Headquarters
Department of the Army
Washington, DC
24 July 2023

*Department of the Army Pamphlet 385–40

Safety

Army Mishap Investigations and Reporting

By Order of the Secretary of the Army:

JAMES C. MCCONVILLE
General, United States Army
Chief of Staff

Official:

MARK F. AVERILL
Administrative Assistant to the Secretary of the Army

History. This publication is a major revision. The portions affected by this major revision are listed in the summary of change.

Applicability. This pamphlet applies to the Regular Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve, unless otherwise stated. In addition, it applies to Department of Army Civilian employees, all Department of Defense personnel, and foreign military with and under Army operational control, as well as contract personnel, as prescribed in AR 385–10.

Proponent and exception authority. The proponent of this pamphlet is the Director of Army Staff. The proponent has the authority to approve exceptions or waivers to this pamphlet that are consistent with controlling law and regulations. The proponent may delegate this approval authority, in writing, to a division chief within the proponent agency or its direct reporting unit or field-operating agency, in the grade of colonel or the civilian equivalent. Activities may request a waiver to this pamphlet by providing justification that includes a full analysis of the expected benefits and must include formal review by the activity's senior legal officer. The commander or senior leader of the requesting activity will endorse all waiver requests and forward them through their higher headquarters to the policy proponent. Refer to AR 25–30 for specific requirements.

Suggested improvements. Send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to usarmy.pentagon.hqda-aso.mbx.army-safety-office@army.mil.

Distribution. This publication is available in electronic media only and is intended for the Regular Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve.

*This pamphlet supersedes DA Pam 385–40, dated 18 March 2015.

Contents (Listed by chapter and page number)

Table List

Figure List

Chapter 1
Introduction

1–1. Purpose
This pamphlet provides a concise, standardized set of instructions and procedures to assist in the investigation process and reporting of Army mishaps, as directed by AR 385–10.

1–2. References, forms, and explanation of abbreviations
See appendix A. The abbreviations, brevity codes, and acronyms (ABCAs) used in this electronic publication are defined when you hover over them. All ABCAs are listed in the ABCA directory located at https://armypubs.army.mil/.

1–3. Associated publications
Policy associated with this pamphlet is found in AR 385–10.

1–4. Records management (recordkeeping) requirements
The records management requirement for all record numbers, associated forms, and reports required by this publication are addressed in the Records Retention Schedule–Army (RRS–A). Detailed information for all related record numbers, forms, and reports are located in Army Records Information Management System (ARIMS)/RRS–A at https://www.arims.army.mil. If any record numbers, forms, and reports are not current, addressed, and/or published correctly in ARIMS/RRS–A, see DA Pam 25–403 for guidance.

1–5. Concept
Mishaps are a result of adverse interactions of man, machine, and environment. Investigation and assessment of these elements reveal human, materiel, and/or environmental factors that are causal or contributory to the mishap. The Army investigates mishaps to the degree necessary to determine causal factors related to the mishap and to recommend corrective actions to prevent recurrence. Mishap investigations will follow the techniques, procedures, and reporting requirements contained in this pamphlet and AR 385–10. Mishap investigators must identify the unsafe act or violation (active failures) of those involved and the system inadequacies or conditions that exist within the organization or elsewhere in the supervisory chain of command that affect the mishap sequence of events. Finally, investigators must develop recommendations to address the identified unsafe act or violations and system inadequacies that fit into the framework of the Army's strategic planning process known as doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF–P). Recommendations that address the DOTMLPF–P outline immediate prevention measures for commanders and provide information necessary to identify Armywide hazards and develop actionable controls the Director of Army Safety can use to affect changes at Department of the Army (DA) level.

1–6. Methodology
a. The identification of mishap causal factors is never simple and rarely associated with a single individual or event. Mishaps and near misses are a result of a series of events comprised of multiple system inadequacies and/or hazardous conditions that provide the opportunity for an unsafe act or violation to occur. A superficial investigation reveals the unsafe act or violations but the goal of a complete investigation includes the identification of the system inadequacies. Investigators with the best intentions can overlook system inadequacies such as fatigue, complacency, illness, and anomalies in the physical/technological environment; all of which affect human performance. The identification of the system inadequacies requires a thorough understanding of their interrelationships. A deep understanding of this relationship allows mishap investigators to proceed beyond the superficial identification of unsafe act or violations to the identification of underlying system inadequacies. Developing recommendations that fall within the DOTMLPF–P framework addresses the underlying failures/inadequacies serve the ultimate goal of mishap investigations, to prevent future mishaps caused by the underlying system inadequacies they identify.

b. The Army investigates mishaps to determine the facts and circumstances of the mishap with a focus on the identification of the material, environmental, and human factors pertaining to the mishap. Based on the results of the investigation, the Safety Investigation Board (SIB) develops realistic, actionable

recommendations to prevent or reduce the probability of the mishap occurring again. Army mishap investigators use the 3W approach (see fig 1–1) to identify the adverse interactions of man, machine, and environment, which caused or contributed to the mishap. The techniques in this pamphlet structure a mishap investigation in such a way as to facilitate the identification of "what" happened, the description of "why" it happened, and the development of "what" to do about it.

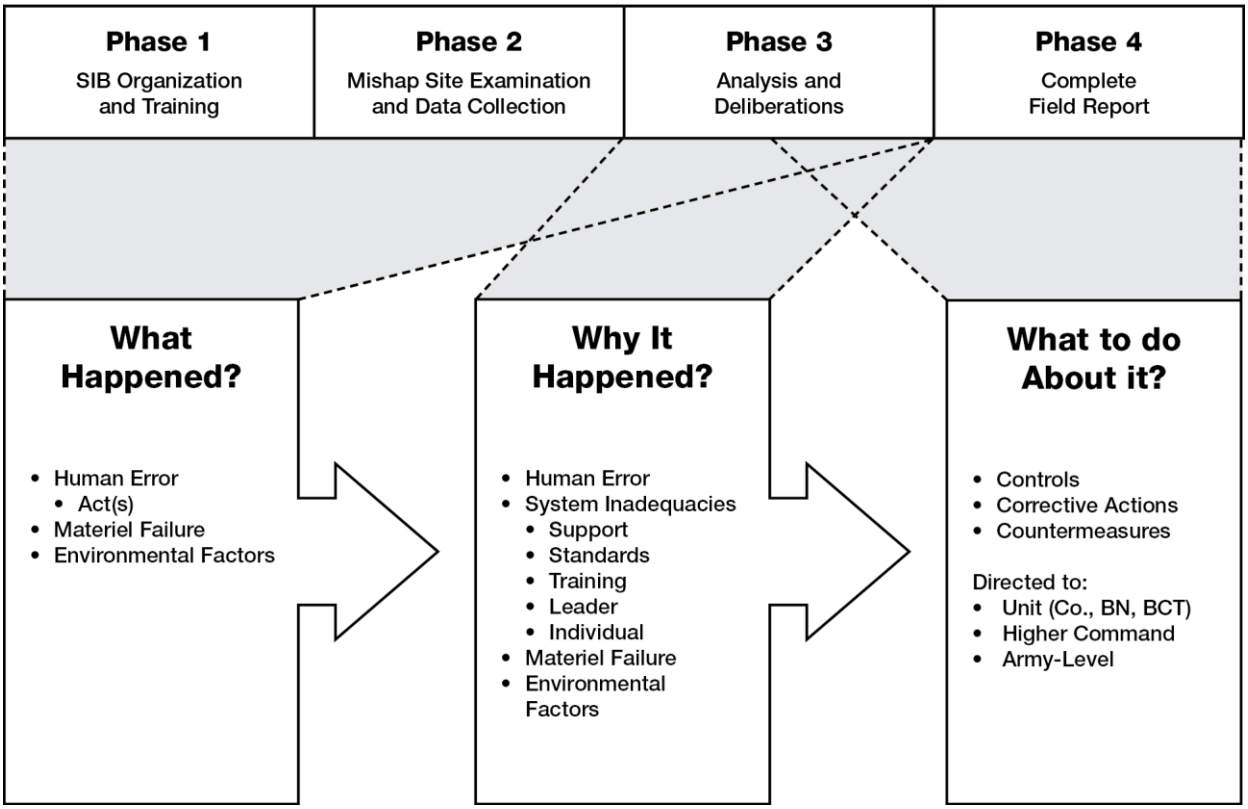


Figure 1–1. 3W approach to information collection, analysis, and recommendations

(1) *What happened (human error/unsafe acts, materiel failure, and/or environmental factor).* The "what happened" portion of the investigation focuses on the data collection effort (Phase 2) where the SIB gathers all pertinent data associated with the mishap. The SIB identifies the individual's unsafe acts or violations, materiel failures, and adverse environmental conditions through the analysis (Phase 3) of the collected data. It is critical the SIB thoroughly collects all data reasonably associated with the mishap before starting its analysis. Data analysis straddles both the "what happened" and the "why it happened" portions of the investigation. The SIB must resolve additional data requirements identified during the analysis before moving on to the deliberations portion of the investigation. At the completion of this portion of the investigation the SIB should have identified the unsafe act or key factors (human, materiel, environmental), which may have caused or contributed to the mishap. Identification of the actual causes of the mishap occur during the "why it happened" portion of the investigation during the deliberations phase (Phase 3) of the investigation. Unsafe acts are defined as, "Those factors that are most closely tied to the mishap, and can be described as unsafe act or violations or actions committed by the operator that resulted in human error or an unsafe situation." Table B–1 defines the individual's unsafe acts (errors and/or violations), the "what" happened associated with human factors.

(2) *Why it happened (human error/system inadequacies, materiel failure(s), and/or environmental factor(s)).* From the standpoint of prevention, the most significant element is "WHY did the mishap or near-miss occur?" The investigation should lead to identify the layers of latent failures (root causes) throughout the system that permitted either the human unsafe action or unsafe condition to occur or the materiel to fail/malfunction. During the analysis phase of the investigation, the SIB begins to associate the identified unsafe act or violations/conditions with the human factor, materiel failure, and/or environmental condition

causal categories. During the deliberations phase the root cause analysis (RCA) process determines the system inadequacies that permitted the unsafe act or violation to occur, the material to fail/malfunction or the environment to become a factor in the mishap. The Army categorizes system inadequacies associated with human error as individual, leader, training, standards, or support failures. Table B–2 defines the system inadequacies associated with human factors. Human error is the leading cause of mishaps; some of the more common contributing human errors are a lack of communication, situational awareness, assertiveness, knowledge gaps, failure to follow establish procedures, and inadequate teamwork. Additionally, there is often an abundance of factors such as fatigue, pressures to meet mission operations tempo, distractions, complacency, inadequate supervision, ineffective planning, and an organizational climate accepting of high-risk behavior. Table B–3 defines the conditions associated with a materiel failure/malfunction. A materiel failure occurs when equipment or part thereof failed or malfunctioned when it becomes completely inoperable, it remains operable but no longer able to perform its intended function satisfactorily, or it has deteriorated to the point where it is unreliable or unsafe for continued use. Table B–4 defines the environmental elements or conditions that have an adverse effect on the performance of the individual or equipment resulting in a mishap. Environmental elements or conditions such as noise, illumination, space, and weather conditions (for example, precipitation, temperature, humidity, pressure, wind, and lightning) all have an effect on human performance but must be found to have been unknown and unavoidable by those involved in the mishap to be considered causal to the mishap. After determining the root causes, look at each and determine where within the DOTMLPF–P the root cause falls. Align the recommendations addressing the specific root cause with the appropriate DOTMLPF–P domain. Identifying the root causes and developing actionable recommendations targeted at a specific DOTMLPF–P domain is the key to preventing future mishaps. It is important to remember the purpose of an Army mishap investigation is to identify underlying causes and contributing factors that will lead to future mishaps.

(3) *What to do about it (recommendations).* Recommendations are the forward-looking, actionable product of the mishap investigation. Solid, meaningful recommendations targeted at a specific DOTMLPF–P domain require effort and imagination unfettered by artificial constraints. The investigator must direct recommendations at the level of command or activity, from Battalion to Army level, most responsible for and capable of implementing the recommendation. Effective recommendations address the system inadequacies. Directing a recommendation at the unsafe act is akin to a doctor telling a patient complaining, “Doctor, it hurts when I do this.” to stop doing that. It may address the immediate issue but accomplishes little to address the underlying cause.

1–7. Conduct of an investigation

a. General. Army mishap investigations identify the human error(s), materiel failure(s), or environmental factor(s) that are causal or contributory to the mishap. The paragraphs below provide a high-level description of the conduct of an Army mishap investigation.

b. Introduction. The investigation and reporting of an Army mishap is a deliberate, process-oriented activity. Once the command responsible for reporting the mishap classifies it as an A or B on-duty mishap and notifies the U.S. Army Combat Readiness Center (USACRC), they begin the process of establishing a SIB based on the provisions of AR 385–10. Figure 1–2 outlines the four phases of the mishap investigation process.

c. Investigation planning. The investigation plan is a systematic process that ensures continuity of effort from the mishap site examination to the submission of the final report. The plan consists of four phases: SIB organization and training, mishap site examination and data collection, analysis and deliberations, and completion of the field report. This paragraph briefly describes each phase. Follow-on chapters provide detailed explanations of each phase of the investigation.

(1) *Phase 1, Safety Investigation Board organization and training*. During this phase, the board president organizes the SIB for the investigation. The safety professional assigned to the SIB conducts initial training of the SIB members explaining the purpose of the investigation, mishap site investigation, individual SIB member responsibilities, 3W approach, data collection, witness interview techniques, analysis of data, SIB deliberations, findings, recommendations, and completion of the mishap report. Additionally, the unit/garrison safety director/officer briefs the SIB on the status of the preliminary actions taken.

(2) *Phase 2, mishap site examination and data collection.* Preliminary actions at the mishap scene include strict site security and controlled access. Once the SIB arrives at the mishap scene, members of the SIB should make a general survey of the entire area, to get a “mental picture” of the physical layout as early as possible. If the SIB cannot arrive at the scene with adequate daylight remaining, delay the

mishap site examination until the following morning. The SIB data collection efforts fall into the broad categories of human factors, materiel factors, and environmental factors. Through the course of the investigation, the SIB collects data through witness interviews, document gathering, observations, research, subject matter expert (SME) discussions, internet research, vehicle digital data recorders (black boxes), mission command/situational awareness systems, or any other source that provides insight into the mishap. Human factors data collected enables analysis focused on the five dimensions of human factors (support, standards, training, leader, and individual system inadequacies). To accomplish this, the SIB should gather all information, regardless of perceived importance, associated with the mission/operation conducted at the time of the mishap. Items such as training records, unit standard operating procedures (SOPs), unit training calendars and plans; unit manning documents, Soldier record briefs (SRBs), and critical shortage military occupational specialty (MOSs); the mishap unit's mission statement, safety brief, and deliberate risk assessment worksheets associated with the mission/task conducted when the mishap occurred, and the summaries of witness interviews.

(3) *Phase 3, analysis and deliberations.* Informal individual and small group analysis occur throughout the conduct of Phase 2; however, the entire SIB must conduct a formal, deliberate RCA. The analysis must be thorough and focus on determining why the mishap occurred. The SIB deliberations mark the formal end of the analysis phase. As deliberations proceed, informal analysis continues as individual SIB members express their perspectives. During the deliberations process, the SIB examines the subjects and anomalies identified during the analysis phase of the investigation to identify the cause of the mishap, issues related to the severity of damage or injury, and identifying those factors that may result in a future mishap. Conclusions derived from the SIB's deliberations identify the unsafe act or violations and the system inadequacies describing any human, materiel, and/or environmental factors causes. The product of the deliberations is clear concise findings and focused actionable recommendations that when implemented prevent similar mishaps. Chapter 4 addresses analysis and deliberation techniques and procedures in detail.

(4) *Phase 4, complete the field report.* In this phase, the SIB carefully organizes all relevant data gathered and documents the conclusions of the SIB in a narrative format. Discuss and resolve any contradictory data in the analysis portion of the narrative to the greatest extent possible.

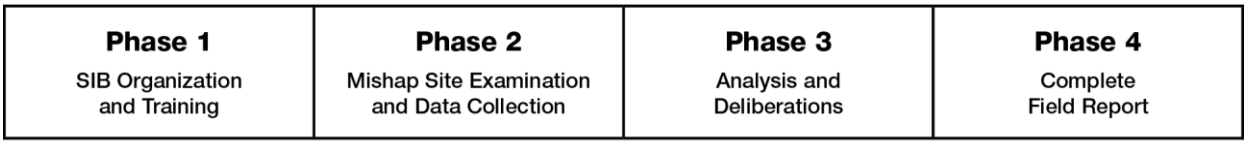


Figure 1–2. Four phases of Army mishap investigative plan

1–8. Mishap cost calculation

Army mishap costs are based on the severity of injury, occupational illness, and/or property/environmental damage (Army and non-Army) resulting from Army operations. For mishap reporting purposes, the logistical disposition of damaged property/equipment (repair or replacement not withstanding) will not negate the requirement to report the mishap.

a. Injury and occupational illness costs. Do not use injury and illness costs to classify a mishap. Include injury and occupational illness costs in the mishap report solely to calculate the total mishap cost. These costs are generally proportional to the severity of injury/occupational illness. When submitting the mishap report use an official estimate of days away from work made by a competent medical authority, if the actual time lost is unknown. Use the cost data in table 1–1 to compute the cost of injuries and occupational illnesses to Army personnel for safety/mishap reporting purposes only.

b. Damage costs.

(1) Start with the estimated cost of damage (ECOD) prepared during the initial mishap classification under the provisions of AR 385–10. Incorporate any updates to the initial ECOD during the period before submitting the mishap report.

(2) Include the resultant cost of decontamination, environmental restoration, and restitution when calculating damage costs. Include these costs in the total mishap cost for classification purposes.

c. Costs peculiar to aircraft mishaps.

(1) For destroyed parts or components, use the cost of replacement per current Army Master Data File (AMDF). Consult with the unit technical supply office or the direct support unit. Do not use unit turn-in credits to reduce the mishap classification.

(2) Include direct person-hour expenditures to repair damaged parts in the mishap cost. U.S. Army Aviation and Missile Command (AMCOM) or the responsible program manager calculates the estimated direct labor costs.

(a) The cumulative (estimated) person-hours expended to remove, repair, and replace damaged aircraft assemblies, subassemblies, or components.

(b) Person-hours expended to restore the aircraft to serviceable condition, if economically repairable.

(c) Person-hours expended in removing and replacing undamaged aircraft components in order to remove, repair, or replace damaged components.

(d) Person-hours expended to remove and replace a part that is not economically repairable.

(e) Person-hours expended to determine the extent of damage.

(3) Person-hours not included in aircraft mishap cost.

(a) Depot and contract overhaul person-hours.

(b) Time expended setting up equipment preparation to actual repair of the aircraft.

(c) Person-hours expended removing, replacing, and inspecting undamaged parts and components solely to satisfy technical manual (TM) inspection requirements.

(d) Indirect person-hours expended for investigating, travel, test flights, and maintenance operational checks.

(e) Maintenance facility overhead cost.

(4) Do not remove a damaged component and replace it with a new component to decrease the number of person-hours and costs solely for purposes of mishap classification. If installing available like components, to make the aircraft available for flight, include the total best available estimated person-hour costs to remove, replace, and repair the damaged component for mishap classification.

(5) Cost computation of helicopter main or tail rotor blades and fixed wing propeller blades.

(a) Do not use depreciation and/or turn-in credits when calculating damage costs to determine mishap classification.

(b) The use of 44 percent of the AMDF cost does not apply when a blade tip cap is the only damage.

(6) Aircraft structural damage. When available, cite the actual cost of aircraft structural damage. When actual cost cannot be determined and the structural damage is repairable, use the calculations detailed in AR 385–10.

(7) Damage not included in aircraft mishap costs.

(a) Fair wear and tear (FWT) including damage to helicopters incurred solely from flying debris during operations in confined areas and unimproved landing sites. Discovery of cracks, breaks, wrinkles, or ruptures during required periodic or scheduled inspections.

(b) When a malfunction or failure of a component part results in damage to another component, the FWT exception does not apply.

(c) Damage to an aircraft as a direct result of action by an enemy force or terrorist group (considered “combat loss”).

(d) Intentional in-flight controlled jettison or release of mission/activity/event essential, aircraft equipment/stores that is not essential to flight. For example, canopies, doors, drag chutes, hatches, life rafts, auxiliary fuel tanks, missiles, drones, rockets, non-nuclear munitions, and externally carried equipment. Intentional emergency jettison of cargo (internal or external) when aircraft control is essential. There must be no injury or reportable damage to the aircraft or other property. Also, intentional controlled jettison of missiles, drones, or non-nuclear munitions must not have resulted from their malfunction.

(e) Planned destruction of Army experimental or prototype aircraft during authorized testing or combat training.

(f) Authorized intentional destruction of Army property or equipment.

(g) Foreign object damage (FOD) to aircraft, air-breathing missiles, or drone engines discovered during scheduled engine disassembly.

(h) The costs of any further Army property damage resulting from rescue or salvage.

(8) Update the cost of aircraft repair if the depot ECOD is significantly different (10 percent or nonrepairable) from the initial or reported ECOD.

d. Procedures for recording injury cost associated with a mishap.

(1) For each person injured in a mishap (including fatalities) determine their individual injury cost by injury severity and occupation category using table 1–1, adjusted for the consumer price index (CPI).

(a) For fatal, permanent total disability (PTD), partial disability injuries, or those injuries that do not result in lost time, apply the associated cost listed in the table one time for each individual injured. No lost time injuries may include needle sticks, loss of consciousness that causes no further injury, or treatment beyond first aid that does not cause days away from work.

(b) For lost time cases, multiply the number of days away from work beyond the day of the mishap by the cost listed under "Per Days Away from Work." For injuries that result in hospitalization, multiply the number of days hospitalized by the value listed under "Per Day Hospitalized" plus the "Days Away from Work Injury Cost" (in other words, (# of days hospitalized * costs) + (days away from work * injury cost)).

(c) Value injuries resulting in first aid treatment at $0.

(d) For injuries that result in restricted duty or temporary reassignment, apply the cost list under 'No Lost Time' one time.

(2) Record the total injury cost for the mishap as the sum of the injury costs for each individual.

(3) The original mishap class (A through D) remains unchanged by total injury cost.

(4) Refer to https://safety.army.mil/reporting-investigation for up-to-date cost standards tables and injury cost calculations.

Table 1–1
Mishap injury and fatality cost for fiscal year 2020 (using calendar year 2019 general–consumer price index) [a]

	No Lost Time per Injury [b, h]	Days Away from Work per Day [c, h]	Days Hospitalized per Day [d, h]	Permanent Partial Disability (PPD) Injury	PTD Injury	Fatality [g, h]
Flying, Sub, Medical Officers	$1,400	$2,600/day	$9,400/day	$2,400,000 [e, h]	$3,100,000 [e, h]	$9,600,000
Other Officers	$1,400	$2,600/day	$9,400/day	$398,000 [e, h]	$1,200,000 [e, h]	$9,600,000
Enlisted Personnel/Cadets	$1,400	$2,600/day	$9,400/day	$396,000 [e, h]	$1,200,000 [e, h]	$9,600,000
Civilian Employees	$1,400	$2,600/day	$9,400/day	$818,000 [f, h]	$1,300,000 [f, h]	$9,600,000

Notes:

[a] At the beginning of each fiscal year, update all costs in this table with the inflation factor based on the CPI using the change in CPI from the average of the previous calendar year (CY) to the average of the current CY (year to date). Source: https://data.bls.gov/pdqweb/cu.

[b] No lost time cases include profiles, restricted duty, and job transfers. Cost was determined as historical direct medical costs plus a one-to-one indirect cost multiplier.

[c] Days away from work per day is the cost for each day away from work, to include quarters, or other recuperation away from work; excludes hospitalization. Cost was determined as historical direct medical costs plus a one-to-one indirect cost multiplier.

[d] Days hospitalized per day is the cost for each day of inpatient hospitalization. Cost was determined as historical direct medical costs plus a one-to-one indirect cost multiplier.

[e] PPD costs of military personnel include training costs, likely medical interventions (cost of average hospital stay), base pay for hospital stay, and partial disability payments over a 30-year period. PTD cost of military personnel was determined based on inclusion of: training cost, likely medical interventions (cost of average hospital stay), base pay for hospital stay, and total disability payments over a 30-year period. When an injury results in a diagnosis of a PPD or PTD at any time during the hospitalization, do not include the hospitalization days cost. The PPD and PTD flat rate equals the total cost for that injury.

[f] Direct wage and medical costs from historical Office of Workers' Compensation data.

[g] Fatality costs as based on the value of statistical life from the U.S. Department of Transportation (DOT) 2016 value of $9.6M. "Guidance on Treatment of the Economic Value of a Statistical Life (VSL) in U.S. Department of Transportation Analyses–2016 Adjustment," August 9, 2016 (https://www.transportation.gov/office-policy/transportation-policy/revised-departmental-guidance-on-valuation-of-a-statistical-life-in-economic-analysis). At the beginning of each fiscal year, update costs based on most recent DOT policy. As of October 1, 2019, the DOT VSL is $9.6M. Use the flat rate fatality cost if the fatality occurs after a hospitalization.

[h] Values updated from the 2014 table using the average CPI from CY 2014–CY 2019 (through July). (Average 2019 CPI/Average 2014 CPI) * Cost = Updated Cost.

1–9. Mishap reports

Report mishaps and near misses using the latest automated mishap reporting system on the USACRC website. The electronic reporting system includes instructions and guides for the completion of the reports.

1–10. Personnel classification

The Army uses the following personnel classifications in reporting Army mishaps:

a. Regular Army personnel.
b. DA Civilian personnel.
c. Army contract personnel.
d. Army direct contractor personnel.
e. Nonappropriated fund employees.
f. Other U.S. military personnel. This includes members of other DoD components on full-time duty in active military service.
g. Reserve Officers' Training Corps (ROTC).
h. Military dependents.
i. Army National Guard (ARNG) personnel.
j. U.S. Army Reserve (USAR) personnel.
k. Foreign nationals, direct hire.
l. Foreign nationals, indirect hire.
m. Foreign nationals, Korean Augmentation to the U.S. Army (Korean nationals assigned to the U.S. Army in a military status).
n. Foreign military personnel assigned to Army units.
o. Public. This category includes all persons not specifically covered elsewhere in this paragraph.

1–11. Occupational Safety and Health Administration recordkeeping requirements
Occupational Safety and Health Administration (OSHA) recordkeeping requirements for military and DA Civilian personnel are outlined in appendix H in accordance with Section 39, Part 1904, Title 29, Code of Federal Regulations (29 CFR 1904.39).

1–12. Safeguarding personally identifiable information and mishap information
Personally identifiable information (PII) is information used to distinguish or trace an individual's identity, such as his or her name; social security number (SSN); date and place of birth; mother's maiden name; and biometric records, including any other personal information linked or linkable to a specific individual. Individuals with access to this information must not disclose any personal information contained in any report of an Army mishap, except as authorized by Army or DoD regulations. Electronic transfer of PII must be encrypted and on a need to know basis. Personnel willfully making such disclosure when knowing the DoD prohibits the disclosure of PII and anyone who releases that information are subject to possible criminal penalties and/or administrative sanctions.

Chapter 2
Phase I, Safety Investigation Board Organization and Training

2–1. Purpose and goal of Phase I
Phase I, SIB Organization and Training sets the tone for the investigation and is key to resourcing the SIB with the necessary personnel, resources, and support to determine the causal factors related to the mishap. The techniques described in this pamphlet apply to all mishap investigations. The board president is responsible for organizing and directing the SIBs efforts to complete a thorough and comprehensive investigation. The appointing authority safety director/officer plays a critical role in coordinating the SIB's reception, staging, and integration into the unit's operational framework to minimize the disruptive effect of the investigation on the mishap organization. This phase begins once the SIB appointing authority resources the necessary personnel forming the SIB. SIB members give priority to the mishap investigation, over all other duties, to ensure prompt completion of the investigation and publishing of the mishap report. A fully assembled, trained, and resourced SIB is in place at the end of Phase I.

2–2. Preliminary actions
By the nature of a mishap being an unplanned event, notification and lead-time for preparations are very short. Until the formation of the SIB, the senior mission commander's safety director will initiate preliminary actions to prepare for the SIB's arrival and the conduct of the mishap investigation. These actions include, but are not limited to, the following:
a. Site security. It is incumbent upon the senior mission commander's safety director to assume responsibility for the mishap site and equipment after release by law enforcement agencies, until the

formation and training of the SIB, and once explosive ordnance disposal (EOD), chemical, firefighting, rescue personnel, and military police (MP)/U.S. Army Criminal Investigation Division (CID)/civilian police have completed their duties and the appropriate authority has declared the area safe for entry. The SIB president will assume control of the mishap site and equipment once the SIB is organized and an appropriate authority releases the site. The board president will ensure the legal investigation has access to the site as necessary, prior to releasing the site or equipment to the owning unit for recovery and cleanup.

(1) First responder on-scene commanders are responsible for mishap scene safety during rescue operations. Once rescue operations are complete and the on-scene commander determines the mishap scene to be safe, he or she will release the scene to civil or military law enforcement jurisdiction. Law enforcement agencies have priority over safety investigations in order to collect and process evidence supporting a criminal investigation. The SIB president must closely coordinate with law enforcement personnel for access to the scene and associated evidence without compromising the criminal investigation. Law enforcement agencies turn control of the mishap scene over to safety personnel when they have determined the evidence does not support a criminal investigation or they have completed their investigation of the mishap scene.

(2) The safety director ensures the mishap unit secures the mishap location when the situation permits. The safety director will ensure the mishap unit limits site access to agencies required to make the area safe for entry, rescue or recovery of injured/deceased personnel, and other investigators. Access will be restricted to personnel directly involved in investigating the mishap. Whenever possible, the safety director will photograph the location of deceased personnel before recovery efforts begin.

b. Witness identification. Obtain the following witness information: name, rank, unit, and telephone number. When possible, and preferably, before witnesses leave the mishap scene, have individuals directly involved in the mishap and any identified witnesses document in writing a description of what they witnessed. When possible, keep witnesses segregated to prevent them from producing a single desired sequence of events. These documents are not sworn statements; the SIB will use them to assist in determining whom and in which order they will conduct formal witness interviews.

c. Biochemical testing of involved personnel. Key personnel as identified in AR 385–10, involved in a mishap must have the appropriate biochemical testing in order to identify the presence of alcohol, carbon monoxide, and drugs. Transport those personnel to the nearest military treatment facility as soon as possible for post-mishap biochemical testing. Military treatment facility commanders send collected specimens to the Armed Forces Medical Examiner System (AFMES) for analyses and evaluation. AFMES does not test for carbon monoxide exposure with ground mishaps.

d. Assist the Safety Investigation Board president with administrative and logistical support.

(1) Records Collection. The mishap unit's parent organization designated safety representative initiates the gathering and preservation of data and evidence. The onsite safety representative will initiate the gathering of data and evidence per the mishap data checklist found on the USACRC safety website at https://safety.army.mil that includes documentary evidence collected in the form of paper and electronic information, such as records, reports, orders, policies, and procedures.

(2) Boardroom. A secured area that will only be accessed by the SIB and large enough for the SIB to conduct investigative planning, witness interviews, data analysis/deliberations, and staffing throughout the entirety of the mishap investigation.

(3) Mishap Investigation Kit. The intent of the mishap investigation kit is to enable the SIB's collection of data and documentation of the mishap site. The investigation kit is assembled and on-hand for future investigation SIBs. There is no all-inclusive packing list for a mishap investigation kit; however, agencies can order a crash investigation tool kit through the Army supply system with the national stock number (NSN) 5180–01–629–5027. Under this NSN is the Army aircraft mishap tool kit; the kit is suitable for ground investigations as well. Safety professionals must identify hazards related to mishap sites and provide protective measures. When assembling a mishap investigation kit, include the necessary personal protective equipment (PPE) to access the mishap site and assess the investigation of equipment involved in the mishap.

2–3. Board training

It is important to ensure all SIB members understand the investigative concept and plan. Typically, a trained safety professional or SIB member conducts an overview briefing of the investigative process. This briefing is to ensure that every SIB member understands the areas of the investigation for which they are responsible, the initial tasks the SIB needs to accomplish, and the data elements necessary to

complete the mishap report. An example investigation 101 briefing slide presentation is available for download on the USACRC website (https://safety.army.mil), in the Reporting and Investigations dropdown menu under the Tools tab.

2–4. Board member duties

AR 385–10 governs the establishment of SIBs. The appointing authority designates individual SIB member duties on the appointment orders. Duty positions include a Board president, a Board recorder, a Board Medical Officer, a Board Maintenance Officer, a Safety Professional, and other personnel as required. SIB composition, dictated in AR 385–10, differs based on the type of mishap. Technical advisors, equipment SMEs, support personnel, and other personnel must be available to the SIB, regardless of its composition. The following are common SIB members and their duties within a mishap investigation.

a. Board president. The board president is responsible for organizing and directing a thorough and comprehensive investigation. Board president duties include, but are not limited to, the following:

(1) Manages the investigation in accordance with AR 385–10 and this pamphlet.

(2) Convenes the SIB at the earliest possible time after notification of appointment.

(3) If applicable, coordinates with the CID special agent in charge and other law enforcement agencies.

(4) Organizes the SIB and assigns areas of investigative responsibility to each member.

(5) Takes control of the mishap scene after rescue, EOD, chemical, and firefighting personnel declare the site safe for entry and law enforcement agencies relinquish jurisdiction.

(6) Verifies the security of the mishap site is adequate to ensure the preservation and protection of evidence including the physical site, equipment, separated parts, and impact scars resulting from the mishap.

(7) Coordinates for all investigating equipment necessary to conduct the investigation.

(8) Evaluates the need for and requests additional technical assistance as required.

(9) Coordinates with the legal investigation officer to share factual data, deconflict data examination times, and witness interviews.

(10) Ensures all available pertinent data is gathered before closing the field portion of the investigation.

(11) When the field examination is complete, and after ensuring the legal investigation has completed its onsite examination, authorizes the recovery of the wreckage from the mishap site.

(12) Conducts frequent meetings of the SIB to ascertain progress, exchange information, and adjust assignments as necessary.

(13) Responsible for the appropriate release of mishap information, in accordance with AR 385–10 and DoDI 6055.07, to persons and agencies during the conduct of the investigation.

(14) Writes the narrative (history and analysis) and the findings and recommendations for the mishap report. The board president does not have to write these documents by himself; however, the board president is responsible to ensure the elements of the mishap report are per the guidance in this pamphlet and convey the appropriate information as outlined in chapter 5.

(15) Responsible for in-briefings and out-briefings as applicable to the appointing authority.

b. Board recorder. When possible, the recorder is a safety-trained individual who meets the requirements outlined in AR 385–10. The duties of the recorder include:

(1) Receives and administratively processes information gathered by the members of the SIB.

(2) Monitors report processing requirements and stages of completion.

(3) Assigns tasks and monitors the work of SIB members.

(4) Ensures all necessary substantiating data is collected and posted to the mishap report.

(5) Assembles the mishap report and submits to the USACRC.

(6) Ensures the human, materiel, and/or environmental analyses of the mishap report are completed.

(7) Conduct and summarizes witness interviews as necessary for inclusion in the mishap report.

(8) Performs other duties as assigned by the board president.

c. Medical officer. The medical officer is responsible for the evaluation of human factors as they relate to the mishap. The duties of the medical officer include:

(1) Assist in the medical, physiological, and psychological aspects of the human factors portion of the investigation in accordance with AR 40–21, AR 40–3, and appropriate chapters of this pamphlet.

(2) Assist with conducting the mishap survival, emergency egress, and survival/rescue portions of the human factors investigations.

(3) In the case of fatal mishaps, ascertains who has jurisdiction, local coroner, medical examiner, or the AFMES; and ensures coordination with the AFMES prior to the autopsy and serves as an observer during the autopsy.

(4) Investigates and reports data concerning personnel injuries.

(5) Collects and evaluates the condition and effectiveness of Life Support Equipment (LSE), and PPE.

(6) Completes the rescue operations, medical analysis, and mishap survivability sections of the narrative as outlined in chapter 5.

(7) Determines the medical qualification/status of rescue personnel to evaluate the adequacy of the medical response.

(8) Performs other duties as assigned by the board president and recorder.

d. Maintenance officer. The maintenance officer is responsible for the evaluation of materiel factors as they relate to the mishap. The appointing authority will appoint a qualified maintenance officer or technician as described in AR 385–10. The duties of the maintenance member(s) include:

(1) Evaluates all maintenance forms/records to determine the pre-mishap status of the equipment.

(2) Determines if a materiel failure could have contributed to or caused the mishap.

(3) Ensures mishap unit completes ECOD.

(4) Identifies design deficiencies.

(5) Researches equipment records for adequacy of inspections and correction of discrepancies and determines if discrepancies existed that may have caused or contributed to the mishap.

(6) Supervises preparation and shipment of items selected for tear-down analysis (TDA).

(7) Officer in charge of equipment recovery.

(8) Reviews the unit's maintenance procedures and record discrepancies.

(9) Completes all maintenance/materiel factor requirements for the mishap report.

(10) Prepares or assists with the preparation of mishap scene diagram(s).

(11) Writes the materiel factors narrative for the mishap report.

(12) Ensures unit submits Standard Form (SF) 368 (Product Quality Deficiency Report (PQDR)), as required.

(13) Performs other duties as assigned by the board president and recorder.

e. Safety professional. The safety professional must be a general schedule (GS)–0018 or aviation safety officer/safety officer that has attended a USACRC Army Mishap Investigation Course. The board president will coordinate with the appointing authority's safety director for additional personnel with the required expertise to form a complete and functional SIB. If the SIB requires Army-level expertise, the safety director can contact the Investigations, Reports, and Tracking Division of the USACRC G3 at (334) 255–3410 or defense switched network (DSN) (312) 588–3410.

(1) Assist Board to ensure report are per the guidance in this pamphlet and convey the appropriate information as outlined in chapter 5.

(2) Review final report to ensure it is complete and accurate in accordance with this pamphlet.

f. Other Safety Investigation Board members/advisors. The complexities and variables of the specific investigation may require the addition of other personnel to the SIB. The board president and recorder must determine as early as possible if additional personnel and subject matter expertise is required to support the investigation. Use AR 385–10 as an initial guide for other SIB members; however, each mishap is unique and may require additional SMEs.

(1) Other SIB members are those members who will actively participate throughout all phases of the investigation.

(2) Advisors are those individuals who have considerable knowledge and expertise in the required field, but do not typically participate in the interviews, analysis, or deliberations, unless deemed necessary by the board president to provide the advisor a contextual reference. The board president must exercise discretion with regard to the type of information shared with advisors. Army Regulations regarding confidentiality do not bind a manufacturer's representative from release of information.

(3) DoDI 5000.88 specifies that the lead systems engineer, working for the program manager, will support system-related Class A and B mishap investigations by providing analyses of hazards that contributed to the mishap and recommendations for materiel risk mitigation measures, especially those that minimize human errors. The lead systems engineer is an advisory member of the SIB for Class A and B mishap investigations.

g. Mishap unit point of contact. The mishap unit provides the board president with a unit point of contact (POC). The unit POC is the SIB's primary conduit for data collection from the mishap unit, scheduling

of interviews, communication with the unit chain of command, and general SIB assistance, as required. The board president or recorder should send the unit POC a checklist of actions and necessary data required for the investigation of the mishap. This checklist helps focus the unit POC and assists the SIB by preventing unnecessary delays to the investigation.

2–5. Organization and planning

a. General. Phase I provides the opportunity for the board president to organize the SIB for the investigation. During this phase, the responsibilities of the board president include the arrival and organization of the SIB, establishing a boardroom, ensuring the SIB members have a full understanding of the investigative concept and plan, and conducting command in-briefs to the appropriate commanders. This phase of the investigative process is imperative in setting the right tone for the entire investigation.

b. Arrival. One of the team's first challenges is to assemble the SIB. In most cases, the SIB members will not arrive simultaneously. Selection, notification, and travel of other SIB members may require days to coordinate. Whatever the circumstance, the board president and recorder must develop a plan to gain control of the other SIB members and advisors immediately upon arrival. The SIB will display a sense of professional urgency in the beginning of the investigation.

c. Board room. It is important to establish the SIB's working area as soon as possible. At a minimum, the boardroom must be a secure area only accessible by the SIB. The area must be large enough for the SIB to conduct the board's business, witness interviews, data analysis/deliberations, and staffing throughout the entirety of the mishap investigation. Access to a phone line, projector, screen, and power for computers is advantageous to the conduct of the SIB. In cases of remote mishap sites, this may not always be possible.

d. Initial Safety Investigation Board briefing. It is important to ensure that all SIB members understand what they are investigating, the status of the mishap site and personnel involved, their duties as a Board member, and the plan moving forward. Typically, the board president will conduct an overview briefing of the investigative process. This briefing is to ensure that every SIB member understands the areas of the investigation for which they are responsible, the initial tasks the SIB needs to accomplish, and the data elements necessary to complete the mishap report. The unit safety officer/appointing authority safety director will brief the SIB on the status of the site and any actions taken by other agencies directly related to the mishap site. Finally, the SIB must be prepared, mentally and physically, with the proper personal protective and investigative equipment to examine the mishap site, as explained in chapter 3 of this pamphlet.

2–6. Command in-brief

The board president should in-brief the appointing authority or their representative 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 SIB's mission, composition, and requirements. On occasion, the appointing authority may provide additional guidance regarding areas they feel need particular emphasis. The SIB should restrict their comments to the process of the investigation and specific roles and responsibilities of each SME assigned to the SIB. The SIB will avoid speculation about any preliminary data gathered or any initial communications with members of the mishap unit. Reinforce the scope of the investigative process and explain that the board will develop its findings only after the SIB conducts its deliberations. Inform the appointing authority that the SIB will advise the unit of any immediate safety concerns 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 SIB will not make that determination on behalf of the unit.

2–7. Coordination with other investigations

a. General. The board president must plan interactions with parallel legal, OSHA, civil law enforcement, and CID investigations. It is to everyone's benefit that the board president cooperates with the other investigations to the maximum extent possible. Just like the safety investigation, each of these parallel investigations has an important mission to accomplish and requires timely access to all appropriate information.

b. Criminal investigation interface. Criminal investigations take priority over SIBs and SIBs take priority over all other investigations for purposes of access to evidence, witnesses, and the mishap scene;

however, all investigations must act with a spirit of cooperation to ensure equal access to the evidence and a successful completion of each investigation. It is common practice for CID to take initial custody of ground mishaps, especially if there was a fatality. Proper coordination with CID prior to the SIB's arrival at the mishap site can often avert any issues.

c. Legal investigation interface. The Army employs legal investigations, commonly referred to as 15–6 investigations, to determine the facts surrounding the mishap for use in litigation, claims, public release, and to support other administrative and disciplinary actions. The results of the legal investigation form the basis of any briefing provided to the families of individuals fatally injured in an Army mishap. Legal investigations must remain independent and apart from the mishap investigation. Commanders appoint legal investigating officers as required by DoDI 6055.07 and AR 385–10, and use procedures in AR 15–6 and AR 27–20. Witnesses may not appear before a legal investigation until the SIB has released them. However, the board president provides the legal investigation, in an expeditious manner, with all factual data collected by the SIB. The following information must be provided (if available) to legal investigation:

(1) List of witnesses interviewed.
(2) Summaries of witness interviews not provided pursuant to a promise of confidentiality.
(3) Photographs (dependent upon captions on the photos; no markings that provide analysis).
(4) Equipment tear-down and inspection reports.
(5) Fuel and oil analysis.
(6) ECOD.
(7) Maintenance records.
(8) Flight/Ground planning.materials (operation orders (OPORDs), Deliberate Risk Assessment Worksheets, and so on).
(9) Medical, Flight, and Training records.
(10) Autopsy reports.
(11) Weather reports.
(12) Cockpit voice transcripts.

d. Information not provided by Safety Investigation Boards. Interaction and cooperation is inherently necessary, but to maintain the integrity of the safety investigation the following information will not be provided to the legal or other investigations:

(1) Witness summaries completed pursuant to a promise of confidentiality**.**
(2) The SIB's preliminary or final analysis, findings, or recommendations.
(3) Any other analysis or assumptions derived by the SIB.

2–8. Media interactions

Press relations. The level of media interest will vary depending on the severity of the mishap. It may range from no interest at all to concentrated national attention. The appropriate course of action is to allow the garrison or the nearest local public affairs officer (PAO) to address media requests. If the PAO is not immediately available, the board president may be required to interface with the press at the mishap scene. The following guidelines govern the board president's handling of the media:

a. The board president will be the sole interface with the media. Board members will refer any 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 mishap. The board president should only provide the following statement: "An investigation of this mishap is now ongoing; please refer all of your requests for information to the local garrison, U.S. Army Combat Readiness Center, or Department of the Army Public Affairs Office." Give the name and number of the local PAO; if not known, be courteous and get the name and number for the reporter. This will show good faith and an attempt to be as helpful as allowed within the scope of the mission and regulations. If you cannot get access to local PAO information, give the name and number of the USACRC or DA PAO to the reporter (USACRC, Communication and Public Affairs Office, commercial (334) 255–3770 or DSN 558–3770; DA Public Affairs Office, Media Relations Division, commercial (703) 614–1742).

d. In most cases, news reporters will understand the truth of the statement that the mishap investigation has just begun and that it is impossible to draw accurate conclusions with incomplete information. Without giving the appearance of trying to conceal anything or pass the reporters' questions off lightly, the board president should advise the media that the post or local PAO will have a statement as soon as the exact events leading up to the mishap are known.

e. SIB members will not 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 should guide PAOs in the direction of the legal investigation as one of the primary responsibilities of a legal investigation is to provide a means of answering the public's concerns regarding the mishap.

f. The board president will not tell a reporter what they should write in a story or restrict them from interviewing civilian witnesses. All DoD personnel should be cautioned against making statements, expressing opinions, or giving out information concerning the mishap. A few moments of calm conversation with the reporter can usually prevent a great deal of misunderstanding.

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 mishap 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. In most cases, the reporters will pass their information along and give the investigator further assistance if they understand the value of their efforts to the safety program. If the board president asks the news agency to provide photos or film clips, be advised that a fee will usually be involved. The same caution applies to other nonmilitary agencies, such as police and fire departments.

h. When a mishap occurs on nonmilitary property, the board president will allow media personnel complete freedom in taking photographs with the caveat not to disturb physical evidence related to the mishap. However, do not allow the media to roam around the secure wreckage site as they may disturb evidence or expose themselves to hazardous substances. If classified material is involved, the board president will communicate this to the photographer. If necessary, the board president will advise the photographer that the photographing of classified material may constitute a violation of federal law (Section 797, Title 18, United States Code). Any such classified material should be either covered or removed before photographer begins to photograph the scene. Although the board president will not restrict the actions of the photographer, a tactful request will usually prevent the use of inappropriate photos. The board president will also advise media personnel that the Army might not have finished the notification of next of kin.

i. If additional assistance or guidance is required beyond the capabilities of the local public affairs office, the SIB can contact the USACRC Communications and Public Affairs Director at DSN (334) 255–3770 or commercial (312) 558–3770.

Chapter 3
Phase II, Mishap Site Examination and Data Collection

3–1. Purpose and goal of Phase II

The purpose of this phase is to gather all relevant data and evidence the SIB will use during the analysis and deliberations phase of the investigation from before, during, and after the mishap. The data/evidence collected during a mishap investigation forms the basis of the SIB's analysis and conclusions. Therefore, the SIB must exert a thorough and coordinated effort to collect and manage all relevant data and evidence. The intent of this chapter is to assist investigators in accomplishing this effort. Although the initial gathering of evidence begins with the onsite safety representative, the SIB will collect the majority of the evidence and data once they assemble. Generally, the gathering of data and evidence is a simultaneous effort by various work groups, parallel investigations, and is an ongoing process. Preliminary evaluation of data and evidence by the SIB will lead to subsequent data collection. The SIB collects data and evidence from seven major areas: the mishap site, witness interviews, organizational data, personnel data, environmental data, materiel data, and digital data, as discussed in this chapter. Data collected during the course of the investigation will assist the Board in creating products derived during the analysis and deliberations phase. For example, the SIB develops a chronological timeline of events essential in understanding the mishap timeline and sequence of events using data captured from witness interviews, duty logs, emergency services logs, documentation, and data recording devices. A list of anomalies (discussed in paragraph 3–10), which are factors uncovered by the SIB during the course of collecting data and evidence that deviate from regulatory guidance, standard business practices, or reasonable expectations, must be immediately recorded by the SIB for discussion and analysis during the analysis and deliberations phase of the investigation.

3–2. Mishap site

a. Once the SIB assembles at the mishap location, the onsite safety representative will brief the SIB on actions taken prior to their arrival and turn over all evidence and data collected by the onsite safety representative to the SIB. The board recorder is responsible for the disposition of all data and evidence acquired during the investigation.

b. The SIB must gain control of the mishap site and record any evidence that may be perishable, or inadvertently moved, removed, or destroyed, especially if the situation does not permit preservation of the mishap site. Therefore, the onsite safety representative, after transcribing initial witness information and statements, should develop a diagram of the mishap site/wreckage distribution. Be aware of and control the hazards presented by composite/hazardous materials whenever working in and around the mishap site. The site diagram should capture positions of debris, equipment, tools, body parts, and injured persons. Overhead photos of the mishap site taken from an unmanned aircraft system (UAS) or helicopter are invaluable in determination of the mishap sequence of events. The safety director will be the officer in charge of the mishap site as soon as EOD, chemical, firefighting, rescue personnel, and MP/CID/civilian police have completed their duties and the fire chief has declared the area safe for entry. Upon arrival, the board president will take charge of the mishap site for the remainder of the investigation.

c. It is imperative that all members of the SIB visit the mishap site as soon as possible after the conduct of the initial overview briefing in order to gain a general mental picture of what occurred. Consider the following issues before visiting the site.

(1) Determine whether the mishap involved composite or hazardous materials and take the appropriate precautions prior to and while visiting the site.

(2) Review any photos, diagrams, videos, or other pictorial representations of the site before the initial visit.

(3) When feasible, visit the mishap site at the time and conditions present on the day of the mishap. Doing so will give the investigators a more accurate picture of the existing environmental conditions at the time of the mishap (glare, traffic, road conditions, and so on).

(4) In the event of a mishap on a public roadway and the site has been cleared away, investigators should utilize local resources such as state, local, or MP reports and site diagrams.

d. Mishap site safety. Immediate steps must be taken to prevent injury/occupational illness to personnel from fire, ammunition cook-off, hazardous material, burnt carbon fiber exposure (present for fires involving composite materials), and other potential hazards present at the mishap site. The most effective means of providing security in these cases is to rope off the area and place guards around the site at a distance sufficient to ensure protection for personnel.

(1) In cases where the hazard is an explosive device, alert an EOD unit.

(2) Composite materials (burned or fragmented) are present in most modern aircraft, tactical wheeled and tracked vehicles, and equipment. Safety personnel must evaluate all mishaps (both aviation and ground) for the presence of composite materials to prevent unnecessary exposure or endangerment of SIB members and individuals recovering the wreckage.

(3) After the onsite commander declares the scene safe for entry, other hazards will usually continue to exist. Hazards vary from mishap to mishap. The board president, in consultation with the board recorder and board safety professional, should evaluate the site for residual hazards and take necessary steps to mitigate risks to the SIB while examining the mishap site. Common hazards include blood borne pathogens, fumes or vapors, and fractured or burned composites or other materials. Board presidents should ensure appropriate PPE is available and worn properly to mitigate mishap site hazards. If there is any question about a potential hazard, coordinate for an industrial hygienist through the garrison safety office.

(4) When a mishap occurs on nonmilitary property, coordinate with local law enforcement to cordon off a perimeter a suitable distance from the mishap site that the local authorities can patrol. In this case, it is the local authorities that can help assess the site stand off and functionally establish a corridor of access until such a time it may be necessary for the military to take over site security duties. If the mishap occurs on military property (on-post), coordinate with the Directorate of Emergency Services for perimeter set up and security.

e. Preservation of the mishap site.

(1) Brief site security personnel on safeguarding information regarding the mishap and associated personnel, particularly injuries, and fatalities.

(2) As soon as the fire chief or other experts declare the mishap site safe for entry, the next task is to safeguard the wreckage and other physical evidence from bystanders and sightseers. This includes:

(a) Military and civilian personnel who have no official business at the site will not enter the mishap site area. Do not allow unit members who are not directly involved in rescue, recovery, or discovery operations to enter the mishap site, as data can be unknowingly disturbed.

(b) The local safety representative must ensure guards remain on duty to keep unauthorized personnel outside the roped-off area and upwind of hazardous composite material.

(c) An entry point will be established where authorized personnel (personnel essential to the preservation of life, property, and data) can present their identification for entry clearance. Maintain a log of all entry to mishap site.

(d) The safety officer will escort authorized personnel entering the immediate mishap site area before the arrival of the SIB. Limited access is essential to protect physical evidence.

(e) When evidence must be removed (for example, to clear an active road or highway) before the arrival of the SIB, the local safety representative must—

(f) Document and photograph the original mishap site.

(g) Prepare an accurate wreckage distribution diagram along with a photographic record of the mishap site.

(h) Accurately document the evidence when the equipment must be moved or disturbed.

(i) Maintain a record of any subsequent damage to the equipment occurring during rescue or recovery.

f. Photographing/Diagraming the scene. The board recorder has the responsibility for photographing the mishap equipment and scene. Print or digital format is preferred. Remember, it is always better to have too many photos than not enough. The SIB will diagram the scene to include flight path angle, impact angle, stopping distance, gouge dimensions, crush data, and ground scars to assist in kinematic analysis.

(1) A recommended photographic checklist is:

(a) Aerial view from four directions (north, south, east, west).

(b) Ground view from four directions (north, south, east, west).

(c) General overview of wreckage beginning at the nose/front and circling every 45 degrees.

(d) Photos of any ground scars.

(e) Photos of major components/controls/parts.

(f) Instrument panel and consoles.

(g) Cockpit/cabin/cab areas (include seats and restraint systems).

(h) Canopy.

(i) Detailed photos of suspected failed parts or parts with damage.

(j) Disassembly of part/equipment (if done).

(k) Other photos deemed necessary.

(2) As the board recorder takes the photos, the SIB logs the photos noting the scene/subject, date, time, direction, and orientation of photos.

Note. Photos must not have this information present as an overlay on the photos.

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

(1) Obtain concurrence among board members before moving any wreckage or equipment 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 videotape made).

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

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

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

h. Inspecting physical evidence at the scene. After diagraming and photographic recording, a systematic inspection of physical evidence can begin. The inspection involves:

(1) Surveying the involved equipment, vehicles, structures, and so on, to ascertain whether there is any indication that component parts were missing or out of place before the mishap.

(2) Noting the absence of any parts of guards, controls, or operating indicators (instruments, position indicators, and so on) among the damaged or remaining parts at the scene.

(3) Identifying as soon as possible any cleaning requirements of the equipment or parts prior to their examination or testing and transfer to a laboratory or to the care of an expert experienced in appropriate testing methodologies.

(4) Maintaining chain of custody records for all evidence sent for examination or testing.

i. Recording observations in notes, diagrams, and photographs so that investigators avoid relying on their memories. Some investigators find digital recorders useful in recording general descriptions of appearance and damage.

j. 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 must be controlled and methodical. Before moving evidence from the mishap site, it must be carefully packaged and clearly identified.

(1) The necessity may exist to move equipment, parts, or subassemblies thought to be defective, damaged, or improperly assembled from the mishap site for technical examination. Document the removal using position maps/diagrams and photos to display the part in its final, post-mishap position and condition.

(2) The SIB will wrap and box those items suspected of failure or malfunction. Additionally, the SIB will wash with 90% isopropyl (rubbing) alcohol suspected metal failure surfaces. Pour the rubbing alcohol over the fractured surface to remove any dirt or mineral salts; do not rub the surface, Blow surface dry. After washing, apply water resistant uncontaminated grease to the surface. If there is any question about the grease, use petroleum jelly such as Vaseline or another brand. Carefully tag and mark (place, date, and serial number (SN) of the equipment) all parts so the lab conducting the testing can easily associate the parts with the mishap and their location at the mishap scene. The tag should contain a brief statement regarding the suspected relationship of the parts to the cause of the mishap. Label the part and the outside of the package. Examples of parts that may be preserved for a more detailed examination are:

(a) Parts suspected of failure.

(b) Improperly designed parts or parts with 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, transmissions, 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) The SIB must exercise discretion in disassembling or reassembling parts or components in the field. The SIB should avoid disassembling parts or components they intend to submit for teardown analysis; disassembly tends to compromise the part or components analysis by destroying or obliterating bits and shreds of evidence only the analyst may recognize. When disassembling parts or components ensure the individual completing the disassembly tags all parts during the disassembly. Include complete information such as part/component nomenclature, part number (PN), locations, and any other significant information. Document all disassembly with photographs. The SIB should request assistance in disassembly and inspection of components, parts, fuel, and oil from the next higher echelon of maintenance, U.S. Army depots, or other experts identified by the SIB.

k. In addition, the SIB will ensure the mishap unit completes SF 368 for items suspected of causing or contributing to the mishap and ensure the SF 368 is submitted to the proponent agency.

3–3. Witness interviews

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

(1) Participants. Individual(s) personally involved in the mishap.

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

(3) 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, and so on.

b. Locating witnesses. A witness's accurate recollection of events deteriorates rapidly as time goes by. Media exposure and witnesses comparing information amongst each other may inadvertently skew their recollection of events. Statements taken from witnesses immediately after the mishap are more reliable. For this reason, it is imperative for the safety representative to encourage eyewitnesses and personnel involved in the mishap to record in writing the details of the mishap they remember. To ensure the information provided by a witness is accurate, detailed, and as authentic as possible, the SIB must conduct witness interviews in an expeditious manner.

c. Onsite representatives 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 mishap and those present on their arrival, as well as provide the most complete list available of witnesses and all involved parties. The board president should attempt to obtain witness statements taken by law enforcement agencies.

d. Individuals involved in the mishap and eyewitnesses may be able to help develop a list of others directly or indirectly involved in the mishap.

e. First-line supervisors can provide information about the individuals involved and provide insight into the planning and preparation phases of the mission prior to the mishap.

f. Staff in nearby facilities may have assisted or responded to the mishap scene.

g. News media may have access to witness information and photographs or videos of the post-mishap 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 SIB an initial list of witnesses and a summary of what they saw. Also, check with the media for video coverage of the wreckage or mishap 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.

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

(1) Identify all witnesses. Based on the initial data collection efforts the SIB develops a list of witness for interview. Typically, the SIB would start with those individuals closest to the mishap or those who witnessed the mishap. The board recorder must complete DA Form 285–W (Technical Report of U.S. Army Ground Mishap Summary of Witness Interview) and read verbatim the statement on page 2 of the form.

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

(3) Schedule an interview with each witness.

(4) Select and prepare the interviewer. The number of SIB 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 person (typically the SIB Recorder) takes notes.

(5) Determine whether a Promise of Confidentiality is warranted in accordance with AR 385–10.

(a) Promise of Confidentiality–The board president may offer witnesses a promise of confidentiality provided the investigation meets the requirements found in AR 385–10.

(b) If the board president offers an individual witness a promise of confidentiality, it will be annotated on the DA Form 285–W.

(c) The board president will not offer a blanket promise of confidentiality for any specific type of mishap or any specific category or group of individuals in accordance with AR 385–10.

i. Develop a standardized list of points or objectives to address in the interview. Ensure all SIB 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, clarify points, or verify witness credibility. Do not limit the focus of the interview to the mishap itself. Use interviews to capture information pertaining to unit and personnel practices, planning, training, and so on. Ask several witnesses the same questions to corroborate facts.

j. Develop sketches and diagrams for use during the interview to pinpoint locations of witnesses, equipment, and so on.

k. Conducting the interview. It is important for the SIB to create a relaxed atmosphere in which witnesses feel comfortable in discussing details with the SIB. The SIB must create an atmosphere where witnesses feel that they are a part of the investigation effort and that the Army will use their input to prevent future mishaps and not to assign blame. Before and after the interview, members of the SIB will notify witnesses that follow-up interviews do not mean that their initial statements are suspect. In addition, they should be encouraged to contact the SIB 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 mishap.

(b) Introduce yourself and the SIB members; 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, and so on).

(2) Prepare the witness.

(a) Describe the investigation's purpose: to prevent mishaps, not to assign blame, and the Promise of Confidentiality, if appropriate.

(b) Stress how important the facts given during interviews are to the overall investigative process.

(c) During the initial witness briefing, the board recorder will explain that they are recording the interview (unless the witness objects) and there might be a follow-up interview as more information becomes available.

(d) Using the witness interview summary form, read the witness the appropriate statement from block 14 of the DA Form 285–W. If offered a promise of confidentiality, have the witness initial the appropriate statement in block 15 of the form.

(3) Things to avoid during an interview:

(a) Do not rush the witness while he/she is describing the mishap 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 (such as violate, kill, lie, stupid, and so on).

(f) Do not omit questions during the interview because you think you 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.

(j) Be aware of board member poor/negative body language or facial expressions.

(4) Begin the interview.

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

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

(c) Let the witness tell things in their own way; start the interview with a statement such as, "Would you please tell me about…?"

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

(e) Aid the witness with reference points, for example, "How did the lighting compare to the lighting in this room?"

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

(g) Use visual aids, such as photos, drawings, maps, training aids, models, and graphs to assist witnesses.

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

(i) Ask open-ended questions that generally require more than a "yes" or "no" answer.

(j) Observe and note how a witness conveys their reply (voice inflections, gestures, expressions, body language, facial expression, and so on).

(k) Determine if the witness has any physical restrictions such as hearing, eyesight, or color blindness that impact on the credibility of the testimony.

(5) Close the interview.

(a) Before closing the interview, check with SIB 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 SIB with additional information or concerns.

(d) Remind the witness that as the investigation proceeds the SIB may conduct a follow-up interview. Remind witness not to discuss interview with other individuals.

(e) The SIB must be careful not to believe a witness based solely on his/her interview. Substantiate or refute his/her information with other sources.

3–4. Organizational data

Through the conduct of the investigation, the SIB must evaluate command factors at all levels to determine if command influence, or lack thereof, contributed to the mishap or could play a role in preventing future mishaps. Key in this evaluation is the risk management process in terms of both the real time risk assessment process and the deliberate risk management process. As the risk management process is the means by which the Army manages risk, the SIB must review ATP 5–19 before proceeding into the data collection process outside of the evaluation of the mishap site. Determine what decisions were made which may have set up the mishap and the authority level of the person making that decision, starting from the mishap itself and working backwards (to include DA level decisions if appropriate). Review DA Pam 385–40 for leader system inadequacies before the start of data collection as this provides insight to failures in the actions of leaders, planning related to the risk management process, adverse safety climate/culture, and challenges with teamwork. 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. Unit status reports.

e. Quarterly training briefs.

f. Unit policies and procedures for:

(1) Deliberate Risk Assessment Worksheet (risk approval levels).

(2) Pre-mission planning and briefings.

(3) Training.

(4) Utilization of personnel including crew rest/sleep plans and operator/crew selection and training.

(5) Equipment/vehicle/aircraft suitability and utilization.

(6) Predeployment or relief in place/transfer of authority training documentation.

(7) Mobilization/demobilization training.

(8) Suitability and availability of LSE and protective equipment.

(9) Maintenance and dispatch procedures.

(10) Information flow.

(11) Pre-mishap plan/emergency action plan.

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

g. Collecting both documentary and verbal evidence will help 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.

3–5. Personnel data

Gather data that will provide insight into the performance, health, qualifications, and training of the individuals involved in the mishap. Individuals involved include those directly involved, those who influenced the operation, and those suspected to have a role in the mishap. 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. Records include the SRB, and all National Guard records maintained by hand at home station.

(2) Equipment/vehicle operator training record (DA Form 348 (Equipment Operator’s Qualification Record (Except Aircraft))) equivalent and license Optional Form (OF) 346 (U.S. Government Motor Vehicle Operator's Identification Card) for specific equipment or vehicle involved.

Note. DA Form 348 defines vehicles individually and not by family of vehicle such as M998 FOV. DA Form 348 should read M998, M1114, M1A2 SEP, and so on.

(3) Performance counseling.

(4) Medical records (include any hospital reports related to the injuries).
(5) Biomedical testing results (as required).
(6) Previous mishap history.

3–6. Environmental data

Data pertaining to environmental conditions (at the time of the mishap) must be 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, lighting, glare, space, quality of air, lunar illumination (moonrise/moonset) for night or Night Vision Device missions, ambient temperature for forward-looking infrared systems and weather/meteorological (for example, humidity, pressure, temperature, wind, and illumination) conditions. Sources include:

a. Observations from personnel near the mishap.

b. Weather/meteorological and moon illumination reports from local forecasters (for example, nearest Air Force weather unit, military weather unit, National Weather Service, and so on).

c. Radar plot location and altitude data from ATC facilities.

d. Maps (topographical and other).

e. Photos. If needed, satellite and aerial photos are often available from the garrison in both digital and paper forms.

f. Field manuals (FMs), TMs, and unit policies and procedures.

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

3–7. Materiel data

a. Introduction. In this paragraph, the term “equipment” is used hardware and software involved in the mishap investigation; such as aircraft, vehicle, structure, weapon system, component, part, software, firmware, and logic sequences. Similarly the term “materiel factors” includes both hardware, software, firmware, logic sequences and learned behavior. Equipment damage or injuries may occur subsequent to a mishap involving software control.

(1) This paragraph provides procedures for performing a systematic and comprehensive investigation of materiel factors associated with a mishap. The objectives of the materiel factors investigation are as follows:

(a) To establish the equipment’s condition at the time of the mishap.

(b) To describe the damage that occurred during the mishap sequence of events.

(c) To describe a sequence of events leading to the mishap.

(d) To identify materiel failures/malfunctions that resulted in a mishap (what happened).

(e) To identify the system inadequacy(ies) for the materiel failure(s)/malfunction(s) (why it failed).

(2) The investigation of materiel factors requires, as a minimum, the assistance of the lead systems engineer and a maintenance technician. The lead systems engineer will be an advisor to the SIB for all Class A and B mishaps.

b. Materiel failure(s)/malfunction(s).

(1) Equipment, or a part thereof, is considered to have failed or malfunctioned when one of the following occurs:

(a) Becomes completely inoperable.

(b) Is still operable but no longer able to perform its intended function satisfactorily.

(c) Has deteriorated to the point where it is unreliable or unsafe for continued use.

(d) Is still operable, but has autonomously performed in an unexpected manner; performed an uncommanded action; or failed to perform a commanded action as directed; the result of which led to a mishap.

Note. This explanation does not apply if the equipment achieves any of these three states because the operator exceeded its design capability or operating limits in the course of an operational situation/condition.

(2) The success of the materiel factors investigation is dependent upon determining the difference between failures/malfunctions that may have caused the mishap and damage caused by the mishap. The SIB’s procedure is generally the same for all mishaps, regardless of damage.

(3) The first step in identifying materiel failure(s)/malfunction(s) is to document the most obvious evidence available at the mishap site by taking notes, photographs, and drawing diagrams. By the time the

SIB completes these tasks, the human factors investigation will usually have some preliminary information from witnesses that may further indicate the most probable failure/malfunction.

(a) Even though the investigation begins by examining components at the mishap site, this examination is not complete until the SIB examines all major components and systems for evidence of failure/malfunction.

(b) In cases where preliminary evidence (for example, witness statements) indicates no materiel failure/malfunction occurred, the examination is still required. The purpose of the examination in this case would be to describe damage or an action along with substantiating the lack of evidence supporting a materiel failure/malfunction.

(4) The next step is the shipment of the materiel to a TDA facility of those components the board identified or suspected of having failed/malfunctioned. The TDA is important since the board may not have the capability to determine how and why a component failed.

(5) The last step for the materiel factors investigation is to determine the cause of the failure/malfunction. Assistance is available from the following facilities by coordinating with USACRC operations at DSN 558–3410.

(a) All systems. Contact the lead systems engineer. This is particularly important as new systems are designed and fielded with autonomous and semi-autonomous control.

(b) Aircraft. Corpus Christi Army Depot, Corpus Christi, TX 78419–6020, telephone DSN 861–2902/2903, commercial (361) 961–2902/2903.

(c) Ground vehicles. Tank-Automotive and Armaments Command, Warren, MI 48397–5000, telephone DSN 786–6194/6121, commercial (313) 574–6194/6121.

(d) Parachutes. Combat Capabilities Development Command Labs, Natick, MA, telephone DSN 256–5208, commercial (508) 233–5208.

(e) Life support equipment/personal protective equipment. U.S. Army Aeromedical Research Laboratory, Building 6901, Andrews Avenue, Fort Rucker, AL 36362–0577, telephone DSN 558–6960, commercial 334–255–6960.

(f) Ammunition/explosives. U.S. Army Technical Center for Explosives Safety, 1C Tree Road, McAlester, OK 74501–9053, DSN 956–8756/8919, commercial (918) 420–8756/8919.

c. Causes of materiel failure/malfunction.

(1) *Overview.* As in the case of human error, the SIB should trace causes of materiel failure/malfunction to an inadequate hardware or software element. (See app D for examples of metal fatigue and load stress failures.) Once identified, the appropriate agency or manufacturer can implement corrective action to prevent the probability of similar materiel failure mishaps in the future. Thus, the SIB defines the causes of materiel failure/malfunction in terms of one or more system inadequacy(ies). The Army defines a materiel system inadequacy as a hardware or software element that did not operate as intended or designed and caused, allowed, or contributed to a materiel failure or malfunction. Materiel failures may be characterized as Design, Manufacture, FWT, and Maintenance. If system inadequacy(ies) identify improper maintenance where the Army had control, and the duty code of the individual(s) can be identified, a resultant finding must be written as a human mistake/error and consider the failure/malfunction as a result of human mistake/error instead of a materiel failure.

(2) *Identifying system inadequacy(ies) (why did it happen).* Once the materiel factors investigation team identifies or suspects a failure/malfunction, it must continue the search for evidence to substantiate the cause of the failure. For example, could unit maintenance have caused a failure of this part, component, or system? To answer questions like this, the investigator must—

(a) Examine records and unit operating procedures.

(b) Interface with the human factors investigation to search for errors/mistakes that may have resulted in the materiel failure.

(c) Gather evidence that will substantiate or eliminate each of the system elements that is within the investigation's capability.

d. Mishap scene. The investigation of the equipment and the components must begin at the scene of the mishap. It is here investigators get an overview of the mishap pattern, degree of damage, direction of travel, and velocity when the mishap occurred. This overview will play an important part in reaching decisions concerning all aspects of the investigation. Therefore, it is necessary to document the scene of the mishap as outlined in the following paragraphs.

(1) *Reconstruction of the mishap sequence of events.* The goals of the investigator(s) include determining how and why damage, separations, and injuries occurred. The best way to initiate this effort is to

begin at the point of first contact with objects in the path or with the ground and follow the path to its final resting place. During this survey, the investigator(s) will—

(a) Observe the condition and location of the various parts of the equipment and mentally begin the process of reconstructing the sequence of events that occurred during the mishap.

(b) Reconstruct the maneuvers or actions of the individuals or equipment just before the mishap. If the SIB can associate the sequence of events to the point where the difficulty began, the causes of the mishap become more apparent. The performance of the individual, or equipment under various sets of conditions, plus the use of basic controllability, will greatly help in making these determinations.

(2) *Mishap site/wreckage distribution diagram.* An accurate, detailed diagram of the mishap site will help the investigator(s) develop the actual sequence of events.

(a) A polar diagram is a simple and effective method of diagramming the mishap site.

1. The top of the diagram will represent north.
2. The main body of the wreckage (center of mass) can serve as the beginning or pole of the diagram.
3. Choose a scale that will allow plotting of the total scene on the chart.
4. Determine the compass heading of the equipment at its final resting place and place a semblance of the equipment on the diagram in such a position as to be able to plot the other debris from that point.
5. Determine the direction from the equipment to the outlying items and scar marks. Measure the distance from one central point of the wreckage to these items/marks. Plot them on the diagram as to their positions relative to the main wreckage.

(b) The SIB may use letters or numbers on the plot in an effort to create a legend to identify the locations of the items in reference to the main wreckage.

e. Techniques of obtaining photographs. Photographs are the best means of preserving physical evidence for study and evaluation.

(1) The local safety representative should obtain a photographer from nearest post/installation assets.

(2) It is important that photographs be of good quality and composition. High-resolution digital photographs are preferred.

(3) All photographs used in the report must be numbered and captioned.

(a) Captions should explain in detail what the picture is supposed to show.

(b) Captions will include type of equipment, date of the mishap, and location of the mishap.

(4) Photographs taken at the mishap scene should include the following:

(a) An overall view of the mishap site (wreckage) taken from a minimum of four directions. Take photographs from the four cardinal directions (north, south, east, west) and four photographs from the midpoints between (northeast, southeast, southwest, northwest).

(b) A view of the equipment ground path from point of initial and major impact to the place where it came to rest. Impact marks are vulnerable to rain and traffic; therefore, the SIB must quickly take a photographic record of this type of evidence.

(c) Aerial views of the mishap scene (equipment and weather permitting).

(d) Photos of objects struck by the equipment.

(e) Larger portions of the equipment wreckage.

(f) Detailed photographs of suspected failed parts that contributed to the mishap.

(g) Photos of failed PPE and the agents causing the failure or injuries.

(h) Photograph and measure skid marks and ground scars.

Note. Put an object of known size alongside an object to provide perspective for the photograph; (for example, a pen or ruler next to a small piece of equipment or scar).

(i) Any other photographs deemed of interest to the investigation board.

(j) When taking digital photographs, if possible, include digital copies of the photographs as well as hard copy.

f. Protection and identification. To prevent loss or damage during shipping, the SIB will wrap and box parts or subassemblies suspected of failure/malfunction. Coat suspected metal failure surfaces with uncontaminated grease to prevent corrosion. Carefully tag and mark all parts with the mishap (place, date, and SN of equipment) and their location at the mishap scene so the lab/testing facility can properly identify the parts and the respective location post-mishap. The tag should contain a brief statement regarding the suspected relationship of the parts to the causes of the mishap. Examples of parts that may be preserved for a more detailed examination are:

(1) Parts suspected of failure.

(2) Parts that appear to the SIB that the manufacturer improperly designed or exhibit faulty workmanship.

(3) Lines, fittings, wiring, or controls not properly supported and subjected to excessive strain or vibration.

(4) Ruptured plumbing or fittings.

(5) Faulty wiring, electrical, or radio equipment.

(6) Defective engines, drive shafts, transmission, and accessories such as fuel systems, fuel controls, governors, and generators.

(7) Defective hydraulic system components.

Note. Do not attempt to mate separate items together. This action could destroy evidence.

g. Disassembly. The SIB must exercise extreme discretion in disassembling parts or components in the field. If the SIB intends to submit components for TDA, avoid disassembly, as this may compromise the analysis by destroying or obliterating bits and shreds of evidence of value to the analyst. However, when detailed disassembles are made, all parts must be tagged with complete information to include nomenclature, PN, locations, and any other significant information. Document all disassembly with photographs. Assistance in disassembly and inspection of components, parts, fuel, and oil is available from the next higher echelon of maintenance, U.S. Army depots, or other experts identified by the USACRC.

h. Equipment records.

(1) As a minimum, review Global Combat Support System–Army (GCSS–A) for all previous historical records.

(a) Check component times and replacement schedule. Review for compliance or noncompliance with modification work order(s).

(b) Check for compliance with safety of use messages, safety advisory messages, safety of flight messages, ground precautionary messages, maintenance advisory messages, and technical bulletins.

(c) Review current and delayed discrepancies records.

(d) Document all deficiencies and discrepancies noted for correlation against other materiel/maintenance factors uncovered during the investigation.

(2) Check any modification or alteration of equipment against applicable technical publications to ensure proper authorization.

(a) When the SIB suspects an alteration or modification of the equipment, implement a thorough investigation to determine how these alterations may have contributed to the mishap (document with photos).

(b) Inspections should be made of structural repairs for quality of workmanship in fittings, welds, stitching, and cables. This inspection will disclose whether improper materials and workmanship contributed to the mishap.

(3) It may be necessary for future investigations to look into additional causal factors not originally considered by the SIB. Parts must be carefully preserved and protected.

(4) Historical records may be electronic (downloadable data) or paper.

i. Reassembly of wreckage. It may be necessary to reassemble wreckage to determine mishap causes or to support a theory in a mishap that is difficult to evaluate. When the SIB reconstructs the entire system, it may afford positive proof of the mishap 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 systems. A detailed and documented inspection of the wreckage layout will often lead the investigator to the areas or systems that played a role in the mishap. The layout also helps the investigator in developing the sequence of events that occurred in the mishap.

j. Failed parts. Unless there is conclusive evidence that a failure occurred during the operation, it is necessary to make a detailed inspection of each suspected failed part. In many cases, the SIB may discover a faulty design (improper material, incorrect assembly, and previously weakened parts) resulted in the failure of the primary structure. Submit suspect failed parts that may have contributed to the mishap for laboratory analysis to determine the type and mode of failure. The investigation board must then fit that evidence into the total evidence to determine whether the failure contributed to the mishap.

k. Special investigations.

(1) Highly technical aspects of the mishap investigation will require further study and special analysis. In many cases, the SIB does not have the expertise to conduct this analysis and technically qualified personnel at a program management office, laboratory, depot, or factory must continue the work. If mechanical failure occurred or is suspected:

(a) Provide all photographs relevant to the suspected failed parts sent for TDA.

(b) Sketches, history, and explanatory material must accompany the parts and should contain enough information to give a clear picture of what happened.

(c) Improper use of a control switch, handle, or knob because of its design, or the mistaken operation of a control when the operator intended to use another, the location, size, shape, method, or operation of the control may prove to be an underlying cause and must be examined in the human factors investigation as well as the materiel factors investigation. Operator deficiencies relative to design issues should be included in the human factors investigation.

(d) Different equipment may have controls or instruments in reversed positions from other equipment operated by the operator and this could contribute to the mishap.

(2) For example, night vision devices require a special investigation.

l. Power plants. When power plant failure is the known or suspected mishap cause, the investigator(s) should make every effort to obtain samples from the lubricating and fuel systems. Obtain samples from several sources to capture any foreign substance that may be in the system. Inspect the power plant to determine if all debris caused by the failure was contained within the engine case. If not contained, attempt to recover the missing pieces. All locations and impact marks should be marked and photographed. Engineers require this information to determine at what point in the mishap sequence of events the power plant failed.

(1) *Field examination.* When the SIB examines the power plant in the field, obtain the SN of the engine, manufacturer, type, model, and all pertinent information from maintenance and inspection records. In addition:

(a) Locate all engine accessories and components.

(b) Check the position of primary and secondary controls to determine the position of the various valves controlling the flow of fuel to the engine.

(c) Obtain pertinent engine operation data prior to the mishap.

(d) Obtain information from witnesses about engine operation such as smoke, fire, explosion, and unusual noises or odors.

(e) If fire was a factor, determine the origin/location (see para 3–7*n* for details).

(f) Check the fuel system for leaks or obstructions from fuel tanks to combustion chamber.

(g) Check fluid-carrying lines for improper installation or signs of malfunction.

(h) Check for water, corrosion, or sediment in the fuel and oil systems.

(i) Obtain samples of fuel, oil, and hydraulic fluid for laboratory analysis.

(j) Check oil filters and pumps for foreign particles.

(k) Check sources of fuel (including storage tanks, pumps, and fuel service trucks) for contamination, if necessary.

(l) Check the ignition system to include switches, spark plugs/igniters, and leads.

(2) *Analyze failures.* A review of the maintenance and inspection forms listed in table 3–1 for operating time, malfunction, and TM compliance will often provide a lead to possible engine failures.

(a) Carefully record the position of engine controls and readings on engine instruments. However, these readings may be effected by mishap forces and are not conclusive evidence of their positions prior to impact.

(b) If structural parts of the engine failed, identify these parts with a description of the failure.

(c) Sketches and/or photographs showing the failure are important in evaluating the cause. Inspect and bench test all accessories if the SIB suspects a malfunction.

Table 3–1
Forms providing a lead to possible engine failures

Form number	Form name
DA Form 2404	Equipment Inspection and Maintenance Worksheet
DA Form 2406	Materiel Condition Status Report
DA Form 2407	Maintenance Request
DA Form 2408–5	Equipment Modification Record
DA Form 2408–12	Army Aviator's Flight Record

Table 3–1
Forms providing a lead to possible engine failures—Continued

Form number	Form name
DA Form 2408–13	Aircraft Status Information Record
DA Form 2408–14	Uncorrected Fault Record
DA Form 2408–15	Historical Record for Aircraft
DA Form 2408–16	Aircraft Component Historical Record
DA Form 2408–17	Aircraft Inventory Record
DA Form 2408–18	Equipment Inspection List
DA Form 2408–20	Oil Analysis Record
DA Form 2410	Component Removal/Repair/Install/Gain/Loss Record
DD Form 314	Preventive Maintenance Schedule and Record
DD Form 365	Record of Weight and Balance Personnel
DD Form 365–3	Weight and Balance Record, Chart C–Basic
DD Form 365–4	Weight and Balance Clearance Form F–Transport/Tactical

m. Transmissions. The same investigation and analysis procedures identified in paragraph 3–7*l* apply. In addition, check transmission case for cracks, distortion, and corrosion. If severity of impact broke the case open, check condition of gears and bearings for abnormal patterns or discontinuity, such as gears out of mesh.

n. Fires.

(1) *Symptoms.*

(a) Fire frequently destroys or consumes clues that could readily disclose the mishap cause. (For example, ruptured or chafed fuel lines consumed by the fire may be the origin of the fire and the cause of the mishap).

(b) Fire that is a result, rather than a cause, of a mishap also hampers the investigator by the destruction or damage of evidence.

1. If a fire occurred, determine when, where, and how the fire originated.

2. A fire originating during movement will generally leave obvious traces, such as molten metal flow marks that will conform to the airflow pattern of the component concerned.

3. A fire resulting from impact with the ground will often leave imprints of twigs, grass, or leaves in the soot pattern on the burned parts of the wreckage. Any folded, smoked, or blackened pieces of wreckage that, when unfolded, show shiny metal would indicate the burning had followed the mishap.

4. Locate parts that separated from the equipment after the mishap. If these parts also show signs of burning, then the fire existed before the mishap.

5. A minor fire will frequently burn undetected until supplied with a larger source of fuel or oxygen. A large fuel-fed fire may result from a smaller fire fed by hydraulic oil, engine oil, or other flammable material.

6. Remember that fluid vapors can travel long distances before reaching a point of ignition.

(2) *Flammable fluids.* Inspect and trace all flammable fluid-carrying lines for breaks, cracks, chafing, and loose fittings. Identify the tubing by reference to the color code or the schematic drawings in the applicable TM. Flammable fluids atomized by high-pressure escape from a small hole possess a much lower flashpoint than when in their liquid state.

(3) *Witness information.* Witnesses are especially important in establishing certain facts about the fire. Generally, smoke from burning oil is blue-white in color; smoke from hydraulic fluid is white; and fuel (gasoline, jet fuel) smoke is black. However, the color and density will vary with changes of intensity of the fire.

(4) *Warning systems.* Determine the systems that warned mishap personnel of the fire and the effectiveness of extinguishing attempts. Record a complete systematic description of the procedure used for extinguishing the fire and compare it with the TM or applicable standard.

o. Communications/navigation equipment. The requirement to determine the functionality and selected frequency of the communication/navigation equipment may vary depending upon the

circumstances surrounding the mishap. Normally, it is possible to determine the selected frequency/station regardless of the extent of component damage.

(1) The control/dash panel normally contains various functional select switches, volume control, digital readout channels, or frequency.

(a) Determine if equipment or vehicle operators, crewmembers, crash rescue personnel, or early arrivals at the scene moved any of the controls or switches.

(b) Index all movable switches and volume control before making changes from the position found.

(c) Analyze all toggle and rotary switches to determine if they show evidence of having changed positions as the result of impact/crash. If the indicators are missing, examine the rotary switch, determine which frequency is selected, and compare the position with a like serviceable unit.

(2) Obtain the assistance of communications, avionics, or electronics experts for additional assistance if necessary.

p. Tear-down analysis request. TDA request, processing, shipment, and disposition.

(1) *Request.* The Analytical Investigation Division (AID), Corpus Christi, TX, is the prime recipient and evaluator of all Army aircraft components/parts selected for TDA. The Commander, USACRC; Commander, AMCOM; commanders of field organizations/units; aviation safety officers; maintenance officers; and presidents of SIBs are authorized to select components/parts for TDA. Investigators use the TDA results to establish or discount materiel deficiencies and aid in determining mishap causal factors, regardless of mishap/incident classification.

(a) Control numbers. Before shipping any components/parts to AID (Q99745), an SF 368/Equipment Improvement Report (EIR) will be submitted via the Product Data Reporting and Evaluation Program website (https://www.pdrep.csd.disa.mil/). Use AID's DoD activity code Q99745, anytime SIBs ship components to that organization. Authorized personnel must coordinate their requests for TDA with Operations, USACRC, DSN 558–3410/2660, commercial (334) 255–3410/2660. Approved requests will receive a USACRC control number which will be placed on the DA Form 2407 (Maintenance Request), block 3a, and must be included in the address to AID.

(b) Data requirement. To obtain USACRC control numbers, the following information will be submitted to the USACRC:

1. POC who is knowledgeable of the reason for the TDA. Identify the unit to which the equipment is assigned and the unit's address.
2. Telephone number(s) (military/commercial) of the POC(s).
3. Materiel identification data for each item, to include noun nomenclature of the component(s)/part(s), SN(s), PN(s), NSN(s) and, when applicable, the time since new, time since overhaul, number of prior overhauls, overhaul activity, and date of last overhaul.
4. AMCOM SF 368/EIR control number for component(s)/part(s) as appropriate.
5. Mishap/Incident data, to include complete aircraft/ground vehicle SN from which the board removed the component(s)/part(s). Army mishap classification, mishap date, how the defect was found, description of the required analysis, and whether a written, electronic, or telephonic report has been provided to the USACRC, or any other technical data that may be of assistance to the materiel analysis personnel.

(2) *Processing.*

(a) The nearest activity having a packing, crating, and shipping capability will process the item(s) for shipment to the TDA facility.

(b) Clean and decontaminated the item(s) to the degree necessary to preclude the possibility of generating a health hazard or crop infestation. However, the cleaning process must not distort or remove evidence such as heat discoloration, abrasion, stress and torsion splinters, and corrosion.

(c) Before submission, the SIB will verify that all traces of foreign matter such as vegetation, human/animal tissue, insects, dirt/soil, or contaminated water are removed. This is especially important when the SIB ships items from outside the continental United States (OCONUS).

(d) When contamination, loose ordnance, tools, or other foreign materiel are suspected, as the cause of a mishap or malfunction, photographs must be taken before cleaning and forwarded with the item(s) as evidence for study by the analyst.

(3) *Shipment.*

(a) DA Form 2407 will accompany each component/part.

(b) Insert the USACRC control number in the first line of DA Form 2407, block 3a.

(c) The description of the analysis desired will follow the USACRC control number.

(d) DA Form 2410 (Component Removal/Repair/Install/Gain/Loss Record), when required, and DA Form 2408–16 (Aircraft Component Historical Record) will accompany the aviation item(s) as appropriate.

(e) Also, arrange for the most expeditious delivery/shipment of item(s) for TDA to Analytical Investigation Division (Q99745), Building 1880 Ocean Drive, Naval Air Station, and Corpus Christi, TX 78419–5260; telephone DSN 861–2902, commercial (361) 961–2902.

(f) Container(s) must be marked clearly, permanently, and conspicuously in red on a white background and in sufficient size to allow for ease of visual identification. If container is too small, follow the SF 368/EIR procedures contained in DA Pam 738–751.

(4) *Disposition of tear-down analysis report.*

(a) AID/contractor/manufacturer will provide four copies of the final report to Commander, AMCOM; and Commander, USACRC, (CSSC–O) (six copies if USACRC conducts the mishap investigation).

(b) One copy each to the applicable theater/command aviation safety officer.

(c) Four copies to the commander of the unit/activity that requested the analysis.

(d) Hold component(s) or part(s) submitted for TDA on USACRC control numbers until disposition instructions are issued by Commander, USACRC.

q. Aviation life support equipment and personal protective equipment analysis requests.

(1) It is the responsibility of the investigator (for example, president, recorder, or medical representative) to analyze how well aviation life support equipment (ALSE), or other PPE, did the job for which it was intended. If an investigator determines that ALSE and/or PPE did not operate as designed, the investigator must further determine if the item of equipment contributed to, or caused injury/occupational illness. The Aviation Life Support Equipment Retrieval Program of the U.S. Army Aeromedical Research Laboratory (USAARL), Fort Rucker, AL, is the prime recipient and evaluator of all Army ALSE and PPE selected for laboratory analysis.

(2) All ALSE and/or PPE that is in any way implicated in the cause or prevention of injury will be recorded in the mishap report. Both air and ground items that caused injury, failed to function as designed, or were significant in preventing injury will be shipped to USAARL for further analysis. This equipment includes, but is not limited to, helmets, survival vests and components, body armor, crashworthy seat system, restraint harnesses, inertial reels, seat belts, and air bag systems.

(3) Contact USAARL concerning which items of ALSE/PPE that should be shipped and the supporting documentation required. Call telephone number–DSN 558–6960/6920, commercial (334)255–6960/6920.

(4) Before completion of the field investigation, the president of the investigation board will arrange for shipment of the equipment for laboratory analysis to: Commander, U.S. Army Aeromedical Research Laboratory (Aviation Life Support Equipment Retrieval Program), Building 6901, Andrews Avenue, Fort Rucker, AL 36362–0577.

(5) Equipment items sent to USAARL for laboratory analysis will be noted in the mishap report of the investigation.

(6) For personal ALSE/PPE sent, identify the wearer/user of each item. For items sent such as a survival vest, count vest and components as one item, unless a component is torn free or separated during the mishap sequence.

(7) Upon completion of the laboratory analysis, USAARL will dispose of unserviceable items and return serviceable items to the unit of origin or the supply system.

(8) Upon request by the USACRC, a copy of the completed laboratory analysis performed under the provisions of this paragraph will be furnished for inclusion in the mishap report of the mishap.

3–8. Digital data

a. Aircraft Information. Modern Army aircraft have data recorders installed that collect telemetry data related to aircraft motion, onboard systems parameters, and some have voice recording capabilities. This data is essential to collect and evaluate as it can provide a wealth of information to the SIB during the next phase of the investigation. This data may also indicate other relevant data to the investigation. For example, the voice data may indicate a flight crew was experiencing an engine issue, which may prompt the SIB to conduct a TDA on that component.

b. Vehicle Information. Some Army ground vehicles have digital equipment installed that collects limited telemetry and/or position data (like Blue Force Tracker) related to the vehicle while in use. Additionally, most vehicles will have a tracking system installed while executing a rotation at one of the combat training centers (CTCs). Many of these digital devices collect data on the vehicles' position and speed and are a valuable tool in assisting an SIB in developing situational understanding before, during, and

after a mishap. If a mishap occurs at a CTC, one of the Observer, Coach, Trainers will be able to contact the proper personnel to download and provide data collected on the vehicle's digital device.

c. Digital Collection Analysis and Integration Lab contact information. The USACRC recommends SIBs contact the Digital Collection Analysis and Integration (DCAI) Lab at commercial (334) 255–1641/2259/2884 or DSN at 558–1641/2259/2884. The lab personnel can provide the location and type of data collection devices installed on the specific aircraft or vehicle type. The lab can also provide the SIB with shipping procedures for the data collection devices.

3–9. Timeline development

An essential tool in understanding the sequence of events is the mishap timeline. A best practice is to establish the timeline oriented on the sequence of events leading to the mishap and then expand chronologically as the SIB identifies timeline data points. Many of the timeline data points are contained in duty logs, 911 call center logs, tower logs, range operations logs, emergency services log sheets, as well as witness interviews. Another best practice is to develop a macro and a micro timeline (see fig 3–1).

a. Macro Timeline. The SIB develops macro timelines in terms of years, months, and weeks. Based on the nature of the mishap, this timeline can depict the major events of the unit and individuals involved in the mishap. The purpose of a macro timeline is to enable the SIB to visualize potential or apparent links between events that occurred prior to, but are significant in some way to the mishap. A Soldier's past training could be of a significant nature that a SIB would include it on the macro timeline. For example, if a mishap involved a properly licensed Soldier driving a vehicle he/she had not driven for an extended period, the SIB could include that Soldier's initial licensing date on the vehicle and the last time the Soldier drove that vehicle. The SIB would gain a clear picture of the gap in time between the Soldier's training and current experience on that piece of equipment. A best practice is to end the macro timeline with mishap mission assignment; the micro timeline picks up the timeline from there. Prior to the conduct of interviews, sources of macro timeline data can be collected from historical maintenance records, unit's historical files, individual training files, SRBs, and military orders.

b. Micro Timeline. Micro timelines usually begin upon notification of the mishap mission and continue through post-mishap actions (recovery). In most instances, the unsafe act or violations of the mishap fall along the micro timeline. The SIB develops micro timelines in terms of days, hours, minutes, and seconds. Prior to the conduct of interviews, sources of micro timeline data can be collected from OPORDs, mission briefing documents, duty and operations logs, emergency services logs, ATC logs (if applicable), onboard digital tracking devices, and onboard vehicle or flight data recorders.

Mishap Macro-Timeline	
DATE	**EVENT**
1 Apr 2013	Mishap Driver assigned to B Co. as a M1A1 Driver
May 2016	Mishap Battalion alerted to prepare for JRTC Rotation in Feb 2012
12 Jul 2016	Mishap Crew is Battle Rostered
5 Aug 2016	Mishap Company Deploys to the local training area for Crew Training and STX Lanes
8 Sep 2016	Mishap Company Deploys Shooter Range to Conduct Gunnery
12 Sep 2016	Mishap Driver is awarded the Battalion Best Driver certificate by the Battalion Command Team
14 Feb 2017 2000L	Mishap Crew arrives at the ISB at JRTC and is tasked to set up sleeping tents

Mishap Micro-Timeline	
DATE 15 Feb 2017	**EVENT**
0200L	Mishap Crew Beds down
0445L	All Battalion M1A1 Crews woken up by 1SG
0530L	Mishap Crew reports for Work Call Formation and is tasked by 1SG to Drive Tanks ISO Railhead Download Operations
0730L	Railhead Operations Begin
1807L	Official Sunset
1903L	Ground Guide directs Mishap Crew to Back up in order to move a pile of Chains and Turnbuckles
1903:30L	Mishap Tank begins to Back Up
1903:39L	Mishap Tank's Left Track slips off the side of the Railcar and Tank begins to roll to the left
1903:46L	Mishap Tank comes to Rest on its Right Side
1904L	Tank Commander is Assisted out of Turret by nearby Soldiers
1905L	Mishap Driver is Pulled Unresponsive from Driver's Station and Medics begin CPR
1906L	EMS Notified
1915L	EMS Arrived
1921L	Mishap Driver Declared Deceased

Figure 3–1. Separate micro and macro timelines method

3–10. Anomaly identification

a. While collecting and examining data, the SIB may identify evidence, timelines, or events that are, or appear to differ (positive or negative) from the norm. The SIB must record these deviations, referred to as anomalies, for a more in-depth examination during the analysis and deliberations phases of the investigation. Anomalies come in many forms and range from minor issues or abnormalities to gross violations. Example anomalies include, but are not limited to:

(1) Evidence that a mishap unit failed to implement the risk management process.

(2) Evidence that a hardware failure or software fault or error may have contributed to the mishap.

(3) Discrepancies in a mishap Soldier's training records or equipment licensing process.

(4) Inadequate number of personnel assigned to perform a given task.

(5) Lack of sufficient quantity or quality of various classes of supply to support the mishap task or operation.

(6) Incomplete or deficient equipment maintenance records.

(7) Any other item or occurrence that is identified as abnormal.

b. A best practice is for the board recorder to use a large dry erase board or a large sheet of butcher-block paper to record these anomalies. Often, this "Anomaly Board" is centrally located in the boardroom to enable all SIB members to easily record and view all anomalies identified during data collection. The SIB categorizes the anomalies under the heading of Mishap Sequence, Rescue Operations, Support, Standards, Training, Leader, Individual, Environmental Factors, and Material Factors.

c. The SIB should start identifying and collecting anomalies on day one. The identification of anomalies assists the SIB members to identify other information requirements that the SIB must collect or examine in closer detail. As the SIB collects and evaluates this additional data, they may identify additional anomalies related to other issues.

d. Another best practice is for the SIB to review anomalies at the start and end of each day to provide a shared understanding of what has been identified, as well as discuss what additional information needs to be collected based on new anomalies. The SIB should take a few minutes after every interview to capture any anomalies from that witness. These interview-derived anomalies will need to be examined further to ensure they were not based on speculation or bias; however, interviews are often a useful way to identify anomalies that may not be visible in physical data or records.

Chapter 4
Phase III, Analysis and Deliberations

4–1. Purpose and goal of Phase III

a. The SIB must conduct a systematic analysis of data collected during the investigation to determine what happened, identify causal factors, and develop findings and recommendations. Informal analysis occurs throughout the data collection phase as investigators pursue information. However, formal analysis begins when the board president determines the SIB has collected sufficient data to determine what happened and identify/describe the causal factors. The SIB develops findings and recommendations from the analysis of data and the deliberative process. The SIB must directly support their findings and recommendations through a thorough analysis of the data.

b. The "what happened" (human error, environmental factor, materiel failure) or unsafe act or violation is often clear. The "why it happened" (system inadequacies) are usually more complex and difficult to determine. Identifying the reasons people make errors, materiel fails, environmental factors contribute, or injuries occur in a mishap are the keys to mishap prevention. Typically, there is a combination of active and latent failures (see table B–2), which contribute to the mishap or severity of the injuries/damage. Identification of system inadequacies can be particularly challenging. A structured and meticulous analysis of the data provides the best opportunity for the SIB to reach accurate conclusions. The end state of analysis is for the SIB to come to a common understanding of the facts and circumstances surrounding the mishap. In addition, the analysis phase prepares the SIB for deliberations and ensures the completeness of the investigative process. It is during this process that the board president will ensure that the analysis portion of the documents is complete and contains all information surrounding each identified anomaly.

4–2. Methodology of analysis and deliberations

a. Establish a chronology. The SIB should review the timelines created by the data collected in Phase II of the investigative process. The fidelity of the timeline continues to improve as the board conducts data analysis and adds additional timestamps related to the mishap. Timelines are invaluable tools as the SIB attempts to determine cause and effects. They graphically portray the sequence of events leading up to the mishap and assist the SIB in establishing links between factors that may otherwise appear unrelated.

b. Examine environmental conditions, materiel failures, and human factors that caused or contributed to the mishap. Continually ask the question "why" until you have identified all the contributing factors that lead to an error, failure, or violation.

c. Evaluate anomalies as to their relationship to the mishap to determine mistakes, materiel failures, and environmental influences. Throughout this process, the SIB must evaluate all data collected and its relationship to the associated anomaly.

d. Conduct deliberations to classify the unsafe acts (unsafe act or violation(s)) of an individual and the system inadequacies (latent failure(s)) for each related causal factor that caused or contributed to the mishap or the severity of injury or damage.

e. Develop findings and recommendations.

4–3. Preparation for analysis

a. 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. It is important that all SIB members review witness statements and unit and Army-level documents pertinent to the operation, as well as equipment, training, and medical records and note any anomalies.

b. The board president will chair the analysis but the recorder will guide the proceedings. Prepare charts for the timeline, human, environmental, and materiel factors. The board president will brief the SIB members prior to beginning the analysis to facilitate efficient proceedings. All appointed SIB members must participate in the analysis and deliberations.

c. The board president is responsible for the supervision of analysis and deliberations and should address the following areas prior to initiating these processes:

(1) Categories of findings: (Contributing, Contributing to the Severity of Injury/Damage, Present but Not Contributing, and so on).

(2) System inadequacies/root causes.

(3) Minority reports.

(4) Preparation of the report.

(5) Disposition of the completed report.

d. Formal analysis begins when the SIB determines they have sufficient data to pursue analysis.

4–4. Data analysis procedures and techniques

a. Overview. Identifying the reasons people make errors, materiel fails, or injuries occur in a mishap are the key to mishap prevention. Identification of contributing active and latent failures by individuals, supervisors, and/or the organization is particularly challenging. Analyzing causal factors is a process that allows the *SIB* to probe, discover, and conduct RCA of data collected during the investigation. The objective of the RCA process is for the Army safety community to identify the facts, reconstruct the sequence of events *("what happened")*, and then use a detailed and methodical process to identify the multiple and interrelated causes *("why did it happened")*. This allows investigators to identify root causes and develop recommendations for corrective actions.

b. Methodology–Analysis Tools. The SIB must exercise caution when applying analytic methods. First, no single method will provide all the analyses required to determine the causal factors of a mishap. A structured and meticulous analysis of the data provides the best opportunity for the investigators to reach accurate conclusions. The SIB may use a number of mishap analysis methods based on each safety personnel's level of training and education. Such tools include the Management Oversight and Risk Tree (MORT) developed by the U.S. Department of Energy (DOE), or the Project Evaluation Tree analysis tool developed by the U.S. Air Force, or other problem solving tools such as Lean Six Sigma, mishap Barrier Analysis Tool, Change Analysis Tool, Fault Tree Analysis, and so on. In recent years the U.S. Navy and U.S. Marine Corps Safety Centers, and the USACRC have each adopted a tool that is a hybrid of the previously mentioned tools called root cause mapping (RCM). Table 4–1 provides an overview of the advantages and disadvantages of these tools. Each method has different areas of application and the investigator should be prepared to use several to ensure a comprehensive analysis of the data. This section provides a description of how to utilize some common methods for analyzing mishap and certain near-mishap data.

Table 4–1
Mishap analysis methods

Method	When to use	Advantages	Disadvantages	Remarks
RCM Also known as Cause and Effect Analysis	To help identify the reasons a process went out of control. For multifaceted problems with long or complex causal factor chains. To visually depict error pathways.	Easy to apply and provides a comprehensive overview of how a single quantity depends on other quantities. Provides visual depiction of the analysis process. Identifies contributors and roots to any event.	Time consuming and requires familiarity with the process to be effective.	Identifies many possible causes of a problem. Used to structure a risk assessment session during a pre-event planning process. Makes the distinction between conditions that allow other conditions to exist or affect events. Helps identify where deviations from acceptable methods occurred.
Five Whys	When problems involve human factors or interactions.	Determine relationships between causes. Simplest of tools without statistical analysis.	Root causes may not be identified without all facts.	Excellent tool to use in conjunction with RCM to ask, "Why did an event occur?" or, "Why did a specific condition exist?"
Materiel Analysis	When there is a suspected failure of equipment, weapons systems, vehicles systems, communications systems, or components of a system.	Improve engineering controls as well as fit, form, and function.	Analysis and long term corrective measures will likely take more than 30 days.	Conduct engineering investigations at the local installation whenever possible. An engineering investigation can provide an in-depth analysis of equipment function or malfunction. When the investigator desires an engineering investigation, submit a request to the appointing authority.
Human System Inadequacies– DoD Human Factors Analysis and Classification System (HFACS)	In conjunction with causal factors analysis mapping.	Structured analysis of error pathways. Applicable to all mishaps and near mishaps. Targets the need for specific intervention (risk management controls)– better command decisions.	Likely will not achieve positive inter-rater reliability without effective understanding of applicability.	Nano-codes may apply directly to the "unsafe act" or to another nano-code that applies directly to the "unsafe act." Use the categories within each major tier to assist in risk analysis and the planning process.
Compliance/ Noncompliance	When investigators suspect noncompliance to be a causal factor.	Helps develop closed-ended interview questions. Helps determine if acts are an error or violation. Helps determine preconditions and potential organizational influences.	Limited use without using the DoD HFACS.	This technique compares evidence collected against three categories of noncompliance to determine the deeper causes of a noncompliance issue.
Barrier Analysis	Identify barrier equipment failures and procedural or admin problems.	Provides systemic approach.	Requires familiarity with process to be effective.	Based on the MORT hazard/target concept and may require input from systems safety engineers.

Table 4–1
Mishap analysis methods—Continued

Method	When to use	Advantages	Disadvantages	Remarks
Change Analysis	Use when cause is obscure. Especially useful in evaluating equipment failures.	Simple six-step process.	Limited value, danger of accepting wrong or "obvious" answer.	A singular problem technique used to support a larger investigation. Limited utility in Root cause determination.

4–5. Root cause mapping

RCM is the primary RCA tool used by investigators of the USACRC. The RCM is a hybrid of other analytical tools from many agencies and/or academic studies (for example, MORT developed by DOE, Lean Six Sigma, Events and Conditions analysis, and Cause Mapping by ThinkReliability). The RCM is easy to develop and provides a clear depiction of the data. Investigators use either sticky notes or Microsoft Excel to provide a graphical depiction (cause map) of the mishap's sequence of events (what) and the layers of conditions (why) that allowed significant events to occur. Keeping the map up-to-date helps ensure the investigation proceeds smoothly and investigators have a clear representation of cause and effect relationships.

a. Key benefits of the root cause mapping.

(1) Provides a structured method for organizing and integrating the collected evidence.

(2) Graphically depicts the triggering conditions to events necessary for the mishap to occur.

(3) Identifies information gaps to collect additional data for analysis.

(4) Identifies hazardous trends of systemic deficiencies and oversights.

(5) Links facts to organizational issues and/or management systems that trigger a chain of conditions and events.

(6) Identifies relationships between organizational influences that had a cascading effect to individual actions.

(7) Provides the investigator with an effective visual aid when writing the mishap report.

(8) Provides a visual representation of accurate information to aid in briefing commanders.

b. Root cause mapping process.

(1) RCM process step 1, establish a sequence of events. An event is considered a point in time defined by a specific action (individual did something, team did something, the weather did something, or equipment/machine did something). The chain of events may have begun days, weeks, months, or years before the mishap even occurred. The SIB must take all the events surrounding the mishap and put them together like a jigsaw puzzle. Develop a timeline by looking at each piece of evidence (documents, photos, witness interviews, logs, records, and so on) and documenting each event on a self-stick note pad placed in the proper sequence or by using a software application (see fig 4–1).

(a) Once the SIB documents the events, the next step is sequencing the events. Working backwards to minutes, hours, days, weeks, months, perhaps years helps identify significant events, unit milestones, unit SOP development, and other activities that could have allowed a cascading series of latent conditions to exist thus leading to the mishap. These timelines allow investigators to analyze policies and events in the proper context and weigh the role each may have played in the resulting mishap (see fig 4–2).

(b) Look as far back as needed to find a cause that with the proper corrective actions could prevent recurrence. For example, maintenance accomplished on a tactical vehicle six weeks ago could be a contributing cause to a crash. A maintenance technician disconnecting a backup warning bell on a forklift last year may result in the injuries to a worker run over by the forklift as it backed up last week.

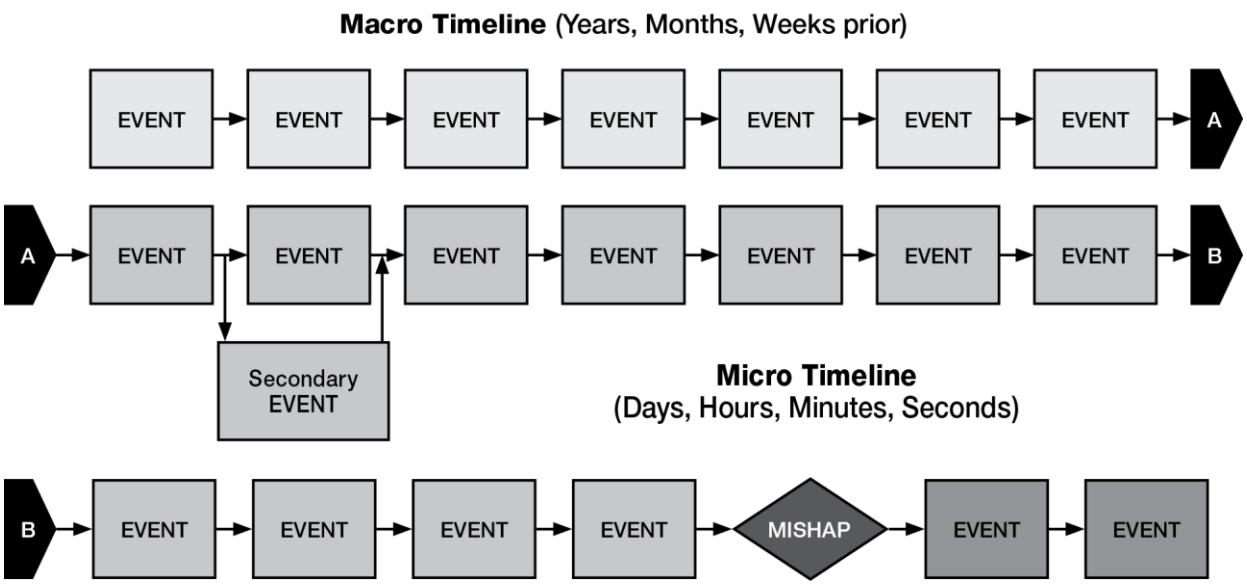


Figure 4–1. Example sequence of events

(2) RCM process step 2, determine which events were significant (identify anomalies). The next step is to identify the anomalies in the sequence. Anomalies are events and/or conditions that deviate from the norm or expectations. Remember that, from paragraph 3–10, anomalies can be positive events as well as negative events (see fig 4–3).

(a) The goal is to analyze each anomaly regardless of perceived individual importance. The method is to use the Five Whys technique and continually ask the question "why" until you have identified all the layers of conditions/contributing factors that led to the anomaly. The main challenge for the investigator(s) is to distinguish between accurate and erroneous information in order to focus on areas that will lead to identifying the causal factors. You may encounter conflicting information while examining evidence (documents, physical evidence, and witness interviews). Constantly review the facts for relevance and accuracy to ensure only factual, relevant information is considered.

(b) Begin with the first event that immediately precedes the mishap. Evaluate its significance in the mishap sequence of events by asking, "If this event had not occurred, would the mishap have occurred?" If the answer is, "The mishap would have occurred with or without this event happening" (for example, the individual reported for duty/work at 0700), then the event is not significant. Proceed to the next event in the sequence, working backwards from the mishap.

1. If the answer to the evaluation question is, "The mishap would not have occurred without this event," then determine whether the event represented normal activities with the expected consequences.
2. Intended events with expected outcomes are not significant to the negative outcome.
3. Unintended events with unwanted consequences are significant events.

(3) RCM process step 3, determine why each anomalous event occurred. Using all collected evidence, carefully examine each significant event to assess what condition(s) existed for the event to occur. You may find that more than one condition either existed or had to exist for the event to occur. As discussed in ATP 5–19, a condition is considered a distinct state that facilitates the occurrence of an event or other conditions that lead to an event.

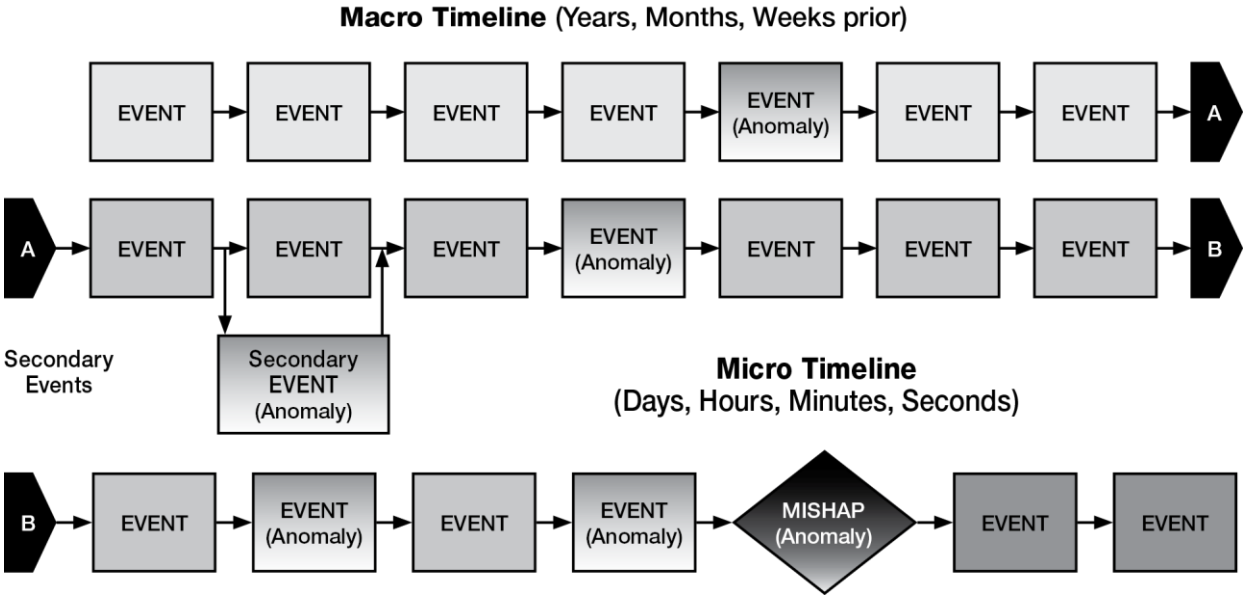


Figure 4–2. Example identifying anomalies in sequence

(a) Assess. Once the SIB has identified the initial conditions, continue to assess each condition separately and identify each layer of conditions that allowed other conditions to exist until the evidence ends. The SIB can achieve this goal by asking a series of questions. One can frame their questions in several manners, such as:

1. Why did this event happen/what condition or conditions existed to allow the event to occur?
2. Why did this condition exist or what other conditions allowed this condition to exist?
3. Are there other conditions that allowed these conditions to exist?
4. How did this event or all these conditions originate?
5. Are there any relationships between what went wrong in this event chain and other events or conditions in the sequence of events leading to the mishap?
6. What other events or conditions are linked to the significant event that may indicate a more general or larger deficiency at the organizational level?

(b) The Five Whys. The Five Whys began at the Toyota Motor Company and became a component of Six Sigma. Investigators can employ this simple technique to explore the cause and effect relationships underlying a specific problem and is a valuable tool when used in conjunction with other analytical tools (such as RCM, Barrier Analysis, Change Analysis, and so on). The goal of the application of the Five Whys method, is to determine a root cause of a defect or problem. By asking a “why” question, the answer identifies conditions/causes that allowed certain events and other conditions to occur. Often the answer to the first “why” question uncovers another reason and generates another “why” question. Practical application does not require or limit an investigator to Five Whys. Ask as many “why” questions as required to identify the root cause. On average, one will discover the root cause of a problem after Five Why questions. The Five Whys process involves selecting one event associated within the sequence of events and asking, “Why did this event occur” (see fig 4–3). Once the condition(s) are identified that lead to the event, the investigator continues to follow each “condition” and ask, “Why was this condition allowed to exist?” Repeat the process for the other events associated with the mishap.

(c) Benefits. The Five Whys offers some real benefits at any maturity level:

1. It is easy to use and requires no advanced mathematics or tool.
2. It is effective to help quickly separate symptoms from causes and identify the root cause of a problem.
3. It is comprehensive in that it aids in determining the relationships between various problem causes.
4. It is flexible as it works well alone and when combined with other troubleshooting techniques.
5. It is engaging in nature, as it fosters and produces teamwork and teaming within and without the organization and is a guided, team-focused exercise.

(d) Limitations. Without good evidence: A team may not reach consensus. Results are not reproducible or consistent if multiple personnel are analyzing the same data. Without the same evidence or information, another team analyzing the same issue may reach a different solution. The Five Whys method must complement, not replace, the RCM.

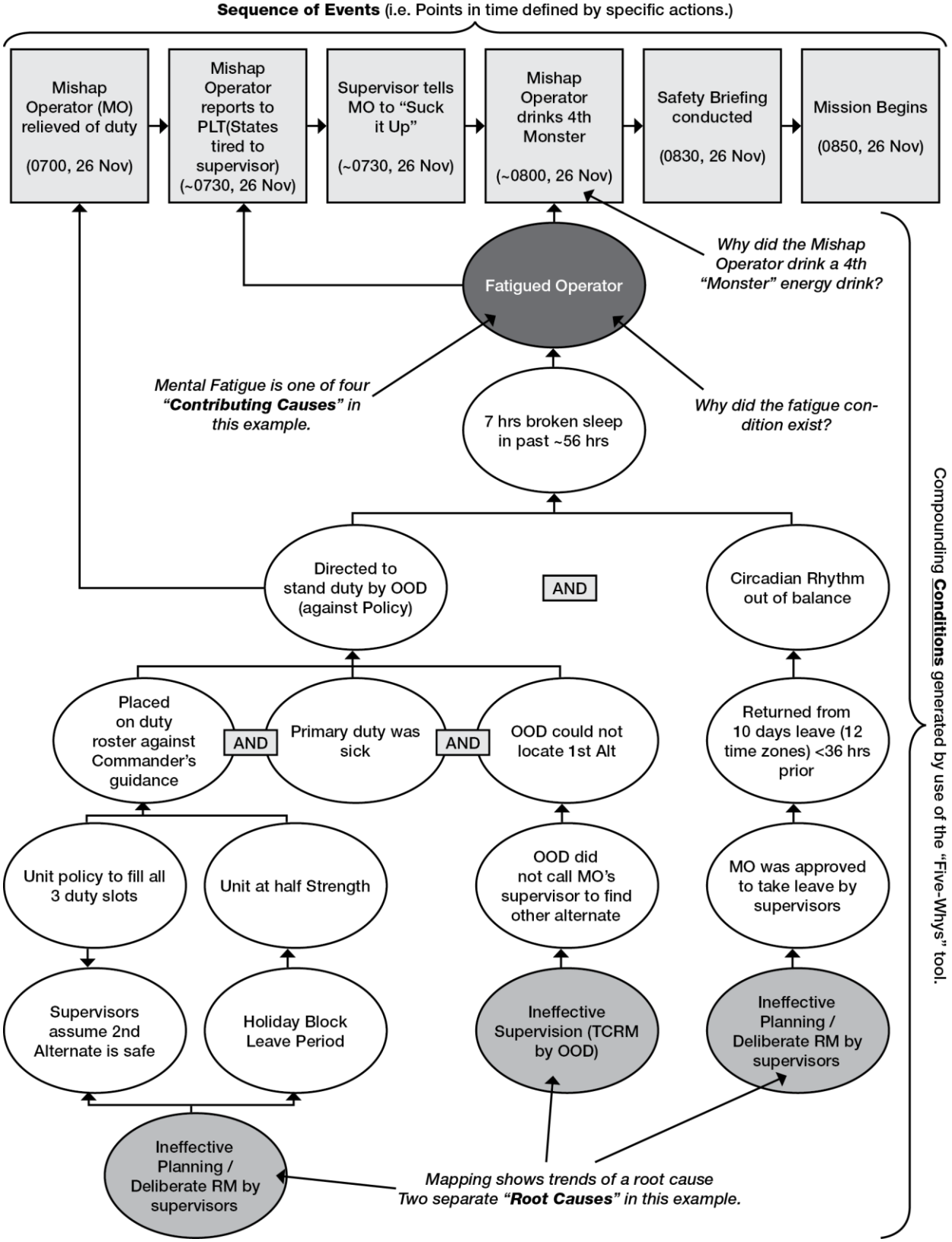


Figure 4–3. Five Whys tool

c. Analysis introduction. The SIB must conduct a systematic analysis of data collected during the investigation to determine what happened, identify causal factors, and develop findings and recommendations. A best practice is to separate the data analysis into the same categories (human, materiel, and environmental factors) in which they were collected. This technique assists the SIB in methodically evaluating data using the RCM to determine any significance in relation to the cause of the mishap. Anomalies, which the SIB determined did not contribute to the mishap or severity of injury/damage may still be important and must be captured, as they will be deliberated in the next phase of the investigation for their possible inclusion as Present but Not Contributing findings.

d. Human factors data analysis. SIB members who evaluate human factors data must examine the data with the purpose of identifying latent conditions/failures applicable to the human system inadequacy categories of support, standards, training, leadership, and/or individual failures. The RCM process aids in linking relationships of organizational conditions that had a cascading effect on individual actions or materiel failure. Once the human causes are categorized into their respective system inadequacy category, assigning human factors codes from tables B–1 and B–2 is then achieved. The following describes the human factors analysis of these five categories:

(1) *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 and resource management (personnel, money, and equipment or facilities) to set subordinate commands (and their Soldiers) up for success or failure. Areas to examine include:

(a) Personnel (adequate number of personnel for the mission or task).

(b) Equipment (adequacy/availability of equipment required for the mission or task).

(c) Supplies (adequacy/availability of supplies required for normal operations or mission/task).

(d) Facilities (adequacy/availability of facilities required for operations or mission/task).

(e) Other factors related to support of the mission, operation, or task.

(2) *Standards.* Determine if adequate written procedures or guidance existed to support the safe mission or task execution associated with the mishap. Do not assume all Army publications, to include operator's manuals are correct or accurate. Should the SIB identify an unclear or unnecessarily complicated procedure that may cause future mishaps, this would be another anomaly. The failure to follow a written procedure is not a standards failure. A true standards failure is the absence of written guidance, errors in the guidance, or unclear written guidance. The SIB must exercise diligence to review the immediate task condition standards for the given task and all applicable publications for additional anomalies such as:

(a) Army doctrine reference publications.

(b) ATPs.

(c) DA Pams.

(d) FMs.

(e) ARs.

(f) Unit policy letters.

(g) Army command, divisional, and garrison regulations/policy letters.

(h) TMs.

(i) Operator's manuals.

(j) Training circulars (TCs).

(k) Division/brigade/battalion/company SOPs.

(3) *Training.* Determine if the training was correct, complete, and sufficient to enable the individual to perform to established standards. The SIB will examine all applicable individual and collective training to ensure appropriate documentation in the individual training/aircrew training folders and the training has appropriate visibility/tracking at the unit level. This may include an analysis of training received in basic training, MOS producing schools, officer basic courses, flight school, and so on. Areas to examine also include an evaluation of the adequacy of:

(a) Individual training.

(b) Crew training.

(c) Crew coordination training.

(d) Residual training (possibly related to negative habit transfer).

(e) Weapons training (individual, crew, collective gunnery).

(f) Drivers training.

(g) Readiness level (RL) progression.

(h) Pilot-in-command (PC) training and selection.

(i) Maintenance training.
(j) Training plans.
(k) Risk management training.

(4) *Leader/command.* Examine the leadership's role in the mishap to determine if a leader's failure to enforce standards, or adequately plan, the exercise of improper command influence, or a leaders' failure to act caused or contributed to the mishap. A best practice is to apply the five-step risk management process in relation to the mission/task planning to identify any previously overlooked hazards, with the benefit of hindsight. Areas to examine also include:

(a) Unrecognized hazards or hazardous operations.
(b) Inadequate risk documentation/mitigation procedures.
(c) Inadequate supervision.
(d) Crew endurance policy management/enforcement.
(e) Personnel selection and utilization for the mishap task.
(f) Planned inappropriate operation (leaders directed personnel to execute a task beyond their skill level or beyond the capabilities of their equipment).
(g) Uncorrected known deficiencies or hazards.
(h) Supervisory violations.
(i) Overall organizational climate (positive, negative, or indifferent).
(j) Command priorities (training, maintenance, other).
(k) Outside influences on the organization.
(l) Application of risk management procedures.
(m) Character of the organization (professional, centralized vs. decentralized control, and so on).
(n) Formal vs. informal leadership.
(o) Appropriate authority delegated with assigned responsibility.
(p) Adherence to established policies.
(q) Mentoring/counseling programs.
(r) Command inspection programs.

(5) *Individual.* If the examination of support, standards, training, and leadership factors fail to yield an anomaly related to the cause of the mishap, then the source of the error is most likely the individual, or one of the individuals involved in, or related to (such as vehicle or aircraft maintenance personnel) the mishap. A thorough examination of the data to this point should highlight the error or violation committed by the individual which the SIB will determine its influence or effect on the mishap sequence of events during the deliberations portion of the investigation. Other areas to examine include:

(a) Any physical problems or injuries associated with personnel involved in the mishap that could have resulted in or affected the outcome of the mishap.
(b) Fatigue.
(c) Nutrition/diet factors and their effect on performance.
(d) Hydration status.
(e) Factors related to substance effects (alcohol, supplements, medication, drugs, and so on).
(f) Individual's state of mind (personality traits, psychological disorders, inappropriate motivation, and so on).
(g) Factors related to sensory misperception that may have resulted in degraded sensory inputs (visual, auditory, or vestibular) which created a misperception of an object, threat, or situation.
(h) Mental awareness/attention management (situational awareness, fixation, confusion, habits, knowledge).
(i) Crew or team cohesion (ability to work in concert, how the crew/team interacted internally, communication/cross talk).
(j) Adequacy of crew or team mission planning.
(k) Any other factor related to an individual's ability to perform, make decisions, or communicate during a task.

e. Materiel factors data analysis. Analysis of data related to the materiel factors seeks to determine if the design of the equipment was adequate/appropriate for its intended use and if the equipment functioned as designed. This process is primarily concerned with evaluating the performance of the aircraft, vehicle, facility, ground support equipment, or other support material. The SIB also collects and evaluates data concerning how operational conditions affected the vehicle/system/equipment performance and

determines if the damage was a result of the mishap or if it caused the mishap. Depending on the nature of the mishap, the materiel analysis examines but is not limited to:

(1) General.
(a) Component TDA.
(b) Laboratory analysis data (petroleum, oils, lubricants).
(c) Fire analysis.
(d) Digital source collection (often requires the assistance of the USACRC DCAI Lab).
(2) Aviation.
(a) Aircraft airworthiness (includes an examination of records and components).
(b) Aircraft systems.
(c) ALSE.
(3) Ground.
(a) Vehicle readiness (roadworthiness).
(b) Onboard vehicle systems (navigation, communications, environmental, and so on).
(c) Soldier systems functionality.
(d) PPE.
(e) Building structural integrity/design/systems.
(4) Airborne.
(a) Parachute system condition and functionality (was the equipment functioning before the mishap?).
(b) Other equipment and PPE condition and functionality.
(c) Future technological advances (personal data recorder, individual tracking devices, and so on).

f. Environmental data analysis. Analysis of data related to the environment allows the SIB to examine both meteorological and nonmeteorological data. Meteorological analysis is an examination of all data related to the weather (clouds, precipitation, temperature, humidity, pressure, wind, and lightning) and the effect of such weather on the mishap. Nonmeteorological data analysis considers environmental aspects beyond the weather, such as terrain condition (rocky vs. powdery sand, and so on), foliage height, water depth, sun angle, lunar data (moon angle and illumination) and their effect on the mishap and the recovery/rescue. The SIB should use caution when identifying environmental anomalies; in order for an environmental anomaly to be causal, that anomaly must have been unknown and unavoidable. For example, an environmental anomaly such as blowing dust experienced by an aircraft landing to an unimproved area in a desert environment is both known and avoidable. Aircrews flying in a desert environment expect landings conducted off a hardstand to be dusty (known) and if they encounter brown out conditions, trained to abort the landing (avoidable) if they lose sight of the intended touchdown area. However, if that same aircrew in flight was suddenly struck by an unforecasted microburst, this would be considered unknown (cannot forecast a microburst) and unavoidable. Other factors include noise, illumination, and space in the operating environment. Investigators must also examine the cockpit, cab, turret, and so on to determine if the design of the equipment may have contributed to the mishap. 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, infrared crossover).
(7) Altitude or depth (supplemental oxygen, impacts of pressure).
(8) Contaminants (dust, smoke, snow, smog).
(9) Foreign objects.
(10) Chemicals or radiation.
(11) Animals or fowl.

4–6. Kinematics analysis

a. Analyzing kinematic data is helpful in understanding the crash sequence or collision forces involved in a ground or air mishap and can often help explain injuries, failure modes, and exceedances of design criterion (operating as designed). Speed, mass of the vehicle/aircraft/equipment, and the object/terrain impacted are all-important factors that contribute to the kinematic understanding of a given mishap and

investigators must properly collect this data during the collection phase of the investigation. An example would be the difference between skid marks or ground scars left by a high or low speed vehicle or aircraft striking a stationary object or terrain.

b. The mathematics required to conduct kinematic analysis is incredibly complex, detailed, and easily corrupted with minor errors. The USACRC has developed a basic kinematics analysis tool to allow SIB members to input required data into a spreadsheet, which then automatically computes the kinematics data.

c. This tool is located on the USACRC website at https://safety.army.mil. Once on the website, scroll over the "Reporting and Investigation" drop down menu and select the Tools link to find the kinematics spreadsheet.

4–7. Deliberations

a. Deliberations are a formalized process by which SIB members agree upon the active and latent failures that caused/contributed to the mishap sequence of events. These active and latent failures become the SIB's Findings and Recommendations of a mishap, which are the most important items the SIB will produce. This phase builds on the SIB member's individual understanding gained during the analysis and is key to developing and ensuring a shared understanding of the causes and contributing factors of the mishap. Deliberations are conducted to ensure the SIB collectively identify human errors, materiel failures, environmental factors (what happened); identify causes and contributing factors (why it happened); and develop recommendations (what to do about it).

b. Every investigation must thoroughly examine environmental factors and materiel performance as potential causes of the mishap. However, the focus of the following sections is on identifying human error, both at the leader and individual levels. There are several reasons for this focus. Historically, human errors contributing to the causal factor of a mishap account for an average of 80% of all mishaps. Second, identifying human error is the least objective of all causal factors, therefore requiring greater effort and time by the SIB. Third, human error is often present in mishaps 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 the SIB addresses all areas. However, in the event that the SIB determines that human factors are not causal or contributing to the mishap, the SIB must then deliberate the causal and contributing potential of a materiel or environmental factor, the same way they would for a human contributing factor. Find these factors in table B–3 for materiel failures and table B–4 for environmental conditions.

4–8. Preparation and conduct of deliberations

a. Preparation. The board president will continue to chair the meetings and guide the proceedings. The recorder will post the products (timelines, anomalies) in such a manner that all board members can see them. All relevant information will remain readily accessible. The recorder will also update the deliberations worksheet to capture the findings and recommendations as the SIB reaches their conclusions. It is important that all SIB members have a working knowledge of the data collected throughout the investigation to ensure the shared understanding required to execute deliberations in a successful manner.

b. Conduct of deliberations. Deliberations are a formalized process by which members of the SIB agree upon the causal and contributing factors of the mishap. Each SIB member will provide input and analytical reasoning when determining if the anomaly caused or contributed to the mishap. The board president may opt to conduct a vote to ensure that a majority of the SIB members agree that the active and latent failures correctly describe the cause and effect relationship of the circumstances surrounding the mishap. The board president should not allow lengthy debate on unresolved issues during deliberations. If a SIB cannot reach consensus on an issue within a reasonable amount of time, the board president will decide the issue and continue with the proceedings. For dissenting arguments, there are provisions for submitting a minority report (see para 5–9).

(1) *Review the Analysis.* Review anomalies to determine if they were present in the mishap sequence of events. Unsafe act or violations are readily apparent, but latent failures require more analysis. As the factors that were present in the sequence of events are isolated, place them into the written timeline to develop an event chart. Then analyze them to determine if they—

(a) Contributed to the mishap (contributing).

(b) Suspected to have contributed to the mishap (suspected contributing).

(c) Did not contribute to the mishap, but contributed to the severity of injuries or extent of property damage (contributing to the severity of injury/damage).

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

(2) *Unsafe act or violation Identification.* Select the most descriptive act or violation that caused or contributed to the mishap from table B–1 for human error. The more specific the unsafe act or violation, the easier it is to determine the latent failures or root causes of that unsafe act or violation and the corrective actions required. Regardless of the task involved, the explanation of how the individual improperly performed the task will also include the directive, standard, and the performance deviated from or not complied with as it related to the mishap. The fact that an unsafe act or violation occurred in and of itself has little meaning until the SIB explains the consequences and relevance to the mishap. Therefore, the defining and explanation process for human errors is not complete until:

(a) It is determined when and where the error/violation occurred.

(b) Identify the equipment and individual (by duty position) involved in the mishap.

(c) Identify the error/violation in relation to the deviation from a performance standard and the proper procedure for performing the task.

(d) The directive or common practice governing the performance of the task is identified, and

(e) Explain the consequences/effect of the active failure.

(f) These five elements make up part 1 of the finding—the act/violation—as described in chapter 5. There is only one error or violation per finding, but there can be multiple latent failures setting the stage for that one unsafe act or violation to occur.

(3) *Latent failure(s) identification.* The next step is to determine the root causes found in table B–2 that set the stage for the error/violation and place them into the timeline. These are latent failures and they could have occurred hours, days, or months prior to the mishap that set the condition for the unsafe act or violation. The best way to identify latent failures is to work backwards from a mistake/error by asking questions aimed at "illuminating" the error. Remember that the latent failures may have occurred just prior to the mishap or a long length of time before the unsafe act or violation occurred.

(a) The most direct source of information is the individual who made the error or the supervisor(s) of the individual. The SIB may need to review interview transcripts or listen to the recorded interview. Additionally, the SIB may need to conduct follow-on interviews for specificity of detail. Records and orders may need to be re-examined.

(b) Select the most descriptive latent failure code(s) from table B–2 that describe the conditions that set the stage for the mistake/error to occur and fall within the categories of Support, Standards, Training, Leader, and Individual latent failures.

(c) The explanation of how the latent failure(s) caused or contributed to the mistake/materiel failure becomes part two of the finding, as described in chapter 5.

(4) *Recommendations development.* When the SIB has reached a consensus on each of the significant factors involved in the mishap, they will develop corrective actions having the best potential for remedying each latent failure. When developing recommendations the SIB must ensure they address or correct the latent failures, not the unsafe act or violation. Each latent failure must have a recommendation to address or correct the failure. The SIB must formulate recommendations to the appropriate level of command for actions necessary to address the specified latent failures.

(a) The goal is to get accurate information (facts) and timely recommendations to the appropriate command level for an informed decision. When the SIB reaches a consensus concerning corrective actions, the SIB then identifies commands or activities having proponency for correcting the latent failures.

(b) To achieve the goal of mishap prevention, recommendations should not focus on specific punitive or administrative actions that might deal with the shortcomings of a particular individual in a specific case. Rather, the recommendations should address the issue on a broader level.

(c) Each recommendation will identify the necessary actions at the appropriate level of command, such as unit-level actions, higher-level actions, Army-level action, or the agency/activity most appropriate to fix the latent failures. The SIB focuses Army-level recommendations on DOTMLPF–P.

(d) The SIB formulates the recommendations in conjunction with the findings for inclusion in the mishap report. 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 of the Army with recommendations to address the Armywide hazards or system inadequacies.

(5) *Completion.* Once all anomalies are reviewed, the active and latent failures identified, and recommendations drafted, the board president and recorder, in consonance with the SIB members, work to complete the written history, analysis, findings, and recommendations in accordance with chapter 5.

Chapter 5
Phase IV, Complete the Mishap Report

5–1. Purpose and goal of Phase IV

a. The final phase of the mishap investigation requires the SIB to record its observations, analysis, findings, and recommendations and complete the mishap report according to the requirements of The Army Safety Management Information System (ASMIS) 2.0. Although completing the mishap report is the culminating phase of the investigation, SIB members should begin drafting their writing requirements as the investigation progresses and data becomes available. A best practice is for SIB members to draft portions of the mishap report as they examine the data. For example, the SIB should write about the airworthiness or roadworthiness of a piece of mishap equipment as the SIB member(s) examines the item or system. This way, the data and discussion is still fresh and the author can capture accurate and relevant information before moving on to other topics.

b. At the end of the final phase, the SIB will have completed the mishap report and submitted the report to the local safety office for review.

5–2. Personnel background and materiel factors reports

a. General. Two additional writing requirements for the SIB are the Personnel Background and the Materiel Factors reports. These reports are factual in nature and will not contain analysis or conjecture, yet are useful in assisting the SIB in writing the analysis portion of the narrative. Write both reports using complete sentences in a paragraph format; each report should be at least one paragraph long.

b. Personnel background report. The SIB will summarize the personal background information on each person who participated in the unsafe act or violation (contributing findings) that resulted in the mishap. For each applicable person, write a separate paragraph and describe the following:

(1) Identify the key personnel by duty assigned, crew member station, MOS/Area of Concentration/Job series, date of assignment to unit.

(2) Report evidence of safety/traffic violations and prior mishap experience on the primary personnel involved. If involved in a prior mishap, explain their role.

(3) Summarize the individual's experience, training, education (if applicable), and qualifications related to their involvement in the mishap.

(4) Report how the unit tasked and trained the individual up to the date of the mishap.

c. Materiel factors report. This report provides results of any special investigation in the appropriate subparagraphs. Identify and discuss damage resulting from pre-mishap materiel failure/malfunctions and omit damage that resulted from crash/impact forces exceeding design limits. The material factors narrative is factual in nature; the SIB will utilize the analysis paragraph of the Narrative of the Investigation to explain their analysis of material factors.

(1) *Vehicle/equipment/structure/vessel worthiness.* Describe the worthiness of the vehicle/equipment/structure. The investigation should include, but not be limited to, maintenance records, historical records, interviews with maintenance personnel, operator preventive maintenance records, safety/recall bulletin alerts, and dispatch records.

(2) *Systems.* Use subparagraphs to report data obtained in the examination of the material/equipment involved in the mishap. For example in the case of a vehicle mishap the material factors report would include subparagraphs including fuel, steering/control, hydraulics, electrical, frame, tires, weapon, suspension, and brake systems. Use subparagraphs to report information obtained that suggests a software control abnormality contributed to the mishap. Note all discrepancies.

5–3. Development of the Safety Investigation Board's findings and recommendations

a. Writing the findings. In order to fully describe the Board's deliberations and develop the SIB's findings, the DoD and Army have developed several standardized tables the SIB must use to translate the identified active and latent failures into findings. These tables enable the SIB to select the most appropriate description for the failures, errors, and/or conditions that permitted a mishap to occur. The tables

discussed in this section are applicable for both aviation and ground mishap deliberations. For ease of use, these tables are broken down by the type of factor in which each failure is grouped (Human, Materiel, Environmental). The USACRC has developed a human factors digital deliberations tool that the SIB can use in lieu of tables B–1 and B–2. This tool is located on the USACRC website at https://safety.army.mil; under the "Reporting and Investigation" menu open the "Tools" hyperlink.

b. Format. Depending on the type of finding (Contributing, Contributing to the Severity of the Injuries or Damage, or Present but Not Contributing) and the type of factors addressed (Human, Materiel, or Environmental), the Army has developed a standardized finding format to assist in both the completeness and readability of the SIB's findings.

(1) The format and required elements for Contributing, Suspected Contributing, and Contributing to the Severity of the Injuries or Damage findings are the same for ground and aviation mishaps. Examples outlined in tables 5–1 through 5–6. The SIB will group the findings by type, and order the findings from the assessed most severe contributing finding to the most benign Present but Not Contributing finding. Prior to writing the contributing findings document, the SIB will include the following applicable statement:

(a) "The finding(s) listed below directly contributed to this mishap;" or

(b) "The finding(s) listed below are suspected to have directly contributed to this mishap;" or

(c) "The finding(s) listed below did contribute to the severity of (injuries) or (mishap damage)."

(2) The format for Present but Not Contributing findings is not as regimented. Figure 5–1 provides an example of a Present but Not Contributing finding. Present but Not Contributing findings are written in a complete paragraph format and the SIB should refer to the latent failures or system inadequacies condition (hazard) identified by the SIB which did not contribute to this mishap, but could contribute to future mishaps if not corrected. Prior to writing these findings, the SIB will include the following statement, "The finding(s) listed below did not contribute to this mishap; however, if left uncorrected, it/they could have an adverse effect on the safety of future operations."

Findings and Recommendations (Cont'd) – 202010260001

THE FINDING(S) LISTED BELOW DID NOT CONTRIBUTE TO THIS MISHAP; HOWEVER, IF LEFT UNCORRECTED, IT/THEY COULD HAVE AN ADVERSE EFFECT ON THE SAFETY OF FUTURE OPERATIONS.

FINDING 4 (Present but Not Contributing):

The Multi-National Corps – Iraq Helicopter Procedures Training Guide (HPG) has a requirement that no Army helicopter will go below 50 feet above ground level (AGL). Paragraph 3-5 of the HPG states that the minimum operating altitude for all rotary-wing aircraft is 50 feet AGL, unless deviations are required for weather or are command directed based on mission requirements. Airspeeds will be consistent with safe operations for altitude, obstacle avoidance, and environmental conditions. The Board determined that the flight hazards are so numerous that the 50 foot AGL limit should be raised to 150 feet AGL except for enemy situations or if directed by the command.

RECOMMENDATION 4:

a. Unit Level Action: None.

b. Higher Level Action: Commander, Multi-National Corps-Iraq, consider changing the HPG from 50 feet AGL minimum altitude to 150 feet AGL minimum altitude.

c. Army Level Action: None.

Figure 5–1. Example of a Present but Not Contributing finding and recommendation

c. The SIB will use the HFACS codes found in tables B–1 and B–2 identified during deliberations for human factors contributing findings. The contributing findings formats are as follows:

Table 5–1
Elements of a human factors contributing, suspected contributing, or contributing to the severity of the injuries and/or damage finding (aviation example)

FINDING 1 (Contributing):

Required Information	Example
1. Explanation of when and where the unsafe act or violation occurred in context of the mishap sequence of events.	While performing multi-aircraft operations under visual meteorological conditions (VMC) at night using night vision goggles (NVGs) in a UH–60M at Fort Totten, NY…
2. Aircraft and individual involved by duty position.	…the unit commander for the UH–60M crew…
3. Identification of the unsafe act or violation from table B–1, and an explanation of how the individual performed the task/activity improperly or violated a standard. *Note*. Only one unsafe act or violation per finding.	…authorized the progression of the mishap pilot (PI)'s RL in violation of (AV002) Army flight training doctrine. That is, the mishap PI had been designated RL2 without demonstrating proficiency in all base tasks of an RL2 aviator.
4. Identify the directive (aircrew training manual (ATM), SOP, FM, TM, and so forth) or common practice governing performance of task/activity that the individual violated.	The unit commander's actions were in contravention to TC 3–04.11.
5. Consequences of the unsafe act or violation.	The Board concluded the mishap PI's inadequate RL progression contributed to an inability to recognize the onset of spatial disorientation and recover the aircraft after experiencing spatial

Table 5–1
Elements of a human factors contributing, suspected contributing, or contributing to the severity of the injuries and/or damage finding (aviation example)—Continued

FINDING 1 (Contributing):

Required Information	Example
	disorientation. As a result, the aircraft crashed into the water, fatally injuring five crewmembers, and destroying the aircraft.
6. Identification of reasons. This element starts the second paragraph of the human error finding (latent failure(s)) for the unsafe act or violation. Reference the latent failure the SIB selected from table B–2. *Note*. The finding may contain multiple latent failures (individual, standards, leader, and so on).	The Board determined there was inadequate management of the Aircrew Training Program by the commander and standardization PI (OP006), a failure to enforce existing regulations and guidelines (SV001) by unit standardization personnel, and complacency (PC 208) on the part of the mishap PC.
7. Brief explanation of how each reason (latent failure) contributed to the mistake/error.	The mishap PC was unable to identify conditions that were conducive to spatial disorientation including lack of hemispherical illumination, low contrast terrain (over water) and lack of references to the horizon. Additionally, the mishap PI's last NVG progression flight was 98 days prior to the night of the mishap, and was 0.8 of an hour in duration. The mishap PI's last training flight was 47 days prior due to temporary duty (TDY) and aircraft nonavailability. The commander did not direct the restart of RL2 phase progression in contravention to TC 3–04.11 paragraph 8–15 which requires the restart of a PI's RL progression when there is a break in training of greater than 45 days. Lastly, the mishap PI had not flown NVGs in greater than 60 days, which requires an NVG proficiency flight evaluation (PFE) before continuing RL progression in accordance with TC 3–04.11, paragraph 6–90. Insufficient management of the ATP set the conditions in which the unit commander expected an inadequately trained mishap PI, lacking recent flight experience, to perform in-flight conditions exceeding his current training and proficiency level.
Full text:	While performing multi-aircraft operations under VMC at night using NVGs in a UH–60M at Fort Totten, NY, the Board found the unit commander authorized the progression of the mishap PI's RL in violation of Army flight training doctrine. That is, the mishap PI had been designated RL2 without demonstrating proficiency in all base tasks of an RL2 aviator. The unit commander's actions were in contravention to TC 3–04.11, paragraphs 6–90, 8–15, and 8–28. The Board concluded the mishap PI's inadequate RL progression contributed to an inability to recognize the onset of spatial disorientation and recover the aircraft after experiencing spatial disorientation. As a result, the aircraft crashed into the water, fatally injuring five crewmembers, and destroying the aircraft. The Board determined there was inadequate management of the Aircrew Training Program by the commander and standardization PI, a failure to enforce existing regulations and guidelines by unit standardization personnel, and complacency on the part of the mishap PC. The mishap PC was unable to identify conditions that were conducive to spatial disorientation, including lack of hemispherical illumination, low contrast terrain (over water) and lack of references to the horizon. Additionally, the mishap PI's last NVG progression flight was 98 days prior to the night of the

Table 5–1
Elements of a human factors contributing, suspected contributing, or contributing to the severity of the injuries and/or damage finding (aviation example)—Continued

FINDING 1 (Contributing):

Required Information	Example
	mishap and was 0.8 of an hour in duration. The mishap PI's last training flight was 47 days prior due to TDY and aircraft nonavailability. The commander did not direct the restart of RL2 phase progression in contravention to TC 3–04.11 para 8–15 which requires the restart of a PI's RL progression when there is a break in training of greater than 45 days. Lastly, the mishap PI had not flown NVGs in greater than 60 days, which requires an NVG PFE before continuing RL progression in accordance with TC 3–04.11, paragraph 6–90. Insufficient management of the ATP set the conditions in which the unit commander expected an inadequately trained mishap PI, lacking recent flight experience to perform in-flight conditions exceeding his current training and proficiency level.

Table 5–2
Elements of a human factors contributing, suspected contributing, or contributing to the severity of the injuries and/or damage finding (ground example)

FINDING 1 (Contributing):

Required Information	Example
1. Explanation of when and where the act, unsafe act, or violation occurred in context of the mishap sequence of events.	During conduct of a night combined arms maneuver live fire exercise (CAMFEX) on range 307 at Fort Huachuca, AZ…
2. Identification of the vehicle and individual involved by duty position.	…the gunner of a M240L machine gun…
3. Identification of the unsafe act or violation from table B–1 and an explanation of how task/activity was performed improperly or violated a standard. *Note*. Only one unsafe act or violation per finding.	…while providing supporting fires for an assault element, mistakenly fired their gun in the wrong sector (AE205).
4. Identify the directive (SOP, FM, TM, and so forth) or common practice governing performance of task/activity that the individual violated.	His actions were in contravention of the guidance provided in the cautions and warnings in the M240 TM.
5. Consequences of the act.	He fired at least two bursts in the sector where a squad was maneuvering to prepare for a counterattack. At least two rounds of 7.62 ball ammunition struck one of the members of the maneuvering squad resulting in a fatal gunshot wound.
6. Identification of reasons (latent failure(s)) for the unsafe act or violation. Reference the system inadequacies failure the SIB selected from table B–2. *Note*. The finding may contain multiple latent failures and begins the second paragraph.	The Board attributed the wrong course of action to environmental conditions related to zero percent illumination (PE101), confusion (PC104) related to the correct primary direction of fire, inadequate mission planning (PP109), and a failure in the risk management process (SP006).

Table 5–2
Elements of a human factors contributing, suspected contributing, or contributing to the severity of the injuries and/or damage finding (ground example)—Continued

FINDING 1 (Contributing):

Required Information	Example
7. Brief explanation of how each reason latent failure contributed to the mistake/error.	The weapons squad leader instructed the gun team to shift fire prior to occupying their final position. The Board concluded that limited visibility and confusion led one of the gun teams to be unsure of their actual sector of fire. The gun team either failed to shift fire or inadvertently shifted back to the first primary direction of fire. The staff failed to conduct adequate mission planning for the creation of the surface danger zone (SDZ) for the support by fire (SBF). Range operations were unaware of the SBF and did not develop SDZs for the position. The post-mishap generated SDZ revealed the clearance of building 3 and the occupation of the final positions for the maneuver elements would have required a lift fire as they were within the SDZ. Company level leaders did not understand this requirement. Although Directorate of Plans, Training, Mobilization, and Security (DPTMS) range operations authorized the use of tracers after a previous ban on tracers, the leadership decided not to relink tracer ammunition for use by the belt fed machine guns in use during the CAMFEX. This decision created a hazard where the observer controller (O/C) on the SBF was not able to identify the sectors of fire at night and maneuvering troops could not identify the fires of the SBF elements.

Table 5–2
Elements of a human factors contributing, suspected contributing, or contributing to the severity of the injuries and/or damage finding (ground example)—Continued

FINDING 1 (Contributing):

Required Information	Example
Full text:	During conduct of a night CAMFEX on range 35 at Fort Huachuca, AZ, the gunner of a M240L machine gun providing supporting fires mistakenly fired their gun in the wrong sector. That is, although the weapon squad leader directed the gun team to shift fire to the left, the gun team continued to fire or shifted their fire to the previous (incorrect) sector of fire. Their actions were in contravention of the guidance provided in the cautions and warnings in the M240 TM. The crew fired at least two bursts in the sector where a squad was maneuvering to prepare for a counterattack. One of the members of the maneuvering squad was struck by at least two rounds of 7.62 ball and sustained fatal gunshot wounds. The Board attributed the wrong course of action to environmental conditions related to zero percent illumination, confusion related to the correct primary direction of fire, inadequate mission planning, and a failure in the risk management process. Before the squad moved to occupy their final position, the weapons squad leader instructed his gun team to shift fire. Compounded by the limited visibility, the Board concluded that one of the gun teams was confused regarding the sector of fire and either failed to shift or inadvertently shifted back to the first primary direction of fire. The staff failed to conduct adequate mission planning of the SDZ for the SBF. DPTMS range operations was unaware of the SBF and did not develop SDZs for the position. Based on the SDZ developed post-mishap, clearance of building 3 and occupation of the final positions for the maneuver elements would have required a lift fire as they were within the SDZ for the SBF but company level leaders did not understand this requirement. Although DPTMS range operations authorized the use of tracers after a previous ban on tracers, the leadership decided not to relink tracer ammunition for use by the belt fed machine guns in use during the CAMFEX. This created a hazard where the O/C on the SBF was not able to identify the sectors of fire at night and maneuvering troops could not identify the fires of the SBF elements.

Table 5–3
Elements of a materiel failure contributing, suspected contributing, or contributing to the severity of the injuries and/or damage finding (aviation example)

FINDING 1 (Contributing):

Required Information	Example
1. Explanation of when and where the materiel failure/malfunction occurred in the context of the mishap sequence of events.	While conducting a combat daytime air movement at 3,500' mean sea level (MSL) and 130 knots in straight and level flight…
2. Name and PN or NSN of the part, component, or system that failed.	…the bond line between the pitch horn housing and the fiberglass skin of the torque tube section of the UH–60M tail rotor blade (PN 70101–31000–043)…

Table 5–3
Elements of a materiel failure contributing, suspected contributing, or contributing to the severity of the injuries and/or damage finding (aviation example)—Continued

FINDING 1 (Contributing):

Required Information	Example
3. Mode of failure (corroded, burst, twisted, decayed, and so on) (see DA Pam 385–40 for definitions and examples). *Note*. Only one failure per finding.	…de-bonded and caused a severe vibration to manifest throughout the airframe.
4. Consequences of materiel failure.	The resultant vibration propagated to the opposing blade and caused it to vibrate and stress the blade spar of the opposing blade until it failed and separated from the aircraft. The ensuing severe tail rotor imbalance caused an overload of the tail rotor system and the gearbox's vertical pylon attachment points, which resulted in a subsequent separation of the gearbox, complete destruction of the aircraft and one fatality.
5. Identification of reasons (root causes) for the materiel failure/malfunction that contributed to mishap. *Note*. The finding may contain multiple root causes (design, manufacture, and so on).	The Board determined the bond line failed due to a manufacturing deficiency and was undetected due to inadequate inspection procedures outlined by the manufacturer.
6. Brief explanation of how each reason (materiel failure root cause) contributed to the materiel failure, if necessary, to fully explain the finding.	The bond line deficiency was due to an inadequate adhesive bond between the pitch horn and the tail rotor torque tube. By design, Army maintenance personnel did not maintain the bond line but did conduct inspections of the bond line. However, the Board determined that the required inspection criterion was insufficient to enable unit maintainers to identify a bond line failure of this nature.
Full text:	While conducting a combat daytime air movement at 3,500' MSL and 130 knots in straight and level flight, the bond line between the pitch horn housing and the fiberglass skin of the torque tube section of the UH–60M tail rotor blade (PN 70101–31000–043) de-bonded and caused a severe vibration to manifest throughout the airframe. The resultant vibration propagated to the opposing blade and caused it to vibrate and stress the blade spar of the opposing blade until it failed and separated from the aircraft. The ensuing severe tail rotor imbalance caused an overload of the tail rotor system and the gearbox's vertical pylon attachment points, which resulted in a subsequent separation of the gearbox, complete destruction of the aircraft, and one fatality. The Board determined the bond line failed due to a manufacturing deficiency and was undetected due to inadequate inspection procedures outlined by the manufacturer. The bond line deficiency was due to an inadequate adhesive bond between the pitch horn and the tail rotor torque tube. By design, Army maintenance personnel did not maintain the bond line but did conduct inspections of the bond line. However, the Board determined that the required inspection criterion was insufficient to enable unit maintainers to identify a bond line failure of this nature.

Table 5–4
Elements of a materiel failure contributing, suspected contributing, or contributing to the severity of the injuries and/or damage finding (ground example)

FINDING 1 (Contributing):

Required Information	Example
1. Explanation of when and where the materiel failure/malfunction occurred in context of the mishap sequence of events.	While traveling on an interstate highway at approximately 55 mph…
2. Name and PN or NSN of the part, component, or system that failed.	…the left front tire (NSN 2610–01–214–1344) of an M925A2…
3. Mode of failure (corroded, burst, twisted, decayed, and so on) (see DA Pam 385–40 for definitions and examples). *Note*. 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, which resulted in personal injuries and equipment damage.
5. Identification of reasons (root causes) for the materiel failure/malfunction that contributed to mishap. *Note*. The finding may contain multiple root causes (design, manufacture, and so on).	The cause of the tire failure was inadequate quality control by the manufacturer. The manufacturer's inspection process did not detect a defect (weak spot) in the tire wall.
6. Brief explanation of how each reason (materiel failure root cause) contributed to the materiel failure, if necessary to fully explain the finding.	The inadequate quality control process failed to identify the defective tire before it was distributed and placed into service. During normal operation, the tire failed resulting in the driver's inability to correct for the loss of directional control before striking the guardrail.
Full text:	While traveling on an interstate highway at approximately 55 mph, the left front tire (NSN 2610–01–214–1344) of an M925A2 failed (burst). As a result, the vehicle veered sharply to the left, striking a guardrail, which resulted in personal injuries and equipment damage. The cause of the tire failure was inadequate quality control by the manufacturer. The manufacturer's inspection process did not detect a defect (weak spot) in the tire wall. The inadequate quality control process failed to identify the defective tire before it was distributed and placed into service. During normal operation, the tire failed resulting in the driver's inability to correct for the loss of directional control before striking the guardrail.

Table 5–5
Elements of an environmental factor contributing or contributing to the severity of the injuries and/or damage finding (aviation example)

FINDING 1 (Contributing):

Required Information	Example
1. Explanation of when and where the environmental factor occurred in context of mishap sequence of events.	While air-taxiing to the parking ramp…
2. Identification of aircraft, and if applicable, the individual(s) involved by duty position.	…the AH–64D…
3. Description of environmental factor encountered (see DA Pam 385–40 for definitions and examples). *Note*. Only one factor per finding.	…encountered an unforecasted and sudden microburst that contained winds exceeding 80 knots.

Table 5–5
Elements of an environmental factor contributing or contributing to the severity of the injuries and/or damage finding (aviation example)—Continued

FINDING 1 (Contributing):

Required Information	Example
4. Consequences of environmental effect.	As a result, the aircraft pitched into an uncommanded nose-low attitude and subsequently entered a right spin from which the crew was unable to recover.
5. Explanation/identification of reason(s) environmental conditions contributed to the mishap.	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.
Full text:	While air-taxiing to the parking ramp, the AH–64D encountered an unforecasted and sudden microburst that contained winds exceeding 80 knots. As a result, the aircraft pitched into an uncommanded nose-low attitude and subsequently entered a right spin from which the crew was unable to recover. Microbursts are environmental events that cannot be seen or forecasted with present meteorological measuring equipment or 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.

Table 5–6
Elements of an environmental factor contributing, or contributing to the severity of the injuries and/or damage finding (ground example)

FINDING 1 (Contributing):

Required Information	Example
1. Explanation of when and where the environmental factor occurred in context of mishap sequence of events.	While driving across the outbound transportation loading yard at Camp Doha…
2. Identification of individual involved by duty position and/or equipment involved.	…the driver and TC of a government-owned nontactical pickup truck…
3. Description of environmental factor encountered (see DA Pam 385–40 for definitions and examples). *Note*. Only one factor per finding.	…encountered an unforecasted and sudden microburst that contained winds exceeding 80 knots.
4. Consequences of environmental effect.	The high winds lifted several unsecured sheets of Class IV material and propelled them into the pickup truck. The impact broke the passenger-side window and caused pieces of glass to strike the TC in the right eye, which resulted in a permanent loss of vision in his right eye.
5. Explanation/identification of reason(s) environmental conditions contributed to the mishap.	Microbursts are environmental events that cannot be seen or forecasted with present meteorological measuring equipment nor are they visible to the crew of the vehicle. They are normally a phenomenon associated with thunderstorms; however, there were no thunderstorms reported or visible in the vicinity.

Table 5–6
Elements of an environmental factor contributing, or contributing to the severity of the injuries and/or damage finding (ground example)—Continued

FINDING 1 (Contributing):

Required Information	Example
Full text:	While driving across the outbound transportation loading yard at Camp Doha, the driver and TC of a government-owned nontactical pickup truck encountered an unforecasted and sudden microburst that contained winds exceeding 80 knots. The high winds lifted several unsecured sheets of Class IV material and propelled them into the pickup truck. The impact broke the passenger-side window and caused pieces of glass to strike the TC in the right eye, which resulted in a permanent loss of vision in his right eye. Microbursts are environmental events that cannot be seen or forecasted with present meteorological measuring equipment or are they visible to the crew of the vehicle. They are normally a phenomenon associated with thunderstorms; however, there were no thunderstorms reported or visible in the vicinity.

d. Writing the recommendations. Recommendations are the means through which the SIB answers the question "What to do about it?" in relation to the findings. Each latent failure identified by the SIB will have at least one corresponding recommendation to address the latent failure. By correcting identified latent failures, the SIB will prevent an unsafe act or violation from resulting in another mishap. Recommendations will not focus on punitive steps to address an individual's failure in a particular mishap. In addition, the SIB should not allow existing budgetary, material, or personnel restrictions to skew potential recommendations. The SIB must spend considerable time and energy developing effective and achievable recommendations for each finding. For example, a design improvement on a component that has a history of recurring failure is a more effective solution than solely recommending procedures to accommodate the deficiency. Direct recommendations to the appropriate level of command able to correct the identified failures or residual hazards. If a recommendation applies to multiple adjacent units of the same command, direct the recommendation at the headquarters with command oversite of those applicable units. For example, if the SIB recommends a mitigation factor to address a latent failure condition in one battalion, and that latent failure condition could exist in the other battalions within the same brigade, the SIB will direct a recommendation to the applicable battalion, and brigade commander.

e. Command levels. For the purpose of an investigation's recommendations, levels of command are categorized as unit-level (company/battalion), higher-level (brigade/division/corps), and Army-level (Army command/Army service component command/direct reporting unit). If the SIB does not have a recommendation for one of the three levels of command (unit, higher, or Army-level), the SIB will simply annotate the word "None" following that level of command. In order to ensure other unit personnel and external organizations benefit from the investigation's lessons learned, a best practice is to list the following statement as a recommendation for unit and higher levels of command for the first finding only, "Disseminate the facts and circumstances of this mishap to all assigned personnel." For one of the Army-level actions for the first finding only, include the following recommendation: "Commander, United States Army Combat Readiness Center (USACRC): Disseminate the facts and circumstances of this mishap across the Army as appropriate."

5–4. Development of the narrative

a. The narrative format is different for Aviation and Ground mishaps, but both follow the same general flow. The narrative starts with a factual history of the mishap and then progresses into the analysis. For both the Aviation and Ground Narratives, this publication describes the required outline and then further describes the elements required of each portion of the outline.

b. The SIB will write each element of the narrative in complete paragraphs that fully describe the items outlined in this chapter.

5–5. Ground narrative outline

The ground narrative outline is as follows:

a. History of event.

(1) Pre-mishap phase.

(2) Mishap phase.

(3) Post-mishap phase.

b. Analysis.

(1) Mishap dynamics.

(2) Rescue operations.

(3) Human factors analysis.

(a) Causal.

(b) Other factors worthy of discussion.

c. Environmental analysis.

(1) Causal.

(2) Other factors worthy of discussion.

d. Material analysis.

(1) Causal.

(2) Other factors worthy of discussion.

e. Medical related analysis.

(1) Medical information related to the individuals associated with an unsafe act or violation or injured in the mishap.

(2) Mishap survivability.

f. Witness interviews.

5–6. Expanded ground narrative outline

a. History of event. The history of the event is a factual synopsis of the pre-mishap phase, mishap phase, and post-mishap phase. The History of Event must contain facts only and will not contain analysis or opinions. This is the only section of the narrative potentially releasable under the Freedom of Information Act (FOIA) as it is a fact-based section of the report. Figure 5–2 contains an example of a ground narrative outline.

(1) *Pre-mishap phase.* Describe the type of mission/activity/event, its purpose, and how the organization became tasked with and who authorized the mission. Identify the individual(s) involved in the mishap/injury or occupational illness, to include duty position, unit/organization assigned, and how the command selected and informed them of the mission/activity/event. Describe the actions of the personnel involved in preparing for the mission/activity/event to include planning, application of risk management, orders, and briefings. Describe aircraft/vehicle/equipment/vessel/structure involved, to include type, serial/lot numbers, inspections conducted and the dispatching process. Describe facts that 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.

(2) *Mishap phase.* Indicate when the aircraft/vehicle/personnel departed on the mission/activity/event and continue until the mishap occurred. If the mission/activity/event involved more than one routine segment, requiring multiple activities, functions, or stops before the mishap occurred, concisely summarize these events until addressing the segment involving the mishap. If the segment involving the mishap contained an emergency, give a detailed description of the onset of the emergency to include where and when it occurred, symptoms, warnings, indications, and instrument readings. Also, describe actions/reactions of the personnel between the time of the emergency and the conclusion of mishap. Do not include a discussion of the boards' analysis, conclusions, or specific analysis of the mishap dynamics. Reserve all discussion of causal factors and conclusions for the analysis portion of the narrative.

(3) *Post-mishap phase.* Briefly describe the condition of the aircraft/equipment/vehicle/structure/vessel, to include whether or not the equipment was operating, and the condition of involved personnel immediately after the mishap. Reserve details of damage to various aircraft/equipment/vehicle/structure components for the materiel factors and analysis portion of the narrative.

(a) If a post-mishap fire occurred, explain how, when, and who extinguished the fire.

(b) Describe the mishap site.

(c) Summarize rescue and first aid efforts, to include who notified rescue/medical/police of mishap, response time, type of equipment used in the evacuation, and who administered first aid or cardiopulmonary resuscitation and their medical qualifications.

(d) Briefly summarize egress of the occupants from the vehicle/equipment, time of arrival at the medical facility, medical facility providing treatment, and time of death, if applicable. Reserve details of the egress, rescue, and evacuation for the rescue operations portion of the narrative.

b. Analysis. The analysis paragraph summarizes the opinions and conclusions of the SIB. It is imperative the SIB conclusively demonstrate the cause and effect relationship of the data gathered during the mishap investigation. The analysis will discuss the influence of command activity, or lack thereof, in the context of its role in the mishap or the prevention of mishaps.

(1) *Mishap dynamics.* Mishap dynamics expound on the mishap sequence of events within the history and provides a description of how the mishap occurred based on the SIB's analysis of the factors involved. Maximize the use of diagrams, drawings, and photographs to help the reader understand the information compiled in this section of the analysis. Measurements, equipment damage, photos, diagrams, and data recorders form the basis for the mishap dynamics. Do not repeat the information previously outlined in the history of the event.

(2) *Rescue operations.* Include the following information in the development of the rescue operations paragraph:

(a) Begin with a discussion of the unit's mishap response plan (pre-mishap plan) or details from the sustainment paragraph of the operations order.

(b) Discuss details of egress, survival, and rescue investigations.

(c) Describe the orientation of the mishap vehicle/structure/equipment and describe the location and position of individual(s) in the vehicle/structure/equipment.

(d) Describe initial post-mishap medical response/treatment and detail any initial egress actions and difficulties encountered during egress.

(e) Describe the notification process of rescue personnel to include who made the notification, how they made the notification, how long it took rescue personnel to respond to the initial notification, and arrive at mishap site, and how long it took to evacuate the survivors.

(f) Explain problems associated with delays in rescue recovery/remains recovery.

(g) Describe factors that may have enhanced or inhibited the success of the survival/rescue situation.

(3) *Human factors, material factors, environmental conditions.* This section of the analysis starts with human factors followed by the material factors and environmental conditions paragraphs.

(a) Causal factors. This is a required heading for the human factors, material factors, and environmental conditions paragraph. If there were no causal factors then state none. The following guidance applies to analysis related to causal factors that contributed to the mishap, severity of damage, or severity of injury. This paragraph includes the act/violation code selected by the SIB during the deliberation process followed by the definition of the code found in either the HFACS deliberation tool or this pamphlet in the case of material factors or environmental conditions. The paragraph then captures the rational for the unsafe act or violation or code for material/environmental factor as it relates to cause and effect. In the case of a causal factor related to human error and following the discussion of the unsafe act or violation, the SIB begins the discussion of latent failure. When discussing the human error active and latent failures, include the name of the failure and the associated code in the description. A best practice is to utilize the language from the error code description when describing how that active/latent failure led to the mishap. To assist the reader, insert a footnote after the HFACS code in this section and insert the HFACS code definition in the footnote (see example narrative). Root cause/latent failure coding derives from the DoD HFACS deliberation tool. Causal material and environmental factors do not require a root cause code. The root cause paragraph also includes the specific code(s) and definition(s) from the SIB's deliberation process. The analysis then summarizes the SIB's rational for the root cause/latent failure in the context of cause and effect.

(b) Other factors worthy of discussion. This is a required heading for the human factors, material factors, and environmental conditions paragraph. If there were no other factors worthy of discussion, then state none. This paragraph captures the SIB's analysis of factors identified through the course of the investigation and the deliberative process that may lead to future mishaps. Additionally, the SIB may include other relevant analysis as required. For example, under environmental conditions it must describe weather conditions that prevailed throughout the mission and conditions that existed at the mishap site at the time of the mishap. Include sky condition, visibility, winds, icing, turbulence, and any significant

weather conditions. Consider weather observations made by trained weather observers and/or witnesses in the area. There is no set format for this discussion; however, the SIB must articulate a clear train of thought to the cause and effect of these factors. Additionally, the SIB must identify the appropriate latent failures associated with the factors that may lead to future mishaps.

(4) *Medical related analysis.* The medical related analysis provides the SIB medical officer with an opportunity to capture pertinent medical information related to the personnel identified with a causal or contributing role in the mishap or who were injured in the mishap. In capturing the medical related analysis, consider the following factors:

(a) Medical information related to the individuals associated with an unsafe act or violation or injured in the mishap:

1. Relevant to personnel who caused/contributed to the mishap or were injured in the mishap.
2. Physically qualified to perform assigned duties.
3. Annual physical examination status.
4. Historical physical irregularities (medical waivers, profiles, medical conditions, and so on).
5. Current medications to include prescription, over-the-counter, and supplements.
6. External factors (sleep, diet, drugs, alcohol, and so on).
7. Injury descriptions (also include personnel injured because of the mishap but did not have a causal/contributory role in the mishap).
8. Summarize autopsy report for fatal injuries.
9. Summary of post-mishap medical evaluations (not related to the immediate mishap response).
10. Review of post-mishap blood/urine toxicology results; if no irregularity, state as such.
11. Unit sleep/rest policies.
12. Historical behavioral health irregularities.

(b) Mishap survivability. Consider the following information in the development of the mishap survivability paragraph:

1. Discuss crashworthiness/construction of the vehicle/equipment/structure in terms of crash/collapse sequence, impact conditions, kinematics, and crash impact forces.
2. Indicate if the restraint systems failed or malfunctioned and the adequacy of the vehicle/equipment structure to maintain survivable space and attenuate crash forces.
3. Explain occupant injury relationship to crashworthiness.
4. Explain if injuries occurred during or after the mishap sequence.
5. Include the performance of PPE such as restraints, visor, helmet, roll bar, and clothing. Discuss in terms of usage, nonusage, and performance related to preventing or causing an injury.

(c) Witness interviews. Indicate number of witnesses interviewed formally and informally, identified by duty position. Summarize pertinent witness observations and indicate whether witnesses generally agreed concerning mishap events. If necessary, describe major conflicts in the provided information and resolution of inconsistencies in the information. If a witness creditability was in question, provide background on how the SIB resolved the issue.

CONTROLLED UNCLASSIFIED INFORMATION –CONTAINS PRIVACY ACT INFORMATION

MISHAP NARRATIVE

CASE NUMBER: YYYYMMDD####

This report is Controlled Unclassified Information (CUI), may contain privacy and/or privileged information and is not to be released to any other agency organization, or used for any purpose other than safety, without the written permission of the Commander, U.S. Army Combat Readiness Center.

1. History of the Event.

a. Pre-Mishap Phase. Report type of mission/activity/event, its purpose, how the organization became tasked with it, and who authorized the mission. Identify the individual(s) involved in the mishap/injury or occupational illness, to include duty, unit/organization assigned, and how they were selected for and informed of the mission/activity/event. Describe the action of the personnel involved in preparing for the mission/activity/event to include planning, application of risk management orders, and briefings. Describe vehicle/equipment/vessel/structure involved, to include type, serial/lot numbers, inspections conducted and the dispatching process. Describe facts that may indicate whether or not an undue sense of urgency was associated with the mission/activity/event and if there were any delays prior to the onset of the operation. Add figures or phots that assist in the articulation of the pre-mishap phase events. For example, a diagram of the vehicle/equipment/vessel/structure involved, a task organization, or overhead imagery of the mishap site.

b. Mishap Phase. Indicate when the vehicle/personnel departed on the mission/activity/event and continue until the mishap occurred. If the mission/activity/event involved more than one routine segment, requiring multiple activities, functions or stops before the mishap occurred, concisely summarize these events until addressing the segment involving the mishap. If the segment involving the mishap contained an emergency, give a detailed description of the onset of the emergency to include where and when it occurred, symptoms, warnings, indications, and instrument readings. Also, describe actions/reactions of the personnel between the time of the emergency and the conclusion of the mishap.

Figure 5–2. Sample ground narrative

CONTROLLED UNCLASSIFIED INFORMATION –CONTAINS PRIVACY ACT INFORMATION

NARRATIVE (Cont'd) – YYYYMMDD####

c. Post-Mishap Phase. Briefly describe the condition of the vehicle/equipment/vessel/structure, to include whether or not the equipment was still operating and the condition of involved personnel immediately after the mishap. Reserve details of damage to various vehicle/equipment/vessel/structure components for the materiel factors and analysis portion of the narrative.

(1) If a post-mishap fire occurred, so indicate explaining how and when it was extinguished, if applicable.

(2) Describe the mishap site.

(3) Summarize rescue and first aid efforts, to include who notified rescue/medical/police of mishap, response time, type of equipment used in the evacuation, who administered first aid/cardiopulmonary resuscitation and their medical qualifications.

(4) Briefly summarize egress of occupants from vehicle/equipment/vessel/structure, time of arrival at the medical facility, medical facility providing treatment, and time of death, if applicable. Reserve details of the egress, rescue, and evacuation for the rescue operations portion of the narrative.

2. Analysis. The analysis paragraph summarizes the narrative and discusses the analysis and conclusion of the SIB. It is imperative that the SIB conclusively demonstrate the cause and effect relationship of the evidence gathered during the mishap investigation. The analysis will discuss the influence of command activity, or lack thereof, in the context of its role in the mishap or the prevention of mishaps. Always start the analysis paragraph with the following like statement, "After analyzing the human, materiel, and environmental data collected during the investigation, the Safety Investigation Board concluded that human error caused the mishap. Rationale for this conclusion is as follows:"

a. Mishap Dynamics. Mishap dynamics provides a description of how the mishap occurred based on the SIB's analysis of the factors in the mishap sequence. Maximize the use of diagrams, drawings, and photograph to help the reader understand the information compiled in this section of the

CONTROLLED UNCLASSIFIED INFORMATION –CONTAINS PRIVACY ACT INFORMATION
2

Figure 5–2. Sample ground narrative—continued

analysis. Measurements, equipment damage, photos, diagrams, and data recorders form the basis for the mishap dynamics. Do not repeat the information previously outlined in the history of event.

b. Rescue Operation. The Board produced the following timeline of events surrounding the response to the mishap at the location of the mishap scene, city, state on date.

HHMM – Time of Mishap

HHMM – Time of egress or initial actions

HHMM – Time of EMS/MEDEVAC request

HHMM – Time EMS arrives

HHMM – Time EMS departs

HHMM – Time EMS arrives at hospital and if necessary, time and who pronounced an individual deceased

Describe the following information in the development of the rescue operations paragraph: Begin with a discussion of the pre-mishap planning or details from the sustainment paragraph of the operations order. Discuss details of egress, survival, and rescue investigations. Describe where individuals were located in vehicle/equipment/vessel/structure, how and where they exited, difficulties encountered, and position of vehicle/equipment/vessel/structure at time of egress. Describe factors that may have enhanced or inhibited the success of the survival/rescue situation. Report when and how rescue personnel were notified and how long it took rescue personnel to respond to the initial notification, arrive at mishap site, and evacuate the survivors. Explain problems associated with delays in rescue and describe initial post-mishap mishap response/treatment.

c. Human Factors, Material Factors, Environmental Conditions. This section of the analysis starts with Human Factors followed by the Material Factors and Environmental Conditions paragraphs.

Figure 5–2. Sample ground narrative—continued

CONTROLLED UNCLASSIFIED INFORMATION –CONTAINS PRIVACY ACT INFORMATION

NARRATIVE (Cont'd) – YYYYMMDD####

(1) Causal Factors. This is a required heading for the human factors, material factors, and environmental conditions paragraph. If there were no causal factors, then state none.

(a) The following guidance applies to analysis related to causal factors that contributed to the mishap, severity of damage, or severity of injury. This paragraph references the act of violation (active failure) code using footnotes selected by the SIB during the deliberation process followed by the definition for the code found in either DoD HFACS deliberation tool or DA Pam 385-40 in the case of material factors or environmental conditions. The paragraph then captures the rational for the active failure or code for material factors or environmental conditions as it relates to cause and effect.

(b) In the case of a causal factor related to human error and following the discussion of the active failure, the SIB begins the discussion of root cause/latent failures that contributed to the mishap. Root cause/latent failure coding derives from the DoD HFACS deliberation tool. Causal material factors and environmental conditions do not require a latent failure code. The root cause paragraph also references, in the form of footnotes, the specific code(s) and definition(s) from the SIB's deliberation process. The analysis summarizes the SIB's rational for the root cause/latent failure in the context of cause and effect.

(2) Other Factors Worth of Discussion. This is a required heading for the human factors, material factors, and environmental conditions paragraph. If there were no other factors worthy of discussion, then state none. This paragraph captures the SIB's analysis of factors identified through the course of the investigation and the deliberative process that may lead to future mishaps. Additionally, the SIB may include other relevant analysis as required. There is not set format for this discussion, however, the SIB must articulate a clear train of thought to the cause and effect of these factors. Additionally, the SIB must identify the appropriate latent failures associated with the factors that may lead to future mishaps.

CONTROLLED UNCLASSIFIED INFORMATION –CONTAINS PRIVACY ACT INFORMATION

4

Figure 5–2. Sample ground narrative—continued

CONTROLLED UNCLASSIFIED INFORMATION –CONTAINS PRIVACY ACT INFORMATION

NARRATIVE (Cont'd) – YYYYMMDD####

d. Medical Related Analysis. The medical related analysis provides the SIB medical officer with an opportunity to capture pertinent medical information related to the personnel identified with a causal or contributing role in the mishap. In capturing the medical related analysis, consider the following factors:

(1) Medical Information Related to the Individuals Associated with an Active Failure or Injured in the Mishap.

(a) Relevant to personnel who caused/contributed to the mishap.

(b) Physically qualified to perform assigned duties.

(c) Annual physical examination status.

(d) Historical physical irregularities (waivers, etc.).

(e) Current medications.

(f) Exogenous factors (sleep, diet, drugs, alcohol, etc.).

(g) Injury descriptions (also include for personnel not causal/contributory to the mishap but were injured because of the mishap).

(h) Summarize autopsy report for fatal injuries.

(i) Summary of post-mishap medical evaluations (not related immediate mishap response)

(j) Review of post-mishap blood/urine specimens. If no irregularity, state as such.

(k) Unit sleep/rest policies.

(2) Mishap Survivability. Consider the following information in the development of the mishap survivability paragraph: Discuss crashworthiness/construction of the vehicle/equipment/structure in terms of the crash/collapse sequence, impact conditions, kinematics, and crash impact forces. Indicate if the restraint system failed or malfunctioned and the adequacy of the vehicle/equipment structure to maintain occupiable space and attenuate crash forces. Explain occupant injury relationship to crashworthiness. Explain if injuries occurred during or after the mishap sequence. Include the performance of PPE. For, example, seatbelt, visor, helmet, roll bar, and clothing. Discuss in terms of usage and non-usage.

CONTROLLED UNCLASSIFIED INFORMATION –CONTAINS PRIVACY ACT INFORMATION
5

Figure 5–2. Sample ground narrative—continued

CONTROLLED UNCLASSIFIED INFORMATION –CONTAINS PRIVACY ACT INFORMATION

NARRATIVE (Cont'd) – YYYYMMDD####

e. Witness Interviews. Indicate number of witnesses interviewed formally and informally, identified by duty position. Summarize pertinent witness observations and indicate whether witnesses generally agreed concerning mishap events. In necessary, describe major conflicts in the provided information and resolution of inconsistencies in the information. If a witness creditability was in question, provide background on how the SIB resolved the issue.

Figure 5–2. Sample ground narrative—continued

5–7. Aviation narrative outline

The aviation narrative outline is as follows:

a. History of event.

(1) Pre-mishap phase.

(2) Mishap phase.

(3) Post-mishap phase.

b. Analysis.

(1) Mishap dynamics.

(2) Rescue operations.

(3) Material factors and airworthiness.

(a) Historical records.

(b) Maintenance records.

(c) Adequacy of preflight.

(d) Weight and balance records.

(e) Flight data recorders.

(f) Airframe.

(g) Landing gear.

(h) Warning system.

(i) Power plant.

(j) Rotor system.

(k) Drivetrain.

(l) Hydraulic system.

(m) Flight controls.

(n) Stability augmentation system.

(o) Fuel system.

(p) Electrical system.

(q) Night vision system (NVS).

(r) Armament systems.

(s) Laboratory analysis.

(t) Fire.

(u) Electromagnetic environmental effects.

c. Human factors analysis.

(1) Causal.

(2) Other factors worthy of discussion.

d. Environmental analysis.

(1) Causal.

(2) Other factors worthy of discussion.

e. Material analysis.

(1) Causal.

(2) Other factors worthy of discussion.

f. Medical related analysis.

(1) Medical information related to the individuals associated with an unsafe act or violation or injured in the mishap.

(a) Relevant to personnel who caused/contributed to the mishap.

(b) Physically qualified to perform assigned duties.

(c) Annual physical examination status.

(d) Historical physical irregularities.

(e) Current medications.

(f) External factors.

(g) Injury descriptions.

(h) Summarize autopsy report for fatal injuries.

(i) Summary of post-mishap medical evaluations.

(j) Review of post-mishap blood/urine toxicology results.

(k) Unit sleep/rest policies.

(2) Mishap Survivability.

(a) Crash attenuation.

(b) Restraint systems.

(c) Compromise of survivable space (container, restraint, energy absorption, environment, post-crash factors (CREEP)).

(d) Impact forces relative to survival.

(e) ALSE performance.

(f) Positive/negative factors affecting extrication from the mishap site.

g. Witness interviews.

5–8. Expanded aviation narrative outline

a. History of event. The history of the event is a factual synopsis of the pre-mishap phase, mishap phase, and post-mishap phase. The History of Event must contain facts only and will not contain analysis or opinions. This is the only section of the narrative potentially releasable under FOIA as it is a fact-based section of the report. Figure 5–3 contains an example of an aviation narrative outline.

b. Pre-mishap phase. Describe the mission tasking process, its type, and purpose. Identify the individual who authorized the mission by name and position. Identify the individual(s) involved in the mishap/injury or occupational illness, to include duty position and unit/organization assigned. Describe the personnel selection process; identify who informed them of the mission/activity/event and the notification process. Describe the actions of the personnel involved in preparing for the mission/activity/event to include the planning, application of risk management, issuance of orders, and briefings. Describe the aircraft involved, to include type, tail numbers, inspections conducted, pre-mission planning and the preflight process. Describe facts that 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.

c. Mishap phase. Indicate when the aircraft departed on the mission/activity/event and describe the events leading up to the mishap. If the mission/activity/event involved more than one routine segment, requiring multiple activities, functions, or stops before the mishap occurred, concisely summarize these events until addressing the segment involving the mishap. If the segment involving the mishap included an emergency, give a detailed description of the onset of the emergency to include where and when it occurred, symptoms, warnings, indications, and instrument readings. Also, describe actions/reactions of the personnel between the onset of the emergency and the conclusion of mishap.

d. Post-mishap phase. Briefly describe the condition of the aircraft, to include whether or not the equipment continued to operate and describe the condition of involved personnel immediately after the mishap. Reserve damage details to various aircraft/equipment/vehicle/structure and/or components for the airworthiness or materiel factors analysis portion of the narrative.

(1) If a post-mishap fire occurred, explain how extinguished and when.

(2) Describe the mishap site.

(3) Summarize rescue and first aid efforts, to include who notified rescue/medical/police of mishap, response time, type of equipment used in the evacuation, and who administered first aid/cardiopulmonary resuscitation and their medical qualifications.

(4) Briefly summarize egress of the occupants from the aircraft, time of arrival at the medical facility, medical facility providing treatment, and time of death, if applicable. Reserve details of the egress, rescue, and evacuation for the *Rescue Operations* portion of the narrative.

e. Analysis of aviation mishaps. The analysis paragraph summarizes the opinions and conclusions of the SIB. It is imperative that the SIB conclusively demonstrates the cause and effect relationship of the data gathered during the mishap investigation. The analysis will discuss the influence of command activity, or lack thereof, in the context of its role in the mishap or the prevention of mishaps.

f. Mishap dynamics. Mishap dynamics expounds on the mishap sequence of events in the history and provides a description of how the mishap occurred based on the SIB's conclusions and analysis of the factors involved in the mishap sequence. Maximize the use of diagrams, drawings, and photographs to help the reader understand the information compiled in this section of the analysis. Measurements, equipment damage, photos, diagrams, and data recorders form the basis for the mishap dynamics. Do not repeat the information previously outlined in the history of the event.

(1) Describe the mishap sequence of events from the aspect of the crew actions and aircraft response. Provide a detailed description of what happened to the vehicle/equipment in the actual crash/mishap sequence.

(a) Speed.

(b) Altitude.

(c) Attitude.
(d) Impact forces.
(2) Describe the actions taken/not taken by the personnel involved during the mishap sequence. Describe how specific personnel actions did/did not affect the outcome.
(a) Specific crew actions.
(b) Use of all sources of information.
(c) Personnel interviews.
(d) Physical investigation.
(e) Digital source data.
g. Rescue operations. Consider the following information in the development of the Rescue Operations paragraph:
(1) Begin with a discussion of the unit's mishap response plan (pre-mishap plan) or details from the sustainment paragraph of the operations order.
(2) Discuss details of egress, survival, and rescue operations.
(3) Describe the location of aircrew/passengers in the aircraft, how and where they exited, difficulties encountered, and position of aircraft at time of egress.
(4) Describe factors that may have enhanced or inhibited the success of the survival/rescue/recovery situation.
(5) Describe the notification process of rescue personnel to include who made the notification, how they made the notification, how long it took rescue personnel to respond to the initial notification, arrive at the mishap site, and evacuation of the survivors.
(6) Explain problems associated with delays in rescue.
(7) Describe initial post-mishap medical response/treatment.
h. Materiel factors and airworthiness. Capture the analysis of the material factors. Identify all deficiencies/discrepancies that had a role in the mishap. Discuss any technical publications not complied with or that were inadequate in any manner. For each of the following topics, the SIB must describe the post-mishap condition of each and assess if the post-mishap condition was caused by crash forces or possibly contributed to the onset of the mishap sequence. The SIB must discuss the following:
(1) *Historical records.* Describe maintenance records to include safety of flight messages, aviation safety action messages, aviation maintenance action messages, and airworthiness releases. Additionally, verify that all messages were properly logged on DA Form 2408–15 (Historical Record for Aircraft).
(2) *Maintenance records.* Describe accumulated flight hours prior to take off, mishap flight hours, and if determined to be in an airworthy condition.
(3) *Adequacy of preflight.* Describe when the last preventive maintenance daily was conducted, what operator's checklist was used for the preflight and if any deficiencies were annotated, and if a successful start of the engines and run-up of all systems were completed with any discrepancies noted prior to takeoff.
(4) *Weight and balance records.* Describe the mishap aircraft's gross weight at the time of takeoff, at the time of the mishap, details of DD Form 365–4 (Weight and Balance Clearance Form F–Transport/Tactical), DD Form 365–3 (Weight and Balance Record, Chart C–Basic), and DD Form 365 (Record of Weight and Balance Personnel), and if the aircraft was within center of gravity/if it exceeded maximum gross weight.
(5) *Flight data recorders.* Describe the type, SN, and condition of the recorder. Also, describe the data recovered from the system.
(6) *Airframe.* Describe the condition of the airframe structure and how the SIB concluded it did or did not contribute to the mishap.
(7) *Landing gear.* Describe the condition of the landing gear, whether it was up or down as part of the landing sequence and if it contributed to the mishap.
(8) *Warning system.* Describe what, if any, warnings illuminated or sounded prior to and during the mishap sequence.
(9) *Power plant.* Identify the type of power plant installed, to include the SNs. Describe the condition and performance of the power plant prior to and during the mishap sequence and explain how it did or did not contribute to the mishap.
(10) *Rotor system.* Describe the condition and performance of the rotor systems prior to and during the mishap sequence, and explain how the rotor systems did or did not contribute to the mishap.

(11) *Drivetrain.* Describe the condition, performance, pressures, and temperatures of the drivetrain prior to and during the mishap sequence and explain how it did or did not contribute to the mishap.

(12) *Hydraulic system.* Describe the condition, performance, and pressures of the hydraulic system(s) prior to and during the mishap sequence and explain how it did or did not contribute to the mishap.

(13) *Flight controls.* Describe the condition of the flight control system prior to and during the mishap sequence. Describe any anomalies (binding, sloppiness) in the flight controls and explain how they did or did not contribute to the mishap.

(14) *Stability augmentation system.* Describe the condition of the stability augmentation system and how the SIB concluded it did or did not contribute to the mishap.

(15) *Fuel system.* Describe the condition, performance, and pressures of the fuel system and how the SIB concluded it did or did not contribute to the mishap. Also, describe the fuel onboard the aircraft at the onset and conclusion of the mishap sequence.

(16) *Electrical system.* Describe the condition, voltage, and so on of the electrical system prior to and during the mishap sequence and how the SIB concluded it did or did not contribute to the mishap.

(17) *Night vision system.* Describe the type of NVS used by the crewmembers and describe any anomalies associated with each. Describe how the SIB determined the NVS did or did not contribute to the mishap.

(18) *Armament systems.* Describe the condition and weapons load prior to and during the mishap sequence. List what, if any, weapons the crew jettisoned during the mishap.

(19) *Laboratory analysis.* Describe what, if any, petroleum, oil, and lubricants the SIB sampled and sent to the laboratory for examination. List any significant or anomalous laboratory findings and how the SIB determined they did or did not contribute to the mishap. Also, list what components or equipment the board sent away for teardown or further analysis. Discuss any anomalous results.

(20) *Fire.* Describe the SIB's determination of the origin and type of fire, if any, and the duration, intensity, and how extinguished.

(21) *Electromagnetic environmental effects.* Describe any electromagnetic anomalies the aircraft experienced. Describe how any exposure to high intensity radio frequency transmission areas did or did not contribute to the mishap.

i. Human factors.

(1) *Causal factors.* This is a required heading for the human factors conditions paragraph. If there were no causal factors, then state none. The following guidance applies to analysis related to causal factors that caused/contributed the mishap, severity of damage, or severity of injury. Identify and describe in each paragraph the unsafe act or violation (Act) "what" happened and the system inadequacies (latent failures) "why" the act was committed. Begin each paragraph by identifying and providing the definition of the act/violation. Then, describe how the SIB, through the deliberative process concluded the act was causal to the mishap. Following the discussion of the unsafe act or violation, identify and define each of the latent failures. Describe how in the context of cause and effect the SIB, through the deliberative process, concluded each of the latent failures led the individual to commit the causal act identified in the first part of the paragraph. When discussing the Human Error active and latent failures, include the name of the failure and the associated code in the description. A best practice is to utilize the language from the error code description when describing how that active/latent failure led to the mishap. To assist the reader, insert a footnote after the HFACS code in this section and insert the HFACS code definition in the footnote (see example narrative).

(2) *Other factors worthy of discussion.* This is a required heading for the human factors paragraph. If there were no other factors worthy of discussion, then state none. This paragraph captures factors identified through the deliberative process that were not causal to this mishap but may lead to future mishaps. There is no set format for this discussion; however, the writer must clearly articulate the cause and effect rationale for including these factors in the report. Identify any latent conditions present and describe how, if left uncorrected a precipitating unsafe act or violation could lead to a mishap.

j. Environmental conditions.

(1) *Causal factors.* This is a required heading for the environmental conditions paragraph. If there were no causal factors, then state none. The following guidance applies to analysis related to environmental conditions (meteorological and non-meteorological factors) that caused/contributed to the mishap, severity of damage, or severity of injury. The central questions to ask when determining if an environmental factor is causal are did this factor adversely influence human and/or equipment performance and was the environmental element unknown and unavoidable at the time of the mishap/injury/occupational

illness? This paragraph starts with the act/violation code selected by the SIB through the deliberation process followed by the definition of the code found in this pamphlet in the case of the environmental conditions. Use the key words under table B–4, describing the environmental phenomena present during the mishap when applicable, along with the results. Environmental factors can be present at the time of the mishap however, not determined to be causal. There can be no present and contributing finding against environmental factors if the board concludes the environmental factor was not causal. Divide environmental factors into those that are unavoidable and those one can avoid or take precautions to reduce or eliminate the adverse effects on personnel and/or equipment. Do not assess a known or avoidable environmental deficiency as a causal factor. Additionally, the paragraph must capture the rational for the environmental condition code as it relates to cause and effect.

(2) *Other factors worthy of discussion.* This is a required heading for the environmental conditions paragraph. Whether the weather conditions are determined by the SIB to be contributing or not contributing to the mishap you must describe weather conditions that prevailed throughout the mission and conditions that existed at the mishap site at the time of the mishap. Include sky condition, visibility, winds, icing, turbulence, and any significant weather conditions. Consider weather observations made by trained weather observers and/or witnesses in the area. Knowledge of environmental elements does not eliminate them as factors influencing errors, injuries, or failures. Therefore, this paragraph captures the SIB's analysis of factors identified through the course of the investigation and the deliberative process that may lead to future mishaps. The SIB may include other relevant analysis as required. There is no set format for this discussion; however, the SIB must articulate a clear train of thought to the cause and effect of these factors.

k. Materiel factors.

(1) *Causal factors.* This is a required heading for the material factors paragraph. If there were no causal factors, then state none. The following guidance applies to analysis related to modes of failure that caused/contributed to the mishap, severity of damage, or severity of injury. This paragraph starts with the mode of failure code selected by the SIB through the deliberation process followed by the definition of the code found in Table B–3. The paragraph then captures the rational for the mode of failure code as it relates to cause and effect. The root cause paragraph also includes the specific code(s) and definition(s) from the SIB's deliberation process. The analysis then summarizes the SIB's rational for the system inadequacies failure in the context of cause and effect.

(2) *Other factors worthy of discussion.* This is a required heading for the material factors paragraph. If there were no other factors worthy of discussion, then state none. This paragraph captures the SIB's analysis of factors identified through the course of the investigation and the deliberative process that may lead to future mishaps. Additionally, the SIB may include other relevant analysis as required. There is no set format for this discussion; however, the SIB must articulate a clear train of thought to the cause and effect of these factors. Additionally, the SIB must identify the appropriate modes of failure associated with the factors that may lead to future mishaps.

l. Medical related analysis. The medical related analysis provides the SIB medical officer with an opportunity to capture pertinent medical information related to the personnel identified with a causal or contributing role in the mishap or who were injured in the mishap. In capturing the medical related analysis, consider the following factors:

(1) *Medical information.* Medical information related to the individuals associated with an unsafe act or violation or injured in the mishap.

(a) Relevant to personnel who caused/contribute to the mishap or were injured in the mishap.

(b) Physically qualified to perform assigned duties.

(c) Annual physical examination status.

(d) Historical physical irregularities (waivers, profiles, medical conditions, and so on).

(e) Current medications to include prescription, over-the-counter, and supplements.

(f) External factors (sleep, diet, drugs, alcohol, and so on).

(g) Injury descriptions (also include for personnel injured because of the mishap but did not have a causal/contributory role in the mishap).

(h) Summarize autopsy report for fatal injuries.

(i) Summary of post-mishap medical evaluations (not related to the immediate mishap response).

(j) Review of post-mishap blood/urine toxicology results; if no irregularity, state as such.

(k) Unit sleep/rest policies.

(2) *Mishap survivability.* Consider the following information in the development of the mishap survivability paragraph. Discuss crashworthiness/construction of the aircraft by describing the performance of the

survivability features of the aircraft/installed equipment. How well did the specific equipment features prevent/permit injury?

(a) Crash attenuation (airbags, seat design, and so on).

(b) Restraint systems (seat belts, harnesses, and so on).

(c) Compromise of survivable space (CREEP).

(d) Impact forces relative to survival.

(e) ALSE performance.

(f) Positive/negative factors affecting extrication from the mishap site.

m. Witness interviews. Indicate number of witnesses interviewed formally and informally, identified by duty position. Summarize pertinent witness observations and indicate whether witnesses generally agreed concerning mishap events. If necessary, describe major conflicts in the provided information and resolution of inconsistencies in the information. If a witness's credibility was in question, provide background on how the SIB resolved the issue.

CONTROLLED UNCLASSIFIED INFORMATION –CONTAINS PRIVACY ACT INFORMATION

MISHAP NARRATIVE

CASE NUMBER: YYYYMMDD####

This report is Controlled Unclassified Information (CUI), may contain privacy and/or privileged information and is not to be released to any other agency organization, or used for any purpose other than safety, without the written permission of the Commander, U.S. Army Combat Readiness Center.

1. History of the Event.

a. Pre-Mishap Phase. Report type of mission/activity/event, its purpose, how the organization became tasked with it, and who authorized the mission. Identify the individual(s) involved in the mishap/injury or occupational illness, to include duty, unit/organization assigned, and how they were selected for and informed of the mission/activity/event. Describe the action of the personnel involved in preparing for the mission/activity/event to include planning, application of risk management orders, and briefings. Describe aircraft involved, to include type, serial/lot numbers, inspections conducted and the dispatching process. Describe facts that may indicate whether or not an undue sense of urgency was associated with the mission/activity/event and if there were any delays prior to the onset of the operation. Add figures or photos that assist in the articulation of the pre-mishap phase events. For example, a diagram of the aircraft involved, a task organization, or overhead imagery of the mishap site.

b. Mishap Phase. Indicate when the aircraft/personnel departed on the mission/activity/event and continue until the mishap occurred. If the mission/activity/event involved more than one routine segment, requiring multiple activities, functions or stops before the mishap occurred, concisely summarize these events until addressing the segment involving the mishap. If the segment involving the mishap contained an emergency, give a detailed description of the onset of the emergency to include where and when it occurred, symptoms, warnings, indications, and instrument readings. Also, describe actions/reactions of the personnel between the time of the emergency and the conclusion of the mishap.

c. Post-Mishap Phase. Briefly describe the condition of the aircraft/equipment, to include whether or not the equipment was still operating and the condition of involved personnel immediately

Figure 5–3. Sample aviation narrative

after the mishap. Reserve details of damage to various aircraft/equipment components for the materiel factors and analysis portion of the narrative.

(1) Describe the mishap site.

(2) Summarize rescue and first aid efforts, to include who notified rescue/medical/police of mishap, response time, type of equipment used in the evacuation, who administered first aid/cardiopulmonary resuscitation and their medical qualifications.

(3) Briefly summarize egress of occupants from aircraft, time of arrival at the medical facility, medical facility providing treatment, and time of death, if applicable. Reserve details of the egress, rescue, and evacuation for the rescue operations portion of the narrative.

2. Analysis. The analysis paragraph summarizes the narrative and discusses the analysis and conclusion of the SIB. It is imperative that the SIB conclusively demonstrate the cause and effect relationship of the evidence gathered during the mishap investigation. The analysis will discuss the influence of command activity, or lack thereof, in the context of its role in the mishap or the prevention of mishaps. Always start the analysis paragraph with the following like statement, "After analyzing the human, materiel, and environmental data collected during the investigation, the Safety Investigation Board concluded that human error caused the mishap. Rationale for this conclusion is as follows:"

a. Mishap Dynamics. Mishap dynamics provides a description of how the mishap occurred based on the SIB's analysis of the factors in the mishap sequence. Maximize the use of diagrams, drawings, and photographs to help the reader understand the information compiled in this section of the analysis. Measurements, equipment damage, photos, diagrams, and data recorders form the basis for the mishap dynamics. Do not repeat the information previously outlined in the history of event. Describe the mishap sequence from the aspect of the equipment involved. Provide a detailed description of what happened to the aircraft/equipment in the actual crash/mishap sequence. Include speeds, altitudes, attitudes, impact forces. Additionally, describe the actions taken/not taken by the personnel involved

Figure 5–3. Sample aviation narrative—continued

during the mishap sequence. Discuss the specific personnel actions and how they did/did not affect the mishap. Include specific crew actions, use of all sources of information, personnel interviews, physical investigation, and digital source data.

b. Rescue Operation. The Board produced the following timeline of events surrounding the response to the mishap at the location of the mishap scene, city, state on date.

HHMM – Time of Mishap

HHMM – Time of egress or initial actions

HHMM – Time of EMS/MEDEVAC request

HHMM – Time EMS arrives

HHMM – Time EMS departs

HHMM – Time EMS arrives at hospital and if necessary, time and who pronounced an individual deceased

Describe the following information in the development of the rescue operations paragraph: Begin with a discussion of the pre-mishap planning or details from the sustainment paragraph of the operations order. Discuss details of egress, survival, and rescue investigations. Describe where individuals were located in the aircraft, how and where they exited, difficulties encountered, and position aircraft at time of egress. Describe factors that may have enhanced or inhibited the success of the survival/rescue situation. Report when and how rescue personnel were notified and how long it took rescue personnel to respond to the initial notification, arrive at mishap site, and evacuate the survivors. Explain problems associated with delays in rescue and describe initial post-mishap mishap response/treatment.

c. Material Factors and Airworthiness. Capture the analysis of the material factors. Discuss the airworthiness of the aircraft by describing, but not limiting to, maintenance records, historical records, interviews with maintenance personnel, weight and balance records, adequacy of preflight, etc. Identify

Figure 5–3. Sample aviation narrative—continued

all deficiencies/discrepancies that had a role in the mishap. Discuss any technical publications that were not complied with or were inadequate in any manner. The SIB must discuss the following:

(1) Historical Records

(2) Maintenance Records

(3) Adequacy of preflight

(4) Weight and Balance Records

(5) Flight Data Recorders

(6) Airframe

(7) Warning System

(8) Power Plant

(9) Rotor System

(10) Drivetrain

(11) Hydraulic System

(12) Flight Controls

(13) Stability Augmentation System

(14) Fuel System

(15) Electrical System

(16) Night Vision System

(17) Armament Systems

(18) Laboratory Analysis

(19) Fire

(20) Electromagnetic Environmental Effects

d. Human Factors, Material Factors, Environmental Conditions. This section of the analysis starts with Human Factors followed by the Material Factors and Environmental Conditions paragraphs.

Figure 5–3. Sample aviation narrative—continued

CONTROLLED UNCLASSIFIED INFORMATION –CONTAINS PRIVACY ACT INFORMATION

NARRATIVE (Cont'd) – YYYYMMDD####

(1) Causal Factors. This is a required heading for the human factors, material factors, and environmental conditions paragraph. If there were no causal factors, then state none.

(a) The following guidance applies to analysis related to causal factors that contributed to the mishap, severity of damage, or severity of injury. This paragraph references the act of violation (active failure) code using footnotes selected by the SIB during the deliberation process followed by the definition for the code found in either DoD HFACS deliberation tool or DA Pam 385-40 in the case of material factors or environmental conditions. The paragraph then captures the rational for the active failure or code for material factors or environmental conditions as it relates to cause and effect.

(b) In the case of a causal factor related to human error and following the discussion of the active failure, the SIB begins the discussion of root cause/latent failures that contributed to the mishap. Root cause/latent failure coding derives from the DoD HFACS deliberation tool. Causal material factors and environmental conditions do not require a latent failure code. The root cause paragraph also references, in the form of footnotes, the specific code(s) and definition(s) from the SIB's deliberation process. The analysis summarizes the SIB's rational for the root cause/latent failure in the context of cause and effect.

(2) Other Factors Worthy of Discussion. This is a required heading for the human factors, material factors, and environmental conditions paragraph. If there were no other factors worthy of discussion, then state none. This paragraph captures the SIB's analysis of factors identified through the course of the investigation and the deliberative process that may lead to future mishaps. Additionally, the SIB may include other relevant analysis as required. There is not set format for this discussion, however, the SIB must articulate a clear train of thought to the cause and effect of these factors. Additionally, the SIB must identify the appropriate latent failures associated with the factors that may lead to future mishaps.

CONTROLLED UNCLASSIFIED INFORMATION –CONTAINS PRIVACY ACT INFORMATION
5

Figure 5–3. Sample aviation narrative—continued

e. Medical Related Analysis. The medical related analysis provides the SIB medical officer with an opportunity to capture pertinent medical information related to the personnel identified with a causal or contributing role in the mishap. In capturing the medical related analysis, consider the following factors:

(1) Medical Information Related to the Individuals Associated with an Active Failure or Injured in the Mishap.

(a) Relevant to personnel who caused/contributed to the mishap.

(b) Physically qualified to perform assigned duties.

(c) Annual physical examination status.

(d) Historical physical irregularities (waivers, etc.).

(e) Current medications.

(f) Exogenous factors (sleep, diet, drugs, alcohol, etc.).

(g) Injury descriptions (also include for personnel not causal/contributory to the mishap but were injured because of the mishap).

(h) Summarize autopsy report for fatal injuries.

(i) Summary of post-mishap medical evaluations (not related immediate mishap response.)

(j) Review of post-mishap blood/urine specimens. If no irregularity, state as such.

(k) Unit sleep/rest policies.

(2) Mishap Survivability. Consider the following information in the development of the mishap survivability paragraph: Discuss crashworthiness/construction of the aircraft by describing the performance of the survivability features of the aircraft/installed equipment. How well did the specific equipment features prevent/permit injury?

(a) Crash attenuation.

(b) Restraint systems.

(c) Compromise of survivable space (CREEP).

Figure 5–3. Sample aviation narrative—continued

(d) Impact forces relative to survival.

(e) Aviation Life Support Equipment (ALSE) performance.

(f) Positive/negative factors affecting extrication from the mishap site.

f. Witness Interviews. Indicate number of witnesses interviewed formally and informally, identified by duty position. Summarize pertinent witness observations and indicate whether witnesses generally agreed concerning mishap events. In necessary, describe major conflicts in the provided information and resolution of inconsistencies in the information. If a witness creditability was in question, provide background on how the SIB resolved the issue.

Figure 5–3. Sample aviation narrative—continued

5–9. Minority report

The SIB board president will make every effort to resolve differences in opinion. However, if differences cannot be resolved, the dissenting SIB member(s) may submit a minority report. In this report, it is not necessary to repeat data presented in the mishap report. As a minimum, the minority report will include an analysis paragraph explaining the disagreement and a signature block of the minority member(s). Attach the minority report to the narrative of the mishap.

Appendix A

References

Section I

Required Publications

Unless otherwise indicated, DA publications are available on the Army Publishing Directorate website at https://armypubs.army.mil/. DoD issuances are available at https://www.esd.whs.mil/dd/.

AR 15–6
Procedures for Administrative Investigations and Boards of Officers (Cited in para 2–7*c*.)

AR 25–30
Army Publishing Program (Cited in title page.)

AR 27–20
Claims (Cited in para 2–7*c*.)

AR 40–3
Medical, Dental, and Veterinary Care (Cited in para 2–4*c*(1).)

AR 40–21
Medical Aspects of Army Aircraft Accident Investigation (Cited in para 2–4*c*(1).)

AR 95–1
Flight Regulations (Cited in para G–1*a*(16)(*c*).)

AR 95–2
Air Traffic Control, Airfield/Heliport, and Airspace Operations (Cited in para G–1*a*(16)(*c*).)

AR 385–10
The Army Safety and Occupational Health Program (Cited on title page.)

DA Pam 25–403
Army Guide to Recordkeeping (Cited in para 1–4.)

DA Pam 738–751
Functional User's Manual for the Army Maintenance Management System–Aviation (Cited in para 3–7*p*(3)(*f*).)

DoDI 5000.88
Engineering of Defense Systems (Cited in para 2–4*f*(3).)

DoDI 6055.07
Mishap Notification, Investigation, Reporting, and Record Keeping (Cited in para 2–4*a*(13).)

TC 3–04.11
Commander's Aviation Training and Standardization Program (Cited in table 5–1.)

29 CFR 1904
Recording and Reporting Occupational Injuries and Illnesses (Cited in para H–1.)

29 CFR 1910.95
Occupational noise exposure (Cited in para H–2*c*(10)(*a*).)

29 CFR 1960
Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters (Cited in para H–1.)

Section II

Prescribed Forms

Unless otherwise indicated, DA Forms are available on the Army Publishing Directorate website at https://armypubs.army.mil.

DA Form 285–W
Technical Report of U.S. Army Ground Mishap Summary of Witness Interview (Prescribed in para 3–3*h*(1).)

Appendix B

Explanations, Examples, and Keywords

B–1. Introduction

These explanations and examples are provided so all users will have the same understanding of what the factors mean. Where appropriate, the table provides a list of key words for each factor. The service components constantly review human factors codes occasionally instituting changes, therefore it is recommended to download and utilize the Human Factors Analysis and Classification System Handbook on the USACRC Safety webpage (https://safety.army.mil) for the most updated tables.

B–2. Explanation of tables

This appendix, organized as follows for easy use. :

a. Table B–1. The DoD HFACS defines unsafe acts as "(t)hose factors that are most closely tied to the mishap, and can be described as active failures or actions committed by the operator that result in human error or unsafe situation." Once the last unsafe act is identified as either an error or violation, the next step is to determine the most appropriate code or codes that best support the unsafe act.

Note. The individual act must be either an error or a violation; it cannot be both. If the act is an error, you may only select codes from Q1 or Q2. If the act is a violation, you may only select one of the three codes from Q3.

b. Table B–2. These describe the latent failures that allowed the unsafe act or violation (unsafe act) to occur.

c. Table B–3. Use these definitions to assist in determining what materiel failure/malfunction occurred that caused/contributed to the mishap.

d. Table B–4. Use these codes and associated definitions to assist in determining what environmental conditions caused/contributed to the mishap.

B–3. Explanation of figures

Figure B–1 contains the human error flow chart, provided to assist the SIB in determining the type of latent failures (individual, leader, training, standards, and support) associated with the unsafe act or violation for a Human Factors Contributing finding.

a. For a mishap in which a human is determined to be the causal factor, the SIB must select an act or violation from table B–1 to describe the unsafe act or violation. The SIB will then use figure B–1 to select the appropriate latent failures with the corresponding portion(s) in table B–2 by answering a series of yes and no questions. Unlike an act or violation, where there can only be one code, several latent failures can be determined to have allowed the unsafe act or violation to occur. These latent failures may occur in multiple types of latent failures. The SIB must follow the human error flow chart (see fig B–1) correctly to identify the corresponding latent failures. As the SIB determines the type of failure from the human error flow chart, they will determine the best code from the associated portion of table B–2.

b. For Present but Not Contributing Human Factors findings, proceed straight to table B–2 without selecting an act or violation from table B–1, since no unsafe act or violation has occurred.

Table B–1
Acts and violations (active failures or "what" happened)

Q1: Did the mishap person(s) make a performance-based error?
Performance-based errors are factors that occur when an individual performs a specific action in a manner that leads to a mishap. (In other words, if errors occur in the operator's execution of a routine, highly practiced task relating to a procedure, training, or proficiency and results in an unsafe situation.)
If yes, see AE100 and go to Q2; If no, go to Q2
Performance-Based Errors (AE100)
Code: AE101

Table B–1
Acts and violations (active failures or "what" happened)—Continued

Keyword/explanation:	**Unintended Operation of Equipment:** is a factor when an individual's movements inadvertently activate or deactivate equipment, controls, or switches when there is no intent to operate the control or device. This action may be noticed or unnoticed by the individual.
Code: AE102	
Keyword/explanation:	**Checklist Not Followed Correctly:** is a factor when the individual, through an act of commission or omission, either makes a checklist error or fails to run an appropriate checklist.
Code: AE103	
Keyword/explanation:	**Procedure Not Followed Correctly:** is a factor when a procedure is performed incorrectly, accomplished in the wrong sequence, or using the wrong technique.
Code: AE104	
Keyword/explanation:	**Over controlled/Under controlled Aircraft/Vehicle:** is a factor when an individual responds inappropriately to conditions by either over- or under-controlling the aircraft/vehicle/system. The error may be a result of preconditions or a temporary failure of coordination.
Code: AE105	
Keyword/explanation:	**Breakdown in Visual Scan:** is a factor when the individual fails to execute learned/practiced visual scan patterns in an effective manner.
Code: AE107	
Keyword/explanation:	**Rushed or Delayed a Necessary Action:** is a factor when an individual takes the necessary action as dictated by the situation, but performs these actions too quickly or too slowly.

Q2: Was a mishap person(s) action a result of poor judgment and or decision-making?

(When an individual proceeds as intended, yet the plan proves inadequate or inappropriate for the situation)

If yes, see AE200 and go to Q3; If no, go to Q3

Judgment and Decision-Making Errors (AE200)

Code: AE201	
Keyword/explanation:	**Inadequate Real-Time Risk Assessment:** is a factor when an individual fails to adequately evaluate the risks associated with a particular course of action and this faulty evaluation leads to inappropriate decision making and subsequent unsafe situations.
Code: AE202	
Keyword/explanation:	**Failure to Prioritize Tasks Adequately:** is a factor when the individual does not organize, based on accepted prioritization techniques, the tasks needed to manage the immediate situation.
Code: AE205	
Keyword/explanation:	**Ignored a Caution/Warning:** is a factor when a caution or warning is perceived and understood by the individual but is ignored by the individual.
Code: AE206	
Keyword/explanation:	**Wrong Choice of Action During an Operation:** is a factor when the individual, through faulty logic or erroneous expectations, selects the wrong course of action.

Q3. Did a mishap person(s) violate a commonly known law or regulation?

Violations are factors in a mishap when the actions of the operator represent willful disregard for rules and instructions and lead to an unsafe situation. Unlike errors, violations are deliberate. (for example, knowingly violated policy, regulations, or orders)

If yes, see AV000. (Select only one that best fits the identified violation)

Table B–1
Acts and violations (active failures or "what" happened)—Continued

Violations (AV000)	
Code: AV001	
Keyword/explanation:	**Performs Work-Around Violation:** is a factor when the consequences/risk of violating published procedures was recognized, consciously assessed, and honestly determined by the individual, crew, or team to be the best course of action. Routine "work-arounds" and unofficial procedures that are accepted by the community as necessary for operations are also captured under this code.
Code: AV002	
Keyword/explanation:	**Commits Widespread/Routine Violation:** is a factor when a procedure or policy violation is systemic in a unit/setting and not based on a risk assessment for a specific situation. It needlessly commits the individual, team, or crew to an unsafe course of action. These violations may have leadership sanction and may not routinely result in disciplinary/administrative action. Habitual violations of a single individual or small group of individuals within a unit can constitute a routine/widespread violation if the violation was not routinely disciplined or was condoned by supervisors. *Note*. This indicates a culture where a normalization of deviance is accepted.
Code: AV003	
Keyword/explanation:	**Extreme Violation:** Lack of discipline (also known as indiscipline) is a factor when an individual, crew, or team intentionally violates procedures or policies without cause or need. These violations are unusual or isolated to specific individuals rather than larger groups. There is no evidence of these violations being condoned by leadership. These violations may also be referred to as "exceptional violations."

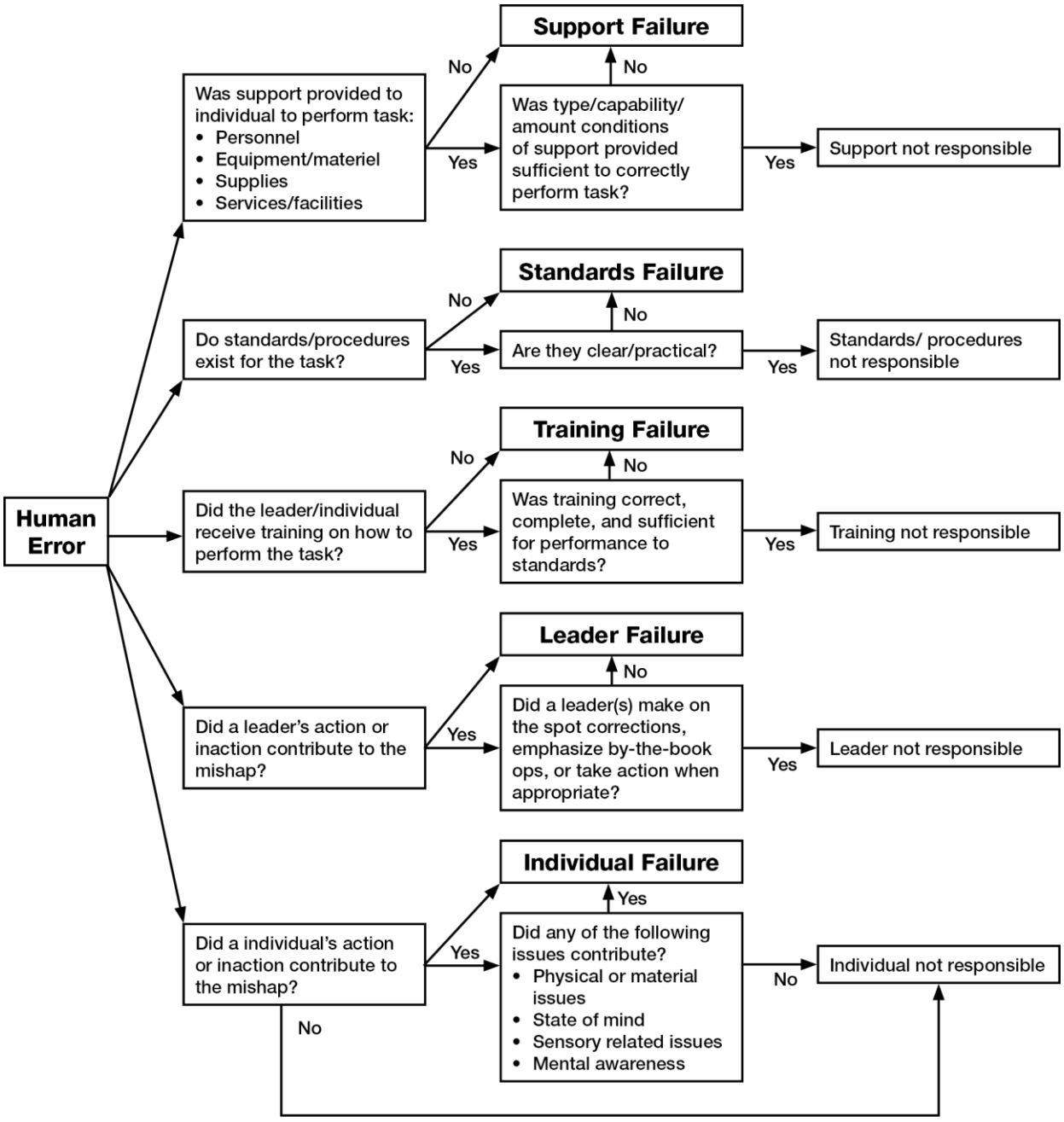


Figure B–1. Human error flow chart

Table B–2
Support, standards, training, leader, individual failure(s) ("why" the error/failure occurred)

Support latent failures occur when the type, amount, capabilities, or condition of the support is insufficient to correctly perform the mission. Support includes personnel, equipment, materiel, supplies, services, or facilities.

S1. Did a problem with resources create an unsafe situation?

Resource Problems (OR) is a factor in a mishap if resource management processes or policies, directly or indirectly, influence system safety and results in inadequate management or creates an unsafe situation. This category refers to the management, allocation, and maintenance of organizational resources, monetary, and equipment/facilities. "Funding issues" refer to the management of nonhuman resources, primarily monetary resources. For example, excessive cost cutting and lack of funding for proper equipment have adverse effects on operator performance and safety. Finally, "equipment" refers to issues related to equipment design, including the purchasing of unsuitable equipment, inadequate design of workspaces, and failures to correct known design flaws. Management should ensure that human-factors engineering principles are known and utilized and that existing specifications for equipment and workspace design are identified and met.

Personnel Selection and Staffing (OS) are factors if personnel management processes or policies, directly or indirectly, influence system safety and results in inadequate error management or creates an unsafe situation. Issues that directly influence safety include selection (for example, background checks), training, and staffing/manning. For each factor where lack of resources created an unsafe situation, assess the following codes for possible applicability.

Determine best code and continue to S2.

Code: OR001	
Keyword/explanation:	**Command and Control Resources are Deficient:** is a factor when installation resources are inadequate for safe operations. Examples include command and control, airfield services, battlegroup management, and so on.
Code: OR003	
Keyword/explanation:	**Inadequate Infrastructure:** is a factor when support facilities (dining, exercise, quarters, medical care, and so on) or opportunity for recreation or rest are not available or adequate. This includes situations where leave is not taken for reasons other than the individual's choice. This may also be apply to installation road maintenance, traffic signs, inadequate facilities or services when the maintenance, facility space, and/or support provided results in unsafe acts or failures/malfunctions that lead to mishaps.
Code: OR005	
Keyword/explanation:	**Failure to Remove Inadequate/Worn-Out Equipment in a Timely Manner:** is a factor when the process through which equipment is removed from service is inadequate.
Code: OR008	
Keyword/explanation:	**Failure to Provide Adequate Operational Information Resources:** is a factor when weather, intelligence, operational planning material, or other information necessary for safe operations planning are not available.
Code: OR009	
Keyword/explanation:	**Failure to Provide Adequate Funding:** is a factor when an organization or operation does not receive the financial resources to complete its assigned task/mission.
Code: OP007	
Keyword/explanation:	**Purchasing or Providing Poorly Designed or Unsuitable Equipment:** is a factor when the processes through which aircraft, vehicle, equipment, or logistical support are acquired allows inadequacies or when design deficiencies allow inadequacies in the acquisition.
Code: OS001	

Table B–2
Support, standards, training, leader, individual failure(s) ("why" the error/failure occurred)—Continued

Keyword/explanation:	**Personnel recruiting and selection policies are inadequate:** is a factor when the process through which individuals are screened, brought into the service, or placed into specialties is inadequate.
Code: OS002	
Keyword/explanation:	**Failure to provide adequate manning/staffing resources:** is a factor when the process through which manning, staffing or personnel placement, or manning resource allocations are inadequate for task/mission demands.

S2. Did the technological environment affect the mishap person(s)?

Technological Environment are factors in a mishap when cockpit, vehicle, control station, or workspace design factors or automation affect the actions of individuals and result in human error or an unsafe situation. For each support failure where technological environment affected the mishap person(s), assess the following codes for possible applicability.

Code: PE201	
Keyword/explanation:	**Seat and Restraint System Problems:** is a factor when the design of the seat or restraint system, the ejection system, or seat comfort has poor impact-protection qualities.
Code: PE202	
Keyword/explanation:	**Instrumentation and Warning System Issues:** is a factor when instrument factors such as design, reliability, lighting, location, symbology, size, display systems, auditory or tactile situational awareness, or warning systems create an unsafe situation.
Code: PE203	
Keyword/explanation:	**Visibility Restrictions (not weather related):** is a factor when the lighting system, windshield/windscreen/canopy design, or other obstructions prevent necessary visibility. This includes glare or reflections on the windshield/windscreen/canopy. Visibility restrictions due to weather or environmental conditions are captured under PE101.
Code: PE204	
Keyword/explanation:	**Controls and Switches are Inadequate:** is a factor when the location, shape, size, design, reliability, lighting, or other aspect of a control or switch are inadequate.
Code: PE205	
Keyword/explanation:	**Automated System Creates an unsafe Situation:** is a factor when the design, function, reliability, symbology, logic, or other aspect of automated systems creates an unsafe situation.
Code: PE206	
Keyword/explanation:	**Workspace Incompatible with Operation:** is a factor when the workspace is incompatible with the task requirements and safety for an individual. This includes inadequate/improperly designed equipment and materiel or lack of equipment/materiel when the design or lack of equipment leads to mishap causing unsafe acts or materiel failures/malfunctions.
Code: PE207	
Keyword/explanation:	**Personal Equipment Interference:** is a factor when the individual's personal equipment interferes with normal duties or safety.
Code: PE208	
Keyword/explanation:	**Communication Equipment Inadequate:** is a factor when communication equipment is inadequate or unavailable to support task demands. This includes electronically or physically blocked transmissions. Communications can be voice, data, or multi-sensory.

Standards latent failures occur when standards do not exist or they are unclear, impractical, or inadequate.

Table B–2
Support, standards, training, leader, individual failure(s) ("why" the error/failure occurred)—Continued

Did an organizational written standard or written policy at any level create an unsafe situation?

Organizational Policy and Process Issues are factors if organizational processes negatively influence performance and result in an unsafe situation or human error. This includes operational risk management practices, procedures, and oversights that negatively influence individual, supervisory, and/or team performance and results in unrecognized hazards and/or uncontrolled risk. This category refers to the formal process by which things get done in the organization. It is subdivided into three broad categories: operations, procedures, and oversight. The term "operations" refers to the characteristics or conditions of work that have been established by leaders. These characteristics include operational tempo, time pressures, production quotas, incentive systems, and schedules. When set up inappropriately, these working conditions can be detrimental to safety. "Procedures" are the official or formal procedures as to how the job is to be done. Examples include performance standards, objectives, documentation, and instructions about procedures. All of these, if inadequate, can negatively impact supervision, performance, and safety.

Determine best code and finish with standards system inadequacies.

Code: OP002	
Keyword/explanation:	**Organizational Program/Policy Risks not Adequately Assessed:** is a factor when the potential risks of a large program, operation, acquisition, or process are not adequately assessed and this inadequacy leads to an unsafe situation (typically at Army or higher level).
Code: OP003	
Keyword/explanation:	**Provided Inadequate Procedural Guidance or Publications**: is a factor when written direction, checklists, graphic depictions, tables, charts, or other published guidance is inadequate, misleading, or inappropriate.
Code: OP005	
Keyword/explanation:	**Flawed Doctrine/Philosophy:** is a factor when the doctrine, philosophy, or concept of operations in an organization is flawed or accepts unnecessary risk that leads to an unsafe situation or unmitigated hazard.
Code: OP006	
Keyword/explanation:	**Inadequate Program Management:** is a factor when programs are implemented without sufficient support, oversight, or planning (typically at Army level or higher).
Code: SI004	
Keyword/explanation:	**Failed to Provide Appropriate Policy/Guidance:** is a factor when policy/guidance or lack of a policy/guidance leads to an unsafe situation (generally, most appropriate at the unit level).

Training latent failures occur when training is incorrect, incomplete, and/or insufficient for performance to standard.

Was the training correct, complete, and sufficient for performance to standards?

Determine best code and finish with training system inadequacies.

Code: OP004	
Keyword/explanation:	**Organizational (formal) Training is Inadequate or Unavailable:** is a factor when one-time or initial training programs, upgrade programs, transition programs, or other training that is conducted outside the local unit is inadequate or unavailable. This includes Inadequate school training. School training becomes a root cause when personnel commit unsafe acts because the quality of school training was inadequate in content or amount. *Note*. The failure of an individual to absorb the training material in an effective/adequate training program does not indicate a training program problem.
Code: PC105	
Keyword/explanation:	**Negative Habit Transfer:** is a factor when the individual reverts to a highly learned behavior used in a previous system or situation and that response is inappropriate for current task demands.
Code: PC109	

Table B–2
Support, standards, training, leader, individual failure(s) ("why" the error/failure occurred)—Continued

Keyword/explanation:	**Technical of Procedural Knowledge Not Retained after Training:** is a factor when the individual fails to absorb/retain required information or is unable to recall experience needed for safe task completion.
Code: SI003	
Keyword/explanation:	**Failed to Provide Proper Training:** is a factor when one-time or recurrent training programs, upgrade programs, transition programs or any other local training is inadequate or unavailable, and so on. This includes inadequate unit/on-the-job training when personnel commit unsafe acts because the quality of training provided was inadequate in content or amount. *Note*. The failure of an individual to absorb the training material in an effective/adequate training program does not indicate a training program problem.
Leader latent failures occur when a leader(s) action or inaction contribute to the mishap.	
L1. Were the actions of the leader inadequate? **Inadequate Supervision** are factors when section, department, platoon, or unit-level supervision proves inappropriate or improper and/or fails to identify hazards; recognize and control risk; provide guidance, training, and/or oversight; and results in human error or an unsafe situation. Determine the best code and continue to L2.	
Code: SI001	
Keyword/explanation:	**Supervisory/Command Oversight Inadequate:** is a factor when the availability, competency, quality, or timeliness of leadership, supervision, or oversight does not meet task demands. Inappropriate supervisory pressures are also captured under this code.
Code: SI002	
Keyword/explanation:	**Improper Role-Modeling:** is a factor when the individual's learning is influenced by the behavior of supervisors and when that learning manifests itself in actions that are either inappropriate to the individual's skill level or violate standard procedures.
Code: SI005	
Keyword/explanation:	**Personality Conflict with Supervisor:** is a factor when a supervisor and individual member experience a personality conflict that leads to a dangerous error in judgment/action.
Code: SI006	
Keyword/explanation:	**Lack of Supervisory Responses to Critical Information:** is a factor when information critical to a potential safety issue was provided but supervisory personnel failed to act upon it (failure to close the loop).
Code: SI007	
Keyword/explanation:	**Failed to Identify/Correct Risky or unsafe Practices:** is a factor when a supervisor fails to identify or correct risky behaviors or unsafe tendencies and/or fails to institute remedial actions. This includes hazardous practices, conditions, or guidance.
Code: SI008	
Keyword/explanation:	**Selected Individual with Lack of Proficiency:** is a factor when a supervisor selects an individual that is not proficient in a task, mission, or event.
Code: SP001	
Keyword/explanation:	**Directed Task Beyond Personnel Capabilities:** is a factor when supervisor/management directs personnel to undertake a task beyond their skill level or beyond the capabilities of their equipment.
Code: SP003	

Table B–2
Support, standards, training, leader, individual failure(s) ("why" the error/failure occurred)—Continued

Keyword/explanation:	**Selected Individual with Lack of Current or Limited Experience:** is a factor when the supervisor selects an individual whose experience is not sufficiently current or proficient to permit safe task execution.
Code: OP001	
Keyword/explanation:	**Pace of Operations Tempo/Workload:** is a factor when the pace of deployments, workload, additional duties, off-duty education, professional military education, or other workload-inducing conditions of an individual or unit creates an unsafe situation.

L2. Did a leader willingly violate a commonly known law or regulation?

Supervisory Violations is a factor in a mishap when supervision willfully disregards instructions, guidance, rules, or operating instructions and this lack of supervisory responsibility creates an unsafe situation.

Determine best code and continue to L3.

Code: SV001	
Keyword/explanation:	**Failure to Enforce Existing Rules (supervisory act of omission):** is a factor when unit (organizational) and operating rules have not been enforced by a supervisor.
Code: SV002	
Keyword/explanation:	**Allowing Unwritten Policies to Become Standard:** is a factor when unwritten or "unofficial" policy is perceived and followed by the individual, although it has not been formally recognized by the organization.
Code: SV003	
Keyword/explanation:	**Directed Individual to Violate Existing Regulations:** is a factor when a supervisor directs a subordinate to violate existing regulations, instructions, or technical guidance.
Code: SV004	
Keyword/explanation:	**Authorized Unqualified Individuals for Task:** is a factor when an individual has not met the general training requirements for the job/weapon system and is considered noncurrent, but supervision/leadership inappropriately allows the individual to perform the task for which the individual is non-current.

L3. Did leader fail to plan or implement the risk management process?

Planned Inappropriate Operations is a factor in a mishap when supervision fails to assess the hazards associated with an operation resulting in unnecessary risk. It is also a factor when supervision allows nonproficient or inexperienced personnel to attempt missions beyond their capability or when crew or flight makeup is inappropriate for the task mission.

Determine the best code and continue to L4.

Code: SP006	
Keyword/explanation:	**Performed Inadequate Risk Assessment–Deliberate:** is a factor when supervision does not adequately evaluate the risks associated with a task or when pre-mission risk assessment tools/programs are inadequate.
Code: SP007	
Keyword/explanation:	**Authorized Unnecessary Hazard:** is a factor when supervision authorizes an activity or task that is unnecessarily hazardous without sufficient cause or need.

Table B–2
Support, standards, training, leader, individual failure(s) ("why" the error/failure occurred)—Continued

L4. Did the safety climate/culture contribute to an unsafe situation?

Organizational Climate/Culture are factors where the working atmosphere within the organizational influences individual actions resulting in human error. "Climate" refers to a broad class of organizational variables that influence worker performance. It can be defined as the situational consistencies in the organization's treatment of individuals. In general, organizational climate is the prevailing atmosphere or environment within the organization. "Culture" refers to the unspoken or unofficial rules, values, attitudes, beliefs, and customs of an organization (in other words, "The way things really get done around here."). Other issues related to culture include organizational justice, psychological contracts, organizational citizenship behavior, esprit de corps, and union/management relations. All these issues affect attitudes about safety and the value of a safe working environment.

Determine best code and continue to L5.

Code: OC001	
Keyword/explanation:	**Organizational Culture (attitude/actions) Allows for unsafe Task/Mission:** a factor when explicit/implicit actions, statements, or attitudes of unit leadership set unit/organizational values (culture) that allow an environment where unsafe task/mission demands or pressures exist.
Code: OC003	
Keyword/explanation:	**Organizational Overconfidence or Underconfidence in Equipment:** is a factor when there is organizational over or underconfidence in an aircraft, vehicle, device, system, or any other equipment.
Code: OC004	
Keyword/explanation:	**Unit Mission/Aircraft/Vehicle/Equipment Change or Unit Deactivation:** is a factor when the process of changing missions, aircraft/vehicle/equipment, or an impending unit deactivation creates an unsafe situation.
Code: OC005	
Keyword/explanation:	**Organizational Structure is Unclear or Inadequate:** is a factor when the chain of command of an individual or structure of an organization is confusing, nonstandard, or inadequate and this creates an unsafe situation.

L5. Did challenges with teamwork contribute to the mishap?

Teamwork refers to interactions among individuals, crews, and teams involved with the preparation and execution of a mission that resulted in human error or an unsafe situation.

Determine best code and finish with leader failures.

Code: PP101	
Keyword/explanation:	**Failure of Crew/Team Leadership:** is a factor when the crew/team leadership techniques failed to facilitate a proper crew/team climate, to include establishing and maintaining an accurate and shared understanding of the evolving task and plan on the part of all crew/team members.
Code: PP103	
Keyword/explanation:	**Inadequate Task Delegation:** is a factor when the crew/team members failed to actively manage the distribution of tasks to prevent the overloading of any individual member.
Code: PP104	
Keyword/explanation:	**Rank/Position Intimidation:** is a factor when the differences in rank of the team/crew caused the task performance capabilities to be degraded. Also, conditions where formal or informal authority gradient is too steep or too flat across a crew/team and this condition degrades collective or individual performance.
Code: PP105	
Keyword/explanation:	**Lack of Assertiveness:** is a factor when an individual failed to state critical information or solutions with appropriate persistence and/or confidence.

Table B–2
Support, standards, training, leader, individual failure(s) ("why" the error/failure occurred)—Continued

Code: PP106	
Keyword/explanation:	**Critical Information not Communicated:** is a factor when known critical information was not provided to appropriate individuals in an accurate or timely manner.
Code: PP107	
Keyword/explanation:	**Standard/Proper Terminology not Used:** is a factor when clear and concise terms, phrases, hand signals, and so on per service standards and training were not used.
Code: PP108	
Keyword/explanation:	**Failed to Effectively Communicate:** is a factor when communication is not understood or is misinterpreted as the result of behavior of either sender or receiver. Communication failed to include backing up, supportive feedback, or acknowledgment to ensure that personnel correctly understood announcements or directives.
Code: PP109	
Keyword/explanation:	**Task/Mission Planning/Briefing Inadequate:** is a factor when an individual, crew, or team failed to complete all preparatory tasks associated with planning/briefing the task/mission.
Code: SP002	
Keyword/explanation:	**Inappropriate Team Composition:** is a factor when the makeup of the crew/team should have reasonably raised safety concerns in the minds of members involved in the task, or in any other individual directly related to the scheduling of this task.
Individual latent failures occur when the individual(s) action or inaction contribute to the mishap.	
I1. Did the mishap person(s) have a medical or physical condition that caused or contributed to the mishap? **Physical Problems** are factors when an individual experiences a physiologic event that compromises human performance and this decreases performance and results in an unsafe situation. Determine best code and continue to I2.	
Code: PC302	
Keyword/explanation:	**Substance Effects (alcohol, supplements, medications, drugs):** is a factor when the individual uses legal or illegal drugs, supplements, energy drinks, or any other substance with measurable effect that interferes with performance.
Code: PC304	
Keyword/explanation:	**Loss of Consciousness (sudden or prolonged onset):** is a factor when the individual has a loss of functional capacity/consciousness due to G-force induced loss of consciousness (G–LOC), seizure, trauma, or any other cause.
Code: PC305	
Keyword/explanation:	**Physical Illness/Injury:** is a factor when a physical illness, injury, deficit, or diminished physical capability causes an unsafe situation. This includes pre-existing and operationally-related medical conditions, overexertion, motion sickness, and so on.
Code: PC307	
Keyword/explanation:	**Fatigue:** is a factor causing diminished physical/mental capability resulting from chronic or acute periods of prolonged wakefulness, sleep deprivation, jet lag, shift work, or poor sleep habits. *Note.* Be sure to clearly identify the source of fatigue (physical vs. mental) and state it in your report.
Code: PC310	

Table B–2
Support, standards, training, leader, individual failure(s) ("why" the error/failure occurred)—Continued

Keyword/explanation:	**Trapped Gas Disorders:** is a factor when gasses in the middle ear, sinuses, teeth, or intestinal tract expand or contracts. Also, capture alternobaric (dizziness from unequal pressures) vertigo for diving or aviation under this code.
Code: PC311	
Keyword/explanation:	**Evolved Gas Disorders:** is a factor when inert-gas evolves in the blood causing an unsafe situation. This includes chokes, central nervous system, bends, paresthesia, or other conditions caused by inert-gas evolution.
Code: PC312	
Keyword/explanation:	**Hypoxia/Hyperventilation:** is a factor when the individual has insufficient oxygen supply to the body and/or breathing above physiological demands causes impaired function.
Code: PC314	
Keyword/explanation:	**Inadequate Adaptation to Darkness:** is a factor when the normal human limitation of dark-adaptation rate affects safety, for example, when transitioning between aided and unaided night vision.
Code: PC315	
Keyword/explanation:	**Dehydration:** is a factor when the performance of the individual is degraded due to dehydration because of excessive fluid losses due to heat stress or insufficient fluid intake.
Code: PC317	
Keyword/explanation:	**Body Size/Movement Limitations:** is a factor when the size, strength, dexterity, mobility, or other biomechanical limitations of an individual creates an unsafe situation. It must be expected that the average individual qualified for that duty position could accomplish the task in question.
Code: PC318	
Keyword/explanation:	**Physical Strength and Coordination (inappropriate for task demands):** is a factor when the relative physical strength and/or coordination of the individual is not adequate to support task demands.
Code: PC319	
Keyword/explanation:	**Nutrition/Diet:** is a factor when the individual's nutritional state or poor dietary practices are inadequate to fuel the brain and body functions resulting in degraded performance.
I2. Did the mishap person(s) state of mind create an unsafe situation? **State of Mind** are factors when an individual's personality traits, psychosocial problems, psychological disorders, or inappropriate motivation creates an unsafe situation. Determine best code and continue to I3.	
Code: PC202	
Keyword/explanation:	**Psychological Problem:** is a factor when the individual met medical criteria for a psychiatric disorder.
Code: PC203	
Keyword/explanation:	**Life Stressors:** is a factor when the individual's performance is affected by life circumstance problems (includes relationship issues, financial stressors, recent move, and so on).
Code: PC204	
Keyword/explanation:	**Emotional State:** is a factor when the individual is under the influence of a strong positive or negative emotion and that emotion interferes with duties.

Table B–2
Support, standards, training, leader, individual failure(s) ("why" the error/failure occurred)—Continued

Code: PC205	
Keyword/explanation:	**Personality Style:** is a factor when the individual's personal interaction with others creates an unsafe situation. Examples are authoritarian, over-conservative, impulsive, invulnerable, submissive, or other personality.
Code: PC206	
Keyword/explanation:	**Overconfidence:** is a factor when the individual overvalues or overestimates personal capability, the capability of others, or the capability of aircraft/vehicles or equipment.
Code: PC207	
Keyword/explanation:	**Pressing:** is a factor when the individual knowingly commits to a course of action that excessively presses the individual and/or their equipment beyond reasonable limits (for example, pushing self or equipment too hard).
Code: PC208	
Keyword/explanation:	**Complacency:** is a factor when the individual has a false sense of security, is unaware of, or ignores hazards and is inattentive to risks.
Code: PC209	
Keyword/explanation:	**Motivation:** motivation is a factor when the individual's motivation to accomplish a task/mission is excessive, weak, indecisive, or when personal goals supersede the organization's goals.
Code: PC215	
Keyword/explanation:	**Mentally Exhausted (Burnout):** is a factor when the individual has the type of exhaustion associated with the wearing effects of high operational and/or lifestyle tempo in which operational requirements impinge on the ability to satisfy personal requirements and leads to degraded effectiveness.
I3. Was sensory information misperceived or misunderstood?	
Sensory Misperception are factors resulting in degraded sensory inputs (visual, auditory, or vestibular) that create a misperception of an object, threat, or situation. Determine best code and continue to I4.	
Code: PC501	
Keyword/explanation:	**Motion Illusion–Kinesthetic:** is a factor when physical sensations of the ligaments, muscles, or joints cause the individual to have an erroneous perception of orientation, motion, or acceleration. (If this illusion leads to spatial disorientation, you must code PC508.)
Code: PC502	
Keyword/explanation:	**Turning/Balance Illusion–Vestibular:** is a factor when stimuli acting on the balance organs in the middle ear cause the individual to have an erroneous perception of orientation, motion, or acceleration. (If this illusion leads to spatial disorientation, you must code PC508.)
Code: PC503	
Keyword/explanation:	**Visual Illusion:** is a factor when visual stimuli result in an erroneous perception of orientation, motion, or acceleration. (If this illusion leads to spatial disorientation, you must code PC508.)
Code: PC504	
Keyword/explanation:	**Misperception of Changing Environment:** is a factor when an individual misperceives or misjudges altitude, separation, speed, closure rate, road/sea conditions, or aircraft/vehicle location within the performance envelope or other operational conditions.

Table B–2
Support, standards, training, leader, individual failure(s) ("why" the error/failure occurred)—Continued

Code: PC505	
Keyword/explanation:	**Misinterpreted/Misread Instrument:** is a factor when the individual is presented with a correct instrument reading but its significance is not recognized, is misread, or is misinterpreted.
Code: PC507	
Keyword/explanation:	**Misinterpretation of Auditory/Sound Cues:** is a factor when the auditory inputs are correctly interpreted but are misleading/disorienting or when the inputs are incorrectly interpreted and cause an impairment of normal performance.
Code: PC508	
Keyword/explanation:	**Spatial Disorientation:** is a factor when an individual fails to correctly sense a position, motion, or attitude of the aircraft/vehicle/vessel or of oneself. Spatial disorientation may be unrecognized and/or result in partial or total incapacitation.
Code: PC511	
Keyword/explanation:	**Temporal/Time Distortion:** is a factor when the individual experiences a compression or expansion of time relative to reality. This is often associated with a "fight or flight" response.

I4. Did the mishap person(s) mental awareness create an unsafe situation?

Mental Awareness (Cognitive Factors) are factors in a mishap if cognitive or attention management conditions affect the perception or performance of individuals.

Determine best code and continue to I5.

Code: PC101	
Keyword/explanation:	**Not Paying Attention**: is a factor when there is a lack of state of alertness or a readiness to process immediately available information. The individual has a state of reduced conscious attention due to a sense of security, self-confidence, boredom, or a perceived absence of threat from the environment. This may often be a result of highly repetitive tasks.
Code: PC102	
Keyword/explanation:	**Fixation**: is a factor when the individual is focusing all conscious attention on a limited number of environmental cues to the exclusion of others.
Code: PC103	
Keyword/explanation:	**Task Over-Saturation/Under-Saturation**: is a factor when the quantity of information an individual must process exceeds their mental resources in the time available to process the information.
Code: PC104	
Keyword/explanation:	**Confusion**: is a factor when the individual is unable to maintain a cohesive and orderly awareness of events and required actions and experiences a state characterized by bewilderment, lack of clear thinking, or (sometimes) perceptual disorientation.
Code: PC106	
Keyword/explanation:	**Distraction**: is a factor when the individual has an interruption of attention and/or inappropriate redirection of attention by an environmental cue or mental process.
Code: PC107	
Keyword/explanation:	**Geographically Lost**: is a factor when the individual is at a different location from where one believes they are.
Code: PC108	

Table B–2
Support, standards, training, leader, individual failure(s) ("why" the error/failure occurred)—Continued

Keyword/explanation:	**Interference/Interruption**: is a factor when an individual is performing a highly automated/learned task and is distracted by another cue/event that results in the interruption and subsequent failure to complete the original task or results in skipping steps in the original task.
Code: PC110	
Keyword/explanation:	**Inaccurate Expectation**: is a factor when the individual expects to perceive a certain reality and those expectations are strong enough to create a false perception of the expectation.

I5. Did the physical environment affect the practices, conditions, and actions of individual or individuals in a manner that contributed to the mishap?

Physical Environment are physical factors in a mishap to which the individual members are exposed such as weather, climate, fog, brownout (dust or sandstorm) or whiteout (snowstorm) that affect the actions of the individuals.

Determine best code and finish with individual failures.

Code: PE101	
Keyword/explanation:	**Environmental Conditions Affecting Vision**: is a factor that includes obscured windows; weather, fog, haze, or darkness; smoke; and so on; brownout/whiteout (dust, snow, water, ash, or other particulates); or when exposure to windblast affects the individual's ability to perform required duties.
Code: PE103	
Keyword/explanation:	**Vibration Affects Vision or Balance**: is a factor when the intensity or duration of the vibration is sufficient to cause impairment of vision or adversely affect balance.
Code: PE106	
Keyword/explanation:	**Heat/Cold Stress Impairs Performance**: is a factor when the individual is exposed to conditions resulting in compromised performance.
Code: PE108	
Keyword/explanation:	**External Force or Object Impeded an Individual's Movement**: is a factor when acceleration forces greater than one second cause injury or prevent/interfere with the performance of normal duties. Do not use this code to capture G–LOC.
Code: PE109	
Keyword/explanation:	**Lights of Other Vehicle/Vessel/Aircraft Affected Vision**: is a factor when the absence, pattern, intensity, or location of the lighting of other vehicle/vessel/aircraft prevents or interferes with safe task accomplishment.
Code: PE110	
Keyword/explanation:	**Noise Interference**: is a factor when any sound not directly related to information needed for task accomplishment interferes with the individual's ability to perform that task.

Table B–3
Materiel failures/malfunctions

Code: M01	
Keyword/explanation:	Overheated/burned/melted. Key words: blister, boil, carbonize, char, flame, fuse, or glaze. Excessive heat caused materiel or equipment to fail or malfunction.
Code: M02	

Table B–3
Materiel failures/malfunctions—Continued

Keyword/explanation:	Froze (temperature). Key words: congeal or solidify. Excessive cold caused materiel/equipment to fail/malfunction.
Code: M03	
Keyword/explanation:	Obstructed/pinched/clogged. Key words: block, crimp, or restrict. Function of materiel or equipment was hindered or completely cut off by an obstacle.
Code: M04	
Keyword/explanation:	Vibrated. Key words: oscillate or shake. Side-to-side or forward-and-backward movement of materiel or equipment caused it to fail or malfunction.
Code: M05	
Keyword/explanation:	Rubbed/worn/frayed. Key words: abrade, chafe, fret, groove, score, or scrape. Friction-producing movement applied to materiel or equipment to such an extent that it failed or malfunctioned.
Code: M06	
Keyword/explanation:	Corroded/rusted/pitted. Key words: erode or oxidize. Gradual wearing away (usually by chemical action) of materiel or equipment to such an extent that it failed or malfunctioned.
Code: M07	
Keyword/explanation:	Over pressured/burst. Key words: balloon, bulge, explode, rupture, or swell. Steady or abrupt force applied over the surface of materiel or equipment to such an extent that it failed or malfunctioned.
Code: M08	
Keyword/explanation:	Pulled/stretched. Key word: elongate. Steady or abrupt force applied to materiel/equipment caused it to move toward the force, in whole, or in part, to such an extent that it failed or malfunctioned.
Code: M09	
Keyword/explanation:	Twisted/torqued. Key word: turn. Steady or abrupt application of twisted forces caused materiel or equipment to fail or malfunction.
Code: M10	
Keyword/explanation:	Compressed/hit/punctured. Key words: chip, collapse, crush, dent, nick, pinch, press. Steady or abrupt application of force that presses/impacts materiel or equipment causing it to fail or malfunction.
Code: M11	
Keyword/explanation:	Bent/warped. Key words: bow or buckle. Changing materiel or equipment from an original straight, level, or even condition through the application of force to such an extent that it failed or malfunctioned.
Code: M12	
Keyword/explanation:	Sheared/cut. Key words: chop or sever. Failure or malfunction caused by steady or abrupt force applied to materiel, resulting in a break with the two parts sliding parallel to each other in different directions.
Code: M13	
Keyword/explanation:	Decayed/decomposed. Key words: mildew, rot, or spoil. Chemical or biological action resulted in a gradual decline in materiel or equipment strength to such an extent that if failed or malfunctioned.
Code: M14	
Keyword/explanation:	Electric current action. Key words: short, arc, fusing, grounding, amperage, voltage, surge. Action of electric current caused materiel or equipment to fail or malfunction.

Table B–3
Materiel failures/malfunctions—Continued

Code: M15	
Keyword/explanation:	No defect but does not meet the mission requirements.
Code: M16	
Keyword/explanation:	Debond. An unbonded or nonadhered region or interface between two plies of a composite material. A separation at the fiber-matrix interface.
Code: M17	
Keyword/explanation:	Deformation. The change in shape of a specimen caused by the application of a load or force.
Code: M18	
Keyword/explanation:	Delamination. The separation of the layers of material in a laminate. This may be local or may cover a large area of the laminate. It may occur at any time in the cure or subsequent life of the laminate and may arise from a wide variety of causes.
Code: M19	
Keyword/explanation:	Disbond. An area within a bonded interface between two adherents in which an adhesion failure or separation has occurred. It may occur at any time during the life of the structure and may arise from a wide variety of causes.
Code: M20	
Keyword/explanation:	Unbond. An area within a bonded interface between two adherents in which the intended bonding action failed to take place.
Code: M97	
Keyword/explanation:	Insufficient information to determine type of failure.
Material Failure/Malfunction Root Cause is a material root cause is a tangible or intangible element that did not operate to design specifications and caused or allowed a materiel failure or malfunction**.**	
Code: 23	
Keyword/explanation:	**Design.** Equipment design becomes an issue when equipment failure occurs because of inadequate design specifications. A design issue may be the result of inadequate material composition, equipment size, shape, location, or operational characteristics opposite to common practice operation. Mishap investigators often overlook design influence on human performance resulting in mishaps. Evaluate all possible design issues in order to implement corrective measures.
Code: 24	
Keyword/explanation:	**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 materiel, improper assembly, or other anomalies occurring during the manufacturing process.
Code: 25	
Keyword/explanation:	**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.
Code: 26	

Table B–3
Materiel failures/malfunctions—Continued

Keyword/explanation:	**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 mishap, write a materiel failure finding with maintenance as the system inadequacy. 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.
Code: 97	
Keyword/explanation:	Insufficient information to determine root cause for individual failure, environmental condition, or materiel failure/malfunction.

Table B–4
Environmental conditions

Environmental conditions are those environmental conditions, which are either unknown or unavoidable	
Code: E01	
Keyword/explanation:	Illumination. Key words: bright, dark, dim, glare, or light. Too much or too little light that was a negative influence on vision.
Code: E02	
Keyword/explanation:	Precipitation. Key words: condensation, fog, frost, hail, ice, mist, rain, sleet, or snow. Climatic precipitation that has a negative influence on human or machine performance.
Code: E03	
Keyword/explanation:	Contaminants. Key words: carbon dioxide, carbon monoxide, chemicals, dust, foreign/debris, fumes, gases, impurities, mists, smog, smoke, toxic materials, or vapors. Natural or manmade elements that render material or the environment unsatisfactory for human or machine use and have a negative influence on performance.
Code: E04	
Keyword/explanation:	Noise. Key words: bang, din, explosion, shout, or static. Unwanted sound that produces hearing loss, disturbs/distracts attention from task at hand, or interferes with communication.
Code: E05	
Keyword/explanation:	Temperature/humidity. Key words: blow, blast, gust, hurricane, storm, tornado, or turbulence. Natural or manmade air movement that has a negative influence on human or machine performance.
Code: E06	
Keyword/explanation:	Wind/turbulence. Key words: blow, blast, gust, hurricane, storm, tornado, or turbulence. Natural or manmade air movement that has a negative influence on human or machine performance.
Code: E07	
Keyword/explanation:	Vibration. Key words: bounce, buck, bump, jar, jolt, jump, oscillate, roll, shake, vibrate, shimmy, or sway. Repeated/periodic motions that have a negative influence on human or machine performance.
Code: E08	
Keyword/explanation:	Acceleration/deceleration. Forces experienced by personnel/materiel due to rate of change of velocity.
Code: E09	
Keyword/explanation:	Radiation. Key words: alpha radiation, beta radiation, gamma radiation, ionizing, laser, maser, neutron radiation, non-ionizing, radio waves, sunlight, ultraviolet, x-ray or x-radiation. Radiant energy emitted in waves or particles that have a negative influence on human or machine performance.

Table B–4
Environmental conditions—Continued

Code: E10	
Keyword/explanation:	Work surface/space. Keywords: holes, inclines, rocky, rough, rutted, slippery, steep, or uneven wave action. Conditions (excluding precipitation) of natural or manmade work surfaces on which personnel and machines operate that have a negative influence on performance.
Code: E11	
Keyword/explanation:	Air pressure. Key words: altitude, bends, blast, boom, chokes, decompression, explosion, or hypoxia. Sudden or gradual changes in air pressure that have a negative influence on human or machine performance.

Appendix C

Medical

C–1. Autopsies

a. The SIB medical officer verifies if AFMES or a civilian medical examiner conducted the autopsy. For assistance with verifying the medical examiner contact AFMES (see app D for contact information).

b. The medical officer should provide enough information regarding the mishap to correlate the injury patterns with the crash dynamics and structure of the aircraft, vehicle, or other equipment that resulted in the fatality. The medical examiner should consider the following:

(1) Become thoroughly familiar with the type of equipment, seating arrangements, escape mechanism, scene of the crash, and objects personnel may have struck during the mishap.

(2) Become thoroughly familiar with all available information relative to the fatal mishap, the nature of the mishap, facts about weather, health of the deceased personnel involved, and their condition before and during the mishap.

(3) Carefully examine the helmet, clothing, and other protective clothing and equipment. Tissue particles attached to these objects may be identified by cytological examination and should be examined under ultraviolet light.

(4) Meticulously examine the exterior of the body and viscera with necessary close-up photographs and x-ray pictures of the skeleton, giving special attention to a detailed examination of all abrasions, lacerations, deep wounds, and fractures.

c. The SIB medical officer should coordinate with the AFMES or civilian medical examiner to observe the autopsy. The SIB will normally be complete with their investigation before the final autopsy report is available and the SIB medical officer should contact the AFMES or civilian medical examiner to request the preliminary findings. The SIB medical officer will also request the final autopsy report.

(1) For a military autopsy, request the final autopsy report from AFMES. Information can be found at https://health.mil/military-health-topics/health-readiness/afmes. Submit required information with a copy of the SIB orders by one of the methods recommended by AFMES.

(2) For an autopsy completed by a civilian medical examiner, the SIB medical officer will need to contact the medical examiner's officer to determine how to request a copy of the final autopsy report.

d. The SIB medical officer will incorporate the autopsy findings into the medical related analysis paragraph of the narrative.

C–2. Toxicology

a. Biochemical testing is required for all crewmembers and personnel involved in all aviation class A, B, or C mishaps; on-duty ground Class A or B mishaps; or when deemed appropriate by the commander or physician. The specimens for biochemical testing must be obtained as soon as possible after a mishap.

b. Nonfatal aviation mishaps require biochemical testing for alcohol, drugs, and carbon monoxide. Nonfatal ground mishaps require biochemical testing for alcohol and drugs. If required, carbon monoxide testing must be requested for ground mishaps. See paragraph 2–2*c* for further details on how to request and submit biochemical specimens to AFMES. See the Guidelines for the Collection and Shipment of Toxicology Specimens at https://health.mil/military-health-topics/health-readiness/afmes and for further assistance contact AFMES (see app D for contact information).

c. For fatal mishaps, biochemical testing will be completed with the autopsy and the medical examiner will collect the appropriate body fluids. AFMES will conduct the correct tests. Civilian medical examiners normally only test for drugs and alcohol; the SIB medical officer should request the civilian medical examiner complete carbon monoxide testing for all aviation mishap fatalities and for ground mishap fatalities if needed.

d. The SIB medical officer will incorporate the toxicology results into the medical related analysis paragraph of the narrative.

Appendix D

Notification Phone Numbers

D–1. Notification phone number list

a. U.S. Army Materiel Command (AMC) Operations Center, (703) 806–9200, DSN 656–9200; AMC Safety Office, DSN 656–8695, commercial (703) 806–8695, facsimile (FAX) (703) 806–8863.

b. Commander, AMC, DSN 284–9475, commercial (703) 274–9475 (during nonduty hours, call duty officer DSN 284–9223, commercial (703) 274–9223 or FAX DSN 284–9469, commercial (703) 274–5481).

c. AFMES, DSN 366–8648, commercial (302)346–8648. On-call duty phone (202) 409–6811, https://health.mil/military-health-topics/health-readiness/afmes.

d. Army Operations Center, DSN 227–0218, commercial (703) 697–0218.

e. Diving Safety Office (ATSP–OCT–S), Fort Eustis, VA 23604–5407, DSN 927–1329, commercial (804) 878–1329.

f. U.S. Department of Transportation, Pipeline and Hazardous Materials Safety, 1200 New Jersey Avenue, SE, East Building, 2nd Floor (PH), Washington, DC 20590, commercial (202) 366–4433, FAX (202) 366–3666, toll free 1–800–424–8802.

Note. The 800 number is to the National Response Center.

D–2. The Office of Hazardous Materials Enforcement regional offices

a. Eastern Region, 820 Bear Tavern Road, Suite 306, West Trenton, NJ 08628, commercial (609) 989–2256, FAX (609) 989–2277.

b. Central Region, 2300 East Devon Avenue, Suite 478, Des Plaines, IL 60018–4696, commercial (847) 294–8580, FAX (847) 294–8590.

c. Southern Region, U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Hazardous Materials Safety, 233 Peachtree Street NE, Suite 602, Atlanta, GA 30303, commercial (404) 832–1140, FAX (404) 832–1168.

d. Southwest Region, U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Hazardous Materials Safety, 8701 S. Gessner Road, Suite 1110, Houston, TX 77074, commercial (713) 272–2820, FAX (713) 272–2821.

e. Western Region, 3401 Centrelake Drive, Suite 550B, Ontario, CA 91761, commercial (909) 937–3279, FAX (909) 390–5142.

f. National Response Center federal hotline for all oil or chemical spills (800) 424–8802, commercial (202) 267–2675.

g. Transportation Branch Marine Safety Office (ATZF–CSS), Fort Eustis, VA 23604–5113, DSN 826–1327, commercial (757) 878–1327.

h. U.S. Army Technical Center for Explosives Safety (USATCES) (request for technical support), DSN 956–8919, commercial (918) 420–8919 or FAX (918) 420–8503, DSN 956–8503.

i. USATCES, DSN 956–8919, commercial (918) 420–8919.

j. U.S. Army Field Support Command, Safety/Rad Waste Directorate, DSN 793–2989/2971/2113 or commercial (309) 782–2989/2971/2113.

k. U.S. Naval Safety Center, Norfolk, VA, DSN 564–6389/6427, commercial (804) 444–6389/6427.

D–3. U.S. Nuclear Regulatory Commission

a. Region I, U.S. Nuclear Regulatory Commission, 475 Allendale Road, King of Prussia, PA 19406–1415, commercial (610) 337–5000, toll free 1–800–432–1156.

b. Region II, U.S. Nuclear Regulatory Commission, Sam Nunn Atlanta Federal Center, 61 Forsyth Street, SW, Suite 23T85, Atlanta, GA 30303–8931, commercial (404) 562–4400, toll free 1–800–577–8510.

c. Region III, U.S. Nuclear Regulatory Commission, 2443 Warrenville Road Suite 210, Lisle, IL 60532–4352, commercial (603) 829–9500, toll free 1–800–522–3025.

d. Region IV, U.S. Nuclear Regulatory Commission, Texas Health Resources Tower, 611 Ryan Plaza Drive, Suite 400, Arlington, TX 76011–4005, commercial (817) 860–8100, toll free 1–800–952–9677.

e. Also contact the Office of the Director of Army Safety (DACS–SF), DSN 227–1321/1128, commercial (703) 697–1321/1128 and (SGPS–PSP) DSN 289–0132, commercial (703) 756–0132 (during nonduty hours, contact Army Operations Center, DSN 227–0218, commercial (703) 697–0218, and indicate the offices to be notified).

Appendix E

Mishap Reports

E–1. Introduction

ASMIS replaced the previous mishap reporting system that required several DA forms to capture critical information for the different classes of mishaps. The one form that is still required for both Aviation and Ground mishap investigations is DA Form 285–W. It is a requirement to upload a DA Form 285–W into ASMIS 2.0 as an attachment for each formal interview conducted. This chapter provides instruction for completing the Summary of Witness Interview report.

E–2. DA Form 285–W, technical report of U.S. Army mishap, summary of witness interview

a. Instruction. Complete DA Form 285–W (see fig E–1) for all on-duty Class A and B mishaps and Aviation Class C mishaps. As a minimum, summaries of the interviews with the primary personnel involved/injured will be included. The board must interview, if available, any individual identified in a finding having a causal or contributing role. Use the form to summarize interviews and statements of commanders, supervisors, maintenance personnel, and others who are able to contribute pertinent information concerning the mishap. If additional space is required, use letter-size paper for continuation sheets. The form is available at the Army Publishing Directorate website: https://armypubs.army.mil.

b. Procedural guidelines. The procedural guidelines instructions are as follows:

(1) Interview all witnesses using the techniques described in paragraph 3–3. The investigator will emphasize to the witness the sole purpose of the mishap investigation is for mishap prevention. Further, inform the witness that the U.S. Army seeks to isolate the cause(s) of the mishap so it may take appropriate action to avoid similar mishaps from occurring in the future. If the witness is a civilian, the investigator will avoid using Army terms and acronyms.

(2) The board president or recorder will brief all witnesses concerning the interview. This will be done by reading to the witness the information on page 2 of the DA Form 285–W, contained in block 15, General Witness Information Briefing. (See fig E–2).

(a) The purpose is to ensure the witness understands the intent of the interview, who will or can have access to the information, DoD restrictions on the use of the interview, and if the statement is releasable pursuant to a FOIA request.

(b) If the board president does not offer or grant the witness a promise of confidentiality, the interviewer will read the section, “No promise of confidentiality offered.” As a rule, for aviation and ground mishap investigations, the promise of confidentiality cannot be granted unless they meet the criteria outlined in AR 385–10.

(c) If a promise of confidentiality is to be offered:

1. The interviewer will read the section, “Promise of confidentiality offered.”
2. The witness will complete block 15, “Availability of Promise of Confidentiality for Limited Use Report of Investigation.”
3. The witness will initial the appropriate paragraph indicating his/her choice, requesting or declining confidentiality.

Note. The witness will not sign witness interview summaries.

4. The interviewer will complete block 12 of the DA Form 285–W and only sign and date the form in block 13, if “Yes” is checked.

(d) If the witness is willing to be interviewed or make a statement, it will be summarized in “third person” in block 12 of the DA Form 285–W. The complete verbatim account of all that was stated should not be included. Summarize the interview ensuring to include any information that assists in explaining the circumstances of the mishap.

TECHNICAL REPORT OF U.S. ARMY GROUND MISHAP
SUMMARY OF WITNESS INTERVIEW
For use of this form, see DA Pamphlet 385-40; the proponent agency is DAS.

REQUIREMENTS CONTROL SYMBOL
CSOCS-308

PRIVACY ACT STATEMENT

AUTHORITY: 10 U.S.C. 7013, Secretary of the Army, 5 USC 7902, Safety Programs, and AR 385-10, The Army Safety and Occupational Health Program.

PRINCIPAL PURPOSE(S): The mishap investigator has in determining the sequence of events and mishap causal factors. The form is used to interview witnesses, which is an integral part of the investigation process, if there are witnesses present. For additional information, see the System of Records Notice A0385-1040 ASO, https://www.federalregister.gov/documents/2020/02/27/2020-03949/privacy-act-of-1974-system-of-records.

ROUTINE USES: There is no specific routine uses anticipated for this form; however, it may be subject to a number of proper and necessary routine uses identified in the system of records notice(s) specified in the purpose statement above.

DISCLOSURE: Voluntary. However, the use of witness information is a critical part of the overall investigation process. Failure to provide the information will interfere with the mishap investigation. This will interfere with the understanding of the mishap and possible lessons learned to prevent the mishap from reoccurring.

1. NAME OF WITNESS *(LAST, FIRST, MI)*	2. OCCUPATION/TITLE	3. GRADE	4. DATE OF BIRTH
Boyd, Don, D.	Driver	E-6	19780101

5. ADDRESS *(Include ZIP Code) (If military, include organization)*	6. TELEPHONE NUMBER *(Duty/Work)*
C Co, 2-215th Aviation Fort Rucker, AL 36330	DSN 558/1236
	7. DATE OF INTERVIEW *(YYYYMMDD)* 20090101

8. EXPERIENCE AND BACKGROUND	9. LOCATION AT TIME OF ACCIDENT	10. INTERVIEWER *(Name and Grade)*
TIS 5 years	Behind accident vehicle	DAC Schwartz

11. Promise of confidentiality. A promise of confidentiality can only be offered in Limited Use Investigations, which normally are not ground accidents. For exception, see AR 385-10, paragraph 3-10.

a. Was a promise of confidentiality offered to the witness? ☒ **Yes** ☐ **No** *(If yes, read blk 14a. to the witness and complete blk 15. If no, read blk 14b. to the witness.)*

b. Confidentiality was requested by the witness. ☒ **Yes** ☐ **No** *(If yes, interviewer sign and date statement below.)*

THE WITNESS MADE THIS STATEMENT UNDER A PROMISE OF CONFIDENTIALITY.

DIGITAL SIGNATURE 123456789	20090101
SIGNATURE OF INTERVIEWER	**DATE** *(YYYYMMDD)*

12. SUMMARY OF INTERVIEW

SSG Boyd was the low jumper in the stack and the #1 jumper for final. SSG Boyd stated that on the crosswind (base) he signaled with his leg for a left turn final. After 50 feet, he heard shouting and turned to see a jumper behind him tell another jumper to turn away. SSG Boyd stated that the jumper to his left turned right into the jumper behind him. SSG Boyd said that the two jumpers collided and became entangled. After they entangled, the two jumpers began to spin in a downward plane and impacted the ground.

End of Summary.

13. DATE OF ACCIDENT *(YYYYMMDD)* 20090101

DA FORM 285-W, JUL 2023 PREVIOUS EDITIONS ARE OBSOLETE. PAGE 1 OF 2
APD AEM v1.00ES

Figure E–1. Sample DA Form 285–W

14. GENERAL WITNESS INFORMATION BRIEFING ***(Interviewer must read appropriate instructions to the witness)***

a. Promise of confidentiality offered.

(1) This accident investigation board has been convened under the provisions of Army Regulation 385-10 for the purpose of conducting a safety investigation.

(2) This may be just one of a number of investigations being conducted regarding this accident; collateral or legal investigations may be ongoing as well. Those investigations are entirely separate from a safety investigation and are also required to inform you of their purpose and of your legal rights.

(3) This safety investigation is being conducted for accident prevention purposes only. Within the military, pursuant to AR 385-10, it cannot be used for any other purpose, to include any future disciplinary actions against any individuals. Therefore, the interview you are being asked to provide will be used by the Army in the interest of safety and accident prevention only.

(3) Nonconfidential witness interviews may be released to the public pursuant to a Freedom of Information Act request. If you wish to protect your interview from public release outside the military, then your interview must be pursuant to a promise of confidentiality. Confidentiality means that your interview will not be released to the public or outside DoD safety channels.

(5) Whether your interview is confidential or not, the chain of command will review the final accident report, which may include a summary of your interview, but the chain of command may only use the investigation report and the interviews for safety and accident prevention purposes.

(6) If you ever have knowledge that your witness interview was used by the Army for anything other than accident prevention purposes (for example, disciplinary action against an individual), you should consult with your local Judge Advocate Defense Counsel Office and request that the Command Judge Advocate, U.S. Army Combat Readiness Center, be notified at DSN 558-2924 or commercial (334) 255-2924.

(7) The promise of confidentiality is available to you if you desire it. Do you desire it?

b. No promise of confidentiality offered.

(1) This accident investigation board has been convened under the provisions of AR 385-10 for the purpose of conducting a safety investigation.

(2) This may be just one of a number of investigations being conducted regarding this accident; collateral or legal investigations may be ongoing as well. Those investigations are entirely separate from a safety investigation and are also required to inform you of their purpose and of your legal rights.

(3) This safety investigation is being conducted for accident prevention purposes only. Within the military, pursuant to AR 385-10, it cannot be used for any other purpose, to include any future disciplinary actions against any individuals. Therefore, the interview you are being asked to provide will be used by the Army in the interest of safety and accident prevention only.

(4) The chain of command will review the final accident report, which may include a summary of your interview, but the chain of command may only use the investigation report and the interviews for safety and accident prevention purposes. The interview summary may be released to the public pursuant to a Freedom of Information Act request.

(5) If you ever have knowledge that your witness interview was used by the Army for anything other than accident prevention purposes (for example, disciplinary action against an individual), you should consult with your local Judge Advocate Defense Counsel Office and request that the Command Judge Advocate, U.S. Army Combat Readiness Center, be notified at DSN 558 -2924 or commercial (334) 255-2924.

15. AVAILABILITY OF PROMISE OF CONFIDENTIALITY FOR "LIMITED USE" REPORT OF INVESTIGATION

a. Pursuant to AR 385-10, witness interviews may only be used within the military for purposes of accident prevention, and may not be used as evidence in connection with any administrative or disciplinary proceeding. This protection alone does not prevent release of the interview outside of the military *(to the public, newspapers, attorneys, etc.)* under the Freedom of Information Act. If you wish to protect your interview from release outside of the military, then your interview must be pursuant to a promise of confidentiality.

b. If you do not wish a promise of confidentiality, you may decline such below. In that case, your interview will still be used in the military only for purposes of accident prevention, but it may be released outside of the military in response to a Freedom of Information Act request. Please indicate which option you desire by initialing one of the choices below:

☒ I request a promise of confidentiality. I understand that the results of my interview will be used within the military only for the purposes of accident prevention, and will also be protected from public release outside of the military under the Freedom of Information Act.

☐ I decline a promise of confidentiality. I understand that the results of my interview will be used within the military only for purposes of accident prevention. I also understand that the results may be publicly released outside of the military under the Freedom of Information Act.

Boyd, Don D.

Name of witness *(Print Name - do not sign)*

Figure E–2. DA Form 285–W general witness information briefing

E–3. Completion instructions for DA Form 285–W

a. Additional information. See paragraph 3–3.

b. Block 15. See figure E–1 for example of completed DA Form 285–W.

(1) *Block 1.* Self-explanatory.

(2) *Block 2.* Enter general occupation of the witness and duty being performed at time of the mishap.

(3) *Block 3.* Enter the grade of witness.

(4) *Blocks 4 and 5.* Self-explanatory. (SSN is not required.)

(5) *Block 6.* List DSN number if applicable.

(6) *Block 7.* Enter date(s) of interview(s) was/were made.

(7) *Block 8.* Enter a summary of experience, expertise, and background in duty/MOS involved in the mishap.

(8) *Block 9.* Enter location of witness at the time of the mishap relative to the mishap.

(9) *Block 10.* Enter grade and last name of person in charge of interview. If different persons in charge interview witness on separate occasions, list the lead interviewer.

(10) *Block 11.* Promise of confidentiality.

(a) Check the appropriate box to indicate if the witness was/was not offered a promise of confidentiality. This can only be offered if requirements for confidentiality are approved in accordance with AR 385–10.

(b) Also, check the appropriate box to indicate whether the witness requested a promise of confidentiality.

(c) If promise of confidentiality is offered and requested/accepted, the interviewer must sign and date the confidentiality statement.

(11) *Block 12.* Summary of interview, will be completed as follows:

(a) Multiple interviews, same witness. Preface the summary of each interview with the date and indicate if it is the first, second, third, and so forth, interview.

(b) Comprehensiveness. As a general rule, the interview summaries of persons involved/injured in the mishap should be summarized in greater detail than the statements of others. This is because the personnel involved are the best source of information pertaining to the mishap chronology of events. The chronology for the "history of events," Narrative of Investigation (see para 3–3) will most often be obtained from the personnel involved and should be used as a guide in determining what elements of information to include in the interview summaries. If human error appears to be involved in the mishap, the mistakes/errors and latent failures listed in the instructions for completing the findings and recommendations (see para 5–5) are useful for determining what should be addressed in the witness summaries.

(c) Consolidating. When several witnesses, other than person(s) involved, provide essentially the same observations, it is not necessary to prepare a separate DA Form 285–W for each witness except for statements made with a promise of confidentiality. In cases where the summarized statements of several witnesses can be consolidated, it is appropriate to leave blocks 1 through 9 blank. In block 13, list the names of the witnesses and then summarize their collective observations.

(d) Format. The proper format is a concise summary of information elements. An example is as follows: "This witness was a passenger (identify location of passenger) in the vehicle at the time of the mishap. Additionally, he heard a grinding noise in the area of the right rear wheel, prior to the brake failure." In cases where it is essential, limited direct quotes of a witness (together with the specific questions they are in response to) may be used. Again, this should be done sparingly and only when necessary. It is important that the statement be the investigator's summarization and not an exact verbatim transcript of what the witness said. Write the summary in the third person ("The witness said...," "He said...,") and not the first person ("I saw...," "I heard...").

1. *Block 13.* Enter the date of the mishap.

2. *Block 14.* Interviewer will read block 15a or 15b to each witness, depending upon the category and/or circumstances of the witness.

3. *Block 15.* Those witnesses offered a promise of confidentiality, must indicate acceptance or refusal by initialing the appropriate statement (see fig E–2).

Appendix F

Basic Examples of Fractures and Damaging Stresses

F–1. Metal fatigue

a. When applying excessive continuous stress, overload, or excessive vibration to metal over a period of time the ability of the metal to withstand stress loads progressively decreases. This condition, called metal fatigue, can result in metal fracture, shear, or warp.

b. Figures F–1 and F–2 contain examples of metal fatigue failure. The area of instantaneous failure will indicate the overstress placed on the fracture. If the area of instantaneous failure is larger in relation to the total area of failure, high overstress is indicated; if lower, a low overstress is indicated. Stop marks radiate outward from the origin of the failure. If the stop marks remain convex about the origin of the failure, low stress concentration is indicated; concave stop marks indicate a high stress concentration.

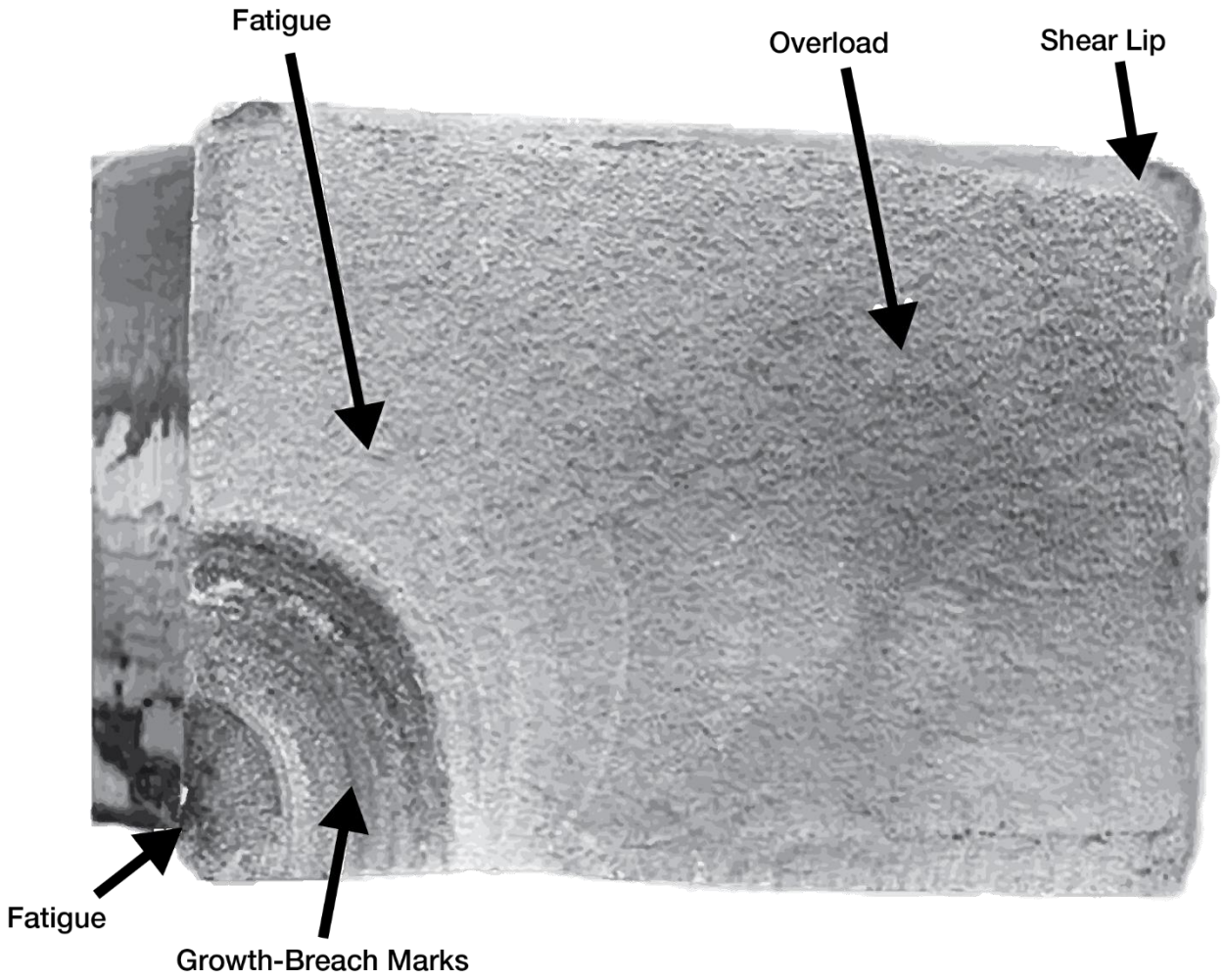


Figure F–1. Metal fatigue

F–2. Bending and/or rotation metal fatigue

a. One-way bending (A, see fig F–2) with low overstress indicated by large area of beach marks and stop marks, and high stress concentration indicated by reversal of stop marks.

b. One-way bending (B, see fig F–2) with high overstress indicated by small area of beach marks and stop marks, and high stress concentration indicated by reversal of stop marks.

c. Two-way bending (C, see fig F–2) with low overstress indicated by large area of beach marks and stop marks, and high stress concentration indicated by reversal of stop marks.

d. Two-way bending (D, see fig F–2) with high overstress indicated by small area of beach marks and stop marks, and high stress concentration indicated by reversal of stop marks.

e. Reversed bending and rotation (E, see fig F–2) with low overstress indicated by large area of beach marks and stop marks, and high stress concentration indicated by reversal of stop marks.

f. Reversed bending and rotation (F, see fig F–2) with high overstress indicated by large area of instantaneous failure.

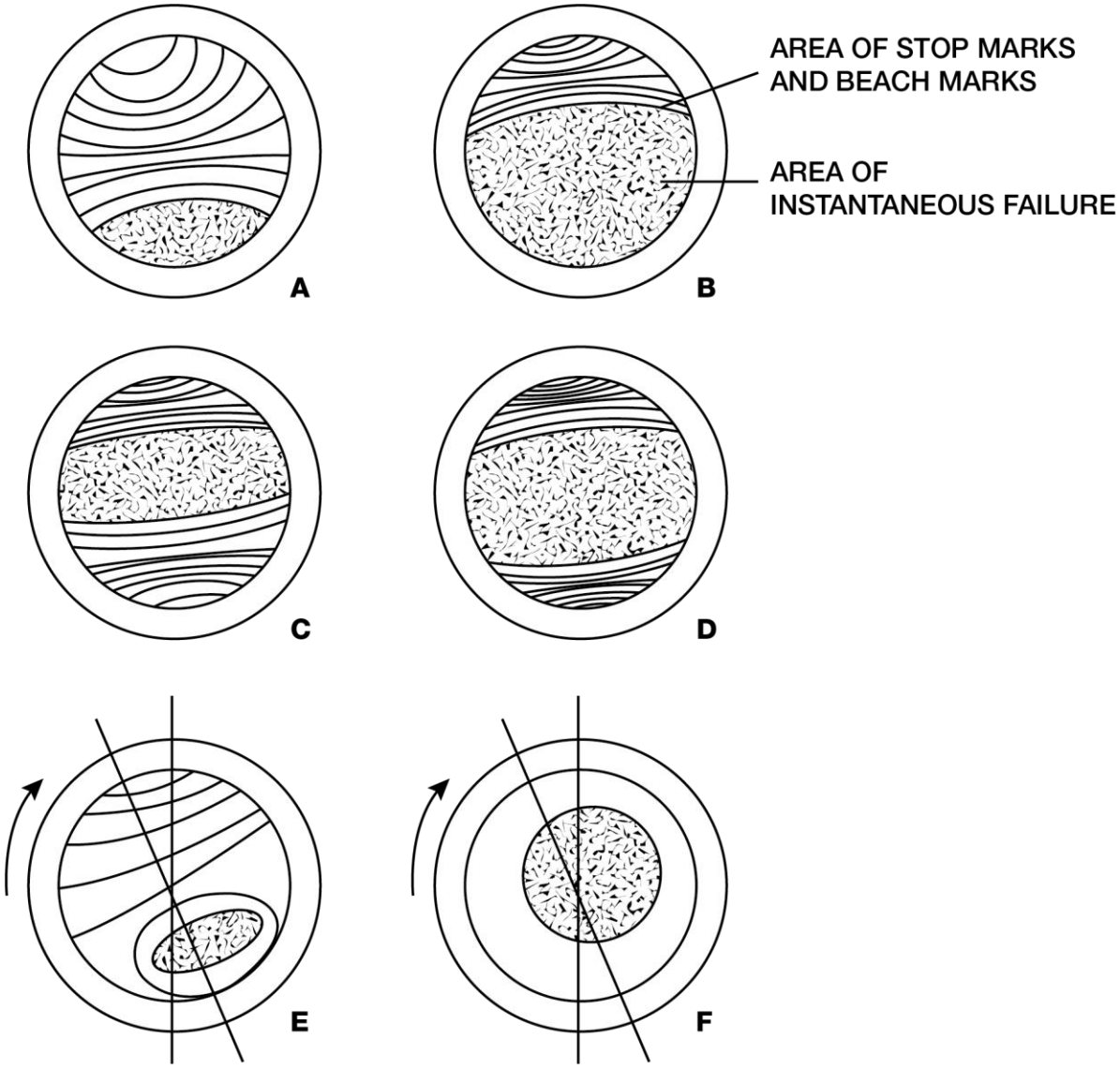


Figure F–2. Fatigue fractures

F–3. Propagation of fatigue crack and ductile-type failure

Figure F–3 shows the propagation of fatigue at right angle to tension stress lines and ductile-type failure of instantaneous zone.

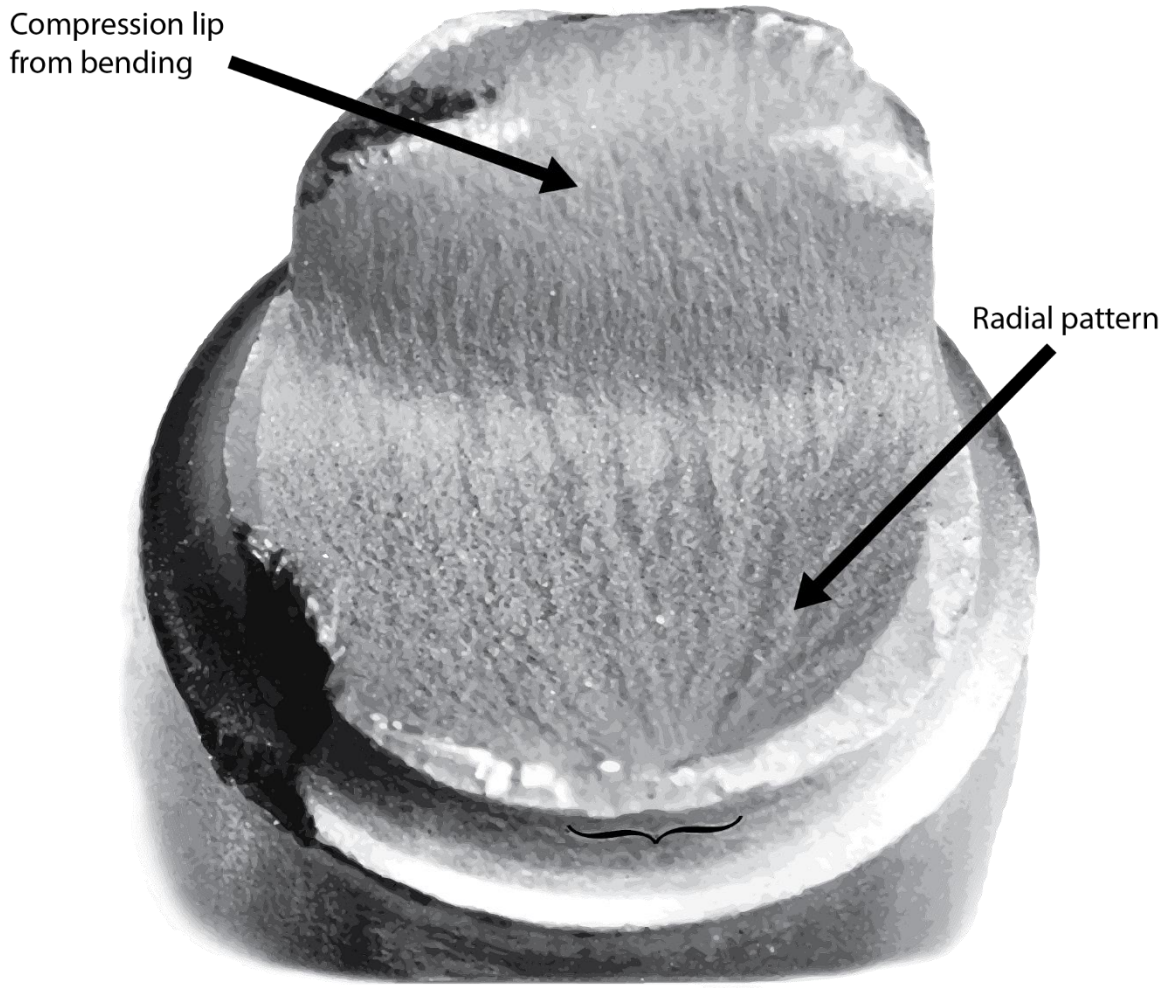


Figure F–3. Propagation of fatigue crack and ductile-type failure of instantaneous zone

F–4. Fatigue failure involving stress

Figures F–4 through F–13 show fatigue failures with no evidence of stress concentration and with evidence of high stress concentration.

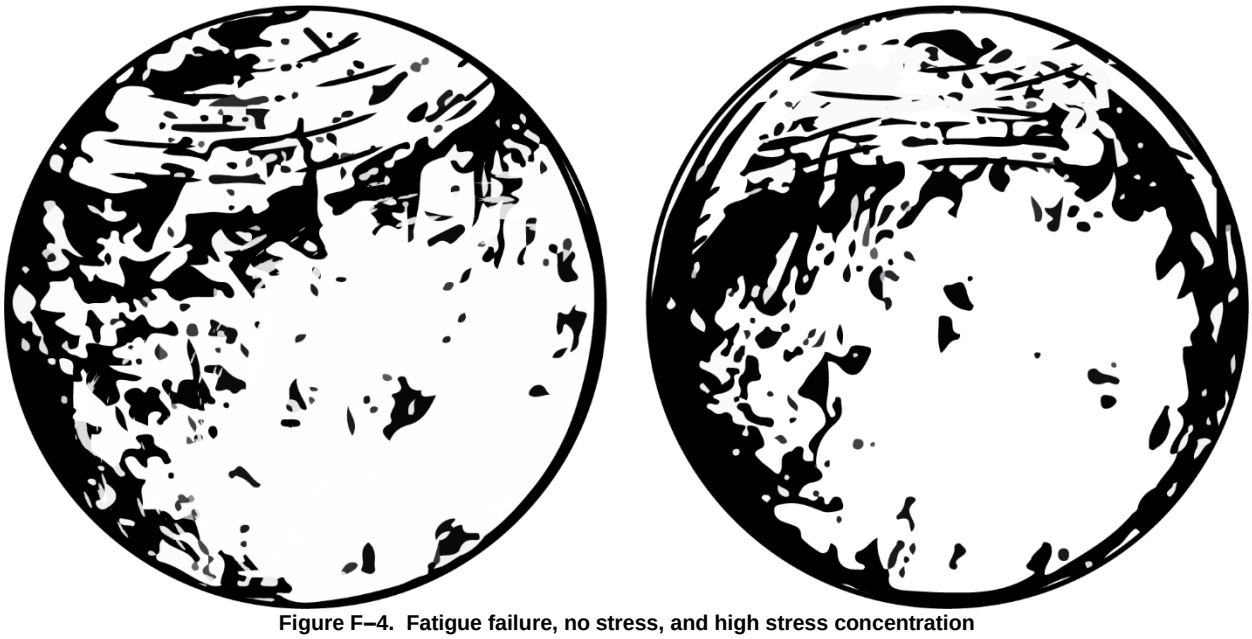


Figure F–4. Fatigue failure, no stress, and high stress concentration

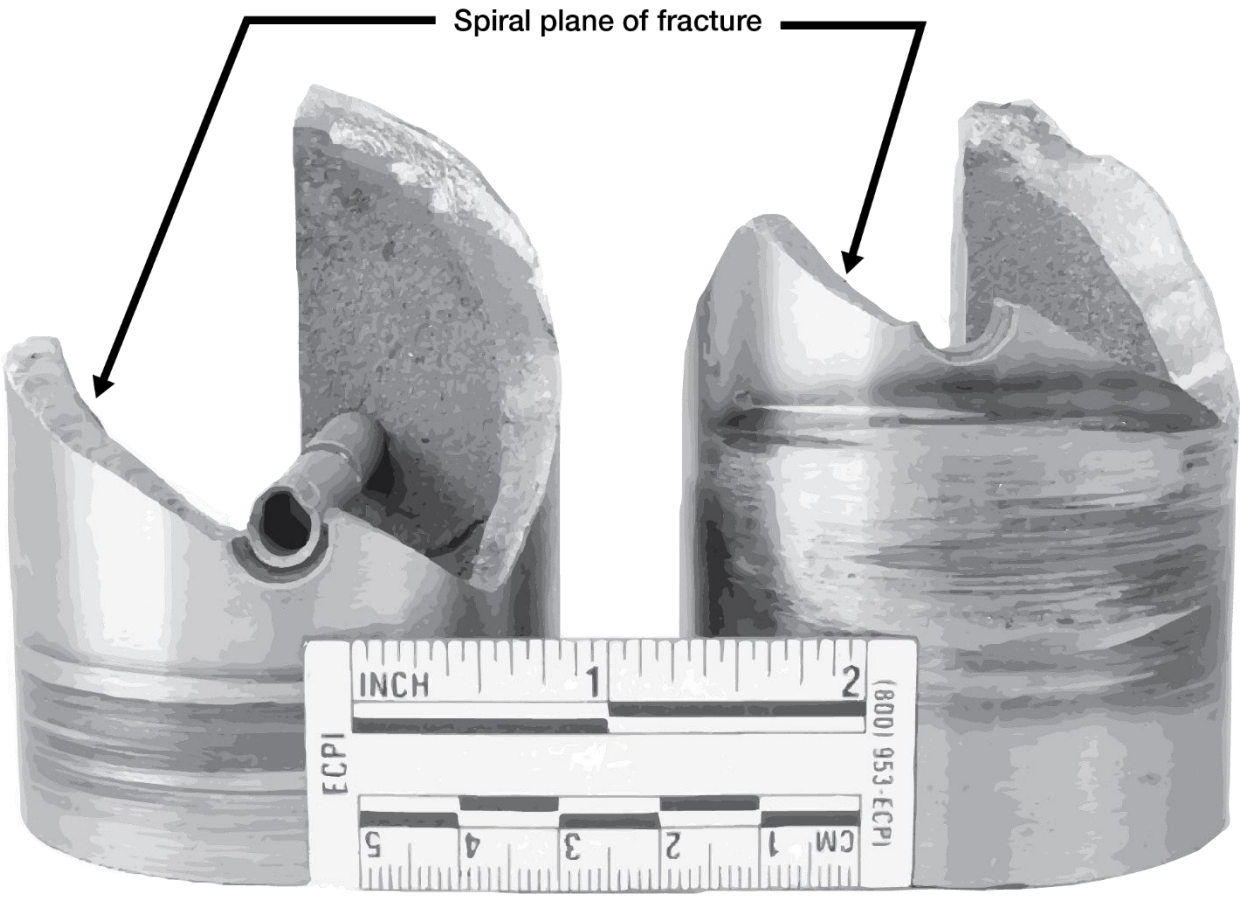


Figure F–5. Fatigue failure under torsion loading

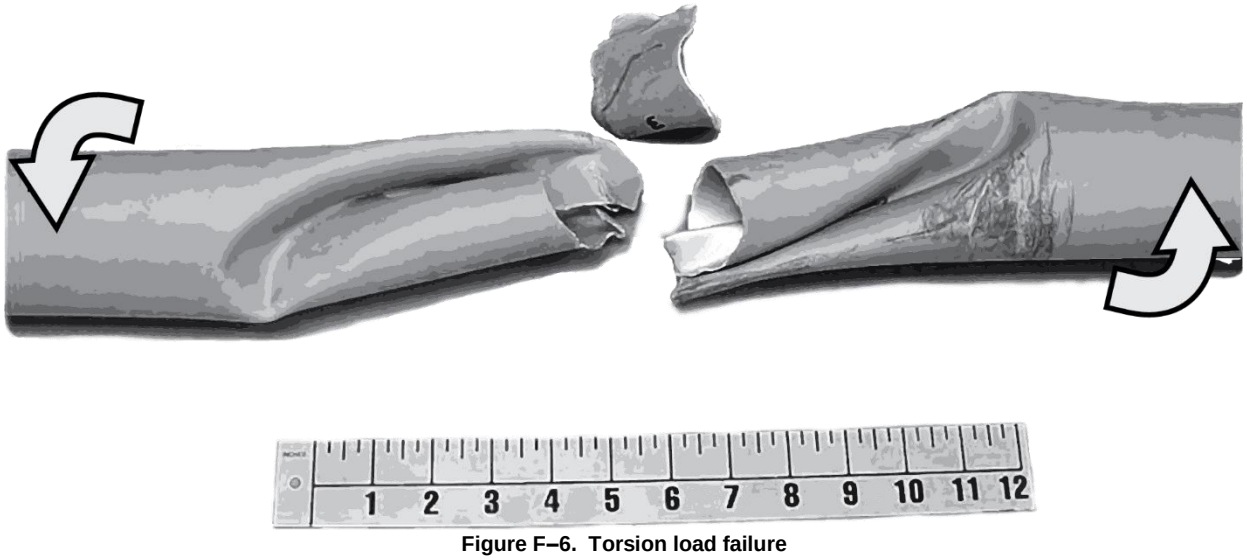


Figure F–6. Torsion load failure

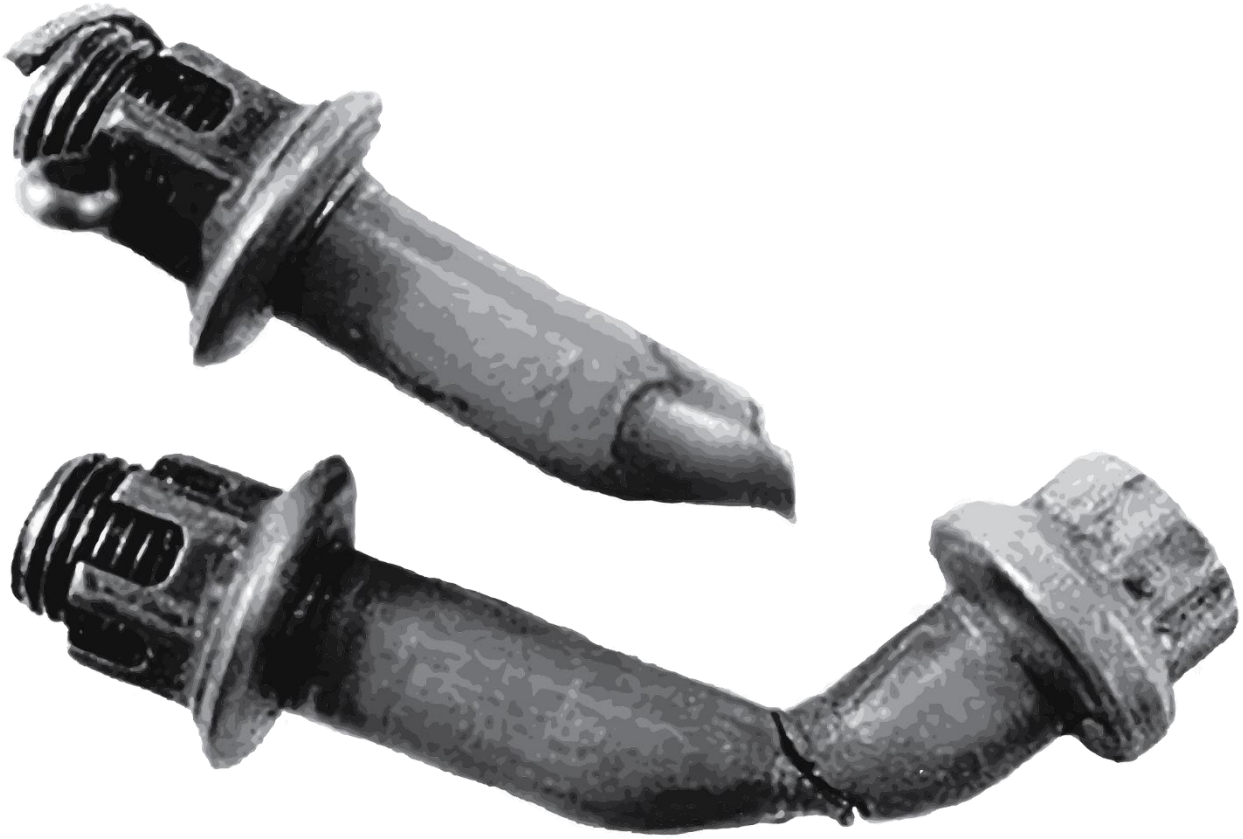
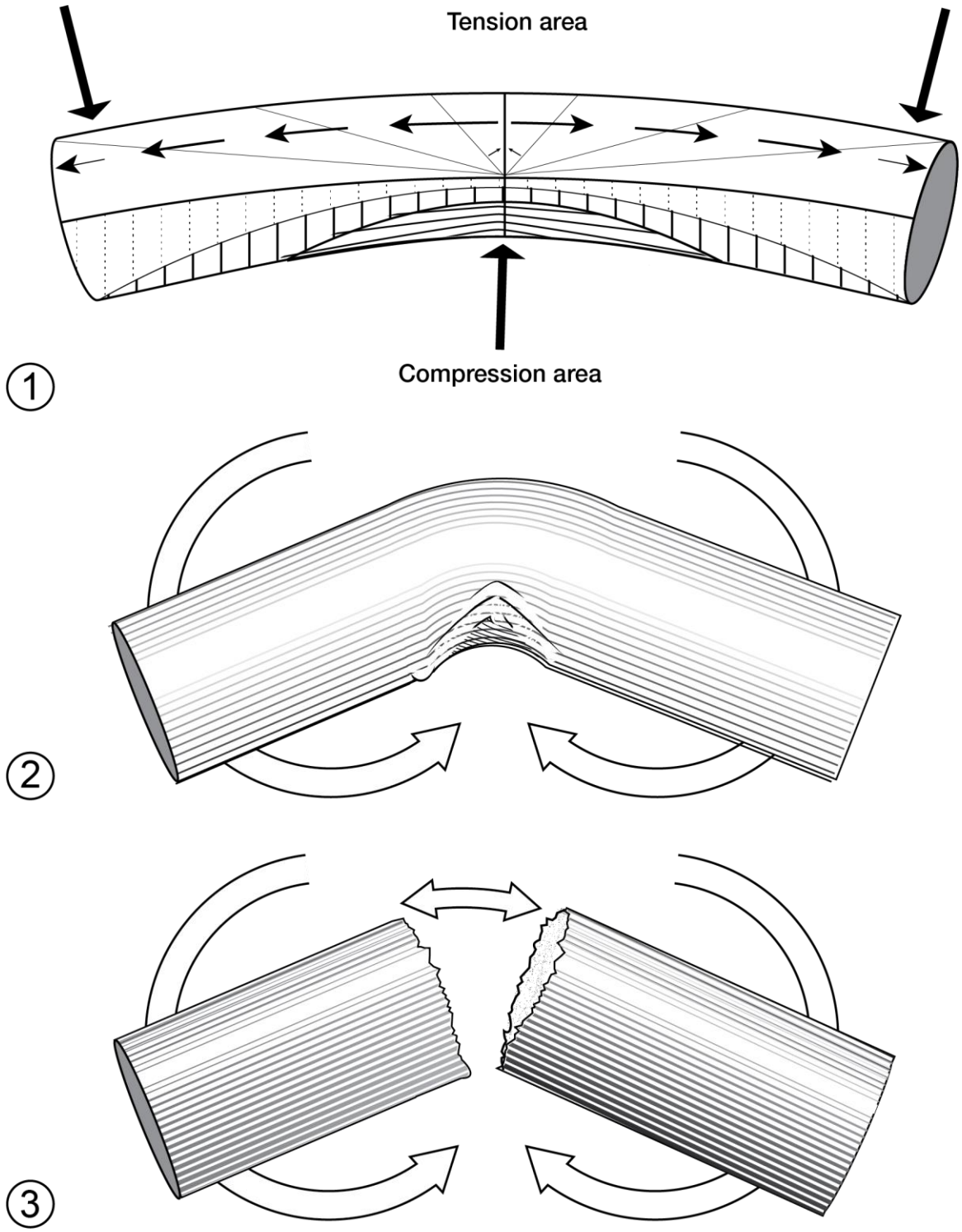


Figure F–7. Bending load failure



1. Tension and compression areas.
2. Permanent deformation (ductile metal).
3. Fracture (brittle metal).

Figure F–8. Deformation and fracture due to tension and compression

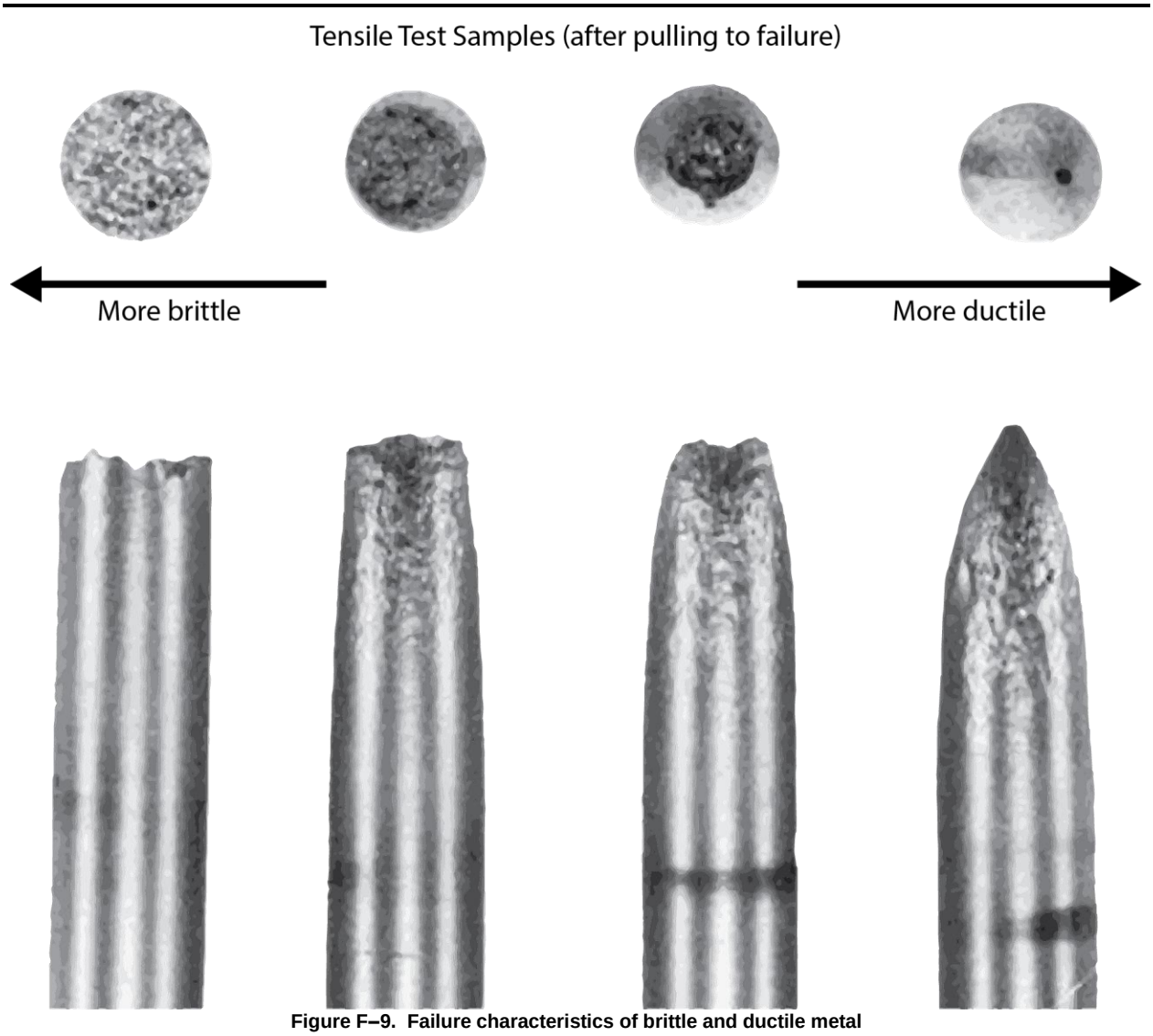


Figure F–9. Failure characteristics of brittle and ductile metal

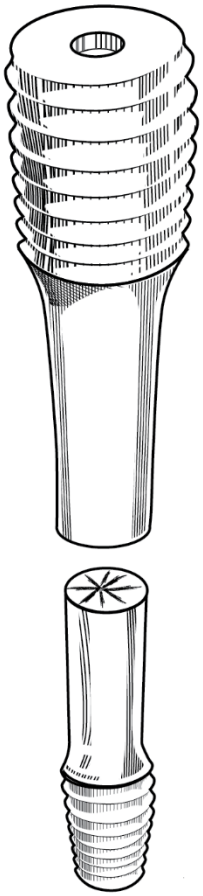


Figure F–10. Failure characteristics of brittle metal due to tension load

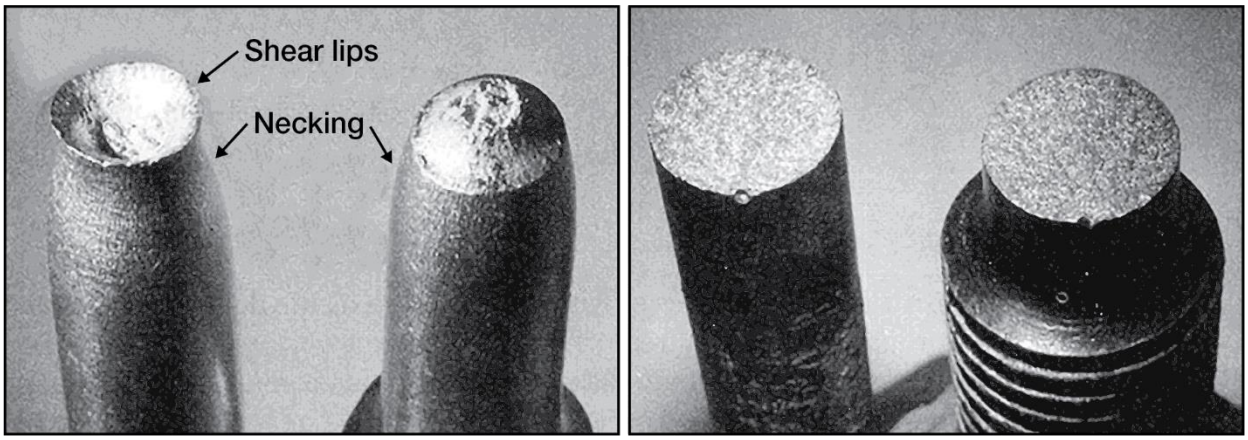


Figure F–11. Static tension failure

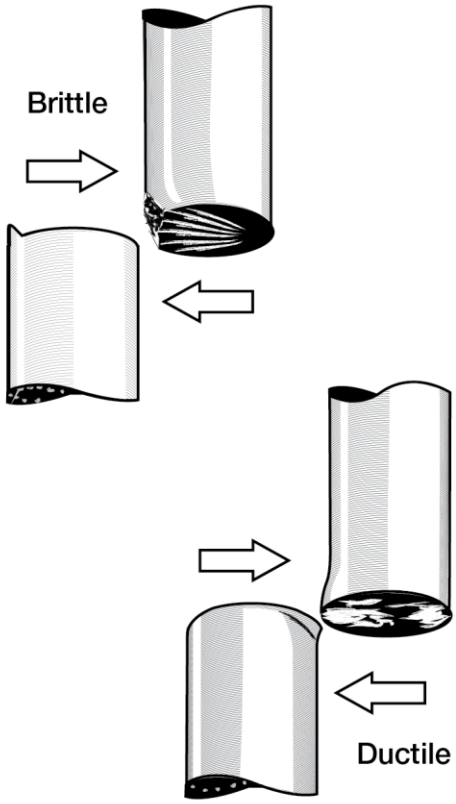


Figure F–12. Pure shear failure

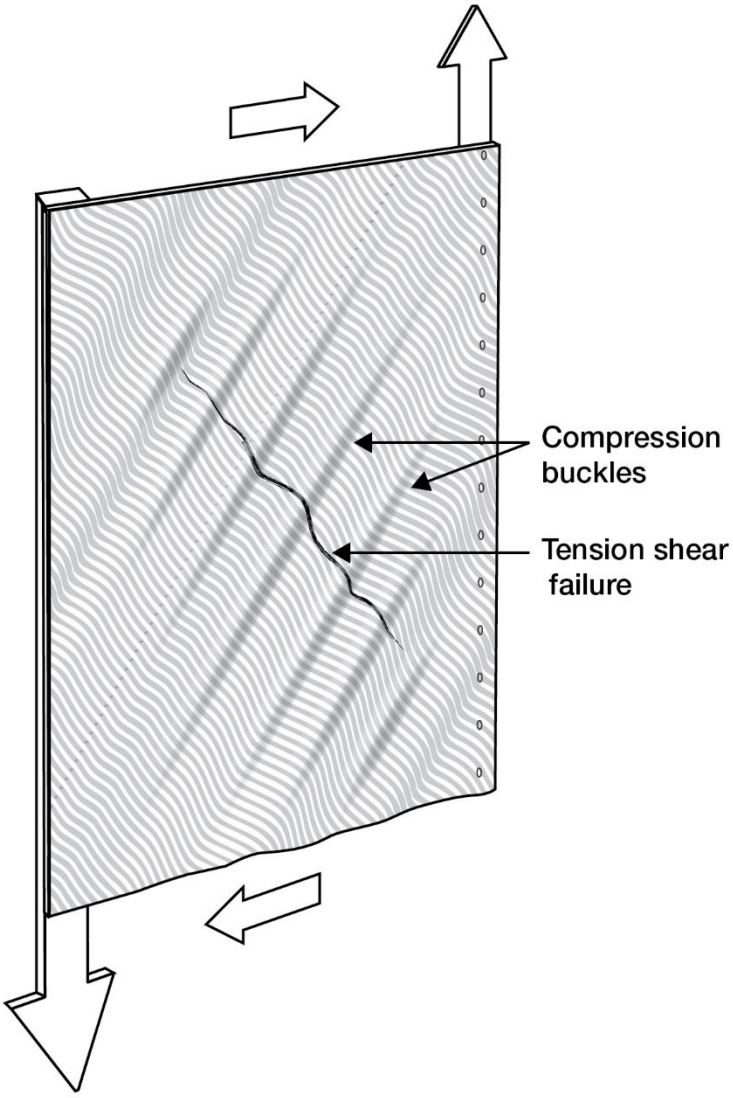


Figure F–13. Compression buckles and tension shear failure due to shear loads

Appendix G

Mishap Investigation Information/Equipment Requirements

G–1. Aviation

The investigator(s) should ensure the following items are available for use or examination when conducting an aviation accident investigation, as required.

a. General.

(1) Orders appointing investigation board signed.
(2) Blood/urine samples/tissue samples.
(3) Witness information: name, rank, telephone number (duty/work), summaries.
(4) Secure work area with access to commercial/DSN telephones.
(5) CID/MP reports.
(6) Individual flight records.
(7) Individual medical records/autopsy and toxicology results.
(8) Individual personnel record(s) (field 201).
(9) ECOD.
(10) Computer.
(11) Transportation: air and/or ground.
(12) Name and location of flight surgeon, fatalities, injured, AFMES, or civilian medical examiner performing the autopsy.
(13) ALSE.
(14) Weather statement preferably from an Air Force weather office, Navy office, or Federal agency (National Weather Service) (signed by forecaster).
(15) Unit and parent organization SOPs to include:
(a) Training.
(b) Administrative.
(c) Maintenance.
(d) Shop standards.
(e) Crew rest.
(f) Safety.
(g) Crew selection.
(16) Directive/policy letters/supplements to regulations that pertain to:
(a) That particular operation.
(b) Assignment of tasks/missions.
(c) AR 95–1 and AR 95–2.
(d) FMs/TCs.
(17) Safety meeting minutes/council meeting minutes (if applicable).
(18) Individual training folders (ATM).
(19) 1:50,000 map that includes location of mishap site.
(20) Survey of mishap site/wreckage.
(21) Unit identification code (UICs)/office symbols and chain of command addresses from unit through the Army command.
(22) Name, grade, title of safety officer; address, and telephone number to send report.
(23) Legal investigation officer's name, address, and telephone number.
(24) Post wiring diagram (organization chart).
(25) ATC tapes (from initial contact through -1 hours).
(26) Unit pre-mishap plan.
(27) PAO/public information officer name and telephone number.
(28) In-brief/out-brief information.
(29) Aircraft recovery team.
(30) Aircraft release letter.
(31) Inventory of aircraft.

b. Aviation maintenance-operations.

(1) Aircraft logbook.
(a) DA Form 2408–5 (Equipment Modification Record).

(b) DA Form 2408–12 (Army Aviator's Flight Record).
(c) DA Form 2408–13 (Aircraft Status Information Record).
(d) DA Form 2408–14 (Uncorrected Fault Record).
(e) DD Form 365–4.
(2) Historical records.
(a) Six-month file (all DA Forms 2408–13).
(b) DA Form 2408–15, DA Form 2408–16, DA Form 2408–17 (Aircraft Inventory Record), and DA Form 2408–18 (Equipment Inspection List).
(c) DA Form 2408–20 (Oil Analysis Record).
(d) DA Forms 2407.
(3) EIR.
(a) DA Forms 2408–20 and samples sent.
(b) Fuel analysis.
1. –10 series operator's manual.
2. Any appropriate checklist.
3. ATM.
4. –10 series organizational maintenance manual.
5. Parts "P" manual.
6. Monthly maintenance report.
7. Operations information.
a) Performance planning card.
b) Briefing forms/data.
c) Flight plan.

G–2. Ground

The investigator(s) should ensure the following items are available for use or examination when conducting a ground mishap investigation, as required.

a. General.
(1) Orders appointing investigation board signed.
(2) Blood/urine samples (Ask that the command test those involved in the mishap.)
(3) Witness information: name, rank, telephone number (duty/work), summaries.
(4) Secure work area with access to commercial/DSN telephones.
(5) Serious Incident Report, MP, CID reports.
(6) Individual personnel record(s) (field 201).
(7) ECOD/ actual cost of damage.
(8) Individual medical records/autopsy results.
(9) Computer.
(10) Photo lab support.
(11) Location and name of medical examiner conducting autopsy. (Request the SIB medical officer to be a part of the autopsy).
(12) Weather statement (signed by forecaster).
(13) Aircraft arrangements for overhead photos.
(14) Unit and parent organization SOPs to include:
(a) Training.
(b) Administrative.
(c) Maintenance.
(d) Shop standards.
(15) Directives that pertain to:
(a) That particular operation.
(b) Assigned tasks.
(16) Training folders (individual, unit).
(17) Individual counseling records.
(18) Individual OF 346.
(19) 1:50,000 map that includes location of mishap site.
(20) UICs/office symbols and chain of command addresses from unit through the Army command.
(21) Local report number.

(22) Name, grade, title of safety manager, address, and telephone number to send report.

b. Ground maintenance records.

(1) DA Form 2404 (Equipment Inspection and Maintenance Worksheet).
(2) DA Form 2404 retained on file (quarterly/semi-annually).
(3) DA Form 2404 deferred maintenance.
(4) DA Form 2407.
(5) DA Form 2408–20.
(6) DD Form 314 (Preventive Maintenance Schedule and Record).
(7) DA Form 2406 (Materiel Condition Status Report).
(8) Calibration records.
(9) Dispatch log.
(10) Equipment logbook.
(11) –10 series operator's manual.
(12) –20 series organizational maintenance manual.
(13) Parts "P," Manual.

Appendix H

Occupational Safety and Health Administration Recordkeeping Requirements

H–1. General

OSHA's final rule amending the occupational injury and illness recording and reporting requirements applicable to Federal agencies in accordance with 29 CFR 1960, Subpart I, will make the Federal sector's recordkeeping and reporting requirements essentially identical to the private sector. However, this change will not diminish or modify Army's responsibility to report or record injuries and illnesses as required by the Office of Workers' Compensation Programs under the Federal Employees' Compensation Act. Except as modified by 29 CFR 1960, Subpart I, the Army's injury and illness recording and reporting requirements will comply with the requirements under 29 CFR 1904, Subparts C, D, E, and G, except for the definition of "establishment" as contained in 29 CFR 1960.2(h).

H–2. Recording criteria

The most important section regarding recording criteria is 29 CFR 1904, Subpart C, as it defines which cases are required to be recorded. Base a determination of recordable cases on the following:

a. Work-relatedness. Injuries and illnesses resulting from events or exposures occurring in the work environment are presumed to be work-related. However, a case is work-related only if an event or exposure in the work environment is a discernable cause of the injury, or illness, or of a significant aggravation to a pre-existing condition.

b. New cases. A case is new if the employee:

(1) Has not previously experienced a recordable injury or illness of the same type that affects the same part of the body; or

(2) Previously experienced a recordable injury or illness of the same type that affects the same part of the body, but had recovered completely and an event or exposure in the work environment caused the signs and symptoms to reappear.

c. General recording criteria. Classify an injury or illness to a DA Civilian or DA direct contractor based on severity. Consider those injuries or illnesses that result in less than a day away from work beyond the date of the mishap Class D injuries. Injuries and illnesses are considered recordable if they result in one or more of the following:

(1) *Death.*

(2) *Days away from work.* Record the case if it involves one or more days away from work, but do not include the day of injury or illness in the count. Count the number of calendar days (includes weekend days, holidays, vacation days, and so forth) the employee was unable to work. Stop the day count if the employee leaves the job for a reason unrelated to the injury or illness or the count reaches the cap of 180 days.

(3) *Restricted work activity.* A restricted work activity exists if the employee is unable to work the full workday they would otherwise have been scheduled to work or is unable to perform one or more routine job functions (regularly performed by the employee at least once per week). Do not count the day of injury/illness. A restriction that is limited to the day of injury or illness does not make a case recordable.

(4) *Transfer to another job.* Defined as when a supervisor assigns an injured or ill employee to a job other than their regular job for part of the day. A case is recordable if the injured or ill employee performs their routine job duties for part of a day and assigned to another job for the rest of the day. A permanent job transfer made immediately, that is, on the day of injury or illness, at least one day of restricted work activity results in a recordable injury or illness.

(5) *Medical treatment beyond first aid.* Medical treatment is the management and care of a patient to combat a disease or disorder. Medical treatment does not include visits to a physician or licensed health care professional (PLHCP) solely for observation and counseling, including follow-up visits. Medical treatment also does not include diagnostic procedures such as x-rays, blood tests, or magnetic resonance imaging. Use of prescription medications for diagnostic purposes is not considered medical treatment. (For example, prescription eye drops used to dilate the pupils.) Finally, medical treatment does not include first aid procedures.

(6) *Loss of consciousness.* All work-related cases involving loss of consciousness must be recorded. The length of time the employee is unconscious is irrelevant.

(7) *Significant injury or illness diagnosed by a physician or licensed health care professional.* Such conditions as cancer, chronic irreversible disease, punctured eardrum, and fractured or cracked bones or teeth must be recorded at the time of diagnosis. There are some significant injuries, such as a punctured eardrum or a fractured toe or rib, for which neither medical treatment nor work restrictions may be recommended. In addition, there are some significant progressive diseases such as byssinosis, silicosis, and some types of cancer for which medical treatment or work restrictions may not be recommended at the time of diagnosis, but are likely to be recommended as the disease progresses. OSHA believes that cancer, chronic irreversible diseases, fractured or cracked bones, and punctured eardrums are generally considered significant injuries and illnesses and must be recorded at the time of diagnosis, even if medical treatment or work restrictions are not recommended, or are postponed in a particular case. Significant injuries and occupational illnesses will be classified based on their severity. Classify those injuries resulting in less than a day away from work beyond the date of the event as a Class D mishap.

(8) *Needle sticks and sharps injuries.* The rule requires recording of all work-related needle sticks and cuts from contaminated sharp objects. This has the greatest effect on the health care sector. Record all work-related needle sticks and cuts from sharps that are contaminated with another person's blood or other potentially infectious material (includes human bodily fluids, tissues, and organs; other materials infected with human immunodeficiency virus (HIV) or hepatitis B virus such as laboratory cultures). Also record splashes or other exposures to blood or other potentially infectious material if it results in a diagnosis of a blood borne disease or meets the general recording criteria.

(9) *Medical removal.* If an employee is medically removed under the medical surveillance requirements of an OSHA standard, (for example, lead, cadmium, and benzene), the case must be recorded. The case will be recorded as either one involving days away from work or days of restricted work activity, depending on the circumstances of the removal. If an employee is voluntarily removed below the thresholds established in the standards, the case does not need to be recorded.

(10) *Hearing loss.* Employers must record work-related hearing loss cases where—

(a) The employee has experienced a Standard Threshold Shift (STS) (see the OSHA noise standard 29 CFR 1910.95(g)(10)(i)).

(b) The employee's hearing level is 25 decibels (db) or more above audiometric zero (averaged at 2,000, 3,000, and 4,000 hertz (Hz)) in the same ears at the STS. Employers must record work-related hearing loss cases when an employee's hearing test shows a marked decrease in overall hearing. If an event or exposure in the work environment caused or contributed to the hearing loss, or significantly aggravated a preexisting hearing loss, the case is work-related. If a PLHCP or other licensed health care determines that the hearing loss is not work-related or has not been significantly aggravated by occupational noise exposure, employers are not required to record the case.

(11) *Tuberculosis.* If an employee is exposed to an active case of Tuberculosis at work and then has a positive Tuberculosis skin test or becomes an active case, then it must be recorded. The case does not have to be recorded if there is evidence that the case did not arise from a workplace exposure.

H–3. Forms

Employers must enter each recordable case on the appropriate OSHA forms listed in paragraphs H–3*a* through H–3*c* within 7 calendar days of receiving information that a recordable case occurred. The rule requires employers to keep the following forms:

a. OSHA Form 300 (Log of Work-Related Injuries and Illnesses). On the OSHA Form 300, the employer checks one and only one of the outcome columns for each case, the one representing the most serious outcome of the case. If the status changes, then the entry must be changed. For example, if the injured employee is experiencing days away from work, then dies, the employer must remove (or line out) the day's away entry and the day count and check the box for a fatality. Only required for DA Civilian occupational injuries and illnesses.

b. OSHA Form 300A (Summary of Work-Related Injuries and Illnesses). This form must be posted at the end of each CY from 1 February to 30 April of the year following the year covered by the form.

c. Maintain the OSHA Form 300 and OSHA Form 300A or equivalent form for all Army personnel, military, civilian, volunteers, and contractors under direct Army supervision. Maintain military occupational injuries/illnesses on a separate log from other personnel.

Note. Employers can keep their records on equivalent forms, on a computer, or at a central location, provided they can get information into the system within 7 calendar days after the injury or illness occurs and they can produce the data at the establishment when required. Retain records for 5 years.

H–4. Protection

For certain "privacy concern cases," employers must not enter the employee's name on OSHA Form 300. Instead, they are to enter "Privacy Case." A separate confidential list of the employees' names and case numbers must be kept by the employer and provided to an OSHA inspector upon request. Privacy concern cases are defined very specifically as follows:

a. An injury or illness to an intimate body part or the reproductive system.

b. An injury or illness resulting from sexual assault.

c. Mental illness.

d. HIV infection, hepatitis, or Tuberculosis.

e. Needle sticks and cuts from contaminated sharps with another person's blood or other potentially infectious material.

f. Illness cases where employees independently and voluntarily request that their names not be entered on the log.

Note. For a privacy concern case, if the employee's identity can still be implied, the employer may use some discretion in describing the case. Enough information must be entered to identify the cause and general severity of the incident. For example, a sexual assault can be entered as "Assault" or an injury to a reproductive organ can be entered as a "Lower abdominal injury." The employer is not required to go into great deal in these types of cases. If the employer gives out the forms to the public, the names must be removed first. There are exceptions for employee access, OSHA access, auditor, insurance, or law enforcement personnel.

H–5. Travel status

When employees are traveling, an injury or illness that occurs while the employee is engaged in work activities for the employer is considered work-related.

a. Activities at the direction of the employer. Travel to and from customer contacts and entertaining or being entertained at the direction of the employer is work-related. For example, if an employee falls in the airport while on a business trip, the case is work-related.

b. "Home away from home." When an employee checks into a hotel or motel, he or she establishes a "home away from home." While in "home away from home" status, cases that occur are not work-related. For example, if an employee slips in the hotel shower and is injured, the case is not work-related.

c. Detour for personal reasons. When an employee takes a side trip for vacations while on travel status (for example, sightseeing, shopping, and so forth) and is injured, the case is not work-related.

Glossary of Terms

Air Force
The Air Forces, Naval Air Forces, and Army Air Forces of the nations involved.

Aircraft
Balloons, gliders, airships, and flying machines, whether manned or unmanned, weight carrying structures for navigating of the air that is supported by its own buoyancy or the dynamic action of the air against its surfaces.

Ammunition and explosives
Includes, but is not limited to, all items of ammunition; propellants, liquid and solid; high and low explosives; guided missiles; warheads; devices; pyrotechnics; chemical agents; components and substances associated therewith, present in real or potential hazards to life and property.

Ammunition malfunction
Failure of an ammunition item to function as expected when fired, launched, or when explosive items function under conditions that should not cause functioning. Malfunctions include hang-fires, duds, abnormal functioning, and prime-true functioning of explosive items under normal handling, maintenance, storage, transportation, and tactical deployment. Malfunctions do not include mishaps or incidents that arise solely from negligence, all practice, or situations such as vehicle mishaps or fires.

Appointing authority
SIB appointing authority. The following are responsible for appointing SIBs as required by AR 385–10:
a. The commander having general court-martial jurisdiction over the installation or unit responsible for the operation, personnel, or materiel involved in a mishap; or
b. The Commander, U.S. Army Reserve Command for USAR units assigned to U.S. Army Reserve Command; or
c. The Commander, U.S. Army Corps of Engineers, for personnel assigned to the U.S. Army Corps of Engineers; or
d. The appropriate state adjutant general in the case of ARNG mishaps.

Army leadership
Army Leadership refers to Army officers, noncommissioned officers, senior executive service officials, and GS employees designated, authorized, held responsible, and accountable by the Army to make decisions at various levels of the Army involving execution of the Army's mission. Designation must be documented in writing or contained in official orders.

Army mishap
An Army mishap is defined as an unplanned event, or series of events, which results in one or more of the following:
a. Occupational illness to Army military or DA Civilian personnel.
b. Injury to on-duty DA Civilian personnel.
c. Injury to Army military personnel on or off duty.
d. Damage to Army property.
e. Damage to public or private property and/or injury or illness to non-Army personnel caused by Army operations (the Army had a causal or contributing role in the mishap).

Army motor vehicle
Any vehicle that meets the following criteria:
a. A vehicle that is owned, leased, or rented by DA and/or USAR components.
b. A vehicle that is primarily designed for over-the-road operation.
c. A vehicle whose general purpose is the transportation of cargo or personnel. Examples are passenger cars, station wagons, trucks, ambulances, buses, motorcycles, fire trucks, and refueling vehicles.

Army National Guard personnel
ARNG personnel who are on—
a. Active duty for training.
b. Inactive duty training.
c. Annual training.
d. Active Duty Special Work.

e. Active Guard Reserve.
f. Temporary Tour Active Duty.
g. Full-time manning.

Army personnel
Active duty Army personnel, DA Civilian personnel, USAR personnel, ARNG personnel and ROTC personnel as defined in this regulation.

Army property
Any item of Army property or property leased by the Army for which the Army has assumed risk of loss such as aircraft, vehicle, building, structure, system, and so forth.

Army risk management process
A holistic approach to preserving readiness that applies 24/7 to Soldiers, DA Civilian employees, and contract workers. The process has five phases that form a closed-loop system of risk assessment, mitigation, and evaluation.

Bystanding/spectating
Includes activities associated with bystanding or spectating regardless of whether on or off duty.

Combat Soldiering
Using/developing skills peculiar to combat. Includes receiving instruction or training in such skills, excludes classroom training. (For example, hand-to-hand combat, slide for life, rope bridge, mission oriented protective posture, nuclear biological chemical, bayonet training, military operations on urban terrain.)

Command responsibility
Commanders down the entire chain of command are responsible for the safety of their personnel.

Commander
An individual that exercises authority and responsibility over subordinates by virtue of rank or position. The purpose of that authority and responsibility is to effectively use available resources and plan the employment of, organize, direct, coordinate, and control the actions of an Army organization for the purpose of successful mission accomplishment. Examples of commanders are as follows:
a. Commander of an Army Headquarters (Army command, Army service component commands, direct reporting units), within the continental United States and OCONUS.
b. The Chief of Engineers (civil and military works).
c. Commander, U.S. Army Space and Strategic Defense Command.
d. The Director, ARNG.
e. Commander, U.S. Army Medical Research and Development Command.
f. Commanders of Army garrisons with a full-time safety professional. This includes posts, camps, stations, and military communities.
g. State adjutants general (for ARNG).
h. Commanders of USAR organizations with a full-time safety professional.
i. Commanders of medical treatment facilities.
j. Commanders in direct support of general support maintenance units.
k. Director of Facilities Engineering.
l. Provost Marshal/law enforcement commander.
m. Director of Industrial Operations.
n. U.S. Army Plant Representative Office.
o. Commander of table of organization and equipment, modified table of organization and equipment, or table of distribution and allowances organization.

Communications
Activities related to installing, operating, and recovering communications equipment. (For example, Erect/dismantle, lay/string/recover wire/cable, splice wire cables, install/operate/disconnect common equipment.)

Competent authority
An individual of the Armed Forces designated in command, responsible for the direction, coordination, and control of military forces. The commander alone is responsible for everything his unit does or fails to

do. He cannot delegate his responsibility or any part of it, although he may delegate portions of his authority to competent individuals. An individual designated by the commander to address areas of primary interest within that individual's technical expertise.

Competent medical authority
Any duly qualified physician (government or private), who is approved by the Office of Workman's Compensation to render treatment. "Competent medical authority" includes surgeons, podiatrists, dentists, clinical psychologists, optometrists, chiropractors, and osteopathic practitioners.

Contracting agency
The organization that has primary responsibility for monitoring, administering, and ensuring compliance with the contract, especially pertaining to the chemical agent program.

Contracting officer
A designated officer who performs administrative functions listed in the Federal Acquisition Regulation.

Contractor mishap
An mishap that occurs as a result of a government contractor's operations in which there is damage to U.S. Government or Army property or equipment, injury or occupational illness to Army personnel, or other reportable event. Occupational injury or illness to a contractor or subcontractor is reported only if contractually required and occurs while on duty and engaged in work at the Army work site. Also, see Army direct contractor.

Counseling/advisory
Activities associated with nonsupervisory advice/assistance provided by subject matter specialists on specific topics. (For example, alcohol/drug abuse, mental health, community services.)

Days away from work
The actual or estimated number of days lost that the individual could not work excluding the day of the injury/occupational illness. Count all calendar days including weekends and holidays. For military personnel, days away from work for onand off-duty injuries and occupational illnesses include hospitalization, medical restrictions to quarters, convalescent leave, and commander directed removal from duties.

Deflagration
A reaction characterized by a rapid burning action that generates vast amounts of heat and pressure if confined. However, the reaction is not as violent as a detonation. Burning propellants and pyrotechnics are typical deflagration type reactions.

Degraded visual environment
An environment of reduced visibility of potentially varying degree, wherein situational awareness and aircraft control cannot be maintained as comprehensively as they are in normal VMC and can potentially be lost.

Department of the Army Civilian personnel
a. Senior executive service, general management, GS, and federal wage system employees.
b. U.S. Army Corps of Engineers employees.
c. ARNG and USAR technicians.
d. Nonappropriated fund employees (excluding part-time military).
e. Foreign nationals directly or indirectly employed by DA (paid by appropriated funds).
f. Youth/Student Assistance and Temporary Program employees; Volunteers in Service to America volunteers; Job Corps, Neighborhood Youth Corps, and Youth Conservation Corps volunteers; Family Support Program volunteers.

Department of the Army contractor
A nonfederal employer engaged in performance of a DA contract, whether as prime contractor or subcontractor.

Department of the Army installation
A grouping of facilities located in the same vicinity that supports a particular DA function. Installations may include locations such as posts, camps, stations, or communities, land, and improvements permanently affixed thereto which are under the DA control and used by Army organizations. Where installations are located contiguously, the combined property is designated as one installation and the separate functions

as activities of that installation. In addition to those used primarily by troops, the term “installation” applies to such real properties as depots, arsenals, ammunition plants (both contractor and government operated), hospitals, terminals, and other special mission installations.

Destroyed aircraft
An aircraft is considered destroyed/total loss when the estimated cost to repair exceeds the current full-up replacement cost.

Detonation
A violent reaction usually characterized by blast, high overpressure, and when located on or near the ground, a crater normally occurs. High explosive (HE) munitions such as projectiles, grenades, and demolition material are typical detonation type munitions.

Digital source collector
An aircraft/vehicle onboard device (static and/or mission equipment) that collects analog and digital data on systems, components, and mission equipment. Examples of digital source collector devices are maintenance data recorder, flight data and cockpit voice data recorder, digital data collection PC media, analog tape and digital media video devices, Health and Usage Monitoring System, Vibration Enhancement Management Program, Global Positional System, and mission equipment flash cards and hard drives.

Educational
Includes classroom training. Excludes field settings such as field training exercises and maneuvers. (For example, teach/instruct/brief/counsel student/audience activities.)

Emergency
An event for which an individual perceives that a response is essential to prevent or reduce injury or property damage.

Emplacing
The placing or setting of an explosives charge in a specific scenario for use as intended, but prior to the actual functioning of the item. Placing a shape charge against a door or a mine in the ground are examples of “emplacing munitions.”

Engineering or construction
Those activities associated with surveying, building, erecting, dissembling, or destroying things. (For example, lay/clear mine fields, bridging, quarrying, welding, brazing, roofing, installing electrical wiring, painting, land surveying, demolition, clearing, digging, concrete work, masonry work, dredging, trenching.)

Environmental factors
Environmental conditions that had or could have had an adverse effect on the individual’s actions or the performance of equipment.

Establishment
A single physical location where business is conducted or where services or operations are performed. Where distinctly separate activities are performed at a single physical location, each activity is treated as a separate establishment. Typically, an establishment refers to a field activity, regional office, area office, garrison, or facility.

Explosion
The chemical reaction of any chemical compound or mechanical mixture that when initiated, undergoes a very rapid combustion or decomposition, releasing large volumes of highly heated gases that exert pressure on the surrounding medium. Depending on the rate of energy release, an explosion can be categorized as a deflagration or a detonation.

Explosive ordnance disposal
The detection, identification, field evaluations, rendering safe, recovery, and final disposal of unexploded explosive ordnance or munitions chemical agents.

Explosive ordnance disposal procedures
Those particular courses or modes of action for access to, recovery, render safe, and final disposal of explosive ordnance or any hazardous material associated with an EOD incident.

Fabricating
Activities associated with the construction or manufacture of equipment and other products. For example, making/modifying equipment/products.

Fair wear and tear
Loss or impairment of appearance, effectiveness, worth, or utility of an item that has occurred solely because of normal and customary use of the item for its intended purpose.

Firefighting
Activities associated with developing or using firefighting skills. Excludes vehicle operation going to and from the scene. (For example, inspecting, rescuing, salvaging, firefighting.)

First aid
First aid is defined as using a list of procedures that are all-inclusive and is not a recordable injury. If a procedure is not on the list, it is not considered first aid for recordkeeping purposes. The following are the procedures contained in the list:
a. Using nonprescription medication at nonprescription strength. However, if an employee is provided prescription medications or nonprescription medications at prescription strength, this is considered medical treatment.
b. Tetanus immunizations.
c. Cleaning, flushing, or soaking surface wounds.
d. Wound coverings, butterfly bandages, Steri-strips. However, use of wound closure methods such as sutures, medical glues, or staples is considered medical treatment.
e. Hot or cold therapy regardless of how many times it is used.
f. Nonrigid means of support.
g. Temporary immobilization device used to transport mishap victims.
h. Drilling of fingernail or toenail; draining fluid from blister.
i. Eye patches.
j. Removing foreign bodies from eye using irrigation or cotton swab. However, use of other methods to remove materials from the eye is medical treatment.
k. Removing splinters or foreign material from areas other than the eye by irrigation, tweezers, cotton swabs or other simple means.
l. Finger guards.
m. Massages. Massage therapy is first aid, but physical therapy or chiropractic treatment is considered medical treatment.
n. Drinking fluids for relief of heat stress. (Drinking fluids for relief of heat stress is first aid, but administering an IV is medical treatment.)

Flight crew
Personnel on flight pay who are involved in operation of the aircraft.

Flight mishaps
Those mishaps in which intent for flight exists (as defined in this glossary) and for which there is reportable damage to the aircraft itself. (Explosives, chemical agent, or missile events that cause damage to an Army aircraft with intent for flight are categorized as flight mishaps to avoid dual reporting.)

Flight-related mishaps
Those aircraft mishaps in which there is intent for flight and no reportable damage to the aircraft itself, but the mishap involves a fatality, injury to aircrew, ground crew, passengers, other injury, and/or property damage.

Food and drug inspection
Activities associated with the certification of conditions, products, and facilities. (For example, inspect livestock/poultry/and so forth, inspect storage facilities, inspect processing facilities, inspect transport and market facilities.)

Food/drink preparation
Activities associated with preparing, cooking, and serving food/drinks. (For example, preparing food, cleaning food preparation/serving equipment and facilities, cooking food, serving food.)

Foreign object damage
Damage to Army vehicle/equipment/property as a result of objects alien to the vehicle/equipment damaged. Excludes aircraft turbine engine(s) defined as a FOD incident.

Fratricide/friendly fire
Circumstances in which members of a U.S. or friendly military force are mistakenly killed or injured in action by U.S. or friendly forces actively engaged with an enemy or who are directing fire at a hostile force or what is thought to be a hostile force. Fratricide/friendly fire incidents will be primarily investigated and reported under AR 385–10.

Garrison
An aggregation of contiguous or near contiguous, common mission supporting real property holdings under the jurisdiction of DoD within and OCONUS. Examples include, but are not limited to, posts, camps, bases, and stations.

Garrison-level safety manager
a. The senior full-time safety professional responsible for providing safety support to Army garrisons, including camps, stations, military communities, and USAR organizations.
b. State safety manager or specialist (for ARNG).

Ground mishap
Any mishap exclusive of aviation (for example, Army motor vehicle, Army combat vehicle, privately-owned vehicle, marine).

Handling animals
Activities associated with handling animals.

Handling/material/passengers
Activities associated with the transportation, distribution, and storage of material or passengers. For example, distributing/issuing, loading/unloading, transporting/moving/delivering, packing/unpacking/preserving, inventorying/inspecting, weigh/measure, palletize/sling load/rig, retrieve, or turn-in/store.

Hazard
A condition with the potential to cause injury, illness, or death of personnel; damage to or loss of equipment, property, or mission degradation.

Hazard analysis
A hazard analysis is a clear, systemic, concise, well-defined, orderly, consistent, closed-loop, quantitative or qualitative and objective methodology used to identify possible hazards within a mission, system, equipment, or process that can cause losses to the mission, equipment, process, personnel, or damage to the environment. Examples of hazard analyses are What-If, Preliminary Hazard Analysis, Sneak Circuit Analysis, Hazard and Operability Study, Fault Tree Analysis, Failure Mode and Effects Analysis, and Fault Hazard Analysis.

Hazardous material
There are many definitions and descriptive names being used for the term hazardous material, each of which depends on the nature of the problem being addressed. The most comprehensive listing of hazardous materials and chemicals can be found in National Aerospace Standard 411–1. The United States agencies involved, as well as state and local governments, have different purposes for regulating hazardous materials that, under certain circumstances, pose a risk to the public or the environment.

Hospitalization
Admission to a hospital as an inpatient for medical treatment.

Human error
Human performance that deviated from that required by the operational standards or situation. Human error in mishaps can be attributed to a system inadequacy/root cause in training, standard, leader, individual, or support failure.

Human factors
Human interactions (man, machine, and/or environment) in a sequence of events that were influenced by, or the lack of human activity, which resulted or could result in an Army mishap.

Human movement
Excludes human movement activities listed elsewhere such as sports, maintenance, and physical training. (For example, walking, running, jumping, bending/leaning, and climbing.)

Impact area
The ground and associated airspace within the training complex used to contain fired or launched ammunition and explosives and the resulting fragments, debris, and components from various weapon systems. A weapon system impact area is the area within the SDZ used to contain fired or launched ammunition and explosives and the resulting fragments, debris, and components. Indirect fire weapon system impact areas include probable error for range and deflection. Direct fire weapon system impact areas encompass the total SDZ from the firing point or positions downrange to distance X:
a. Temporary impact area. An impact area within the training complex used for a limited period of time to contain fired or launched ammunition and explosives and the resulting fragments, debris, and components. Temporary impact areas are normally used for non-dud-producing ammunition or explosives and should be able to be cleared and returned to other training support activities following termination of firing.
b. Dedicated impact area. An impact area that is permanently designated within the training complex and used indefinitely to contain fired or launched ammunition and explosives and the resulting fragments, debris, and components. Dedicated impact areas are normally used for less sensitive ammunition and explosives than that employed in high hazard impact areas. However, any impact area containing fused HE or white phosphorous duds represent a high risk to personnel and access must be limited and strictly controlled.
c. High hazard impact area. An impact area that is permanently designated within the training complex and used to contain sensitive HE ammunition and explosives and the resulting fragments, debris, and components. High hazard impact areas are normally established as part of dedicated impact areas where access is limited and strictly controlled because of the extreme hazard of dud ordnance such as ICM, HEAT, 40 mm, and other highly sensitive ammunition and explosives.

Individual failure
Soldier knows and is trained to standard but elects not to follow standard (self-discipline-mistake due to own personal factors).

Information and arts
Activities associated with the processing and dissemination of information. Includes writing, drawing, drafting, and photographing. (For example, taking pictures, printing activities, drafting/illustrating activities.)

Initial denial authority
The official at Headquarters, DA level with the authority to deny release of a document, in whole or in part, under the FOIA.

Injury
A traumatic wound or other condition of the body caused by external force, including stress or strain. The injury is identifiable as to time and place of occurrence and member or function of the body affected, and is caused by a specific event or incident or series of events or incidents within a single day or work shift.

Intent for flight (unmanned aircraft system)
Intent for flight begins when power is applied or brakes released (if so equipped), or unmanned aircraft is hand released by the operator, or the launcher is released, for the purpose of moving an aircraft under its own power to commence authorized flight (including ground taxi/hover) by an authorized crew. Intent for flight ends when the aircraft is at a full stop and power is completely reduced and/or stopped Intent for flight begins for Aerostat balloons when all of the mooring lines are removed for the purpose of deployment and ends when all of the mooring lines are attached.

Intent for flight (unmanned aircraft system/manned aircraft)
Intent for flight begins when power is applied or brakes released to move the aircraft under its own power, for the purpose of commencing authorized flight with an authorized crew. Intent for flight ends when the aircraft is at a full stop and power is completely reduced. Intent for Flight is the physical act of applying power to move the aircraft, not the thought process of the crewmember as to what is going to occur in the future.

Investigation
A systematic study of a mishap, incident, injury, or occupational illness circumstances.

Janitorial/housekeeping/grounds keeping
Activities associated with the upkeep, tending, or cleaning of premises such as grounds, homes, offices, and other buildings; excludes maintenance, repair, or services activities. (For example, floor polishing, buffing, cleaning, vacuuming, sweeping, raking, shoveling, policing, planting, garbage disposal, incinerating.)

Job transfer
When an employee/Soldier is assigned to a job other than his/her regular job for part of the day because of an injury or occupational illness.

Laundry/dry-cleaning services
Includes activities performed at personal residences, Laundromats, or on-post laundry/dry-cleaning plants. (For example, handling laundry, operating laundry/dry-cleaning equipment.)

Leader failure
Occurs when leaders fail to monitor mission execution and planning, correct inappropriate behavior, take appropriate actions, or emphasize correct procedures that allowed subordinates to commit task errors or results in a failure.

Leased aircraft
Any government-owned aircraft provided to a contractor under a Lease Agreement for use in conjunction with a specific contractor need. Aircraft are usually leased to a contractor for the contractor's use. Aircraft are usually bailed to a contractor to perform government contract work. DoDD 7230.8 further clarifies leased aircraft procedures and requirements. Lease agreements are legal contracts between the Government Program Office and the contractor.

Maintenance/repair/servicing
Activities associated with the maintenance, repair, or servicing of equipment and other property; excludes janitorial, housekeeping, or grounds keeping activities. (For example, install/remove/modify equipment, tune/adjust/align/connect, hot metal work, cold metal work, plastic working, soldering, repairing tires, inspecting tires/batteries, fueling/defueling, changing/inflating tires, charging batteries.)

Major component
A combination of subassemblies, assemblies, components, modules, and parts connected in such a manner as to be a self-contained unit which, although part of an end-item, is capable of operating independently of the end-item (for example, engine T–53).

Malfunction
Failure of an ammunition item to function as expected when fired, launched, or when explosive items function under conditions that should not cause functioning. Malfunctions include hang-fires, misfires, duds, abnormal functioning and premature functioning of explosive items under normal handling, maintenance, storage, transportation, and tactical deployment. Malfunctions do not include mishaps or incidents that arise solely from negligence, all practice, or situations such as vehicle mishaps or fires.

Materiel factors
When materiel elements become inadequate or counter-productive to the operation of the vehicle/equipment/system.

Medical treatment
Any treatment (other than first aid) administered by a PLHCP.

Military personnel
All Soldiers (U.S. Army active duty personnel; USAR or ARNG personnel on active duty or full-time National Guard duty or in a paid drill status; Service Academy midshipmen/cadets; ROTC cadets when engaged in directed training activities; foreign national military personnel assigned to DA; and members of other U.S. uniformed services assigned to DA).

Military-unique equipment, systems, and operations
The term "uniquely military equipment, systems, and operations" excludes from the scope of 29 CFR 1960 the design of DoD equipment and systems that are unique to the national defense mission such as

military aircraft, ships, submarines, missiles and missile sites, early warning systems, military space systems, artillery, tanks, and tactical vehicles; and excludes operations that are uniquely military such as field maneuvers, naval operations, military flight operations, associated research test and development activities, and actions required under emergency conditions. Within the scope of DoD, the term includes workplaces and operations comparable to those of industry in the private sector such as vessel, aircraft, and vehicle repair, overhaul, and modification (except for equipment trials); construction; supply services; civil engineering or public works; medical services; and office work.

Mishap
An unplanned event that causes personal injury or illness, or property damage.

Missile
Air-to-air, surface-to-surface, air-to-surface, surface-to-air, and aerospace vehicles other than aircraft, whether guided or unguided.

Nonfatal case without lost workdays
Cases other than lost-workday cases where U.S. Army military or DA Civilian personnel, because of an injury or occupational illness, experienced one or more of the following:
a. Permanent transfer to another job or termination.
b. Medical treatment greater than first aid.
c. Loss of consciousness.
d. Restricted work activity or profile.
e. Diagnosis as having an occupational illness that did not result in a fatality or lost-workday case. This includes newly diagnosed occupational illnesses detected on routine physical examinations.

Nuclear weapon
A device in which the explosion results from the energy released by reactions involving atomic nuclei, either fission, fusion, or both. For the purpose of this pamphlet, nuclear components of weapons are also included.

Nuclear weapon minor incident
An unexpected event (flag word DULL SWORD) involving nuclear weapons that is not reportable as a nuclear weapon mishap or significant incident, but which results in any of the following:
a. Damage to the warhead, or warhead section which Army organizations are authorized to repair, or malfunctions of associated equipment that could result in damage to the warhead, or warhead section. Associated equipment includes test, handling, and launch, control, arming, and monitoring systems.
b. Damage, loss, or destruction of a nuclear-type training weapon, warhead, or warhead section. Of particular concern are instances of damage or equipment failure when the same technical procedures and equipment prescribed for use with nuclear weapons were being used on a trainer.
c. Unauthorized acts that degrade the safety of a nuclear weapon, unless they are reportable as mishaps or significant incidents.
d. A nuclear-capable missile system mishap in flight that does not meet the definition of a NUCFLASH (NUCFLASH refers to detonation or possible detonation of a nuclear weapon which creates a risk of an outbreak of nuclear war) or while being transported or stored, even though no nuclear warhead or warhead joint flight test assembly is attached at the time. Missile system mishaps will be reported and will contain the flag word DULL SWORD.
e. Any unexpected occurrence, which results from Army developmental weapon testing, stockpile testing, or product improvement program testing of a nuclear weapon.
f. Any other condition (for example, potentially adverse publicity, unauthorized release of contamination, or suspected contamination of the environment.) which is reportable in the judgment of the commander or custodian of a nuclear weapon.

Nuclear weapon mishap
An unexpected event (flag word OPREP–3 PINNACLE BROKEN ARROW) involving nuclear weapons or nuclear components that results in any of the following:
a. Non-nuclear detonation or burning of a nuclear weapon or radiological nuclear weapons component.
b. Radioactive contamination.
c. Seizure, theft, loss, or destruction of a nuclear weapon or radiological nuclear weapon component, including jettisoning.

d. Public hazard, actual or implied.

Nuclear weapon significant incident
An unexpected event (flag word OPREP–3 BENT SPEAR) involving nuclear weapons or nuclear components that does not fall into the nuclear weapon mishap category but results in any of the following:
a. Evident damage to a nuclear weapon(s) to the extent that major rework, complete replacement or examination, or recertification by DOE is required.
b. The striking of a nuclear weapon by lightning or when a commander suspects that lightning has degraded the safety or reliability of a nuclear weapon system.
c. Known or suspected arming (partially or fully) of a nuclear weapon.
d. Probable high interest by the public or news media that may result in adverse public reaction (national or international) or premature release of classified information.
e. An attempted penetration, actual penetration, or other unexpected degradation of the security of nuclear weapons sites, activities, or logistical movements.
f. A threat, actual or implied, of an attempt to seize a nuclear weapon. This includes a threat to attack or inflict damage to a nuclear weapons storage site, nuclear weapons, or nuclear weapons security forces.

Nuclear weapon war risk mishap
An event (Flag word OPREP–3 PINNACLE NUCFLASH) that results in an mishap, unauthorized, or unexplained nuclear detonation; or an mishap or unauthorized launching, firing, or use by U.S. Forces or U.S.-supported Allied Forces of a nuclear-capable weapon system which could create the risk of an outbreak of war.

Occupational illness
Occupational illness is defined as any abnormal condition or disorder resulting from a noninstantaneous event or exposure in the work environment.

Occupational injury
A wound or other condition of the body caused by external force, including stress or strain. The injury is identifiable as to time and place of the occurrence and a member or function of the body affected, and is caused by a specific event or incident or series of events or incidents within a single day or work shift.

Off duty
Army personnel are off duty when they:
a. Are not in an on-duty status, whether on or off Army garrisons.
b. Have departed official duty station, TDY station, or ship at termination of normal work schedule.
c. Are on leave and/or pass.
d. Are traveling before and after official duties such as driving to and from work.
e. Are participating in voluntary and/or garrison team sports.
f. Are on permissive TDY (no cost to Government other than pay).
g. Are on lunch or other rest break engaged in activities unrelated to eating or resting.

Off duty in a combat theater
In a combat theater, general considerations for making the duty status determination include the following:
a. Soldier is off duty in a combat theater when on personal time in major built-up areas.
b. Personal time does apply in areas where Soldiers are NOT authorized to have weapons loaded and are free to pursue personal activities without supervision such as personal hygiene, personal trips to food exchanges and internet cafes (areas other than duty-associated mess hall), participation in recreational sports, and personal time in containerized housing units or sleeping areas.

Office
Activities associated with the performance of clerical, typing, and administrative-type duties; excludes supervisory activities. (For example, typing/work processing, filing/posting, telephoning, operating office machines.)

On duty
Army personnel are on duty when they are:

a. Physically present at any location where they are to perform their officially assigned work. (This includes those activities incident to normal work activities that occur on Army garrisons such as lunch, coffee, or rest breaks, and all activities aboard vessels).
b. Being transported by DoD or commercial conveyance for the purpose of performing officially assigned work. (This includes reimbursable travel for performing TDY, but not routine travel to and from work.)
c. Participants in compulsory physical training activities, including compulsory sports.
d. Soldiers operating in and around outposts where combat operations are anticipated around the clock are considered to be on duty 24 hours a day.
e. If a mishap discharge occurs while Soldiers are conducting weapons maintenance, even if the incident occurs during personal, unsupervised time, the mishap is on duty.

Operating nation
The nation that owns the aircraft or missile. In certain cases, this explanation will not apply. Therefore, the nations concerned may agree that the operating nation is the nation under whose direct control the aircraft or missile was being flown or operated at the time of the mishap or incident.

Operating vehicle or vessel
Activities associated with operating vehicles or vessels under power. (For example, driving, convoying/road marching, towing/pushing, mowing, hauling/transporting, driver testing, flying, vehicle road testing.)

Operational control
Operational control is the authority to perform those functions of command over subordinate forces involving organizing and employing command and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission. Operational control includes authoritative direction over all aspects of military operations and joint training necessary to accomplish missions assigned to the command. It does not, in and of itself, include authoritative direction for logistics or matters of administration, discipline, internal organization, or unit training.

Parachuting
To descend by means of a parachute.

Patient care (people/animals)
Activities associated with the medical treatment, detection, and prevention of disease/injury; excludes experiments, studies, and tests conducted with well people or animals for research purposes. (For example, injection/inoculation, cleaning wounds, medical equipment operations and handling, laboratory equipment operations and handling, changing dressings, lift/position/escort patients.)

Permanent partial disability
Any injury or occupational illness that does not result in death or PTD but, in the opinion of competent medical authority, results in the loss or permanent impairment of any part of the body, with the following exceptions:
a. Loss of teeth.
b. Loss of fingernails or toenails.
c. Loss of tip of fingers or tip of toe without bone involvement.
d. Inguinal hernia, if it is repaired.
e. Disfigurement.
f. Sprains or strains that do not cause permanent limitation of motion.

Permanent total disability
Any nonfatal injury or occupational illness that, in the opinion of competent medical authority, permanently and totally incapacitates a person to the extent that he/she cannot follow any gainful employment. (The loss or loss of use of both hands, feet, eyes, or any combination thereof because of a single mishap will be considered PTD.)

Personal hygiene/food/drink consumption/sleeping
Activities associated with taking care of personal requirements. (For example, personal cleaning, grooming, eating, drinking, and sleeping/resting.)

Pest/plant control
Includes activities performed at personal residences and government facilities; excludes pest control tests and experiments. (For example, prepare/mix/dispense chemicals, inspect, setting traps, baits.)

Physical training
Body conditioning or confidence building activities, excludes combat skills development. (For example confidence courses, combat football, combat basketball, push-ball, marches, calisthenics, pugil stick, running/jogging, physical training test.)

Precautionary landing
A landing resulting from unplanned events that makes continued flight inadvisable.

Pre-existing physical condition
A medical condition that existed prior to the occurrence of the mishap.

Probability
Probability is the qualitative or quantitative likelihood of a particular event or sequence of actions initiated by a hazard-related cause resulting in the maximum credible loss. The probability can be expressed as the product of the incident rate and mishap set likelihood.

Recommendations
Those actions recommended to the command to correct system inadequacies that caused, contributed, or could cause or contribute to an Army mishap. Also referred to in this pamphlet as corrective action, remedial measures, and/or countermeasures.

Regular Army personnel
Members of the Army on full-time duty in active military service, including cadets at the U.S. Military Academy.

Reportable
All occurrences that cause injury, illness, or property damage of any kind must be reported to the Soldier/employee/unit's servicing/supporting safety office.

Reserve Officers' Training Corps personnel
a. Members of the ROTC during periods of basic or advanced training at premises owned or under the control of the Army whether on or off duty.
b. Cadets performing professional enrichment training while under Army supervision and directed by competent orders, regardless of the location of the training site. Regular training on campus is excluded; that is, weekly drill and classroom instruction.
c. Cadets involved in rifle and pistol marksmanship training under Army supervision on any firing range.
d. Cadets undergoing ROTC flight instruction.

Residual risk
The levels of risk remaining after controls have been identified and countermeasures selected for hazards that may result in loss of combat power (personnel or equipment). Risks remaining after hazard mitigation measures have been applied.

Residual significant risk
Residual significant risk is any risk remaining in a system after corrective actions have been executed.

Restricted work activity
Individual's injury is such that they are unable to perform their normal duties. (For example, light-duty, and profile.)

Risk
Probability and severity of loss linked to hazards.

Risk acceptability
Risk acceptability is that level of risk which has been determined as tolerable in order to fulfill mission requirements. It represents a level of risk where either the output of resources to rectify safety deficiencies does not result in a proportional increase in the level of safety be provided, or so restricts the performance that the assigned mission cannot be executed.

Risk acceptance
Risk acceptance is a formal and documented process indicating Army Leadership understands the hazard, its associated cause, and the probable consequences to mission, personnel, equipment, public, and/or the environment and that they have determined the total risk is acceptable because of mission execution. Risk acceptance is an Army Leadership prerogative.

Risk acceptance level
Risk acceptance levels are used to denote the level of risk a particular level of Army Leadership and Management may accept. These levels are based on the magnitude of the risk involved and the duration of the risk acceptance.

Risk assessment
The identification and assessment of hazards (the first two steps of the risk management process).

Risk decision
The decision to accept or not accept the risk(s) associated with an action; made by the commander, leader, or individual responsible for performing that action.

Security/law enforcement
Activities associated with MP, CID, and other military or civilian personnel performing security or law enforcement rescue duties. (For example, traffic safety, investigating, apprehending suspects, guarding/patrolling, controlling disturbances, intelligence activities.)

Severity
The expected consequence of an event (hazardous incident)in terms of degree of injury, property damage, or other mission impairing factors (loss of combat power and so on) that could occur.

Soldiering
Noncombat activities peculiar to military life, includes receiving instruction/training in such activities, excludes classroom training. (For example, marching, police call, formation, barracks detail, field sanitation.)

Sports
Includes activities associated with sports, regardless of whether the participation is on duty or off duty, Army-supervised or unsupervised, excludes hobbies. (For example, racquetball/paddleball, handball, softball, tennis, soccer, baseball, basketball, football, volleyball, skiing, swimming, scuba diving, golf, boating, hunting, fishing, martial arts, canoeing.)

Standards failure
Standards/procedures not clear or practical, or do not exist.

Supervisory
Activities associated with the management of personnel. (For example, inspection tasks, directing workloads/work crews, monitoring work/crews, planning unit activities.)

Support failure
Inadequate equipment/facilities/services in type, design, availability, or condition, or insufficient number/type of personnel, which influenced human error, resulting in an Army mishap.

Tactical training
Training in a field environment that uses or develops combat, combat support, or combat service support skills.

Test/study/experiments
Activities associated with the conduct of tests, studies, and experiments on natural or man-made materiel or on human beings or animals for research projects. (For example, preparing for test/study/experiment, performing test/study/experiment.)

Training failure
Soldier/individual not trained to known standard (insufficient, incorrect, or no training on task-insufficient in content or amount).

Training-related death
A death associated with a noncombat military exercise or training activity that is designed to develop a military member’s physical ability or to maintain or increase individual/collective combat and/or

peacekeeping skills, and is due to either a mishap or the result of natural causes occurring during or within one hour after any training activity where the exercise or activity could be a contributing factor. This does not apply to DA Civilians participating in a Wellness Program.

U.S. Army Reserve personnel
USAR members who are on—
a. Active duty for training.
b. Inactive duty training.
c. Annual training.
d. Active Duty Special Work.
e. Active Guard Reserve.
f. Temporary Tour Active Duty.
g. Full-time manning.

Unexploded ordnance
Ammunition and explosives that have been primed, fused, armed, or otherwise prepared for action and that have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, garrisons, personnel, or materiel, and remain unexploded by malfunction, by design, or for any other cause. Unexploded ordnance is synonymous for the dud.

Unmanned aircraft
An Army aircraft, to include Aerostat balloons, operated without the possibility of direct human intervention from within or on the aircraft. It is operated by personnel on the ground or in a manned aircraft. It is the major component of an UAS. An unmanned aircraft carries a variety of payloads to include day/night cameras, weapons, and so forth.

Unmanned aircraft system
The system, whose components include the necessary equipment, data communications links, and personnel to control and employ unmanned aircraft, to include Aerostat balloons. The UAS is composed of six primary components: the aircraft, payloads, data communications links, ground control stations, ground support equipment, and personnel to operate and maintain.

Unmanned aircraft system groups
a. *Group 1.* Has a maximum gross takeoff weight of 1–20 pounds; operates normally at less than 1,200 feet above ground level (AGL) and at a speed of less than 100 Knots indicated airspeed (KIAS).
b. *Group 2.* Has a maximum gross takeoff weight of 21–55 pounds; operates normally at less than 3,500 feet AGL and at a speed of less than 250 KIAS.
c. *Group 3.* Has a maximum takeoff weight less than 1,320 pounds; operates normally at less than 18,000 feet AGL and at a speed of less than 250 KIAS.
d. *Group 4*. Typically weighs more than 1,320 pounds and normally operates below 18,000 feet mean seal level (MSL) at any speed.
e. *Group 5.* Typically weighs more than 1,320 pounds and normally operates higher than 8,000 MSL at any speed.

Weapons firing
Carrying, loading, sighting, firing, assembling. (For example, emplacing, loading/unloading, sight/aim/target acquisition, elevate/lowering, traversing, fire/discharge/wield/launch/throwing, assemble/disassemble/cleaning, bore sighting, misuse.)

Workplace
A place (whether or not within or forming part of a building, structure, or vehicle) where any person is to work, is working, for the time being works, or customarily works, for gain or reward; and in relation to an employee, includes a place, or part of a place, under the control of the employer (not being domestic accommodation provided for the employee).

Work-related injuries
Injuries or occupational illnesses incurred while performing duties in an on-duty status.

SUMMARY of CHANGE

DA PAM 385–40
Army Mishap Investigations and Reporting

This major revision, dated 24 July 2023—

- Changes the title from “The Army Accident Investigations and Reporting” to “The Army Mishap Investigations and Reporting.” (cover).
- Fundamentally shifts the way the Army investigates mishaps by transitioning to the use of the Army Safety Information Management System to complete the mishap investigations online (para 5–1 and app E).
- Addresses Human Factors as an integral part of mishap investigations (throughout).
- Replaces the term “accident” with the term “mishap” (throughout).
- Cancels the following previously prescribed forms:
    - DA Form 285 (Technical Report of U.S. Army Ground Accident)
    - DA Form 285–A (Technical Report of U.S. Army Ground Accident Index A)
    - DA Form 285–AB (U.S. Army Abbreviated Ground Accident Report (AGAR))
    - DA Form 285–B (Technical Report of U.S. Army Ground Accident Index B)
    - DA Form 285–O (Technical Report of U.S. Army Ground Accident Statement of Reviewing Officials)
    - DA Form 2397 (Technical Report of U.S. Army Aircraft Accident Part I–Statement of Reviewing Officials)
    - DA Form 2397–1 (Technical Report of U.S. Army Aircraft Accident Part II–Summary)
    - DA Form 2397–2 (Technical Report of U.S. Army Aircraft Accident Part III–Findings and Recommendations)
    - DA Form 2397–3 (Technical Report of U.S. Army Aircraft Accident Part IV–Narrative)
    - DA Form 2397–4 (Technical Report of U.S. Army Aircraft Accident Part V–Summary of Witness Interview)
    - DA Form 2397–5 (Technical Report of U.S. Army Aircraft Accident Part VI–Wreckage Distribution)
    - DA Form 2397–6 (Technical Report of U.S. Army Aircraft Accident Part VII–In-Flight or Terrain Impact and Crash Damage Data)

- DA Form 2397–7 (Technical Report of U.S. Army Aircraft Accident Part VIII–Maintenance and Material Data)
- DA Form 2397–8 (Technical Report of U.S. Army Aircraft Accident Part IX–Personal Data)
- DA Form 2397–9 (Technical Report of U.S. Army Aircraft Accident Part X–Injury/Occupational Illness Data)
- DA Form 2397–10 (Technical Report of U.S. Army Aircraft Accident Part XI–Personnel Protective/Escape/Survival/Rescue Data)
- DA Form 2397–11 (Technical Report of U.S. Army Aircraft Accident Part XII–Weather/Environmental)
- DA Form 2397–12 (Technical Report of U.S. Army Aircraft Accident Part XIII–Fire)
- DA Form 2397–13 (Technical Report of U.S. Army Aircraft Accident Index A)
- DA Form 2397–14 (Technical Report of U.S. Army Aircraft Accident Index B)
- DA Form 2397–AB (Abbreviated Aviation Accident Report)
- DA Form 2397–U (Unmanned Aircraft System Accident Report)