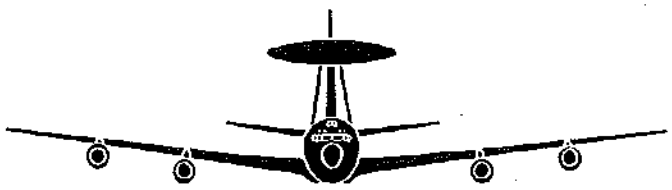

AFI 51-503

# USAF AIRCRAFT ACCIDENT INVESTIGATION REPORT

## E-3B
## AIRCRAFT
## #77-0354

ASSIGNED TO:
**3rd WING**
**ELMENDORF AFB, ALASKA**
**22 SEPTEMBER 1995**

CONDUCTED IN ACCORDANCE WITH AFI 51-503

APPOINTING AUTHORITY:

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SUBMITTED BY:

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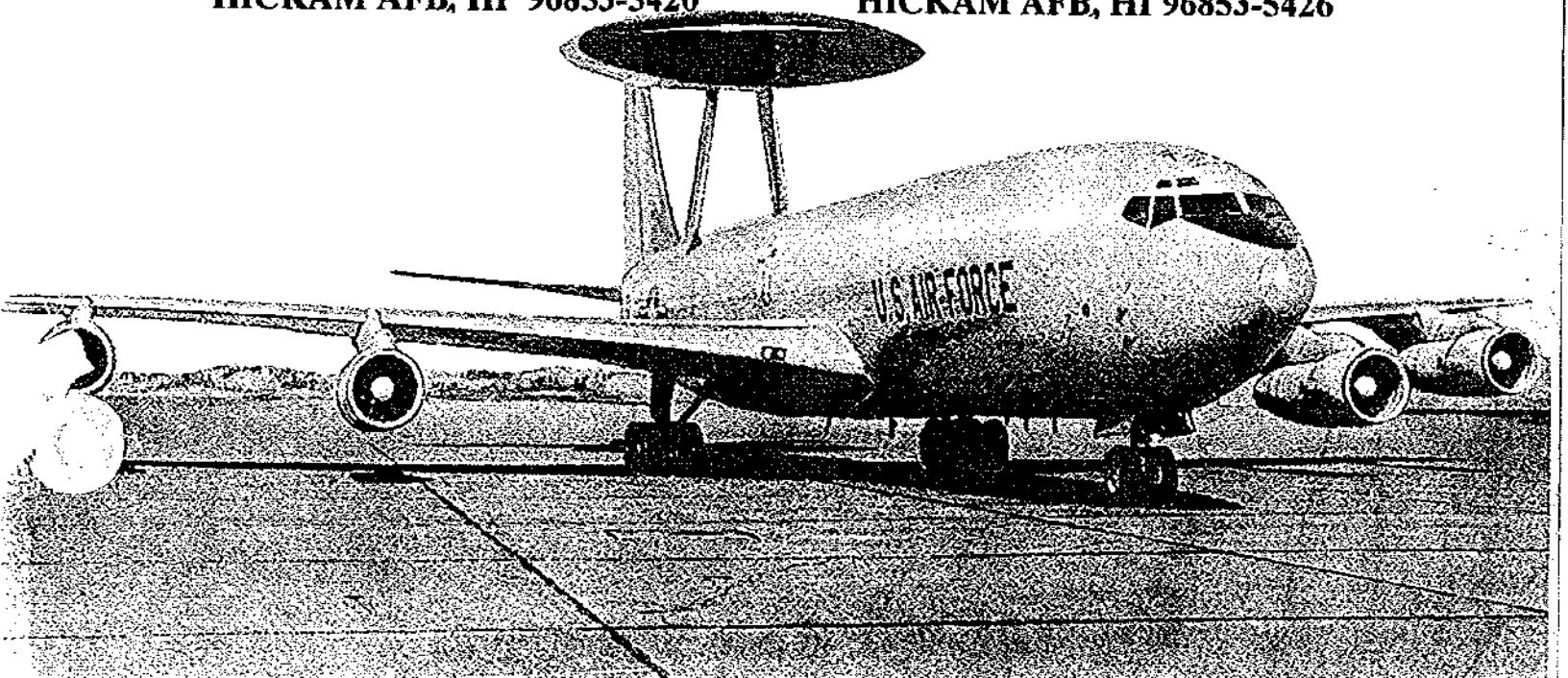

# EXECUTIVE SUMMARY

Accident Investigation
E-3B, SN 77-0354
Elmendorf AFB, Alaska
22 September 1995

While departing Elmendorf AFB on a routine training mission the morning of 22 Sept 95, an E-3B aircraft struck a flock of Canada Geese, several of which were ingested by the number one and number two engines. The result was an immediate, unconfined catastrophic failure of the number two engine as well as compressor stalls in the number one engine. The mishap aircraft began a slow left-hand climbing turn, struck a hilly wooded area less than 1 mile off the departure end of the runway and broke apart. The mishap aircraft was destroyed and all 24 crew members were fatalities.

The aircrew did everything humanly possible to fly this aircraft out of an unflyable situation. All flight deck aircrew members were fully qualified to perform in their assigned crew positions. Aircrew training and qualifications were not a factor in this accident. Material and maintenance factors did not contribute to this accident.

The flock of Canada Geese that the mishap aircraft struck after rotation originated in the infield area adjacent to runway 05. The senior controller in the tower told two witnesses that he observed the geese lift off and turn to the right, directly into the path of the mishap aircraft. Two minutes before the E-3 began takeoff roll, a C-130 taking off on the same runway flushed a flock of geese. The tower controller observed this flock, but did not notify the mishap aircraft or Airfield Management.

The geese had been roosting in the infield adjacent to runway 05 and 33. AFR 127-15 describes this condition as "an immediate safety hazard." The reason why the geese went undetected was the result of systemic failure. A Headquarters Air Force Safety Agency team conducted a staff assistance visit at Elmendorf AFB in July 1995. Their endorsement of the Wing's written plan (OPLAN 127-15) convinced the Wing that nothing else was required to prepare for migration season. Also, Elmendorf had experienced only one aircraft goose strike in the past five years.

The 3rd Wing had a well-written plan, but there were inadequate preventive measures to handle the growing number of geese on the airfield. Specifically, there was no augmentation of airfield patrols, no static deterrents, such as sound cannons, and no spotlighting of infield areas during hours of darkness. The primary action of the program at 3rd Wing was to maintain the infield grass at a recommended height of 7-14 inches. Airfield Management reacted effectively when geese were seen. In the 17 days prior to the accident they dispersed geese on seven occasions, and two days prior they killed geese that would not disperse. However, procedures to detect and deter geese were inadequate and lacked perseverance.

In summary, the accident was directly caused by the ingestion of Canada geese into engines one and two. Furthermore, two factors substantially contributed to the accident. First, the Wing lacked an aggressive program to detect and deter geese; specifically, the Bird Hazard Reduction Working Group did not adequately prepare for the migration season, Airfield Management's efforts to detect and deter geese were inadequate, and an earlier Safety Agency staff assistance visit had mislead the Wing to believe it was prepared. Second, the tower controller failed to notify the mishap aircraft or Airfield Management that geese were present in the infield.

## I. STATEMENT OF AUTHORITY AND PURPOSE

**A. Authority:** On 18 October 1995, General John G. Lorber, Commander, Pacific Air Forces, appointed Colonel Thomas J. Gresch as Accident Investigator (AI), under authority of AFI 51-503 (formerly AFR 110-14) to investigate an aircraft accident involving E-3B, 77-0354, assigned to the 962nd AACS, 3rd Wing, Elmendorf Air Force Base, Alaska (Tab Y).

**B. Investigation Period:** The investigation officially began 20 October 1995, when the AFI 91-204 Safety Board President released Part I of the Safety Mishap Report to the Accident Investigator.

**C. Purpose:** According to AFI-503, the purpose of this investigation is to obtain and preserve all available evidence for use in claims, litigation, disciplinary action, adverse administrative proceedings, and for all other purposes deemed appropriate by competent authority. This accident report is not privileged, and is releasable IAW AFI 51-503 and AFI 37-131, Air Force Freedom of Information Act.

**D. Time Reference:** The times addressed in this report are Alaska local times, unless otherwise noted. Furthermore, unless otherwise specified, times are stated in a 2400 hour clock format.

**E. Aircrew:** Twenty four personnel were aboard the mishap aircraft on 22 September 1995:

Captain Mishap Aircraft , Aircraft Commander;
Captain Mishap Aircraft , Co-Pilot;
Lieutenant Colonel Mishap Aircraft , Navigator;
Technical Sergeant Mishap Aircraft, Instructor Flight Engineer;
Technical Sergeant Mishap Aircraft Instructor Flight Engineer;
Major Mishap Aircraft, Mission Crew Commander;
Major Mishap Aircraft , Air Surveillance Officer;
Major Mishap Aircraft Mission Crew Commander;
Captain Mishap Aircraft Senior Director;
First Lieutenant Mishap Aircraft, Weapons Director;
Master Sergeant Mishap Aircraft , Instructor Advanced Air Surveillance Technician;
Technical Sergeant Mishap Aircraft , Instructor Airborne Radar Technician;
Technical Sergeant Mishap Aircraft , Airborne Area Specialist, 381st Intelligence Squadron;
Technical Sergeant Mishap Aircraft , Instructor Computer Display Maintenance Technician;
Technical Sergeant Mishap Aircraft , Instructor Advanced Air Surveillance Technician;
Technical Sergeant Mishap Aircraft , Instructor Communications Systems Operator;
Staff Sergeant Mishap Aircraft Instructor Airborne Radar Technician;
Senior Airman Mishap Aircraft Computer Display Maintenance Technician;
Staff Sergeant Mishap Aircraft , Instructor Air Surveillance Technician;
Senior Airman Mishap Aircraft , Instructor Communications Systems Operator;

Airman Mishap Aircraft, Air Surveillance Technician;
Airman Mishap Aircraft, Air Surveillance Technician;
Master Corporal Mishap Aircraft , Canadian Air Forces, Communications Technician;
Sergeant Mishap Aircraft , Canadian Air Forces, Battle Director Technician.

This is the normal crew complement for this aircraft and type of mission.

**F. Matters Investigated:** This Class A aircraft accident investigation involved an E-3B, AWACS. The aircraft was assigned to the 962nd Airborne Air Control Squadron, 3rd Wing, Elmendorf Air Force Base, Alaska. During a routine training mission, the mishap aircraft struck a flock of Canada geese, several of which were ingested by the number one and number two engines. The result was an immediate, unconfined catastrophic failure of the number two engine as well as compressor stalls in the number one engine. The mishap aircraft began a slow left-hand climbing turn, struck a hilly wooded area .9nm off the departure end of the runway and broke apart. The mishap aircraft was destroyed and all crew members were fatalities.

## II. SUMMARY OF FACTS

**A. History of Flight:** On 22 September, 1995, aircraft 77-0354, an E-3B (call sign YUKLA 27) was scheduled for an 0800 take-off on a 6.2 hour routine training mission. The aircraft was assigned to the 962nd Airborne Air Control Squadron, 3rd Wing at Elmendorf Air Force Base, Alaska. The mishap aircraft initiated take-off roll at 0745 from runway 05. Approximately 45 seconds later, after beginning the rotation for lift-off, the aircraft experienced numerous bird strikes in engines number one and two causing significant loss of thrust to both engines (Tab J). 39 seconds (Tab N) later, the mishap aircraft impacted a wooded area approximately .9nm (Tab R) Northeast of runway 05, fatally injuring all 24 crew members. The mishap aircraft was completely destroyed upon impact. This incident was the first loss of an E-3, so local, and national media attention was high.

**B. Mission:** Mishap aircraft was departing on a routine training mission. Scheduled sortie duration was 6.2 hours.

**C. Briefing and Preflight:**

**1. Crew Rest:** The crew was scheduled to enter crew rest at 1800 on Thursday, 21 September, 1995. This provided 12 hours of non-duty time prior to a 0600 show time on Friday, 22 September. All evidence indicates the flight crew received adequate non-duty time and crew rest was not a contributing factor in this mishap.

**2. Flight Planning:** Flight planning for this mission was accomplished in accordance with all applicable guidance and regulations. Flight planning was not a contributing factor in this mishap.

3. **Mission Briefing:** Mission planning and the pre-mission briefing were conducted in accordance with all applicable guidance and regulations. This briefing included a safety and emergency procedures briefing. The mission briefing was not a contributing factor in this mishap.

**D. Impact:** At 0747:12, the mishap aircraft impacted at coordinates 149 degrees, 45 minutes West and 61 degrees, 16 minutes North, approximately .9 nm Northeast of Elmendorf Air Force Base runway 05. The impact area is on Elmendorf Air Force Base property.

**E. Egress Systems:** Egress systems were not a factor in this accident.

**F. Personal and Survival Equipment:** The impact was not survivable (Tab J); therefore, personal and survival equipment were not a factor.

**G. Rescue:**

1. Aircraft 77-0354 crashed at 0747:12 immediately after take-off from Elmendorf Air Force Base, Alaska, on 22 September 1995. Base fire and rescue vehicles were alerted at 0746:44 when the tower controller activated the Primary Crash Alarm System (PCAS). Crash 10 was the first unit responding at 0747:49 (Tab N). The wreckage was located and the first firefighter was on scene at 0758. The first crew member was located at 0832 and the last body was found at 1938.

**H. Crash Response:**

1. There were many difficulties experienced in the crash response. The weather was not a factor and the sun was up and lighting conditions were good. The topography presented difficulties. Although the crash location was on base, there were no access roads leading to the site. Crash response firefighters initially proceeded to the scene on foot until a bulldozer created better access. The fire burned for several hours. Fire crew were able to get water hoses to the scene at 0901. Units from nearby Ft. Richardson also assisted in the crash response.

2. Overall, given the terrain and lack of access roads, crash response was very effective and people were on scene relatively soon after the crash. Due to the severity of the impact, however, crash response and rescue efforts were not a factor in this mishap.

**I. Environmental Response:**

1. The following environmental response was received from Capt. Jim Liddle, 3rd SPTG/CEVC. (Phone: DSN 317-552-8057/7021):

a. A preliminary environmental site assessment was conducted 28-29 Sep 95 for the site of the AWACS crash. The objective was to determine the location and extent of contamination. Per Alaska Department of Environmental Conservation (ADEC) regulation, 18 AAC 75, the area is considered a "spill" site requires a report to be filed with the state. This

happened immediately after the incident. Closure of the spill report will come when the ADEC is satisfied that the level of contamination is not compromising the environment.

b. 20 samples were taken for laboratory analysis. An effort was made to include areas known to be high in hydrocarbons, as well as future drainage zones and background samples. Sample locations were marked with large wooden stakes for future reference. Samples were analyzed for diesel range organics (DRO) and metals. Analytical results indicated that the only contaminant of concern was DRO from jet fuel. Drainage areas were free of contamination (as expected) and the land prior to the initial impact zone was also free of fuel.

c. A follow-up sampling occurred 01 Nov 95. The purpose of this task was to prove that the DRO had not migrated into the subsurface and that the higher levels were actually vaporizing and naturally attenuating. Although our marking stakes had been removed and much of the ground had been modified (including the addition of a gravel road through the site), we attempted to sample in areas that had been high in DRO initially. Samples were taken at the surface, where a comparison would indicate the level of dissipation, as migration was thought not to be an issue by the ADEC because there are no sources of potable water at the crash site.

d. Analytical results for the follow-up effort are expected 13-14 Nov 95. Once these are assessed, a final spill closure report will be filed with the ADEC. We expect that they will support our efforts to close this issue as quickly as possible. If that is the case, no future remediation projects will be required for the site.

e. Asbestos sampling was conducted for the site and pieces of wreckage thought to be asbestos containing material (ACM). A portion of the Rotodome was found to contain 1 to 2 percent ACM in a non-friable state. Non-friable asbestos does not pose a health hazard as long as it is not mechanically abraded or burned. It is intended that this material will be disposed per the applicable regulations, in an approved asbestos landfill.

**J. <u>Maintenance Documentation:</u>**

1. AFTO form 781 aircraft records and Computer Automated Maintenance System (CAMS) records for aircraft 77-0354 were reviewed (TAB U-A-1 through TAB U-A-40). My maintenance technical advisor visited the maintenance facility and reviewed all maintenance log books.

2. Operating time on number one engine was 10,369.0 hours (TAB U-E-1).

3. Operating time on number two engine was 25,803.5 hours (TAB U-E-1).

4. Operating time on number three engine was 23,743.9 hours (TAB U-E-1).

5. Operating time on number four engine was 12,813.3 hours (TAB U-E-1).

6. Engines were physically examined, and engine records and log books were reviewed. All engines were operating normally before the ingestion of birds.

7. AFTO 781 and CAMS reflect that all scheduled inspections were accomplished on time or scheduled for future inspections (TAB U-A-16).

8. Two TCTO's were discovered awaiting action; both have parts on back order (TAB U-A-21, U-A-22). Neither TCTO was a contributing factor to the accident.

9. BPO through flight conducted on 20 Sept 95 reflected no abnormal discrepancies (U-D-1, U-D-2).

10. Examination of maintenance documentation revealed no discrepancies that contributed to the accident.

**K. Maintenance Personnel and Supervision**

1. Inspection of personnel training records reflect that the Dedicated Crew Chief and Assistant Dedicated Crew Chief were thoroughly trained and current on all assigned maintenance tasks.

2. No Maintenance practice or procedures were related to the mishap.

**L. Engine, Fuel, Hydraulic and Oil Inspection Analysis**

1. The number one engine (S/N PW00707003) was installed on aircraft 77-0354 on 20 Mar 91 (TAB U-E-1).

2. The number two engine (S/N PW00660090) was installed on aircraft 77-0354 on 29 Jan 93 (TAB U-E-1).

3. The number three engine (S/N PW00659708) was installed on aircraft 77-0354 on 5 Apr 95 (TAB-U-E-1).

4. The number four engine (S/N PW00696822) was installed on aircraft 77-0354 on 11 May 94 (TAB U-E-1).

5. Fuel samples were collected from tank farm tanks 49, 50 and pump houses 88 and 89 (TAB U-B-1). Additional fuel samples were gathered from MA fuel truck # 89600973 and fuel hose cart #76W00175 (TAB U-B-1). The base fuel lab conducted particle assessment and fuel weight tests. No tests showed evidence of contaminated fuel. No fuel sample was recovered from the crash site, due to the post impact fire.

6. Hydraulic fluid was removed from hydraulic carts ACH1 and ACH2. Test results met specification limits (TAB U-C-1 ).

7. Oil was taken from oil carts ACO1 and ACO2. Test results met specification limits (TAB U-C-2 ).

8. Examination of the engine records and the fluid test results do not indicate any abnormalities that were factors in the mishap.

**M. Airframe and Aircraft Systems**

1. Aircraft 77-0354 arrived at Elmendorf AFB, AK on 16 Dec 93, with 14057.8 total operating hours. This aircraft had a good statistical record while assigned to the 962 AACS (TAB U-F-1). Over the past year, aircraft 77-0354 had an 83 percent mission capable rate and an 81.5 percent maintenance fix rate. Additionally this aircraft had only three ground aborts and six air aborts for FY 95 (TAB U-F-2).

2. The last Phase Inspection took place on 17-21 Jul 95. This scheduled inspection was complied with without any difficulty.

**N. Operations Personnel and Supervision:**

1. This mission was authorized for flight by Major Guy Wills, the 962nd AACS Assistant Operations Officer, Air (TAB K-6).

2. The briefing guide used for mission planning at the 962nd AACS is the 3rd Wing FORM 0-105, DEC 94 (TAB K-8). This briefing sheet was accomplished and it was not a factor in this mishap. Operations supervision was not a factor in this mishap.

**O. Crew Qualifications:**

**1. Overall Unit Training and Documentation Deficiencies**

a. The governing training regulation during the mishap was ACC/PACAFR 51-60 Vol 2, dated 2 Jun 92. This document covered currency requirements for the aircrew. PACAFR 51-60 Vol 2, has since been superseded by MCI 11-E3, which officially went into effect on 5 Oct 95. Currency requirements are different in this new instruction, but it did not apply to the E-3 mishap on 22 Sep 95. All currencies discussed are the ones in effect 22 Sep 95 from PACAFR 51-60, Vol 2. The unit documentation was excellent and no discrepancies were found. All flight deck aircrew were current and qualified in every required event and ready to fly.

**2. Capt** Mishap Aircraft **Aircraft Commander**

**a. Qualification Training:** Mishap Aircraft Commander completed his initial E-3 Co-pilot training in Mar 92 and upgraded to Aircraft Commander in Dec 94. The 962nd Squadron Commander certified him as a mission ready aircraft commander on 27 Feb 95. Mishap Aircraft Commander had a solid flying background with no breaks in flying operational assignments since pilot training.

**b. Continuation Training:**

**1. Ground Training:** Mishap Aircraft Commander ground training history was reviewed. He was current and up to date in all aspects of 962nd AACS required ground training.

**2. Flying Training:** Mishap Aircraft Commander was partially complete with his semi-annual flying training requirements. He was current in every event. Mishap Aircraft Commander briefly lost mission ready status on 27 Jul 95 for failing to maintain air refueling currency. He regained mission ready status on 17 Aug 95 (TAB T-A-24). Mishap Aircraft Commander met the Air Force requirements for his job and his flying training was not a factor in this mishap.

**c. Experience Level**

**1. Total Flying Experience:** Mishap Aircraft Commander had accumulated 1,922 hours of flying time, excluding student pilot training (TAB G). All of this flying was accomplished in the E-3B, E-3C, TC-18, and the SE003 simulator. Mishap Aircraft Commander was a mission ready, Experienced, GCC Level A, Aircraft Commander.

**2. Recency of Flying:** Mishap Aircraft Commander had flown one 10.0 hour sortie on 25 Aug 95. This was his only sortie in the last 30 days. He flew three additional sorties logging a total of 26.9 hours in the last 90 days (TAB G).

**d. Performance and Overall Qualification:** There were no documented recurring problems in Capt Mishap Aircraft Commander training records (TAB T). He had flown four sorties in the last 90 days. He was current by all Air Force standards. Mishap Aircraft Commander had a strong flying record and was a very capable Aircraft Commander.

**3. Capt Mishap Aircraft , Co-pilot**

**a. Qualification Training:** Mishap Aircraft Co-Pilot completed his initial E-3 Co-pilot training in Nov 92. The 962nd Squadron Commander certified him as a mission ready Co-pilot on 29 Dec 93. Mishap Aircraft Co-Pilot had a strong flying background with no breaks in operational flying assignments since pilot training. No discrepencies were noted in Mishap Aircraft Co-Pilot qualification or mission ready status.

**b. Continuation Training:**

**1. Ground Training:** Mishap Aircraft Co-Pilot ground training history was reviewed. He was current and up to date in all aspects of 962nd AACS required ground training.

**2. Flying Training:** Mishap Aircraft Co-Pilot had completed the majority of his semi-annual flying training requirements and had not lost currency in any event. He met the Air Force requirements for his crew position and his flying training was not a factor in this mishap.

**c. Experience Level**

**1. Total Flying Experience:** Mishap Aircraft Co-Pilot had accumulated 1,258.9 hours of flying time, excluding student pilot training (TAB G). All of this flying was accomplished in the E-3B, E-3C, TC-18, and the SE003 simulator. He was an Experienced, mission ready, GCC Level B, Co-pilot.

**2. Recency of Flying:** Mishap Aircraft Co-Pilot had flown three sorties in the last 30 days. He flew a 9.9 hour mission on 14 Sep 95 and a 6.5 hour sortie on 7 Sep 95. In addition, he flew four sorties in August and three in late July logging a total of 79.2 flying hours in the 90 days prior to the mishap (TAB G).

**d. Performance and Overall Qualification:** There were no documented recurring problems in Capt Mishap Aircraft Co-Pilot training records (TAB T). He was a strong Co-pilot who was being actively prepared for Aircraft Commander duties. His training records were thorough and gave a very clear picture of a responsible and competent aviator.

**4. LtCol Mishap Aircraft , Navigator**

**a. Qualification Training:** Mishap Aircraft Navigator completed his initial E-3 Navigator qualification in Jan 95 and became mission ready in Mar 95. Mishap Aircraft Navigator began his flying career in the RF4C. He returned to flying in the E-3 and was assigned to the 962nd AACS.

**b. Continuation Training:**

**1. Ground Training:** Mishap Aircraft Navigator ground training history was reviewed. He was current and up to date in all aspects of 962nd AACS ground training requirements.

**2. Flying Training:** Mishap Aircraft Navigator had completed approximately half of his semi-annual flying requirements. He was current in every event.

**c. Experience Level:**

**1. Total Flying Experience:** Mishap Aircraft Navigator had accumulated 1,150.3 hours of flying time, excluding student time (TAB G). All of his flying was accomplished in the RF4C or the E-3. Mishap Aircraft Navigator was an Experienced, GCC Level A Navigator.

**2. Recency of Flying:** Mishap Aircraft Navigator had flown a 9.9 hour sortie on 14 Sep 95 and two additional missions in the last 30 days. He flew seven more sorties for a total flying time of 79.2 hours in the last 90 days.

**d. Performance and Overall Qualification:** There were no documented recurring problems in Mishap Aircraft Navigator training records (TAB T). He was mission ready, current and qualified in the E-3.

**5. TSgt Mishap Aircraft , Instructor/Evaluator Flight Engineer**

**a. Qualification Training:** Mishap Aircraft Instructor/Evaluator Flt E completed his initial E-3 Flight Engineer training in Nov 85 and upgraded to Instructor Flight Engineer in Jul 92. The 962nd Squadron Commander certified Mishap Aircraft Instructor/Evaluator Flt E as mission ready in Aug 92. Mishap Aircraft Instructor/Evaluator Flt had accumulated 4,562.6 hours of flying time (TAB G). He was an Experienced, GCC Level A, Evaluator Flight Engineer.

**b. Continuation Training:**

**1. Ground Training:** Mishap Aircraft Instructor/Evaluator Flt Engine ground training history was reviewed. He was current and qualified in all aspects of required 962nd AACS ground training.

**2. Flying Training:** Mishap Aircraft Instructor/Evaluator Flt E had completed the majority of his semi-annual requirements. He was current and up to date and met all aspects of 962nd AACS required flying training.

**c. Performance and Overall Evaluation:** There were no documented training deficiencies in Mishap Aircraft Instructor/Evaluator Flt Engin records (TAB T). Mishap Aircraft Instructor/Evaluator Flt had flown seven sorties in the last 30 days for a total of 41.7 hours. He flew four additional missions in the last 90 days for a total of 70.2 hours. He was a well respected and experienced Instructor/Evaluator Flight Engineer with a very high level of experience.

**6. TSgt Mishap Aircraft , Instructor Flight Engineer**

**a. Qualification Training:** Mishap Aircraft Instructor Flt Engineer completed his initial E-3 Flight Engineer training in Mar 89. After a tour at Tinker AFB, OK, he transferred to the 962nd AACS where the Squadron Commander certified him as mission ready in Apr 93. Mishap Aircraft Instructor Flt Engineer had accumulated 3,510.3 flying hours (TAB G). He was an Experienced, GCC Level A, Instructor Flight Engineer.

**b. Continuation Training:**

**1. Ground Training:** Mishap Aircraft Instructor Flt Engineer ground training history was reviewed. He was current and up to date in all aspects of 962nd required ground training requirements.

**2. Flying Training:** Mishap Aircraft Instructor Flt Engineer was about half-way complete with his semi-annual flying training requirements. He was current and qualified.

**c. Performance and Overall Qualification:** There were no documented recurring problems in Mishap Aircraft Instructor Flt Engineer training records (TAB T). He had flown one 2.3 hour mission two days prior to the mishap and logged a total of 50.6 flying hours in the last 90 days Mishap Aircraft Instructor Flt Engineer was a well respected and experienced Instructor Flight Engineer with a great deal of flying time in the E-3.

**P. Medical:**

1. Medical records, toxicology reports and postmortem examinations of the 24 crew members associated with the mishap flight of 22 Sep 95 were reviewed. Their medical records were current and they were medically and psychologically qualified for flying duties. None of the crew members had any disqualifying medical conditions (Tab BB).

2. Postmortem toxicological reports were negative or consistent with tissue decomposition. Review of postmortem examinations revealed injuries that were consistent with damage to the aircraft and the crew members' duties on the mishap flight. Due to the nature of the accident and resultant injuries, the crew members died instantaneously and did not suffer (TAB AA).

**Q. Navaids and Facilities:** Local NOTAMS were reviewed (TAB K-4). The Elmendorf AFB bird condition was listed as "moderate". Other airfield data did not apply and was not a factor in this mishap.

**R. Weather:**

1. Various weather forecast documents were reviewed including satellite depictions and prognostic charts (TAB W). In addition, the DD 175-1 was reviewed (TAB K-3).

2. The mishap crew received a flight weather briefing on a DD Form 175-1. The briefing was conducted by a forecaster at 0605. The Aircraft Commander, Capt Rogers, received the weather briefing. It included the forecast takeoff and landing weather and any significant hazards expected for the planned flight.

3. Sunrise on 22 Sep 95 occurred at 0742. The lighting at the time of the mishap was twilight. The sun had yet to rise above the mountains to the East of the field but there was sufficient light to see objects without the aid of artificial illumination. Weather was overcast at about six to nine thousand feet and the temperature was approximately 55 degrees; visibility was greater than five miles. The winds for the takeoff were from the Northwest at 11 knots. The runway was dry and tire friction was normal. Weather was not a factor in this mishap.

**S. Governing Directives and Publications:**

1. The applicable instructions and regulations that apply to the mishap Aircrew are:

a. T.O. 1-1C-1
b. T.O. 1-1C-1-27
c. T.O. 1-1C-1-27CL-1
d. T.O. 1E-3A-1
e. T.O. 1E-3A-1CL-1
f. T.O. 1E-3A-1-1
g. AFI 11-206
h. MCR 55-33
i. 3rd Wing Instruction 13-203
j. ACC/PACAFR 51-60 Vol II

(b) (6)

THOMAS J GRESCH, Col, USAF
Accident Investigator

## III. STATEMENT OF OPINION

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

Based on eye witness testimony, technical analysis of the accident site, technical analysis of the aircraft engines, and simulator flight profiles, I believe the accident was directly caused by the ingestion of Canada Geese into the #1 and #2 engines (Tab V-B, V-C, V-D, V-F, V-G, V-H, V-J, V-K, V-M, V-U, V-V). The resultant loss of thrust rendered this aircraft incapable of controlled flight. It subsequently crashed into a hill less than a mile from the departure end of the runway (Tab R-3, S-2, V-F, V-G).

Based on a thorough review of the training records and Standardization/Evaluation records, it is my opinion that all flight deck aircrew members were fully qualified to perform in their assigned crew positions (Tab T). Aircrew training and qualifications were not a factor in this accident.

Based on technical analysis and a thorough review of maintenance documentation, procedures, personnel and supervision, I believe that material and maintenance factors did not contribute to this accident (Tab U, V-O, V-P).

Using the exact flight and atmospheric data that existed at Elmendorf AFB, AK, on the morning of 22 September 1995, I flew the mishap aircraft simulator profile at Tinker AFB, OK. I am convinced that a total power loss on #2 engine and a 50 to 70 percent power loss on the #1 engine immediately after rotation renders the E-3 incapable of controlled flight. I am convinced that the flight deck aircrew accomplished their emergency procedures flawlessly in an attempt to fly this aircraft out of an unflyable scenario.

I am convinced that the mishap aircraft struck a flock of Canada Geese that originated from an infield area adjacent to runway 05. The mishap Co-pilot and Flight Engineer saw "all the birds" simultaneous with the "Rotate" call (Tab N-40). Two eyewitnesses stated that they saw a disorganized flock of approximately 100 geese above, below and behind the mishap aircraft just after rotate (Tab V-U, V-V). The two personnel in the control tower had an excellent view of the runway area, but invoked their rights to remain silent; therefore, I was unable to obtain their testimony (Tab V-X, V-Z). Immediately after the accident, however, Eyewitness 1told two witnesses that he observed geese lift off and turn right, directly into the path of the mishap aircraft (Tab V-LL, V-VV).

A number of geese were roosting in the infield areas near runways 05 and 33 (Tab V-E, V-T, V-II). AFR 127-15 describes this condition as "an immediate safety hazard." Why these geese went undetected was the result of systemic failure. The Bird Hazard Reduction Working Group (BHRWG), required by AFR 127-15 and the supplemental 3rd Wing OPLAN 127-15, were

responsible for the overall implementation and supervision of 3rd Wing's Bird Aircraft Strike Hazard (BASH) program. I examined the Bird Strike Information for Elmendorf for the last five years (Tab GG). The only recorded incident of geese striking an aircraft occurred in September 1993 when a C-130 aircraft stuck several geese on the runway after a blacked out landing. It was common knowledge that migratory geese typically arrived in large numbers on Elmendorf during September and October (Tab V-E, V-AA, V-MM), but the BHRWG formulated no special plan to handle these increasing numbers (Tab V-AA, V-CC). There was no augmentation of airfield patrols. Additionally, static deterrents, such as sound cannons, were not utilized until after the accident (Tab CC, V-AA, V-I, V-T). I believe Airfield Management operated with little supervision or input from the BHRWG. Action depended on personalities rather than established process. Airfield Management reacted effectively when geese were seen, but procedures to detect and deter geese were inadequate. AFR 127-15 advises that perseverance is the key to bird dispersal. This lack of perseverance, especially in the infield areas, was a contributing factor to this accident.

Several witnesses emphasized the lack of Air Force training in BASH issues (Tab V-GG, V-HH, V-JJ, V-KK). The deficiencies I noted in bird detection and deterrence did not result from insufficient Air Force training. Airfield Management could have been instructed by the BHRWG to perform more frequent airfield checks, to go into infields, to use spotlights, or to install sound cannons. These tasks require little expertise and could have been performed easily. I believe the BHRWG and the Wing's Safety office had sufficient training and knowledge to formulate and implement an effective bird detection and deterrence program.

HQ AFSA/SEFW personnel (BASH Team) conducted a Staff Assistance Visit (SAV) at Elmendorf AFB in July 1995, before the fall migration had begun. This team emphasized habitat management but did not discuss the particulars of 3rd Wing's plan for migration season. The team did advise Airfield Management personnel to prevent geese from establishing themselves in the airfield. They reviewed OPLAN 127-15 and noted its sufficiency, but did not discover that BHRWG meeting minutes were not being kept (Tab DD, V-II).

Finally, Eyewitness 1, the senior tower controller on 22 September 1995, should have warned the mishap aircraft that geese might be near the runway. Just moments before the E-3 began takeoff roll, a C-130 taking off on runway 05 flushed a flock of geese (Tab V-LL, V-VV). Eyewitness 1 observed this flock, but did not notify the mishap aircraft (Tab V-LL, V-VV). While it would not have been standard operating procedure for a tower controller to raise the bird watch condition to severe, he certainly could have warned the aircraft of the potential hazard.

**A. <u>Background Information</u>**

**1. Controlling regulations require a thorough plan to reduce the potential for bird strikes to aircraft.**

Air Force Regulation 127-15, The Bird Aircraft Strike Hazard (BASH) Reduction Program, gives policy and guidance for implementing an effective bird aircraft strike hazard reduction program. It designates the Air Force agencies that are responsible for carrying out the program

and evaluating its effectiveness. It outlines procedures for developing a wing-level BASH program and establishes requirements for its operation. This regulation further states:

> The key to a successful BASH reduction program is an active concern by well trained individuals assigned specific tasks. Birds on runways, taxiways, or infields create an immediate safety hazard and must be dispersed before flying operations can safely continue. The key to active bird dispersal is perseverance. When birds are strongly attracted to an airfield, several teams may be required to provide continual harassment. A well-written, workable BASH plan is the key to reducing bird strike hazards and ensures continuity of knowledge with personnel turnover. Local expertise and assistance is available through the USDA Animal Damage Control.

3 WG OPLAN 127-15, based on AFR 127-15, establishes and defines the BASH Program at Elmendorf Air Force Base. Its purpose is to provide a base program to minimize aircraft exposure to potentially hazardous bird strikes in areas where 3 WG conducts flying operations. This plan is designed to establish a Bird Hazard Reduction Working Group (BHRWG), establish procedures to identify and to communicate hazardous situations to aircrews and supervisors to determine if altering / discontinuing flying operations is required, and to decrease the attractiveness of Elmendorf AFB to birds by eliminating, controlling, or reducing environmental factors which attract birds. The OPR (office of primary responsibility) for implementation of this plan is the 3 WG Safety Office. Members of the BHRWG include 3 WG Vice Commander as chairman, as well as a representative from Operations, Flight Safety, Airfield Management, Civil Engineering, the flying organizations and representatives from other interested agencies. Meetings are to be held semi-annually in conjunction with changing bird activity with meetings called by 3 WG/SE. 3 WG SOF (Supervisor of Flying) will declare bird watch conditions (BWC) based on personal observations, Airfield manager observations, pilot reports, radar observations, etc., and coordinate bird dispersal through the Airfield Manager. The 3 OSS/DOFJ (Airfield Manager) will coordinate BWC with the 3 WG SOF during duty hours, declare appropriate BWC through the tower supervisor when 3 WG SOFs are not on duty and coordinate dispersal of birds through the Base Wildlife Management Office under all BWC Severe conditions or 3 WG SOF requests.

**2. On 22 September 1995, the geese population on Elmendorf Air Force Base was high and many geese were frequenting the airfield.**

Mr. Witness 1 , U.S. Department of Agriculture Animal Damage Control Specialist, stated that there were entirely too many geese on Elmendorf Air Force base (Tab V-T). Mr. Witness 2 , Chief of Conservation and Environmental Planning, 3rd Civil Engineering Squadron, stated that he had counted the goose population on Elmendorf since 1990 (Tab V-E). He estimated that there were about 1,000 geese on site in 1990, with yearly increases until the population peaked this year at 2700. On the day of the accident, he estimated that there were around 900 geese on the base (Tab V-EE). Other witnesses have seen many geese on the base and airfield (Tab V-I, V-S, V-FF, V-MM). Three witnesses, who were at Elmendorf as part of a HQ PACAF Air Traffic Systems Analysis Visit (ATSAV) during a several day period just prior

to the accident remarked that the base, compared to other Air Force bases, had an unusually high number of birds (Tab V-LL, V-TT, V-UU). One witness stated, "But I've never really been at a location, except for, of course, Elmendorf now, that's had so many birds. I mean, not only on the flightline, of course, but all over the place. I mean they're everywhere" (Tab V-LL). Clearly, there was a large number of geese on Elmendorf the day of the accident.

It appears that an extremely dangerous condition was developing at Elmendorf: geese were becoming strongly attracted to the airfield area. Two members of the ATSAV team had occasion to view the airfield and commented on the number of geese there. One remarked that "it wasn't uncommon to see geese out there;" the other stated, "I had never seen that number of geese in an airfield before" (Tab V-TT, V-UU). Evidence suggests that geese were, in fact, roosting in the areas near runway 05 and 33 (Tab V-E, V-I, V-T, V-II). Between 6 September and 20 September 1995, Base Operations and Wildlife personnel dispersed geese from the airfield on several occasions (Tab CC, V-E, V-I). These efforts included actions to disperse geese from infield areas (Tab V-TT). Clearly, 3rd Wing was on notice that geese were indeed locating in infields as well as on hard surfaces such as runways and taxiways. On two occasions, Witness 2 's office had to kill geese with shotguns in order to disperse the flock. The geese were beginning to establish themselves and occasional dispersal was not deterring them from returning. As the Wing's Safety officer explained, "they were not reacting as normal" (Tab V-GG).

These infield geese were extremely hazardous, as AFR 127-15 makes clear. The presence of these geese warrants a Severe Bird Condition even if they are not directly on or above the runway. The movements of these geese can be sudden and unpredictable. Within moments, a large flock can fly from an airfield area to a location and altitude dangerous to aircraft (Tab V-T, V-II). Furthermore, geese tend to leave their roost in the early morning hours (TAB V-E, V-II, V-T). Clearly, this situation called for a plan of increased vigilance to detect and deter these geese.

**B. <u>3rd Wing Had No Aggressive Plan or Methodology to Detect and Deter Geese</u>**

**1. The Bird Hazard Reduction Working Group did not adequately prepare for migration season.**

A basic tenet of AFR 127-15 is the requirement for semi-annual Bird Hazard Reduction Working Group (BHRWG) meetings. After talking with several witnesses who would have been members of this group, I could not establish when the meetings were held or what topics were covered. Colonel , 3rd Wing Vice Commander and Chairman of the BHRWG, stated that the BHRWG was not part of the Foreign Object Damage (FOD) Board meetings, but typically met immediately after the FOD Board and did so on a monthly basis (Tab V-AA). Colonel , the Operations Group Commander could recall one occasion when the BHRWG met after the FOD Board (Tab V-CC). Lieutenant Colonel , Commander of the Operations Support Squadron, which included Airfield Management, never attended a BHRWG and had no idea who did (Tab V-DD). MSgt , who was the Flight Safety NCO and had much responsibility for the BASH plan and program, stated that the BHRWG was sometimes separate from the FOD

Board and other times bird issues were addressed during the FOD Board (Tab V-SS). TSgt Witness 3 who assumed Flight Safety NCO duties during September 1995 when Flight Safety NCO was reassigned to the 509th Bomb Wing, testified that Flight Safety NCO told him during a brief turnover of BASH information that the BHRWG was part of the FOD board (Tab V-HH). MSgt Witness 4, who was present at nearly every FOD board during 1995 could recall no occasion when the BHRWG met after the FOD Board (Tab V-QQ). His belief was that there were no separate BHRWG meetings because the Safety office had erroneously assumed that BASH issues were addressed during the FOD board (Tab V-QQ). He related that TSgt Witness 3 called him several weeks after the accident and told him to be sure to mention "BASH" during the FOD board so the term would be reflected in the minutes of those meetings (TAB V-QQ). Colonel 3rd WG Vice CC and Colonel Ops Group CC refer to BASH (historical data) slides (Tab V-AA, V-CC), but these slides were shown during FOD Board meetings (Tab V-QQ). It is possible that the BHRWG also showed these slides. It is equally possible that Colonel 3rd WG Vice CC and Colonel Ops Group CC are confusing the showing of BASH slides at the FOD Board with a separate BHRWG meeting.

What topics were addressed by the BHRWG was also difficult to ascertain. As stated, several witnesses refer to the BASH slides, but these slides simply contain historical data (Tab FF). Colonel 3rd WG Vice CC stated that the March 1995 BHRWG meeting was intensive, but it is not clear what was discussed. He stated that migration season was discussed during the May 1995 meeting, but went on to say that the main emphasis was preparation for the SAV (Tab V-AA). Colonel Ops Group CC could recall no specific discussions, only the slides (Tab V-CC). Flight Safety NCO stated that bird hazard strategies and awareness was occasionally discussed during the FOD Board. Who attended the BHRWG and what was discussed was further complicated by the fact that no minutes of BHRWG meetings were kept. Although Lieutenant Colonel , Chief of 3rd Wing Safety, opined that minutes are not necessary (Tab V-R), AFR 127-15 clearly establishes this requirement. I also examined the minutes of the last ten FOD Board meetings and could find no mention of the BHRWG or associated meetings.

The BHRWG did not formulate a concrete plan to deal with changing bird activity levels or the presence of geese in the airfield. 3rd Wing had an effective OPLAN, but the BHRWG was responsible for ensuring that the implementation of this plan resulted in effective geese detection and deterrence at all times of the year. Colonel 3rd WG Vice CC and Colonel Ops Group CC stated that the only specific tasks assigned to individuals was to prepare for the SAV (Tab V-AA, V-CC). MSgt Flight Safety NCO claimed there was no special preparation for the SAV because the Wing's OPLAN was already prepared and operating (Tab V-NN). Colonel 3rd WG Vice CC explained that, because the migration meeting was in May 1995 before the season began, there was no frame of reference for assigning specific tasks (Tab V-AA). I am unsure why there was no follow up meeting after the geese began arriving and frequenting the airfield. Colonel 3rd WG Vice CC stated that it appeared everyone was prepared for the migration season and that Flight Safety NCO had told him that geese were not a problem in the airfield (Tab V-AA). Reports submitted after the May 1995 meeting, however, indicated that geese were arriving on base and becoming a problem in the airfield (Tab EE).

Wildlife experts were not included in the FOD Board or BHRWG meetings during 1995, but Witness 2 submitted information concerning goose counts in reports that Colonel 3rd WG Vice CC

received (Tab EE, V-AA). The 21-25 August and 4-8 September 1995 reports state "Canadian goose counts continue to be high, with the birds showing up regularly along the flight line. Conservation agents have twice assisted Base OPS in dispersing the birds from the runway medians during the past week." The 11-18 September 1995 report states "Canada goose counts continue to be high, with the birds showing up regularly along the flightline. Due to the number of cracker shells being expended in driving geese from the flightline, conservation agents have been instructed to shoot a few geese, if they have to fire more than five cracker shells to disperse them" (Tab EE). As stated, 3rd WG Chief of Safety was also aware that the geese were not reacting as normal to dispersal efforts (Tab V-GG). As OPR of the OPLAN he could have called a special meeting of the BHRWG. It is not clear whether the BHRWG ever discussed the fact that geese were becoming a problem on the airfield. Perhaps it was assumed that Airfield Management would meet the increased challenge. Regardless, the lack of a strategy to handle migration season left Airfield Management to exercise their own judgment, which resulted in poor detection and deterrence of geese.

**2. Airfield Management's efforts to detect and deter geese were inadequate.**

AFR 127-15 states that perseverance is the key to controlling airfield areas and warns that single trips around the runway perimeter are not effective. The regulation advises that several teams may be required to deter geese who are strongly attracted to an airfield. Roosting infield geese went undetected because Airfield Management had no controlling plan to locate them. Technical Sergeant Witness 5 one of the key personnel conducting airfield patrols, stated that there was no formal strategy or instruction, only word of mouth transfer of information from one person to the next (Tab V-I). It is evident that personnel knew geese posed a danger to aircraft and they acted to disperse them on several occasions, but their efforts to detect or deter infield geese were inadequate. Few, if any, of the suggested patrol and deterrent methods suggested by AFR 127-15 were in place.

The several team approach recommended by AFR 127-15 was not implemented. TSgt Witness 5 described solo patrols during which he used his truck to scare geese from one airfield area to another (Tab V-I). Moreover, it appears that these patrols occurred infrequently. While regulations require only two checks per day (Tab V-UU), the high number of geese in Elmendorf's airfield warranted increased patrols. The last runway check on 22 September 1995 occurred nearly 3.5 hours before the mishap aircraft began takeoff roll (Tab CC). Several geese could have arrived in the infields after the last check and prior to the takeoff of the E-3.

Airfield Management did not sufficiently check these infield areas for the presence of geese. Base Operations personnel and Supervisors of Flying were engaged in little other than vehicle sweeps of runways and taxiways (Tab V-I, V-K, V-Q). A cursory glance at the infield would not result in the detection of geese (Tab V-E, V-II). These patrols were effective, if at all, during daylight hours only. Prior to the accident there was no illumination of infield areas before first light. Furthermore, there were no static deterrents, such as cannons, to make the airfield habitat unattractive to geese (Tab V-T). Airfield cannons are not an absolute necessity, but, without them, superior detection methods would be needed. The worst possible combination existed: there were infrequent patrols of the airfield, nearly no checking of infields, and no placement of

static deterrents. This combination of factors resulted in geese roosting in the infields without being detected. Those aircraft that began takeoff roll at or before dawn were at risk that those geese would move into their flight path, as it happened in this accident.

I could not determine why Airfield Management did not aggressively patrol infields. I agree with Colonel [3rd WG Vice CC] that, if anyone had known geese were roosting in the infield, the birds would have been dispersed (Tab V-AA). Given the several witnesses who had, at one time or another, seen geese in nearly every airfield location, it is difficult to believe that no one considered the possibility that geese could be roosting there. It seems there would have been a greater interest in those median areas. There was a general assumption, however, that geese would not roost in the infields. This assumption may explain why there were limited detection and deterrent measures. Whether Airfield Management should have taken a more active role in detection and dispersal without being told to do so by the BHRWG is difficult to say. MSgt [Witness 6] was the Airfield Manager. She was well aware of the BASH plan and had been personally briefed by the BASH Team during the July 1995 SAV. I attempted to establish her understanding of Airfield Management's specific responsibilities in the OPLAN, but she invoked her right to remain silent (Tab V-Y).

**3. The Staff Assistance Visit (SAV) conducted by HQ AFSA/SEFW during July 1995 may have contributed to the BHRWG belief that 3rd Wing was prepared for migratory season and to the assumption that geese would not roost in infields.**

The SAV concluded that Elmendorf Air Force Base was in "fine shape" (Tab DD). The visit occurred during the month of July, when the goose population was quite low (Tab V-E). The team spent the majority of their time surveying the airfield and other outdoor areas (Tab V-S, V-II). The team did not attempt to locate minutes from BHRWG meetings or to evaluate participation in or content of these meetings. Major [Witness 7] stated the BASH Team does not "get into digging into the specifics in a lot of cases" (Tab V-II). During the debrief, the BASH Team emphasized that geese should not be allowed to establish themselves in the airfield. It is not clear whether the team believed static deterrents in the airfield were unnecessary, assumed there would be active patrols by Airfield Management personnel, or simply did not realize that migrating geese would be highly attracted to the airfield. I believe the BASH Team's endorsement of the Wing's OPLAN convinced the BHRWG that nothing else was required to prepare for migration season (Tab V-AA).

The SAV may have generated a false assumption that geese would not remain in tall grass. The SAV team echoed the recommendation in AFR 127-15 that infield grass be kept at seven to fourteen inches in height. The logic is that birds do not feed in long grass and do not roost there because they cannot see predators (Tab V-E, V-T). Several witnesses believed that habitat management was the key to deterring geese, and that geese would not frequent infields when grass was kept at that height (Tab V-AA, V-BB, V-FF, V-OO). The problem was that the infield grass at Elmendorf was bent by heavy rains and became low enough for the geese to roost but remained long enough to conceal them from a cursory view (Tab V-E, V-II). It is possible that Airfield Management personnel did not routinely check infields because, based on the SAV, they

assumed there would be no geese there. Regardless, these geese remained and originated from one of those areas before striking Yukla 27 on 22 September 1995 (Tab V-E, V-K, V-T, V-U, V-V, V-LL, V-VV).

## C. MSgt Eyewitness 1 Should Have Warned The Mishap Aircraft

Moments before the mishap aircraft's departure, MSgt Eyewitness 1 witnessed a C-130 takeoff and flush a flock of geese from the infield adjacent to runway 05 (Tab V-LL, V-VV). Fortunately for that aircraft, this flock turned away from its flight path. MSgt Eyewitness 1 was on notice that geese were concealed from view in the infield area near runway 05. While he could have assumed that every infield goose joined the flock that the C-130 flushed and that this flock had left the area, sound judgment dictates that he should have contacted the E-3 and warned the crew. The aircraft could have held takeoff until the squadron SOF or Base Operations could ensure that these geese had not returned and that no more geese were in the area. I cannot imagine why MSgt Eyewitness 1 did nothing. He had more than two minutes to advise the mishap aircraft that a flock of geese had taken wing and nearly struck the C-130 (Tab N).

The witnesses whom I queried regarding MSgt Eyewitness 1 actions did not believe it was clear that he should have warned the aircraft or changed BWC to severe (Tab V-LL, V-TT). CMSgt Witness 8 an expert in tower control procedures, stated that no regulation authorized MSgt Eyewitness 1 to raise the bird watch condition to severe (Tab V-UU). It is true that 3rd Wing's OPLAN envisioned the SOF or Base Operations changing bird watch conditions, but MSgt Eyewitness 1 did not have a SOF in the tower, and Base Operations had already completed an airfield check without spotting these geese, who may have flown in after the last patrol. CMSgt Witness 8 stated that 3rd Wing altered its OPLAN after the accident to allow tower controllers to change the bird watch condition. I do not view the change in the OPLAN as an indicator that it was poorly conceived. Whether MSgt Eyewitness 1 changed the bird watch condition is irrelevant. As an experienced SOF stated, many geese were dispersed from the airfield in the past without a change in bird watch condition to severe (Tab V-MM). The goal is not changing bird watch condition; it is ensuring the safety of aircraft. The relevant question is whether MSgt Eyewitness 1 should have warned the aircraft. He could safely assume that no one outside the tower had seen a flock of geese leave the infield area. I believe he had a duty to warn the mishap aircraft and that his failure to do so was a contributing factor to this accident.

(b) (6)

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