



ACCIDENT INVESTIGATOR'S HANDBOOK

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This Accident Investigator's Handbook, dated August 2015, supersedes the handbook dated September 2012.

This manual is used in conjunction with AR 385-10 Chapter 3 and DA PAM 385-40 for Army accident investigations. It may be used as a guide for units in the field. This manual is not all encompassing nor does it supersede any regulations, official pamphlets, or local standing operating procedures (SOP).



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Introduction

PURPOSE: To provide a concise, standardized set of instructions and procedures to assist U.S. Army Accident Investigation/Installation-level accident (CAI/IAI) boards. This handbook is designed to supplement DA PAM 385-40, as a daily use guide for accident investigations.

APPLICABILITY: The manual is intended for use by accident investigation boards and as a guide for field accident investigators who are appointed by their local command. Contents of this guide are intended for both aviation and non-aviation (ground) accidents. Unless otherwise stated, information pertains to either type accident. Where necessary, differences have been delineated. Additionally, this guide does not cover all circumstances. Contact the operations officer, USACRC, DSN 558-3410/2660, commercial (334) 255-3410/2660 for special instructions concerning situations and circumstances not covered in this handbook.

For a digital copy of this handbook and additional information for use during an accident investigation, type “USACRC” into a Web search engine. Once at the U.S. Army Combat Readiness Center’s webpage click the drop down arrow on “REPORTING & INVESTIGATION” then click “Tools” for downloadable information and investigation tools.

Point of contact for accident investigations and this guide is U.S. Army Combat Readiness Center, chief, Accident Investigations Division, DSN 558-2194, commercial (334) 255-2194.

Getting Started

1-1. NOTIFICATION.

a. General. By nature of an accident being an unplanned event, notification and lead time for preparations are very short. Board members can expect 24 hours or less from notification to forming a local Installation-level Accident Investigation (IAI) Board or the deployment of a Centralized Accident Investigation (CAI) from the U.S. Army Combat Readiness Center.

b. Initial Actions. After initial notification, the board president or recorder sends the accident unit's point of contact (POC) a checklist (see Appendix A) of actions and materials needed for the board. This checklist helps focus the unit POC and assists the board in preventing unnecessary delays to the investigation.

1-2. ARRIVAL.

a. General. Upon arrival, the board president and recorder meet with the unit POC, set up the board room, form the board, visit the accident site, if possible, and conduct in-briefs with the appointing authority/chain of command.

b. Unit POC. Unit POCs are your primary conduit for data collection from the accident unit, scheduling of interviews, and communication with the chain of command. In most cases the POC is the installation or unit safety officer. During your initial meeting with the unit POC, check on scheduling an in-brief with the appointing authority and accident unit's battalion and brigade commanders. Additionally, check on orders for the board. The board is operating under the authority of the appointing authority and the absence of orders can sometimes delay the gathering of important data.

c. Board Room. The board room is your primary work and interview area during the investigation. It's important to establish the board's working area as quickly as possible. In cases of remote accident sites, this may not always be possible. If the accident site is near the installation or designated work area, the board president may elect to establish the work area after ensuring that the preliminary accident site investigation is ongoing. An ideal board room is similar to a conference room with enough room to work and seat all the board members, away from common work areas, to facilitate confidentiality of the investigation.

d. Forming the Board. One of the team's first challenges is to assemble the board. In most cases, the board members do not arrive simultaneously. Its members may be provided by the host installation or may be required to travel from other locations. Selection, notification and travel of other board members may require days instead of hours. Whatever the circumstance, the board president and recorder must develop a plan to gain control of other board members and advisors immediately upon arrival. Administrative orders and costs that are associated with the travel of board members are the responsibility of the accident unit and should be controlled and coordinated by the accident unit.

e. Accident Site. Get to the accident site as quickly and safely as possible. There are two important reasons. First, the board must gain control of the accident site and record any evidence that may be perishable. Trained safety personnel usually attempt to preserve the site to the degree possible, however well-intentioned, but uninformed interested personnel often feel the need to inspect the scene personally and may inadvertently destroy evidence in the process. Impending inclement weather is an obvious scenario where the board may find it necessary to view the site even during periods of darkness. The board checks the weather at the accident site and makes a determination with the unit POC and equipment subject matter expert (SME) as to whether or not fluid samples will be compromised by the effects of inclement weather. If so, have the unit POC coordinate with maintenance personnel to take the required samples prior to the onset of inclement weather. These samples are sequestered with the equipment's records and logbooks and made available to the board upon arrival. Second, display a sense of professional urgency to begin the investigation.

f. In-briefs. The board president should in-brief the appointing authority as soon as possible. The appointing authority in-brief is informal and does not require media support or a briefing room. Often, it is done in the appointing authority's (or designated representative's) office. The purpose is to inform the appointing authority regarding the board's mission, composition and requirements (see Appendix B). On occasion, the appointing authority may provide additional guidance regarding areas that he feels need particular emphasis. The board restricts their comments to the process the investigation will undertake and the specific roles and responsibilities of each subject matter expert (SME) assigned to the board. Discuss the materiel, human and environmental factors teams. Avoid speculation about any preliminary data gathered either en route to the accident or during any initial communications with members of the accident unit. Reinforce

the investigative process and that it is not until the board conducts deliberations that its findings are developed. Inform the commander that the board will advise the unit of any immediate safety concerns that are identified during the process of the investigation. It is important to note that the decision to continue flight or ground operations is a commander's decision and the board does not make that determination on behalf of the unit.

1-3. ORGANIZATION & PLANNING. (See DA PAM 385-40, Paragraph 2-1)

a. Board In-brief. Before starting the investigation, it is important to ensure that all board members understand the investigation concept and plan (see Appendix C). The investigation plan is a systematic process that ensures continuity of effort from the preliminary examination of the accident site to the submission of the final report. The plan is divided into four phases-

- (1)** Organization and preliminary examination (two days)
- (2)** Data collection (eight days)
- (3)** Data analysis and deliberations (two days)
- (4)** Completing the technical report (two days)

b. Phase 1 - Organization and preliminary examination. This phase provides the opportunity for the board president to organize the board personnel into materiel and human factors board members for the investigation. This is accomplished in a board meeting before departing for the accident scene. This meeting ensures that every board member understands the areas of the investigation for which they are responsible, the initial tasks to be accomplished (see paragraphs below) and the data elements to be collected to complete the report. The board is also briefed by the unit/installation safety director/officer on the status of preliminary actions. Once the board arrives at the accident site, its members make a controlled entry (ensuring the site, to include ground scar/mark, is not disturbed) to get a "mental picture" of the physical layout. This orientation usually requires less than 30 minutes. If the board cannot arrive at the scene with adequate daylight remaining, the preliminary examination may be delayed until the following morning.

c. Phase 2 - Data collection. Human, environmental and materiel

factors are interrelated as each influence the performance of man and machine. Divide data collection into the following areas:

(1) Environmental Factors. Collection of environmental evidence is simultaneous and inclusive with the human and materiel factors evidence collection.

(2) Materiel Factors (see Appendix F). Materiel factors concerns gathering data necessary to evaluate the performance or design of the vehicle, aircraft, buildings, ground support equipment or other material involved. The materiel factors team also conducts a thorough review of previous maintenance performed on the accident equipment to check for inadequate maintenance procedures.

(3) Human Factors (see Appendix G). Human factors are primarily concerned with gathering data necessary to evaluate the job performance of all personnel who influenced the operation that resulted in the accident. Data collection should enable analysis focused on the five dimensions of human factors (individual, leader, training, support, and standards failures). To accomplish this the human factors team gathers all associated training records, unit SOPs, authorized briefer memos, unit training calendars and plans, unit manning documents and critical shortage MOSs, the mission brief and risk assessment.

d. Phase 3 - Data Analysis. The analysis function is an ongoing process throughout the data collection phase. Conclusions derived from the analysis are the basis for developing findings and recommendations. The analysis is thorough and focuses on determining why the accident occurred. This drives the analytical effort throughout the investigation, so that findings and recommendations can be developed that have the best potential for preventing similar accidents. (See Chapter 4 for a detailed discussion of data analysis).

e. Phase 4 - Completing the technical report. In this phase, the board ensures all relevant evidence gathered is carefully recorded (Chapter 10 provides detailed instructions on completing the report). It is not unusual for some of the evidence to be contradictory. Contradictory evidence is discussed and resolved to the extent possible in the analysis.

Investigation Process.

(See DA PAM 385-40, Paragraph 1-5 & Chapter 2)

2-1. OVERVIEW.

a. 3W Approach. The on-site accident investigation process utilizes the “3W” approach. The “3W” approach reveals adverse interactions of man, machine and environment, which caused or contributed to the accident.

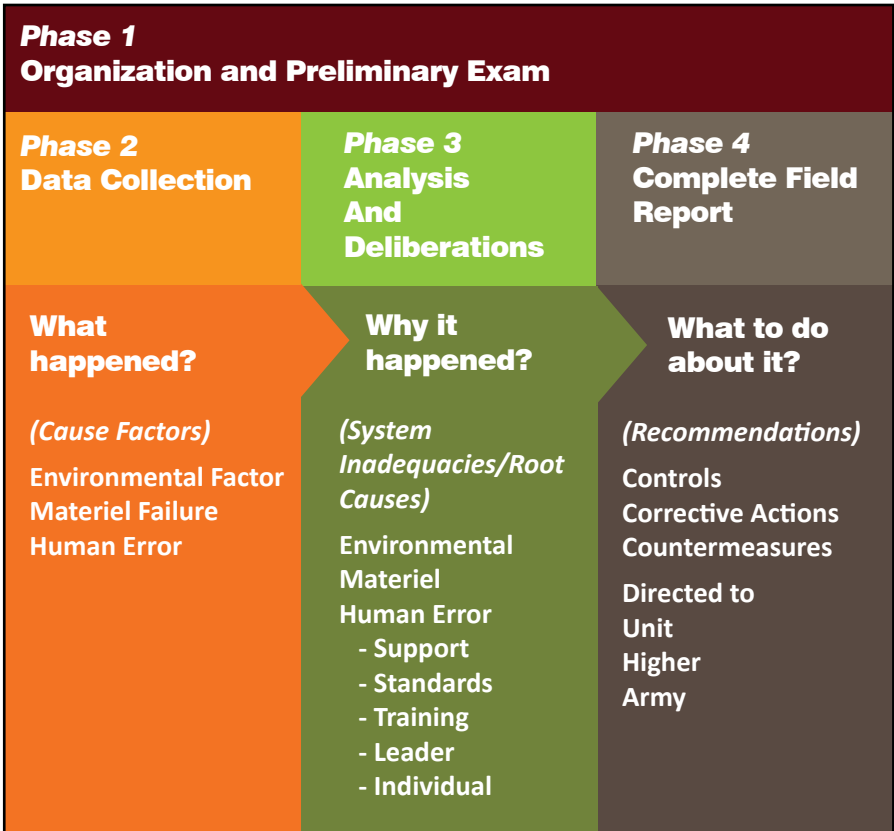


Figure 2.1

(1) What happened (mistake/error, materiel failure, and/ or environmental factor). Identify key factors (human, materiel, environmental), which caused or contributed to the accident. In the case of injuries, explain how they happened. (See DA PAM Tables B-1 through B-6 for additional information/guidance)

(2) Why it happened (root cause(s)/system inadequacy(ies)). Identify the system inadequacy(ies) that permitted the mistake/error to occur, the materiel to fail/malfunction or the environment to become a factor in the accident. Identifying and resolving root causes/system inadequacies are the keys to preventing future accidents. It's important to remember the purpose of Army accident investigation is to identify underlying causes and contributing factors that led or will lead to future accidents and not fault. Fault is a function more appropriate for collateral boards or legal inquiries and can often be a distraction to CAI/IAIs during the conduct of an investigation. Identifying who is at fault does little or nothing in pointing out how to prevent a similar accident in the future. Focus on why, not who.

(3) What to do about it (recommendations). Identify the recommended actions and identify the proponent activity or lowest level of command that is most responsible for taking action targeted at eliminating/correcting the system inadequacies/root causes (both at the unit and, if applicable, Army levels). It is important to provide the local commander with recommendations to address his local situation, but it is equally important to provide the Department of the Army with recommendations to address Armywide hazards. Recommendations are based on the circumstances as they existed at the time of the accident. Often units make immediate changes based on the early understandings of an accident. While that is a unit commander's prerogative and certainly appropriate it does not affect the resulting findings and recommendations. If the circumstances existed in this organization they most likely exist in other organizations and it is the responsibility of the CAI/IAI to ensure the widest dissemination of accident prevention information possible, through their report. Additionally, the appropriate activity responsible for correcting each identified system inadequacy is notified by the U.S. Army Combat Readiness Center. This process is continually followed up to ensure recommendations have been adopted by the field and that appropriate measures are in place to ensure accident prevention.

2-2. DATA COLLECTION.

a. Crucial to any investigation is the gathering of data and physical evidence. Tactical situation determines the level of detail collected in a combat zone. The data/evidence collected during an accident investigation becomes the very basis of the accident investigation board's analysis and conclusions. Therefore, a thorough effort to collect all relevant data and evidence must be made.

b. Data and evidence collected during an investigation should include:

(1) Physical evidence - Matter related to the accident such as equipment, parts, debris, hardware, voice recorders and other physical items. **NOTE:** *It is critical to preserve digital source data from aircraft/vehicle recording devices (See Appendix J).*

(2) Verbal evidence - Witness statements and observations.

(3) Documentary evidence - Paper and electronic information, such as records, reports, policies and procedures, photos, videos, accident site graphs, duty logs, board proceedings and notes, board member notes, etc.

(4) Recording of anomalies – Through the course of collecting data and evidence there are those factors uncovered by the board that deviate from the norm or expectations. The board records these anomalies for discussion and analysis during the analysis phase of the investigation. Typically, anomalies are recorded under the headings of environmental, human and materiel factors.

c. The collection of evidence and data comes from six major areas-

(1) The Accident Scene. Prepare a site diagram that captures positions of debris, equipment, tools, body parts and injured persons. Also, check with the host organization's designated representative to see if any photographs, diagrams, videos or other pictorial representations of the scene have been collected and are available for viewing. When feasible, visit the accident site at the time of day commensurate with the accident time and under the same conditions. Doing so gives the investigators a more accurate picture of the existing environmental conditions at the time of the accident (glare, traffic, road conditions, etc.). These observations should be recorded in notes, diagrams and photographs so that investigators avoid relying on their memories.

(2) Witness Interviews. Although witness interviews provide insightful information, witness recollection rapidly deteriorates and can be inadvertently tainted through media exposure and from comparing stories with other witnesses. Statements taken from witnesses located immediately after the accident are more reliable. To ensure witness statements are accurate, detailed and as authentic as possible, witness interviews are given a high priority. (See DA PAM Paragraph 2-3 for interview techniques)

(3) Command Data. Command factors at all levels are evaluated to determine if command influence or lack thereof, contributed to the cause of the accident or could play a role in preventing future accidents. Collecting both documentary and verbal evidence helps investigators determine whether personnel in the organization had knowledge of the policies and procedures as well as the organization's enforcement of policies and procedures. Risk management is assessed with respect to the accident under investigation. Determine what decisions were made which may have "set up" the accident and the authority level of the person making that decision, starting from the accident itself back (to include DA level decisions, if appropriate).

(4) Environmental Data. Data pertaining to environmental conditions (at the time of the accident) is collected to evaluate its impact or influence on the performance of the individuals and/or equipment involved. Environmental conditions include terrain, noise, electromagnetic effects (E3), lighting, glare, space, quality of air, lunar illumination (moonrise/moonset) for night or NVG missions, IR crossover times for FLIR and weather/meteorological (humidity, pressure, temperature, wind and illumination) conditions. To determine if an environmental factor should be assessed as a causal factor, the central questions to ask are: did this factor adversely influence human and/or equipment performance and was the environmental element unknown or unavoidable at the time of the accident? (See DA PAM 385-40, Paragraph 2-6)

(5) Materiel Data. Collect data necessary to evaluate the performance and survivability of the vehicle, aircraft, equipment (including life support equipment (LSE) and protective equipment), buildings, and or other support materiel. At a minimum, collect data from the historical records for the past six months such as work orders, modification work orders, services and periodic inspection records, as well as other relevant records.

NOTE: *For the purpose of accident classification any component failure resulting from maintenance procedures performed prior to the Army taking possession of the aircraft is considered a materiel failure accident. Any component failure resulting from maintenance procedures performed after the Army takes possession of the aircraft is considered a human error accident.*

(6) Personnel Data. Gather data that provides insight into the performance, health, qualification and training of the individuals

involved in the accident. Those individuals include those directly involved, those who influenced the operation, and those suspected to have a role in the accident. Sources of information include, but are not limited to individual records, interviews, and autopsy/medical records.

2-3. ANALYSIS. (See DA PAM 385-40, Paragraph 2-8)

a. General. The board conducts a systematic analysis of data collected during the investigation to determine causes and develop findings and recommendations. Findings and recommendations are derived from the board's analysis and deliberations. With few exceptions (for example, insufficient data to make conclusive findings), findings and recommendations are directly supported by the analysis of data. It is acknowledged that informal analysis occurs throughout the data collection phase as investigators pursue information. However, formal analysis begins when the board president determines sufficient data has been collected for the board to arrive at findings and recommendations.

b. Purpose. Analysis can be accomplished in many ways. Often the board reviews collected data to ensure it is accurate and complete. This may then be followed by individual, group teams (materiel/human/environmental), or board level discussions of the data. This is designed to ensure all data is placed in its appropriate area (human/materiel/environmental) within the investigation. The end state of analysis is to first provide all group members a full understanding of the facts and circumstances surrounding the accident. It is also used to prepare for deliberations and ensure the completeness of the investigative process. This phase of the investigation may be formal or informal, but is accomplished to ensure deliberations proceed without jeopardizing the quality of the board's findings and recommendations. It is during this process that the board president ensures the analysis portion of the preliminary report is complete and contains all factual information surrounding each identified anomaly.

c. Methodology. The "what happened" (mistake/error, environmental factor, materiel failure) is often clear. The "why it happened" (system inadequacy/root cause) is usually more complex and difficult to determine. The reasons people make errors, materiel fails, environmental factors contribute, or injuries occur in an accident are the keys to accident prevention. It is also likely that a combination of active and latent failures contributed. Identification of latent failures can be particularly challenging. A structured and meticulous analysis of the data provides the best opportunity for the board to reach accurate conclusions. Analysis can be accomplished in many ways. The following is a standard method used during analysis:

(1) Establish a chronology. The board develops two timelines.

The first, a macro timeline includes significant training events, unit milestones, and other activities that could have led to a cultural or latent error. The second, a micro timeline identifies critical time stamps that involved the accident equipment, personnel and mission. These timelines allow the board to analyze policies and events in the proper context and weigh the role each played in the resulting accident.

(2) Identify Contributing Factors. Examine environmental conditions, materiel failure, and human factors that caused or contributed to the accident. Continually ask the question “why” until you have identified all the contributing factors that led to an error, failure, or mistake.

(3) Review Anomalies. Anomalies are a deviation from the normal or common order or from a rule. Anomalies can be positive events as well as negative events. List all anomalies and group by environmental, materiel, and human factors. (This is done periodically throughout all phases of the investigation and recorded by each member in their investigative notes.)

(4) Evaluate Anomalies. Evaluate anomalies as to their relationship to the accident to determine mistakes, materiel failures and environmental influences. Through this process each factual piece of data needs to be continually analyzed and placed in its appropriate category. Additionally, as new information is collected some anomalies are deleted as insignificant or explained. The important part is to capture all the anomalies, no matter if they seem insignificant, until a determination can be made.

(5) Determine Root Causes. The last part of analysis is conducted during deliberations. Remaining anomalies are categorized into task errors and the reasons for the errors are identified by system inadequacies (root causes) for the mistake, materiel failure and/or environmental influences.

2-4. DELIBERATIONS.

a. General. Deliberations are the final stage of analysis and result in the development of findings and recommendations. Deliberations are conducted to:

(1) Identify mistakes/errors, materiel failures, environmental factors (what happened).

(2) Identify root causes (why it happened).

(3) Develop recommendations (what to do about it).

b. Preparation. The facility used to conduct the deliberations and analysis should be secure, free from distractions, and allow for complete privacy. The board president and recorder are the key personnel to facilitate and record the analysis and deliberations. It is important that all board members review witness statements, unit and Army-level documents pertinent to the operation, as well as equipment, training and medical records, and note any anomalies. Board members should review their notes as well as Paragraph 2-8 of DA Pam 385-40 prior to the analysis and deliberation session.

The president chairs the meetings and guides the proceedings. The recorder ensures the products (timelines, anomalies) are posted in such a manner that all board members can see them. All relevant information remains readily accessible. The recorder also prepares charts prior to beginning deliberations to capture the findings and recommendations as the board reaches its conclusions. Each board member reviews and has on hand a list of task error and system inadequacy codes (Appendix B from DA PAM 385-40) prior to conducting deliberations.

c. Conduct of Deliberations. Deliberations are a formalized process by which members of the board agree upon the resulting findings and recommendations of an accident. The findings and recommendations are the enduring foundation of the investigation and are the mitigating tools to prevent future accidents. Each member provides input to each finding and assists in the development of recommendations. The board president may opt to conduct a vote to ensure that a majority of the board members agree on a finding and that the task error and system inadequacies correctly describe the circumstances of the accident. It is important that each board member participate to the fullest extent possible and arrives to deliberations with a full understanding of the facts associated with the accident.

2-5. PRELIMINARY REPORT.

a. General. The narrative of the investigation consists of four sections: history of events/flight, human factors, materiel factors, and analysis. Two of these sections are required in the preliminary report: history of events/flight and analysis. The history contains factual data only while the analysis is reserved for the board's documentation of its conclusions, suspicions and opinions concerning the accident cause relationships.

b. History of Events/Flight. The history presents a sequential snapshot of the activities and events of the mission leading up to the accident, the accident, and the immediate actions following the accident. The timeline established during the investigation assists in writing this paragraph. It includes enough detail to give the reader an accurate description of events. Typical errors in this section include not clearly identifying the units involved, not detailing the planning in preparation for the mission, including analytical statements, and including findings. Writers of this paragraph, normally the board president, include only statements of fact.

NOTE: *Names of the individuals are used in the history; however names are not to be used in the analysis or findings.*

c. Analysis. The analysis is the documentation of board deliberations. It clearly shows the cause and effect relationship of the evidence gathered during the accident investigation. Not only does the analysis show clear cause and effect of an accident, but also eliminates plausible accident causes the board determined did not cause or contribute to the accident. In comparison to the findings, the analysis presents all relevant data as the basis of the findings and recommendations.

Board President

3-1. GENERAL. (See DA PAM 385-40, Paragraph 2-1)

a. The duties and responsibilities of the president of an accident investigation board include, but are not limited to the following:

- (1)** Manage the investigation IAW DA PAM 385-40.
- (2)** Convene the board at the earliest possible time.
- (3)** Organize the board and assign areas of investigative responsibility to each member.
- (4)** Take control of the accident site after the area is declared safe for entry.
- (5)** Verify that adequate guards are on site to ensure the preservation of evidence.
- (6)** Coordinate for equipment necessary to conduct the investigation.
- (7)** Dispatch board members to perform their duties and responsibilities.
- (8)** Request additional technical assistance as required.
- (9)** Ensure all pertinent data is gathered before closing the field portion of the investigation.
- (10)** After coordination with the collateral board, authorize recovery of the wreckage from the accident site when the field examination is complete. Release wreckage/equipment for disposition to the owning organization when the investigation is completed.
- (11)** Conduct frequent meetings of the board to update progress, exchange information and adjust assignments as necessary.
- (12)** Ensure accident information is released only to appropriate authorities (i.e., appropriate command, staff, safety and investigation personnel).
- (13)** Advise appropriate safety and public affairs officers to contact local legal advisors in cases involving potential claims against the U.S. government for personal injury or property damage.

(14) Ensure data is correctly analyzed and conclusions are supported by evidence.

(15) Ensure suitable recommendations are made and that a thorough and accurate report is completed and submitted IAW AR 385-10 and DA PAM 385-10.

(16) If applicable, coordinate with the local Criminal Investigation Division (CID).

(17) Write the history of events/flight, analysis, findings and recommendations for the technical report.

b. Backwards planning. Before meeting with the board, prepare a timeline. The timeline is crucial, because it helps identify benchmarks that otherwise may not be noted without its preparation.

c. Daily meetings. Normally there is a morning and afternoon board meeting. These meetings are a tool for the board president to create shared understanding with the board, manage daily assignments, and record/discuss anomalies discovered by the board. The time selected for the meetings are synced with the accident unit's beginning and end of the duty day. As a technique, one of these meetings can be used to meet with the unit point of contact in order to schedule interviews and request data.

3-2. COLLECTION MANAGMENT.

a. Data collection. Crucial to any investigation is the gathering of data/physical evidence. METT-T analysis determines the level of detail collected in a combat zone. The data collected during an accident investigation becomes the very basis of the accident investigation board's analyses and conclusions. To ensure a thorough effort is made to collect all relevant data, the board president provides guidance and direction on data collection during the Board's daily meetings.

b. Data release. The board president authorizes the release of factual information to individuals that are not board members (See AR 385-10 Paragraphs 3-27 through 3-31).

c. Data collected during an investigation include:

(1) Physical evidence - Matter related to the accident such as equipment, parts, debris, hardware, voice recorders and other physical items.

(2) Verbal evidence - Witness statements and observations.

(3) Documentary evidence - Paper and electronic information, such as records, reports, policies and procedures, photographs, videos, accident site graphs, duty logs, board proceedings and notes, board member notes, etc.

(4) Recording of anomalies – Through the course of collecting data and evidence there are those factors uncovered by the board that deviate from the norm or expectations. The board immediately records these anomalies for discussion and analysis during this phase of the investigation.

3-3. PRELIMINARY REPORT.

a. Narrative. The narrative of the investigation consists of four sections: history of events/flight, human factors, materiel factors and analysis. Two of these sections are written by the board president and required in the preliminary report: history of events/flight and analysis. Outlines for these sections are presented below. The history contains factual data while the analysis is reserved for the board's conclusions, suspicions and opinions, concerning the accident cause relationships. Additionally, the board president is responsible for writing the findings and recommendations of the board.

b. History of Events/Flight. This paragraph presents a sequential snapshot of the activities and events of the mission leading up to the accident, the accident and the immediate actions following the accident. Only include factual information in this paragraph. The timeline established during the investigation assists in writing this paragraph. It includes enough detail to give the reader an accurate description of events. Typical errors in this paragraph include not clearly identifying the units involved, not detailing the planning in preparation for the mission, including analytical statements, and including findings. Names of the individuals may be used in the history; however names are not to be used in the analysis. Below is an outline of the information included in the history of events/flight:

History of Events/Flight Outline

a. Pre-accident phase

- type of mission, activity or event (task and purpose)
- how the organization became tasked with the mission
- who authorized the mission
- individual(s) involved in the accident/injury or occupational illness

- individual's duty, unit/organization assigned
- how personnel were selected for the mission
- how they were selected for and informed of the mission, activity or event

- actions of the personnel involved in preparing for the mission, activity or event to include planning, application of RM, orders, and/or briefings

- vehicle/equipment/vessel/structure involved, to include type, serial/lot numbers, inspections conducted and the dispatching process

- Describe facts which may indicate whether or not an undue sense of urgency was associated with the mission, activity, or event and if there were any delays prior to the onset of the operation

b. Accident phase.

- when the vehicle/personnel departed on the mission, activity or event, and continue until the accident occurred

- if the mission, activity or event involved more than one routine segment, requiring multiple activities, functions, or stops before the accident occurred, concisely summarize these events until addressing the segment involving the accident

- if the segment involving the accident contained an emergency:

- *where and when it occurred/onset of the emergency occurred*
- *symptoms*
- *warnings, indications and instrument readings.*

- describe actions/reactions of the personnel between the time of the emergency and its conclusion.

c. Post-accident phase.

- describe the condition of the equipment/vehicle/structure/vessel, to include whether or not the equipment was still operating and the condition of personnel immediately after the accident. ***Reserve details of damage to various equipment/vehicle/structure components for the materiel factors portion of the narrative.***

- if a post accident fire occurred, so indicate and explain how and when it was extinguished, if applicable

- describe how the accident site was located

- summarize rescue and first-aid efforts, to include:

- *who notified rescue/medical/police of accident*
- *response time*
- *type of equipment used in the evacuation*
- *who administered first aid/cardiopulmonary resuscitation and their medical qualifications*

- briefly summarize:

- *egress of occupants from vehicle/equipment*
- *time of arrival at the medical facility*
- *medical facility providing treatment*
- *time of death, if applicable*
- ***Reserve details of the egress, rescue and evacuation for rescue operations portion of the narrative***

c. Analysis. This paragraph clearly shows the cause and effect relationship of the evidence gathered during the accident investigation. Not only does the analysis show the clear cause and effect relationship of the accident, but it also eliminates plausible accident causes the board determined did not cause or contribute to the accident. Below are outlines of the required sections of the analysis paragraph for both aviation and ground investigations:

Analysis (Aviation)	Analysis (Ground)
<p>a. Accident Sequence</p> <p>b. Environmental Factors</p> <ul style="list-style-type: none"> (1) Meteorological (2) Non-meteorological <p>c. Materiel Factors</p> <ul style="list-style-type: none"> (1) Aircraft Information (2) Forms and Records (3) Aircraft Systems (4) Aviation Life Support Systems (5) Night Vision Goggles <p>d. Human Factors</p> <ul style="list-style-type: none"> (1) Support (2) Standards (3) Training (4) Command/Leader (5) Individual <p>e. Other (observations)</p>	<p>a. Accident Sequence</p> <p>b. Environmental Factors</p> <ul style="list-style-type: none"> (1) Meteorological (2) Non-meteorological <p>c. Materiel Factors</p> <ul style="list-style-type: none"> (1) Major Components (2) Major Systems <p>d. Human Factors</p> <ul style="list-style-type: none"> (1) Support (2) Standards (3) Training (4) Command/Leader (5) Individual <p>e. Other (observations)</p>

d. Analysis Paragraph Directions. Before starting the sub-paragraphs of the analysis, begin the paragraph by specifying the scope and conclusions of the investigation. In all cases, begin the paragraph with the words: “After analyzing the human, materiel and environmental data collected during the investigation, the board concluded the accident was caused by” complete the sentence specifying the factors (human, materiel, environmental) that caused the accident.

(1) Accident Sequence. Include a description of the accident that includes the board’s estimate of how the accident occurred. This paragraph creates a picture in the reader’s mind of how the aircraft crashed or how the vehicle rolled over, etc. It is not a repeat of the history, but includes details of the accident dynamics. Include the board’s analysis of how and why the accident happened as it did.

(2) Environmental Factors. Include meteorological and non-meteorological factors. Use the key words under Table B-4 of DA PAM 385-40, describing the environmental phenomena present during the accident when applicable, along with the results. Environmental factors can be present at the time of the accident but not be causal. There can be no present and contributing finding against environmental factors if the board concludes they were not causal.

(3) Materiel Factors. This sub-paragraph includes all materiel factors. Use the key words under Table B-3 of DA PAM 385-40 to describe what happened to a particular part, piece of equipment, system, or component. Refer to reports written by board advisors, like manufacturer representatives. Develop a separate paragraph for each major component or system. Each statement of materiel failure is followed by the cause of the failure. Also describe the consequences of the failure and identify the part number or NSN of the part that failed. Explain why the board ruled out a part, system, or component that could have caused the mishap. Design or maintenance issues that originated or occurred at the manufacturer are considered materiel issues.

(4) Human Factors. This sub-paragraph includes all human factors. Use the key words on Table B-5 of DA PAM 385-40 to describe issues associated with each of the human factors system inadequacies/ root causes. Develop a separate paragraph for each of the basic root causes/system inadequacies and discuss the result of the deficiency. In each case, develop analytical statements and then support them with statements of fact.

a. Support. Describe issues relating to resourcing, facilities, services, equipment (design-induced error, etc.), numbers of personnel and other support type factors.

b. Standards. Describe the adequacy of written guidance for a particular task. All findings refer to a standard of some type. Be sure to explain any standards shortcomings and the consequences of those shortcomings. If the board concluded all documents were adequate, explain it that way. The presence of a standard in an Army publication suffices as a standard if not included in the unit SOP. Not restating the standard from the Army publication in the unit SOP is not a shortcoming.

c. Training. Describe the training an individual may have received either in an MOS-producing school, unit, or other. A Soldier without adequate experience or with some sort of negative habit transfer is considered to have a training deficit. For other than active duty Army Soldiers, i.e. National Guard, or other service soldiers, discuss mobilization or familiarization training.

d. Leader/Command.

-Leader Factors. Describe what an individual did in his or her capacity as a leader. Table B-5, DA PAM 385-40 discusses leader failure as a lack of supervision, but also consider it a leader issue when a leader chose not to enforce a standard, did not make an informed decision, or was not where he or she should have been.

-Command Factors. Assess the influence of command activity, or lack thereof, in relation to the accident. Apply the risk management 5-step process. Look at each decision point in the accident sequence of events (from pre-mission planning to the actions immediately following the accident) and the authority level of the person making that decision. The goal is to determine if informed decisions were made at the appropriate level of authority.

e. Individual. Discuss the board's conclusions relative to an individual Soldier in terms of the error or the indiscipline that caused the accident or permitted the Soldier to make the error, along with the results of his/her actions. Include the injuries to the Soldier in the results portion of the discussion. Although each injury does not need its own paragraph, injuries which are the result of an anomaly are described.

(5) Other. In this paragraph include special observations (i.e., factors that in no way contributed to the accident but identify local conditions or practices that should be corrected).

NOTE: *If a potential safety issue has Armywide implications, making the finding a PBNC rather than a special observation ensures the problem has visibility above the accident unit level.*

3-4. FINDINGS & RECOMMENDATIONS.

a. General. Finding and recommendations are formulated during deliberations. Each finding is substantiated in the analysis paragraph of the report narrative. Immediately following the finding, the recommendations are written. Recommendations answer the question, “what to do about it?” The recommendations target the root causes/ system inadequacies.

b. Findings. DA Pam 385-40 groups findings into four categories: present and contributing, present but not contributing, present and contributing to the severity of injury/extent of property damage and suspected present and contributing. The most common error in an accident investigation report is an improperly written present and contributing finding. Present and contributing findings are an integral part of the accident reporting process and are imperative in identifying the task errors (what happened) and system inadequacies (why it happened). If the findings’ author does not clearly identify “why” the accident occurred he/she cannot formulate properly directed recommendations (what to do about it) addressing the root cause of the accident. There are three accident causal factors: human error, materiel failure and environmental factors. Present and contributing findings must be written using the elements described in DA Pam 385-40. For an aviation accident, use the instructions for DA Form 2397-2 and Table 3-1. For ground accidents, use the instructions for block 65 of the DA Form 285 found in Paragraph 4-3. The elements of a present and contributing finding give the investigator a standardized way to present the finding.

(1) Elements of a Present and Contributing Finding:

Element 1: An explanation of when and where the error, materiel failure, or environmental factor occurred in the context of the accident sequence of events; e.g., “during preflight,” “during takeoff,” “while employing,” etc.

Element 2: Identification of the individual involved by duty position; or the name and part number (PN) or national stock number (NSN) of the part, component, or system that failed; or a description of the environmental factor, as appropriate.

Element 3: For human error, identification of the task or function the individual was performing and an explanation of how it was

performed improperly. Refer to DA PAM 385-40, Appendix B, Table B-1 for task error categories. The error could be one of commission or omission, e.g., an individual performed the wrong task, incorrectly performed the correct task, or failed to perform a required task or function. In the case of a materiel failure, identify the mode of failure; e.g., corroded, burst, twisted, decayed, etc., refer to Appendix B, Table B-3 and for environmental conditions see Table B-4. NOTE: *Identify only one task error per finding.*

Element 4: Identification of the directive, i.e., ATM, SOP, FM or common practice governing the performance of the task or function. In lieu of a written directive, the error may represent performance that is contrary to common practice.

Element 5: An explanation of the consequences of the error, materiel failure, or environmental effect. An error may directly result in damage to equipment or injury/occupational illness to personnel, or it may indirectly lead to the same end result. A materiel failure may have an immediate effect on equipment or its performance, or it may create circumstances that cause errors resulting in further damage/injury or occupational illness inevitable.

Element 6: Identification of the reasons (system inadequacy(ies)) the human, materiel, environmental conditions contributed to the accident. Refer to the list and examples of system inadequacy(ies) provided in DA PAM 385-40, Appendix B, Table B-5. NOTE: *The finding may contain multiple system inadequacies (training, individual, leader, etc.).*

Element 7: A brief explanation of how each reason contributed to the error, materiel failure, or environmental factor.

Present and contributing human error findings contain at a minimum the seven elements of information identified above. The first five elements relate to the task error, with element six and seven identifying the system inadequacies. Materiel failure and environmental factors basically contain the same elements as human error finding with a few differences. DA Form 285 ground accident report follows the same element requirements as the aircraft accident report.

Human Error - When writing a present and contributing human error finding the two most important elements are the task error (element 3 above) and the system inadequacy (element 6 above). These two elements define the root cause of the accident. The aviation (UAS

included) human task errors are located in DA Pam 385-40, Appendix B-1 and the ground task errors in Appendix B-2. When writing a present and contributing human error finding, use only one of the individual task errors. It is not a requirement to use the exact wording of the task error in a particular finding, but if there is any doubt which task error you are trying to describe, use its basic descriptor, e.g., failed to properly scan (Code P01) or improper use of equipment (Code 06). Again, you may only use one task error per finding.

The most overlooked element in a present and contributing finding is the system inadequacy (element 6 above). Common to both aviation and ground accidents, the system inadequacy is an essential element of the finding because it tells why the individual made the mistake. If an individual failed to scan which is a task error, why did he/she fail to scan? One of the five system inadequacies answers that question: leader, training, standards, support and individual. As in the task error above, it is not a requirement to use the exact wording of the system inadequacy in a finding, but if there is any doubt which system inadequacy you are trying to describe, use the system inadequacy's basic descriptor, e.g., overconfidence in abilities (Code 16). you may only use one task error per finding but the use of multiple system inadequacies in a single finding is acceptable if more than one system inadequacy identifies why the individual made the mistake.

NOTE: *For Class A and B accidents substantiate the findings by analysis, as described in the completion instructions for the DA Form 2397-3 and the DA Form 285 Paragraph 4-4. Manned aircraft Class C, aircraft ground A/B and UAS accidents do not require a formal analysis, support the findings by entering a concise summary of events from the initial onset of the emergency until the aircraft is at rest, to include injuries resulting from the accident. Specify and discuss in the narrative of the summary the actual error/failure/effects and the root causes to support the present and contributing finding(s).*

(2) Human Error System Inadequacy Definitions:

Leader Failure - This occurs when leaders fail to monitor mission execution and planning, correct inappropriate behavior, take appropriate action or emphasize correct procedures that allowed subordinates to commit task errors or results in a materiel failure. A leader failure cause factor is identified by the leader failure system inadequacy (element 6) not by the leader/supervisory errors identified in the (element 3).

NOTE: *A leader failure system inadequacy does not identify why the leader failed. The leader failure system inadequacy explains a leader's lack of supervision that allowed a subordinate to make a mistake. If a finding includes a leader failure system inadequacy there is a follow-on finding on that leader describing how a leader fails to properly supervise a subordinate (see example findings).*

Training Failure - This occurs when training is incorrect, incomplete or insufficient for an individual to perform a task to standard. A common mistake is to identify inexperience as an individual failure when DA Pam 385-40, Table B-5, identifies inexperience as a training failure.

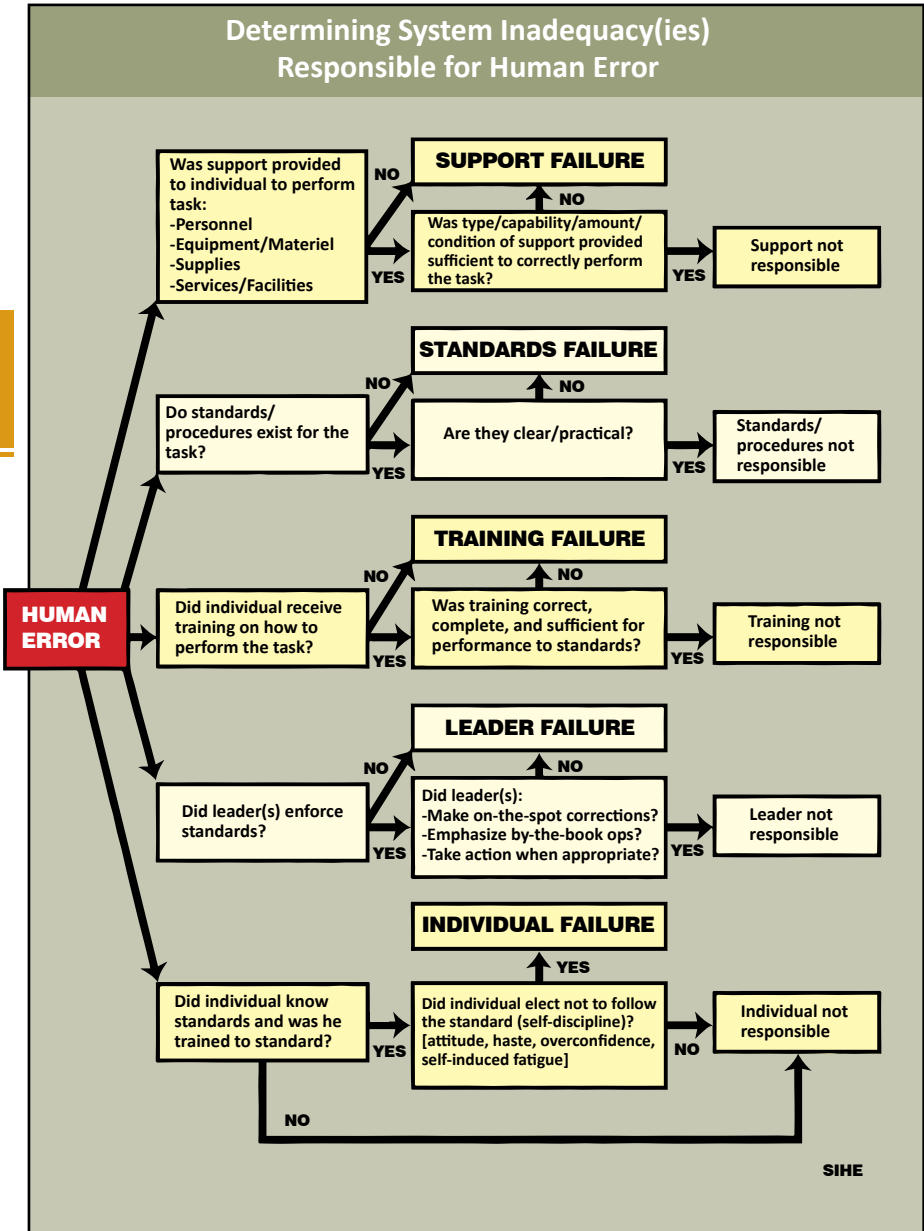
Standards Failure - This occurs when standards do not exist or they are unclear, impractical, or inadequate. Failure to follow an established standard does not constitute a standards failure.

Support Failure - This occurs when the type, amount, capabilities, condition of the support is insufficient to correctly perform the mission. Support includes personnel, equipment, materiel, supplies, services, or facilities. A piece of equipment that fails because the mechanic did not service it properly because the proper tools were not available would not be a materiel failure. The piece of equipment failed because of human error: support failure. Additionally, if an individual makes an accident causing mistake due to the way a piece of equipment is manufactured or designed, the finding would be classified as a human error on the individual that made the mistake with a support failure system Inadequacy. A support failure due to inadequate/improper design (Code 11) would be when an operator intended to use a switch and its location, size, shape, method, or operation is similar to another switch with a different function. The mere failure of a component or part due to design or manufacture is not a support failure (see materiel failure).

Individual Failure - This occurs when the individual knows the standard and is trained to standard but elected not to follow the standard.

The chart below may assist in determining system inadequacies responsible for human error.

CH 3



Aviation Example – Present and Contributing Human Error Finding

FINDING (Present and Contributing: Human Error – Individual Failure):	
Required Information	Example
1. Explanation of when and where the mistake/error occurred in context of the accident sequence of events.	While conducting day, nap-of-the-earth aircrew training at 50 feet AGL and 10 KIAS...
2. Aircraft and individual involved by duty position.	the Pilot in Command (PC) and Pilot (PI) of the UH-60...
3. Identification of mistake made (ref aviation-specific mistakes/errors in DA PAM 385-40, Table B-1) and an explanation of how task/activity was performed improperly. NOTE: <i>Only one Task Error per finding.</i>	improperly scanned. That is, both crewmembers failed to properly scan for obstacles when they both became visually fixated on an animal on the ground...
4. Directive (ATM, SOP, FM, TM, etc.) or common practice governing performance of task/activity.	in contravention of TC 1-237, Task 1026.
5. Consequences of mistake/error.	As a result, the aircraft main rotor blades were damaged when they made contact with a tree at approximately 50 feet AGL. There were no injuries.
6. Identification of reasons (root causes/system inadequacies) for the mistake/error {ref <i>System Inadequacies in Table B-5 of DA PAM 385-40</i> }. NOTE: <i>The finding may contain multiple System Inadequacies (Training, Individual, Leader, etc.).</i>	The PC's and PI's actions were a result of overconfidence in each other's ability to clear the aircraft and maintain obstacle clearance.
7. Brief explanation of how each reason (root cause/system inadequacy) contributed to the mistake/error.	The PC and PI allowed the aircraft to fly too close to known obstacles resulting in damage to the main rotor blades.

FINDING 1: (Present and Contributing: Human Error- Individual Failure):

While conducting day, nap-of-the-earth aircrew training at 50 feet AGL and 10 KIAS, the pilot in command (PC) and pilot (PI) of the UH-60L improperly scanned. That is, both crewmembers failed to properly scan for obstacles when they both became visually fixated on an animal on the ground in contravention of TC 1-237, Task 1026. As a result, the aircraft main rotor blades were damaged when they made contact with a tree at approximately 50 feet AGL. There were no injuries.

The PC's and PI's actions were a result of overconfidence in each other's ability to clear the aircraft and maintain obstacle clearance. The PC and PI allowed the aircraft to fly too close to known obstacles resulting in damage to the main rotor blades.

(3) Elements of a Present and Contributing Materiel Failure Finding:

1. Explanation of when and where the materiel failure/malfunction occurred in the context of the accident sequence of events.
2. Name and part number (PN) or national stock number (NSN) of the part, component or system that failed.
3. Mode of failure (corroded, burst, twisted, decayed, etc.)(see DA PAM 385-40, Appendix B, Table B-3 for definitions and examples) NOTE: only one task error failure per finding.
4. Consequences of the materiel failure.
5. Identification of reasons (root causes/system inadequacies) materiel failure/malfunction caused or contributed to accident. **NOTE:** *The finding may contain multiple system inadequacies (design, manufacture, etc.)*
6. Brief explanation of how each reason (root cause/system inadequacy) contributed to the materiel failure/malfunction.

Materiel failure and malfunction causes/system inadequacies. The identification of a materiel failure is of little value until “why” the failure occurred is determined. After the “why” is determined, develop corrective measures to elevate or implement controls reducing the possibility of recurrence. Identify materiel failures/malfunctions in terms of one or more system inadequacy(ies). DA Pam 385-40 defines materiel system inadequacy as a tangible or intangible element that did

not operate to design specifications and caused, allowed, or contributed to a materiel failure or malfunction. The system inadequacies associated with materiel failure are design, manufacturer, fair wear and tear (FWT) and maintenance applicable to both aviation and ground accidents.

Design. Equipment design becomes an issue when equipment failure occurs because of inadequate design specifications. A design issue may be the result of inadequate materiel composition, equipment size, shape, location, or operational characteristics opposite to common practice operation. Accident investigators often overlook design influence on human performance resulting in accidents. Evaluate all possible design issues in order to implement corrective measures.

Manufacture. Equipment manufacture becomes an issue when the failure results from equipment development processes not conforming to design specifications. A manufacture issue may be the result of using substandard material, improper assembly, or other anomalies occurring during the manufacturing process.

Fair, Wear and Tear (FWT). FWT becomes an issue when equipment fails due to use. Any item of equipment exposed to a repetitive motion is subject to failure. FWT can occur in conditional items as well as time between overhaul/change items.

Maintenance. Maintenance becomes an issue when failure or malfunction occurs because of improper maintenance or lack of maintenance. When the Army does not have control or oversight of the maintenance operation and improper maintenance caused the accident, write a materiel failure finding. When the Army exercises control of the maintenance operation, classify materiel failures due to improper maintenance as human errors and document them as a human error finding.

NOTE: *For Class A and B accidents, substantiate all findings by an analysis, as described in the completion instructions for the DA Form 2397-3 and Paragraph 4-4 for the DA Form 285. Manned aircraft Class C, aircraft ground A/B and UAS accidents do not require a formal analysis, support the findings by entering a concise summary of events from the initial onset of the emergency until the aircraft is at rest, to include injuries resulting from the accident. Specify and discuss in the narrative of the summary the actual error/failure/effects and the root causes to support the present and contributing finding(s).*

Aviation Example - Present and Contributing Materiel Failure Finding

FINDING (Present and Contributing: Materiel Failure):

Required Information	Example
1. Explanation of when and where the materiel failure/malfunction occurred in the context of the accident sequence of events.	During engine run-up of the CH-47D with rotor blades turning...
2. Name and part number (PN) or national stock number (NSN) of the part, component or system that failed.	the retention bolts (P/N NAS624H-5) securing the fixed droop stop to the aft rotor system red blade pitch shaft failed.
3. Mode of failure (corroded, burst, twisted, decayed, etc.)(see DA PAM 385-40, Appendix B, Table B-3 for definitions and examples) NOTE: Only one failure per finding.	The excessive pressure on the engaged threads allowed the threads to strip from the nuts.
4. Consequences of materiel failure	This failure allowed the fixed droop stop and bolts to separate from the aircraft. As a result, during shutdown, with both engine condition levers at stop and the main rotor blades coasting slowly, the aircraft red main rotor blade contacted the fuselage...
5. Identification of reasons (root causes/ system inadequacies) materiel failure/ malfunction caused or contributed to accident. NOTE: The finding may contain multiple System Inadequacies (Design, Manufacture, etc.)	The droop stops failed due to improper installation by the manufacturer during aircraft overhaul.
6. Brief explanation of how each reason (root cause/system inadequacy) contributed to materiel failure/ malfunction.	That is, the bolts (P/N NAS624H-5) installed in the separated fixed droop stop, though nearly identical in appearance were 1/8-inch shorter than the bolts (P/N NAS624H-7) required by TM 55-1520-240-23P1.

FINDING 1 (Present and Contributing: Materiel Failure):

During engine run-up of the CH-47D with rotor blades turning, the retention bolts (P/N NAS624H-5) securing the fixed droop stop to the aft rotor system red blade pitch shaft failed. The excessive pressure on the engaged threads allowed the threads to strip from the nuts. This failure allowed the fixed droop stop and bolts to separate from the aircraft. As a result, during shutdown, with both engine condition levers at stop and the main rotor blades coasting slowly, the aircraft red main rotor blade contacted the fuselage, resulting in minor fuselage and main rotor blade damage.

The droop stops failed due to improper installation by the manufacturer during aircraft overhaul. That is, the bolts (P/N NAS624H-5) installed in the separated fixed droop stop, though nearly identical in appearance, were 1/8-inch shorter than the bolts (P/N NAS624H-7) required by TM 55-1520-240-23P1.

(4) Elements of a Present and Contributing Environmental Factor

1. Explanation of when and where the environmental factor occurred in the context of the accident sequence of events.
2. Aircraft and, if applicable, the individual(s) involved by duty position.
3. Description of environmental factor encountered (see DA PAM 385-40, Appendix B, Table B-4 for definitions and examples).
4. Consequences of environmental effect.
5. Explanation/identification of reason(s) environmental conditions caused the accident.

Environmental factors are those environmental elements or conditions such as noise, illumination, space and weather conditions (For example, precipitation, temperature, humidity, pressure, wind and lightning) having an adverse effect on the performance of the individual or equipment so that an accident results or could result. Assessment of environmental elements (For example, contaminants, noise, vibration, artificial illumination, acceleration, deceleration, radiation, adequacy of work surface/space and weather conditions) is accomplished to determine their influence on human and/or materiel performance. Contaminants (fumes, chemicals) can lead to respiratory problems; noise (radio static, engine and transmission noise) can distract attention, interfere with effective communications and lead to fatigue.

Inadequate illumination can cause reduced visibility. Inadequate work space (cluttered, poorly designed driver compartment) can contribute to procedural errors or limit outside visibility. Knowledge of environmental elements does not eliminate them as factors influencing errors, injuries, or failures.

NOTE: *To determine if an environmental factor should be assessed as a causal factor, the central questions to ask are: did this factor adversely influence human and/or equipment performance and was the environmental element unknown or unavoidable at the time of the accident/injury/occupational illness? Environmental factors can be divided into those which could not have been avoided, and those which could have been avoided or precautions implemented to reduce or eliminate its adverse effects on personnel and/or equipment. An environmental deficiency is not assessed as a causal factor if it was known and could have been avoided before the accident.*

Aviation Example – Present and Contributing Environment Factor Finding

FINDING (Present and Contributing: Environment):	
Required Information	Example
1. Explanation of when and where the environmental factor occurred in the context of the accident sequence of events.	While ground-taxiing to the parking ramp...
2. Aircraft and if applicable, the individual(s) involved by duty position.	the AH-64D...
3. Description of environmental factor encountered (<i>see DA PAM 385-40, Appendix B, Table B-4 for definitions and examples</i>).	encountered an unforecast sudden microburst with winds exceeding 80 knots.
4. Consequences of environmental effect.	As a result, the aircraft became airborne in a nose-low condition and subsequently entered a right spin from which the crew was unable to recover.
5. Explanation/identification of reason(s) environmental conditions caused the accident.	Microbursts are environmental events that cannot be seen or forecasted with present meteorological measuring equipment nor are they visible to aircraft crewmembers. They are normally a phenomenon associated with thunderstorms; however, there were no thunderstorms reported or visible in the vicinity.

FINDING 1 (Present and Contributing: Environment):

While ground-taxiing to the parking ramp, the AH-64D encountered an unforecast sudden microburst with winds exceeding 80 knots. As a result, the aircraft became airborne in a nose-low condition and subsequently entered a right spin from which the crew was unable to recover. The aircraft struck the ground causing aircraft damage and injuring one crewmember.

Microbursts are environmental events that cannot be seen or forecasted with present meteorological measuring equipment nor are they visible to aircraft crewmembers. They are normally a phenomenon associated with thunderstorms; however, there were no thunderstorms reported or visible in the vicinity.

NOTE: *For Class A and B accidents, all findings are substantiated in the analysis, as described in the completion instructions for the DA Form 2397-3 and Paragraph 4-4 for the DA Form 285. Manned aircraft Class C, aircraft ground A/B and UAS accidents do not require a formal analysis but is supported by entering a concise summary of events from the initial onset of the emergency until the aircraft is at rest, to include injuries resulting from the accident. The actual error/failure/effects and the root causes are specified and discussed in the narrative of the summary in order to support the present and contributing finding(s).*

(5) Example Aviation Present and Contributing Findings and Recommendations with Multiple System Inadequacies

You may combine multiple system inadequacies in one finding, but only one task error per finding. Please note that a leader failure in the second paragraph below (system inadequacy paragraph) requires an additional present and contributing finding on why the leader failed to properly supervise the subordinate. (See findings 1 and 2 below)

FINDING 1 (Present and Contributing: Human Error – Training, Individual and Leader Failure):

While executing an approach to an unimproved LZ in mountainous terrain in a heavily loaded UH-60L, the pilot (PI), on the flight controls, did not recognize the hazardous conditions. That is, the PI failed to recognize the conditions produced by the combined effects of high gross weight and tail winds at the higher altitude. The PI did not recognize the critical condition and execute a go-around as required by TC 1-237, Task 1058, before he lost control of the aircraft. As a result, the aircraft main rotor RPM drooped and the aircraft crashed. The aircraft was severely damaged and two crew members sustained minor injuries.

The board concluded the PI's actions were a result of his lack of experience operating in this type of environment and overconfidence in his ability to operate in that environment. The PI had executed similar approaches to this LZ days prior to the accident, but not with the conditions present during the accident. The board also concluded the PI's actions were due to improper supervision by the pilot in command (PC).

RECOMMENDATION 1:

a. Unit Level Action: Commander, 1-999th Avn Regt, during simulator periods ensure a scenario is developed and instituted that replicates the high power demands required during mountainous approaches with full CEFS tanks on. Further, develop the scenario to rehearse circumstance where jettisoning the CEFS is the most logical outcome to avoid an accident. This will give crews the experience in what effect jettisoning the CEFS will have on the aircraft.

b. Higher Level Action: None.

c. Army Level Action: None.

NOTE: *The following finding (Finding 2) is the result of finding 1 above identifying why the leader (pilot in command) contributed to the pilot's error.*

FINDING 2 (Present and Contributing: Human Error – Individual and Training Failure):

While preparing to land in an unimproved mountainous LZ in a heavily loaded UH-60L, the PC did not properly conduct in-flight planning. That is, the PC did not modify the approach and landing plan based on the environmental conditions IAW Training Circular (TC) 1-237, Task 1058, Perform Visual Meteorological Conditions Approach. The PC did not use the tabular data or evaluate the winds accurately. As a result, as the PI executed the approach, the aircraft's main rotor drooped and the aircraft crashed. The aircraft was severely damaged and two crew members sustained minor injuries.

The board concluded the PC's actions were a result of his overconfidence in the pilot's (PI) ability to safely conduct the approach and landing, his overconfidence in his ability to correct any error the PI might make, and improper mountain training conducted by the unit standardization instructor pilot.

RECOMMENDATION 2:

a. Unit Level Action: Commander, 1-999th Avn Regt, utilize High Altitude Army Aviation Training Site, Mountain Training Course, and trained instructor pilots, to serve as unit trainers to train other unit instructor pilots on mountain, pinnacle, ridgeline and terrain flight in mountainous environments.

b. Higher Level Action: Commander 999 CAB, forecast and fund one slot per year to allow an instructor pilot from 1-999th Avn Regt to attend the Army High Altitude Army Aviation Training Site approved Mountain Flying Course.

c. Army Level Action: PEO-Avn, ensure tabular data in the operator's checklist (TM 1-1520-237-CL) includes Hover High Drag Configuration Tables, to assist in ease of tabular computation with High Drag Configuration in flight.

(6) Ground Example Present and Contributing Human Error Finding

FINDING 1 (Present and Contributing: Human Error - Training):	
Required Information	Example
1. Explanation of when and where the error occurred in context of the accident sequence of events.	While receiving driver's training on an unimproved road during New Equipment Training (NET) at the Yankee Training Center.
2. Identification of individual involved by duty position and equipment involved (if applicable).	the student driver of an M1117 Armored Security Vehicle (ASV)...
3. Identification of mistake/error made (<i>ref ground-specific mistakes/errors in DA PAM 385-40, Table B-2</i>) and an explanation of how task/activity was performed improperly. Only one Task Error per finding.	over-steered the vehicle. That is, while descending a hill on a dirt/gravel road, he made abrupt and excessive steering inputs causing the vehicle to swerve uncontrollably from one side of the road to the other ...
4. Directive (SOP, FM, TM, etc.) or common practice governing performance of task/activity or function.	in contravention of AR 385-10, AR 600-55 and TC 21-305.
5. Consequences of mistake/error.	Consequently, the vehicle departed the roadway, slid into a ditch, pivoted and rolled four times, coming to rest in an upright position. The vehicle sustained substantial damage. The gunner and passenger were critically injured when they were ejected from the vehicle during the rollover sequence. The driver and senior occupant received minor injuries.
6. Reason(s) {root cause(s)/system inadequacy(ies)} for the mistake/error (<i>ref System Inadequacies in Table B-5 of DA PAM 385-40</i>) May contain multiple System Inadequacies per finding.	The student driver's actions were the result of inadequate unit training and inexperience.
7. Brief explanation of how each reason (root cause/system inadequacy) contributed to the error.	The unit failed to ensure the student driver received the required prerequisite training, testing and a learner's permit for the ASV before allowing him to attend NET and operate the vehicle on an unimproved road. Due to the student driver's lack of experience, he was unfamiliar with the handling characteristics of the ASV and over-steered the vehicle causing loss of control.

NOTE: When 'leader' is identified as a system inadequacy/root cause, this leads to a second finding, in which case a mistake/error is assigned to the leader/command and the root cause(s)/system inadequacy(ies) for the mistake identified. When a finding is written on a leader/command, it is important to determine why that mistake/error was made so that, if necessary, the problem can be brought to the attention of senior Army leadership. For example, if inadequate risk management is identified, was it due to a support problem (lack of sufficient resources), a standards problem, etc.

FINDING 1 (Present and Contributing: Human Error – Training):

While receiving driver's training on an unimproved road during New Equipment Training (NET) at the Yankee Training Center, the student driver of an M1117 Armored Security Vehicle (ASV) over-steered the vehicle. That is, while descending a hill on a dirt/gravel road, he made abrupt and excessive steering inputs causing the vehicle to swerve uncontrollably from one side of the road to the other in contravention of AR 385-10, AR 600-55 and TC 21-305. Consequently, the vehicle departed the roadway, slid into a ditch, pivoted and rolled four times, coming to rest in an upright position. The vehicle sustained substantial damage. The gunner and passenger were critically injured when they were ejected from the vehicle during the rollover sequence. The driver and senior occupant received minor injuries.

The student driver's actions were the result of inadequate unit training and inexperience. The unit failed to ensure the student driver received the required prerequisite training, testing and a learner's permit for the ASV before allowing him to attend the NET and operate the vehicle on an unimproved road. Due to the driver's lack of experience, he was unfamiliar with the handling characteristics of the ASV and over-steered the vehicle causing loss of control.

Ground Example Present and Contributing Materiel Failure Finding

FINDING 1 (Present and Contributing: Materiel Failure)	
Required Information	Example
1. Explanation of when and where the materiel failure/malfunction occurred in context of the accident sequence of events.	While traveling on an interstate highway at approximately 55 mph, ...
2. Name and part number (PN) or national stock number (NSN) of the part, component or system that failed.	the left front tire (NSN 2610-01-214-1344) of a M925A2...
3. Mode of failure (<i>see DA PAM 385-40, Appendix B for definitions and examples</i>). Only one failure per finding.	failed (burst).
4. Consequences of materiel failure.	As a result, the vehicle veered sharply to the left, striking a guardrail. The impact caused the driver to strike his head on the steering wheel and he received minor injuries. The left front and side of the vehicle received substantial damage.
5. Identification of reasons (root causes/system inadequacies) materiel failure/malfunction caused or contributed to accident. <i>May contain multiple System Inadequacies per finding (Design, Manufacture, etc.)</i> .	The cause of the tire failure was inadequate quality control by the manufacturer. That is, a defect (weak spot) in the tire wall was not detected during the manufacturer's inspection process.
6. Brief explanation of how each reason (root cause/system inadequacy) contributed to the materiel failure/malfunction.	The inadequate quality control allowed a defective tire to be distributed and placed in service. During normal operation the tire failed causing personal injuries and equipment damage.

FINDING 1 (Present and Contributing: Materiel Failure):

While traveling on an interstate highway at approximately 55 mph, the left front tire (NSN 2610-01-214-1344) of a M925A2 failed (burst). As a result, the vehicle veered sharply to the left, striking a guardrail. The impact caused the driver to strike his head on the steering wheel and he

received minor injuries. The left front and side of the vehicle received substantial damage.

The cause of the tire failure was inadequate quality control by the manufacturer. That is, a defect (weak spot) in the tire wall was not detected during the manufacturer’s inspection process. The inadequate quality control allowed a defective tire to be distributed and placed in service. During normal operation the tire failed causing personal injuries and equipment damage.

Ground Example - Present and Contributing Environment Finding

<i>FINDING 1 (Present and Contributing: Environment):</i>	
Required Information	Example
1. Explanation of when and where the environmental factor occurred in context of accident sequence of events.	At approximately 1915 hours, a severe thunderstorm passed through ...
2. Identification of individual involved by duty position and/or equipment involved.	the heliport in Camp Doha, Kuwait, ...
3. Description of environmental factor.	with estimated sustained winds of 40 mph and gusts to 60 mph.
4. Consequences of environmental effect.	As a result, two temporary sunscreen shelters were destroyed and four helicopters that were secured on the ramp were damaged. One UH-60A was damaged as the temporary shelter under which it was parked was destroyed. One destroyed shelter was blown into and damaged another UH-60A secured on the ramp. The high winds also overcame the main rotor blade tie downs for two AH-64 aircraft, causing extensive damage due to excessive blade flapping.
5. Explanation of reason(s) environmental conditions caused/ contributed to accident.	The property damage was caused by an abrupt, rapidly developing thunderstorm that was neither forecasted nor expected. The exposed aircraft were secured on the ramp in accordance with established policy.

FINDING 1 (Present and Contributing: Environment):

At approximately 1915 hours, a severe thunderstorm passed through the heliport in Camp Doha, Kuwait, with estimated sustained winds of 40 mph and gusts to 60 mph. As a result, two temporary sunscreen shelters were destroyed and four helicopters that were secured on the ramp were damaged. One UH-60A was damaged as the temporary shelter under which it was parked was destroyed. One destroyed shelter was blown into and damaged another UH-60A secured on the ramp. The high winds also overcame the main rotor blade tie downs for two AH-64 aircraft, causing extensive damage due to excessive blade flapping.

The property damage was caused by an abrupt, rapidly developing thunderstorm that was neither forecasted nor expected. The exposed aircraft were secured on the ramp in accordance with established policy.

(6) Additional Example of a Ground Present and Contributing Finding and Recommendations

FINDING 1 (Present and Contributing: Environmental):

While conducting a daytime interdiction mission, area reconnaissance of the northwest Area of Operation (AO) Falcon, the third vehicle in a three-vehicle patrol, an M1114 up-armored high mobility multipurpose wheeled vehicle (HMMWV), rolled into an irrigation canal when the road collapsed into the canal. That is, the board concluded that the road was saturated with water due to three days of constant rain prior to the day of the mission. When the roadway collapsed, the vehicle rolled into the canal and came to rest inverted. As a result, one Soldier received fatal injuries and the vehicle received significant damage.

The board determined that the driver's actions did not cause or contribute to the accident. The board concluded that the right side of the road collapsed due to being saturated from previous days of heavy rainfall. It is also possible that the other two vehicles weakened the road to the point of collapsing.

RECOMMENDATION 1:

a. Unit Level Action: Commander, Company D, 2d Battalion, 9999th Infantry Regiment, brief all assigned and attached personnel on the facts and circumstances surrounding this accident. Emphasize the guidance in GTA 55-03-030, GTA 55-03-031, and Safety of Use Message (SOUM) 050004 prior to all missions.

b. Higher Level Action: Commander, 2d Brigade Combat Team, brief

all assigned and attached personnel on the facts and circumstances surrounding this accident. Emphasize the guidance in GTA 55-03-030, GTA 55-03-031, and SOUM 050004 during these briefings. Recommend usability surveys of all unimproved roads.

c. Army Level Action: Commander, U.S. Army Combat Readiness Center, disseminate the facts and circumstances surrounding this accident.

When to use a Suspected Present and Contributing Finding. A suspected present and contributing finding is used when the accident investigation board cannot positively determine or reasonably conclude what caused the accident. In these cases, the board must develop a hypothetical explanation for why an accident occurred. Using whatever evidence is available, it is acceptable for the accident investigation board to deduce that a certain event could have been or was the most likely cause of the accident. The discussion in the analysis must be very detailed and must discount any other plausible explanations of why the accident occurred and support the cause the board suspects actually caused the accident. For example, an aircraft is found crashed in an area in which there were known to be thunderstorms around the time of the accident, but the crew did not survive the accident and there were no witnesses. Radar showed the aircraft was in vicinity of the thunderstorm area, but not close to or in any storm at the time of the accident. The impact appeared to have a significant vertical component. Teardown analysis and records reviews show no problems with the aircraft components or maintenance and the engine appeared to be operating normally. All aircraft components were found to be attached and appeared fully functional at impact. The board may suspect the aircraft was involved in a downburst event, based on the physical evidence at the scene, the weather report and radar tracks of thunderstorms in the vicinity, and the lack of any evidence indicating otherwise.

Present and Contributing to the Severity of Injury/Extent of Property Damage. This type of finding covers factors that did not cause the accident, but contributed to the severity of the injuries or extent of damage. Personnel injuries attributable to defects in life support equipment, personal protective clothing/equipment, or aircraft/vehicle crashworthiness design should also be summarized as findings in this category. These findings are written in the same format as the present and contributing finding using the applicable elements for the three causal factors (human, materiel and environmental). These findings are preceded by the following statement.

THE FINDING LISTED BELOW DID NOT DIRECTLY CONTRIBUTE TO THE CAUSE FACTORS INVOLVED IN THIS ACCIDENT; HOWEVER, IT DID CONTRIBUTE TO THE SEVERITY OF INJURIES AND DAMAGE.

Present But Not Contributing findings (PBNC). These findings did not cause the accident but in the opinion of the investigator(s) if they are not corrected they could adversely affect the safety of future operations. Present but not contributing findings are not written using the elements in a present and contributing finding. These findings are preceded by the following statement.

THE FINDINGS LISTED BELOW DID NOT DIRECTLY CONTRIBUTE TO THE CAUSAL FACTORS IN THIS ACCIDENT; HOWEVER, IF NOT CORRECTED, THEY COULD ADVERSELY AFFECT THE SAFETY OF FUTURE OPERATIONS.

FINDING 5 (Present But Not Contributing):

The accident crews failed to complete pre-mission planning requirements by departing with an expired weather briefing void time. The Accident Investigation Board investigating another recent CAB, 22ID, accident noted that the accident crew also departed with an expired weather briefing void time. Furthermore, the board reviewed flight briefings for the week of 31 December 2005 through 5 January 2006 and noted that 74 flights took off with an expired weather briefing void time. Although the board concluded that weather conditions did not contribute to this accident, these uncorrected weather planning deficiencies could jeopardize the safety of future flights.

RECOMMENDATION 5:

a. Unit Level Action: Commander, 1-22th Attack Reconnaissance Battalion, Combat Aviation Brigade, 22th Infantry Division, enforce rules and regulations regarding weather briefing requirements.

b. Higher Level Action: Commander, Combat Aviation Brigade, 22th Infantry Division, enforce rules and regulations regarding weather briefing requirements.

c. Army Level Action: None.

c. Recommendations. Each present and contributing finding is followed by recommendations having the best potential for correcting or eliminating the reasons (system inadequacy(ies)) for the error, materiel failure, or environmental factor that caused or contributed to the accident. Additionally, recommendations follow each finding that

was present but not contributing to the accident; i.e., a factor that could adversely affect the safety of continued operations if left uncorrected. Recommendations do not focus on punitive steps addressing an individual's failure in a particular case. To provide a broad application at preventing accidents in the future, state recommendations in broad terms. Refer to the list of remedial measures in DA PAM 385-40 Appendix B-6 for both ground and aviation accidents. The board should not allow existing budgetary, materiel, or personnel restrictions to influence their recommendations. In developing the recommendations, view each recommendation in terms of its potential effectiveness. For example, design improvement of a part that has a history of recurring failure is a better solution than recommending procedures to accommodate the deficiency. Direct each recommendation at the unit, command, or activity having proponentcy for and which is best capable of implementing the actions contained in the recommendation. The actions required at "Unit Level" (company, troop, battalion), "Higher Level" (brigade, division, corps, Army Headquarters), and "DA Level" (to include Army Headquarters with Army-level proponentcy) is addressed by each recommendation. If one or more of these three command levels had no action requirement, a negative report is required. For example, "DA Level Action: None." (See example recommendations in this document).

3-5. INTERNAL Board STAFFING. After completing the initial draft of the board president's portion of the report narrative, designate a time for the board to carefully read the draft history, analysis, and findings and recommendations. A suggested technique is to make separate copies for all board members and allow them enough time to thoroughly read the written product. The intent is to review the documents for clarity and accuracy of content. An additional benefit is that the review also identifies major grammatical and spelling errors. Installation accident investigation (IAI) board presidents may contact the USACRC G-3 operations at 334-255-2660/3410 (DSN: 558) to have investigators assist the board with review of their products and provide advice on the presentation of their investigation material.

3-6. TERMINOLOGY. There is specific terminology used in the board president's part of the report narrative. The following terms and phrases are not found in DA PAM 385-40, but are accepted terminology:

In contravention to – This phrase is used to convey deviation for a published or well-known common practice. It is used in the analysis paragraph and findings.

Suspected - This term is used to convey the board was unable to agree on the exact origin or cause, but the data indicates what or why something happened. In these cases there may be more than one plausible cause and the board suspected one more strongly than another. In deliberations and analysis, the board takes a lot of time to discount other plausible causes and to justify their final cause or contributing factors. (Critical information is unavailable)

Concluded - This term is used to convey the board agreed the preponderance of data is enough to judge what or why something happened (analysis is required).

Determined - This term is used to convey, based on documented evidence, the board easily discovered and is resolute in what or why something happened. There is typically a very clear cause and the board is not obligated to discount other plausible causes. (The facts are self-evident)

Habit Interference - An error is made because task performance was interfered by:

- a. The way the person usually performs similar tasks
- b. The way the person performs the same task under different conditions or with different equipment (e.g., a particular control is operated in one direction for early models, but reversed in subsequent models)

Negative habit transfer - Negative transfer of training; i.e., it is more difficult to learn Task B as a result of having learned Task A.

Board Recorder

(See DA PAM 385-40, Paragraph 2-1)

4-1. GENERAL.

a. USACRC-trained recorders are mandatory for all Centralized Accident Investigations (CAI). The responsibilities and duties of the recorder are as follows:

- (1) Receive and administratively process data gathered by the members of the board.
- (2) Monitor report processing requirements and stages of completion.
- (3) Assign tasks and monitor work of supporting clerical personnel.
- (4) Ensure all necessary substantiating data are collected and posted to the technical report.
- (5) Assemble the final technical report.
- (6) Ensure the human and materiel narrative of the technical report is complete.
- (7) Document the accident site (photographs & diagram).
- (8) Review unit safety program and life support equipment (LSE) program.
- (9) Perform other duties as assigned by the board president.

4-2. DATA MANAGEMENT.

a. The data collected during an accident investigation becomes the very basis of the accident investigation board's analyses and conclusions. The board recorder is responsible for the disposition of all data acquired during the investigation.

b. Data and evidence collected during an investigation includes-

- (1) **Physical evidence** - Matter related to the accident such as equipment, parts, debris, hardware, voice recorders and other physical items.
- (2) **Verbal evidence** - Witness statements and observations.
- (3) **Documentary evidence** - Paper and electronic information, such as

records, reports, policies and procedures, photographs, videos, accident site graphs, duty logs, board proceedings and notes, board member notes, etc.

(4) Recording of anomalies – Through the course of collecting data and evidence there are those factors uncovered by the board that deviate from the norm or expectations. The board records these anomalies for discussion and analysis during the analysis phase of the investigation. Typically, boards record anomalies under the headings of environmental, materiel and human factors.

c. The collection of data comes from six major areas-

(1) The Accident Site

(2) Witness Interviews

(3) Command Data

(4) Environmental Data

(5) Materiel Data

(6) Personnel Data

d. Usually, the accident unit's parent organization designated safety representative initiates the gathering and preservation of data and evidence. To ensure the appropriate measures are taken, the board recorder requests the on-site safety representative to initiate the gathering of data and evidence as outlined in Appendix A, POC checklist. A copy of the checklist can be emailed or faxed to the designated safety representative.

e. Once the board assembles at the accident location, the on-site safety representative briefs the board on actions taken prior to the board's arrival. All data collected by the on-site safety representative is turned over to the board recorder with the appropriate documentation.

f. Although the initial gathering of data begins with the on-site safety representative, the majority of the data is collected by the board once they assemble. Generally, the gathering of data is a simultaneous effort by various work groups and is an ongoing process. Preliminary evaluation of data by the board leads to subsequent data collection.

4-3. ACCIDENT SITE. (See DA PAM 385-40, Paragraph 2-2)

Evidence may be inadvertently moved, removed or destroyed, especially if the situation does not permit preservation of the accident scene. Therefore, the on-site safety representative, after recording initial witness information and statements, develops a diagram of the accident site/wreckage distribution. The site diagram captures the position of debris, equipment, tools, body parts and injured persons.

a. It is imperative that all members of the board view the accident site as soon as possible after being briefed in order to have a general mental picture of what occurred. Consider the following issues before visiting the site:

(1) If there is daylight left every effort should be made to visit the site.

(2) Consider whether or not the accident involved composite or other hazardous materials and ensure the appropriate precautions are taken prior to and while visiting the site.

(3) Check with the host organization's designated representative to see if any photographs, diagrams, videos or other pictorial representations of the scene was collected and are available for viewing.

(4) When feasible, visit the accident site at the same time of day as the accident and under the same conditions. Doing so will give the investigators a more accurate picture of the existing environmental conditions at the time of the accident (glare, traffic, road conditions, etc.).

(5) In the event of an accident on a public roadway and the scene has been cleared away; investigators should maximize local resources such as state, local, or military police reports and site diagrams.

b. Photographing the scene. The board recorder has the responsibility for ensuring that all necessary photographs are taken. If an installation photographer is provided, the board member in charge of photography should supervise him. Remember: It is always better to have too many photos than not enough.

(1) A recommended photographic checklist is shown below:

- Aerial view from four directions (N, S, E, W)
- Ground view from four directions (N, S, E, W)

- General overview of wreckage beginning at the nose and circling site every 45 degrees
- Photographs of any ground scars
- Photographs of major components/controls/parts
- Instrument panel and consoles
- Cockpit/cabin/cab areas (include seats and restraining systems)
- Canopy
- Detailed photographs of suspected failed parts
- Disassembly of parts/equipment (if done)
- Other photographs deemed necessary

(2) As photographs are taken, a log should be completed noting the scene/subject, date, time, direction, and orientation of photographs, as well as the photographer's name.

c. Inspecting physical evidence at the scene. After diagramming and photographic recording, a systematic inspection of physical evidence can begin. The inspection involves-

(1) Survey the involved equipment, vehicles, structures, etc., to ascertain whether there is any indication that component parts were missing or out of place before the accident.

(2) Note the absence of any parts of guards, controls, or operating indicators (instruments, position indicators, etc.) among the damaged or remaining parts at the scene.

(3) Identify as soon as possible any equipment or parts that must be cleaned prior to examination or testing and transfer them to a laboratory or to the care of an expert experienced in appropriate testing methodologies.

(4) Note the routing or movements of records that can later be traced to find missing components.

d. These observations are recorded in notes, diagrams, and photographs so that investigators avoid relying on their memories. Some investigators find a small recorder useful in recording general descriptions of appearance and damage; however, the potential failure of a recorder and limitations of verbal description require their use in conjunction with notes, diagrams and photographs.

e. Before inspecting or removing physical evidence, follow these guidelines:

(1) Obtain concurrence among board members before any wreckage or equipment is moved or removed to ensure observations are complete. However, final approval lies with the board president.

(2) Complete site documentation prior to removing or moving any wreckage or equipment (measurements for maps, photographs and video made).

(3) Be aware that the accident site may be unsafe due to hazardous materials or weakened structures.

(4) Do not start recovery/removal until witnesses have been interviewed, since visual reference to the accident site can stimulate one's memory.

(5) Mark locations of removed wreckage or equipment with spray paint or wire-staffed marking flags. Annotate the marking flags to identify wreckage or equipment that was removed and to allow later measurement.

(6) Use care during recovery/removal and preliminary examination to avoid defacing or distorting impact marks and fracture surfaces.

f. Following inspection of the scene, investigators may need to remove items of physical evidence. To ensure the integrity of evidence for later examination, the extraction of parts is controlled and methodical. Before evidence is removed from the accident scene, it is carefully packaged and clearly identified.

(1) Equipment, parts or subassemblies thought to be defective, damaged, or improperly assembled are removed from the accident scene for technical examination. Document the removal using position maps/diagrams and photographs to display the part in its final, post-accident position and condition. If improper assembly is suspected, investigators ensure the part or equipment is photographed and documented as each subassembly is removed.

(2) Items suspected of failure or malfunction are wrapped or boxed to prevent loss or further damage. Suspected metal failure surfaces should be washed with 90 percent isopropyl (rubbing) alcohol, which can be purchased at any drug store. Pour the rubbing alcohol over the fracture

surface to remove any dirt or mineral salts, do not rub the surface, and then blow dry. After washing, apply water resistant uncontaminated grease to the surface. If there is any question about the grease, use Vaseline. Carefully tag and mark (place, date, and serial number of the equipment) all parts so they are easily identified with the accident and their location at the accident scene. Ensure the tag contains a brief statement regarding the suspected relationship of the parts to the cause of the accident. Both the part and the outside of the package are labeled. Examples of parts that may be preserved for a more detailed examination are—

- (a) Parts suspected of failure.
- (b) Parts that appear to be improperly designed or contain faulty workmanship.
- (c) Lines, fittings, wiring, or controls not properly supported and subjected to excessive strain or vibration.
- (d) Ruptured plumbing or fittings.
- (e) Faulty wiring, electrical or radio equipment.
- (f) Defective engines, drive shafts, transmission and accessories, such as carburetors, fuel controls, governors and generators.
- (g) Defective hydraulic system components.

NOTE: *Do not attempt to mate separated items. This will destroy evidence.*

(3) Extreme discretion is used in disassembling parts or components in the field. If it is known that parts and components will be submitted for teardown and analysis, disassembly should be avoided, as it tends to compromise the analysis by destroying or obliterating bits and shreds of evidence, the value of which may be known only to the analyst. However, when detailed disassemblies are made, all parts are tagged with complete information to include nomenclature, part number, locations, and any other significant information. Document all disassembly with photographs. Assistance in disassembly and inspection of components, parts, fuel and oil may be obtained from the next higher echelon of maintenance, U.S. Army depots or other experts identified by the safety investigation board.

g. A product quality deficiency report (PQDR) is completed for items suspected of causing or contributing to the accident and submitted to the proponent agency.

h. Check with the on-site safety representative for a copy of the police report, if applicable.

i. Reassembly of wreckage. It may be necessary to reassemble wreckage to determine the accident causes or to support a theory in an accident that is difficult to evaluate. When the entire system has been reconstructed, it may afford positive proof of the accident causes. Wreckage layout should resemble the original equipment as closely as possible. This gives the investigator a better overview of separations, fire damage and control system. A detailed and documented inspection of the wreckage layout will often lead the investigator to the areas or system that played a role in the accident. The layout also assists the investigator in developing the sequence of events that occurred in the accident.

4-4. VERBAL EVIDENCE/WITNESS INTERVIEWS. (See DA PAM 385-40, Paragraph 2-3)

a. One of the greatest tools the investigator has in determining the sequence of events and accident causal factors is interviewing witnesses. There are three categories of witnesses—

(1) Participants - Individual(s) personally involved in the accident.

(2) Background witnesses – personnel whose information can aid the investigation. They include manufacturers, air traffic control (ATC) personnel, crash rescue personnel, friends and peers, supervisors, weather briefers, mechanics, etc.

(3) Eyewitnesses - persons who directly observed the accident or conditions preceding or following the accident as well as persons who heard or saw anything relevant to the subject matter of the investigation.

b. Locating witnesses. Although witness interviews provide insightful information, witness recollection rapidly deteriorates and can be inadvertently tainted through media exposure and from comparing stories with other witnesses. Statements taken from witnesses located immediately after the accident are more reliable. To ensure witness statements are accurate, detailed and as authentic as possible, witness interviews should be given a high priority.

(1) On-site designated representative and emergency response personnel (to include MP/CID, local and state police, firefighters, and paramedics, if applicable) can name the person who provided

notification of the incident and those present on their arrival, as well as provide the most complete list available of witnesses and all involved parties. Witness statements from police should be obtained for review.

(2) Individuals involved in the accident and eyewitnesses may be able to help develop a list of others directly or indirectly involved in the accident.

(3) First-line supervisors can provide information about individuals involved and provide insight into the planning and preparation phases of the mission prior to the accident.

(4) Staff in nearby facilities may have assisted or responded to the accident scene.

(5) News media may have access to witness information and photographs or videos of the post-accident scene. Obtain copies of local newspapers, especially if the team gets there a day after. Local media may have already interviewed eyewitnesses and this gives the board an initial list of witnesses and a summary of what they saw. Also, check with the media for video coverage of the wreckage or accident scene. Most media sources will provide a copy of the video coverage if they know it will help the investigation. Use caution when using cell phones around the media. Many of them have scanners that can pick up cell phone conversations and intentions of the board can be compromised.

c. Interview preparation. Much of the investigation's fact-finding occurs in interviews. Therefore, to elicit the most useful information possible from witnesses, interviewers must be well prepared and have clear objectives for each interview. Interviews are conducted after the board has established the areas to be covered and after the board president has reviewed with the board the objectives of the interviews, and strategies for obtaining useful information.

(1) Identify all witnesses. Initial contact information should be provided to the board president from the on-site designated representatives. The board recorder completes the "Summary of Witness Interview" form (DA FORM 285-W, for Ground and DA Form 2397-4, for Aviation).

(2) Select a location. The location should present a comfortable atmosphere, free of distraction and environmental noise when possible.

(3) Schedule an interview with each witness.

(4) Select and prepare the interviewer. The number of board members present during the interview is at the discretion of the board president. However, more than two or three investigators could intimidate some witnesses. One investigator should conduct the interview and maintain eye contact with the witness while another monitors and records the interview, and takes notes.

(5) Determine if the Witness is authorized to be offered a ‘promise of confidentiality.’ (See AR 385-10, Chap 3-10 for clarification and scope thereof.) The board first determines if the safety investigation and final report are deemed LIMITED USE or GENERAL USE, depending on the nature of the accident or the type of equipment or training involved. AR-385-10 defines both of these categories in Chap 3-10 *a* and *b*, respectively. Paragraph *a* identifies LIMITED USE as applicable to all aviation (flight, aircraft-ground, and flight-related) and friendly-fire accidents and goes on to stipulate ‘complex systems, operations, exercises and military-unique items.’ (See AR 385-10, Chap 16-3 for further clarification of the latter.) If the board experiences any ambiguity with applicability to their accident, verify with the USACRC as to which category the safety investigation falls because ‘confidentiality’ is restricted to LIMITED USE only.

(a) If deemed a LIMITED USE safety investigation/report, the board is encouraged to offer confidentiality to all witnesses associated with the accident in the interview process. The promise is read to the witness verbatim, as prescribed in DA Form 2397-4, Block 14, Section a, for aviation, and DA Form 285-W, Block 14, section for ground accidents. Note that each of these forms features express verbiage to delineate the scope of that promise. This is to ensure the witness understands that, if he/she prefers ‘confidentiality,’ that person can expect the statement to be protected from release outside the DoD, either to members of the public or the press under the Freedom of Information Act (FOIA), or state or local governments or federal agencies. In addition, the person can expect the U.S. Army to oppose in court, to the fullest extent, any legal order or court order for release of any witness account/summarization made under the promise of confidentiality.

(b) If the scope of the investigation does not fall under the caveats of the LIMITED USE category, then the associated safety report defaults to the GENERAL USE category. If this is the case, the ‘promise of confidentiality’ does NOT apply to witnesses. The board does, however, read to the witness, verbatim, the verbiage in DA 2397-4, Block 14,

Section b, for an aviation accident investigation, and DA Form 285-W, Block 14, Section b, for a ground accident investigation. This is to relay to the witness that his/her statement will be summarized for accident-prevention purposes only, within the scope of the safety investigation, but that the summary may be released to the public pursuant to a Freedom of Information Act request, with the exception of personally identifiable information (PII).

(c) If a witness declines confidentiality pursuant to a LIMITED USE investigation/report, the board communicates to the witness that the statement/summary, while NOT to be used for administrative or disciplinary actions within the DOD, may subsequently be released to the public pursuant to a Freedom of Information Act request, with the exception of personally identifiable information (PII).

(6) Develop a standardized list of points or objectives to be addressed in the interview. Ensure all board members understand the objectives and strategies and use consistent interviewing methods. Read written witness statements taken by police, CID, or the unit safety officer prior to the interview. Use the statements to formulate questions to clarify points or verify witness credibility. Do not limit the focus of the interview to the accident itself. Use interviews to capture information pertaining to unit and personnel practices, planning, training, etc. Ask several witnesses the same questions to corroborate facts.

(7) Develop sketches and diagrams for use during the interview to pinpoint locations of witnesses, equipment, etc.

(8) Test audio equipment before the interview. Use of an audio recorder (digital or tape) is the preferred method of recording witness interviews and should be used unless the interviewee objects. Using this device allows the interviewer and interviewee to focus on the content of the interview. Ensure the individual conducting the interview is familiar with the operation of the recorder.

d. Conducting the interview. It is important to create a comfortable atmosphere in which witnesses are not rushed to recall their observations. Witnesses are informed that they are a part of the investigation effort and that their input is used to prevent future accidents and not to assign blame. Before and after questioning, witnesses are notified that follow-up interviews are a normal part of the investigation process and that further interviews do not mean that their initial statements are suspect. They are also encouraged to

contact the board whenever they can provide additional information or have any concerns. (See Appendix D, Pre-interview Checklist)

4-5. COMMAND DATA.

Determine what decisions were made which may have “set up” the accident and the authority level of the person making that decision, starting from the accident itself back (to include DA level decisions if appropriate). Collection sources include, but are not limited to:

- a.** Command Climate Assessments
- b.** Interviews and observations
- c.** Records of past unit assessments and inspections
- d.** Defense Readiness Reporting System – Army (DRRS-A)/Unit Status Reports
- e.** Quarterly training briefs (QTB)
- f.** ARAP Data
- g.** Unit policies and procedures for
 - (1)** Risk Management (risk approval levels)
 - (2)** Pre-mission planning and briefings
 - (3)** Training
 - (4)** Utilization of personnel including rest/sleep plan and operator/crew selection and training
 - (5)** Equipment/vehicle/aircraft suitability and utilization
 - (6)** Pre-deployment or RIP/TOA training documentation
 - (7)** Mobilization/de-mobilization training
 - (8)** Suitability and availability of life support equipment (LSE) and protective equipment
 - (9)** Maintenance and dispatch procedures
 - (10)** Information flow

(11) Pre-accident plan/emergency action plan

(12) Copies of the actual mission briefing and risk assessment worksheets

h. Collecting both documentary and verbal evidence helps investigators determine whether personnel in the organization had knowledge of the policies and procedures as well as the organization's enforcement of policies and procedures.

4-6. ENVIRONMENTAL DATA. (See DA PAM 385-40, Paragraph 2-6)

Data pertaining to environmental conditions (at the time of the accident) is collected for evaluation of its impact or influence on the performance of the individuals and/or equipment involved. Environmental conditions include terrain, noise, electromagnetic effects (E3), lighting, glare, space, quality of air, lunar illumination (moonrise/moonset) for night or NVC missions, AT for FLIR aircraft and weather/meteorological (humidity, pressure, temperature, wind and illumination) conditions. Sources include:

a. Observations from personnel in the vicinity.

b. Weather/meteorological and moon illumination reports from local forecasters.

c. Radar plot location and altitude data from air traffic control (ATC) facilities.

d. Maps (topographical and other). Photographs – if needed, satellite and aerial photos are often available from the installation in both digital and paper forms.

e. FMs, TMs, and unit policies and procedures.

f. Subject matter experts (SMEs) for evaluation of specific environmental concerns (occupational health/industrial hygiene specialist for analysis of workspace and quality of air).

4-7. DATA ANALYSIS. (See DA PAM 385-40, Paragraph 2-8)

The board president and recorder are the key personnel to facilitate analysis. It is important that all board members review witness statements, unit and Army-level documents pertinent to the operation, as well as equipment, training and medical records and note any anomalies. Ensure board members review their notes as well as

paragraph 2-8 of DA Pam 385-40 prior to conducting analysis. The responsibilities and duties of the recorder are as follows:

- (1)** Post anomalies for review.
- (2)** Ensure the macro and micro timelines are posted.
- (3)** Ensure all documents are organized and available for discussion.
- (4)** Ensure witness interviews are available to reference.

Human Factors Team

5-1 GENERAL.

a. The Human Factors Team usually consists of the medical officer and other subject matter experts (SMEs) in the mission or training being conducted when the accident occurred.

b. **Medical Officer.** The medical officer's duties and responsibilities are as follows:

(1) Lead the medical, physiological, and psychological analysis of the human factors investigation. AR 40-21 (Medical Aspects of Army Aircraft Accident Investigation), AR 40-2, (Army Medical Treatment Facilities General Administration) and appropriate chapters of this handbook govern the investigation and reporting of these factors.

(2) Evaluate accident survival, emergency egress and rescue portions of the human factors investigations.

(3) Ensure the board is advised of medical/human factors related to the cause(s) of the accident, the reason therefore, and recommendations for corrective action.

(4) In case of off post accidents or where local coroners/medical examiners are involved, promptly recover the remains for autopsy (if applicable), specimen collection, records, etc.. For assistance coordinating with local coroners/medical examiners contact the Armed Forces Medical Examiner's office at 302-346-8648 (DSN: 366).

(5) Investigate and report data concerning personnel injuries this includes collecting all medical and treatment records and procedure reports.

(6) Collect and evaluate life support equipment (LSE), and personal protective clothing and equipment (PCE).

(7) Ensure the human factors narrative for the technical report is complete.

(8) Determine the medical qualification/status of the personnel involved and rescue personnel.

(9) Perform other duties as assigned by the board president.

c. Subject Matter Experts. Individuals who have considerable knowledge and expertise in the required fields (instructor pilot, master/senior/equipment operator, etc.) The duties of other board members are as assigned by the board president. Other duties include, but are not limited to the following:

(1) Examine and record all factors involving operations of the equipment, to include assignment of personnel, mission planning and the history of events from mission assignment to the time the accident occurred.

(2) Investigate and record the status of personnel/individual training, experience, operating regulation, instructions and unit directives. Recommend and prepare changes to ARs and TMs, if required.

(3) Investigate the activities of all personnel involved in the accident, determine if it had an influence on the mission, or played a role in the accident.

(4) Assist the board recorder in preparing a sketch of the accident site.

(5) Conduct and summarize witness interviews as necessary for inclusion in the technical accident report.

(6) Assist with the writing of the technical report as required.

5-2. MEDICAL & PERSONNEL DATA.

Gather data that provides insight into the performance, health, qualification and training of the individuals involved in the accident. Individuals involved include those directly involved, those who influenced the operation, and those suspected to have a role in the accident. Sources of information include, but are not limited to:

a. Verbal evidence from supervisors, peers, and operations, training and maintenance personnel.

b. Individual records.

(1) Training and qualification records. National guard and reserve soldiers' records are often not brought to theater and must be requested early in the investigation to allow for transmittal time. Records include ORB and all NG records maintained by hand at home station.

(2) Equipment/vehicle operator training record

(3) Performance counseling.

(4) Personnel (ORB/ERB) records.

(5) Medical records (include any hospital reports related to the injuries)

(6) Blood and urine results (as required).

(7) Previous accident history.

c. Evaluating injuries is part of the investigation and therefore autopsy information is very important.

5-3. HUMAN FACTORS INVESTIGATION.

a. Support. Examine all areas of resource management in order to determine if adequate support was available to accomplish the mission or task to standard. The higher headquarters provides the support; resource management (personnel, money, and equipment/facilities), organizational climate (structure, policies, and culture), and the operational process (operations, procedures, and oversight) that ultimately set subordinate commands (and their soldiers) up for success or failure. Areas to examine include:

(1) Personnel

(2) Equipment

(3) Money

(4) Services

(5) Supplies

(6) Facilities

NOTE: *Support includes manufacturing, quality control and design. Materiel failures are deficiencies created when the materiel is manufactured. (See DA PAM 385-40, Table B-5 for definitions of support failures)*

b. Standards. Determine if adequate written procedures or guidance exist to support the mission or task. While the analysis usually focus

at the immediate task-condition-standard level, the board conducts a review of all applicable publications-

- (1) Field manuals
- (2) Army regulations / Unit policy letters
- (3) ACOM and installation regulations
- (4) Technical manuals
- (5) Training circulars
- (6) Graphic training aids
- (7) Division/brigade/battalion/company standing operating procedures (SOPs)

NOTE: *A failure to follow a written procedure is not a standards failure. A standards failure is the absence of written guidance, errors in the guidance, or unclear written guidance.*

c. Training. Determine if the training was correct, complete, and sufficient to enable the individual to perform to established standards. All applicable individual and collective training should be examined to ensure appropriate documentation in the individual training folder and appropriate visibility and tracking at the unit level. This may include analysis of training received in basic training, military occupational specialty (MOS)-producing schools, officer basic courses, flight school, etc. Areas to examine include:

- (1) Individual training
- (2) Crew training
- (3) Crew coordination training
- (4) Residual training (negative habit transfer)
- (5) Weapons training (individual, crew, collective)
- (6) Drivers training
- (7) Readiness level progression
- (8) Pilot-in-command selection and training

- (9) Unit collective training
- (10) TRADOC (schoolhouse) training
- (11) Risk management training
- (12) Maintenance training
- (13) Planning for training
- (14) Resourcing training
- (15) Unit specific required training (mobilization/demobilization)

c. Leader/Command

(1) Examine the leadership's role in the accident to determine if the accident causing mistake can be attributed to a leader's failure to enforce standards. Determine if risk management was conducted properly. Areas to address include:

- (a) Unrecognized hazards or hazardous operation
- (b) Inadequate documentation/procedures
- (c) Inadequate supervision
- (d) Crew endurance policy
- (e) Personnel utilization
- (f) Planned inappropriate operation
- (g) Failure to correct known problem
- (h) Supervisory violations

NOTE: *A leader failure can be found when the plan is inadequate.*

(2) Assess the influence of command activity, or lack thereof, in relation to the accident. Apply the risk management 5-step process. Look at each decision point in the accident sequence of events (from pre-mission planning to the actions immediately following the accident) and the authority level of the person making that decision. What decisions were made along the way that set up the accident? You will not always be able to determine the cause of an accident, but you can

determine what allowed it to happen. This provides the unit's command solid information, which can be used to implement corrective action and prevent future accidents. This may also help to identify DA-level decisions (OPTEMPO, PERSTEMPO, etc.) that set that unit up for failure. The ultimate goal is to determine if informed decisions were made at the appropriate level of authority. As a minimum, investigators analyze the following:

- (a) Overall organizational climate (positive, negative, or indifferent)
- (b) Command priorities (training, maintenance, other)
- (c) Outside influences on the organization
- (d) Application of risk management procedures
- (e) Organizational process (policies, procedures, controls)
- (f) Communications (one-way only, open, etc.)
- (g) Character of the organization (professional, excessive centralized control, excessive decentralized control, etc.)
- (h) Formal versus informal leadership
- (i) Appropriate authority delegated with assigned responsibility
- (j) Adherence to established policies
- (k) Mentoring/counseling programs
- (l) Command inspection programs

e. Individual. If it is determined that adequate standards existed and were known to the individual, that the individual was trained to standard (i.e., training was adequate), and that support was adequate to perform the task to standard, and the unit's leadership was adequate the source of the error is probably the individual. Individuals fail to follow standards for a variety of reasons (lack of professional/self-discipline, complacency, haste, loss of composure, fatigue, etc.).

NOTE: Reference DA PAM 385-40, Chapter 2, Figure 2-1 to determine the root causes/system inadequacies of human failure.

Material Factors Team

6-1 GENERAL.

a. The Materiel Factors Team usually consists of the maintenance officer and other subject matter experts (SMEs) in materiel accident investigation and/or other technical advisors for the equipment being used when the accident occurred.

b. Maintenance Personnel. When possible, maintenance specialists are assigned to the board. The responsibilities and duties of the maintenance member(s) are as follows:

(1) Evaluate maintenance forms/records to determine the pre-accident status of the equipment.

(2) Determine if equipment failed and could have contributed to or caused the accident.

(3) Research equipment records for adequacy of inspections and correction of discrepancies. Determine if discrepancies existed that may have caused or contributed to the accident.

(4) Supervise preparation and shipment of items selected for teardown/analysis.

(5) Monitor equipment recovery if accomplished before completion of the investigation.

(6) Review unit's maintenance procedures and record discrepancies.

(7) Ensure all maintenance/materiel factor requirements for the technical report are complete.

(8) Assist with the preparation of accident scene diagram(s).

(9) Write the materiel factors narrative for the technical report.

(10) Perform other duties as assigned by the board president.

6-2. MATERIEL DATA.

NOTE: *for the purpose of accident classification any component failure resulting from maintenance procedures performed prior to the Army taking possession of the aircraft is considered a material failure accident. Any component failure resulting from maintenance procedures*

performed after the Army takes possession of the aircraft is considered a human error accident.

a. Collect data necessary to evaluate the performance and survivability of the vehicle, aircraft, equipment (including Life Support and protective equipment), buildings, and or other support material. If materiel evaluation exceeds local capabilities contact USACRC Operations for assistance at 334-255-2660/3410 (DSN: 558).

b. Equipment records.

(1) As a minimum, collect data from the historical records for the past six-months such as work orders, modification work orders, services and periodic inspection records, as well as other relevant records. Include information pertaining to—

(a) Component times, replacement schedules and compliance with modification work order(s) (MWO).

(b) Safety-of-use messages, safety advisory messages, safety-of-flight messages, ground precautionary messages, maintenance advisory messages and technical bulletins.

(c) Current and delayed discrepancies records. Gather all deficiencies and discrepancies noted for correlation against other materiel/maintenance factors uncovered during the investigation.

(2) Dispatch/logbook records and the daily inspection

b. Technical reports relevant to the equipment.

c. ECODs

d. Lab analysis reports from equipment/component teardown, fluids, digital source collectors or other like equipment.

e. Technical manuals and technical bulletins related to operation and maintenance of the equipment involved.

f. Commercial service bulletins, equipment manufacturers, contractors and other DoD service components with like equipment.

6-3. MATERIEL FACTORS INVESTIGATION.

a. Performance. Determine if the equipment functioned as designed, and if the design was adequate/appropriate for use. Materiel factors

analysis is primarily concerned with evaluating the performance of the aircraft, vehicle, facility, ground support equipment, land/or other support material. Data concerning how operational conditions affected vehicle/ system/equipment performance is also collected. In accordance with AR 385-10, a Priority Quality Deficiency Report (PQDR) must be submitted to address materiel failures found during the investigation, even if it is suspected. The owning unit is responsible for completing the PQDR and a copy is submitted with the accident investigation report.

b. Appropriate use of equipment. Analysis of materiel factors also leads investigators to examine if the required equipment was available, if it was used, and if it was used correctly. If the equipment was not used appropriately it is not a materiel failure and is assessed as human error.

c. Adequacy of Life Support Equipment (LSE) and Protective Clothing and Equipment (PCE). Examine the applicable LSE/PCE to determine if the equipment performed in the manner that was expected or if it contributed or caused injury. Identify shortfalls in LSE/PCE that should be addressed.

7-1 GENERAL.

a. Advisors can be a general subject matter expert or a technical advisor for the equipment used during the accident. Additionally, they can be part of human factors, materiel factors, or a separate part of the investigation depending on their expertise.

b. Advisors are not voting members of the board. The board president has to exercise discretion with reference to the type of information shared with advisors. As a general rule, advisors are not allowed to participate in witness interviews. A manufacturer's representative is not bound by Army regulations. Therefore, manufacturer's representatives, and anyone else not bound by Army regulations regarding promises of confidentiality, are not permitted in interviews where promises of confidentiality are granted. If the advisor has specific questions for the crew or operator that is deemed necessary to determine equipment functionality, then a board member may ask that question for him during the interview.

c. Any outside technical assistance requests or requests to attend a CAI in an observer status for the purpose of initial or continuation training is routed through USACRC operations at 334-255-2660/3410 (DSN: 558).

7-2 TECHNICAL ADVISORS.

a. Technical advisors are usually part of the materiel factors portion of the investigation and can be Department of Defense personnel or industry subject matter experts.

b. Duties of technical advisors include, but are not limited to:

- (1) Provide technical expertise to evaluate equipment.
- (2) Assist in detailed teardown analysis.
- (3) Coordinate assistance from manufacturer's facilities.
- (4) Complete a technical field report for inclusion in the final report.

7-3 GENERAL ADVISORS.

a. General advisors are usually part of the human factors portion of the investigation and can be Department of Defense personnel or industry subject matter experts.

b. Duties of general advisors include, but are not limited to:

- (1)** Provide subject matter expertise to assist in the evaluation of data.
- (2)** Educate board members on their subject matter expertise.
- (3)** Provide data for use in the final report.
- (4)** Advise board members on information needed for the final report.

NOTE: *During investigations that involve sensitive and classified information, add an advisor to the board familiar with what is authorized or not authorized for disclosure in an unclassified medium. Information that is not classified can be combined with other unclassified data to make it classified. For this reason, use caution in a deployed environment.*

Deliberations

8-1. GENERAL.

a. Deliberations are the final stage of analysis and result in the development of findings and recommendations. Deliberations are conducted to:

(1) Identify mistakes/errors, materiel failures, environmental factors (What happened).

(2) Identify root causes (why it happened).

(3) Develop recommendations (what to do about it).

b. Every investigation thoroughly examines environmental factors and materiel performance as potential causes of the accident. However, the focus of this chapter is on determining human error, both at the command and individual levels. There are several reasons for this focus. First, records show human error causes approximately 85 percent of all accidents. Second, identifying human error is the least objective of all the causal factors. Third, human error is often present in accidents caused by environmental factors and materiel failures. Finally, the complex nature of human behavior and organizational culture mandates a systematic approach to investigations to ensure that all areas are thoroughly addressed.

8-2. PROCEDURES.

The board president chairs the meetings and guides the proceedings. The recorder ensures products (timelines, anomalies) are posted in such a manner that all board members can see them. All relevant information remains readily accessible. (See Appendix H)

8-3. PREPERATION.

The recorder prepares butcher charts or dry erase boards prior to beginning deliberations to capture the findings and recommendations as the board reaches their conclusions. Prior to deliberations, the recorder and president brief the board on the use of the charts/tables in DA PAM 385-40 to reach a consensus on the findings (See Appendix H). After the brief, each board member reviews and has on hand a copy of the task error and system inadequacy codes from Appendix B of DA PAM 385-40, prior to conducting deliberations.

NOTE: *Prior to conducting deliberations, the Board completes their analysis, agrees on the timeline, remaining anomalies, and the accident sequence.*

8-4. CONDUCT OF DELIBERATIONS.

Deliberations are a formalized process by which members of the board agree upon the resulting findings and recommendations of an accident. The findings and recommendations are the enduring foundation of the investigation and are the mitigating tools to prevent future accidents. Each member provides input to each finding and assists in the development of recommendations. The board president may opt to conduct a vote to ensure that a majority of the board members agree on a finding and that the task error and system inadequacies correctly describe the circumstances of the accident. It is important that each board member participate to the fullest extent possible and arrives to the deliberation with a full understanding of the facts associated with the accident.

a. Review anomalies to determine if they were present in the accident sequence. Active failures are readily apparent, but latent failures require more analysis. As the factors that were present in the accident sequence are isolated, place them into the written timeline to develop an event chart. Then analyze them to determine if they-

(1) Contributed to the accident (present and contributing).

(2) Suspected to have contributed to the accident (suspected present and contributing).

(3) Did not contribute to the accident, but contributed to the severity of injuries or extent of property damage (present and contributing to the severity of the injuries/extent of property damage).

(4) Did not contribute to the accident, but could adversely affect the safety of future operations (present but not contributing).

(5) In no way contributed to the accident, but identify local conditions or practices that should be corrected or is noteworthy of praise (special observation).

NOTE: *If a potential safety issue has Armywide implications, making the finding a PBNC rather than a special observation will ensure the problem has visibility above the accident unit level.*

b. Task Error identification. Select the most descriptive mistake/error that caused or contributed to the accident from the list in DA PAM 385-40 Appendix B (Table B-1 for aviation human error or Table B-2 for ground human error). The more specific the error, the easier it is to determine the system inadequacies or root causes of that error and the corrective actions required. Also, specific mistakes/errors help USACRC accurately identify accident trends. Regardless of the task involved, the explanation of how it was improperly performed identifies the directive, standard, and the performance deviated from or not complied with. The fact that an error occurred in itself has little meaning until its consequences and relevance to the accident are also explained. This is a key concept to understand during the actual writing of the findings and recommendations. Therefore, the defining and explanation process for human errors is not complete until:

(1) It is determined when and where the mistake/error occurred.

(2) The equipment and individual (by duty position) involved is identified.

(3) The mistake(s) is identified in relation to the deviation from a performance standard and the proper procedure for performing the task is identified.

(4) The directive or common practice governing the performance of the task is identified.

(5) Consequences of the mistake (the effect) are explained.

c. The mistake/error makes up the first part of the finding. There is only one mistake/error per finding, but there can be multiple system inadequacies setting the stage for that one mistake/error.

NOTE: *In the event of a materiel failure, cite the part number. The standard is the “mil spec” requirements concerning the manufacture and utilization of the component. Materiel failures often have human system inadequacies that can result in a human error finding (failures with respect to improper maintenance, improper installation and improper utilization).*

d. The next step is to determine the root causes or system inadequacies that set the stage for the mistake/error and place them into the timeline (Table B-5 DA PAM 385-40). Again these could be latent failures that occurred hours, days, or months prior to the accident that set the

condition for failure. The best way to identify system inadequacies is to work backwards from a mistake/error by asking why until an “aha” moment is reached. Remember that the system inadequacy may have occurred minutes, hours, days, weeks, or even months before the mistake/error.

(1) The best source of information is the individual who made the error or the supervisor(s) of the individual. The interview transcripts may need to be reviewed and the recordings listened to again. These individuals may need to be re-interviewed for specificity of detail. Records and orders may need to be re-examined. The human factors team also has information from other sources. These include individual records, unit records, and other people who may have knowledge about the individual or the accident. A post-accident medical examination may identify physiological factors (acute fatigue, alcohol, carbon monoxide, drugs, impaired vision, etc.). The analysis should include a review of the previous command inspections, FORSCOM Aviation Resource Management Surveys (ARMS), previous accidents, safety council minutes, Quality Deficiency Reports (QDRs), etc. for any trends of known deficiencies and the corrective actions taken by the command.

(2) Select the most descriptive system inadequacy code that set the stage for the mistake/error or materiel failure from the list in DA PAM 385-40, Appendix B (Table B-5).

(3) The explanation of how the system inadequacy caused or contributed to the mistake/materiel failure becomes part two of the finding. Ensure this is added to the timeline/event chart.

e. Develop recommendations that can correct the system inadequacies, not the mistake/errors. These recommendations are developed for the appropriate level of command to take action to correct identified hazards.

(1) When the board reaches a consensus on each significant factor involved in the accident, develop corrective actions having the best potential for remedying each system inadequacy. The goal is to send accurate information and timely recommendations to the appropriate command level for an informed decision. When the board reaches a consensus concerning corrective actions, the command or activity having proponency for correcting the system inadequacies is identified. When this is accomplished, corrective actions can then be directed to the activity and level of command best capable of accomplishing them. To achieve the goal of accident prevention, recommendations do not

focus on specific punitive or administrative actions that deal with the shortcomings of a particular individual in a specific case. Rather, the recommendations address the issue on a broader level.

(2) Each recommendation identifies the actions to be taken at the appropriate level-of-command, such as unit-level actions, higher-level actions, DA-level action, or the agency/activity most appropriate to fix the system inadequacies. Recommendations to division and corps level are often focused on the METL and War Fighting Function (WFF) that can rapidly respond to a division commander's immediate corrective guidance. Army-level recommendations are focused on doctrine, organizations, training, materiel, leadership & education, personnel, and facilities (DOTMLPF) at the Army level and often take months or years to respond to corrective input.

(3) The recommendations are written in conjunction with the findings and included in the technical report of the accident. It is important to provide the local commander with recommendations to address his local situation, but it is equally important to provide the chief of staff, Army (CSA) with recommendations to address the Army wide hazards or systemic deficiencies.

(4) Recommendations/Remedial Measures/Countermeasures Code Identification. Select the most descriptive recommendation code from the list in DA PAM 385-40, Appendix B (Table B-6) that has the best potential for correcting the system inadequacies.

(5) The board president does not allow unresolved issues to be debated indefinitely during deliberations. If a board consensus on an issue cannot be reached within a reasonable amount of time, the board president decides the issue and continues with the proceedings. Board members that do not agree with the president's ruling can file the reasons for their objections using a minority report. Provisions for submitting a minority report are in Paragraph 2-1h of DA Pam 385-40.

NOTE: *This can be a lengthy process. Analysis can take a day in itself, as can deliberations. While it is important to not become bogged down, the board president ensures the board does not rush to conclusions or fail to find significant mistakes/errors and systemic deficiencies.*

(6) It may become apparent during the deliberations that evidence is conflicting. In such cases, the board usually has two choices:

(a) They may further question personnel involved or other witnesses. If this approach is used, it is probably best to come directly to the point. Inform the personnel being questioned of the conflict and ask for an explanation.

(b) If the first approach does not resolve the conflict, it may be possible to rationalize why the conflict exists and then develop an explanation. In any case, the board is responsible for resolving conflicts and carefully weighs the evidence and decides what is most credible.

(7) Once all anomalies are reviewed and findings and recommendations drafted, the board president and recorder, in consonance with the board members, work to complete the written history, narrative, analysis, findings and recommendations IAW Paragraph 1-7 of DA PAM 385-40. The board reviews the completed work for technical accuracy and consistency. Any discrepancies are corrected.

Outbrief

9-1. GENERAL.

At the conclusion of the investigation, the board president prepares and presents an outbrief to inform the appointing authority of the board's findings and recommendations. It may be 60 days or longer before the final report is submitted for distribution through command channels. In most cases, the outbrief is an execution document for the appointing authority to implement corrective actions. Therefore, the brief is as thorough and clear as possible. Make it clear the outbrief is a preliminary report based on information currently available to the board. Based on the circumstances of the accident, ensure that the appointing authority understands that the report may change if new information is made available (e.g., teardown analysis reveals unsuspected materiel failure). Assure the appointing authority that the results of additional analysis are reflected in the final report. The final report is staffed at a later date after the investigation is closed and all remaining analysis is complete.

9-2. ATTENDANCE.

The appointing authority is the primary audience of the outbrief. With the exception of the board, all other attendees are at the direction of the appointing authority. In many cases, the installation or unit POC will ask the board president for advice on who else should attend. As a general rule, the chain of command down to battalion-level should be present. In aviation accidents, brigade or battalion-level ASOs, SPs and/or MEs are normally appropriate. In ground accidents, command sergeants major or other senior NCOs (e.g., master gunner) may be appropriate. This brief is not for the general public or other personnel not in the chain of command or in the safety business. All information contained within the outbrief is for official use only and can only be used in the prevention of future accidents. The information is not intended for use as a briefing tool for next-of-kin or family members. Surviving service members from the accident are briefed as part of their unit and not as an individual.

NOTE: *Pre-briefing the chain of command is not a requirement. Based on the circumstances, the board president decides if it is appropriate to pre-brief the brigade and battalion commanders. This is done when specific command-related or controversial findings are to be presented. A pre-brief is not conducted if the brigade or battalion commanders are possible witnesses for the collateral board or have interests in*

the accident other than accident prevention. The board president does NOT leave a copy of the briefing after the pre-brief. All available board members attend the outbrief and the board president ensures they are prepared to field questions in their areas of expertise. Advise board members that they represent the convening authority, not their respective units.

9-3. PREPARING THE OUTBRIEF.

The board president should not wait until the end of analysis before preparing the outbrief. You can begin preparing the briefing early in the investigation. Many of the slides can be developed before analysis begins. Examples include the board members, pre and post-accident timelines, photographic slides and diagrams, drawings or other pictures that you may expect to use to discuss analysis. The more completed before deliberations, the more time you have to develop a polished product. Inquire early in the investigation as to who might attend the outbrief, where the brief will take place, and what audio visual equipment is available. Finalize the briefing after the board deliberations are completed. This avoids making the slides and writing the script or briefing note cards the night before when you should be rehearsing the briefing or relaxing. Personally conduct a recon of the briefing site a few days prior to eliminate as many unknowns as possible. Normally, the briefing is given to the command group on the installation. After the board president has prepared and rehearsed the briefing, he presents it to the board members. This serves two purposes: first, it serves as a quality review to resolve any problems, solicit comments for improvement, and ensure all information is presented accurately; second, it provides the board president an opportunity to prepare the board members for possible questions that may arise during the actual briefing. All board members attend to provide technical support to the board president.

9-4. RECOMMENDED STRUCTURE.

The board president may utilize the following format for the command out-brief (see Appendix I). Slides are listed in standard order of presentation:

9-5. PRESENTATION.

The board recorder documents the names and duty positions of personnel briefed at each briefing conducted, as well as any questions and comments, to include respective board responses. At no time is a copy of the briefing left with anyone other than the appointing authority without approval from the USACRC chain of command.

If the USACRC chain of command approves a request for additional copies of the briefing, the briefing is labeled “For Accident Prevention Purposes Only. This briefing is not for distribution.” Additional approval is required from the USACRC chain of command to leave a digital copy of the outbrief with the appointing authority. Upon completion of the presentation, the recorder and board president document the outbrief through a written AAR memorandum for record using the issue, discussion and recommendation format.

9-6. TIPS FOR EFFECTIVE PRESENTATION.

To assist the board president in presenting the most professional briefing possible, the following recommendations are made:

- The board president should write a script for the briefing. Using the notes pages allows the board president to maintain continuity during the briefing and assists him in finding his place in the event of a question or untimely interruption. If you decide to brief from note cards, make sure you know the briefing thoroughly. Briefing using note cards can lead to presenting unintended remarks. It is possible to say things you didn’t want to say and dig yourself into a hole that’s hard to get out of.
- When constructing the briefing slides, use text that is large enough for the audience to read. Use a dark colored background with light colored text or a light colored background with dark colored text. Slides are very difficult to read when using dark colored text on a dark colored background or using light colored text on a light colored background. Remember also, if you have to construct a slide that is not listed in Appendix I, keep it simple. “Busy” slides make it difficult for the audience to discern the point you are trying to make.
- The board president conducts a practice briefing in front of the board members. This allows the board members to provide input to the briefing to ensure all possible questions are answered in the briefing. Additionally, minor errors, such as spelling, incorrect times, or sequence of events, can be corrected. Remember “practice, practice, practice.”

The following tips are listed to assist the board president in his presentation:

- Recon the briefing room.
- Know your audience. Remember, they may have just lost a Soldier.
- Rehearse, rehearse and rehearse again.

- Be yourself, be natural, be flexible and be mature.
- Listen. If a question or comment is raised, ensure you have addressed it before you continue your briefing.
- Be professional. No profanity or off color jokes. Use proper grammar, pronunciation and enunciation.
- Speak loudly, vary the rate of delivery and avoid monotone.
- Do not be condescending or argumentative. Do not come across as a “know-it-all.” Discussions with personnel that are not the primary audience are conducted after the briefing.
- Avoid turning your back to the audience and speaking to the screen.
- Maintain eye contact, scan the audience and look at everyone.
- Do not walk or lean in front of overhead projector.
- Do not pace. Stand behind a podium and use an assistant to change slides.
- Arrive at the briefing site early. Check all audio visual equipment. Ensure spare bulbs are available and the seating arrangement is appropriate for the audience.

Red Book Preparation

10-1. NARRATIVE.

a. DA PAM 385-40 requires the investigation board to report, in narrative form, the facts, conditions and circumstances, as established during the investigation. This portion of the report is the “Narrative of the Investigation” and is completed for all on-duty Class A and B accident reports. The narrative is prepared on letter size paper for ground accidents (Paragraph 4-4, DA Pam 385-40) and on a DA Form 2397-3 (Paragraph 3-6, DA Pam 385-40) for aviation accidents.

b. The narrative of the investigation consists of four sections, the history of events/flight, human factors, materiel factors and the analysis. The first three sections of the report contain factual data and if properly written are releasable in an un-redacted format under the Freedom of Information Act (FOIA). The analysis, is reserved for the board’s documentation of its conclusions, suspicions and opinions concerning the accident cause and effect relationships.

c. Each section has specific considerations for the board. The board comments on each of these specific areas, regardless whether causal/contributory. In the history, human factors and materiel subordinate paragraphs, the board can be brief and say the “board concluded not a factor” when appropriate. However, each subordinate paragraph in the analysis section includes sufficient information to substantiate areas not identified as causal or contributory.

d. Outlines of aviation and ground accident narratives are presented below in Figures 10-1 and 10-2 respectively.

(1) Paragraph 1 (History of Events/Flight) presents a sequential snapshot of the activities and events of the mission leading up to the accident, the accident, and the immediate actions following the accident. The timeline established during the investigation assists in writing this paragraph. It includes enough detail to give the reader an accurate description of events. Detailed instructions for this can be found in Figure 3-5 of DA PAM 385-40 for aircraft accidents and Figure 4-2 for ground accidents. Typical errors in this paragraph include not clearly identifying the units involved, not detailing the planning in preparation for the mission, including analytical statements and including findings. Writers of this paragraph, normally the board president, include only statements of fact.

(2) Paragraph 2 (Human Factors Investigation) is described on Figure 3-5 of DA Pam 385-40 for aviation accidents and on Figure 4-2 for ground accidents. The medical officer and SME, with assistance from the board recorder, are responsible for writing this paragraph.

(a) The number one error in this paragraph is not including information for all personnel involved in the accident. A good rule of thumb, air or ground, is if there is a finding concerning someone or if they are a crewmember on board an aircraft at the time of the accident, include them in this paragraph.

(b) The next most prevalent error is not including enough information on the individuals listed. Go into as much detail as possible in the paragraph discussing personnel background information and personnel management. For example, it is not enough to say that “the Soldier was assigned to the unit on 1 December 2014” and nothing more.

(c) In each of the remaining paragraphs, list the required information as listed in DA Pam 385-40.

Figure 10-1 Aviation Accident Narrative Outline

1. History of Flight
 - a. Preflight Phase
 - b. Flight Phase
 - c. Post Flight Phase
2. Human Factors Investigation
 - a. Personnel background
 - b. Personnel management information
 - c. Aircraft suitability
 - d. Communications/air traffic control
 - e. Navigational aids
 - f. Meteorological information
 - g. Ground support services
 - h. Crash survival
 - i. Emergency egress, survival, and rescue
 - j. Special investigation
 - k. Witness investigation
3. Materiel Factors Investigation
 - a. Aircraft airworthiness
 - b. Digital Source Collection
 - c. Airframe
 - d. Systems
 - e. Power plant
 - f. Rotor system or propellers
 - g. Transmissions/gearboxes and drive train
 - h. Laboratory analysis
 - i. Crash site information
 - j. Fire
4. Analysis
 - a. Accident sequence
 - b. Environmental factors
 - (1) Weather conditions
 - (2) Other than weather
 - c. Materiel factors
 - (1) Major components
 - (2) Major systems
 - d. Human factors
 - (1) Support
 - (2) Standards
 - (3) Training
 - (4) Leader/Command
 - (5) Individual
 - e. Other (observations)

Figure 10-2 Ground Accident Narrative Outline

1. History of Events
 - a. Pre-accident phase
 - b. Accident phase
 - c. Post-accident phase
2. Human Factors Investigation
 - a. Personnel background & personnel management information
 - b. Vehicle/system/equipment suitability
 - c. Communications
 - d. Meteorological information
 - e. Support services
 - f. Accident survivability
 - g. Rescue operations
 - h. Special investigation
 - i. Witness investigation
3. Materiel Factors Investigation
 - a. Vehicle/system/equipment worthiness
 - b. Systems
 - c. Engine
 - d. Transmission
 - e. Laboratory Analysis
 - f. Accident site information
 - g. Fire
4. Analysis
 - a. Accident sequence
 - b. Environmental factors
 - (1) Weather conditions
 - (2) Other than weather
 - c. Materiel factors
 - (1) Major components
 - (2) Major systems
 - d. Human factors
 - (1) Support
 - (2) Standards
 - (3) Training
 - (4) Leader/Command
 - (5) Individual
 - e. Other (observations)

(d) The items below are those DA PAM 385-40 paragraph 4-4c(1) and 4-4c(2) require the board to address in the human factors investigation portion of the narrative on all individuals involved in the accident:

- 1.** Briefly summarize service background, to include date of service entry (or civilian equivalent), training, experience, type of assignments, and qualifications acquired prior to joining current unit.
- 2.** Report evidence of safety/traffic violations and prior accident experience on the primary personnel involved. If involved in a prior accident, explain their role.
- 3.** Describe experience in mission/duty/activity relative to the accident mission/duty/activity, also describe whether the individual received his/her qualifications by on-the-job training (OJT) or attending a school. Discuss only those pre-service activities/experiences which are accident related.
- 4.** Review how the unit/organization has managed the individual involved. Begin with date of assignment to current unit/organization.
- 5.** Review experience, training and qualifications upon assignment and report how individual was tasked, trained, and otherwise managed up to the date of the accident.
- 6.** Describe how the unit/organization prepared the individual with qualifications and readiness to perform the mission/activity/event. Indicate whether or not the individual was qualified to perform the mission/activity/event involved in the accident.
- 7.** Explain irregularities in the individual's training folder.
- 8.** Also discuss whether the individual was medically qualified to perform the mission/activity/event involved in the accident.
- 9.** Discuss additional duties and the percentage of time given them versus their primary duty.
- 10.** Report qualifications acquired since assignment to unit such as OJT and schooling.
- 11.** Review the procedures involved in selecting the personnel involved for the mission/activity/event.

12. Describe timelines of notification, compatibility of personnel for the mission/activity/event and their relative experience for the mission/activity/event.

13. Describe involved personnel in terms of their professional reputations in the unit, opinions of peers, subordinates and others who have worked with/for them.

14. Describe the individual's sleep, work, and dietary habits and use of alcohol and nicotine. Review unit sleep/rest policy. Report whether or not a sleep/rest policy was in effect, being monitored, and complied with.

15. Highlight weaknesses in proficiency, if appropriate, especially the performance of tasks duplicating those involved in the accident.

16. Discuss if the individual was receiving medication before the accident. Report type, source, dosage, side effects and possible effect on performance.

17. Summarize the findings of the post accident medical examination. If the individual sustained injuries, give a brief description of the injuries and how they occurred. If the individual sustained fatal injuries, briefly summarize autopsy report (if available), to include cause of death.

(3) Paragraph 3 (Materiel Factors Investigation), The maintenance officer with assistance from the board recorder is responsible for writing this paragraph. The principal objective of this paragraph is to establish the equipment's condition and serviceability prior to the accident.

(4) Paragraph 4 (Analysis) is normally written by the board president. Instructions for writing the analysis are located in DA PAM 385-40, Paragraph 2-8. For more detailed instructions in DA PAM 385-40 refer to Paragraph 3-25b(1) for an aviation accident and paragraph 4-4e for a ground accident. The board president may modify the order of the environmental, materiel, and human factors sections but makes entries for each.

(a) The analysis paragraph summarizes the narrative and discusses the opinions, suspicions, and conclusions of the board. The analysis is

the documentation of board deliberations. It clearly shows the cause and effect relationship of the evidence gathered during the accident investigation. Not only does the analysis show the clear cause and effect of accident causes, but also eliminates plausible accident causes the board determined did not cause or contribute to the accident.

(b) The following are required paragraphs for the analysis. The board makes an entry for each. In each paragraph, develop an analytical statement or statements and then articulate statements of fact that support the analysis.

(1) Begin the paragraph by specifying the scope and conclusions of the investigation. In all cases, begin the paragraph by the words: After analyzing the human, materiel, and environmental data collected during the investigation, the board concluded the accident was caused by” Complete the sentence specifying the factors (human, materiel, environmental) that caused the accident.

(2) Accident sequence. Include a description of the accident that includes the board’s estimate of how the accident occurred. This paragraph creates a picture in the reader’s mind of how the aircraft crashed or how the vehicle rolled over, etc. It does not repeat the history, but includes details of the accident dynamics. Include the board’s analysis of how and why the accident happened.

(3) Environmental Factors. This paragraph includes meteorological and non-meteorological factors. Use the key words under Table B-4 of DA PAM 385-40, describing the environmental phenomena present during the accident when applicable, along with the results. Environmental factors can be present at the time of the accident but not causal. There is no present and contributing finding against environmental factors if the board concludes they were not causal.

(4) Materiel Factors. This paragraph includes all materiel factors. Use the key words under Table B-3, of DA PAM 385-40 to describe what happened to a particular part, piece of equipment, system, or component. Refer to reports written by advisors to the board like manufacturer representatives. Develop a separate paragraph for each major component or system. Each statement of materiel failure is followed by the cause of the failure. Also describe the consequences of the failure. Identify the part number or the NSN of the part that failed. Explain why the board ruled out a part, system, or component that could have caused the mishap. Design or maintenance issues that originated

or occurred at the manufacturer are considered materiel issues.

(5) Human Factors. This paragraph includes all human factors. Use the key words in Appendix B of DA PAM 385-40 to describe issues associated with each of the human factors system inadequacies/root causes. Develop a separate paragraph for each of the basic root causes/system inadequacies and discuss the result of the deficiency. In each case, develop analytical statements and then support with statements of fact--

1. Support. Describe issues relating to resourcing, facilities, services, equipment, number of personnel and other support type factors.

2. Standards. Describe the adequacy of written guidance for a particular task. All findings refer to a standard of some type. Be sure to explain any standards shortcomings and the consequences of those shortcomings. If the board concluded all documents were adequate, explain it that way.

3. Training. Describe the training an individual may have received either in an MOS-producing school, unit, or other. A Soldier without adequate experience or with some sort of negative habit transfer is considered to have a training deficit.

4. Leader/Command.

• **Leader Factors.** Describe what an individual did in his or her capacity as a leader. Table B-5, DA PAM 385-40 discusses leader failure as a lack of supervision, but also consider it a leader issue when a leader chose not to enforce a standard, did not make an informed decision, or was not where he or she should have been.

• **Command Factors.** This paragraph discusses topics like risk management, command climate, unit morale, deployment information, unit training status, OPTEMPO, command priorities, formal versus informal leadership, general equipment status, communication up and down the chain of command, and other issues relevant to the accident.

5. Individual. Discuss the board's conclusions relative to an individual Soldier in terms of the error or the indiscipline that caused the accident or permitted the Soldier to make the error, along with the results of the Soldier's actions. Include the injuries to the Soldier in the results portion of the discussion.

6. Other. In this paragraph include special observations (i.e.,

factors that in no way contributed to the accident but identify local conditions or practices that should be corrected).

NOTE: *If a potential safety issue has Armywide implications, make the finding a PBNC rather than a special observation this ensures the problem has visibility above the accident unit level.*

10-2. FORMS.

a. AVIATION ACCIDENTS - 2397 SERIES FORMS.

(1) CLASS A OR B ACCIDENT REPORT (Right Side)

DA FORM	DESCRIPTION	TAB
2397-14	Index B	N/A
2397	Statement of Reviewing Officials	A
2397-1	Summary	B
2397-2	Findings and Recommendations	C
2397-3	Narrative	D
2397-4	Summary of Witness Interviews	E
2397-5	Wreckage Distribution	F
2397-6	In-Flight or Terrain Impact and Crash Damage Data	G
2397-7	Maintenance and Materiel Data	H
2397-8	Personal Data	I
2397-9	Injury/Occupational Illness Data	J
2397-10	Personal Protection/Escape/Survival/Rescue Data	K
2397-11	Weather/Environmental	L
2397-12	Fire	M

(2) CLASS A OR B ACCIDENT REPORT (Left Side)

TITLE	TAB
Index A (DA FORM 2397-13)	N/A
Copy of Orders Appointing Investigation Board	1
Weather Data	2
Certificate of Damage/ECOD	3
Diagrams and/or Photographs	4
Copy of Deficiency Reports	5
Special Technical Reports and Laboratory Analysis	6
Weight and Balance (DD Form 365-4)	7
Copy of Directives, Regulations, etc.	8
Medical Data (Autopsy, Toxicology, AFIP, etc.) (In USACRC copy only)	9
Flight Planning Data (Flight Plan, Mission Briefing, PPC, Risk Assessment, etc.)	10
Copy of Army Aviators Flight Record (DA Form 2408-12)	11
Copy of Aircraft Inspection and Maintenance Record (DA Form 2408-13)	12
Copy of Uncorrected Fault Record (DA Form 2408-14)	13
Copy of Equipment Modification Record (DA Form 2408-5)	14
Other (Specify)	15
Other (Specify)	16
Other (Specify)	17
Other (Specify)	18

b. GROUND ACCIDENTS DA Form 285 Series. Responsibility for obtaining information and completing the various forms of the series is assigned commensurate with the accident investigation.

(1) CLASS A or B ON DUTY ACCIDENT REPORT (right side)

DA FORM	DESCRIPTION	TAB
285-B	Index B	N/A
285-O	Statement of Reviewing Officials	A
285	U.S. Army Accident Report	B
N/A	Findings and Recommendations	C
N/A	Narrative of Accident	D
285-W	Summary of Witness Interviews	E

(2) CLASS A or B ON DUTY ACCIDENT REPORT (Left Side)

TITLE	TAB
Index A (DA FORM 285-A)	N/A
Serious Incident Report/Casualty Report	1
Copy of Orders Appointing Investigation Board	2
Map of Accident Site	3
Diagrams and/or Photographs	4
Certificate of Damage/ECOD	5
Copy of Deficiency Reports	6
Copy of Directives, Regulations, etc.	7
Special Technical Reports and Laboratory Analysis	8
Copy of Uncorrected Fault Record	9
Copy of Equipment Modification Record (DA Form 2408-5)	10
Weather Data	11
Medical Data (Autopsy, Toxicology, AFIP, etc) (In USACRC copy only)	12
Other (Specify)	13
Other (Specify)	14
Other (Specify)	15
Other (Specify)	16
Other (Specify)	17
Other (Specify)	18

DA Forms 285-A and 285-B is used to track completion of required forms and as a log to ensure all required data is gathered prior to departure.

10-3. DOCUMENT STANDARDS.

a. Paper submission of accident redbooks is the least preferred method and should only be done if in austere conditions or other special circumstances.

b. Format. Documents are typed in 12 font Courier New with the following margins: TOP-1.3 inches, BOTTOM-1.3 inches, LEFT-0.7 inches, and RIGHT-0.8 inches. The layout is 1.3 inches for the Header and 0.5 inches for the Footer. Line spacing is 1.5 and tabs are set at 3, 6 and 9 on the ruler.

c. Packaging. Paper documents are packaged in a bi-fold, two-hole punch, Permaclip Folder. The left and right side of the folder are organized and tabbed in accordance with paragraph 10-2, listed above.

d. Diagrams and/or Photographs. The diagrams and photographs are documented on the left side of the Redbook in Tab 4. Each diagram or photograph is printed on a separate page on the bottom two thirds of the paper. The diagram or photograph contains a compass rose and labeling arrows/markings. The line immediately below the diagram or photograph lists in order the number of the photograph, type of equipment, equipment serial number, location, and date (Example: *Photo #1 C-12C, 78-23130, California, 06 October 2014*). One line is then skipped and a brief explanation of the diagram or photograph is given to include what the label arrows and markings are illustrating. The documents are typed in 12 font Courier New.

e. Digital File Names. Along with the paper copy of the report attach a disk with separate files for each tab labeled in accordance with the Redbook tab naming convention in Paragraph 10-2 for either a ground or aviation accident. The first element in the digital file name contains "FINAL", the second is the date of the accident (YYYYMMDD), the third element "left" or "right" for the side of the redbook, and the fourth states the tab's name (Example: *FINAL YYYYMMDD Left Tab A*).

f. Transmittal of Documents. Mail completed redbooks and digital files to the U.S. Army Combat Readiness Center at the following address:

**U.S. Army Combat Readiness Center
ATTN: Data Quality Control Division
Bldg 4905, Ruf Ave
Fort Rucker, AL 36362**

g. Format Example. For a digital example type “USACRC” into a Web search engine. Once at the U.S. Army Combat Readiness Center’s webpage click the drop down arrow on “REPORTING & INVESTIGATION” then click “Tools” for a digital example/outline.

10-4. DIGITAL SUBMISSION.

a. Digital submission is the preferred submission method for redbooks. Submit digital copies to USACRC Data Quality Control Division at **usarmy.rucker.hqda-secarmy.mbx.safe-accident-info@mail.mil**. Digital files are submitted in either Microsoft Word or scanned in a PDF format to a disk and sent to the address in Paragraph 10-3 or sent via AMRDEC Safe (<https://safe.amrdec.army.mil/SAFE/>) or encrypted email.

b. File Names. Submit separate files for each tab labeled in accordance with the redbook tab naming convention in paragraph 10-2, for either a ground or aviation accident. The first element in the digital file name contains “FINAL”, the second is the date of the accident (YYYYMMDD), the third element is “left” or “right” for the side of the redbook, and the fourth states the tab’s name (Example: *FINAL YYYYMMDD Right Tab 1*).

10-5. FINAL CHECK.

a. After assembling the redbook a consistency check is needed in order to ensure information contained in the various sections of the report are consistent.

b. The following items are duplicated throughout the redbook and require checking to ensure congruity.

Aircraft/Vehicle location (Grid):

- Weather Memorandum
- DA Form 2397-5/285

Speed:

- Photograph Timeline
- Analysis
- Performance Planning Card (Aircraft)
- DA FORM 2397-1/285
- DA FORM 2397-6/285

Weight:

- 365-4 (Aircraft Weight & Balance Form)
 - *Takeoff blocks 9 & 12*
 - *Crash block 16*
- Performance Planning Card (Aircraft)
- DA Form 2397-1/285
- Paragraph Three

Mission Type:

- 2408-12/285
- DA Form 2397-1/285

Altitude (MSL)/Elevation:

- DA Form 2397-1/285
- DA Form 2397-5/285

Fuel:

- 365-4 (Aircraft Weight & Balance Form)
- Performance Planning Card (Aircraft)
- DA Form 2397-1/285
- DA Form 2397-6 (fluid spillage)/285

Weather:

- Weather Memorandum
- DA Form 2397-11/285

UIC:

- DA Form 2397-1/285
- DA Form 2397-9/285
- DA Form 2397-10/285

System Inadequacies:

- Narrative
- Findings & Recommendations
- Ensure Outbrief Slides Match Final Report

Order of forms (persons):

- DA Form 2397-8/285
- DA Form 2397-9/285

Remedial Measures:

- Findings & Recommendations
- DA Form 2397-2/285

Estimated Cost of Damage (ECOD):

- DA Form 2397-1 block 10(a)/285
- DA Form 2397-9/ 285
- ECOD

Crosscheck:

1. System Inadequacies in the findings match what is said in the Analysis paragraph.
2. Redbook turn-in only contains final documents. “Final” is included in the name of the digital file.
3. Witness statements are in third person, without direct statements. Do not use a question and answer format.
4. If there is a finding on an individual, ensure they are in the human factors paragraph.
5. Weight and balance information reflects the weight of aircraft at time of the accident.
6. Paragraphs one through three of the narrative do not contain analysis.
7. All material failures require a Priority Quality Deficiency Report (PQDR) in the redbook.
8. Battalion level UICs end in AA, brigade level UICs end in FF.

10-6. COMMON ERRORS.

a. Improper Marking: The front of the accident report folder was not marked with the proper identifying information IAW DA Pam 385-40, paragraph 4-6e.

b. Report incorrectly labeled as a Limited Use report: Normally flight, flight related, fratricide, or friendly fire accidents are designated Limited Use IAW AR 385-10, Paragraph 3-10a. Other complex weapon systems, equipment, and military unique items may be designated Limited Use at the approval of the commander, USACRC.

c. The Army Headquarters Reviewing Authority: The Army headquarters commander or their designated representatives provides written concurrence or non-concurrence for each finding and

recommendation made by the accident investigation board IAW AR 385-10, Paragraph 3-17c. Additionally, a signature block is required in this block.

d. Missing Forms: IAW DA Pamphlet 385-40 personnel involved, meaning any person who was injured or who took actions or made decisions that generated a present and contributing finding to the accident, require a separate DA Form 285 or 2397-9.

e. Task Errors: When describing mistakes, use mistakes/task errors listed in Appendix B to identify the specific mistakes made by the individual and included the results of the mistake.

f. Findings and Recommendations:

(1) All elements of a finding were not present and the task errors and root causes were not clearly identified in the findings.

(2) Names are not used to identify individuals in the findings. Individuals are identified by duty position.

(3) DA Level recommendations should have been directed at the unit, command or activity which was best capable of implementing the actions contained in the recommendations IAW DA Pam 385-40, Paragraph 4-3f(4).

(4) A present and contributing finding is not a standards failure if a clear standard published. Failure to adhere to the standard is an individual failure, not a standards failure.

g. Narrative of Investigation. The analysis identifies errors that occurred in the accident sequence and contains an explanation of the system inadequacies that caused or permitted an error, failure, or injury to occur.

h. Summary of Witness Interview:

(1) A promise of confidentiality can only be made in a Limited Use accident investigation and cannot be offered in a general use accident investigation IAW AR 385-10, Paragraph 3-10 and DA Pam 385-40, Paragraphs 2-3a(4).

(2) Witness summaries are not a verbatim copy of questions and answers used in the interview. Questions and answers are summarized in the third person.

(3) No Summary of Witness Interviews - Summary of witness interviews are completed for all on duty Class A and B accidents. As a minimum, summaries of the interviews with the primary personnel involved or injured are included. Any individual identified in a finding having a causal or contributing role is also interviewed.

i. Board Appointment Orders:

(1) Board recorders are required IAW AR 385-10, Paragraph 3-12b (1).

(2) For on-duty Class A and B accidents, individuals appointed as board members will not be from the unit that incurred the accident, that is, the same battalion, company, or detachment.

(3) For on-duty Class A or B accidents involving personal injuries, a medical officer or flight surgeon is required to be a board member IAW AR 385-10, Paragraph 3-15d(3).

(4) For an accident involving material damage, a qualified maintenance officer or technician is required to be a board member IAW AR 385-10, Paragraph 3-15d(4).

j. Diagrams and Photographs: Photographs were not numbered and captioned IAW DA Pam 385-40, Paragraph 2-5e. Captions explain in detail what the picture is illustrating and includes the type of equipment, location and the date of the accident.

k. Estimated Cost of Damage (ECOD): Completed ECODs or ACODs are required for vehicle, system, or equipment damage. The ECOD includes an itemized list of damaged components, number and cost of man-hours, and the total cost of repair.

APPENDIX A: UNIT POINT-OF-CONTACT CHECKLIST**General Information:**

- Orders appointing investigation board.
- Blood/urine samples from all personnel involved.
- Witness information: Name, rank telephone number. (Keep personnel segregated until they can be interviewed).
- Secure work area with access to commercial/DSN telephone and SIPR/NIPR for voice and data.
- CID/MP/Casualty Reports/SIRs.
- Individual medical records/autopsy results as applicable.
- Individual personnel records for all involved in accident—
 - *ORB or ERB (Including battalion commander & command sergeant major).*
 - *Training folders (individual, unit).*
 - *Individual counseling records.*
- ECOD initiated through support maintenance.
- Access to laser printer and color printer.
- Transportation to accident site by air (for overhead photographs) and/or ground.
- Name and location of flight surgeon, bodies, injured.
- Weather statement (signed by forecaster).
- Unit and parent organization SOPs to include:
 - *Training and Standardization*
 - *Administrative*
 - *Maintenance*
 - *Shop standards*
 - *Crew rest*
 - *Safety*
 - *Crew selection*
 - *Risk management worksheets and SOP*
 - *Defense Readiness Reporting System – Army (DRRS-A)/Unit Status Reports*

- Directive/policy letters/supplements to regulations that pertain to—
 - *That particular operation*
 - *Assignment of tasks/missions*
 - *Field manuals/training circulars*
- Safety meeting minutes/council meeting minutes/OHR file/last ARMS results, unit hazard log.
- 1:50,000 map which includes location of accident site.
- Survey of mishap site/wreckage (if requested by board).
- UICs/office symbols and chain of command addresses from unit through Major Army Command (MACOM).
- Name, grade and telephone number of safety officer.
- Collateral officer's name, unit and telephone number.
- Unit organization chart and installation telephone directory.
- Unit and installation pre-accident plan and quarterly AARs of testing.
- Unit training schedule that covers the activity.
- Copies of past two QTB briefings for unit and METL.
- MEDEVAC information (if utilized). Include log, triage sheet and name all personnel involved.
- Duty logs from unit and higher, base operations logs, MEDEVAC log, fire station logs, range control, etc.
- Unit ARTEP manual/mission training plan (MTP).
- Access to interpreter (if required).

Aviation Specific:

- Collect individual flight records and ATM records for all personnel involved. Close out flight records.
- ATC tapes (from initial contact through -1 hour) and any available radar data.
- Recovery team for aircraft (on-call).

- Inventory of aircraft (if destroyed).
- Installation supplement to AR 95-1 (as required).

Ground Specific:

- OF 346/346-E Operator's Permit.
- DA Form 348-E/348 Operator's Qualification Record.

NOTE: *Ensure all equipment used in the operation is secured and available for the investigation board (i.e. ropes, field gear, parachute, etc.)*

Aviation Maintenance Records:

E-form equivalents may be used as forms and records are updated to ULLs, ELAS, etc., and E-Pubs may be used in lieu of hard copy manuals.

- Aircraft logbook.
 - DA Form 2408-5
 - DA Form 2408-12
 - DA Forms 2408-13, 13-1, 13-2, 13-3
 - DA Form 2408-14
 - DA Form 2408-18
 - *Weight and balance records.*

- Historical records.
 - *Six-month file (DA Form 2408-13).*
 - *DA Forms 2408-15, 16, 17, and 18.*
 - *Oil analysis records.*
 - *DA Form 2404 retained on file.*
 - *DA Form 2407 Maintenance Work Orders.*

- Equipment Improvement Report (EIR), Quality Deficiency Report (QDR) or Product Quality Deficiency Report if appropriate (SF 368).
 - *Oil analysis records and samples sent.*
 - *Fuel analysis.*

- -10 Operator's Manual (with all current changes).
- Checklist.
- ATM and any unit supplemental tasks.
- -23 maintenance repair manual.
- -23P parts manuals.
- TM series 1-1500-204-23-1 through 10.

- TM 1-1500-328-23
- Unit last flying hour report for that type aircraft.
- Operations Information
 - PPC
 - Briefing forms/composite risk assessment
 - Flight plan
 - Planning weather DD Form 175
 - Weight and Balance DD Form 365-4
- Aviation Life Support Equipment (ALSE) maintenance records, helmets, vests, radios, LPU, etc.
- NVG maintenance records and TMs
- Copy of maintenance contract (if aircraft is under contract maintenance)

Ground Maintenance Records:

- DA Form 5988-E/2404, Daily Inspection Worksheet
- DA Form 5988-E/2404 retained on file (latest schedule of service)
- DA Form 5988-E/2408-14, Deferred Maintenance Worksheet
- DA Form 2407/5504/5990-E, (Maintenance Request Form work order)
- DA Form 5989-E Maintenance request register
- DA Form 2408-20, 5991-E Oil Analysis Record, if applicable
- DA Form 314, AWCMF-450 Prevention Maintenance Record
- DA Form 2406, AWCMF-456 Materiel Condition Status Report
- Calibration Records
- DA Form 5987-E/1970 Motor Vehicle Dispatch
- DA Form 2401/5982-E, Dispatch Log
- Equipment Logbook
- -10 Operator's Manual
- -20 Organizational Maintenance Manual
- "P" Parts Manual
- DA Form 5992-E, 2408-9 Equipment Periodic usage
- All associated equipment components for technical inspection

APPENDIX B: COMMAND IN-BRIEF

- Introductions
- Identify board members and advisors
- Briefly explain investigation process
 - *IAW DA PAM 385-40*
 - *3W Approach (what, why, what to do about it)*
 - *For Accident Prevention Only*
 - *Accident Causes (environmental, materiel and human)*
 - *No interim findings*
 - *Immediate safety concerns are brought to chain of command*
 - *2-3 Weeks to Investigate*
- Request any significant assistance required
- Explain Relationship with collateral board
- No routine updates are provided

APPENDIX C: Board in-brief

GENERAL. In most cases, this is the first time any of the board members have performed an accident investigation. It is important that everyone understand the mission and end result of the accident investigation. The initial board briefing, conducted by the president, should include the following:

- a. Introductions (office/telephone number).
- b. Ensure board is comprised of personnel qualified in the system under investigation; i.e., technical inspector (TI), maintenance officer, medical doctor (per DA PAM 385-40).
- c. Explain (and ensure understanding) that they are to be dedicated to the investigation (reschedule calendars for three weeks).

d. Explain investigative mission:

- (1) For accident prevention purposes only.
- (2) Human/materiel/environmental causes.
- (3) Approximate duration of investigation (2-3 weeks).
- (4) Recap date/time/summary of accident.
- (5) Review DA Pam 385-40 as a guide for completing the forms.

e. **Explain investigation:**

(1) Data collection phase- Collection of factual information. Stress the need for organization of data and the use of an investigator's notebook to assist in organizing data and providing the complete context in which it was collected. This will prevent delay during analysis and deliberations.

(2) Analysis phase- Analysis of the factual information to determine its relevancy/correlation to the accident. Additional data collection may ensue pursuant to those issues raised during this phase.

(3) Deliberations phase- The board's proceedings to collectively identify the cause of the accident, determine why it occurred, formulate the findings, and present recommendations to prevent recurrence.

f. Assign work groups/leaders:

(1) Human factors (doctor, instructor pilot/training SME)

(2) Materiel factors (test pilot, technical inspector/maintenance technician)

(3) Environmental factors (as required).

g. Explain report preparation

h. Assign responsibility for report sections:

(1) History of flight/events (president)

(2) Human factors

(3) Materiel factors

(4) Analysis (president)

(5) Findings/recommendations (president)

(6) DA Form 2397/285 series (all groups)

i. Establish a daily meeting time(s) to exchange information

j. Allow work groups organization time

k. Request for support personnel (i.e., CCAD, Natick Lab, AMCOM, etc.) is coordinated through USACRC operations, DSN 558-2660/3410

l. Discuss release of information outside board (only PAO and board president)

m. Discuss work relationships with technical advisors (e.g., manufacturers)

n. Discuss work relationship with the collateral investigation board

o. Collection of all notes, materials, etc. at completion

p. Use of cell phones and potential release of information. Type of information appropriate for cell phone: facts only. Do not discuss findings, recommendations, analysis, opinions, etc.

APPENDIX D: Pre-interview checklist

GENERAL. It is important to create a comfortable atmosphere in which witnesses are not rushed to recall their observations. Witnesses are told that they are a part of the investigation effort and that their input is used to prevent future accidents and not to assign blame. Before and after questioning, witnesses are notified that follow-up interviews are a normal part of the investigation process and that further interviews do not mean that their initial statements are suspect. Also, encourage the witness to contact the board whenever they can provide additional information or have any concerns.

(1) Create a relaxed atmosphere-

(a) Conduct the interview in a neutral location that was not associated with the accident.

(b) Introduce yourself and shake hands.

(c) Be polite, patient and friendly.

(d) Treat witnesses with respect.

(e) Determine whether the witness has any issues that might interfere with conducting an effective interview (language, vision, hearing, seating, need for frequent breaks, etc.).

(2) Prepare the witness (board recorder)-

(a) Describe the investigation's purpose: to prevent accidents, not to assign blame, and the promise of confidentiality, if appropriate.

(b) Stress how important the facts given during interviews are to the investigation.

(c) Explain that witnesses may be interviewed more than once.

(d) Let the witness know the interview session will be recorded unless they object.

(e) Using the witness interview summary form, complete the form's header information and brief the witness using the appropriate statement from block 15. If offered a promise of confidentiality, have the witness initial the appropriate statement in Block 16 of the form.

(3) Things to avoid during the interview (review with board)-

(a) DO NOT rush the witness while he/she is describing the accident or answering questions.

(b) DO NOT judge, display anger, refute, threaten, intimidate, or blame the witness.

(c) DO NOT suggest answers.

(d) DO NOT make promises that cannot be kept (for example, unrestricted confidentiality).

(e) DO NOT use inflammatory words (violate, kill, lie, stupid, etc.).

(f) DO NOT omit questions because you think you already know the answer.

(g) DO NOT ask questions that suggest an answer, such as “Was the odor like rotten eggs?”

(h) DO NOT embarrass a witness by reacting to obvious errors.

(i) DO NOT interrupt the witness.

(4) The interview-

(a) Start the audio digital recorder and begin the interview by obtaining the “header” information. Ensure the information is stated out loud (in case more than one interview will be digital recording on the same tape).

(b) Note crucial information immediately in order to ask meaningful follow-up questions.

(c) Ask the witness to describe the accident in full before asking a structured set of questions.

(d) Let witnesses tell things in their own way; start the interview with a statement such as “Would you please tell me about...?”

(e) Ask several witnesses similar questions to corroborate facts.

(f) Aid the witness with reference points; e.g., “How did the lighting compare to the lighting in this room?”

(g) Keep an open mind; ask questions that explore what others have already stated in addition to probing for missing information.

(h) Use visual aids, such as photographs, drawings, maps and graphs to assist witnesses.

(i) Be an active listener and give the witness feedback; restate and rephrase key points.

(j) Ask open-ended questions that generally require more than a “yes” or “no” answer.

(k) Observe and note how replies are conveyed (voice, gestures, expressions, etc.).

(l) Determine if the witness has any physical restrictions such as hearing, eyesight, or colorblindness that impact on the credibility or quality of the testimony.

(5) Close the interview-

(a) Before closing, check with board members to see if they have any additional questions.

(b) End on a positive note; thank the witness for his/her time and effort.

(c) Encourage the witness to contact the board with additional information or concerns.

(d) Remind the witness that a follow-up interview may be conducted.

(e) Do not believe a witness based solely on his/her interview. Substantiate or refute his/her information with other sources.

(f) Documenting witness interviews for the accident report—

(1) Summary of Witness Interview, DA Form 2397-4 for aviation and DA Form 285-W for ground, are used by the accident investigation board to summarize necessary witness statements to substantiate the accident report.

(2) Procedural guidelines for completion of the witness interview forms are delineated in DA PAM 385-40 as follows:

(a) DA Form 2397-4: Paragraph 3-7 with a sample in Figure 3-6.

(b) DA Form 285-W: Paragraph 4-5 with a sample in Figure 4-2.

APPENDIX E: Environmental factors checklist

GENERAL. Include noise, illumination and space in the operating environment. Investigators also examine the cockpit, cab, turret, etc., to determine if the design of the equipment may have contributed to the accident. For example, sunlight may wash out video displays or excessive cockpit noise may prevent a crewmember from hearing a critical radio call. Areas to examine include-

- (1) Illumination
- (2) Noise
- (3) Vibration and motion
- (4) Terrain and vegetation (condition of surface)
- (5) Obstructions (wires, towers)
- (6) Thermal conditions (excessive heat/cold, IR cross-over)
- (7) Altitude or depth (supplemental oxygen)
- (8) Contaminants (dust, smoke, snow, smog)
- (9) Foreign objects
- (10) Chemicals or radiation
- (11) Animals or fowl

APPENDIX F: Materiel factors checklist**Initial action at accident scene:**

- a. Remain outside the secured crash site area until the initial site photography is completed. The board president or recorder will notify you when to enter.
- b. Do not move (or touch) any items (parts, pieces, controls, etc.) or disturb ground scars or marks until they are properly documented (measured and photographed).
- c. Systematically record instrument readings, control positions, switch positions, and equipment settings as soon as possible. Preserve with photographs.
- d. Assist the board recorder in the photography and wreckage distribution diagram.
- e. Account for all parts of the equipment.
- f. Check continuity of drive train and examine rotational damage.
- g. Keep a notebook and record anomalies as you find them. Safeguard notes throughout investigation and provide them to the recorder upon completion of the investigation.
- h. Keep an open mind, don't speculate or draw conclusions until all data is collected.
- i. Do not discuss anything concerning the accident or the data collected with anyone outside the investigation board (especially the collateral officer).

WARNING: *Be aware of blood borne pathogens and composite materials. Use appropriate personal protective equipment.*

Aviation Materiel Factors Team (Maintenance Officer and Technical Inspector)**Duties and Responsibilities:**

- a. Evaluate all maintenance forms/records to determine the pre-accident status of the equipment.
- b. Determine if equipment failed and could have contributed to or caused the accident.

- c.** Research equipment records for adequacy of inspections and correction of discrepancies.
- d.** Determine if discrepancies existed that may have caused or contributed to the accident.
- e.** Supervise preparation and shipment of items selected for teardown analysis.
- f.** Monitor equipment recovery if accomplished before completion of the investigation.
- g.** Review unit's maintenance procedures and record discrepancies.
- h.** Assist with the preparation of accident scene diagram(s).
- i.** Examine and record all factors involving operations of the equipment.
- j.** Ensure all data is collected concerning the following issues prior to deliberations:
 - (1)** Materiel inspection (failures and design errors)
 - (2)** Maintenance SOP review
 - (3)** Weight and balance record review
 - (4)** Maintenance record review (current and 6-month file)
 - (5)** Historical records review
 - (6)** POL analysis
- k.** Ensure all maintenance/materiel factor requirements for the technical report are collected. Write the materiel factors narrative for the technical report.
- l.** Gather data to support the following paragraphs in the report:
 - (1)** Aircraft airworthiness
 - (2)** Flight recorders
 - (3)** Airframe
 - (4)** Systems
 - (5)** Power plant
 - (6)** Rotor system or propellers
 - (7)** Transmission/gear boxes and drive train
 - (8)** Laboratory analysis

(9) Crash site information

(10) Fire

m. Collect required data and complete the DA Form 2397 series as directed by the board recorder.

n. Ensure Estimated Cost of Damage (ECOD) is completed.

o. Perform other duties as assigned by the board president.

Ground Materiel Factors Team (*Maintenance Officer and Technical Inspector*)

Duties and Responsibilities:

a. Evaluate all maintenance forms/records to determine the pre-accident status of the equipment.

b. Determine if equipment failed and could have contributed to or caused the accident.

c. Research equipment records for adequacy of inspections and correction of discrepancies.

d. Determine if discrepancies existed that may have caused or contributed to the accident.

e. Supervise preparation and shipment of items selected for teardown analysis.

f. Monitor equipment recovery if accomplished before completion of the investigation.

g. Review unit's maintenance procedures and record discrepancies.

h. Assist with the preparation of accident scene diagram(s).

i. Examine and record all factors involving operations of the equipment.

j. Ensure all data is collected concerning the following issues prior to deliberations:

(1) Materiel inspection (failures and design errors)

(2) Maintenance SOP review

(3) Maintenance record review (current and past)

(4) Historical records review

(5) POL analysis

k. Ensure all maintenance/materiel factor requirements for the technical report are collected. Write the materiel factors narrative for the technical report.

l. Gather data to support the following paragraphs in the report:

(1) Vehicle/system/equipment worthiness

(2) Systems

(3) Engine

(4) Transmission

(5) Laboratory analysis

(6) Accident site information

(7) Fire

m. Collect required data and complete the ground accident report forms (DA Form 285 series) as directed by the board recorder.

n. Ensure Estimated Cost of Damage (ECOD) is completed.

o. Perform other duties as assigned by the board president.

APPENDIX G: Human factors checklist

Initial action at accident scene:

- a. Remain outside the secured accident site area until the initial site photography is completed. The board president or recorder will notify you when to enter.
- b. Do not move (or touch) any items (parts, pieces, controls, etc.) or disturb ground scars or marks until they are properly documented (measured and photographed).
- c. Systematically record possible injury mechanisms based on the seating positions of crewmembers. Preserve with photographs.
- d. Assist the board recorder in the photography. Point out anomalies that need to be recorded.
- e. Account for all crewmembers personal gear. Check for over-the-counter medications.
- f. Observe possible egress paths out of fuselage. Determine survivability based on personnel locations in vehicles (adequate space).
- g. Keep a notebook and record anomalies as you find them. Safeguard notes throughout investigation and provide them to the recorder upon completion of the investigation.
- h. Keep an open mind, don't speculate or draw conclusions until all data is collected.
- i. Do not discuss anything concerning the accident or the data collected with anyone outside the investigation board, especially the collateral officer.

WARNING: *Be aware of blood borne pathogens and composite materials. Use appropriate personal protective equipment.*

Aviation Human Factors Team (Instructor Pilot and Flight Surgeon) Duties and Responsibilities:

- a. Lead the medical, physiological, and psychological analysis of the human factors investigation (AR 40-21, AR 40-2).
- b. Evaluate accident survival, emergency egress, and rescue portions of the human factors investigations.

- c.** Ensure the board is advised of medical/human factors related to the cause(s) of the accident, the reason therefore, and recommendations for corrective action.
- d.** In case of off post accidents or where local coroners/medical examiners are involved, promptly recover the remains for autopsy (if applicable), specimen collection, records, etc.
- e.** Investigate and report data concerning personnel injuries.
- f.** Collect and evaluate aviation life support equipment (ALSE), and personal protective clothing and equipment (PCE).
- g.** Determine the medical qualification/status of the personnel involved and rescue personnel.
- h.** Investigate and record the status of personnel/individual training, experience, operating regulations, instructions, and unit directives. Recommend and prepare changes to ARs and TMs, if required.
- i.** Investigate the activities of all personnel who were victims, had an influence on the mission, or played a role in the accident.
- j.** Complete a weight and balance form and PPC for the actual conditions at the time of the accident.
- k.** Ensure all human factors requirements for the technical report are collected. Write the human factors narrative for the technical report.
- l.** Gather data to support the following paragraphs in the report:

 - (1)** Personnel background information
 - (2)** Personnel management
 - (3)** Aircraft suitability
 - (4)** Communications/Air Traffic Control
 - (5)** Navigational Aids
 - (6)** Meteorological information
 - (7)** Ground support services
 - (8)** Crash survivability
 - (9)** Emergency egress, survival, and rescue
 - (10)** Special investigation
 - (11)** Witness investigation

- m. Collect required data and complete the DA Form 2397 series as directed by the board recorder.
- n. Perform other duties as assigned by the board president.

Ground Human Factors Team (*Subject Matter Expert and Medical Officer*)

Duties and Responsibilities:

- a. Lead the medical, physiological, and psychological analysis of the human factors investigation (AR 40-21, AR 40-2).
- b. Evaluate accident survival, emergency egress and rescue portions of the human factors investigations.
- c. Ensure the board is advised of medical/human factors related to the cause(s) of the accident, the reason therefore, and recommendations for corrective action.
- d. In case of off post accidents or where local coroners/medical examiners are involved, promptly recover the remains for autopsy (if applicable), specimen collection, records, etc.
- e. Investigate and report data concerning personnel injuries.
- f. Collect and evaluate personal protective clothing and equipment (PCE).
- g. Determine the medical qualification/status of the personnel involved and rescue personnel.
- h. Investigate and record the status of personnel/individual training, experience, operating regulations, instructions and unit directives. Recommend and prepare changes to ARs and TMs, if required.
- i. Investigate the activities of all personnel who were victims, had an influence on the mission, or played a role in the accident.
- j. Ensure all human factors requirements for the technical report are collected. Write the human factors narrative for the technical report.
- k. Gather data to support the following paragraphs in the report:
 - (1) Personnel background information
 - (2) Personnel management

(3) Vehicle/system/equipment suitability

(4) Communications

(5) Meteorological information

(6) Support services

(7) Accident survivability

(8) Rescue operations

(9) Special investigation

(10) Witness investigation

l. Collect required data and complete the ground accident report forms (DA Form 285 series) as directed by the board recorder.

m. Perform other duties as assigned by the board president.

APPENDIX H: Deliberations process

FINDINGS. Determine findings using the following methodology:

1. Group anomalies into three categories:

- Environmental, materiel or human

2. Review anomalies to determine if they were present in the accident.

Then analyze to determine if they were:

- **Present & Contributing (PC)** - Contributed to the accident.

- **Present & Contributing to Severity of the Injury or Damage (PC S/D)** - Did not cause the accident, but contributed to a more severe injury or greater damage

- **Present but not Contributing (PBNC)** - Did not contribute, but could cause an accident in the future

- **Suspected PC**- Suspected to have contributed to the accident

- **Special Observation (SO)** - In no way contributed, but the board determined the chain of command should be informed (positive or negative)

- **Freebie (F)** - Minor discrepancies that are brought to the chain of command, but are not in the final report.

3. Refer to DA PAM 385-40, Appendix B to determine a task error for the anomaly

(One per finding):

- **Table B-1:** Aviation Human Task Errors

- **Table B-2:** Ground Human Task Errors

- **Table B-3:** Materiel Failures/Malfunctions

- **Table B-4:** Environmental Conditions

4. For human task errors, refer to DA PAM 385-40, Figure 2-1 in conjunction with Table B-5 to determine root cause/system inadequacy (there can be multiple system inadequacies).

5. Record the following information to assist in writing the finding using Table 3-1 in DA PAM 385-40:

- When and where the mistake/error occurred

- Equipment and individual (by duty position) involved
 - Identify the mistake/error in relation to a deviation from a standard, directive, or common practice governing the performance of the task
- 6. Develop recommendations using DA PAM 385-40, Table B-6**

APPENDIX I: Outbrief standards

OUTBRIEF STRUCTURE:

1. Introduction. Start with the appropriate greeting, “Good morning or good afternoon, sir” and an introduction of yourself. Continue by stating, “This will be an information briefing on the aircraft or vehicle accident that took place at (location) on (date).” Continue with your slides from this point.

This introductory slide includes:

- **Aircraft, vehicle, equipment or task involved in the accident**
- **Classification**
- **Location**
- **Date**

2. Disclaimer. Inform the audience this is a preliminary briefing and that there may be minor adjustments to the findings and recommendations based on additional information that may become available to the board. This slide also serves as an opportunity to excuse from the audience any JAG or 15-6 personnel.

3. Board Members. Use this slide to introduce your board members.

4. Background. The appointing authority may be familiar with much of the information on this slide. He/she knows the unit, equipment, date and location. Be brief. However, he/she may not know the extent of injuries and total cost. Summarize the mission or task. Often, this provides you an opportunity to talk at the macro level as a lead-in to your next slide.

5. Personnel Involved. Use this slide when the linking of duties and the associated injuries supports the findings and recommendations.

6. Seating Diagram. Use a diagram of the vehicle/aircraft/formation to depict individual locations if it helps to present a clear picture of the conditions just prior to the accident.

7. Pre-accident Timeline. Similar to the written history paragraph, this slide frames the accident. Include data that is relevant to the accident. Show when training occurred (or didn't occur), some important personal or unit history, etc. Talk through the sequence of events until the accident occurs, this makes a good transition into the next slide.

8. Accident Site Photographs. A series (2-4) of photographs, start with the big picture and narrow down to a close-up of the accident. Identify relevant data in a lower block on the photographs. From the macro view photograph, begin to show more detailed photographs of the accident site. Use accident site photographs, to include aerial photographs that allow the audience to get a clear picture of the site. Additionally, the photographs orient the audience to the direction of travel, impact angle, and include a compass rose. You may insert other sketches, diagrams or drawings. Make the determination if they belong here or in the analysis section. If the photograph shows “what happened” put it here. Photographs are included to illustrate and support your findings.

9. Post-Accident Timeline. Used to show how the unit or installation reacted to the accident. Medical response timelines are highlighted.

10. Analysis. Don't spend an inordinate amount of time on this slide. Use subsequent findings and recommendations to present your analysis.

11. Summary of Findings. Use this slide to briefly summarize the findings of the investigation. This allows your audience time to process key information before reviewing the findings and recommendations that are written using required terms from DA PAM 385-40.

12. Findings and Recommendations. Allow the appointing authority time to read the each slide before you talk. After he/she reestablishes eye contact, summarize what he/she read. Unlike the findings, cover key points to each recommendation on this slide to ensure the appointing authority understands the intent of the recommendation.

13. Conclusion. Inform the appointing authority that this concludes your briefing and ask them if there are any questions or comments. The recorder takes good notes on the appointing authority's questions and/or comments.

FINAL SLIDE CHECKS:

- Headings 36 Arial Bold
- Body 16 Arial, minimum
- Paragraphs indented ½”
- Line Spacing set at 1

- Text box starts two dots from slide edge
- Pictures need to tell a story and have a specific purpose
- Reflects the analysis paragraph

SAMPLE SLIDES. For an example brief type “USACRC” into a Web search engine. Once at the U.S. Army Combat Readiness Center’s webpage click the drop down arrow on “REPORTING & INVESTIGATION” then click “Tools” for a digital example/outline of the brief.

APPENDIX J: Digital source collection

GENERAL. Centralizes accident investigations (CAI) and installation-level accident investigations (IAI) are supported by the U.S. Army Combat Readiness Center's Digital Collection, Analysis, and Integration (DCAI) Lab. The DCAI Lab assists in the analysis of data, provides accident animation upon request and a technical report of the data upon request.

DIGITAL SOURCES.**a. Aircraft Sources:**

- Maintenance/Flight Data Recorders
- PCMCIA Cards
- Helicopter Operation Monitoring System (HOMS)
- Aircraft Systems/Flight Management Computers
- Non Volatile Memory (FADEC, EEC, ECU, DECU, etc.)
- Engine Trend Monitoring Systems
- Engine Instrument Crew Alert System
- Electronic Data Manager (EDM)/Digital Kneeboard
- Modernized Signal Processing Unit (MSPU)
- IVHMS
- Unmanned Aerial System (UAS) Shelter Recordings

b. Other Data Sources:

- Global Positioning Systems
- Joint Capability Release/Blue Force Tracker (JCR/BFT)
- Air Bag Module Data (GSA Vehicles)
- Consult DCAI Lab for developing capabilities on ground vehicles

PROCEDURES.

a. Contact DCAI Lab with request prior to removing equipment from aircraft or vehicle at 334-255-0280 (DSN:558) or usarmy.rucker.hqda-secarmy.list.safe-dcai@mail.mil.

- b.** Provide a brief history of the accident.
- c.** Provide a unit point of contact with telephone number and email address.
- d.** Mail equipment and/or correspondence to:

Commander, U.S. Army Combat Readiness Center
ATTN: DCAI Lab
Bldg 4905, Ruf Ave
Fort Rucker, AL 36362

APPENDIX K: Media guidance

GENERAL. The level of media interest varies depending on the severity of the accident. It may range from no interest at all to concentrated national attention. The appropriate course of action is to allow the installation or the nearest local public affairs officer to address media requests. If a PAO is not immediately available, the board president may be required to interface with the press at the accident site. The following guidelines govern the president's handling of the media:

- a. The board president is the sole interface with the media. Board members refer requests for information to the board president.
- b. Cooperate with the media to the extent possible.
- c. Do not speculate as to the cause of the accident. The following statement is all that should be provided: *"An investigation of this accident is now ongoing; please refer all of your requests for information to the local installation, U.S. Army Combat Readiness Center, or Department of the Army Public Affairs Office."*

NOTE: *Give the name and contact number of local PAO; if not known, be courteous and get the name and number for the reporter. This shows good faith and an attempt to be as helpful as allowed within the scope of the mission and regulations. If you can't get access to local PAO information, give the name and number of the U.S. Army Combat Readiness Center or Department of the Army Public Affairs Office to the reporter (U.S. Army Combat Readiness Center: Public Affairs Office, 334-255-3770; Department of the Army Public Affairs Office: Media Relations Division, 703-697-7550).*

d. In most cases, news reporters understand that it is too early in the investigation to determine what happened and that you will not speculate about the cause of the accident. Without giving the appearance of trying to conceal anything or pass questions off lightly, the board president should advise reporters that the post or local PAO is the point of contact for responding to all of their future questions.

e. Accident investigation boards are not authorized to provide periodic updates in the form of news releases or press conferences to either media representatives or local PAOs. Board presidents should ask PAOs to seek information from other sources to use in responding to media requests for updates. Board presidents guides PAOs in the direction of the collateral board for obtaining information to be released to

the media. One of the primary intents of a collateral investigation is to provide a means of answering the public's concerns regarding the accident.

f. No attempt is to be made to tell reporters what should be written in their stories or to restrict them from interviewing civilian witnesses. However, do advise military personnel against making statements, expressing opinions, or giving out information concerning the accident.

g. In many instances, the news reporters are able to provide a great deal more information than they receive. Sometimes reporters are among the first persons to arrive at the accident site, and they may have talked to several witnesses before the rescue party arrives. This fact may not be apparent from their conversations, which probably will consist primarily of questions. Rather than strain relations at an accident scene by quoting regulations as the reason why you cannot provide reporters with accident details, attempt to be cordial and helpful, yet firmly refer reporters to a public affairs officer. Remember you may find it necessary later to interview the reporter as well.

h. In most cases, the reporters are happy to pass their information along to the individual in charge of the accident scene and give the investigation team further assistance as needed if they understand the value of their efforts to the safety program. If the news agency is asked to provide photographs or film clips, be advised that a fee is usually involved, so arrangements for financing are made before making this kind of request for assistance. The same caution applies to other nonmilitary agencies (police, fire departments, etc.).

i. When an accident occurs on nonmilitary property, media personnel should be allowed complete freedom in taking photographs from outside the secured area. If classified material is involved, the photographer should be advised of such. If necessary, the photographer may further be advised that the photographing of classified material may constitute a violation of Federal law (18 U.S. Code, Section 797). Any such classified material is either covered or removed before photographs are taken. Although no restriction is placed on the photographer, a tactful request usually prevents use of photographs that would violate propriety. Media personnel should also be advised that the notification of next-of-kin may not have been accomplished.

APPENDIX L: USEFUL CONTACTS

U.S. Army Combat Readiness Center (USACRC) Operations:
334-255-2660/3410 (DSN:558)

Digital Collection and Integration (DCAI) Lab:
334-255-0280 (DSN:558)

U.S. Army Aviation Research Laboratory (USAARL):
334-255-6920/6960 (DSN:558)

USACRC Recommendations Tracking:
334-255-9528 (DSN:558)

USACRC Aviation Directorate:
334-255-3530 (DSN:558)

USACRC Ground Directorate:
334-255-0246 (DSN:558)

USACRC Garrison Safety:
334-255-0244 (DSN:558)

USACRC Motorcycle/ATV Safety:
334-255-2892 (DSN:558)

USACRC Range Safety:
334-255-2372 (DSN:558)

USACRC Ammunition & Explosives:
334-255-3867 (DSN:558)

USACRC Army Readiness Assessment Program (ARAP) Data:
334-255-2643 (DSN:558)

USACRC Operations Research and Systems Analysis (ORSA) Data:
334-255-1496 (DSN:558)

System Safety Engineering:
334-255-3261 (DSN:558)

Corpus Christi Army Depot (CCAD):
361-961-2902/2903 (DSN:861)

Armaments Command:
313-574-6194/6121 (DSN:786)

Ammunition/Explosives:
918-420-8756/8919 (DSN: 956)

Natick Labs:
508-233-5204 (DSN: 256)

U.S. Quartermaster School:
804-734-3178

Medical Examiner (AFMES):
302-346-8648 (DSN:366)



Scan here for
a PDF copy
of handbook
and other
investigation
material