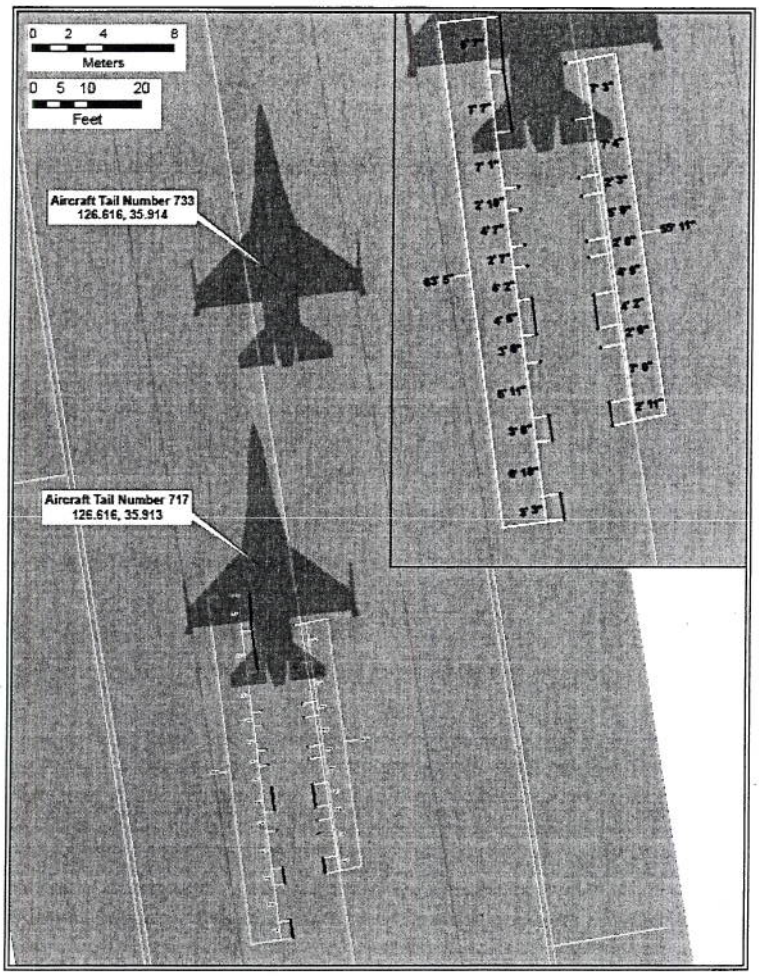


Figure 2. Diagram of aircraft post collision with skid marks.

After the impact, MP1 and MP2 shut down their respective aircraft and did a normal ground egress. (Tabs V-1.6, R-5) Neither pilot sustained any injuries. (Tabs V-1.6, R-5)

e. Impact

The aircraft came to rest approximately 500 feet from the north end of taxiway P at 06:59:25L. (See Figure 3) Both MA1 and MA2 remained on the taxiway after the impact. (Tab S-3)

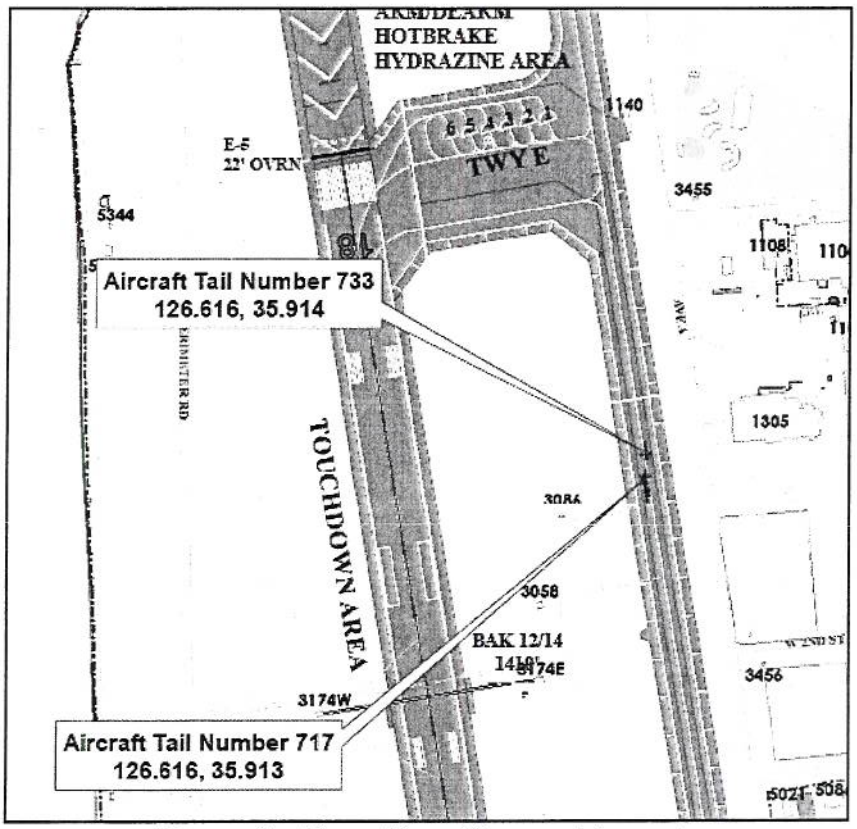


Figure 3. Aircraft position post impact.

f. Egress and Aircrew Flight Equipment (AFE)

AFE was determined by the AIB to not be a factor and therefore was not included in the investigation.

g. Search and Rescue (SAR)

At 07:00:00, MP1 informed MFL of the collision. (Tab V-4) At 07:00:43, MFL told the control tower ground controller of the collision. (Tab CC-1.3) At 07:01:16, the control tower ground controller stated they "are rolling the trucks." (Tab CC-1.3) At 07:05:00, the rescue crews report to the control tower they are on the scene and assuming command of the situation. (Tab CC-1.5) By 07:15:00, both mishap aircraft had been shut down and the pilots had exited their aircraft. (Tab CC-1.8) There were no issues with shutdown and no rescue operations performed.

h. Recovery of Remains

This section not applicable.

5. MAINTENANCE

a. Forms Documentation

A detailed review of maintenance records and forms revealed no evidence of mechanical, structural, or electrical issues with either mishap aircraft that could have contributed to this mishap or that were relevant to the accident investigation. (Tab D-3 through D-4, D-6 through D-37, D-40, and D-42)

b. Inspections

The last scheduled inspection of MA1 was a 400-hour phase inspection performed on 7 March 2011. (Tab D-3) The last scheduled inspection of MA2 was a 400-hour phase inspection performed on 1 December 2009. (Tab D-4) The AIB determined there were no maintenance inspection issues that could have contributed to this mishap or that were relevant to the accident investigation.

c. Maintenance Procedures

The AIB determined there were no maintenance procedures, practices, or performance issues that could have contributed to this mishap or that were relevant to the accident investigation. (Tab D-6 through D-37, D-40, D-42)

d. Maintenance Personnel and Supervision

The AIB determined maintenance was not a factor, so maintenance training records are not included. (Tab G-46)

e. Fuel, Hydraulic and Oil Inspection Analyses

The AIB determined there were no issues related to fuel or oil that could have contributed to this mishap or that were relevant to the accident investigation (Tab J-7 through J-13). Hydraulic fluid was examined as a potential cause of the mishap. Details of the hydraulic fluid analysis are presented in paragraph 6 B. (2).

f. Unscheduled Maintenance

The AIB determined there were no unscheduled maintenance issues that could have contributed to this mishap or that were relevant to the accident investigation. (Tab D-6 through D-37, D-40, D-42)

6. AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS.

a. Structures and Systems

The two structures/systems considered relevant to this mishap were the Brake/Anti-Skid Control Unit (BACU) and the hydraulic fluids from MA1. (Tab I-3 through I-6, J-7 through J-13)

b. Evaluation and Analysis

(1) Brake System Analysis

The recovered BACU from MA1 was sent to the 524th Maintenance Wing electronic shop at Hill AFB for testing and evaluation. A "Fault 32" was recorded, which occurs when there is a difference in the redundant brake pedal signals, seen by each channel of the BACU. (Tab J-3) After analysis of the data and photographs provided, it was determined this fault occurred upon aircraft impact and was not a factor in the mishap. (Tab J-3) The MA1 BACU was operating within the design specification envelope and was determined to be functioning properly. (Tab J-3)

(2) Hydraulic Fluid Analysis

Five hydraulic fluid samples from MA1 were tested by the Air Force Petroleum Laboratory and passed or were within the maximum allowable limit. It was determined both A and B hydraulic systems on MA1 were free of contaminants and particulates. (Tab J-7)

7. WEATHER

a. Forecast Weather

At brief time, the weather for takeoff was forecasted to be a scattered cloud layer at 1,300 feet (ft) above ground level (AGL), with a broken cloud layer at 6,000 ft AGL. (Tab F-5) The forecast predicted seven statute miles visibility, and winds out of the south, 190 degrees at 6 knots (kts). (Tab F-5)

b. Observed Weather

At the time of the mishap, the current observation reported winds out of the south, 190 degrees at 10 kts, with unrestricted visibility. (Tab F-12) The observation reported few clouds at 1,600 ft AGL, and a temperature of 26 degrees Celsius. (Tab F-12) The runway condition at the time of the mishap was reported as dry. (Tab F-15)

c. Space Environment

Not applicable.

d. Operations

Based on the observation and forecast, the weather was well within limits for the sortie.

8. CREW QUALIFICATIONS

a. Mishap Pilot

MP1 was an experienced pilot with over 1234 total hours of Pilot in Command (PIC) time. (Tab G-4) The bulk of his previous flying time was in the T-38C as an Undergraduate Pilot Training (UPT) flight instructor. (Tab G-4) MP1 began his transition to the F-16 in December of 2009 when he started the Introduction to Fighter Fundamentals course (Tab T-1.1). In January of 2010, MP1 started F-16 training at Luke AFB, Arizona. (Tab T-2.1) He completed this training in December of 2010, graduating number 2 of 15 in his class, and was recognized as a Distinguished Graduate. (Tab T-2.1) MP1 Arrived at Kunsan AB, ROK in March of 2011 and had his first Mission Qualification Training (MQT) flight on 28 March 2011. (Tab T-3.1 – T-3.2) MP1 finished the MQT course with a zero discrepancy Initial Mission Check Ride on 6 May 2011. (Tab G-39) At the time of the mishap, MP1 had a total of 154.2 hours of Primary PIC time in the F-16. (Tab G-4) Despite his extensive time in the T-38, the lack of F-16 time categorized MP1 as "inexperienced." (Tab G-4) This was MP1's first experience flying in an ORE. (Tab V-1.7)

MP1's recent flight time is as follows (Tab G-5):

	Hours	Sorties
Last 30 Days	16.7	13
Last 60 Days	27.4	26
Last 90 Days	43.9	40

MP qualifications were not contributory to this mishap.

MP2 was a highly experienced F-16C instructor pilot with over 1970 F-16 hours. (Tab G-21) None of MP2's training or experience were deemed to be factors in this mishap.

MP2's recent flight time is as follows (Tab G-22)

	Hours	Sorties
Last 30 Days	9.5	5
Last 60 Days	17.6	13
Last 90 Days	19.9	15

9. MEDICAL

a. Qualifications - Mishap Pilots

The AIB Medical Member verified MP1 and MP2 were both medically qualified for flight duties at the time of the aircraft mishap. Both members had completed their initial base clearances and annual Flight Preventive Health Assessments. Neither member had medical conditions deemed contributory to the accident.

b. Health

A post aircraft mishap Medical Examination was performed on 29 July 2011. (Tab X-1) The mishap pilot did not suffer any injuries during the mishap and was reported to be in excellent health. (Tab X-2) Prior to the mishap, MP1 reported sleeping well. (Tab V-1.8) MP1 had been taking Claritin for allergies without adverse symptoms for three years while flying. (Tab V-1.10)

c. Pathology

There were no deaths involved with the mishap, therefore no autopsies were performed. The AIB Medical Member reviewed the results of both the local and Armed Forces Medical Examiner System (AFMES) toxicology reports and confirmed all lab results were within normal limits. Blood work was negative for alcohol or narcotics that could have contributed to this mishap. The results of the toxicology tests done have been made a part of MP1 permanent medical records and are not included as a tab to this report.

d. Lifestyle

The AIB determined no lifestyle factors were relevant to the mishap.

e. Crew Rest and Crew Duty Time

In accordance with Air Force Instruction (AFI) 11-202 Volume 3, *General Flight Rules*, paragraph 9.8, Crew Rest, aircrew require at least 10 continuous hours of restful activities (including an opportunity for at least 8 hours of uninterrupted sleep) during the 12 hours immediately prior to the Flight Duty Period (FDP). MP1 stated he had adequate crew rest for the 72 hours leading up to the aircraft mishap. (Tab V-1.8) MP1 stated he had been working 12 hour shifts from 0515 – 1715. (Tab V-1.8) Based on this, the board determined prior to the mishap MP1 met all crew rest requirements.

10. OPERATIONS AND SUPERVISION

a. Operations

The 35 FS had a normal operations tempo for an ORE. By its nature, an ORE has a significantly higher short-term operations tempo compared to a normal training tempo. However, nothing in this ORE was inconsistent with other OREs conducted at Kunsan AB. (This information is derived from 8 FW exercise evaluations that are not releasable to the public but were reviewed by the AIB president) There was nothing in the operations tempo in the previous 3 months that was significant to the mishap. (This information is derived from 8 FW flying schedules that are not releasable to the public but were reviewed by the AIB president)

b. Supervision

The AIB found no fault with the level of supervision in the squadron. The squadron conducted briefings on the operations prior to the exercise, and provided and updated guidance on the

missions. (Tab AA-1) The Top-3 provided two briefs to the pilots prior to the flight. (Tab V-1.4) Although inexperienced, MP1 was paired with an experienced instructor for this sortie. (Tab V-1.4)

11. HUMAN FACTORS

AFI 91-204, *Safety Investigations and Reports,* 24 September 2008, Attachment 5, contains the Department of Defense Human Factors Analysis and Classification System (DoD HFACS), which lists potential human factors that can play a role in aircraft mishaps. (Tab BB-5) AFI 91-204 provides a model designed to present a systematic, multidimensional approach to error analysis for accident investigation. The DoD HFACS is a systematic and comprehensive tool that is comprised of a list of potential human factors that can be contributory or causal to a mishap. The DoD HFACS classification taxonomy describes four main tiers of human factors: Acts, Preconditions, Supervision, and Organizational Influences. Each of these tiers is briefly described below:

> **"Acts"** are those factors that are most closely tied to the mishap, and can be described as active failures or actions committed by the operator that result in human error or unsafe situation.
>
> **"Preconditions"** are factors in a mishap if active and/or latent preconditions such as conditions of the operators, environmental or personnel factors affect practices, conditions or actions of individuals and result in human error or an unsafe situation.
>
> **"Supervision"** is a factor in a mishap if the methods, decisions or policies of the supervisory chain of command directly affect practices, conditions, or actions of individual and result in human error or an unsafe situation.
>
> **"Organizational Influences"** are factors in a mishap if the communications, actions, omissions or policies of upper-level management directly or indirectly affect supervisory practices, conditions or actions of the operator(s) and result in system failure, human error or an unsafe situation.

a. Causal

The following human factors were relevant and considered causal to this mishap:

(1) AE105 Breakdown in Visual Scan

Breakdown in Visual Scan is a factor when the individual fails to effectively execute learned / practiced internal or external visual scan patterns leading to unsafe situation. (AFI 91-204)

MP1 was not alternating between his internal and external scans of his environment with the necessary frequency to maintain a safe distance from the aircraft in front of him. MP1 acknowledged his visual scan while taxiing at this time was "below average." (Tab V-1.6) He

was crosschecking his steer point coordinates just moments before impact. (Tab V-1.6) His failure to maintain a proper visual scan resulted in this impact.

(2) AE202 Task Mis-Prioritization

Task Mis-Prioritization is a factor when the individual does not organize, based on accepted prioritization techniques, the tasks needed to manage the immediate situation. (AFI 91-204)

MP1 was focused on ensuring his tape titling was completed and his steer point coordinates were input correctly to the exclusion of maintaining a safe distance between aircraft. Tape titling is the process where the pilot records pertinent identifying information for the mission. (Tab V-1.5 – 1.6)

IAW 8 FW ORE procedures, a failure to complete this task results in no credit being received for the mission. (This information is derived from 8 FW exercise evaluations that are not releasable to the public but that were reviewed by the AIB president) MP1 began titling his tape while taxiing along Taxiway C and continued the process up to the point immediately before impact. (Tab V-1.5) MP1 completed his initial review of his steer point coordinates while stationary in the aircraft hardened shelter. (Tab V-1.5) He crosschecked the coordinates while taxiing. (Tab V-1.6) The task of re-verifying the coordinates while moving instead of focusing on maintaining the standard distance between aircraft resulted MP1 impacting the aircraft in front of him.

(3) PC102 Channelized Attention

Channelized Attention is a factor when the individual is focusing all conscious attention on a limited number of environmental cues to the exclusion of others of a subjectively equal or higher or more immediate priority, leading to an unsafe situation. It may be described as a tight focus of attention that leads to the exclusion of comprehensive situational information. (AFI 91-204)

MP1 reports being focused on crosschecking the steer point coordinates for his targets while taxiing. (Tab V-1.6) MP1 stated he reviewed the first set of coordinates and noted his distance from the aircraft in front of him. (Tab V-1.6) He then reviewed the next three sets of coordinates. (Tab V-1.6) MP1 stated he then looked up and realized he was moments from impact. (Tab V-1.6) His attention on the task of crosschecking his coordinates hindered his ability to assess the higher priority task of maintaining a safe distance between aircraft.

b. Contributory

The following human factors were relevant and considered contributory to this mishap:

(1) PC206 Overconfidence

Overconfidence is a factor when the individual overvalues or overestimates personal capability, the capability of others or the capability of aircraft/vehicles or equipment and this creates an unsafe situation. (AFI 91-204)

MP1 had flown five similar sorties during this ORE. (Tab V-1.9) On all five of those sorties, he had used this same taxi route and procedures. (Tab V-1.9) He reported being overconfident. He believed he had time to check the last three coordinates while taxiing. (Tab V-1.6)

(2) PC212 Excessive Motivation to Succeed

Excessive Motivation to Succeed is a factor when the individual is preoccupied with success to the exclusion of other mission factors leading to an unsafe situation. (AFI 91-204)

MP1 was flying in his first ORE at Kunsan AB. (Tab V-1.7) He had "inklings" of concern about things that had previously gone wrong. (Tab V-1.7) On previous mission, he thought he had missed one target and had failed to properly film his employment procedures on another. (Tab V-1.7) MP1 stated he knew he had already checked his coordinates once, but he was re-checking those coordinates again just to be sure. (Tab V-1.5-1.6)

c. Non-Contributory

All human factors were considered for their possible contribution to the mishap sequence. High interest non-contributory human factors include:

Organizational Influences and Supervision were considered as potential factors but no evidence was found substantiating these issues as factors in this mishap. Preconditional Environmental Factors were considered in this mishap in reference to the physical environment (i.e. weather, climate, etc) and technological environment (e.g. cockpit, workspace design, automation factors, etc) but neither was found to be contributory. In reference to individual preconditions, no physical or mental limitations or perceptual factors were noted; no adverse physiological states or self-imposed stresses were identified; and lastly, no coordination, communication or planning factors impacted MP1.

12. GOVERNING DIRECTIVES AND PUBLICATIONS

a. Directives and Publications Relevant to the Mishap

(1) AFI 11-2F-16, Volume 3, F-16 –Operations Procedures, 18 February 2010
(2) AFI 11-202, Volume 3, *General Flight Rules*, 22 October 2010
(3) AFI 51-503, *Aerospace Accident Investigations*, 26 May 2010
(4) AFI 51-503, PACAF Supplement 1, *Aerospace Accident Investigations*, 15 December 2004
(5) Air Force Tactics, Techniques, and Procedures (AFTTP) 3-3.F16, *Combat Aircraft Fundamentals, F-16*, 30 March 2010
(6) Technical Order (T.O.) 1F-16CM-1, *Flight Manual, USAF Series F-16C and F-16D CCIP Aircraft Blocks 40, 42, 50, and 52*, 15 December 2009
(7) AFI 11-2F-16, VOLUME 3, CHAPTER 8, 8TH FIGHTER WING SUPPLEMENT, 17 December 2009 (Tab BB)

b. Other Directives and Publications Relevant to the Mishap

None.

NOTICE: The AFIs listed above are available digitally on the AF Departmental Publishing Office internet site at: **http://www.e-publishing.af.mil.**

c. Other Documents Reviewed by the AIB, but not Releasable

(1) 23-28 January 2011 Operational Readiness Exercise Evaluation, 2 February 2011
(2) 13-18 February 2011 Operational Readiness Exercise Evaluation, 25 February 2011
(3) 13-18 March 2011 Operational Readiness Exercise Evaluation, 23 March 2011
(4) 3-8 April 2011 Operational Readiness Inspection Evaluation, 25 April 2011
(5) 25-29 July 2011 Operational Readiness Exercise Evaluation, 3 August 2011

d. Known or Suspected Deviations from Directives or Publications

None.

13. ADDITIONAL AREAS OF CONCERN

None.

09 September 2011

MATTHEW R. DANA, COLONEL, USAF
President, Accident Investigation Board

STATEMENT OF OPINION

F-16CM, T/N 90-0717 and 90-0733
KUNSAN AIR BASE, REPUBLIC OF KOREA
29 JULY 2011

Under 10 U.S.C. 2254(d), any opinion of the accident investigators 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

I find by clear and convincing evidence the cause of this mishap was pilot error, specifically the human factors of Breakdown in Visual Scan, Task Mis-Prioritization, and Channelized Attention. These factors combined led to a situation where Mishap Pilot 1 (MP1) lost awareness on his position relative to the aircraft in front of him. MP1 failed to notice the aircraft in front of him had stopped, and MP1 taxied MA1 into the left rear of Mishap Aircraft 2 (MA2). I found the human factors of Overconfidence and Excessive Motivation to Succeed to be contributory to this mishap.

MP1 was number four in a flight of four F-16s preparing to launch on the first of three scheduled sorties in a local Operational Readiness Exercise (ORE). After an uneventful briefing and preflight, the Mishap Flight (MF) began taxiing from their parking locations to the north end of runway 18 for takeoff. As per ORE standards, the MF was to stop en route to the runway for a check of their respective Radar Warning Receivers (RWR).

As the MF was taxiing, MP1 began a second task of confirming his Modular Mission Computer had the correct target coordinates loaded. This involved MP1 reading the coordinates from the mission data card strapped to his leg and comparing them to the coordinates displayed in his aircraft. As MP1 was accomplishing this task, the Mishap Flight Lead (MFL) reached the RWR check area and stopped. Numbers two and three of the four-ship stopped behind the MFL. However, MP1 failed to notice his flight stopped in front of him resulting in the collision.

MA1 received extensive damage totaling $2,041,997.17, including damages to the nose cone, nose radome, FCR antenna, targeting pod, forward fuselage, bulkhead, canopy, equipment bay door and side access door. MA2 received damages totaling $589,321.74, including damages to the wing box assembly, horizontal stabilizer, fuel tank, pylon assembly, and targeting pod. There was no damage to private property or any other aircraft. There were no civilian casualties. There has been no media interest.

I developed my opinion by analyzing factual data from historical records, guidance and directives, engineering analysis, witness testimony, and analysis of the cockpit video and audio recorders. I used the MP testimony in conjunction with information obtained from the cockpit

recorders, other witness statements, and transcripts of radio calls to determine the mishap sequence of events.

2. DISCUSSION OF OPINION

a. Causes

(1) Breakdown in Visual Scan

Breakdown in Visual Scan is a factor when the individual fails to effectively execute learned / practiced internal or external visual scan patterns leading to unsafe situation.

MP1 was not alternating between his internal and external scans of his environment with the necessary frequency to maintain a safe distance from the aircraft in front of him. MP1 acknowledged his visual scan while taxiing at this time was "below average." He was cross checking his steer point coordinates just moments before impact. His failure to maintain a proper visual scan resulted in this impact.

(2) Task Mis-Prioritization

Task Mis-Prioritization is a factor when the individual does not organize, based on accepted prioritization techniques, the tasks needed to manage the immediate situation.

MP1 was focused on ensuring his tape titling was completed and his steer point coordinates were input correctly to the exclusion of maintaining a safe distance between aircraft. Tape titling is the process where the pilot records pertinent identifying information for the mission. IAW 8 FW ORE procedures, a failure to complete this task results in no credit being received for the mission. MP1 began titling his tape while taxiing along Taxiway C and continued the process up to the point just moments before impact. MP1 completed his initial review of his steer point coordinates while stationary in the aircraft hardened shelter. He crosschecked the coordinates while taxiing. The task of re-checking the coordinates while moving instead of focusing on maintaining the standard distance between aircraft resulted in his impacting the aircraft in front of him.

(3) Channelized Attention

Channelized Attention is a factor when the individual is focusing all conscious attention on a limited number of environmental cues to the exclusion of others of a subjectively equal or higher or more immediate priority, leading to an unsafe situation. It may be described as a tight focus of attention that leads to the exclusion of comprehensive situational information.

MP1 reports being focused on crosschecking the steer point coordinates for his targets while taxiing. MP1 stated he reviewed the first set of coordinates and noted his distance from the aircraft in front of him. He then reviewed the next three sets of coordinates. MP1 stated he then looked up and realized he was moments from impact. He applied his brakes and simultaneously

impacted the aircraft in front of him. His attention on the task of crosschecking his coordinates hindered his ability to assess the higher priority task of maintaining a safe distance between aircraft.

b. Contributing Factors.

(1) Overconfidence

Overconfidence is a factor when the individual overvalues or overestimates personal capability, the capability of others or the capability of aircraft/vehicles or equipment and this creates an unsafe situation.

MP1 had flown five similar sorties during this ORE. On all five of those sorties, he had used this same taxi route and procedures. He reported being overconfident. He believed he had time to check the last three coordinates while taxiing. He had just reviewed the last steer point coordinate when he stated he reached up and realized he was about to impact the aircraft in front of him.

(2) Excessive Motivation to Succeed

Excessive Motivation to Succeed is a factor when the individual is preoccupied with success to the exclusion of other mission factors leading to an unsafe situation.

MP1 was flying in his first ORE at Kunsan AB. He had "inklings" of concern about things that had previously gone wrong. On a previous mission, he thought he had missed one target and had failed to properly film his employment procedures on another. MP1 stated he knew he had already checked his coordinates once. He was re-checking those coordinates again, "just to be sure," moments before the impact.

3. CONCLUSION

I find by clear and convincing evidence this mishap was caused by the failure of MP1 to maintain a proper visual scan and properly prioritize his tasks, as well as channelizing his attention. The added stress of the ORE and the desire to excel, coupled with a sense of overconfidence as a result of the previous days' experience contributed to MP1's failure to properly manage his tasks. These factors yielded a situation where MP1 failed to recognize the dangerous situation developing in front of him until it was too late to prevent the aircraft from colliding.

09 September 2011

MATTHEW R. DANA, COLONEL, USAF
President, Accident Investigation Board

Under 10 U.S.C. 2254(d), any opinion of the accident investigators 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.