FISCAL YEAR 2017

Annual Assessment of the Army Safety Program

Director of Army Safety
At the close of every fiscal year, the U.S. Army Combat Readiness Center conducts a holistic review of Army-wide mishap data from the previous 12 months to analyze trends and offer commanders insights to augment their safety programs. This detailed assessment is a product of those efforts.

As a whole, Army mishap fatalities remained below the 10-year average during fiscal 2017. On-duty ground fatalities fell to their lowest level in at least a decade, while aviation fatalities remained stable in recent fiscal years. However, a slight increase in private motor vehicle fatalities showed that off-duty activities remain our Army’s enduring safety challenge.

While we traditionally assess mishap data against near-term intervals such as year-over-year comparisons or five- to 10-year comparative performance, current world events demand a longer view of operational safety. The following graphs depict on-duty manned aviation and ground Class A mishaps and rates during the last 35 years.

**35-YEAR TREND (FY83 - FY17) AVIATION (MANNED) CLASS A MISHAPS AND RATES**

![Graph depicting 35-year trend of aviation (manned) Class A mishaps and rates during FY83 - FY17.](image)

Data as of 5 Dec 2017
Rate Per 100,000 Hours

- Class A
- Class A Rate
- Flying Hours

- AH-64A
- OH-58D
- UH-60L
- ACT HUD
- AH-64D
- ACT-E
- CH-47F
- UH-60M
- AH-64E

Class A Total

- FY83
- FY85
- FY87
- FY89
- FY91
- FY93
- FY95
- FY97
- FY99
- FY01
- FY03
- FY05
- FY07
- FY09
- FY11
- FY13
- FY15
- FY17

Future

- OIR
- OND
- Kosovo
- Bosnia
- OEF/OIF
- Somalia
- Panama
- Grenada

Flying Hours (x 1,000)
Our force must always prepare for another major operation, and past conflicts show we can expect a significant increase in Class A mishaps and fatalities if and when we enter a new combat theater.

As our Army remains globally deployed and engaged, our leaders and Soldiers continue to do a remarkable job maintaining consistently low Class A mishap and fatality rates. Yet the historical trends indicated in these graphs can help us predict what to expect mishap-wise during our next large-scale deployment or operation. While preparing for future contingencies, our challenge will be breaking this cycle of increased mishaps in a new environment while enabling and maintaining readiness.

The USACRC initiated a comprehensive study of information from previous deployments to determine the causal factors behind these trends. Anecdotally, we assess these spikes are caused primarily by failure to follow established standards and procedures, conducting tasks without proper training or equipment, and executing missions with an undue sense of urgency, regardless of risk. We will share lessons learned as they become available.

In the meantime, we can prevent the next potential increase of mishaps by focusing on the fundamentals of our profession: training, leader development, discipline, and standards. Use this assessment as a guide for developing your team’s safety goals for the new year and beyond. Thank you for your continued efforts to protect the force and enhance readiness. The USACRC stands ready to assist.

**Readiness Through Safety!**

**DAVID J. FRANCIS**  
Brigadier General, USA  
Commanding
FY 2017 STATE OF ARMY SAFETY – MISHAPS AND CULTURE

Class A Army mishaps and fatalities have steadily declined during the past 10 years, falling to historic lows even as the force remains engaged in challenging and dangerous environments across the globe. Fiscal Year 2017 saw the Army’s first real increase in mishap fatalities since FY07, driven by a notable rise in off-duty deaths. On-duty mishap fatalities, however, remained stable with the previous five years, highlighting the consistency with which our commanders and subordinate leaders are integrating risk management into their mission sets (figure 1). Despite the increase in fatal mishaps off duty, FY17 still ranked as one of the Army’s safest years on record.

While fatalities are the most catastrophic and concerning outcome we measure, mishap rates — which account for force structure adjustments — provide a more comprehensive picture of a safety program’s effectiveness. Using rates as a baseline, combined aviation and ground Class A mishaps have declined 10 percent since FY13 (figure 2). Aviation and ground mishap rates are calculated according to different factors, and the detailed sections below (On Duty, Off Duty, and Civilian Injury) reflect appropriate methodology for the given category.
With respect to unmanned aircraft, 74 Class A-C mishaps, with 15 Class A, were reported during FY17, as compared to 55 and 14, respectively, in all of FY16. Aerostat units also recorded six Class A and one Class C mishap. Unmanned mishap rates were comparable to previous years that saw fielding of new or upgraded aircraft. Materiel failure remained the leading causal factor in unmanned mishaps, followed by human error.

Figure 3 outlines FY17 manned and unmanned aviation Class A-C totals and rates.

Manned Aviation

The Army recorded 1,014 Class A-C manned aviation mishaps from FY08-FY17, with the highest total mishaps and rates occurring in FY09 and the lowest in FY13.

Figure 4 illustrates total manned aircraft flight hours (fixed and rotary wing) and associated Class A and Class A-C mishap rates per 100,000 flight hours for all components during the 10-year period.

![Manned Class A - C (Flight) Mishap Rate](image)

Class A-C manned aircraft mishaps rose 4 percent during FY17, from 73 in FY16 to 76. Nine Class A mishaps (eight flight, one flight-related) across all components resulted in a Class A flight mishap rate of 0.99, 14 percent above FY16’s rate of 0.87. Ten fatalities resulted from four UH-60 mishaps and one AH-64 mishap. Of the Class A mishaps, six occurred at night and three during the day; six were at home station and three forward deployed; and six were directly caused by human error.

Class B manned mishaps dropped slightly from FY16 (11 total versus 12), with 10 flight mishaps and one aircraft ground. Three mishaps occurred at night and eight during daytime hours. Class C mishaps totaled 56 (45 flight, three flight related, and eight aircraft ground), with 45 occurring during the day and 11 at night. Causal factors included 32 human error, three environmental, and 21 undetermined or unreported.

Four of FY17’s Class A and B manned mishaps occurred in a degraded visual environment (DVE). Since 2002, DVE has factored into more than 30 percent of all UH-60 and CH-47 Class A and B mishaps. Ten Class A mishaps in DVE conditions resulted in 24 service member fatalities in the past five years. Brownout conditions were cited in 59 percent of mishap reports for the five-year period, as well as three FY17 mishaps (one Class A and two Class B). One additional DVE Class A mishap occurred in low illumination/low contrast conditions when the aircrew became spatially disoriented and crashed, resulting in five fatalities.

Aircrew coordination errors, a subset of human error, contributed to approximately 32 percent of Class A mishaps during FY17. Three Class A mishaps were associated with crew coordination errors, including failure to effectively communicate among crewmembers and lack of assertiveness to state or obtain critical information.

Summary

In an effort to continue loss prevention in manned aviation, the following initiatives are taking place across the Army.

The United States Army Aviation Center of Excellence is developing an aviation battle book to establish common operating procedures within the Aviation Branch. Standardization of key elements in aviation operating procedures, including operational risk management, will optimize interoperability between aviation units, enhance support to aviation customers, and reduce risk associated with mission planning and execution.
The USACRC is working with Program Executive Office-Aviation to incorporate the Safety Awareness Program-Aviation (SAP-A) into the new Aviation Data Exploitation Capability Program, currently in the testing phase. A proactive hazard reporting program designed to enhance aviation safety, SAP-A is an anonymous, self-reporting program modeled after similar systems embedded in many airlines to encourage voluntary reporting of risky practices. Unit leaders will see the anonymous reports and may use that data to address safety concerns or prevent high-risk activities. The target date for SAP-A fielding is late FY18.

Aircrew members currently receive annual crew coordination training that incorporates lessons learned from recent mishaps. Leader emphasis to ensure effective crew coordination training can make a tremendous difference in mishap prevention.

**Unmanned Aviation**

Class A-C unmanned aviation mishaps increased 35 percent during FY17, with 74 mishaps recorded versus 55 the year prior and a Class A rate of 12.41. For the 10-year period from FY08 to FY17, the Army recorded 627 Class A-C unmanned mishaps with a Class A rate of 10.17 for MQ-1 and MQ-5 (the only unmanned aircraft that can reach the cost threshold for Class A classification). The combined 10-year Class A-C rate for MQ-1, MQ-5 and MQ-7 airframes is 35.25. Overall, MQ-1C Gray Eagle Class A mishaps fell 49 percent in FY17, while RQ-7B Shadow Class B-C rates climbed 49 percent during the last two years due primarily to materiel failures.

**MQ-1C Gray Eagle:** Units reported 15 Class A-C mishaps during FY17 (figure 5): nine Class A, two Class B, and four Class C. The Class A flight mishap rate was 10.03, a 49 percent decrease from FY16. Human error was cited in 53 percent of mishaps; materiel failure in 41 percent; environmental factors in 7 percent; and unknown/unreported factors in 7 percent.

**RQ-7B Shadow:** The Army recorded 15 Class B and 37 Class C mishaps in FY17. Approximately 71 percent of those mishaps were attributed to materiel failure; 19 percent to human error; 2 percent to environmental; and 8 percent unknown/unreported. Figure 6 depicts total flight hours and associated Class B-C mishap rates.

**Aerostat:** Of the six Class A and one Class C mishaps during FY17, environmental factors (high, gusty winds) were determined as the primary causal factor.

**Summary**

Although materiel failure remains the predominant causal factor, human error still contributes to a significant number of unmanned mishaps. Factors include failure to follow proper procedures, maintenance errors and inadequate supervision. The countermeasures for human error failures remain proper adherence to established procedures and checklists, adherence to standards while conducting training and mission tasks, maintaining proficiency levels, and having qualified supervisory personnel.

**Figure 5**

**Figure 6**

**ON DUTY: GROUND OVERVIEW**

Similar to aviation, on-duty ground mishaps increased at the start of OIF/OEF but declined significantly during the past decade, albeit with some fluctuation. During the last five years, however, Class A-C mishap rates stabilized and have steadily remained relatively low.
Motor vehicle mishaps continue to produce the majority of Class A mishaps and result in the greatest share of on-duty ground fatalities. Sports/physical training mishaps and combat soldiering/tactical training activities account for the majority of nonfatal Class A-D mishaps.

The on-duty ground Class A mishap rate increased 27 percent during FY17 and was slightly higher than the five-year average, but total associated Soldier fatalities were at their lowest level since FY08. Army vehicle mishaps were primarily responsible for the increase in on-duty Class A mishaps (figure 7).

In addition to the 18 Soldier fatalities recorded in FY17, two Department of the Army Civilians (DACs), one Army contractor, and two members of the public were killed in on-duty mishaps. Those fatalities are discussed in greater detail in the Civilian Injury section of this assessment.

**On-Duty Ground Class A Mishaps**

![On-Duty Ground Class A Mishaps](image)

**Army Vehicles**

Thirteen Soldiers died in 21 Class A on-duty Army or private motor vehicle mishaps during FY17, compared to 16 fatalities in 13 vehicle mishaps the year prior (figure 8). Approximately 64 percent of FY17’s Class A-D Army vehicle mishaps were attributed to operator error, with speed, inattention, and poor judgment the most prevalent contributing factors. Passenger injury accounted for a further 16 percent, resulting from rough terrain, sudden stops, shifting cargo, or weapons systems or hatches.

Vehicle fires increased during the past five years and made up 8 percent of all FY17 mishaps, a 3 percent increase from FY16. A majority of these fires were due to an aging fleet prone to exhaust system and fluid leaks, as well as electrical wiring shorts. Fires were also reported during recovery operations with vehicles improperly prepared for towing (preparation of transfer case and drive shafts).

**Weapons/Explosives**

Three on-duty Class A weapons/explosives mishaps resulted in four Soldier fatalities across the Army in FY17. This marked an increase from FY16, when three Soldiers were killed in mishaps involving weapons or explosives.

**On-Duty Other**

Other on-duty Class A mishaps remained steady from FY16 to FY17. Nine mishaps resulted in four fatalities (three Soldiers and one civilian) and two disabling Soldier injuries. Two Soldier fatalities occurred during APFT, and one Soldier died during a night SCUBA dive. The civilian was killed during boat-operator training conducted by a DAC. One Soldier suffered a disabling injury after contacting a power line during checks on an M1 Abrams tank while conducting rail load operations. In a separate event, a Soldier injured himself during horseplay while on break. Three of the nine Class A mishaps resulted from weather damage.

**Summary**

Following an Army-wide assessment of driver training challenges and their correlation to mishap trends, the USACRC Ground Division is working with the U.S. Army Training and Doctrine Command, Army Materiel Command, and DA G3/5/7 to improve training, certification processes, and operator tools. Related assessment visits and mishap analyses were instrumental in shaping targeted recommendations for revision of Army Regulation 600-55, The Army Driver and Operator Standardization Program (Selection, Training, Testing, and Licensing), which is expected for publication in spring 2018.

With approval of the Army Airborne Board, the USACRC is working closely with stakeholders throughout the Army and Joint Airborne communities.
on the Parachute Suite of Sensors (PSS). The PSS will leverage current technology to recreate the sequence of jump operations events and be used for training, life cycle management, and mishap investigations.

The USACRC is also working with the Center for Applied Critical Thinking to help leaders, Soldiers, and safety professionals become more aware of behavioral tendencies such as bias, cognition errors, and groupthink in risk management practices.

**OFF DUTY OVERVIEW**

During the last five years, off-duty Class A mishap rates fell 10 percent across the Army. However, total off-duty Class A mishaps increased 9 percent during FY17 (figure 9). Sustaining a decades-long trend, private motor vehicle (PMV) mishaps accounted for the majority of off-duty Class A mishaps (figure 10), although both total mishaps and rates gradually declined for the five-year period. Mishaps involving water-related activities and privately owned weapons continue to comprise the next-greatest shares of off-duty Class A mishaps.

Despite the Army’s lingering safety challenge with PMVs, Soldier PMV fatality rates are historically lower than the nation as a whole (figure 11). Data from the National Safety Council show that, for calendar years 2015 and 2016, the United States experienced its largest two-year percentage increase (6 percent) in motor vehicle deaths in more than 50 years. Soldier PMV-4 fatalities, meanwhile, declined 27 percent for the same time frame.

Fatality rates have declined steadily since CY10, when senior leaders implemented mandatory motorcycle training for riders across the force.

While Soldier pedestrian fatalities increased dramatically in FY17, relevant data show the Army is trending under the national average. A March 2017 report from the Governors Highway Safety Association stated that fatal pedestrian mishaps jumped 11 percent nationally between CY15 and CY16, the greatest single-year increase ever and the highest total fatalities in more than 20 years. Using the report’s statistical methodology, figure 12 depicts the Army’s pedestrian fatality trend line as compared to the nation.

![Figure 10](image_url)

**PMV-4**

Off-duty PMV-4 mishaps resulted in 37 Soldier fatalities during FY17, up from 31 the previous year. These mishaps predominantly involved Soldiers at the rank of E1-E4 and aged between 18 to 24. As in years past, indiscipline was the leading causal factor cited in mishap reports — primarily speeding, failure to wear seat belts, and alcohol use.
Soldier motorcycle fatalities fell 18 percent during FY17, down to 28 from 34 the year prior. Of those mishaps, 46 percent involved a leader over age 25, and primary causal factors included speeding and failure to wear personal protective equipment.

Eleven Soldiers were killed in off-duty pedestrian mishaps during FY17, compared to four in FY16. Approximately a third of those mishaps involved alcohol, and all but one occurred after dark and six after midnight. Over the last five years, 58 percent of fatal pedestrian mishaps involved alcohol or some form of indiscipline. For the same time period, 24 percent of pedestrian fatalities involved Soldiers attempting to render roadside assistance to fellow motorists.

Three Soldiers were killed and two suffered disabling injuries in off-duty weapons handling mishaps during FY17. Alcohol was cited as a factor in two of those mishaps.

Of 15 off-duty Other fatal mishaps in FY17, eight Soldiers died during water-related activities; two in privately owned aircraft mishaps; two while participating in winter sports; two in a single cabin fire; and one while engaging in high-risk sexual behavior. One Soldier suffered disabling injuries after a mishap on a trampoline.

The USACRC is continually refining tools to assist commanders in addressing off-duty mishaps. The Off-Duty Safety Awareness Presentation, developed for use at battalion level and below and updated annually based on mishap trends, helps make Soldiers aware of potential hazards and empowers them to be part of the risk management solution. Driving safety also remains a priority, with approximately 11,000 Soldiers completing the Intermediate Driver Training Course and Army Traffic Safety Training Program during FY17.

The USACRC is pursuing additional behavioral-based instruction to augment current motorcycle operator training and continues to engage leaders, mentors and riders on benefits of the Motorcycle Mentorship Program. Leaders and mentors may also find value in the USACRC’s mentorship subscription page, which provides users up-to-date information and guidance at https://safety.army.mil.

Two DACs died in civilian injury mishaps during FY17, but Class A mishap rates have remained consistent for the last five years. Both fatalities — which involved operation of heavy equipment — were attributed to “caught-in/between,” one of the Occupational Safety and Health Administration’s (OSHA) top four causal factors in construction operations. Overall DAC injury claims were up in FY17 but costs fell for the year, and data indicate no new loss trends or any significant changes to injury cause.

Department of Labor (DOL) records show that for the 2016 chargeback year ending 30 June 2017, the Army recorded 13,660 DAC injury or illness claims, compared to 12,161 in 2016. The DAC population remained relatively stable: 256,582 in FY16 versus 255,854 in FY17. Chargeback costs decreased from $160 million in 2016 to $148 million in 2017 (figure 13). A significant drop in medical expenses drove most of the decrease in Federal Employees Compensation Act costs. The DOL instituted a series of new requirements for opioid and compound medications that seemed to curtail the explosive growth of drug costs during previous years. The Army also saw a decline in lost-time injuries during FY17 (figure 14) and returned 11 employees to duty from the workers’ compensation rolls via the DoD Pipeline Program, thereby avoiding an estimated $17 million in future costs.

The total injury and illness case rate fell from 2.02 in FY16 to 1.77 in FY17, and the lost-time injury and
Illness case rate dropped from 1.18 to 1.09. Data from the Department of Defense Injury/Unemployment Compensation System indicate 62 percent of FY17's total injury cases resulted from manual handling of equipment (36 percent) and slips, trips, and falls (26 percent).

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**OSHA Inspections**

While not directly related to mishap data, information available from recent OSHA inspections can help commanders focus their loss prevention efforts within the Army's industrial operations. During FY17, OSHA conducted 67 inspections of Army organizations and issued 118 violations. Six of the Army's top 10 violations are common to private industry (figure 15). Electrical standards and means of egress were the Army's top two safety violations for 2017.

**SAFETY CULTURE AND CLIMATE OVERVIEW**

The Army Readiness Assessment Program (ARAP) is the Army's premier tool for assessing organizational safety climate. By capturing data from battalion-level units across the force, the USACRC can measure changes in overall Army safety culture. The Army’s mean score experienced a .26 percent increase between FY16 and FY17 (figure 16). Although culture
change is a slow process, ARAP survey results show the perception of unit safety climate among Soldiers and DACs continues on a gradual positive trend.

Historical data support the premise that units scoring in the bottom 25 percent account for 75 percent of the Army’s fatalities. Units that score in the top 25 percent experience fewer reportable Class A-B mishaps (Figure 17). Detailed analysis indicates three key factors for obtaining and sustaining a positive safety climate and culture: emphasizing safety at all levels; holding individuals accountable; and quality training.

FY17 Trends

During FY17, the question, “In my unit, we believe safety is an important part of all operations” received the highest score of all 61 survey questions (4.09). The next four highest-scored questions were:

- Leaders in my unit encourage everyone to be safe and to follow the rules (4.08)
- My unit sets high standards and strives to maintain quality control (3.94)
- Based upon my unit’s personnel and other resources, the unit is stretched too thin (2.82)
- Lack of experienced personnel has negatively affected my unit’s ability to operate safely (3.32)
- Mandatory “down time” standards are enforced in my unit (3.39)

Write-in comments provided during the survey give leaders candid feedback to address potential mishap environments and conditions. When asked, “The most hazardous thing I do is … ,” respondents continued to perceive driving a vehicle (privately owned or military) as their most hazardous activity, followed by airborne operations and operating other tactical and non-tactical equipment. When asked how to improve their safety climate or culture, more than 107,000 respondents indicated more/continued job-related safety training, followed by additional resources (time and personnel) and more/improved communication.

Leaders should continue to inculcate safety and risk management into all operations, and ARAP provides an excellent tool for predictive loss prevention.

CONCLUSION

This assessment of the Army Safety Program in FY17 demonstrates that our leaders and Soldiers continue to do a superb job in managing risk in a complex, uncertain, and changing environment. However, we must learn from our past. We have an opportunity now, through increased rigor in training and proactive risk management, to enhance readiness today and prevent the anticipated rapid increase in mishaps in the next fight ... if and when our nation calls.
U.S. ARMY COMBAT READINESS CENTER

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