



DEPARTMENT OF THE AIR FORCE
PACIFIC AIR FORCES



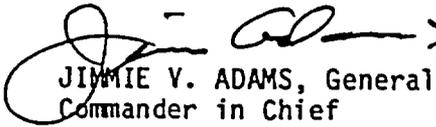
FROM: CINCPACAF/CC
Hickam AFB HI 96853-5001

24 Aug 92

SUBJ: AFR 110-14 Report of Investigation, F-16C, 85-1496, Accident of
23 Jan 92

TO: HQ 5AF/CC

The subject report of investigation is approved.


JIMMIE V. ADAMS, General, USAF
Commander in Chief

DOCKETED
USNRC

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OFFICE OF THE SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

NUCLEAR REGULATORY COMMISSION

Docket No _____ Official Exh No. 208

In the matter of _____

Staff _____ IDENTIFIED

Applicant RECEIVED

Intervenor _____ REJECTED _____

Cont'g Off'r _____

Contractor _____ DATE 7/1/02

Other _____ Witness _____

Reports ELH

PFS Exh. 208

56635

13 Mar 92

SUPPLEMENTAL STATEMENT

Documents contained in Tabs A through S were provided by the president of the safety board. As received, they consisted of both originals and copies. I examined all copies and verified they were true and accurate duplicates of original documents. In addition, as required by AFR 110-14, Atch 1, paragraph 3(e), all reference to social security account numbers and 'For Official Use Only' have been deleted. Except for the required deletions noted above, these documents have been included unchanged.


JAMES D. WOODALL, Col, USAF
AFR 110-14 Board President

56636

AIRCRAFT ACCIDENT INVESTIGATION UNDER AFR 110-14
MISAWA AIR BASE, JAPAN.

1. Statement of Authority and Purpose:

On 14 February 1992, by authority of Air Force Regulation 110-14, the Commander-in-Chief, Pacific Air Forces, (CINCPACAF), appointed Colonel James D. Woodall to investigate the aircraft accident which occurred on 23 January 1992 (TAB Y). The mid-air collision between an F-16C assigned to the 432d Fighter Wing (FW), Misawa Air Base (AB), JA, and a KC-135R assigned to the 92d Wing (WG), Fairchild Air Force Base (AFB), WA, occurred 625 nautical miles (NM) east of Tokyo, JA, after completing air-to-air refueling (AAR) during the Coronet West 30 deployment (TAB A-1). By the same authority and on 14 February 1992, CINCPACAF appointed Captain Felix A. Losco as legal technical advisor (TAB Y). By the same authority and on 26 February 1992, VCINCPACAF appointed Lt Col Donald W. Averitt as a KC-10 operations technical advisor (TAB Y). By the same authority and on 25 February 1992, the Commander, 3d Air Division (AD), appointed Major Christopher N. Kirtland as a KC-135R operations technical advisor (TAB Y). By the same authority and on 18, 20, and 24 February 1992, the Commander, 432 FW, appointed Captain Mark R. Aldrich, Captain Robert A. Johnson, and Captain John R. Hyle as F-16 operations, maintenance, and search and rescue (SAR) advisors, respectively (TAB Y). By the same authority and on 26 February 1992, the Commander, 909th Air Refueling Squadron (AREFS), 18 WG, appointed Technical Sergeants David W. Shugart and Arthur R. Dickens as maintenance technical advisors (TAB Y).

The General Dynamics F-16C, tail number 85-1496, was combat coded by possession and assignment; the Boeing KC-135R, tail number 61-0284, was combat support coded by possession and assignment. The F-16C crashed into the Pacific Ocean in 19,000 ft of water; the KC-135R, which sustained structural damage to its left wing, recovered safely to Yokota AB, JA. The F-16 pilot received only minor injuries from his successful ejection, 4 1/2 hours in a life raft, and rescue by Japanese Maritime Self Defense Forces (JMSDF); there were no injuries aboard the KC-135R.

2. Summary of Facts:

a. History of Flight:

On 23 January 1992, ten F-16C aircraft from the 432 FW, 13th Fighter Squadron (FS), were scheduled to deploy from Misawa AB, JA, to Tyndall AFB, FL, with an intermediate stop at Hickam AFB, HI. That deployment, Coronet West 30, under the operational control (OPCON) of the 2d Aircraft Delivery Group (ADG), Detachment 6 (Det 6), was supported by four tankers (two KC-135s and two KC-10s) under the OPCON of the 15th Air Force (AF) (TAB BB-2A). The tanker units were: KC-135A, 379 WG, Wurtsmith AFB, MI, Strategic Air Command (SAC); KC-135R, 92 WG, Fairchild AFB, WA, SAC; KC-10, 2 WG, Barksdale AFB, LA, SAC; and KC-10, 4 WG, Seymour Johnson AFB, NC, Tactical Air Command (TAC). As a result of a KC-10 ground abort, only one cell of two tankers (Pro 61-62) and five primary fighters (Clan 31-35) plus two airspares (Clan 36 and 45) launched. Scheduled takeoff time was 0300I (local=Zone India (I)); actual takeoff was 0332I. After completing the second AAR, the two tankers developed

converging flight paths and altitudes. During collision avoidance maneuvers by tankers and fighters, Pro 62, the cell lead KC-135R, collided with Clan 33, an F-16 flying on the left wing of Pro 61, the 4 WG KC-10. Clan 33's aircraft was uncontrollable as a result of damage from the collision, and the pilot successfully ejected at approximately 15,000 ft mean sea level (MSL), 625 NM east of Tokyo at 0527I. Pro 62 received damage to his left wing and successfully recovered at Yokota AB at 0840I. The downed pilot, Captain John L. Dolan, 13 FS, was rescued by a JMSDF seaplane at 1004I and arrived at Yokota AB at 1350I. All remaining aircraft returned to Misawa AB.

Base and local media were involved in reporting the accident. Japanese media interest was high (TAB AA).

b. Mission:

On 23 January 1992, the 432 FW was scheduled to deploy ten F-16s of the 13 FS from Misawa AB, JA, to Tyndall AFB, FL, to participate in the Weapons System Evaluation Program (WSEP); the deployment had a planned intermediate stop at Hickam AFB, HI. The Coronet West 30 deployment consisted of two cells spaced 30 minutes apart. Each cell consisted of one KC-135, one KC-10, and five fighters plus one fighter spare. The deployment plan called for five AARs during the 7.2-hour flight from Misawa AB to Hickam AFB, with the first departure scheduled for 0300I.

Each cell was to accomplish an on-course join up. The KC-135 was to launch first, followed 1 minute later by the KC-10. Three minutes after the KC-10, the fighters would launch single ship, in 20-second trail. Cell join up was to be accomplished using overtake on the departure, with the following climb airspeeds: KC-135, 285 knots indicated air speed (KIAS); KC-10, 310 knots calibrated airspeed (KCAS); and F-16s, 350 KCAS. Planned cell positions were: the KC-135 in the lead at Flight Level (FL) 250 (25,000 ft above MSL) and the KC-10 at FL255 in 60 degrees right echelon, with 2 NM spacing (TAB BB-14A). The fighter's position on a tanker's wing was 20-40 ft lateral spacing, slightly aft and stacked high enough to see 1/2 of the tanker's opposite wing (TAB BB-14B). Fighters positioned on a fighter's wing were to be in route formation, with spacing as required for visual cues. The F-16s were to join up in two-ship elements, then join on the KC-10 to check air refueling systems. Once those checks were complete, the fighters would move forward and rejoin on the KC-135 for AARs 1 and 2 (TAB V-19). At the end of AAR 2, the KC-135s were to depart the cells, and the KC-10s and fighters would proceed to Hickam AFB.

c. Briefing and Preflight:

The Coronet West 30 deployment briefing was conducted on 22 January 1992 at 1100I by Lt Col Wells, 2 ADG/DCO (in training), and Lt Col Faucher, 13 FS/CC. The original 0730I briefing time was changed due to the 0930I arrival time of the last tanker, the 4 WG KC-10, returning from Osan AB, Republic of Korea. The initial portion of the briefing covered all applicable rules and regulations governing the move in detail; however, while emergency and rescue information was included, it contained several incorrect high band radio frequencies (HF) and one telephone number that had been disconnected. The second portion of the briefing reviewed each phase of the mission; however, testimony indicated cell breakup after AAR 2 was not briefed

(TAB V-38). Following this briefing, Lt Col Faucher covered F-16 specifics, while Lt Col Wells and the tanker crews moved to the 13 FS lounge to discuss tanker cell considerations and various abort options.

While still at the 13 FS, a tanker cell briefing was started by the 379 WG KC-135A aircraft commander (AC) with the 4 WG KC10 AC. Crew rest considerations shortened the briefing and cell breakup was not covered. The tanker meeting adjourned at approximately 1230I. The 92 WG KC-135R AC coordinated with the 2 WG KC-10 AC for their cell briefing to be conducted at base operations prior to preflight.

Additional cell briefings between tanker ACs were conducted on the ramp following cell assignment changes on the morning of the mission; however, testimonies indicate cell breakup was not briefed.

A 12-hour crew rest period started for the tanker crews at 1230I, followed by the fighters at 1315I, per AFR 60-1. While sufficient time was provided for crew rest, the rest period, from 1230/1315I to 0030/0115I, was not conducive to sleep. The F-16 pilots rested in their quarters and were offered, and some used, Restoril (no go pills) administered by the 13 FS flight surgeon (TAB V-33). The tanker crews were billeted in government quarters, two to a room, and rested on their own. Although the tanker crews' bus time was 0030I, billeting checkout and crew transportation difficulties caused delays due to the number of people involved. The tanker crews arrived at base operations at approximately 0100I to file flight plans and receive their weather briefings. The fighters attended a pilot update briefing at 0115I at the 13 FS.

The original tanker ground operations and taxi plan created several problems due to parking congestion on the new hot cargo pad (TAB U-4B). These problems were resolved by exchanging the cell assignments of the KC-10s, moving the 4 WG KC-10 from cell one to cell two. This change allowed the 2 WG KC-10 to taxi first and eliminated the majority of the congestion in the tanker parking area. The tactical aircraft monitor (TAM) and passenger assignments for the KC-10s were then changed to keep the TAMs with their respective F-16 flight and the F-16 recovery personnel in the first cell (2 WG KC-10). Snow fall, which began during preflight, further complicated ground operations by necessitating deicing on the F-16s and KC-10s. The 2 WG KC-10 worked a standby attitude indicator malfunction until engine start time with no success, then aborted. His abort returned the 4 WG KC-10 to the first cell, and resulted in the TAMs and KC-10 passengers being on the wrong aircraft. Timing and deteriorating weather precluded returning the TAMs and passengers to their original aircraft.

During F-16 ground operations, Clan 32 (85-1498) aborted due to a flight control malfunction indication. The spare (85-1503) was preflighted but also aborted for an Emergency Power Unit (EPU) self test failure. Clan 44 (cell two) moved forward to replace Clan 32. Maintenance repaired 85-1498 and returned it to the lineup as Clan 44. The F-16 aircraft deicing was accomplished after preflight and engine start. Clan 31 flight taxied at 0250I.

Following engine start, the first tanker to taxi was the 379 WG KC-135A (Pro 62). His parking location, on Delta Finger, did not conflict

with the remaining tanker aircraft (TAB U-4B). The aborted 2 WG KC-10 taxied out of the hot cargo pad to clear the taxi route. The 92 WG KC-135R (Pro 72, rolling spare for the KC-135A) taxied next, followed by the 4 WG KC-10 (PRO 61). After taxi and prior to takeoff, the 92 WG KC-135R (Pro 72) AC asked over ultra high frequency (UHF) radio if it mattered which KC-135 flew in the first cell. The 2 ADG/DCO indicated that it did not matter. The 92 WG KC-135R (Pro 72) AC then asked the 379 WG KC-135A (Pro 62) AC if the KC-135R (Pro 72) could lead the first cell. The 379 WG KC-135A (Pro 62) agreed, and the KC-135R (Pro 72) became lead of the first cell, changing his call sign to Pro 62 (TAB V-11A). The 379 WG KC-135A then received clearance to taxi down the active runway and cleared off on taxiway 2 North. Following a delay of approximately 15 minutes for the new Pro 62 to recompute takeoff performance data, revise the clearance for the new Pro 62's final destination of Guam, and locate the standard instrument departure (SID), Pro 62 received takeoff clearance and launched. Pro 61 followed 1 minute later, and Clan 31 flight took off 3 minutes after Pro 61. As a result of ground delays, the cell departed at 0332I, 32 minutes after cell one's scheduled takeoff of 0300I.

d. Flight Activity:

A radar vector departure was specified in the altitude reservation approval (ALTRV APVL) for this deployment and requested on filed flight plans (DD form 1801). The request for radar vectors was disapproved by Misawa Radar Approach Control (RAPCON), and all aircraft were given the CHUHI 3 SID, HANAMAKI transition. That SID was in the Terminal Change Notice (effective 9 January 1992) to Vol II of the Pacific Instrument Procedures Book, dated 19 September 1991 through 9 March 1992, and was flown by all aircraft in the cell. Weather on departure was a 3,000 ft ceiling and 1 7/8 statute miles (mi) visibility, with snow showers. The runway condition reading (RCR) at 0255I was 14, with loose snow on the runway.

The briefed departure for the tanker aircraft had Pro 62 climbing at 285 KIAS and Pro 61 climbing at 310 KCAS, with Pro 61 using its higher airspeed and onboard radar to overtake and join Pro 62 during the departure. However, during the departure, Pro 62 deviated from the depicted SID flight path, flying outside the 7 NM arc by approximately 4 NM (TAB V-39A). This deviation resulted in Pro 61 being unable to locate Pro 62 on radar. Pro 61 queried Pro 62 on his position and altitude and determined that altitude separation existed between both aircraft. When both aircraft reached visual meteorological condition (VMC) above the weather at about 8,000-10,000 ft MSL, Pro 62 observed Pro 61 approximately 2 NM ahead and 4,000 ft below (TAB V-11A). Positive identification was established between Pro 61 and Pro 62. Pro 62 passed Pro 61 on the left, assumed cell lead for the tanker formation, and leveled off at FL 250. Pro 61 positioned his aircraft, as briefed, at FL 255, in 60 degrees echelon, 2 NM to the right of Pro 62.

Clan 31 to 36 departed at 0336I in 20-second trail spacing. Shortly after getting airborne, Clan 33 reported a Central Air Data Computer/Air Data Computer (CADC/ADC) caution light (TAB V-14). Upon hearing this call, Clan 31 directed Clan 45 to launch as a second air spare to be used as needed. Clan 33 used T.O. 1F-16C-1CL-1 (checklist) procedures to reset the CADC/ADC caution light, and the CADC/ADC functioned normally for the remainder of the flight.

Clan 31 flight climbed as briefed at 350 KCAS and rejoined as elements of two aircraft, and, after Pro 62 and 61 were in proper cell formation, Clan 31 flight joined on Pro 61 for KC-10 air refueling boom checks by each F-16. During the boom checks, three F-16s were on each wing of Pro 61 and Clan 45 remained in 1 NM trail. When boom checks were completed, Clan 31-36 moved up to Pro 62 to prepare for the first AAR; Clan 45 accomplished a boom check with Pro 61, departed the cell, and landed at Yokota AB due to intermittent, poor recovery weather at Misawa AB. After AAR 1, Clan 36 departed the cell and returned to Misawa AB.

Other than a restriction on Pro 62, the KC-135R, which prohibited the use of his autopilot during AAR, AARs 1 and 2 were unremarkable and proceeded according to plan. AAR 2 was completed approximately 14 minutes prior to planned AAR 2 termination. Clan 31 flight and Pro 62 completed fuel off-load reports, and Clan 31 flight was cleared to rejoin on Pro 61.

Clan 33 and 34 moved from the right wing of Pro 62 to the left wing of Pro 61. Pro 61 was 500 ft above and approximately 2 NM to the right and behind Pro 62 (TAB V-22A). Clan 33 rejoined to the observation position, 20-30 ft off the left wing of Pro 61 and stacked high enough to see the top of the right engine nacelle (TAB V-14). The move of Clan 33 and 34 took an estimated 2-3 minutes to reposition on Pro 61. Clan 31, 32, and 35 then moved from Pro 62's left wing to the right wing of Pro 61 (TAB BB-14C). Clan 31 was rejoining on the wing and Clan 32 was approximately 800 ft behind Pro 61 when the mishap occurred. Clan 35 was approximately 1 NM behind Clan 31 and 32 at the time of the mishap (TAB V-19,36,37).

By all testimony, Pro 62 and Pro 61 were in the pre-briefed cell formation at the end of AAR 2. Pro 62 was at FL 250 and Pro 61 at FL 255, in 60 degree right echelon, approximately 2 NM to the right of Pro 62. During the ensuing estimated 7-10 minutes, tanker cell formation discipline deteriorated. Pro 62 and Pro 61 developed converging flight paths; Pro 62 climbed through Pro 61's altitude, and Pro 61 failed to maintain formation spacing (TAB A-1). As a result, at some distance less than 1/4 NM (1500 ft), both tankers attempted evasive maneuvers. Also, Clan 33, positioned on Pro 61's left wing, perceived a potential conflict, called a warning to the tankers, and attempted to climb his formation (Clan 33 and 34) above the converging tankers. Pro 62's evasive maneuver was a rapid roll to the left and a sharp pull upward (TAB V-11A). During this maneuver, the top of Pro 62's left wing struck the bottom of Clan 33's fuselage, knocking off Clan 33's radome, doing undetermined damage to his pitot-static and flight control computer systems, and putting Clan 33 out of control. Pro 61 rolled to the right using 15 degrees of bank for 3-4 seconds and maintaining level flight (TAB V-13A). Shortly thereafter, estimates were less than 1 minute, Clan 33 successfully ejected at an estimated 15,000 ft MSL.

Pro 62 recovered his aircraft at FL 270, assessed the damage to his left wing, and turned to the north. After ascertaining his aircraft was controllable, despite a damaged left aileron and minor fuel leak, Pro 62 offered help for the SAR and was told by Pro 61 to land his aircraft.

After Pro 61 completed his evasive maneuver, he then turned to the north to keep Pro 62 and Clan 33 in sight. He then turned back to the right and descended to establish a SAR air patrol over the approximate position of

Clan 33, 35 degrees 24.8 minutes north latitude, 152 degrees 08.9 minutes east longitude (N35 24.8, E152 08.9), approximately 625 NM east of Tokyo, JA (TAB A-1). Pro 61 initially descended to 10,000 ft MSL, then climbed to 14,000 ft MSL to avoid scattered clouds in the area, and later climbed to FL 240 to conserve fuel and coordinate support for the SAR.

After the collision, Clan 31 descended to keep Clan 33 in sight and leveled off when Clan 33 ejected because he could not see Clan 33's parachute. After Clan 33 entered the water and boarded his raft, he made contact with Pro 61 using his AN/PRC-90-2 survival radio. Clan 33 relayed that he was uninjured and in his raft. Clan 31, 32, 34, and 35 refueled on Pro 61 and alternated, as two ship formations, looking for Clan 33 and updating his position. To conserve fuel for the SAR, Clan 34 and 35 returned to Misawa AB. Clan 31 and 32 remained with Pro 61 until Clan 33 was rescued by a JMSDF US-1 seaplane after 4 1/2 hours in the ocean. During the SAR, Pro 71, the 2 WG KC-10 that had aborted earlier at Misawa AB, was able to launch in day VMC and provide fuel to Pro 61 to extend their on-station time.

After Clan 33 was rescued, all remaining Clan and Pro aircraft returned to Misawa AB.

e. Impact:

No information was available to independently verify the ground track of the cell or the positions of any aircraft in the cell. The cell was well beyond any ground station radar tracking capability. No airborne systems, such as the F-16's APG-68 fire control radar, were recorded, nor do any audio recordings exist to validate the sequence or timing of events leading to the mishap. The only recorded information available is the information contained in the digital flight data recorder (DFDR) of Pro 61, the KC-10. DFDR data was used to reconstruct the altitude, KCAS, magnetic headings, and pitch and bank angles of Pro 61. That data does not, however, provide any information on ground track or relative position of aircraft in the cell. Additionally, DFDR data provided the approximate time and length of transmission on each of the two UHF, two very high frequency (VHF), and two HF radios on the KC-10. No data, other than eyewitness testimony, was available on what frequencies were on each radio, nor was any information available on transmissions received by the KC-10 or any other aircraft in the cell.

The cockpit voice recording system on the KC-10 was a closed loop system which continuously recorded over itself at 30-minute intervals, and the length of flight after the mishap resulted in no usable information on the recording. Because of the nature and length of the deployment sorties, none of the F-16s had video cassette tapes in their airborne video tape recorders.

After completing AAR 2, Clan 31 flight repositioned from the lead tanker, Pro 62, the KC-135R, to Pro 61, the KC-10. By all eyewitness testimony, the tankers were in the briefed cell position, with Pro 61 500 ft above and approximately 2 NM to the right of Pro 62, in 60 degrees echelon.

Between the time Clan 31 flight began repositioning from Pro 62 and prior to all Clan 31 aircraft rejoining on Pro 61, the tanker headings and altitudes were altered to create a converging flight path. During this estimated 7-10 minutes, Clan 31 and Pro 62 completed their off-load report.

and Clan 31 received clearance from both tankers to reposition his flight. Clan 31 directed Clan 33 and 34 to move first, from Pro 62's right wing to Pro 61's left wing. During this maneuver, Clan 33 moved Clan 34 to his left wing. Estimates vary as to the length of time it took Clan 33 to reposition his element on Pro 61; however, all witnesses agree that Clan 33 and 34 were on Pro 61's left wing in the briefed formation prior to the mishap. That position, approximately 20-30 ft outside Pro 61's left wing, stacked high enough to see Pro 61's right wing and #3 engine nacelle, changed as the tankers did their collision avoidance maneuvers.

Clan 31, 32, and 35 repositioned from Pro 62's left wing to Pro 61's right wing. These aircraft were in the process of rejoining on Pro 61 when the mishap occurred. Clan 31 was rejoining on Pro 61's wing, and Clan 32 was approximately 800 ft aft and to the right of Clan 31. Clan 35 was approximately 1 mi in trail, with closure.

The actual time required to reposition Clan 31 flight is undetermined. Estimated time for Clan 33 and 34 to move was 2-3 minutes. Estimated time for Clan 31, 32 and 35 to reach the position described above was 5-7 minutes after Clan 33 and 34 rejoined, for a total estimated time of 7-10 minutes. During that time, light from the impending sunrise was making the horizon visible, and some aircraft in the cell were beginning to rely on visual references (TAB V-22A). The testimony on how much light varied, but at the estimated mishap time and altitude, 0527I at 25,500 ft MSL, sunrise was 17 minutes away, 0544I.

Prior to the mid-air collision, formation discipline within the tanker cell deteriorated. Pro 61's AC failed to maintain the briefed 2 NM 60 degree right echelon, number two position, in the cell. His testimony indicated he concentrated on the fighters rejoining on his aircraft and did not monitor his position off Pro 62 until prompted by other members of Pro 61's flight crew (TAB V-13A,B). When he did look at Pro 62, he did so visually, at night, without referring to his radar to get an accurate range to Pro 62. Also, Pro 61 was not using air-to-air tacan to help maintain position; that denied the AC and copilot (CP) access to an accurate system to determine range and closure. Range readouts were available in 1/10 NM increments and could have provided early warning of the impending convergence. Further, when Pro 61's AC recognized closure, his first reaction was to try to get Pro 62 to maneuver rather than maneuver his own aircraft to maintain a proper formation position because Pro 61 had fighters on his wing.

The only means used by Pro 62, the cell leader, to monitor Pro 61's position (range, location, and closure) was visual estimation, at night, by Pro 62's CP. Pro 62 did not attempt to monitor Pro 61's position through Pro 62's only available, onboard equipment, the air-to-air tacan. Pro 62's CP had only seen a KC-10 in formation once before, during CP training in November 1991, during a daylight mission. Using only visual means to determine Pro 61's range, location, and closure at night made it improbable Pro 62's CP could accurately determine whether Pro 62's flight path would conflict with Pro 61 during the climb to FL 260, if Pro 61 was in a position other than as briefed.

Testimony from Pro 62's aircrew (the cell lead KC-135R) indicated no heading or airspeed changes from the end of AAR 2 until the collision

avoidance maneuver (TAB V-11A). Pro 62 engaged the autopilot (AN/ASW-48) after AAR 2, and it remained engaged until the collision avoidance maneuver. Testimony further indicated Pro 62 and Pro 61 were communicating on a UHF tanker interplane frequency regarding Pro 62's clearance to depart the ALTRV and proceed to Andersen AFB, Guam. Pro 61 had been working on Pro 62's clearance on HF radio for approximately 17 minutes and had not received Pro 62's clearance at the time of the mishap. Pro 62 aircrew testimony further stated Pro 62 had received clearance from Pro 61 to climb from FL 250 to FL 260, the top of the ALTRV altitude block, and through FL 255, the altitude of Pro 61 and Clan 31 flight (TAB V-11A,B). However, Pro 61 aircrew testimony stated Pro 62 was never cleared to climb to FL 260 (TAB V-13A, B). Conversely, testimony from Pro 62 and Pro 61 aircrews agreed that no verbal termination of the tanker cell or lead change had occurred.

Communications confusion was apparent within the cell and may have contributed to several missed warning calls as Pro 62 and 61 converged. Although Emission Option (EMCOM) 2 was briefed by the 2 ADG/DCO for that mission, at the time of the mishap, four frequencies were being used to communicate between the seven aircraft in the formation. The UHF AAR frequency was being used for communications between the tankers and the fighters. A tanker interplane frequency was first established on a VHF frequency, then alternated between air traffic control (ATC) frequencies and interplane. Another interplane frequency between tankers was set on UHF 303.0, which was used by the tanker ACs. Also, the F-16's had their own VHF interplane frequency.

Based on aircrew testimony, Pro 62's AC initiated the climb to FL 260 by disengaging and reengaging the autopilot elevator (pitch) axis (TAB V-11A). This action disabled the altitude hold function of the autopilot but had no effect on the other functions of the autopilot. He then used the thumb wheel (pitch knob) to select a 500-ft per minute rate of climb and adjusted power to reestablish 315 KIAS after a loss of 2-3 knots at the start of the climb.

Pro 62's CP indicated Pro 61 was slightly aft of abeam, above, and about 1 mile away prior to Pro 62 initiating the climb and was well clear during the initial part of the climb estimated at 45 seconds (TAB V-12A). Pro 62's CP also stated he saw Pro 61 turn left, toward Pro 62, in 25-30 degrees of bank, when he heard the '30 left' call. Pro 61's DFDR showed a series of left bank turns of 4-10.9 degrees in the 2 minutes prior to the mishap but no bank angles greater than 10.9 degrees (TAB O).

An estimated 10 seconds later, Pro 62's CP saw closure developing, shouted to the AC the need to maneuver, and attempted to override the autopilot (TAB V-12A). He felt the AC already on the flight controls. Pro 62's AC rolled into approximately 45 degrees of bank and pulled up. During that maneuver, Pro 62 collided with Clan 33 at approximately 25,650 ft MSL. After impact, Pro 62 rolled out of his bank, pulled up to at least FL 270, then returned to FL 260. Damage to Pro 62 included loss of a section of the left outboard aileron, damage to the wing assembly, and damage to the number one reserve fuel tank in the left wing (TAB J). Pro 62 turned to the north, assessed controllability of his aircraft, turned south, offered help for the SAR, and then turned toward Andersen AFB, Guam. After computing the flying time to Guam and Kadena AB, Okinawa, Pro 62 determined Kadena AB was closer by approximately 20 minutes and turned toward Kadena AB. At 06461 Pro 62

declared an in-flight emergency (IFE) with Yokota Global Command and Control Station (known as Yokota Airways (YA)), requested a chase aircraft, and reported he was proceeding to Kadena AB due to bad weather on the Japanese mainland. At 0650I, Western Pacific Rescue Control Center (WestPAC RCC) recommended Pro 62 divert to Yokota AB. Pro 62 checked the weather and proceeded to Yokota AB. No chase aircraft were available, and Pro 62 reduced his gross weight by dumping 35,000 pounds of fuel. At approximately 50-80 NM from Yokota AB, Pro 62 descended to 6,000 ft MSL, conducted a controllability check, and proceeded to land uneventfully. The Yokota AB Disaster Response Team was activated, but not needed, for Pro 62's recovery.

Based on aircrew testimony, after AAR 2, Pro 61, the KC-10, maintained cell position off of Pro 62 (TAB V-13A, B). Pro 61's AC indicated all flight path changes were made in relation to Pro 62 and no cell termination had been verbally accomplished. At the end of AAR 2, Clan 31 flight was cleared to rejoin on Pro 61. During the rejoin and time preceding the mishap, estimated at 7-10 minutes, Pro 61's DFDR shows heading changes from 105.5 degrees to 102.7 degrees to 116.4 degrees to 100.2 degrees to 105.2 degrees and an airspeed increase of 31.2 knots, from 295.8 KCAS to 327.0. Pro 62's AC testimony indicated he was maintaining 315 KIAS (TAB V-11A). The maximum bank used during this period was 10.9 degrees and the series of small heading changes was consistent with Pro 61's aircrew testimony that the autopilot was in use in the heading select mode. No altitude deviations were noted. No data is available to verify the ground track of either Pro 62 or Pro 61, nor can their spatial relationship be verified other than by testimony. Based on Pro 62's testimony of no heading or airspeed changes after the end of AAR 2 and Pro 61's testimony of flying straight and level with changes only to maintain position on Pro 62, the data on Pro 61's DFDR cannot conclusively support either statement.

By all available testimony, the last known position of Pro 61 off of Pro 62 at the end of AAR 2 was 60 degrees right echelon at 1.8 NM and 500 ft above Pro 62 (TAB V-22B). The next position observed was Pro 62 and Pro 61 at approximately 1 NM on converging headings with Pro 62 still 400-500 ft below Pro 61 (TAB V-13A). Most observers state there was no line of sight movement between Pro 62 and 61 indicating a collision course. At this point, the CP and an extra flight engineer (FE) on Pro 61 recognized closure. Pro 61's CP stated he queried Pro 62 about Pro 62 clearing off to the left. Pro 61's CP got no response and returned to working on Pro 62's clearance on the HF radio (TAB V-22A,B). Pro 61's AC looked at the closure and made a call to Pro 62 to adjust his heading to the left (check 30 left) because Pro 61 had fighters on his wing. As the closure continued, between 1/2-1/4 NM, the CP, FE, and extra FE on Pro 61 all called for a turn to the right. At this point, it also appeared that Pro 62 was climbing. Pro 61's AC made a level 15 degree bank turn to the right for 3-4 seconds and looked back to observe Pro 62 climbing above Pro 61's altitude, FL 255, and disappearing from view. Pro 61's AC turned back to the left to keep Pro 62 in sight just as Pro 61's extra FE stated there had been a mid-air collision (TAB V-13A,B). Pro 61's AC then turned north to keep Pro 62 and Clan 33 in sight. Pro 61 lost sight of Clan 33 and relayed to Pro 62 that the KC-135R was losing fuel from its left wing. Pro 62 acknowledged and offered to help in the SAR. Pro 61 recommended he return to base, then turned back to the right and descended to set up an SAR air patrol over Clan 33's last known position.

Testimony from Pro 61's AC indicates he watched the fighters as they rejoined on his aircraft. He has no recollection of looking at Pro 62 after the fighters moved to his aircraft until he heard a warning call in his cockpit (TAB V-11A,B).

With no data available to depict the ground tracks of either aircraft, eyewitness testimony reflects the following: first, observers to the initial portion of the convergence stated that Pro 62 moved into Pro 61, with right bank angles estimated to be 0-30 degrees (Pro 62's flight crew stated they were in 2 degrees of left bank); second, eyewitnesses estimated the heading crossing angle between Pro 62 and Pro 61 to be 5-90 degrees; third, observers all initially believed Pro 62 would pass under Pro 61 prior to recognizing Pro 62 was in a climb; and all stated that a horizon was visible in the east but it was still dark.

Clan 33, on Pro 61's left wing and observing closure between Pro 62 and Pro 61, made a radio call asking if the tankers saw each other (TAB V-14). While Clan 33 believes he called on the AAR primary (UHF) frequency being monitored by all aircraft in the cell, neither Pro 62 nor Pro 61 recall hearing the call. All of Clan 31 flight remembers that call and Clan 33's call to Clan 34 to climb. At this point, Clan 33 and 34 maneuvered to the left and tried to climb away. As described in Clan 33's testimony, he felt 'sandwiched' between Pro 62 and 61 and tried to climb away from both tankers. In his climb he lost sight of Pro 62 until the KC-135R appeared from under Clan 33's aircraft. Clan 33 then tried to slide aft of Pro 62 by reducing power and opening his speed brakes. He was unsuccessful, and the top of Pro 62's left wing struck the forward fuselage of Clan 33 from the bottom, knocking off the radome and doing unknown damage to the aircraft. Clan 34 was left and slightly above Clan 33 and continued to climb away after the impact.

Damage to Clan 33's aircraft could only be estimated since the wreckage was not recovered. The F-16 lost its radome and pitot-static system and had undetermined damage to its forward fuselage and flight control computer systems. By testimony, Clan 33 had no valid airspeed, altitude, or vertical velocity information (TAB V-14). The aircraft was not controllable after impact and Clan 33 ejected at an estimated 15,000 ft MSL. The approximate location at the time of ejection was N35 24.8, E152 08.9, approximately 625 NM east of Tokyo, JA. The aircraft impacted in the Pacific Ocean and sank in 19,000 ft of water.

f. Ejection Seat:

The Advanced Concept Ejection System (ACES II) ejection seat (serial number F6A1273) performed as expected. It was properly installed by General Dynamics with its next inspection due in 14 months, March 1993. Because the aircraft and seat sank in approximately 19,000 ft of water, both the seat data recorder and the aircraft crash survivable flight data recorder were unrecoverable.

Based on witness testimony, Capt Dolan ejected within the survivable ejection envelope of the ACES II seat at approximately 15,000 ft MSL (TAB V-19). The F-16 flight parameters could not be duplicated, but witness testimony stated the aircraft had departed controlled flight due to impact

damage (TAB V-14).

Capt Dolan recalled making several radio calls about his aircraft damage and that he was going to have to eject. Other members of his flight confirmed hearing those radio calls (TAB V-31). He then confirmed the seat arming handle was down and ejected. Because of his estimated altitude, Capt Dolan thought he would fall in the seat for some time before man-seat separation; he had not realized his aircraft's descent rate after the collision. He separated from the seat almost immediately after ejection and the automatic man-seat separation sequence, which occurred at 15,000 ft MSL (+ or - 1,000 ft), went without incident. Capt Dolan estimated his parachute descent lasted approximately 10 minutes. He mentally reviewed his post ejection checklist four times before actually executing the four-line cut of the parachute shroud lines to make his parachute steerable. Capt Dolan aligned himself into the wind and kept the raft and seat kit behind him. He inflated his life preserver unit (LPU-9/P), executed a normal water landing, and released his parachute without incident. The next swell brought his raft to him and Capt Dolan climbed aboard (TAB BB-15E).

g. Personal and Survival Equipment:

The parachute, raft, and seat kit all functioned normally and were not factors in the mishap. All inspections were current. The raft and seat kit were recovered. The parachute was lost at sea. No discrepancies were identified.

Capt Dolan was not wearing a CWU-74/P or CWU-21A/P anti-exposure garment (poopy suit). The flight planned route kept the deployment over water above 60 degrees Fahrenheit; therefore, poopy suits were not required in accordance with PACAFR 55-7.

h. Rescue:

In the water, Capt Dolan boarded his raft and organized his survival equipment; his injuries were minor, bruises and a stiff neck (para p). Overhead, Clan 31 descended in an attempt to obtain a visual sighting on the raft while Pro 61 set up a SAR air patrol over the general location. SAR forces were first notified by a Mayday call from Pro 61 to Tokyo Air Route Traffic Control Center (ARTCC) at 0550I. Tokyo ARTCC then contacted the WestPAC RCC (American) and Fuchu RCC (Japanese). Pro 61 then called Yokota Airways, and all these agencies became participants in the rescue. Contact was maintained between Capt Dolan and Pro 61 on UHF 282.8 at set intervals to conserve battery power on Capt Dolan's radio. Clan 31 flight alternated between overhead search patterns to update his position and refueling on Pro 61. Rescue forces consisted of a JMSDF P-3 (call sign Rescue Orient 35) and a US-1 (an amphibious seaplane, call sign Seagull 81, TAB BB-15D). Both rescue aircraft were overhead (N35 32.0, E152 11.0) approximately 4 hours after the mishap. Seagull 81 landed 200 meters from Capt Dolan, dispatched two pararescue men (PJs) in a motorized rubber boat, and had him aboard the seaplane at 1004I. First aid was administered, and Seagull 81 landed at Yokota AB, JA, at 1350I (TAB BB-15B).

i. Crash Response:

Response to this mishap began when Tokyo ARTCC was notified by Pro 61

of the mid-air. Some difficulty was encountered here because of the language barrier between the American pilot and Japanese controller. Next, Pro 61 attempted to contact rescue forces on the frequencies briefed by 2 ADG, with no success. A mutual decision was made by Pro 61's flight crew, the TAM, and a KC-10 additional AC to contact Yokota Airways on the HF radio and have them help in the SAR.

WestPAC RCC and Fuchu RCC were notified by Tokyo ARTCC. Although WestPAC RCC had OPCON of all US rescue assets in the western Pacific, there were no US assets immediately available within range; therefore, the OPCON of the actual Japanese aircraft that affected the rescue was at Fuchu RCC. The timely notification process and rapid preflight preparation resulted in Seagull 81 getting airborne at 0649I. Other participants in the response network included Yokota AB Command Post, the 13 FS, the 33d Air Rescue Squadron (ARS), the 17th Special Operations Squadron (SOS), and Pro 71 (2 WG KC-10), (TAB BB-15A). The communication links between the various control agencies were effective. WestPAC RCC retained overall control of the rescue and provided timely updates to appropriate commanders or their command posts. Other agencies were also contacted; the United States Coast Guard provided a surface depiction (SURPIC) of ships in the area, and Headquarters, Air Rescue Service, provided additional inputs about the HC-130's RamZ (rubber boat) mission.

Once a plan of action had been established, the distance to be covered (625 NM) and the speed of the rescue aircraft (264 KIAS maximum) dictated the length of time (2.8 hrs) to reach Capt Dolan. Ten minutes after the Japanese aircraft reached the scene, they located Capt Dolan. Although voice communications between USAF and Japanese forces were not optimum because of the language difference, Seagull 81 credits Capt Dolan's Mk-13 smoke flare, sea dye marker, and Clan 31's directions with helping them to quickly find Capt Dolan (TAB BB-15A).

j. Maintenance Documentation:

The aircraft maintenance records (AFTO Form 781 binder) in the F-16 did not survive the crash. During deployments, pilots carry the aircraft AFTO Form 781 binder with them so the forms arrive with the aircraft at each stop on the trip. According to Capt Dolan's statement, there were no open discrepancies which were a factor in this mishap (TAB V-14). Capt Dolan referred to a CADC/ADC light on takeoff that reset in accordance with the 1F-16C-1CL-1 checklist with no further occurrence. This light occasionally comes on during takeoff and is a false indication if it resets, per the checklist. Additionally, AIC Camper, the assistant crew chief, who preflighted and launched the aircraft, confirmed no open or related discrepancies in the AFTO Forms 781, (TAB V-8).

There were no maintenance discrepancies noted in the review of the KC-135R and KC-10 aircraft AFTO Forms 781 which related to the accident.

There were no outstanding Time Compliance Technical Orders (TCTOs) on any of the aircraft that had any bearing on the mishap. All scheduled inspections were satisfactorily completed. All time change requirements were completed on time. All inspections and maintenance were performed in a timely manner on the F-16 and KC-10. The KC-135R had two overdue inspections which

had no bearing on the mishap. All oil analysis records were within standards (TABs H, U-5,6,7). As the F-16 was lost in over 19,000 ft of water, no onboard fluid samples were available (TAB A). All fuel, hydraulic fluid, oil, and oxygen from servicing equipment were within standards (TAB U-8). Tanker fluid samples were within standards.

The F-16's last major inspection was a 150-hour phase inspection (Phase 1) completed 1 November 1991; the engine received a 75-hour hourly postflight inspection (HPO) on 9 December 1991 (TAB D-1). Both inspections were satisfactorily completed. The aircraft had accumulated 66.7 hours since phase and 26.8 hours since the 75-hour HPO.

The KC-135R's last major inspection was a 50-hour HPO, completed 8 January 1992, on the aircraft and engines. It had flown 31.9 hours since that inspection (TAB D-2).

The KC-10's last major inspection was an A-2 phase inspection, completed 13 December 1991, on the aircraft and engines. The number one engine was overhauled by United Airlines on 7 February 1991 and was installed on 9 April 1991. The other two engines are factory original equipment. The aircraft had flown 125.6 hours since the A-2 inspection (TAB D-3).

A number of unscheduled maintenance discrepancies were worked on all three aircraft between the time of the last scheduled inspection and the time of the accident. All maintenance was routine or preventative in nature, with no relationship to the accident.

No maintenance activity, procedure, practice, or performance was related to the accident.

k. Maintenance Personnel and Supervision:

During the F-16 launch, maintenance supervision included the production supervisor, SMSgt Stanley Herrera, the expeditor (Panther 2), TSgt Booker, and the crew chief A1C Camper. The F-16 was parked on the open ramp in front of Building 918. According to SMSgt Herrera and verified by A1C Camper, the night servicing crew properly serviced the aircraft. A1C Camper performed the power-on checks (TAB V-8). Then a pilot (1 of 6 fully qualified pilots) with the assistance of A1C Camper performed a hot preflight of the aircraft. All systems and fluid levels checked good.

SMSgt Herrera was a 9 skill level, 45299, fully qualified production supervisor; TSgt Booker was a 7 skill level, 45274B, fully qualified expeditor and F-16 crew chief. A1C Camper was a 5 skill level, 45254B, a fully qualified F-16 crew chief, assigned as the assistant dedicated crew chief on the mishap aircraft.

No maintenance practice or procedure was related to the mishap.

Prior to and during the tanker launch, numerous changes occurred. Decisions regarding taxi and launch sequence changed a number of times prior to engine start (TAB V-24). No single point of contact for tanker ground operations was identified. On-scene 432 FW Logistics Group (LG) maintenance supervision included Col Dale Smith, MSgt Valenzuela, SSgt Howe, SSgt Jackson,

SSgt Truesdale, and AIC Cravotta. On-scene maintenance supervisors from the mishap tankers were: MSgt Eddy, Sgt Hoogerland, SrA Boonstra, and SSgt Collingwood from the 4 WG KC-10; and TSgt Mitchell, Sgt Bove, and AIC Campbell from the 92 WG KC-135R.

Col Smith was the LG Commander and a fully qualified maintenance officer. MSgt Valenzuela was a 9 skill level crew chief and the fully qualified NCOIC of Transient Alert. SSgts Howe, Jackson, and Truesdale were all 7 skill level, fully qualified transient alert crew chiefs. AIC Cravotta was a 5 skill level, fully qualified transient alert crew chief and was a licensed air frame and power plant (A&P) mechanic. MSgt Eddy and SSgt

Collingwood were fully qualified, 45770, KC-10 dedicated crew chiefs. SrA Boonstra and Sgt Hoogerland were fully qualified, 5 skill level, 45750, KC-10 crew chiefs. TSgt Mitchell was a 7 skill level, fully qualified, 45770, KC-135R dedicated crew chief. Sgt Bove and AIC Campbell were 5 skill level, 45750, fully qualified KC-135R crew chiefs.

The 2 WG and 4 WG KC-10s, and 92 WG KC-135R were parked on the new hot cargo pad, while the 379 WG KC-135A was parked on Delta Finger (TAB V-24). The conditions were snowy and the only available lighting was light-allis. No taxi lines were painted on the hot cargo pad.

No maintenance factor or procedure related to the mishap; however, the congested parking on the hot cargo pad caused changes to the planned tanker cell lineup (TAB U-1,4).

1. Engine, Fuel, Hydraulic, and Oil Inspection Analysis:

Engine inspections on all aircraft were completed on time and satisfactorily. Fluid samples were all within normal limits (TAB H, U-5,6,7,8). All oil samples analyzed under the Joint Oil Analysis Program (JOAP) were satisfactory (TAB U-5F,6E,7E). No post crash fluid samples from the F-16 were taken. The tanker samples were all within standards.

m. Airframe and Aircraft Systems:

F-16C number 85-1496 arrived at Misawa AB on 4 May 1989 and had accumulated 1415.9 total flight hours since its acceptance by the Air Force on 20 May 1987 (TAB D-1). According to the pilot's and crew chief's testimonies, there were no grounding discrepancies carried in the AFTO Form 781 binder at the time of the mishap (TABs V-14,8).

KC-135R number 61-0284 was accepted by the Air Force on 2 January 1962. The 92 WG, Fairchild AFB, WA, received the aircraft from the 22d Air Refueling Wing, March AFB, CA, on 16 November 1989. It was last overhauled on 6 August 1990 during programmed depot maintenance at Boeing, Lake Charles, LA. 'R' model conversion was performed on 28 June 1991 by Boeing Wichita Modification Center in Kansas. The aircraft had accumulated 11219.9 hours since its acceptance by the Air Force. After the accident, status checks were performed on the digital autopilot by the Chief Inspector, Quality Assurance Flight, 909 AREFS, and the autopilot checked normal (TAB U-6D). System operational checks were performed by an Avionics Technician, Avionics Flight, 909 AREFS, and the autopilot system functioned normally, except for the

autopilot gyro (TAB U-6C). The system worked properly using the Inertial Navigation System (INS) gyro. The autopilot gyro could have sustained damage from the mishap. There was no testimony or maintenance data to indicate the autopilot gyro was not operating properly before or after the mishap.

KC-10 number 87-0123 was accepted by the Air Force on 24 August 1988 by the 68th Air Refueling Group, Seymour Johnson AFB, NC, and was assigned, in place, to the 4 WG, in 1991. It was last overhauled by Lockheed, Greenville, SC, on 28 June 1991 and had accumulated 3566.4 total hours.

n. Operations Personnel and Supervision:

The deployment was conducted in accordance with Coronet West 30/31 Air Tasking Order, Combat Archer Deployment/Redeployment, 8 January 1992, issued by 2 ADG/DOX, Langley AFB, VA. TAC, through the 2 ADG, controlled the worldwide delivery of aircraft. The 2 ADG exercised control through the Delivery Control Center (2 ADG/DOC) at Langley AFB, VA, via 2 ADG/Det 6 at Andersen AFB, Guam, to the delivery control officer (DCO), Maj Mark J. Kantor (2 ADG/Det 6) at Misawa AB. Lt Col Michael E. Wells (2 ADG/Det 6) was a DCO in training with Maj Kantor. The DCO controlled all Clan aircraft. Control began 24 hours prior to scheduled takeoff and lasted until the aircraft were released by 2 ADG. The Clan aircraft were authorized on a PACAF Form 106, Flight Authorization (flight orders), signed by Lt Col Wells.

CINCSAC had OPCON of the KC-135s and KC-10s. Command and control was delegated to 15 AF, March AFB, CA, which requested the 909 AREFS/Tanker Task Force (TTF), 18 WG, PACAF, develop the tanker plan and coordinate with 2 ADG/Det 6. The tanker mission was authorized in accordance with the 15 AF Coronet West 30 message, 9 January 1992, issued by 15 AF/DOOP. Although the 909 AREFS/TTF planned the tanker mission, and a representative was present at Misawa AB, command and control remained at 15 AF, since 3 AD no longer had a command post and the 909 AREFS/TTF was under PACAF. The 92 WG KC-135R was authorized on a SAC Form 60, Flight Authorization, signed by the Chief of Scheduling, 909 AREFS/TTF. The 4 WG KC-10 was authorized on a TAC Form 50, Flight Order, signed by the Operations Officer, 911 AREFS, 4 WG, TAC.

Lt Col Wells was the 2 ADG briefing officer for the mission (TAB V-38). He used appropriate briefing guides in accordance with 2 ADGR 55-7, 1 May 1991. The briefing covered required items, except that tanker cell breakup procedures were not covered, and some SAR information was out of date (TAB V-38). The ALTRV APVL was not given to the pilots, as recommended by 2 ADGR 55-9, Attachment 3, 1 May 1991, because the original was of poor quality and copies were not legible.

Supervisory personnel from the 13 FS were an integral part of the deployment briefing. However, one of the two F-16 TAMs could not attend due to another scheduled duty, Supervisor of Flying (SOF). After the 2 ADG briefing, the 13 FS/CC (Clan 31) led a fighter specific briefing with the F-16 pilots, per PACAFR 55-116, 9 November 1990 (TAB V-19). The 2 ADG/DCO and the tanker ACs met outside the briefing room in order to clarify the tanker lineup. The concept of taxiing the 92 WG KC-135R in the first cell as rolling spare was discussed. According to testimony, the 4 WG KC-10 AC mentioned the congested parking situation but was told since no KC-10 towing capability existed, it would fall on him to deconflict the parking situation. A tanker

cell leader briefing was started but not completed by the 379 WG KC-135A AC with the 4 WG KC-10 AC due to start of crew rest (TAB-22A). On launch day, the 92 WG KC-135R AC gave a cell brief to the 2 WG KC-10 AC at Base Operations and the 4 WG KC-10 AC on the parking ramp in accordance with SACR 55-11, 15 May 1990, except that all crew members were not in attendance, and it was unclear if cell breakup procedures were covered (TABS V-13A, 13B, 11A, 11B).

During ground operations and launch, the 2 ADG/DCO was in the control tower. The 909 AREFS/TTF representative was on the ramp in a vehicle which was not equipped with a radio. He did not participate in the changes to the tanker cell lineup (TAB V-32B). According to testimony, and verified by the 432 FW Operations Group Commander (OG/CC), the 432 FW OG/CC approved the change of the 4 WG KC-10 from cell one to cell two when the 4 WG KC-10 AC confirmed his aircraft could not safely make the required 180-degree turn due to weather conditions, gross weight, and parking congestion. Movement of the 4 WG KC-10 from cell two to cell one when the 2 WG KC-10 in cell one aborted, was a briefed spare option. Approval for the 92 WG KC-135R to switch positions with the 379 WG KC-135A for takeoff came from the 2 ADG/DCO in the control tower (TAB V-38). Although the 92 WG KC-135R was briefed as an option to replace the 379 WG KC-135A if the KC-135A aborted, replacing an operational KC-135A and changing the cell lineup just prior to takeoff was not a briefed option (TAB V-11A). In all, three changes were made to the original tanker lineup without the knowledge of the TTF representative. (TABS V-32 A,B; BB-11A-D).

o. Crew Qualifications:

All the aircrew involved in the mishap were fully qualified and mission ready to perform their assigned duties (TAB G). All primary aircrew members had current mission qualification certifications. All pilots had current instrument ratings. The following is a brief summary of their flying time, aircraft flown, and previous 30/60/90 day totals for sorties and hours (hrs) flown as of 23 January 1992.

Capt Dolan was an F-16 instructor pilot, with 1035.2 hrs total flying time, of which 191.4 hrs were flown as a student pilot during Undergraduate Pilot Training (UPT) (TAB G-1). During Lead In Fighter Training, he accumulated 28.9 hrs in the AT-38A/B. He had 814.9 hrs total in the F-16, of which 85.9 hrs were in the F-16A/B and 729.0 hrs in the F-16C/D. Capt Dolan became a mission-ready F-16 pilot in December 1988, qualified as flight lead in March 1990, and as an instructor pilot in May 1991. He had 151 hrs of instructor pilot time. His previous 30/60/90 day totals for sorties and hrs were 6/12/26 and 7.7/15.9/48.7, respectively (TAB G-2).

Capt Davey was a KC-135R aircraft commander, with 1827.5 hrs total flying time, of which 197.5 hrs were flown as a student pilot during UPT (TAB G-11). Additionally he accumulated 172.6 hrs in the T-38A during the accelerated copilot enhancement (ACE) program. He had 1312.7 hrs total in the KC-135, of which 975.2 hrs were in the KC-135A and 337.5 hrs in the KC-135R. Capt Davey qualified as a KC-135 copilot in May 1987 and then upgraded to aircraft commander in March 1990. He had 602.3 hrs as an aircraft commander. His previous 30/60/90 day totals for sorties and hrs were 12/16/18 and 74.5/94.0/101.7, respectively (TAB G-12).

1st Lt Detenbeck was a KC-135R copilot, with 380.4 hrs total flying time, of which 196.0 hrs were flown as a student pilot during UPT (TAB G-16). He had 148.2 hrs total in the KC-135R. Lt Detenbeck qualified as a KC-135 copilot in September 1991. His previous 30/60/90 day totals for sorties and hrs were 12/16/18 and 74.5/94.0/104.5 respectively (TAB G-17).

Capt Willis was a KC-135R navigator with 776.8 hrs total flying time, of which 42.1 hrs were flown as a student navigator during Undergraduate Navigator Training (UNT) (TAB G-20). He had 700.9 hrs total in the KC-135, of which 534.6 hrs were in the KC-135A and 166.3 hrs in the KC-135R. Capt Willis qualified as a KC-135 navigator in March 1989. His previous 30/60/90 day totals for sorties and hrs were 12/16/21 and 74.5/88.3/97.6, respectively (TAB G-21).

Capt Dillon was a KC-10 aircraft commander with 1383.0 hrs total flying time, of which 193.0 hrs were flown as a student pilot during UPT (TAB G-26). Additionally, he accumulated 226.1 hrs in the T-38A during the ACE program. He had 773.8 hrs total in the KC-10. Capt Dillon qualified as a KC-10 copilot in June 1989 and then upgraded to aircraft commander in November 1991. He had 91.3 hrs as an aircraft commander. His previous 30/60/90 day totals for sorties and hours were 7/23/30 and 35.2/89.5/121.9, respectively (TAB G-27).

Capt Harris was a KC-10 copilot with 1720.8 hrs total flying time, of which 178.6 hrs were flown as a student pilot during UPT (TAB G-34). He had previously been an instructor pilot in Air Training Command and had accumulated 1195.5 hrs in the T-37B. He had 294.4 hrs in the KC-10. Capt Harris qualified as a KC-10 copilot in February 1991. His previous 30/60/90 totals for sorties and hrs were 9/9/12 and 43.0/43.0/56.3, respectively (TAB G-35).

p. Medical:

The medical records of all primary flight crew members involved in the mishap were thoroughly reviewed to determine medical eligibility and currency of flight physical examinations (TAB BB-10). All aircrews had current Air Force Forms 1042 clearing them for flying duty and current flight physical examinations. Additionally the results of the toxicological examinations were negative for carbon monoxide, ethanol, and drugs for every crew member (TAB BB-10).

During the ejection and subsequent rescue operation, Capt Dolan sustained minor injuries to include multiple bruises, a stiff neck, and mild hypothermia. Following pickup by the JMSDF rescue aircraft, he was placed in an electric mummy bag and provided oxygen to breathe. Upon arrival at Yokota AB, Capt Dolan was admitted to the hospital for overnight observation and released the following day to return to Misawa AB. Major (Dr) Peter T. Walsh, 432d Medical Group, examined Capt Dolan on 24 January 1992 at Misawa AB and temporarily removed him from flying status due to painful knees, groin, and a stiff neck. On 31 January 1992, he was released to unrestricted flying status by Dr Walsh.

q. Nav aids and Facilities:

All flight facilities and navigational aids affecting the flight were operating properly and did not contribute to this accident. Additionally, there were no significant Notice to Airman (NOTAMs) affecting this flight.

r. Weather:

The complete terminal area and enroute weather forecast, as briefed the morning of the mishap, is located at (TAB W-1). The departure forecast for Misawa AB called for a 3,000 ft ceiling with 7 MI of visibility in light snow showers, a seasonal ice FOD alert, and a dry runway. Enroute hazards included clear air turbulence for the first two AARs and in-flight visibility restrictions for AARs 3, 4 and 5 due to high level clouds. Additionally, the winds at the planned cruise altitude were forecast to be out of the west-southwest at 70-120 knots. Yokota AB, one of the primary divert bases, was forecasting thin scattered clouds at 5,000 ft, with 6 mi of visibility in haze.

Approximately 1/2 hour prior to the actual launch, an RCR was taken and found to be 14, with loose snow on the runway (LSR). An RCR of 23 is a dry runway; 2 ADG RCR limits are 8 for taxi and 12 for single ship takeoff. All Pro/Clan aircraft were within their RCR limits. The actual weather for departure was a 3,000 ft ceiling with 3,000-4,000 meters (1 7/8 to 2 1/2 mi) visibility in snow showers. This was confirmed by ground observation and aircrew testimony (TAB K-6). The actual cloud tops reported varied with witness testimony, from 7,000 ft MSL to 15,000 ft MSL. Once above the weather on climbout, the rest of the mission was conducted in night VMC, with no restrictions to in-flight visibility or other significant weather factors. Testimony also indicated the enroute winds were as forecast, and there was a scattered cloud deck well below the flight cruise altitude. Just prior to, during, and after the mishap, witness testimony was consistent in describing a low scattered cloud deck at about 10,000-14,000 ft MSL, unrestricted visibility (night) with the sun just below the horizon, beginning to rise. Solar radiance, zenith angle, and azimuth angle were also calculated using LOWTRAN7 (a computer generated weather model) for the mishap location, time, and altitude (TAB K-7). On this date at 25,500 ft MSL, at the mishap location, sunrise was 0544I, approximately 17 minutes after the mishap. At the time of the mishap, the sun was 6.27 degrees below the horizon at a 111.3 degree azimuth, providing only limited radiance.

After the mid-air collision, Clan 31 maneuvered through the scattered cloud deck to begin the SAR operations for Clan 33. Because the mishap occurred near sunrise, the lighting conditions improved rapidly, and the weather conditions were not a limitation to the eventual recovery of Clan 33. Pro 61 initially set up an orbit at 10,000 ft MSL but later adjusted it to 14,000 ft MSL to stay above the scattered deck, before climbing to FL 240 to conserve fuel. Additionally, the wave heights were as forecast, with maximum swell tops at about 10 ft. This was the only significant weather restriction for the rescue based on the technical order landing limits (3 meters-9.8 ft) of the rescue aircraft and the actual pickup of the pilot.

The actual weather at Yokota AB for Pro 62's recovery was reported as 3 to 4 mi of visibility, no ceiling, and light winds. Although there were some scattered clouds in the area, the weather was not a restrictive factor in the safe recovery of Pro 62.

s. Directives and Publications:

AFM 2-36	Search, Rescue and Recovery Operations, Jan 67
AFR 55-2	Airspace Management, 4 Mar 91
AFR 55-17	Flight Delivery of Aircraft, 30 Mar 90
AFR 55-47	Air Refueling Management, 1 Sep 89
AFR 60-1	Flight Management, 9 Feb 90; C1 20 May 91; PACAF S1, 5 Nov 90; 5AF S1, 25 Jan 90
AFR 60-11	Aircraft Operation and Movement on the Ground, 17 Jan 86; C2, 21 Sep 90; PACAF S1, 31 Oct 90
AFR 60-16	General Flight Rules, 3 Mar 89; C1, 19 Dec 89; PACAF S1, 14 Dec 89
AFM 64-2	National Search and Rescue Manual, Nov 86
PACAFR 51-50 Vol 1	Tactical Aircrew Training, 30 Oct 85; Chptr 7, 13 Feb 91; C1, 10 May 91
PACAFR 55-12	Altitude Reservation (ALTRV) Procedures, 14 May 90
PACAFR 55-90	Operations, Search and Rescue, 15 Apr 91
PACAFR 55-116	F-16 Pilot Operational Procedures, 9 Nov 90
SACR 55-3	Airspace Management, 29 Dec 89; C1, 26 Mar 91; C2, 27 Sep 91
SACR 55-11	Aircraft Formation and Mito Procedures, 15 May 90
SACR 55-12, Vol 1	Air Operations, 20 Nov 89
SACR 55-25	KC-10 Air/Land Operations, 27 Mar 89
SACR 55-41	Tanker Task Force Operations, 16 Oct 89
ARSR 55-3	Rescue Coordination Center (RCC) Operations, 31 Mar 91
2 ADGR 55-7	Delivery Aircrew Briefings, 1 May 91

2 ADGR 55-9 Mission Operating Procedures, 1 May 91

T.O. 1-1C-1 Air Refueling Manual, 15 Jun 91

T.O. 1-1C-1-3 Air Refueling Procedures (KC-135), 1 Jan 87; C4
15 Dec 91

T.O. 1-1C-1-30 Air Refueling Procedures (F-16), 1 May 78; C11,
15 Jun 91

T.O. 1-1C-1-30CL-1 Flight Crew Checklist (F-16) Air Refueling with
KC-135 and KC-10, 1 Jan 87; C2, 4 Aug 89

T.O. 1-1C-1-33 Air Refueling Procedures (KC-10), 15 Apr 90;
C1, 21 Dec 90

T.O. 1C-10(K)A-1 Flight Manual, 1 Dec 90

T.O. 1C-10(K)A-1-1 Flight Manual Performance Data, 1 Apr 90

T.O. 1C-135(K)R-1 Flight Manual, 1 May 84; C26, 1 Jul 91

T.O. 1C-135(K)R-1-1 Flight Manual Performance Data, 30 May 85; C13,
15 Dec 91

T.O. 1F-16C-1 Flight Manual, 17 Oct 88; C5, 7 Oct 91.

T.O. 1F-16C-1CL-1 Flight Crew Checklist, 17 Oct 88; C5, 7 Oct 91

T.O. 1F-16C-1-1 Flight Manual Supplement, 29 Sep 91; C10, 17
Jun 91

T.O. 1F-16C-1-2 Flight Manual Supplement, 10 Oct 90;
C1, 1 Jan 91

HQ PACAF SAR Plan C-12, 1 May 91

432 FW Pilots' Guide, 3 May 91; C3, 18 Nov 91

432 FW Wing Standards, Dec 89

International Standards and Recommended Practice, Search and Rescue,
Annex 12, 12 Mar 75

Deviations from some of the above directives occurred.

SACR 55-12, Vol I, states, "When a tanker force supports a fighter/reconnaissance/interceptor aircraft movement, the tanker task force commander(s) will be selected in accordance with SACR 55-41."

SACR 55-41 para 2-2c, states, "The NAF will select the tanker task force commander."

SACR 55-25, para 2-6a, states "On SAC missions, a mission commander will be required when more than two aircraft are assembled to perform missions away from home station. With two aircraft, the tasked unit will designate an aircraft commander for overall mission responsibility, crew duties/crew rest permitting. When conflicts with crew responsibilities exist, a separate mission commander should be appointed to ensure mission coordination is accomplished."

A clearly defined chain of command (tanker task force commander or mission commander) was not apparent to support tanker ground operations or participate in decisions leading to changes in the tanker cell line ups. Individual tankers crews requested approval of their decisions from personnel not in their chain of command. (TABs U,V).

SACR 55-11, paragraph 1-5b(2), states, "Formation integrity and discipline begin with the formation briefing. The leader must ensure that all aspects of the mission are clarified and understood." Paragraph 2-2a states, "The recommended formation briefing guide (Attachment 1) may be used to conduct the briefing. As a minimum, the briefing must include all applicable items listed in the guide."

Testimony indicates that cell breakup was not covered clearly in the KC-135R AC's cell brief (TAB V-12-A).

T.O. 1-1C-3 and T.O. 1-1C-1-33, Chapter 1, states, "When more than one tanker is involved in an air refueling formation, the air refueling frequency will normally be used as the tanker interplane frequency during the entire air refueling operation."

The tankers had two interplane frequencies in addition to the air refueling frequency (TAB V-11-A and V-22-A).

SACR 55-11, Paragraph 1-4a states, "Separation between formation aircraft is the responsibility of the flight leader and the pilot(s) of the other aircraft in the flight. This includes transition periods when aircraft within the formation are maneuvering to attain separation for individual control."

The KC-10 AC failed to maintain his briefed number two position in the cell. The KC-135R AC/CP did not effectively clear their aircraft's flight path. (TAB V-12-A).

t. Summary:

During the first leg of the Coronet West 30 deployment of 432 FW F-16s from Misawa AB, JA, to Tyndall AFB, FL, (with an enroute stop at Hickam AFB, HI), Pro 62, the cell leader, a KC-135R, struck Clan 33, an F-16C. The mid-air collision occurred at night when the two cell tankers, Pro 62, assigned to the 92 WG, Fairchild AFB, WA, and Pro 61, a KC-10 assigned to the 4 WG, Seymour Johnson AFB, NC, developed converging flight paths and maneuvered to avoid colliding. Clan 33, on Pro 61's left wing saw the convergence and climbed. During those maneuvers, Pro 62's left wing struck Clan 33's aircraft from below. After the impact, the F-16 was not controllable and crashed into the Pacific Ocean, 625 NM east of Tokyo, JA, at

0527I. The KC-135R received damage to its left wing and landed safely at Yokota AB, JA, at 0840I. The F-16 pilot, Captain John L. Dolan, a fully qualified F-16 instructor pilot, ejected safely and was rescued after 4 1/2 hrs by a JMSDF seaplane at 1004I. Captain James R. Davey, the KC-135R aircraft commander, and his flight crew were fully qualified crew members and received no injuries during the collision. After the rescue, all other aircraft on the mission returned safely to Misawa AB, JA.

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