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DEPARTMENT OF DEFENSE AVIATION SAFETY MISHAP REVIEW AND OVERSIGHT PROCESS

HEARING

BEFORE THE

SUBCOMMITTEE ON TACTICAL
AIR AND LAND FORCES

OF THE

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES

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HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES,
Washington, DC, Wednesday, June 13, 2018.

The subcommittee met, pursuant to call, at 10:01 a.m., in Room 2212, Rayburn House Office Building, Hon. Michael R. Turner (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. MICHAEL R. TURNER, A REPRESENTATIVE FROM OHIO, CHAIRMAN, SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Mr. TURNER. The hearing will come to order. The subcommittee meets today to receive testimony on the Department of Defense [DOD] aviation safety mishap review and oversight process.

I would like to welcome our distinguished panel of witnesses. We have Brigadier General David J. Francis, Commanding General of the Army Combat Readiness Center and Director of the Army Safety; Rear Admiral Mark Leavitt, Commander of the Naval Safety Center; and Major General John T. Rauch, Jr., Air Force Chief of Safety and Commander of the Air Force Safety Center.

I want to thank all of you for attending today, and we look forward to your testimony.

This hearing continues the subcommittee's ongoing oversight of the aviation modernization and readiness. As I have stated before, we are experiencing a crisis in military readiness brought on by years of continuous combat operations and continued deferred modernization, lack of training hours, and aging equipment.

The alarming number of aviation accidents just in the past 3 months reveals how deep the damage goes and the magnitude of the task of repairing and rebuilding our capabilities.

According to a recent Military Times investigation, aviation mishaps rose nearly 40 percent from fiscal years [FY] 2013 to 2017 and nearly doubled for some aircraft.

Just this past weekend an F–15 aircraft assigned to Kadena Air Base in Okinawa crashed while performing routine training maneuvers. Fortunately, the pilot survived. I believe this is the sixth Air Force-related aircraft accident in the last 12 months.

Most concerning is that more U.S. military service members have died in aircraft mishaps over the past year than have died while serving in Afghanistan. One of those service members was a constituent of mine. Gunnery Sergeant Derik Holley was a 33-year-old enlisted Marine, and he was killed while conducting training mis-

sions in a CH–53E helicopter, a helicopter that had been in service since the 1970s.

Given this alarming trend, the hearing today will examine how the military services conduct investigations post accident or mishap. We need to be assured the military services are adequately identifying the source and cause fast enough for us to be able to remedy them.

We specifically want to better understand the process used by the Department and the military services to answer these three fundamental questions regarding mishaps: What happened? Why did this happen? And what changes and recommendations are being taken to prevent this from happening again?

The witnesses today are responsible for conducting investigations of service mishaps, identifying mishap causes and problems, and recommending mitigation actions. We have asked them to walk us through the steps that they use to determine the root causes of aviation mishaps, as well as how they communicate the results of these investigations to their senior leadership for action.

It is my understanding that military accident investigation processes include a thorough review of the mishap aircraft, circumstances of the incident and personnel involved. Investigations of an automobile accident might use a similar process, but if repeated accidents are occurring at the same intersection, it seems most reasonable to examine the intersection itself for changes that need to be made, such as signage, lighting, lane markings, and the number and adequacy of the lanes in question in the intersection.

So I expect today that the witnesses will elaborate on how the military service safety centers collect and report mishap data to the Office of the Secretary of Defense [OSD] as required by current policy, to include data on the underlying factors that cause the mishaps.

For example, I would like to know whether the safety centers include information on human factors that contributed to mishap, which according to DOD represent the leading cause of DOD mishaps.

The hearing will also provide an opportunity to understand how lessons learned or recommendations from the outcomes of these investigations are informing changes to requirements for aircraft modernization in a timely manner.

Additionally, the hearing should help members make a determination as to whether potential changes and reforms are needed in the overarching governance structure for the safety enterprise.

Before I close, I also want to briefly touch on the issue of aging equipment and the undetermined causes and effects that may be evident pre-mishap, and with an awareness that some of those are identified in mishaps actually avoided.

I have had recent discussions with the Secretary of the Air Force. This particular issue is a major concern of not only the Air Force, but also the Department as well. Our subcommittee will be taking a closer look at this issue also, in that there are circumstances with aging equipment where we are identifying vulnerabilities that are being addressed that avoid mishaps, but nonetheless should be brought to the attention of this committee so we look at the overall

enterprise of reviewing these equipments and how we fund and look at modernization and maintenance.

In closing, I am deeply concerned by the recent increase in these mishaps. While I am traveling to military bases, and spoken to pilots and maintainers, I have been more concerned also about morale and how this affects the military services and whether or not the military services are being too slow to respond. We have to do whatever it takes to ensure that our aircraft are safe and that pilots are getting the training that they need. And before we begin with our witness opening statements, I would like to then turn to my good friend Ranking Member Tsongas for her comments.

[The prepared statement of Mr. Turner can be found in the Appendix on page 37.]

STATEMENT OF HON. NIKI TSONGAS, A REPRESENTATIVE FROM MASSACHUSETTS, RANKING MEMBER, SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Ms. TSONGAS. Thank you, Mr. Chairman. And good morning.

I would like to thank our witnesses for being here today to provide us with information on how each of the military services handles aviation mishap investigations and more broadly, aviation safety programs—or aviation safety programs.

The past 2 years and the statistics provided by the witnesses show that despite the best efforts of the services, the aviation safety community, and others, military aviation is an inherently risky endeavor. We ask our aviators to train for and conduct missions in bad weather, at night, at low altitudes, and under other high-risk conditions that no civil aviation aircrew would ever even consider attempting to operate under.

However, this capability to operate at high tempo in all kinds of conditions while conducting complex missions is what differentiates U.S. military from all others. Simply put, lots of nations have advanced aircraft, but only the United States has a capability to put it all together and use airpower to achieve remarkably effective airpower in all kinds of operations.

So I think it is important to keep in mind that having the most capable and powerful military in the world comes at a price, one that is all too real for our pilots and their families.

Realistic and complex training is required to achieve the kind of airpower only the United States can provide. However, this realistic training is sometimes also dangerous, as we have been reminded of recently.

While we would all like there to be zero accidents, it is important to remember there this is no, quote, "free lunch," unquote, and no zero-risk way to train for war. We are fortunate that we have a military full of people willing to take these risks to protect us.

Based on the testimony we received, it is clear that all the services take aviation safety seriously and have a strong cadre of professionals dedicated to this challenge. However, there is always room for improvement.

In today's hearing, I would like to hear how we can do even better and where Congress might be able to help. With that, Mr. Chairman, I look forward to hearing from our witnesses and I yield back.

Mr. TURNER. Thank you. I ask unanimous consent that nonsubcommittee members be allowed to participate in today's hearing after all subcommittee members have an opportunity to ask questions. Is there objection? Without objection, nonsubcommittee members will be recognized at the appropriate time for 5 minutes.

And, also without objection, all witnesses' prepared statements will be included in the hearing record.

General Francis, please begin.

STATEMENT OF BG DAVID J. FRANCIS, USA, COMMANDING GENERAL, U.S. ARMY COMBAT READINESS CENTER AND DIRECTOR OF ARMY SAFETY

General FRANCIS. Chairman Turner, Ranking Member Tsongas, and distinguished members of this committee, thank you for the opportunity to appear before you today to talk about aviation safety and for your continued commitment to our aviation forces.

It is an honor to represent the Army leadership, the soldiers and civilians, and, most importantly, the men and women of Army Aviation who are deployed throughout the world, supporting our Nation today.

The United States Army maintains the world's most modernized and well-trained aviation force of its kind, providing an asymmetric advantage to the joint force. Aviation is an inherently dangerous business and we continue to make strides to reduce mishaps.

Army Aviation Class A mishap rates have steadily declined over the course of the last 35 years, with noticeable anomalies associated with major combat deployments. In FY 2007, during the surge in Iraq, the Army's manned Class A mishap rate was 2.39 per 100,000 flying hours.

In the 10 years that followed, that rate fell to a point—to a low of 0.87 during FY 2016, with a 10-year average of 1.33. FY 2017 ended with a Class A manned mishap rate of 0.99, and the current rate for FY 2018 is 0.93.

The mishap rates from FY 2016 to 2018 year-to-date constitute the lowest 3-year period for Class A aviation mishaps in the last 35 years. Despite this improvement, the Army can—remains committed to aggressively driving our mishap rates down further.

Commanders across the Army are committed to conducting rigorous training in the most demanding environments to ensure we are ready to conduct large-scale combat operations in the most demanding conditions.

The Army Combat Readiness Center mishap investigation and analysis capability is also crucial to meeting this goal. The Combat Readiness Center maintains a cadre of expertly trained accident investigators ready to deploy on a moment's notice, anywhere in the world.

They are tasked with determining the root cause of our most severe mishaps and reporting lessons learned for Army-wide distribution, all with the aim of future mishap prevention.

These teams follow a very deliberate and methodical process to answer three fundamental questions: what happened, why it happened, and what we are going to do about it. The follow-on collective analysis of these mishaps is also crucial to determining strategies to prevent future mishaps.

The Army's efforts to reduce aviation mishaps is an ongoing process. We must train to the highest standards in the most demanding conditions to meet future threats, while systematically drawing from and disseminating lessons learned.

We must remain aware of and mitigate inherent aviation risks, but—aviation risks, but must avoid becoming risk-averse, or we will pay the price in our next conflict.

Mr. Chairman, Ranking Member Tsongas, thank you again for your continued support of Army soldiers, civilians, and families, and I look forward to your questions.

[The prepared statement of General Francis can be found in the Appendix on page 39.]

Mr. TURNER. Admiral Leavitt.

STATEMENT OF RADM MARK LEAVITT, USN, COMMANDER, NAVAL SAFETY CENTER

Admiral LEAVITT. Chairman Turner, Ranking Member Tsongas, distinguished members of the subcommittee, I am grateful for the opportunity to appear before you today.

The aviation mishap investigation review and oversight process is an important topic. Any loss of aircraft, aircrew, or maintainers negatively affects the lethality and resilience of our Navy-Marine Corps team. Our goal is to have zero preventable mishaps, but, for those that do occur, we rigorously investigate and learn from them to help prevent them from happening again.

You have heard in previous testimony that physiological episodes are the number one safety priority in the Naval Aviation community. I wholeheartedly agree. This is a challenging issue, but there are many developments taking place to make our aircrew safer.

Reporting is up because awareness is up. As we thoroughly investigate every single suspected physiological episode, we do that so we can continue to understand them, improve technological advances and human factors modification already in progress.

In addition to our work on physiological episodes, it is important to know that we have detailed procedures in place to immediately investigate all aviation mishaps, even those that don't make the headlines.

After investigating mishaps, hazard reports, and near-miss reports, we immediately disseminate those lessons learned from each one to the respective community of interest. Furthermore, high-velocity learning is central to the fleet safety culture. As such, we reaffirm at every opportunity the importance of and requirement for units sharing these lessons learned and risk mitigation techniques with others.

To enhance the important work that we do responding to and investigating mishaps, the Naval Safety Center is undergoing some major internal organizational improvements. These initiatives align with Secretary Mattis' vision of innovation and delivering performance at the speed of relevance.

Based on the findings in the Comprehensive Review and the Strategic Readiness Review, we are working with fleet and type commanders to aggregate manning, training, and other data sources so we can conduct complex modeling and analytics.

This will allow us to provide a holistic picture about the overall health and risk level of units. Such analysis will provide preventative solutions that naval leaders can use to make decisions that reduce unnecessary exposure to risk.

Getting this right is a vital interest to our Navy-Marine Corps team. Our people are our greatest asset, and keeping them safe is our responsibility. We owe them nothing less.

I look forward to answering your questions. Thank you.

[The prepared statement of Admiral Leavitt can be found in the Appendix on page 48.]

Mr. TURNER. General Rauch.

STATEMENT OF MAJ GEN JOHN T. RAUCH, JR., USAF, AIR FORCE CHIEF OF SAFETY, COMMANDER, AIR FORCE SAFETY CENTER

General RAUCH. Chairman Turner, Ranking Member Tsongas, and distinguished members of the subcommittee, thank you for the opportunity to provide an update on the United States Air Force aviation safety program.

I would like to let you know that safety is a top priority for the Air Force in everything we do, especially in aviation. We understand flying operations carry inherent risk, but we strive to eliminate or mitigate these risks to the greatest extent possible. We owe this commitment to our airmen and to the Nation.

Our view is that one mishap is one too many, and the focus of our safety programs is mishap prevention. We have numerous efforts in place to identify and mitigate hazards well before a mishap occurs. However, when we do have a mishap, we strive to learn everything we can to prevent similar occurrences in the future.

It is important to stress that we thoroughly investigate mishaps, identify root causes in order to formulate recommendations. Indeed, these recommendations are the legacy of a mishap investigation.

We actively manage and track these mishap recommendations into closure. We have had success with this approach over the years, and our long-term aviation mishap rates have generally declined, but we never lose sight of the need to make adjustments to ensure we stay on top of any emerging hazards or trends.

I also want to highlight that working together with the Office of the Secretary of Defense and the other services is an important part of what we do. Our safety centers and leaders constantly share information to ensure synergy and collaboration.

In the end, we want to share effective safety programs across the entire Department to safeguard our people, protect resources, and preserve combat capability.

Thank you and I look forward to your questions.

[The prepared statement of General Rauch can be found in the Appendix on page 66.]

Mr. TURNER. Gentlemen, thank you for your comments. I mean, we certainly all understand that you are committed. We understand that mishap rates might not reflect casualty rates.

Everybody can open the newspaper and look at the news stories that are occurring—that we have an unbelievable amount of risk that our service members are currently undertaking as a result of these mishaps.

We understand what you must do, but this hearing is about are you? So I guess the first thing I would like to ask is, give us an example of something that you are learning.

Tell us something that—you all outlined the process that we expected that you would be undertaking, but give us an example of something that we are learning as a result of the processes that you have been undertaking.

General Rauch, I will begin with you.

General RAUCH. Thank you, sir. One example of one within the last year is we had a mishap with an engine, and one—Class A—and, once they tore into the root cause, they noticed that there was a defect with the actual blades in the engine.

So went back, discovered that it was a manufacturing process and then, real quickly, time-critically, went across the fleet, ended up inspecting 15,000 different fan blades as of a couple weeks ago, noticing that 163 of these were bad and removed them from the system.

That is the way we do it with technology. Now of course that creates a demand on the maintainers or whoever's doing that inspection—has to do with aircraft availability and that sort of thing. We also do the same thing whether it is an operational requirement or something about the way the aircraft itself is maintained.

Mr. TURNER. Admiral.

Admiral LEAVITT. Chairman, I will use the example of a T–45 and the physiological episodes that we were incurring with that airplane. Initially, gathering the data took a little bit of time.

We established the Physiological Episode Action Team, led by a flag officer, instituted a three-part form that allowed us to collect data. And as we dug down into specifically T–45, what we learned—that it was a gaseous oxygen problem that was getting different volumes to the crews in the front and the back.

Working with NAVAIR [Naval Air Systems Command], NASA [National Aeronautics and Space Administration], and some other entities, we discovered that there were some design issues with the piping in the system and some other things. So we increased the idle—power of the engine when it sits at idle to keep the volume of air going through the OBOGS [On-Board Oxygen Generation System] generation system up.

And we are in the process of designing an alternate oxygen supply system that will—is out for a request for—excuse me—to be installed in the airplane, it looks like, down the road, in the next fiscal year.

Mr. TURNER. General Francis.

General FRANCIS. Mr. Chairman, thank you for the question.

I think the biggest thing that the Army has learned over the course of the last year is that an in-depth study of our lesser accidents, in other words Class C mishaps, has provided to be very revealing.

What we often realize is that it is a matter of inches or seconds that make the difference between a Class C or a Class A, which is a more severe mishap and oftentimes with fatalities.

Our study of that has brought us to the production of what we call the near-miss brief, where we take a Class C mishap and, using our flight data recorders, we can recreate the flight and have

a conversation about what might have been different that would have made that catastrophic and what procedures and processes and training can we implement to prevent those from happening in the future.

We are currently conducting that brief across all Army Aviation—Active, Guard, and Reserve. And it is being very well received in the field, and we think it is going to make a big difference. Thanks.

Mr. TURNER. So, when we look at these incidences, the commonality is that things are falling out of the sky. But, when you look at the instances themselves, are you finding commonality?

What types of things, as you are looking at these mishaps, are evident and that we need to be aware of as we look at what we are advancing for the committee's oversight?

General Francis.

General FRANCIS. Thank you, Mr. Chairman.

The U.S. Army—our causal factors have remained relatively constant, and that is that human factors generally count for between about 76 percent and 80 percent of our mishaps; material causes, between about 15 percent and 19 percent of our mishaps.

So what that allows us to do is go in and further refine what those human factors are. And that is a—that is an across the DOD—effort to do right now—and then really go after those primary human causal factors, specifically as relate to training, that we can get after to prevent future mishaps.

Mr. TURNER. Admiral.

Admiral LEAVITT. Thank you, Mr. Chairman. Our data is very similar, with the percentage of both human factors and material failures, and then there's another 5 percent that is yet to be determined due to ongoing investigations.

We are doing the same thing when it comes to human factors. The human factors coding allows us to do exactly the same thing that the Army is doing and get after those specific traits that we need to either change publications for, train—change tactics and procedures for, or do some training adjustments as we move forward. Thank you, sir.

General RAUCH. Thank you, Chairman. Our numbers for us are about 75 percent to 80 percent, as well, that are human factors. And doing some more things, as the other services—and one of the things we are trying to do is get access to, potentially, other data from other sources that aren't in sort of normal safety chains, as well, to see if there's some correlations between those things, as well as the human factors that we are seeing.

But, so far as the human factor identification, as well as the same rates as it relates to the systems, sir.

Mr. TURNER. General Rauch, I understand the Chief of Staff of the Air Force has directed all wing commanders to conduct an operational safety review. And part of the review requires a review of the backlog of mishap safety investigation recommendations which have not been closed.

Could give us an update on the status and how that process works? And then the same question for the others, after you finish. Once you come up with recommendations, what is the oversight process for determining that recommendations are implemented?

And what happens when there's a backlog, as, apparently, the Air Force is experiencing.

General RAUCH. Thank you, Chairman. If I could take the second question first. So we get recommendations that come in from mishaps, average, just under about 100 a month. And so there will be individual OPRs [Offices of Primary Responsibility] that are identified and responsible for those.

And so, whether it is across the different major commands [MAJCOMs]—you can imagine, if they are material ones, a lot of those belong to Air Force Materiel Command; policy and oversight at the major command levels would belong to the operating levels; and then some things would be on the Air Staff that is general policy.

And that kind of accounts for most of the recommendations that aren't local in nature that a wing commander would take care of and it is isolated to themselves, because we try and figure it out—broad spectrum, obviously, internal things to—a wing could take care of.

That process runs yearly. The different MAJCOMs have a different way of handling it. We, internally at the Safety Center, once a week are pulling down what those numbers look like, what the timeline is that people are actually reviewing them.

And if you dig into one of those recommendations, it might be a significant material solution to something that takes years to field. And so that mishap recommendation will stay open, and we will track those through. And so that is one of the things we spend time on.

Other ones will be overcome by events, and the other part is safety investigation boards are not restricted from what they recommend, and so they can really stretch beyond, potentially, what is currently available, and that will be out there and it will be something that comes to fruition.

An example of that might be the auto-ground collision avoidance system that was out there for a while, and it has been implemented on the F–16s, now, coming—we will bring it forward on the F–35s as well as on the F–22, a different system. But, anyway, so that sort of thing might be a recommendation; it might come from that, and it takes many years to implement.

If we go back to the operational safety review, which was the first part of the question, sir, you are exactly right that in May the chief directed that they actually have a standdown across all the wings, that we do an operational pause; that we take time to look at seven different categories he asked them to do.

He empowered the local commanders to clearly talk about the different issues that they are interested in and asked for that feedback. The intent was not to have the Air Force as a whole and the major commands fix the local problems or to highlight the local problems, but to give them a chance—an opportunity to talk about the risk that is out there and highlight those things that upper levels can—can take care of.

The interim feedback we are getting is exactly that, when the wings got together—the Active Duties have been complete. The Guard and Reserve have been given to the 25th of June to make sure that they can fit within the schedules that they have on the

weekends and Guard weekends and that sort of thing, the drill periods.

So we are getting interim feedback back, and it talks about some of the things that are going on, both local, MAJCOM, and Air Force level that they are—they will go after and tackle.

Some success stories are buried in there of things that they have been able to do, and some other concerns that have to do with aging aircraft, manning levels, experience levels, and that sort of thing. But it is still interim and we are—and it is still coming in.

And so I am not sure what all we will hear from that. We will bind that together. Look to see what sort of actions that are things that we can take care of at the half level, sort of policy issues. And it might be larger, broader things that will drive an initiative that will have to do, sir.

Mr. TURNER. Thank you. Admiral.

Admiral LEAVITT. Mr. Chairman, every mishap investigation, when they determine causal factors, has recommendations that go along with those causal factors. And the recommendations, either from a hazard report or a safety investigation report, become either mishap recommendations or hazard recommendations.

Of the majority of them, 65 percent of those are aligned to NAVAIR, because many of it is engineering or parts issues going forward. That list is maintained by the Naval Safety Center, and then it is kept up to date on a weekly basis through the aircraft controlling custodians—that would be Commander Naval Air Forces Pacific, Commander Naval Air Forces Atlantic, Assistant Commandant for the Marine Corps for Aviation, and things along those lines.

Right now, in the last 90 days, there were 140 MISRECs [mishap recommendation responses] or HAZRECs [hazard report recommendation responses] closed, and there were also 74 added in the 90 days. So it is an ongoing effort to stay in front of those things, as General Rauch alluded to. Sometimes, there are long-term design issues or parts that have to be bought. Again, the mishap boards are not constrained in the Navy and Marine Corps, as well, from putting things out there that future technology may be able to solve, so some of them do stay open for long periods of time.

Mr. TURNER. General Francis.

General FRANCIS. Mr. Chairman, the U.S. Army Combat Readiness Center maintains what we call the recommendation tracking system, and that is where we take all the recommendations that come from mishap investigations, and we assign those recommendations to the appropriate agency in the Army to deal with that particular subject.

On a weekly basis, the general officer leadership from across what we call our aviation enterprise, those that are responsible for training, doctrine, for sustainment, for acquisition, special operations, and dealing with the Army staff, we meet weekly and discuss the most important of these things.

As you know, depending on the urgency of the recommendation, we will determine the speed at which we resolve that recommendation. Some of them might be fairly simple to do. Others might be more complex, involving a materiel solution or a revisement of

training or documentation, training publications, et cetera, that might cause us to go a little bit longer.

But we do, in fact, track those and make sure that they have the right leadership emphasis across the Army Aviation's leadership on a weekly basis.

Mr. TURNER. Ms. Tsongas.

Ms. TSONGAS. Thank you.

In reading the materials leading up to the hearing, I see that the mishap notification and reporting process is governed by each service's internal regulations, which outline responsibilities, timelines, reporting, and safety investigation requirements for each type of mishap. I would like to ask more about the mishap boards that clearly have such responsibility that each service assembles to respond to these incidents.

So are there standing boards or teams that respond to major mishaps? Or are the boards assembled on an ad hoc basis, depending on the type of aircraft, the circumstances surrounding the incident, and other—other factors that may be taken into account? And I will start with you, General Rauch.

General RAUCH. Thank you, ma'am. So, to start at the back, we do not have standing boards, so you are exactly right. We have board presidents that are previously trained ahead of time and throughout the organization.

And so, when a mishap happens at a location, they'll stand up an interim safety board that will preserve the evidence and take care of things while the major command that is responsible to be the convening authority will assemble the board.

That board will have that board president that is trained to do that. We will have an investigation officer that has been trained to do investigations. Both of these may or may not have done investigations in the past.

We will have a pilot member, depending upon whatever airplane it is that is involved. We will have a medical professional, and then whatever else the team really needs to kind of round out that board. And then, as time goes, if they need more help, we will get them access to that help.

Meanwhile, there will be a person from the Air Force Safety Center that is responsible to integrate with that team and get them the support they need, and on some of the boards, they are actually a member of the board. It really depends on the makeup and the mishap that occurred.

Ms. TSONGAS. The board presidents are drawn from where?

General RAUCH. They are normally drawn from the MAJCOM in which the accident occurred. So, if it is Air Combat Command and they have a mishap, then they will be the ones that will normally draw a colonel from somewhere across that group, unless there's fatalities, in which case it will be at least a one-star that will be chosen to be the board president.

So what we end up doing is training a lot of board presidents every year to be prepared in case something happens.

Ms. TSONGAS. So you train them in anticipation that there will be incidents?

General RAUCH. Yes.

Ms. TSONGAS. And is there a standard protocol for that training?

General RAUCH. Yes, ma'am. It is actually—the training is run by the Safety Center for the board presidents' course, and we do it in Albuquerque, but we also do it on the road, sometimes—just send a couple instructors on the road.

And they will actually do the instruction for both the safety investigation board and the accident investigation board; they get the same sort of training together. And so we do that for the group commanders and wing commanders, but then we also do that for other people that will—that may be selected, ma'am.

Ms. TSONGAS. Admiral.

Admiral LEAVITT. Thank you, ma'am. In the Navy-Marine Corps case, we can have either standing boards, or boards that are appointed by the controlling custodian when a mishap occurs. The controlling custodian is the convening authority.

Membership, at a minimum, includes a senior member—either a naval aviator or a naval flight officer. If it is a Class Alpha, it is an O–5 or above, preferably outside the reporting chain when it comes to the mishap. All other mishaps, the senior member has to be a senior to the pilot and commander or mission commander of the aircraft that was involved.

There's an aviation safety officer, who is professionally trained in aviation safety at our School of Aviation Safety down in Pensacola, Florida. There's a flight surgeon to do—to deal with aeromedical issues. There's a maintenance representative, and an operations representative.

Other—just like the Air Force, other specialties as required, and we do rely on technical support from the outside, from original manufacturers and NAVAIR. But it is important to note that those people are not directly members of the board. They are advisers to the board.

Ms. TSONGAS. Do you have a similar training program for those that might be tasked with leading the effort?

Admiral LEAVITT. With leading the effort? No, ma'am. We have aviation safety officers who—who are the—the aviation safety experts that have been trained at our School of Aviation Safety.

Our COs [commanding officers] and wing commanders also attend a 2-week course down at the aviation safety school to give them a top-level view of what to expect if they are appointed senior member of a board.

Ms. TSONGAS. And, since you have both ad hoc and those that are created—are standing, have you compared results or processes between the two different approaches?

Admiral LEAVITT. Anecdotally, ma'am, I would have to say, from the reports that I have seen that have been done by both over my career in the Navy, I have seen no difference in the rigor that is put into those investigations.

Ms. TSONGAS. Thank you. General.

General FRANCIS. Thank you, ma'am. At the U.S. Army Combat Readiness Center, we do have four standing teams, two ground and two air, that consist of a board—a school-trained board president and recorder.

Now, the rest of that team is built much like the other services, depending on the type of mishap and the expertise that is, in fact,

required. The—what they bring to that is they are experts at accident investigation and the processes to do that.

We do have a formal accident investigators' course that we do out of Fort Rucker, Alabama, that all of our investigators are required to go through. In addition to our standing boards, we do have—we do train other accident investigators throughout the Army, in the event that we are committed, another mishap occurs and we do have other trained—school-trained folks to conduct our mishap investigations.

And we have the same board makeup that the other services have, as well, in terms of the medical and the technical and all the other disciplines that may be required in any particular mishap.

Ms. TSONGAS. And, again, have you seen the benefit of one versus another, the ad hoc versus the standing?

General FRANCIS. So the—the accident investigators that we have at the Combat Readiness Center—that is what they do. That is all they do. They are very, very good at what they do.

The completeness of the reports is—the quality of the reports tends to be a little bit better, quite frankly, than the rest of the field. However, we do a quality control check on all accident reports that come up from the team—but their expertise in that particular area makes them better than just about anybody else.

Ms. TSONGAS. Thank you.

I would like to ask a question about how you are responding to families as these events are happening. So I believe keeping face with the families of our military aviators is obviously critical whenever there is an accident.

And family members do deserve to know as much as possible, as soon as possible, about how their loved ones were injured or lost in an event. So how are families integrated into the investigation process? And we will start with you, General.

General RAUCH. Ma'am, the purpose of the Safety Investigation Board—the primary purpose of that is mishap prevention. And there are some aspects of that that go back quite a ways that end up with taking safety privilege from privileged communications that may come from an aircrew member or somebody else.

And so what the Air Force has done is, at the same time, we do a separate board by the individuals trained—the board presidents are trained, for us, the exact same way—called the Accident Investigation Board.

And so, within 2 days of that standing up, they plan on talking—the normal routine is to go talk to the families to make sure they understand the process from the very beginning. Depending upon where the mishap occurred, there may be—the families may have an unusual request or something that they can meet there, and then they keep the family informed.

And it is that Accident Investigation Board that is actually releasable to the public. And what we do is, they are the ones that are first advised. So, once it is signed off and approved, that board president offers to go brief those family members, let them know what was discovered, answer any questions before it is released to the public, because, obviously, we agree with you and think that they should be the first ones to receive that information, ma'am.

Ms. TSONGAS. So, essentially, they are first told the process, but it may be some time before they are actually informed of what happened?

General RAUCH. Yes, ma'am. It will take some time to go through and figure out—determine exactly what did happen, yes, ma'am.

Ms. TSONGAS. And does the seriousness of the accident play a role in what you are able to tell and when?

General RAUCH. Sometimes it is the nature of the accident, maybe, more than seriousness. Obviously, if you are talking about families of injured or deceased members, those are the worst type of accidents, obviously, because we have lost life or injured individuals.

So a lot of those—each one is different, but a lot of those will have that time dynamic that there's something, probably, complicated that happened, and it takes a while for that investigation to occur, ma'am.

Ms. TSONGAS. Admiral.

Admiral LEAVITT. Yes, ma'am. Similarly, there will be parallel investigations that go on—the safety investigation to determine the causal factors and prevent reoccurrence. The other investigation that goes on is the JAG [Judge Advocate General's Corps] manual investigation, which assigns accountability.

The Safety Center does not directly interface with family members or—of someone who is injured or involved in an accident. If there's a fatality, the Casualty Assistance Call Office, which is local to the command that had the fatality, will notify the family members and things along those lines.

Before the JAG manual is released, the family does get a brief, and, if the family member desires a copy of the safety information—safety investigation report, they can generally contact our FOIA [Freedom of Information Act] office for freedom of information and obtain a redacted copy, due to some of the safety-privileged information that would be in the report that we would not want—that is important to getting to the bottom of the investigation, finding out the causal factors.

Ms. TSONGAS. But they would have to go through that FOIA process before they would be privy to some of those details?

Admiral LEAVITT. The specific details of the accident, ma'am?

Ms. TSONGAS. Yes.

Admiral LEAVITT. If it was non-safety privileged and it was factual, yes, they would get—they would go through the—the FOIA process to get that information. Yes, ma'am.

Ms. TSONGAS. General.

General FRANCIS. Ma'am, obviously, as with all the services, the Army is very, very concerned about our families, especially in a time of crisis, if there's a fatality and so forth. And the Army has multiple mechanisms to help families through those times that are outside of the safety arena.

Within the safety arena, just like the other services, we have the safety investigation and what we call the AR, Army Regulation, 15–6 investigation, which is the legal investigation.

At the completion of those investigations, the safety investigation will share all factual data with the—with the 15–6 investigation,

and that is the—the 15–6 is the one that would get out-briefed to the family members.

The family members, much like the other services, can request the—the report that is not safety privileged through the FOIA process. But, other than that, the factual data would already have been transmitted to them through the 15–6 that we could share from the Safety Center.

Ms. TSONGAS. Thank you. I yield back.

Mr. TURNER. Mr. Bacon.

Mr. BACON. Thank you, Chairman. Appreciate it. We thank our three safety experts here and leaders for being here. I was trained to be safety officer, by the way, Ms. Tsongas, so I did two accident board president duties myself and briefed the families.

I thought it was one of the most challenging jobs, but when you find a root cause and can compassionately brief a family it is also, I would say, rewarding and something you never forget.

So I really appreciate what you all do, and I know firsthand the importance of your—your jobs. And, also, I would like to say, firsthand, I know the professionalism of Major General Rauch over here, who I have worked with on multiple occasions, so good to see you here.

We had 80 fatalities last year from routine operations. We think some of that—can't say all of it, but some of it goes back to underfunding—or underresourcing our training, our maintenance, stretching people out too thinly in some of our service areas. So last year, we plused-up funding by 10 percent to the NDAA [National Defense Authorization Act]. This year, we—we held that even with inflation. And is our hope that through better funding of our operations and training and maintenance that we are going to see some improvements in our safety record this—you know, in the coming years.

And that is—that is one of the motivators for us to fund and approve the funding of our military. One of the things that concern me is I was on an aircraft carrier over Christmas in the Persian Gulf and the skipper of the aircraft carrier said that the average fighter pilot got 11 hours a month training prior to deployment. And I know in the Air Force, there are some communities they are getting the same kinds of flying hours.

And I think it is about one-third of what we used to do in the 1990s. Or I should say maybe one-third of optimal training before we deploy people and put them in—in combat. So I would like just get your-all's sense. Are you getting enough flying hours right now with your various crews? I know it may depend on what MDS [mission design series] or what type aircraft out there. But we would like to get your feedback.

Are we giving enough flight hours and what is the relationship between routine flight flying hours and training versus safety? I would appreciate your—your feedback. And we will start left to right. Thank you.

General FRANCIS. Thank you, Congressman, for the question. Our data do not indicate a correlation between the execution of flight hours and—and mishaps. It—we just cannot correlate that data one to the other. What we can say is that our data does indicate that the Army Aviation has experienced the most—biggest

spike in Class A mishaps in conjunction with major combat operations.

So when we went to Desert Shield/Desert Storm, Bosnia and Kosovo, Iraq and Afghanistan. During each one of those conflicts, especially during the initial stages, we experienced a major spike in Class A mishaps. And so where we are focused right now is making sure that we are doing that hard training that is going to be required to meet a peer or near-peer threat which will drive us to lower flight profiles and increase risk to prevent that next spike from occurring, when and if we do get called to the next combat engagement.

Mr. BACON. So what I hear you saying, if I may— if you are under-training, that adds risk in the early stages of combat. If you—if you under-train.

General FRANCIS. Yes, sir.

Mr. BACON. And there—and so you are seeing that direct correlation. Thank you. Admiral.

Admiral LEAVITT. Thank you, Representative, for the question. Again, the Navy has not—Navy-Marine Corps team has not been able to draw a direct correlation between a lack of flight hours and increase in mishaps. What we have discovered through a study that was done recently was a change in OPTEMPO [operational tempo] from very high OPTEMPO to very low OPTEMPO or very low OPTEMPO to very high OPTEMPO. That is where we see the greatest increase of risk.

Units that remain in low OPTEMPO and are able—they are able to look at that low OPTEMPO, mitigate risk ahead of time and same when we are in the high OPTEMPO area. We have discovered it is the fluctuation between the two is when we see the increased level of risk out there going forward.

Mr. BACON. General Rauch.

General RAUCH. Congressman, we—so we went—and of the recent ones being investigated, of course we went back to look at the individual pilots to see the amount of flying they would have had in the last 30, 60, and 90 months. What we did not see was a correlation between those that have had a lot or a little as it relates to the Class A's within recent times. Now, clearly those numbers—when we are fortunate—are in the small numbers.

And so you end up with small number dynamics if you are not—if you are not careful. And so we don't think that it proves that there's no correlation, but at least from the individuals that we have had that have been in the mishaps, that has not been something that we can directly correlate to the number of mishaps we have had in—across the different years of cross—last couple years, we were looking to compare that sort of thing.

We are tracking the number above flight—total flight hours we fly as a service, look at that as it relates to the rates. So that you can—we kind of judge years to years. Like I say, fatalities at different rates across the different years. We actually looked for last year, for us, the number was less than it was this year. And so we do—we do track those closely but—but haven't got the connection between two, sir.

Mr. BACON. This may be a better question for the A–3 or the G–3 or N–3, whatever—whatever service it may be. But wouldn't you

agree that maybe 11 hours a month would be too low? And that—that does induce risk, particular maybe for the pre-combat or early stage—early phases of a combat? So maybe I will just come back to you. We—are we getting enough flight hours for safety?

General RAUCH. Congressman, I will tell you the one thing we are looking at that from a safety point of view is if we are getting inadequate flying time and if there's inadequate training, then there's some concern is that a hazard that we are now having to deal with. And then how do you mitigate that hazard and how to create that risk. And definitely reduced flying hours below a threshold that would cause that.

We don't have a number that—on the safety community that we are using, but obviously as you say, the three is the one that is looking at that. But from our point of view, we are worried about the risk if you are not flying enough.

Mr. BACON. Okay. Either—any more comments? Maybe one follow up—go ahead, General. You—were you going to——

General FRANCIS. Certainly, sir, there's a risk if we don't train to standard. The aviation training strategy for the U.S. Army says that we shoot for 14.5 hours per crew per month. It would change the battalion level collective proficiency. And that—that is what we are going for as we transition to large-scale combat operations. And—and the Army is working towards funding that, they are getting us to closer to those levels than we are currently.

Mr. BACON. Okay, thank you. Chairman, I yield back.

Mr. TURNER. Mr. Carbajal.

Mr. CARBAJAL. Thank you, Mr. Chairman. In the Navy's testimony, I found something a bit disturbing. On page 3, there is a chart showing the Marine Corps Class A mishap rate over the past 10 years. The Army, the Air Force, and the Navy show roughly a flat rate of Class A events over that time period. But as shown in the testimony, the Marine Corps rate has more than doubled between 2008 and 2017. Fiscal years, should I say.

This data appears to show that the Marine Corps has a serious aviation safety problem. What is going on with this situation when you look at the comparisons? What seem to be the top reasons for this problem? Is it funding? Is it—is it old aircraft? Is it the lack of training? What is it? And what is the plan to get to this issue? If you could outline maybe what that plan to move forward is, I would greatly appreciate it.

Admiral LEAVITT. Thank you for the question, sir. Over a 10-year average, the Marine Corps is within normal rates with a couple aberrations, as we talked about. Last year was a—a tough year for the Marine Corps with the number of personnel that we had lost along the way. One of the efforts that we are pursuing at the Naval Safety Center right now to look across greater data streams instead of just mishap and hazard reporting data.

We are working internal with our organization to stand up a knowledge management safety promotion directorate that is going to aggregate data that includes operational data, manning data, and many other things. We are hiring data scientists and some other folks who are working with the Army analytic group to come up with some complex modeling and deep-dive analytics that will

be informed by subject matter experts who are operators of Navy and Marine Corps aircraft.

And hopefully from that we can become much more predictive in—in discovering what could come in the future for occurring mishaps; getting left of the bang, as I like to put it, sir.

Mr. CARBAJAL. Is there an actual plan to achieve that and timelines?

Admiral LEAVITT. Yes, sir, there is. It actually came out of the Strategic Readiness Review and the Comprehensive Review, although those were focused on the tragic ship mishaps last year. Aviation safety is taking lessons from those and we are funded both in 2018, 2019, and 2020 to increase our staffing and manning.

We have a contract with Army Analytics Group right now, we just hired a data scientist contract at the Safety Center, so within this year—I would say by the end of this year, we will have that division stood up at the Safety Center, we will be producing results hopefully next year at some point, sir.

Mr. CARBAJAL. Thank you, Admiral. Mr. Chair, I yield back.

Mr. TURNER. Mr. Panetta.

Mr. PANETTA. Thank you, Mr. Chairman. Gentlemen, good morning and thank you for being here. Major General Rauch, you, in your testimony, you submitted information and basically differentiated in regards to the mishap rate between manned and unmanned rates.

However, Admiral Leavitt and General Francis, you did not. Can you provide this data or do you know now whether or not there are any trends between manned and unmanned mishaps that you can talk to right now?

Admiral LEAVITT. Sir, I will have to take that for the record, I don't have those stats in front of me.

[The information referred to can be found in the Appendix on page 95.]

Mr. PANETTA. Affirm, thank you.

General FRANCIS. Sir, we will get back to you with those statistics as well.

[The information referred to can be found in the Appendix on page 95.]

Mr. PANETTA. I appreciate that, thank you. And then in regards to—let's see, General Francis, you did a good job in your testimony pointing out the need to train in regards to large-scale combat operations. However, you go on to say this operational tempo challenges our ability to achieve collective level training standards above the platoon level.

Now obviously, as you know well, the NDAA, we authorized a pretty big budget and if we can't train the large-scale combat operations under this record budget, you know, what are we doing wrong? What else do we need to do in your recommendation?

General FRANCIS. Congressman, thank you for the question. This would be more for the Army G–3 to answer, but the operational tempo can deploy units at less than that collective level. And so as we deploy, we actually can sometimes consume readiness depending on how we deploy our aviation forces.

So it is not that our aviation forces aren't flying in training, but training to that battalion collective level for large-scale combat op-

erations is quite a challenge for us right now with this operational tempo.

Mr. PANETTA. Okay, all right, thank you. Gentlemen, I look forward to continuing the conversation as we move along. Thank you, I yield back.

Mr. TURNER. Mr. Brooks.

Mr. BROOKS. Thank you, Mr. Chairman. I am trying to get a feel for military versus commercial, and it is like comparing apples and oranges with substantial differences between the two, obviously.

Let me get some background and then I am going to ask some questions, and I have gone through your submitted testimonies in writing, and commercial airliners typically look at fatal accidents per 1 million flights, while the military data that you have given us is on a basis of 100,000 flight hours.

If we were to assume, and I recognize that this makes the military numbers look better, because most commercial flights are longer than an hour, but if we were to assume 1 hour per commercial flight and transform your numbers, which are on 100,000 basis, to a million basis, then this is generally speaking what we get.

With commercial airliners, they are averaging about 0.25 fatal accidents per million flights versus the Army's roughly 0.99, if I understood your testimony correctly, per 100,000 flight hours, multiplied times 10 gives us 9.9.

So the military is having fatality rates that are much higher than what we see in the commercial sector, and the Air Force numbers, if I understand the difference between the Air Force and Army, is the Air Force has a fatality rate that is a little bit—or Class A mishap rate—that is a little bit higher than the Army's.

So that is kind of a background, and looking at some of the factors as I understand them, but if you are aware of other factors please illuminate, you have got the types of aircraft and you have got the argument that military aircraft are much more complex and they are operated by fewer individuals, hence there's smaller room for error. You have got with military aircraft, you are almost continually testing the limits of those aircraft in order to be combat ready where you would be expected to do the same thing. That, of course, is not what commercial pilots do.

Perhaps there is a difference in experience of pilots where, by way of example, a lot of military pilots when they retire, they become commercial airline pilots. That is their second career, so they have already got all that military experience built in and then they add onto it.

And then you have got the maintenance issue, and I don't know how often or how much maintenance work is done by the military versus commercial, and there may be other factors, but those are four that come to mind.

So with all this as a backdrop, which factors do you believe are most responsible for the Class A mishaps in your various services, and then second, what can we do to help?

Mr. TURNER. Just a note. I appreciate that the gentlemen's questions were not to them with respect to a comparison of commercial versus military, but I do want to note that they were not asked to

prepare any data or information with respect to commercial versus military.

But your questions seem to be pretty much targeted toward just their—their current role, so I appreciate that.

General RAUCH. Congressman, thanks for the question, as the broad overlay, we—we do spend time with the civilian aviation community, some of the type of flying we do is close to that, the actual flying itself.

And so we pay attention to the safety forums that they have and are on some of those boards so that we can learn some of the things they do if industry drives forward with some sort of a safety program data gathering or some sort of analysis we try and learn from that and bring it on as quick as we can.

From the Air Force's point of view, you talked about the different missions set, and that is exactly the case for us. It is—it is all the way from helicopters to fighters to cargo to ISR [intelligence, surveillance, and reconnaissance] and everything in between. So a completely different set of missions that are required. So while the airline is traveling from point A to point B, we often have some mission that is going on in between.

We also have aircraft that are significantly older than the normal commercial fleet, which drives increased maintenance, as you addressed, and those are probably the two of the largest features for us.

Mr. BROOKS. So one thing that we can do to help would be to buy new aircraft.

General RAUCH. The environment that we live in with—with aging aircraft and the engineering that is required to sustain those aircraft and the more time, we are certainly setting up hazards there that have to mitigated if not, sir.

Mr. BROOKS. Admiral Leavitt or General Francis?

Admiral LEAVITT. Sir, thanks for the question, I would offer along the lines of what General Rauch said. I think the mission in and of itself is much more inherently risky as we go forward, and being able to consistently train and do things along those lines would be helpful to be able to keep our training.

As you know, the Navy uses tiered readiness, as we get ready to deploy, the OFRP cycle, the optimized fleet readiness cycle, is a 36-month cycle for our carrier strike groups. We spent some of that time in the maintenance basic phase, then we get into the advanced phase, and then we deploy and sustain afterwards. And it is that training ramp along the way that gets people up to speed so they can be certified to deploy.

General FRANCIS. Thank you for the question, sir.

Sir, we—I am very proud of what we ask our Army aviators to do. We ask these young aviators to operate in adverse weather, in unimproved conditions, they are not landing on runways.

Our Army aviators are landing in the dirt, in dust, in various challenging environments. They are up against an enemy force. They are working in coordination with the ground force. So the complexity of what military—especially Army Aviation does, in conjunction with a ground force, compared to a civilian airline, is really apples and oranges. And so it goes back to training.

You asked, you know, what—what are the causal factors. I think we have already talked about that the—76 percent or so of our mishaps are human factors related; about 19 percent are materiel related and so going after that biggest part of that, which is training, particularly for large-scale combat operations, is our primary focus.

Mr. BROOKS. So, as I understand it, the two main things: new aircraft, more money for more time for training. Thank you.

Thank you, Mr. Chairman.

Mr. TURNER. Mr. O'Halleran.

Mr. O'HALLERAN. Thank you, Mr. Chairman. Thank you for being here today. I would like to go back to the Air Force issue first, Mr.—General, and identify—it seems that there's three different kinds of boards.

And does everybody talk to one another about maybe which one is more adept at making sure that we get to an answer sometime before, you know, to some of the major issues, two, three, four, whatever amount of years it is?

Because—and what happens in that intervening period to make sure that the issue is resolved for the safety of the pilots in that intervening period? So right to left, please.

General RAUCH. Congressman, thank you. Yes. So, first off, we do—we are underneath the OSD umbrella of what needs to be investigated. Our mishap investigation boards are pretty similar. The training or background and where we pull them from is slightly different, with the exception of if we have a standing board.

What—to not consume time, there were some details that we left out. For us, for example, when a board goes to investigate, they are tasked with coming to resolution in 30 days. So that time pressure is there for them to find out what's happened within 30 days. Then there's some time after that for them to actually get to the convening authority and brief it and have it accepted.

In that 30 days at the very beginning, if they find some time-critical safety item that needs to be fixed, whether it is identifying a problem with a part that they discover, a way an aircraft's maintained, a way it is operated—pretty much the spectrum—there is ways within the service to go out and get that to the fleet immediately, because we don't want that type of aircraft or, maybe, the entire Air Force to be operating with that same hazard. Once something gets identified, if it is a time-critical item, it will go out that way.

Mr. O'HALLERAN. Admiral.

Admiral LEAVITT. Yes, sir, thank you. Very similar procedures to what the Air Force does when it comes to their boards—because we are an expeditionary force, and a lot of times, it would be very hard to get somebody out to the ship or out to an austere Marine Corps expeditionary facility, that is why we draw internally from our—from our own folks to comprise the board.

Additionally, once the board meets, they, as well, have 30 days to get the information out. And then, from there, it goes through the endorsing chain. I call them information off-ramps, but, along the way, there's off-ramps to get the information out to the fleet via hazard reports or near-miss reports or things along those lines—to get the information back out to the fleet well before the investigation report itself is done.

I hope that answers your question, sir.

Mr. O'HALLERAN. Thank you.

General FRANCIS. Thank you for the question, sir. The Army, as we said, has standing investigation boards that are really—we are packed and ready to deploy at a moment's notice. So getting to the scene and beginning investigation is not generally an issue for us, even in remote places. We can get there pretty quickly.

At any time in our investigation we determine there is an issue that affects the entire fleet of aircraft or the Army or other users, potentially other services or even other countries, we do not wait for the completion of an investigation to get after that problem.

We immediately convene a panel with all of the correct technical experts to make sure that we are addressing the issue, be it materiel, training, whatever the case may be, and getting after it immediately.

Then we have communication mechanisms that gets that word out to every aviation unit and aircraft user across the force, with foreign cases and with our joint services, as well, very, very rapidly, if there's a safety of flight. And that is generated by our airworthiness authority.

Mr. O'HALLERAN. And I—this would be for anybody. But how do we close this window, the two, three, four—we have pilots up there. If we find the part that is wrong, then we can fix it. But, in some cases, obviously, it takes investigation.

And it take—how do we close that window so the safety of the pilots and the aircraft itself is at a level that is reliable for those pilots to get into within a year or within the shortest amount of time possible?

General RAUCH. Congressman, if I understand the question correctly, there's really two ways we go after that. One is flying aircraft that are already airworthy. We are looking to maybe extend the timeline of it. So there's a lot of engineering and nondestructive inspection and that sort of thing that goes on to try and identify that flaw or hazard to do something to the fleet before it ever comes up.

And, if we—they discover something, some time-critical—time order change will go out to make that. And if it is something that is very high risk, there will be decisions about whether they will even fly that airplane. We might end up standing it down.

The same thing happens right after a mishap occurs. Oftentimes, operationally, you will see the commander decide to elect to not to fly that platform until they can get a little bit of a sense of what just happened.

Obviously, there's a lot of other good reasons for that, too. You just had an organization that suffered some sort of mishap and a loss, and that you want to make sure that you have got everything squared away and you can look your folks in the face.

Mr. O'HALLERAN. I yield.

Mr. TURNER. Mr. Langevin.

Mr. LANGEVIN. Thank you, Mr. Chairman. I want to thank our witnesses for your testimony today, your service to the country.

So I know that, over the last 2 weeks alone, the Air Force has halted flights of F–15s in Japan and stood down B–1 operations

worldwide. These are just the most recent in a long line of reports about aviation issues across the services.

And while, thankfully, we did not lose pilots in these recent incidents, Congress is deadly serious about ensuring the safety of our service members. So that is why I applaud this and support Ranking Member Smith's initiative for an independent aviation commission to take an objective and apolitical look at—at the root causes of these mishaps and work to identify actionable steps that the Department can take.

So my question is, how will these types of initiatives help us to turn lessons learned into best practices and, at the same time, with increased speed, agility, and competence?

Admiral LEAVITT. Sir, thank you for the question. One thing I will add about your lessons-learned piece and things along those lines—the three of us here, as well as the Coast Guard, participate in what is called the Joint Service Safety Council.

And we meet biannually to discuss things in person, but our staffs and action officers exchange data, lessons learned, and best practices for common problems and issues, as well as common airframe types, when we discover something between them. So there's a joint effort between us and the Coast Guard, as well, to address the lessons learned and make them best practices across the services.

Mr. LANGEVIN. Okay. Thank you. And—and I am really curious as to how we balance what seems to be a very bureaucratic accident review process with the need to maintain readiness.

For example, a board is going through the investigation process and identifies a problem. Since one point does not make a line and two points don't make a trend, how do they determine if it is a systemic problem where an action item needs to be disseminated to everyone, or if it was just a unique combination of factors that was specific to that incident?

General RAUCH. Thank you, Congressman. The boards are actually tasked to do just that—to dig into it, to find out, you know, what exactly, specifically happened in this time. And so the recommendations will come from there.

And you are exactly right that, sometimes, if you see more than one recommendation coming from a place, they have got access to past investigations for us off of our databases and that sort of thing to help to identify that very early on.

If they identify that there's a problem with just—the mechanical piece on just one jet, they will go to the—the actual sustainment center or organization for that and see if that is a systemic piece or part to it.

But you are exactly right. For each individual mishap, they are tasked with finding the purpose and the root cause of that individual mishap. It is the analysis that happens afterwards that—you are exactly right—you are going to see what other things that could be related to—that is a little bit more difficult.

Mr. LANGEVIN. And, if it is found to be systemic, how quickly is that the disseminated across the services?

General RAUCH. If it is systemic about a part on an airplane or something like that——

Mr. LANGEVIN. Right.

General RAUCH. It is that day, we are talking. You know, we—we have a mishap of a—of a T–38, we—in this case, we end up calling NASA right away, just to let them know, before we even know anything that happened with it, to give them the heads-up so we can establish that communication. And we do the same thing with the sister services, as it relates to that.

Mr. LANGEVIN. Okay, thank you. And my understanding is that, once an investigation is complete, the board produces a report accepting or rejecting potential causal factors, after which the report's endorser—usually a flag or a general officer—can generally agree or disagree with the report.

How often is there disagreement between the board and the endorser? And what are the most common reasons for the disagreement?

General FRANCIS. Thank you for the question, Congressman. Since I have been in this job, there has not been a disagreement between the legal investigation and the safety investigation. It has occurred in the past, and—and sometimes that is simply because the safety board may have access to some information that the legal investigation did not have, or there may be just a difference of opinion on the causal factors, if it is unable to be determined.

So we did—I don't see that as a big issue. I have not seen it, in particular, in the Army.

Mr. LANGEVIN. And my last question that I have here is, while we have—we have increasingly moved to on unmanned systems and are actively working towards autonomous assistance in multiple domains, unmanned and autonomous systems can analyze information faster than humans and can operate under physical conditions that humans could—could not.

Artificial intelligence has beaten our pilots in multiple flight simulator trials. With aviation mishaps on the rise, do you feel that this is going to hasten acquisition and utilization of these unmanned and autonomous systems? And do you feel that they are going to—we will—they will see an increased role in the future of combat aviation?

General RAUCH. Congressman, thanks for that question. As we have started to look through the human factors pieces of what might be coming next, it really is what may be the human factors that are involved with something that is closer to semiautonomous in the system. And so you let part of the airplane do some level of work for you.

We already have that in the most rudimentary of algorithms that run, or whatever else. But, as it gets smarter and smarter, how do you bring that on and how do we make sure that the human factors—that it either doesn't overwhelm the aircrew, or that it does exactly what they want in the conditions they want?

So the first part is probably going to be, how do we interact with something that is semiautonomous, that is doing some of the work for us? That next step is one of the ones that is of interest and folks looking at, as we look at the artificial intelligence and that sort of thing. But automating the system is another realm, sir.

Mr. LANGEVIN. Thank you very much. And my time has expired, but I appreciate your testimony today and I yield back.

Mr. TURNER. Mr. Gallego.

Mr. GALLEGO. Thank you, Mr. Chair. I would like to have a couple of questions. What—number one, what specific platforms are of most concern to—for future incidents or mishaps? Any ones in particular that we should particularly be looking at? Let's start with——

General FRANCIS. Are you—did you say patterns?

Mr. GALLEGO. No, I apologize. Platforms.

General FRANCIS. Platforms. In the Army, our—we do not have a specific platform that indicates to us that there's a particular problem. We have various sizes of fleets for Apaches, Chinooks, and Black Hawks, but none of them are indicating to us that we have a—one problem in one particular area.

Mr. GALLEGO. Okay. Admiral.

Admiral LEAVITT. Yes, sir, thank you for the question.

What we discovered through some studies, both—two independent studies that were done independently of each other, assisted with contractors for the Marine Corps and the Navy—and we discovered that there are Class C aviation ground mishaps, primarily maintenance evolutions, towing of airplanes, dropping things on airplanes, and things along those lines.

Within the Navy and Marine Corps, the two highest-density communities are our MH–60 Sea Hawk fleet and our FA–18 fleet—is where we have seen the most number of mishaps. In the Marine Corps, it has been with the MV–22 and F–18, as well.

We don't single those—those platforms out as necessarily having problems. It is because we are having an increase in Class C mishaps, and that is the preponderance of the fleet for both services, sir.

Mr. GALLEGO. Thanks.

General RAUCH. Thank you, Congressman. We haven't identified a specific fleet that is worse than the others, but there are hazards across the spectrum. And so, with the aging fleets that—some that are—that aged—we are looking at what it takes to sustain those and what hazards that creates.

We are bringing new systems on. We are looking at what does it take to absorb and learn that new system and train to it and so each one has some peculiar hazards that exist that have to be mitigated.

Mr. GALLEGO. And, holding that thought, you know, is age the issue here? Because—I mean it's just me, but it looks like what—what we see happening is, on some of the older airframes, like the B–52 or U–2, you rarely hear about any problems with that.

And then, newer platforms, we actually do have more problems. Is that—is there something going on about how things are made or different training cycles that—that have evolutionized how people actually are able to take care of these platforms?

General RAUCH. Congressman, I think there's really two parts to that. There's a lot of work that is required to keep an aged aircraft, you know, flying, as time goes on, so a lot of extra maintenance that goes into it, the engineering support and that sort of thing.

So there is a lot of work that goes on there. Those sort of things that are found ahead of time and somebody does something about it—doesn't necessarily hit the news cycle.

Then, on the more modern aircraft, we do have a situation where, if it is a fifth-generation fighter or some others—that the engine components and some other things are more expensive to those, and especially, the first couple times you have a mishap, it takes a lot longer to figure out what—the cost to repair and replace that piece.

And so, on some of the newer aircraft, you are also seeing that and that is why some of them pop up in—on our system, and you look at our—if you—when you dive into our mishaps for Class A rates, there's more that are of that system than if it was an older airplane—would not have risen to the same level of damage, so it would not have been the same sort of mishap, sir.

Mr. GALLEGO. Okay. I yield back.

Mr. TURNER. Mr. Banks.

Mr. BANKS. Thank you, Mr. Chairman. Thanks to each of you for being here today.

To begin with, I wonder if any of you have any programs in place that use artificial intelligence or other basic data analytics tools that might help detect possible issues before they occur. General.

General FRANCIS. So we do not have that. We are moving towards that right now. Much like the Navy with—working with the Army Analytics Group, we are developing what we call the Army Safety and Occupational Health Enterprise Information Management System that will incorporate that. And that—we will start fielding that in the beginning of 2019.

Mr. BANKS. Okay. Admiral.

Admiral LEAVITT. Yes, sir, thanks for the question. I spoke earlier about partnering with Army Analytics and the fleet and type commanders out there to obtain their data, to collaboratively share data, and come up with deep-dive analytic tools.

Additionally, we are moving from our legacy safety reporting system, which is called the Web-Enabled Safety System, which was fielded in about 2006, and we are moving to what is now called RMI, Risk Management Information.

We are actually partnering with the Air Force, using their AFSAS, Air Force Safety Automated System, and we are creating our data fields in there and we are populating that.

Within AFSAS by itself, there will be a couple tools, business intelligence tools, that will be able to just mine data at the squadron level, ship level, individual unit level, to take a look at how they are doing compared to other units and things along those lines.

That is kind of the—the less deep-dive stuff. And Army Analytics is going to be where we are going to get the big bang for the buck, sir.

Mr. BANKS. Okay. Sir.

General FRANCIS. And, as discussed, sir, that automated system for us that we stood up in 2007, moved to the cloud in 2014—about 370,000 records that are in there. And so we have this layer of analytic tools that are there.

But what we were also craving is access to other datas and—other data and then things to handle big data analytics and that sort of thing. And so we—although we have a level of analytics that are there, we definitely want to ramp that up, sir.

Mr. BANKS. Okay. Thanks for that. General Francis, I would like to commend you on the Army's lowest 3-year period of mishaps. In your testimony, you stated that most mishaps are the result of a series of events. First of all, does the Army investigate different mishaps depending on the initial cause, or is it more of a blanket approach?

General FRANCIS. You know, we—the Army investigates all mishaps. Regardless of the severity, we investigate all of them. And, yes, regardless of what we suspect is the underlying causal factor, we investigate them all. That is how we get the data that we do have.

Mr. BANKS. Okay. And how are mishap reviews prioritized? And do different causes play a part in the prioritization?

General FRANCIS. It is really prioritized by severity. So the Combat Readiness Center, we won't necessarily go out and use one of our centralized investigation teams to investigate a Class D mishap, for instance.

We will go do the most severe Class A's, and it is usually associated with a fatality, when we—when we would use our particular team. So they are prioritized primarily on severity versus any other category.

Mr. BANKS. Are certain causes any more prevalent than others?

General FRANCIS. Yes, human factors comprise about 76 percent of our current mishaps, and about 19 percent are material failure. So we track those, and those—that ratio has been pretty consistent over the 35 years that Army Aviation has been a branch.

Mr. BANKS. Okay. General Francis, the global security environment is obviously changing rapidly. As we transition away from counterinsurgency and strictly air-to-ground tactics and the larger scale operations, is the mishap review process shifting accordingly?

General FRANCIS. Yes. What we are doing is trying to go from being reactive to more proactive. In other words, we are taking a look at the—where we have suffered the most Class A mishaps in previous conflicts. And we have experienced those in conflicts like Desert Shield/Desert Storm, Bosnia and Kosovo, and Iraq and Afghanistan.

So, as we sit here today, as we—as the Army prepares for large-scale combat operations, we are looking very hard at what can we do to get after the problem now, before we get launched into another conflict that may cause us to have that spike and what can we do to prevent that now.

Mr. BANKS. Okay. And my last question—as you noted [in] your testimony, the less severe mishaps are downgraded to review by local entities with, quote, "abbreviated requirements." Does this more minor threshold of review lead to less effective results or recommendations?

General FRANCIS. No, it does not. It simply means that they have—they have less of a requirement to report that to higher levels with a formal briefing. We still get all the data from those mishaps to conduct analysis with.

Mr. BANKS. Okay. I want to make sure that abbreviated requirements doesn't necessarily lead to less thorough reviews.

General FRANCIS. No, it does not.

Mr. BANKS. Okay. With that, I yield back. Thank you.

Mr. TURNER. Mr. Wittman.

Mr. WITTMAN. Thank you, Mr. Chairman. I would like to thank our witnesses for joining us today.

I wanted to begin with Rear Admiral Leavitt and—and ask you this. As we look at our Navy air assets—and we know that, when the demand signal goes out, the first question is, you know, where are the aircraft carriers, how do we get them to the fight? Want to make sure we understand, with that, the risk that our naval aviators are facing.

And I just wanted to—to get you to—to give us a distinction about how the different levels of investigations happen when we have these crashes. Is there a difference when there's a fatality involved? Is it something different if it causes, you know, an emergency landing? Is it different if it occurs at sea than on the land? Are—are there—are there different levels about how you do that evaluation?

Do you risk-rate that? Give us some indication about what urgency is placed on these investigations and then the urgency placed on what the follow-up corrective actions would be.

Admiral LEAVITT. Congressman, thanks for the question. Like the other services, all accidents are investigated. If it is the most serious accident, either in cost of lives or damage to an airplane, they have the largest priority.

Every action is invested by an accident investigation board and a trained aviation safety officer. There is no difference in the investigation process itself. The idea is to prevent this mishap from happening again in the future. When it comes to corrective actions in the endorsement chain and—and—well, let me go back.

If something's identified immediately that—it is a bad part on an airplane or there's a training procedure out there that is wrong, an immediate HAZREP, hazard report, will go out that identifies the problem, and it goes to NAVAIR, who's our airworthiness authority.

And if they determine it is an airworthiness issue, it will go—what is called red-stripe the fleet, which means it puts that entire type, make, model, series of airplanes out of service until they can come up with the corrective action for it.

But, from there, outside of something that—that pops up immediately, the endorsement chain, as it goes up—if it is a Class A, it makes it all the way to the Naval Safety Center and the commander of the Naval Safety Center endorses that for CNO [Chief of Naval Operations].

Bs, Cs and Ds aren't—go up the endorsement level, where the individual has the authority to affect the corrective actions for what that mishap report came out with. So it may just go to AIRLANT [Naval Air Force Atlantic] or Naval Air Forces or CNATRA [Chief of Naval Air Training] or one of those individuals to—to initiate the corrective action for the—for the issue, sir.

Mr. WITTMAN. Got you. Thanks. Thanks. I am just concerned about, you know, making sure there's consistency, especially in how we respond to those.

Brigadier General Dav—Francis—excuse me. I wanted to ask a question about how investigations occur in what I see as a bifur-

cated way. You know, we are already, you know, almost halfway through 2018. We already have 20 people dead in 2018 mishaps.

The thing that concerns me is, I understand the need for us to have safety privilege protections, but it seems like to me that we have a two-tiered system. One where we incentivize aviators to come in and give a full account of what happened in that and say—listen, do that, no legal ramifications.

And then, afterwards, we have a formal investigation that says, by the way, be careful what you say. Don't disclose anything, because there are legal ramifications to that.

How do we really get at the root of these issues, if you say one thing at one point in the investigation, say, we want your really honest opinion about what is happening, and then, later on, when we get to the formal process, we say, by the way, there are all kinds of legal ramifications to what you may give us?

Give us your perspective about how somehow that serves the better purpose of really getting to the root of these mishaps.

General FRANCIS. Thank you for the question, Congressman. That is exactly why we have this thing called safety-privileged information. Okay? Those involved give witness statements and so forth, so that we can in fact get that unadulterated view of what happened for the purpose of loss prevention.

The purpose of the other investigation is a different purpose, and each—anyone who is a subject of one of those investigations has all the legal rights associated with those investigations.

So I don't necessarily see it as a bifurcated system, but one that preserves our ability to get after safety-privileged information that helps us with loss prevention.

Mr. WITTMAN. But doesn't one affect the other? Doesn't one, where you say, hey, be honest and forthright with us and don't worry about it, we are going to make sure that we privilege that information—yet, later, they are going to be in a formal investigation where they know that what they say could have legal ramifications for them.

I still see that, in one, you are asking them to be truthful; in the other, you are—essentially, the incentives are to be tight-lipped.

General FRANCIS. I haven't seen that as being a concern. I—we also have the ability to give safety privilege to a specific individual, saying that we will not, even in a FOIA request—I will guarantee that we will not submit your statement to anyone or anywhere, so that we can, in fact, get that information.

So we have not experienced that—a problem with either one of those investigations competing with one another or causing a change of information.

Mr. WITTMAN. Okay, very good. Thank you, Mr. Chairman, I yield back.

Mr. TURNER. Thank you. Ms. Tsongas, your follow-up question?

Ms. TSONGAS. Well, as we have been hearing today, it is clear that all the services have large safety organizations. And over time, like other parts of the military, you have come under budget pressures, as well. And so your funder—funding priorities and amounts have to change.

So, over the past 10 years, how have resources changed in your service? Do you have more people? Less? What about funding lev-

els? Are they adequate? And, most especially, are there any areas of the safety enterprise where we are taking risks where we shouldn't because of these constraints?

So we will start on the right and move to the left here.

General RAUCH. Okay, ma'am. As we talk about funding levels, the Safety Center has funds, and, me as part of the Air Staff, get funded that way. And so the entire safety enterprise, though, is much, much larger than that, right? So there's safety organizations, and it is really a commanders' program; and so operational and maintenance accounts pay for some day-to-day safety things that are spread throughout the entire enterprise.

And then the preventive engineering-type work that happens in the program offices to identify what it takes to extend the life of an aircraft safely is, at least from our point of view, something that also goes towards safety. And so it is hard to wrap around what all those items are.

I can tell you that, from the account that individually goes to pay for the Safety Center, for example, this year is the best year in the last 10 years for funding for the Air Force. We have been able to go after more of the initiatives that we wanted to do inside the Safety Center.

But, as a member of that, over the years, we have had both plus-ups—in the last 10 years, we have had both plus-ups and reductions in manning levels within the Safety Center as the staffs were forced to cut manpower down.

Ms. TSONGAS. So do you see an area where you are absorbing risk that you worry about?

General RAUCH. What I see us doing is, in a time when we are very, very busy responding to current mishaps—that you may not have the forces you would like to have to be able to do some of the proactive things that you are able to do, because, of course, the mishaps don't happen in a steady rate, unfortunately for, at least, the workload.

But—so, yes, we had more manpower before, which allowed you to do more initiatives. But we have enough folks to do the things that we are doing now. So, really, it is, how much hazards can you mitigate? And how do you go after those practice things you want——

Ms. TSONGAS. So, the more hazards that you are having to investigate, the more—the more thinly you are stretched.

General RAUCH. Yes, ma'am.

Ms. TSONGAS. Admiral.

Admiral LEAVITT. Yes, ma'am, and I will speak strictly for the Naval Safety Center and not the enterprise writ large. But much like General Rauch said, there are things at Naval Air Systems Command and things like that—extending airplanes, doing engineering investigations, and things like that—that affect—are affected by funding.

But the Naval Safety Center itself, over the last 10 years, has remained fairly constant and as we take new tasks in our knowledge-management, safety-promotion area—we are actually in a growth mode right now, over the next several years. We got a plus-up in funding in 2018, we will get one in 2019, and we are palming

for some additional manpower to assist in our data analytics for 2020.

So one issue that we have seen is our operational aviation safety assessments, where our teams go out and assess different units along the way. Sometimes, when funding gets tight, we cut back on the number of those that actually go out and do that.

But we have a program in place where we can identify at-risk squadrons and high-performing squadrons, so we try to look at those specifically and take the best practices from the high-performing squadrons and try to inculcate that into our at-risk squadrons and move from there.

Ms. TSONGAS. General.

General FRANCIS. Thank you, ma'am. So we are adequately funded and resourced to do the mission that we are required to do. Over the last 5 years, we have had a decrease in personnel that has—that has—we were asked to say, how can we do this more efficiently? Just like everybody else is challenged to do in tough times.

And we—we designed the organization that we thought best did that. As we have now executed using that new organization, we have identified probably two places where we need to re-shore up. One is our analytic capability and then the other is our investigation capability.

So we do have enough teams to support our requirements right now in terms of accident investigation, but our analytic capability has gone down. So not only are we going to go back to the Army and compete and—for those spaces, if we compete well for them, but we are looking at other assets, like Army Analytics Group, to help us with that analysis. And we think that is going to be a very a strong partnership that will help us to do that.

Ms. TSONGAS. So, until that happens, do you feel that is an area where you are—you are absorbing a level of risk that worries you?

General FRANCIS. It does not worry me. We are not—we are not missing anything. It is taking us a little bit longer than we would like, right now, to get to some of the analytics.

But, certainly, on urgent things, there's no—we are not seeing a risk to the force or to the Army right now—with our ability, right now. But we do want to expand that capability to look deeper into some areas.

Ms. TSONGAS. Thank you. I yield back.

Mr. TURNER. Gentlemen, thank you for your testimony. And we have had great participation by members of the committee. This is going to be the beginning of a series of hearings that we will be having, looking at all aspects of how this issue is managed.

I am certain that we will be returning to you again and your expertise. But we greatly appreciate both your commitment to this issue and the insight that you have provided us today. Thank you. We will be adjourned.

[Whereupon, at 11:26 a.m., the subcommittee was adjourned.]

A P P E N D I X

JUNE 13, 2018

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

JUNE 13, 2018

Statement of the Honorable Michael Turner
Chairman, Subcommittee on Tactical Air and Land Forces
Department of Defense Aviation Safety Mishap Review and Oversight Process

June 13, 2018

The hearing will come to order.

The subcommittee meets today to receive testimony on the Department of Defense aviation safety mishap review and oversight process.

I'd like to welcome our distinguished panel of witnesses:

- Brigadier General David J. Francis, Commanding General of the Army Combat Readiness Center and Director of Army Safety,
- Rear Admiral Mark Leavitt, Commander of the Naval Safety Center, and
- Major General John T. Rauch Jr., Air Force Chief of Safety and Commander of Air Force Safety Center

I thank you all for your service and look forward to your important testimony today.

This hearing continues the subcommittee's ongoing oversight of aviation modernization and readiness.

As I've stated before, we are experiencing a crisis in military readiness brought on by years of continuous combat operations combined with deferred modernization, lack of training hours, and aging equipment.

The alarming number of aviation accidents just in the past 3 months reveals how deep the damage goes and the magnitude of the task of repairing and rebuilding our capabilities.

According to a recent Military Times investigation, aviation mishaps rose nearly 40 percent from fiscal years 2013 to 2017 and nearly doubled for some aircraft.

Just this past weekend an F-15 aircraft assigned to Kadena Air Base in Okinawa crashed while performing routine training maneuvers. Fortunately the pilot survived. I believe this is the 6th Air Force related aircraft accident in the last 12 months.

Most concerning is that more U.S. military service members have died in aircraft mishaps over the past year than have died while serving in Afghanistan.

One of those service-members was a constituent of mine. Gunnery Sergeant Derik Holley was a 33-year old enlisted Marine and he was killed while conducting training missions in a CH-53E helicopter, a helicopter that has been in service since the 1970s.

Given this alarming trend, the hearing today will examine how the military services conduct investigations post-accident or mishap. We need to be assured the military services are adequately identifying the source and cause fast enough for us to be able to remedy them.

We specifically want to better understand the processes used by the Department and the military services to answer three fundamental questions regarding mishaps: what happened, why did this happen, and what changes and recommendations are being taken to prevent this from happening again.

The witnesses today are responsible for conducting investigations of service mishaps, identifying mishap causes and problem areas, and recommend mitigation actions. We have asked them to walk us through the steps they use to determine the root cause of aviation mishaps as well as how they communicate the results of these investigations to their senior leadership for action.

It is my understanding that military accident and investigation processes include a thorough review of the mishap aircraft, circumstances of the incident and personnel involved. Investigation of an automobile accident might use a similar process. But if repeated accidents are occurring at the same intersection, it seems most reasonable to examine the intersection itself for changes that need to be made such as signage, lighting, lane markings, or the number and adequacy of the lanes at the questionable intersection.

So I expect the witnesses to elaborate on how the military service safety centers collect and report mishap data to the Office of the Secretary of Defense as required by current policy to include data on the underlying factors that caused the mishaps. For example, I'd like to know whether the safety centers include information on human factors that contributed to the mishap, which according to DOD, represent the leading cause of DOD mishaps.

The hearing will also provide an opportunity to understand how lessons learned and recommendations from the outcomes of these investigations are informing changes to requirements for aircraft modernization in a timely manner.

Additionally, the hearing should help Members make a determination as to whether potential changes or reforms are needed in the overarching governance structure for the military safety enterprise.

Before I close, I want to briefly touch on the issue of aging equipment and the undetermined cause and effects this may be having pre-mishap. I've had recent discussions with the Secretary of the Air Force and this particular issue is a major concern of not only the Air Force but the Department as well. Our subcommittee will be taking a much closer examination of this issue going forward.

In closing, I am deeply concerned by the recent increase in aviation mishaps. When I've traveled to military bases and spoken to pilots and maintainers, I become more and more concerned that the military services are being too slow to respond.

We have to do whatever it takes to ensure that our aircraft are safe and that pilots get the training they need.

Without objection, all witness' prepared statements will be included in the hearing record.

General Francis, please begin.

RECORD VERSION

STATEMENT BY
BRIGADIER GENERAL DAVID J. FRANCIS
COMMANDING GENERAL,
UNITED STATES ARMY COMBAT READINESS CENTER

BEFORE THE

SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
COMMITTEE ON ARMED SERVICES
UNITED STATES OF HOUSE REPRESENTATIVES

SECOND SESSION, 115TH CONGRESS

ON DEPARTMENT OF DEFENSE AVIATION SAFETY MISHAP REVIEW AND OVERSIGHT PROCESS

JUNE 13, 2018

NOT FOR PUBLICATION UNTIL RELEASED BY THE
COMMITTEE ON ARMED SERVICES

STATEMENT BY
BRIGIADIER GENERAL DAVID J. FRANCIS
COMMANDING GENERAL
U.S. ARMY COMBAT READINESS CENTER

Chairman Turner, Ranking Member Tsongas, and fellow distinguished Members of the Tactical Air and Land Forces Subcommittee, I sincerely appreciate the opportunity to appear before you to discuss Army Aviation Safety. I am honored to represent the Army's leadership, and the Soldiers and Civilians of the Army and Army Aviation, serving our Nation around the world as we discuss this critical topic.

Army Aviation Mishap Rates

The United States Army maintains the world's largest, most modernized, and well-trained aviation force of its kind that provides an asymmetric advantage to the Joint Force. Military aviation is an inherently dangerous business, and we continue to make strides to reduce mishaps. Army aviation Class A mishap rates have steadily declined over the course of the last 35 years with noticeable anomalies associated with major combat deployments. In FY07, during the surge in Iraq, the Army's manned Class A Flight mishap rate was 2.39 per 100,000 flying hours. In the ten years that followed the rate has been reduced to a low in FY16 of 0.87 with a ten year average of 1.33. FY17 ended with a rate of 0.99 and the current rate for FY18 is 0.93. The mishap rates from FY16 to FY18 YTD constitute the lowest three-year period in the last 35 years. Despite this improvement, the Army is committed to aggressively driving our mishap rates down. The single most important thing we can do to reduce Aviation mishaps is continue to train in the most demanding conditions as we prepare to fight and win against peer and near-peer adversaries.

The Army continually assesses Class A, B, and C mishaps to identify trends we can target for loss prevention. The Class B and C mishap totals and rates for FY17 and FY18 are below ten year averages but remain relatively consistent over the last five years. Analysis of these mishaps indicate that the causal factors mirror those of our Class A mishaps. While most mishaps are the result of a series of events, roughly 80% of all Class A though C mishaps involve human factors as the leading or latent (underlying) causal factors contributing to the mishap. The leading causal factors are performance based and judgment errors; while

individual training, experience level, supervision, planning, and crew and team training represent the predominant underlying causal factors.

The Army's Aviation force faces unique challenges as we prepare for Large Scale Combat Operations against a peer or near-peer adversary. Large Scale Combat Operations demand a different training approach to reach collective level proficiency. Doctrine, tactics, techniques, and procedures are different compared to those used for training and conducting counter-insurgency operations like those in Iraq and Afghanistan. The anti-access area denial capabilities of our peer and near-peer adversaries will drive our rotary wing forces much closer to the ground. These capabilities include the multi-domain, contested environment of early warning, cyber, space, electronic warfare, integrated air defense systems and sophisticated reconnaissance and security tied to precision long range fires. We need to train at terrain flight altitude profiles to counter the potential threat and avoid the sharp increase in mishaps we suffered during the initial stages of previous conflicts. Aggressive, realistic training in the most demanding mode of flight is the best way to mitigate a rise in mishaps associated with Large Scale Combat Operations. However, current demands on the force have 84% of active duty Army Aviation units committed to training for, deploying to, executing, or recovering from mission support requirements. This operational tempo challenges our ability to achieve collective level training standards above the platoon level. Large Scale Combat Operations will require companies and battalions to operate as integrated teams. If we do not train for those operations we will significantly increase the risks associated with those operations in combat. At the current pace we run the risk of repeating the spike in aviation mishaps we experienced in previous major operations.

Army leadership is working diligently to prevent future mishaps. Army Aviation's Executive Leadership convenes weekly to discuss actions across the Doctrine, Organization, Training, Material, Leadership and Education, Personnel, Facilities and Policy (DOTMLPF-P) spectrum. In addition to continuous aircraft modernization, other initiatives include the development of low altitude emergency procedures Training Support Packages (TSP), development of changes to instructor pilot training courses, re-assessing and evaluating instructor pilot experience levels and prerequisites for becoming an instructor pilot, and development of a standardized Aviation "Battle Book" for the entire Aviation force. Additionally, the U.S. Army Combat Readiness Center (USACRC) is conducting vignette-based training with every Aviation element across all three components, drawing lessons learned from Class C mishaps and other "near-miss" incidents. These vignettes poignantly illuminate the leading and

underlying human factors that can lead to many of our most catastrophic events. The USACRC is also developing and fielding improved information management systems that capture near-miss reporting for more ready access and dissemination to the field.

Aviation Mishap Governance, Investigation and Review

The Army takes every mishap seriously. Though mishaps are stratified based on severity, the Army investigates all mishaps in accordance with Title 10, U.S. Code, Department of Defense Instruction (DoDI) 6055.07, Army Regulation (AR) 385-10, and Department of the Army Pamphlet (DA PAM) 385-40, in order to prevent future mishaps. AR 385-10 requires immediate notification to the USACRC of Class A-C aviation mishaps. The USACRC receives and analyzes these initial notifications to determine investigation requirements and notify senior leaders as appropriate. As part of this process, the information available for the mishap is recorded in the Army Safety Management Information System (ASMIS) and initial electronic notifications of serious mishaps are forwarded to senior leaders, including the Vice Chief of Staff of the Army (VCSA), Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health (DASA-ESOH), and the Department of Defense Deputy Assistant Secretary of Defense, Environment, Safety and Occupational Health.

Less severe mishaps, those that do not involve permanent injury or damage over $500K, are investigated in the field by locally assigned officers or safety specialists using abbreviated reporting requirements. For Class A and B mishaps, the Army utilizes formal Investigation Boards. The USACRC deploys teams to lead Centralized Accident Investigations for the most serious mishaps. The Commanding General (CG), USACRC, after consultation with the General Officer leadership of the mishap unit, makes the final decision on whether to deploy a team based on the initial report of the mishap and the resources available at the time. Any specific areas to be investigated outside of the requirements of AR 385-10 or DA PAM 385-40 are also covered in this consultation. The CG, USACRC also informs the VCSA of his decision. If the USACRC does not deploy a team to lead the investigation, the responsibility for the investigation is returned to the General Courts Martial Convening Authority (GCMCA) to appoint a board to investigate the mishap ensuring that the members of the board are impartial, not from the mishap unit, and meet the requirements of AR 385-10.

Regardless of the composition of the investigative board, or whether a USACRC team leads the investigation, we utilize a deliberate and methodical process to answer three fundamental questions: what happened, why it happened, and what to do about it.
The formal process for answering these questions is broken into five phases. Phase one is the organization phase, which comprises the assembly and formal appointment of the Board. Board composition varies, depending on the nature and degree of severity of the mishap (aviation vs. ground mishap, the type of equipment involved, the degree of injury suffered or fatalities involved, etc.). The Board is organized into three teams to ensure a comprehensive perspective: the Board leadership, a Human Factors team, and a Materiel Factors team. The second phase is the data collection phase, during which the Board collects data and evidence from all available/applicable sources, including the mishap site, risk assessments, equipment maintenance, training and medical records, and unit orders and policies, in order to gain an accurate understanding of the personnel, equipment, and environment surrounding the mishap. The third phase is the analysis phase, during which the Board examines all collected data and develops an understanding of what happened and how the information collected is relative to the cause of the mishap. During the fourth phase, the deliberation phase, the Board identifies and assesses the active failure(s) and latent condition(s) that contributed to the mishap, thereby answering why it happened. The Board develops Contributing findings (directly leading to the mishap) and Present but Not Contributing findings (those not directly leading to the mishap but if not corrected, could result in future mishaps). The most important output from the deliberations phase are the recommendations, which are directed at three Army echelons: 1) to the mishap unit, 2) to that unit's higher headquarters, and 3) to Army Commands (ACOM). These recommendations determine what actions the Army will take to address the mishap. During the final phase, the Board completes the field report and outbriefs their findings and recommendations to the convening authority (usually the first general officer in the chain-of-command with GCMCA).

AR 385-10 requires that the board complete the investigative report within 90 days of the mishap, to include staffing through the mishap chain of command from battalion to ACOM level. During this endorsement process, commanders at every level are expected to answer all recommendations not already acted upon earlier in the investigation process. The investigation is complete when all findings are closed with action and the ACOM commander signs the final report. Once the final report is signed by the convening authority and subsequent commanders up to the ACOM level, the USACRC enters all information from the report into the ASMIS database to complete the record. Final reports are maintained at the USACRC and available for analysis and

research. Multiple agencies across the Army use the ASMIS database for research and analysis, and the USACRC continually reviews the data for emerging trends. The Army shares data with the other services and with the Office of the Secretary of Defense (OSD) through data pushes, such as to Force Risk Reduction (FR2) in accordance with the current memorandum of understanding, and with pulls to support any follow on requests.

Of note, the mishap unit typically conducts a separate legal investigation concurrent with the AR 385-10 mandated safety investigation. Using AR 27-20 or AR 15-6 as the governing document, the purpose of the legal investigation is to preserve all available evidence for use in litigation, claims, disciplinary action, or adverse administrative actions. All factual information gathered by the safety investigation board is shared with the legal investigation, and all information gathered by the legal investigation is releasable to the safety investigation board.

Lessons Learned

If the safety investigation board discovers a critical hazard to operations, the board president immediately reports the hazard to the USACRC and appropriate agencies. For example, if the investigation reveals a materiel failure, the USACRC and investigation board will immediately consult with the appropriate Program Executive Office, Product Manager, and Army Materiel Command (AMC) to remedy the issue. As a case in point, while investigating an AH-64D mishap, the board discovered a probable failure of the main rotor system blade retention yoke ("strap pack") and retention nut. The board immediately alerted the probable materiel failure to the USACRC and the Aviation and Missile Command (AMCOM), AMC's aviation materiel proponent. AMCOM immediately assembled expertise from across the enterprise to study and assess the probable materiel failure. They then issued a Safety of Flight Message to the Army and all other AH-64 users requiring immediate and follow-on inspections for all main rotor strap packs and retention nuts. A similar process occurred when a UH-60L tail rotor blade disbonded, causing the aircraft to crash. AMCOM immediately issued a Safety of Flight Message requiring maintenance inspections of the tail rotor and a mandatory review of tail rotor malfunction emergency procedures training. As a final example, less than 72 hours after a recent AH-64E mishap, the Chief of Staff of the Army hosted a worldwide VTC with all AH-64 equipped Aviation commands across all three components, demonstrating Army Senior Leader commitment to loss prevention.

The USACRC manages less urgent recommendations that require Army action through the Army Recommendation Tracking System (RTS). These recommendations address shortcomings across the DOTMLPF-P and include changes to Army policy, institutional training, technical manuals, and materiel. The USACRC communicates recommendations to the appropriate ACOM for action, captured in RTS, and closes the action when the ACOM commander implements the recommendations. The CG, USACRC is the authority to close a recommendation.

Beyond RTS, the USACRC and Army disseminate lessons derived from mishap findings and recommendations in a variety of ways:

- The CG, USACRC communicates mishap analyses across the force through "Safety Six Sends" messages to brigade commanders.
- The USACRC posts one-page executive summaries of Class A accidents containing safety privileged information to the Army Center for Lessons Learned (CALL) website.
- The U.S. Army Aviation Center of Excellence addresses any immediate action changes to procedures, standards, and leader and individual training issues by issuing "STANSGRAMS" to all active and reserve component Aviation units.
- The USACRC enters safety reports into ASMIS, which are then available to any individual who has safety responsibilities and requests access.
- The USACRC posts Centralized Accident Investigation results to ASMIS within two weeks of completion of the field investigation.
- The USACRC disseminates lessons learned Army-wide on its website and electronic publications — Knowledge Magazine and FlightFax Newsletter.
- The CG, USACRC briefs all Aviation pre-command courses, which include all company, battalion, and brigade commanders, command sergeants major, and command chief warrant officers, to share lessons learned from mishaps and other analyses.
- The CG, USACRC alerts brigade commanders when any of their battalions score in the bottom 50% of the Army Readiness Assessment Program (ARAP) survey. Every Army battalion executes the ARAP survey in accordance with AR 385-10. ARAP informs incoming commanders of their units' safety climate.
- The CG, USACRC authors a monthly article in the Army Aviation Association of America magazine which concentrates on trends and emerging issues.

Interaction at the Joint and OSD Level

While mishap investigation and reporting is a service specific requirement, the Army actively participates in joint and OSD efforts. The Joint Services Safety Council (JSSC), composed of the commanders of each service's safety organizations, meets semi-annually in person to share information, discuss trends and lessons learned, and share prevention programs. The JSSC and its subordinate working groups convene as needed when emerging issues require. The Services share mishap data and coordinate on concerns involving like systems or similar hazards. Program managers communicate materiel issues across the services through safety channels. The USACRC staff participates in numerous joint and OSD working groups and supports FR2 with data and analysis as requested. The USACRC interfaces with the Defense Safety Oversight Council (D-SOC) via the Safety and Occupational Health Integrating Committee (SOHIC), which convenes monthly and is co-chaired by OUSD P&R and OUSD EI&E. This forum provides for collaboration and coordination across the Services.

Finally, the Army routinely participates in information sharing with OSD through the preparation of data or briefings for senior Defense officials. Most recently, the CG, USACRC briefed the Assistant Secretary of Defense for Energy, Installations and Environment and the Deputy Assistant Secretary of Defense, Environment, Safety and Occupational Health on an in-depth study of Class C Aviation mishaps.

Conclusion

The Army's efforts to reduce Aviation mishaps to the low levels we see today is an ongoing process. We must train to the highest standards in the most demanding conditions to meet future threats, while systematically drawing from and disseminating lessons learned. We also must remain aware of and mitigate the inherent risk in Aviation operations, but we cannot be risk averse — or we will pay the price in our next conflict.

Mr. Chairman and distinguished members of this subcommittee, thank you for your continued strong support for the Army's Soldiers, Civilians and families.

Brigadier General David J. Francis
Commanding General,
U.S. Army Combat Readiness Center and Director of Army Safety

Brigadier General David J. Francis is a native of Pennsylvania and received his commission from Gannon University, Erie, Pennsylvania.

BG Francis has served in a series of command and staff positions. After graduation from AVOBC and flight school, he served as an Assault Helicopter Platoon Leader and Infantry Liaison Officer in the 2nd Battalion (Assault), 2nd Infantry Division, Camp Stanley, Korea from 1990 to 1991. He then completed the Aviation Officer Advanced Course and proceeded to Ft. Bragg, N.C. From 1992 to 1996, he served as an Assault Helicopter Platoon Leader, Battalion Flight Operations Officer, Battalion Adjutant and Assault Helicopter Company Commander in 2nd Battalion (Assault), 82nd Aviation Brigade, Ft. Bragg, N.C.

After company command, he moved to the National Training Center, Ft. Irwin, Calif. From 1996 to 1998, he served as an Assault Helicopter Company Trainer and S3 Trainer. From 1998 to 2001, he served as a Small Group Instructor, Aviation Captain's Career Course and Battalion S3, 1-145th Aviation Regiment, Ft. Rucker, Ala. From 2002 to 2004, he served as a Battalion Executive Officer, 2nd Battalion (Assault), 25th Aviation Regiment, Wheeler Army Airfield, Hawaii and Task Force S3, Task Force Diamondhead, Kandahar, Afghanistan. BG Francis assumed duties as the Joint Task Force Wings (25th Aviation Brigade) S3 in October 2004 in support of Operation Enduring Freedom. From June 2005 to 2007, he served as the Chief of Joint Task Force Certification, J7, United States Pacific Command at Camp Smith, Hawaii. From December 2007 to October 2010, BG Francis commanded 2nd Battalion, 25th Aviation Regiment (Task Force Diamond Head) and completed a combat deployment in support of OIF 09-11.

From October 2010 until June 2011, he served as the Chief of Staff, 25th Infantry Division Rear at Schofield Barracks, Hawaii. BG Francis attended the U.S. Army War College from July 2011 to June 2012. BG Francis commanded the 10th Combat Aviation Brigade from July 2012 to May 2014 and deployed the Brigade to Regional Command East, Afghanistan in support of Operation Enduring Freedom. He then served as the Deputy Commander for the U.S. Army Aviation Center of Excellence at Fort Rucker, Ala. from May 2014 to June 2016. BG Francis most recently served as the Deputy Commanding General (Support), 2nd Infantry Division, Republic of Korea.

He holds a Bachelor of Arts degree in History from Gannon University, a Masters of Business Administration from Touro University and a Masters in Strategic Studies from the U.S. Army War College. He is a graduate of the Aviation Officer Basic Course, the Initial Entry Rotary Wing course, the Jumpmaster Course, the Aviation Officer Advanced Course, the United States Army Command and General Staff College and the United States Army War College.

His military awards and decorations include the Legion of Merit with oak leaf cluster, Bronze Star Medal with two oak leaf clusters, the Defense Meritorious Service Medal, the Meritorious Service Medal with four oak leaf clusters, the Air Medal with Numeral 2, the Army Commendation Medal, the Army Achievement Medal with three oak leaf clusters, the Meritorious Unit Citation with one oak leaf cluster, the Army Superior Unit Award, the Joint Meritorious Unit Award, the Armed Forces Expeditionary Medal, the Iraq Campaign Medal with Campaign Star, the Global War on Terrorism Expeditionary and Service Medals, the Korean Defense Service Medal, the Humanitarian Service Medal and the Armed Forces Service Medal. He has also earned the Combat Action Badge, the Master Army Aviator Badge the Parachutist Badge and the Air Assault Badge.

BG Francis is married and has seven children.

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THE HOUSE ARMED SERVICES COMMITTEE
TACTICAL AIR AND LAND FORCES
SUBCOMMITTEE

STATEMENT OF

REAR ADMIRAL MARK LEAVITT
COMMANDER, NAVAL SAFETY CENTER

BEFORE THE

TACTICAL AIR AND LAND FORCES SUBCOMMITTEE

OF THE

HOUSE ARMED SERVICES COMMITTEE

ON

DEPARTMENT OF DEFENSE AVIATION SAFETY MISHAP REVIEW AND OVERSIGHT PROCESS

JUNE 13, 2018

NOT FOR PUBLICATION UNTIL RELEASED BY
THE HOUSE ARMED SERVICES COMMITTEE
TACTICAL AIR AND LAND FORCES SUBCOMMITTEE

INTRODUCTION

Mr. Chairman, Ranking Member Tsongas, and distinguished members of the Subcommittee, thank you for the opportunity to testify before you today to discuss the aviation mishap review and oversight processes designed to keep mishaps from recurring. This is a crucial issue that effects the lethality of our Navy and Marine Corps team. While the Department of the Navy's goal is zero preventable mishaps, especially the most tragic ones that result in the death of a Sailor or Marine, it is critically important to have proven processes in place to rigorously investigate the mishaps that do occur. Once the investigation has been completed, the analysis of the causal factors will be used to enact effective controls to prevent recurrence. All available data must be used to proactively identify negative trends so that corrective measures can be put in place to prevent mishaps before they occur. Finally, the successful employment of clear and timely communication will ensure important risk information is provided up and down the chain of command. Risk management information derived from the most meticulously analyzed accident scene or deduced by PhD-level data studies is only useful for mishap prevention when it is disseminated and utilized by the entire chain of command, from senior leaders who plan multi-unit operations all the way down to the Sailors and Marines who perform maintenance or support in squadrons. The aviation mishap investigation, review, analysis, and communication of lessons learned processes are multifaceted but have the singular goal of preventing mishaps to save lives and preserve fleet combat readiness.

10-YEAR AVIATION MISHAP HISTORY

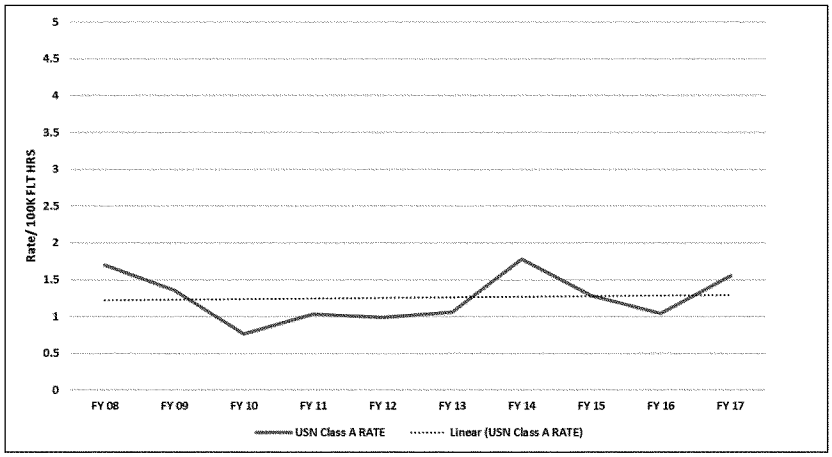
Class A

While Class A mishaps, those costing $2 million or more, a loss of life, or permanent total disability, are the rarest mishap type, they impact the Navy and Marine Corps tremendously in terms of human and materiel costs. From FY13 to FY17, Class A

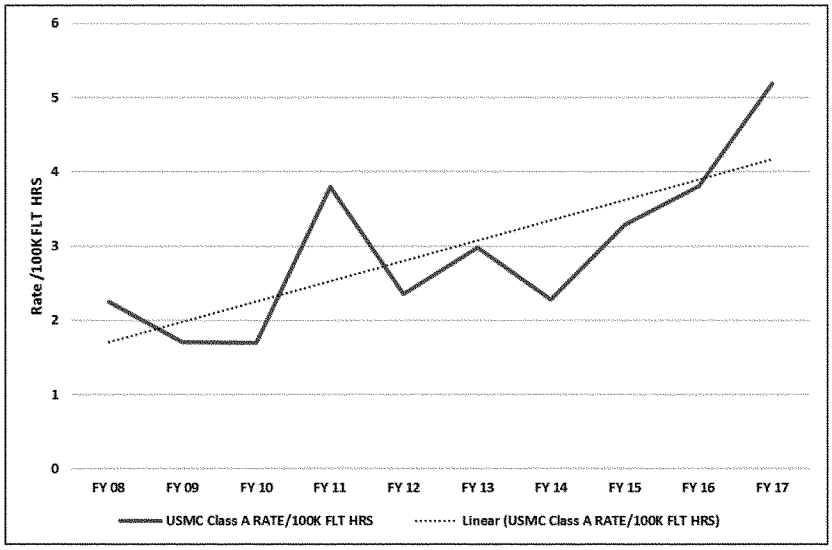
mishaps alone accounted for 94 percent of the $4.11 billion total cost of aviation mishaps and the tragic loss of 53 Navy (USN) and Marine Corps (USMC) aviators, aircrew, Sailors and Marines.

Aviation mishap rates for all classes are calculated per 100,000 flight hours. USN Class A rates have remained relatively constant during the last 10 years. There is no statistical significance in the fluctuation in the Class A mishap rate during the last 10 years. Total USN flight hours averaged 942,000 between FY08 and FY12, in the years before sequestration. In the last five years, flight hours have averaged about 90,000 less; however, this has not had a statistically significant impact on the Class A mishap rate.

The majority of both USN and USMC Class A mishaps occur during flight operations as opposed to flight related or aviation ground mishaps. USMC flight hours are about a third of the USN's, averaging 302,000 between FY08 and FY12. In the last five years, those averages have dropped by approximately 50,000 hours. USMC Class A rates are showing an increase over the last 10 years.



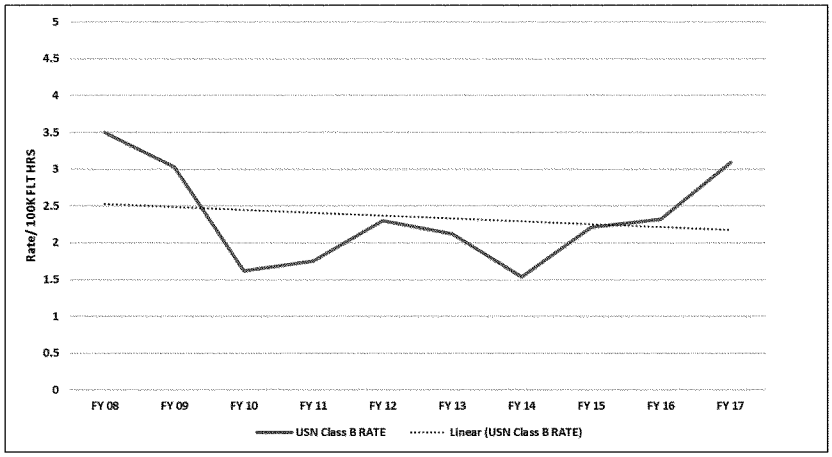
USN 10-Year Class A Aviation Mishap Rates



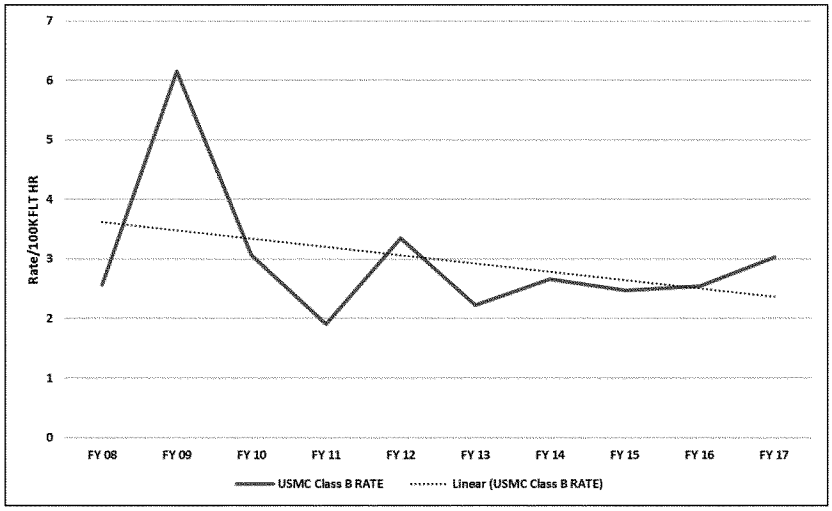
USMC 10-Year Class A Aviation Mishap Rates

Class B

Class B mishaps also have significant effects on the fleet. Each costs at least $500,000 but less than $2 million, or results in a permanent partial disability to a service member or DON civilian. The USN Class B mishaps show a more even dispersion between flight, flight-related, and aviation ground mishaps than USN Class A mishaps. USMC Class B rates trended slightly down over 10 years, but not enough to be of statistical significance. USMC Class B mishaps are a nearly even split between flight and aviation ground mishaps.



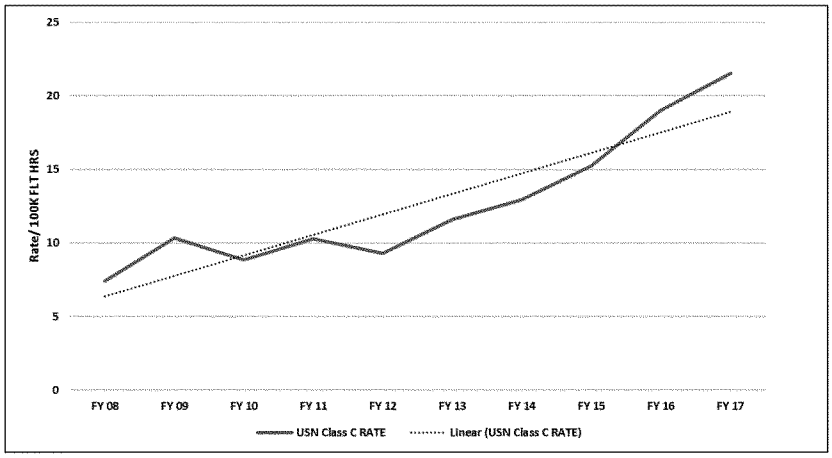
USN 10-Year Class B Aviation Mishap Rates



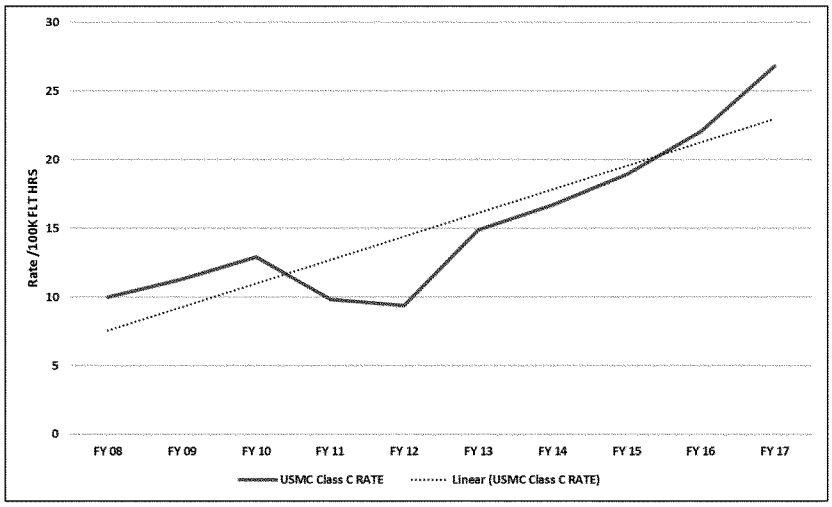
USMC 10-Year Class B Aviation Mishap Rates

Class C

The naval enterprise is currently investing a great deal of its analytical efforts to understand the recent rise in Class C mishaps, those costing the government between $50,000 and $500,000 or nonfatal injuries or illnesses that result in one or more days away from work. This rise is affecting both the USN and the USMC. Additionally, the majority of these mishaps are aviation ground mishaps, rather than flight or flight-related mishaps. The bulk of these mishaps occur during maintenance evolutions and involve aircraft striking or being struck by other objects. Multiple discrete studies from numerous sources point to inexperience in the E-5 and E-6 maintainer rates as a significant contributing factor. A recent USN study showed that F/A-18 and MH-60 squadrons, the largest aviation communities in terms of density of squadrons and aircraft, are experiencing the largest numbers of these mishaps. Human factors analysis studies point to breakdowns in organizational teamwork, an analysis category defined as the interaction among individuals, crews and teams involved in the preparation or execution of a task that resulted in human error or an unsafe situation. This breakdown could be related to the E-5 and E-6 inexperience issues previously noted. A similar study on USMC Class C aviation mishaps showed the same type of performance-based errors, and suggested applying the largest effort to the MV-22 and F/A-18 communities.



USN 10-Year Class C Aviation Mishap Rates



USMC 10-Year Class C Aviation Mishap Numbers and Rates

DEPARTMENT OF THE NAVY AVIATION SAFETY MISHAP GOVERNANCE, OVERSIGHT, INVESTIGATION, AND REVIEW PROCESS

Notification and Reporting Process

The mishap notification and reporting process is governed by OPNAV Instruction 3750.6 series, Naval Aviation Safety Management System, which outlines responsibilities, timelines, reporting, and safety investigation requirements for each type of mishap. When a mishap occurs, the first step is for the mishap unit to execute its pre-mishap plan, which describes the actions to be taken and delineates responsibilities following a mishap. One of the first actions within the pre-mishap plan is a required notification phone call to the Naval Safety Center within one hour of a Class A mishap. Additionally, the initial notification of a mishap must be made in the Web-Enabled Safety System (WESS) which is the online mishap reporting tool used by the Navy and Marine Corps. This must be done within four hours for Class A and B mishaps and within 24 hours for Class C mishaps. As more detailed information becomes available, complete mishap reports are required to be submitted via WESS.

Mishap information is regularly reported to the office of the Undersecretary of Defense (Personnel and Readiness) for entry into the Force Risk Reduction (FR2) application. This provides a centralized database for Department of Defense (DoD) personnel to review, evaluate, and monitor high risk areas such as mishaps. The Naval Safety Center updates FR2 monthly with all mishap information and at least weekly with current Class A data, and more often if there is a new Class A event.

Mishap Investigation Initiation

After all proper notifications are accomplished, the Aviation Mishap Board is convened. All aviation mishaps, regardless of severity, are investigated. Class A mishap boards are convened by the controlling custodian, the Navy or Marine Corps Flag or General Officer who is responsible for achieving readiness and safety standards while

optimizing total resource requirements. There may be a standing mishap board at the squadron level or one may be appointed. Board membership, at a minimum, consists of a senior member, who is a Naval Aviator or Naval Flight Officer. For a Class A mishap, the senior member must be an O-5 or above and external to the mishap unit. For all classes of mishaps, the senior member must be senior to the pilot in command and the mission commander. The board also consists of a formally trained Aviation Safety Officer, Flight Surgeon, operations representative, maintenance representative, and any other specialties and technical support as required. Class A and B mishaps, in addition to all Class C mishaps involving more than 10 lost work days, require investigation by a full mishap board. Class D mishaps and Class C mishaps involving anything less than 10 lost work days may be investigated by one officer or civil service employee filling an Aviation Safety Officer billet, at the discretion of the unit Commanding Officer.
At the request of the mishap board, a trained Naval Safety Center investigator will provide on-scene assistance, and will usually travel to the scene of the mishap within 24 hours. Naval Safety Center investigators assist most Class A flight mishap safety investigations and others as requested. The investigator serves as an advisor to the Aviation Mishap Board. The initial actions of the mishap board are to gather evidence and gain situational awareness. The mishap scene must be secured so evidence can be preserved.

Once all relevant evidence has been collected, the mishap board initiates the analysis and deliberation phase. This involves reviewing the three types of evidence: People (witnesses, survivors), Physical (wreckage, tools and equipment, facilities), and Documentation (records and logbooks, photos and video, electronic media). The deliberative process of the board focuses on discovering the mishap causal factors and making recommendations to prevent it from happening again.

There is no standard aviation mishap safety investigation timeline. These investigations vary based on factors such as the severity of the mishap, whether or not the aircraft wreckage can be recovered or reconstructed, and whether there were survivors to

make statements. However, on average, the first 48 hours following a mishap is spent in initial response, the next two weeks are spent gathering evidence, followed by a week of board deliberations, and another week to write the investigation report and release it. The report is due 30 days from the date of the mishap, but extensions are often requested and approved due to the length of some engineering investigations and other extenuating circumstances.

The sole purpose of a mishap safety investigation is to determine the causal factors of the mishap and develop recommendations to prevent recurrence. As such, parts of mishap safety investigations are covered by safety privilege. Safety privilege is not granted to other types of investigations such as Judge Advocate General or Naval Criminal Investigative Services investigations which are designed to assign responsibility or fault. Safety privilege protections have been upheld by the Supreme Court and are based on a national defense need for rapid and accurate assessment of the causes of mishaps to prevent a recurrence and maintain mission readiness. This privilege creates restrictions on handling and releasing information in mishap investigation reports. The purpose of safety privilege is to overcome a witness' reluctance to reveal complete and candid information to investigators. It also encourages mishap boards and safety investigation report endorsers to provide complete, open and forthright information, opinions, and recommendations about a mishap. Safety privilege protects witnesses, boards, and endorsers from the fear of retribution, the use of the information for disciplinary purposes, or adverse administrative actions. The specific parts of a mishap safety investigation covered by safety privilege include witness statements offered under a promise of confidentiality, board deliberations and analysis, and certain portions of the mishap safety investigation report and endorsements, to include mishap recommendations until those actions are complete.

Post Investigation Processes and Procedures

Once the mishap safety investigation is complete, the board will produce a report detailing whether each causal factor is accepted or rejected. The endorsers of the report, in turn, have an opportunity to concur or non-concur on every accepted and rejected causal factor and the associated mishap recommendations. The endorsement chain is determined by the aircraft controlling custodian. Any endorser who determines that a safety investigation is incomplete or that the report is inadequate may direct the reconvening of the mishap board and require resubmission of the report, addressing specific areas of concern. Acting as the Chief of Naval Operations' Special Assistant for Safety Matters, Commander, Naval Safety Center is the final endorser for all Class A mishap investigation reports. For Class B and C mishaps, the final endorser is the commander who can affect the closeout of the mishap recommendations.

The endorsement process can be lengthy because it must be deliberate, thorough, and accurate. There are typically four endorsers for a Class A mishap. The reporting command and the immediate superior in command each have 15 days to review the report, concur or non-concur on accepted or rejected causal factors, and make any additional recommendations. The controlling custodian then has 28 days to review and endorse the report before it is forwarded to the Naval Safety Center for final endorsement. Extensions are often granted. Based on the safety investigation timelines and typical endorsement chain, the average report is scheduled to be completed in 157 days. However, due to issues like wreckage recovery, engineering investigations, and endorsement chain extensions, finalization times vary. For this reason, it is crucial for critical safety information to be released to the fleet as soon as it is discovered and often well before the mishap investigation report is finalized.

When a hazard is discovered during the safety investigation or at any point in the process, a non-privileged hazard report (HAZREP) is released by the mishap board to provide timely notification to the fleet and program managers. These HAZREPS allow the air worthiness authority (Naval Air Systems Command) to decide if groundings,

inspections, or other mitigation actions are necessary before the continued employment of the type of aircraft or equipment involved is permitted. There have been several examples where a hazard has prompted the release of a HAZREP which resulted in an operational safety pause, conditional inspections, and even groundings long before the investigation report was released.

Within 10 days of the release of any Aviation Class A mishap report, a representative from the Naval Safety Center's Aviation Safety Programs Directorate develops two products for fleet use and distribution. These products are the Mishap Executive Summary and Safety Officer Training Presentation. The Mishap Executive Summary is a two to three-page review of the event's mishap safety investigation report and is designed to be routed to the endorsing chain of command to facilitate briefing of Class A mishaps to higher echelon leadership. The Safety Officer Training Presentation is distributed to same or similar community unit safety departments with the intent of providing a training tool at the squadron level.

The Naval Safety Center continuously looks for cost-effective ways to create relevant lessons-learned products. One such recent innovation is a sanitized mishap safety investigation report that is distributed as a lessons-learned awareness product. This product is an abbreviated version of the original mishap investigation report with elements of privileged information and PII redacted to enable the report to be more readily disseminated and used for fleet training. The sanitized report remains a "For Official Use Only" (FOUO) document and is required to be handled accordingly.

The Naval Safety Center aviation platform subject matter experts also produce periodic Safety Gram messages for their community safety representatives. Safety Grams are sent via email and provide community safety trends, contain relevant and recent mishap investigation and hazard reports, and distribute type/model/series community lessons learned and best practices across all stakeholders.

The analysis of data collected from mishap safety investigations is key to understanding and communicating mishap information. However, the Naval Safety

Center is working to get ahead of mishaps with preventive mishap data analysis and informed risk identification through strategic partnerships. These collaborative efforts include the Navy and Marine Corps Public Health Center, the Digital Warfare Office, the Center for Naval Analysis, the Naval Post-Graduate School, and other organizations. All of these organizations are equipped to perform in-depth studies to gain a better understanding of the human and materiel factors that lead to mishaps so mitigations can be developed to stop a mishap before it happens. The Naval Safety Center is also increasing its organic analytical capabilities by acquiring enhanced technology and additional specialized manpower devoted to this effort.

While the Naval Safety Center is the authoritative source for mishap data, deeper analysis requires a holistic approach where data scientists can leverage readiness, manning, and other information to assess the overall health of a unit and the safety posture of the Navy and Marine Corps as a whole. The Naval Safety Center is working with the Fleet and Type Commanders to develop mutually beneficial data sharing agreements that will allow for improvements in risk and hazard identification and analysis. This "deep dive" analysis should eventually allow for the identification of risk trends that become a predictive and preventative tool. The Naval Safety Center has been tasked with expanding its analytical workforce. This will include hiring contracted data scientists who will assist in the development of sophisticated risk models using these new data streams in addition to growing organic capabilities and capacity. Understanding the importance of working jointly, the Naval Safety Center and other Navy organizations have partnered with the Army Analytics Group for data aggregation and complex data analysis.

MISHAP RECOMMENDATIONS AND LESSONS LEARNED

The primary purpose of the aviation mishap review and oversight process is to prevent recurrence. Recommendations from mishap safety investigations, hazard reports, and lessons learned are most useful when they are clearly communicated and successfully implemented. After a mishap investigation is finalized, every causal factor is required to have at least one corrective action or recommendation with which it is associated. Recommendations are assigned to action agents throughout the naval enterprise who are responsible for completing the assigned action unless relieved by higher authority. Mishap recommendations vary, but common examples include changes to aircraft operating procedures and modifications to aircraft equipment. In some cases, if a widespread threat is identified, a REDSTRIPE might be issued to ground a fleet for an inspection or maintenance action related to an identified hazard or component failure. The Naval Safety Center tracks all open mishap recommendations and hazard recommendations assigned a risk assessment code of one or two (the two most serious categories based on probability and severity out of a scale of five).

Completed mitigations from mishap and hazard recommendations are having a positive effect. With regard to physiological episodes, the number one safety concern in the aviation community right now, the Naval Safety Center provides support to the Physiological Event Action Team (PEAT). As a collaborative effort, specific Naval safety policies and procedures have been developed for the investigating and reporting of physiological events. The quality and accuracy of engineering, maintenance, and medical data collected is enabling engineering and "big data" teams to find solutions to mitigate physiological events. As a result of these efforts, the Navy is currently integrating an Automatic Backup Oxygen System (ABOS) into T-45s to improve overall oxygen system performance. The Naval Safety Center and PEAT are collaborating with DoD, NASA, TYCOMS, SYSCOMS, and industry partners to expand upon current research and

further recommendations regarding improvements to the Environmental Control System in the F/A-18 aircraft.

Other safety mitigations implemented based on mishap recommendations include improvements to the MH-60 gunner's seat funded in POM-19 and a Dual Function Display Knob in the AH-1Z that was a cockpit foreign object damage (FOD) hazard. A structural modification was made to the AH-1Z cockpit and the hazard was taken off the System Safety Working Group's Top Ten List this year. These are just a few examples of the many improvements made possible by a methodical and rigorous mishap investigative process.

The Naval Safety Center has centralized and strengthened its lessons learned program office with the sole focus of developing products aimed at various fleet audiences. These products provide units with unique approaches to mishap and hazard education and training in order to increase safety awareness and appropriate mitigation strategies for all levels of leadership. A typical lessons learned product is a two-page document capturing the highlights of a mishap or significant hazard event and the key strategies to mitigate the risks in the future. The format and content, however, is tailored to fit the intended audience and specific requirement. A recent example includes a lesson learned product about maintainers in different squadrons working on different aircraft platforms using the wrong engine oil. The use of the incorrect oil led to multiple Class A mishaps and several HAZREPs. Sharing this type of information across communities is essential, because the true extent of many safety problems go well beyond just one squadron or aircraft platform.

RELATIONSHIP WITH OSD OVERSIGHT AGENCIES

RELATIONSHIP WITH OTHER SERVICES SAFETY CENTERS AND JOINT WORKING GROUPS

Joint Service Safety Council

The Joint Service Safety Council (JSSC) is the primary forum where Service Safety Chiefs meet to discuss mishap and safety concerns having joint applicability. The Flag and General Officers of the Naval Safety Center, Army Combat Readiness Center, Air Force Safety Center, U.S. Coast Guard Health, Safety and Work-Life Directorate, and the head of HQMC Safety Division meet in person twice per year, and have staff discussions via teleconference more frequently through the year as necessary.
Two years ago, the JSSC endorsed the formation of the Joint Service Safety Lessons Learned Forum, a working-group level council with representatives from each of the services that also meets twice per year to develop and address lessons learned with joint applicability. There are two working groups that deal with issues of importance to the aviation community and support the JSSC. The Human Factors Working Group (HFWG) explores human factors issues including data collection, sharing, analysis, research, and reporting. The HFWG focuses upon prioritization of the most significant hazard exposure categories with the highest potential to reduce risks that are common across the DoD and Coast Guard. The HFWG is also responsible for the standardization of the DoD Human Factors Analysis and Classification System (HFACS) across the Services.

The Aviation Safety Working Group (ASWG) serves as a forum for collaboration among DoD safety stakeholders to identify data-informed, benefit-focused safety policies, programs, strategies, and initiatives designed to reduce the risk inherent in aviation operations across the DoD and the U.S. Coast Guard. The ASWG supports both the JSSC and the DoD 3-Star Safety and Occupational Health Steering Group and is chartered by the Director, Environment, Safety and Occupational Health Office of the

Under Secretary of Defense (AT&L) and the Director, Personnel Risk Reduction Office of the Under Secretary of Defense (Personnel and Readiness).

Joint Mishap Investigations

In mishaps involving more than one service, the Naval Safety Center works in close coordination with other service safety centers. The DoDI 6055.07, *Mishap Notification, Investigation, Reporting, and Record Keeping,* outlines specific requirements for coordination between services for the conduct of safety investigations involving more than one service. The DoDI specifies the coordination, composition and conduct of a Joint Safety Investigation Board, the sharing of reports, accountability for the mishap, and the completion of recommendations to prevent recurrence. Additionally, the Service Safety Chiefs, including the U.S. Coast Guard, signed a Joint Memorandum of Understanding on 10 April, 2006 that provides additional detail.

Service safety investigators take advantage of each others' safety schools to cross-pollinate investigative techniques, procedures, and best practices. Analysts have the ability to request and gain access to the other services mishap databases.

Rear Admiral Mark "Beave" Leavitt
Commander, Naval Safety Center

Rear Adm. Mark Leavitt is a native of New England and son of a United States Marine Corps sergeant major. He is a graduate of Florida State University (FSU), in Tallahassee, Florida, and enlisted as an aviation reserve officer candidate in April 1982. Upon graduation from FSU, he entered Aviation Officer Candidate School in Pensacola, Florida. He was designated a naval aviator in June 1986 at Naval Air Station (NAS) Meridian, Mississippi.

Leavitt completed operational assignments with the "Blue Blasters" of Attack Squadron (VA) 34 and Commander, Carrier Air Wing (CVW) 7 assigned as the senior staff landing signals officer, both based in Virginia Beach, Virginia.

His shore assignments include Fleet Replacement instructor pilot duty with the "Green Pawns" of VA-42. His command tours include: Fleet Logistics Support Squadron (VR) 56; Training Air Wing 2 Reserve Component; Chief of Naval Air Training Reserve Component; and Joint Transportation Reserve Unit Navy Element, United States Transportation Command. He has also served as deputy Reserve component commander, Navy Region Midwest.

In October 2011, Leavitt was promoted to flag rank. He has commanded Naval Air Force Reserve and the Naval Air Training Command and served as reserve director of Warfare Integration (OPNAV N9I) and reserve deputy director, Maritime Operations U.S. Fleet Forces Command.

In March 2018, Leavitt assumed his current position as Commander, Naval Safety Center.

Leavitt has accumulated over 5,000 hours in multiple naval aircraft. His awards include the Defense Superior Service Medal, Legion of Merit, Meritorious Service Medal and other personal and unit awards and citations.

Updated: 22 March 2018

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HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
UNITED STATES HOUSE OF REPRESENTATIVES

DEPARTMENT OF THE AIR FORCE

PRESENTATION TO THE
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
UNITED STATES HOUSE OF REPRESENTATIVE

HEARING DATE/TIME: June 13, 2018/1000

SUBJECT: Army, Navy, and Air Force Aviation Safety

STATEMENT OF: Maj Gen. John T. Rauch, USAF
Chief of Safety

NOT FOR PUBLICATION UNTIL RELEASED BY
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
UNITED STATES HOUSE OF REPRESENTATIVES

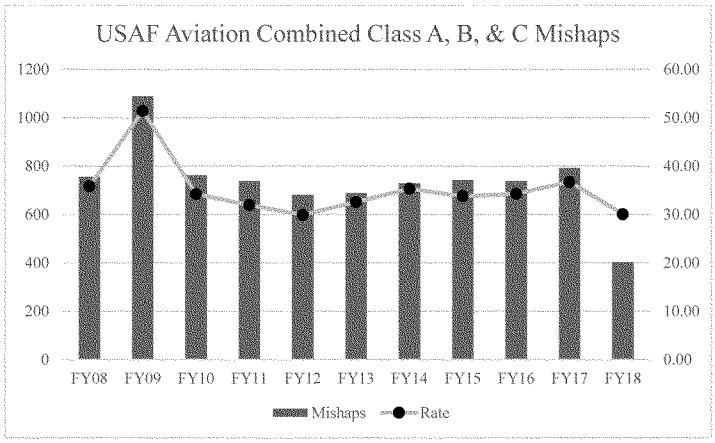
INTRODUCTION

Chairman Turner, Ranking Member Tsongas and distinguished members of the Tactical Air and Land Forces Subcommittee, thank you for the opportunity to provide an update on the United States Air Force Aviation Safety program. Safety remains a top priority for our service to ensure the preservation of our critical personnel and equipment and in the end our precious combat capability and readiness. While risk will always be present in our missions, especially in the aviation domain, our goal is to understand the associated hazards, and to eliminate or mitigate them to greatest extent possible, both during training and combat operations.

Since any preventable mishap is one mishap too many, our safety processes are designed with future mishap prevention as the focus. Ideally, of our proactive efforts will prevent a mishap from ever occurring. When a mishap does occur, however, we strive to quickly and accurately learn the lessons from the mishap's cause and apply them to prevent similar incidents. We thoroughly investigate each mishap, and ensure root causes are identified. In addition, safety recommendations from these mishaps are documented and tracked until resolution. The success of these methods is evident in the long-term mishap rate reductions in aviation—from fixed to rotary-wing and in both manned and unmanned aircraft—our safety programs and culture have realized reductions in overall aviation mishap rates steadily over the last few years. It is also important to note that our service safety center maintains constant communication with the safety centers of the other services regarding trends and critical information about specific incidents whenever appropriate. This collaboration and coordination allows the synergy of each service's safety programs to support efforts across the Department of Defense.

AVIATION MISHAPS

To date, our aviation mishap rates, as calculated by mishaps per 100,000 flying hours, are as follows:

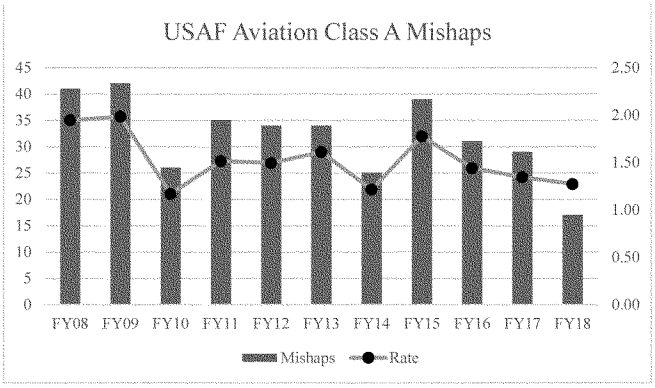


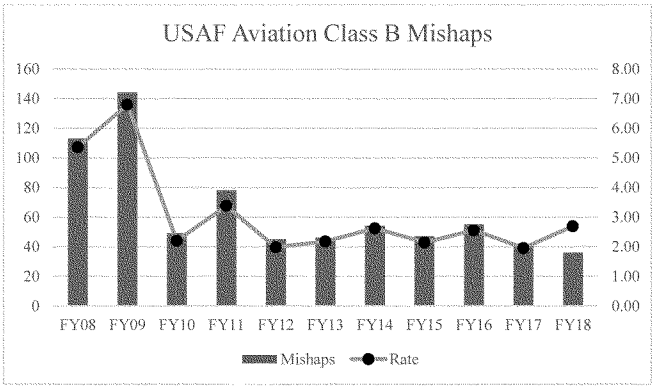
-- Last decade (since FY2008): the combined aviation Class A through C rate, including both manned and unmanned aircraft, has decreased by 16%. Specifically, our aviation Class A mishap rate decreased 35%, the Class B mishap rate decreased 50%, and the Class C mishap rate decreased 9%.

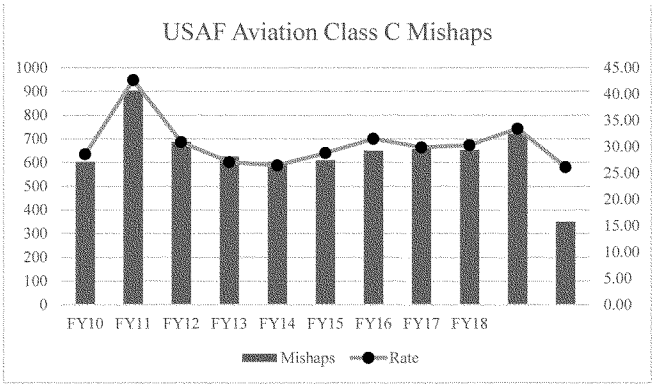
-- Last two years (since FY2016) – the Class A mishap rate decreased 12%, the Class B mishap rate increased 5%, and the Class C mishap rate decreased 14%.

-- In FY2018 (as of 23 May 2018), the overall Air Force aviation Class A mishap rate has decreased 5%, the Class B rate increased 38%, and the Class C rate decreased 18% when compared to FY2017. However, a breakout of manned aviation mishaps in the Class A category highlights a rate increase of 53% compared to FY2017. Meanwhile, the unmanned aviation Class A mishap rate has decreased 100% compared to FY2017.

4


USAF Aviation Class A Mishaps
45
40
35
30
25
20
15
10
5
0
2.50
2.00
1.50
1.00
0.50
0.00
FY08 FY09 FY10 FY11 FY12 FY13 FY14 FY15 FY16 FY17 FY18
Mishaps
Rate


USAF Aviation Class B Mishaps
160
140
120
100
80
60
40
20
0
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
FY08 FY09 FY10 FY11 FY12 FY13 FY14 FY15 FY16 FY17 FY18
Mishaps
Rate



We realize any long-term reductions in mishap rates do not replace the need for near-term adjustments when necessary. We continually monitor, analyze, and adjust our safety efforts to ensure the focus remains on the current issues. From trends analysis to directed safety reviews, the intent is always to understand and mitigate any emerging hazards. Together, these safety efforts fully support diverse missions across the spectrum of operations ensuring the preservation of our personnel and resources.

INVESTIGATIONS

Investigations are a core aspect of the safety efforts in our service. While we definitely work to prevent mishaps from occurring, when one does occur we need to fully understand what happened and apply these lessons learned to prevent another mishap. In this sense, mishap investigations are also proactive—although it is in response to a mishap that already occurred, obtaining the key recommendations from an investigation and then applying them is indeed proactive. The Air Force maintains a trained cadre of personnel that are tasked to investigate every

aviation incident that meets certain thresholds. The severity and type of mishap drives the response composition and footprint.

The most comprehensive investigation team is assembled for Class A aviation mishaps (those with a fatality, permanent disability, destroyed aircraft, or cost greater than $2M). This includes a safety-trained O-6 grade or higher officer for the Board president, a trained investigating officer, a current and qualified pilot, a trained maintenance officer, a flight surgeon/officer, as well as other expertise as deemed necessary based on the specific mishap. This team is also provided a representative from the Air Force Safety Center for guidance and reach back support for technical assistance.

Normally, this team, designated as the Safety Investigation Board (SIB), has 30-45 days to complete their investigation and formulate their formal report. This timeline may be extended as necessary to ensure a thorough and accurate investigation. The SIB's final report contains findings, causes, and recommendations to prevent similar mishaps in the future. After having its investigation approved by the Convening Authority (normally the commander of a Major Command), the report is processed at the Air Force Safety Center and each of the report's recommendations is formally assigned to an office of primary responsibility. Each recommendation is then updated in a centralized safety database every six months by this office until it is closed. Even if it takes several years to fully implement a recommendation, such as a material modification on a fleet of aircraft, the recommendation will stay open until the last aircraft is modified. This ensures full tracking and awareness of the recommendation's implementation status in case something changes. Each Air Force Major Command, as well as Headquarters Air Force, maintains a staff process to manage recommendations from formal safety investigations. A notable example of a modification to Air Force systems that originated as a safety investigation

recommendation is the recent incorporation of the Automatic Ground Collision Avoidance System, which prevents controlled flight into terrain in the F-16 and F-22 fighters. This system has been accelerated for implementation in the F-35.

In some investigations, critical safety issues may become evident that require dissemination prior to the approval and release of the formal report. In these situations, a "Critical Safety Information" process is followed that allows a more rapid dissemination or corrective action. When a SIB discovers information that seriously impacts the safe operation of a system, they immediately notify their Convening Authority. This ensures other agencies get notified and ensures access to required technical information by the aircraft's program manager. Also, the Air Force Safety Center disseminates the information to the Federal Aviation Administration and National Transportation Safety Board (if required for military variants of civil aircraft). This process, when required, ensures the most rapid resolution of issues that may impact ongoing operations. Recent investigations have used this process to ensure actions, such as one-time inspections across an aircraft fleet or adjustments in flight planning procedures, prior to the conclusion of an investigation.

For lower mishap classes, the investigative footprint may change. For Air Force Class B mishaps, the board composition remains identical but the Convening Authority may change to the Numbered Air Force, rather than the Major Command. For Class C mishaps and lower, the investigation is normally conducted by a single investigator assigned to the installation, and the Convening Authority is normally the local wing commander. Regardless of the investigation's footprint or approval level, a thorough investigation to understand the root cause and provide recommendations is always the top priority, and all recommendations are tracked until final resolution.

ANALYSIS

Analysis of trends and other safety information is a continuous effort in the Air Force and occurs at multiple command levels in the safety system. Primarily, Air Force aggregate safety trend analysis is accomplished by the Air Force Safety Center and is greatly aided by the fact that all Air Force mishap information is collected and managed via a database called the Air Force Safety Automated System (AFSAS). This cloud-based database is used by all safety investigators in the Air Force during mishap investigations and it contains every finding, cause, and recommendation from every Air Force safety mishap investigation, regardless of mishap level. AFSAS also contains analytical tools that allow categorization and sorting based on numerous facets, including aircraft types, dates, and other details.

Since the database's mishap catalog reaches into aviation mishaps from the 1990s, it allows thorough research and on-demand trend analysis by the Air Force Safety Center's aviation safety experts. Using the AFSAS database, we continually conduct analysis for trends within aircraft types, mission areas, and mishap causes. The AFSAS data greatly supplement overall qualitative assessments that are accomplished by Air Force Safety Center aviation experts. Some recent examples of this analysis include examining the physiological incidents in some Air Force platforms and an on-going "deep-dive" into Class C aviation mishaps. Also, it's important to note that AFSAS information is available to any safety office across the Air Force—not just the Air Force Safety Center, analysis may be performed at each Major Command, Numbered Air Force, Wing or Squadron for their respective mission areas and aircraft.

Other analytical efforts that may assist a commander's safety focus is the Air Force Combined Mishap Reduction System, which consists of a commander-requested survey to assess a unit's safety culture. After completion, the commander receives an in-depth debrief and analysis

to help identify hazardous areas of safety culture and unit climate. To date, over 680,000 surveys have been completed in the Air Force. Similarly, we can also conduct an in-person Organizational Safety Surety Assessment when required to further assess a unit's safety culture. In many cases, these assessments result in actionable recommendations to improve the culture and climate within the unit. This process has been used recently to aid the efforts regarding physiological issues in some Air Force aircraft fleets.

PROACTIVE EFFORTS

Proactive Safety is a crucial portion of our safety efforts. While post-mishap investigations are important to understand a mishap and prevent it from occurring again, our proactive-focused programs discover hazards and stop mishaps from happening at all, in essence applying actions "left of boom."

These programs include the Military Flight Operations Quality Assurance (MFOQA), where aggregate flight parameters are collected from numerous missions and then analyzed to understand if hidden hazards are present. With this program, we've learned of issues such as adverse aircraft parameters and hazardous air traffic procedures prior to these hazards leading to an actual mishap, permitting modifications in our guidance and training to eliminate or mitigate the previously unidentified risks. Currently in the Air Force, the equipment to enable this program is featured on 12 major aircraft types, with additional aircraft planned for the future.

Another successful program in the Air Force has been the Line Operations Safety Audit (LOSA), which entails having safety observers record non-attributional aircrew performance across numerous flights. The results of these observations are then analyzed by a team to understand if there are systemic issues that may require corrective actions, such as training adjustments. In the Air Force, this program has been heavily utilized in our airlift and tanker fleet

within Air Mobility Command. Recently, the LOSA program has also been used on our unmanned MQ-9 Reaper aircraft by Air Combat Command.

Allowing line personnel to submit non-attributional, identity-protected comments in safety channels is another proactive program that may highlight issues to allow mitigations or actions prior to a mishap. A program to enable this is called the Airman Safety Action Program, and it entails allowing individuals to electronically submit comments to their respective safety office via computers or mobile devices. This potentially allows the entire population of an installation or weapon system to become the "eyes and ears" for potential hazards. In all cases, the safety chain becomes aware of an issue and can take the appropriate action to mitigate or eliminate the hazard identified.

JOINT COLLABORATION

Working together is a key component of our service's safety programs. Although service-unique aspects may require a tailored approach in many areas, information sharing and collaboration are constants. Even outside shared platforms and systems, service collaboration promotes synergy and each service gains valuable perspectives from such actions.

On a day-to-day basis, our Air Force Safety Center is the key to information sharing and collaboration with the other services. Each respective safety center's leadership and action officers often share information that may be relevant to efforts in other services. For instance, observation of a mishap occurring in another service that appears to have similarities to another mishap may result in a past investigation report being sent to another service for situational awareness. Also, emerging issues such as physiological incidents may result in cross-flow of information and observations between centers. A good example of this is the recent development of the Air Force physiological response checklist for safety investigators, which was coordinated with the Navy

Safety Center prior to publication to ensure both services were gathering the identical data points to allow future cross-service collaboration and actions.

The Air Force participates with the other services in the quarterly Joint Services Safety Council, which convenes with each service's Chief of Safety (as well as US Coast Guard) on a regular basis. This forum allows for discussion of major issues, including aviation safety, and is a catalyst for coordinated actions and information sharing. Another important aspect of this forum is its joint working groups, which include aviation safety, to allow focused issues to be analyzed and actioned in this joint forum when necessary.

Coordination with the Office of the Secretary of Defense (OSD) staff on safety matters is also an ongoing process. In 2017, the Air Force signed a Memorandum of Agreement with OSD Personnel and Readiness to regularly provide, via automated net-based transfer, non-privileged safety information from the Air Force AFSAS safety database into the OSD safety database to allow OSD oversight and awareness of Air Force safety trends. The Air Force has been rapidly moving to ensure full compliance with the intent of this agreement. We're currently providing well over 90% of the requested data and we anticipate that we'll have modifications complete to the AFSAS database to allow 100% compliance by 1Q of FY2019.

Furthermore, in support of the Defense Safety Oversight Council framework, the Air Force supports and participates in the Safety and Occupational Health Integration Committee (SOHIC) and the Environmental, Safety, and Occupational Health Deputy Assistance Secretaries forums on a recurring basis, providing Air Force safety information and expertise to assist in these deliberations. In addition, the joint working groups from the JSSC also support OSD efforts in the SOHIC and other engagements. For instance, the JSSC's Aviation Safety Working Group recently

analyzed an issue concerning FAA information dissemination that was requested by OSD Personnel and Readiness.

SUMMARY

Safety remains a top priority in the Air Force. In essence, safety focus is infused in all that we do to ensure the preservation and safety of our personnel and resources by preventing mishaps. The Air Force has made significant strides in reducing mishaps over recent decades; however, we realize the need to continually adjust and focus efforts on emerging hazards. To this end, our efforts in proactive safety, mishap investigations, analysis, and joint collaboration are key aspects to a successful safety program. While risk will be ever-present in aviation, our goal is to ensure we identify all hazards to allow the elimination or mitigation of risks to the fullest extent possible.

Major General John T. Rauch Jr.

Maj. Gen. John T. Rauch Jr. is the Air Force Chief of Safety, Headquarters U.S. Air Force, Washington, D.C., and Commander, Air Force Safety Center, Kirtland Air Force Base, New Mexico. He develops, executes and evaluates all Air Force aviation, ground, weapons, space and system mishap prevention and nuclear surety programs to preserve combat readiness. Additionally, he directs research to promote safety awareness and mishap prevention, oversees mishap investigations, evaluates corrective actions and ensures implementation. Finally, he manages, develops and directs all Air Force safety and risk management courses.

General Rauch received his commission in 1989 through the Air Force ROTC program at the University of Colorado at Boulder. He served in numerous flying tours and his staff assignments include Air Force Intelligence, Legislative Liaison, Air Education and Training Command, U.S. Special Operations Command and the Air Staff's Skunk Works. He has commanded the 763rd Expeditionary Reconnaissance Squadron, the 338th Combat Training Squadron, the 552nd Air Control Wing and the 55th Wing.

General Rauch is a master navigator with more than 3,200 flying hours.

EDUCATION
1989 Bachelor of Science in Aerospace Engineering, University of Colorado at Boulder
1995 Squadron Officer School, Maxwell AFB, Ala.
1997 Master of Arts in Organizational Management, George Washington University, Washington, D.C.
2001 Master of Military Operational Art and Science, Air Command and Staff College, Maxwell AFB, Ala.
2002 Master of Airpower Art and Science, School of Advanced Airpower Studies, Maxwell AFB, Ala.
2007 NATO Defense College, Rome
2008 Joint and Combined Warfighting School, Joint Forces Staff College, Norfolk, Va.
2009 Enterprise Leadership Seminar, Darden School of Business, University of Virginia, Charlottesville
2012 National and International Security Leadership Seminar, Washington, D.C.

ASSIGNMENTS
September 1989 - June 1990, Student, Specialized Undergraduate Navigator Training, Mather AFB, Calif.
October 1990 - February 1991, Student, KC-135 Combat Crew Training School, Castle AFB, Calif.
March 1991 - July 1995, RC-135 Instructor, Evaluator Navigator and Operations Group Executive Officer, Offutt AFB, Neb.
August 1995 - June 1997, Air Force Intern Program, Intelligence and Legislative Liaison Directorates, the Pentagon, Arlington, Va.
June 1997 - July 2000, Instructor Navigator, Flight Commander and Assistant Director of Operations, Joint Specialized Undergraduate Navigator Training, Randolph AFB, Texas
July 2000 - July 2001, Student, Air Command and Staff College, Maxwell AFB, Ala.
July 2001 - July 2002, Student, School of Advanced Air Power Studies, Maxwell AFB, Ala.
July 2002 - July 2003, Deputy and Director Air Education and Training Command Commander's Action Group, Randolph AFB, Texas
July 2003 - December 2004, Operations Officer, 38th Reconnaissance Squadron, Offutt AFB, Neb.
December 2004 - October 2006, Commander, 338th Combat Training Squadron, Offutt AFB, Neb.
October 2006 - February 2007, Deputy Commander, 55th Operations Group, Offutt AFB, Neb.
February 2007 - August 2007, Student, NATO Defense College, Rome
August 2007 - June 2009, USSTRATCOM Special Operations Support Team Chief, USSOCOM, Offutt AFB, Neb.
June 2009 - July 2010, Vice Commander, 55th Wing, Offutt AFB, Neb.
July 2010 - June 2012, Commander, 552nd Air Control Wing, Tinker AFB, Okla.
June 2012 - June 2013, Commander, 55th Wing, Offutt AFB, Neb.
June 2013 - August 2014, Chief of Concepts, Strategy, and Wargaming for Headquarters Air Staff, the Pentagon, Arlington, Va.

September 2014 – January 2017, Director of Intelligence, Surveillance, and Reconnaissance Capabilities for Headquarters Air Staff, the Pentagon, Arlington, Va.
January 2017 – July 2017, Director of Future Warfare for Headquarters Air Staff, the Pentagon, Arlington, Va.
August 2017 – present, Air Force Chief of Safety, Headquarters U.S. Air Force, Washington, D.C., and Commander, Air Force Safety Center, Kirtland AFB, N.M.

SUMMARY OF JOINT ASSIGNMENTS
1. August 2007 - June 2009, USSTRATCOM Special Operations Support Team Chief, USSOCOM, Offutt AFB, Neb., as a colonel

FLIGHT INFORMATION
Rating: Master navigator
Flight hours: More than 3,200
Aircraft flown: E-3B/C/G, RC-135U/V/W and T-43

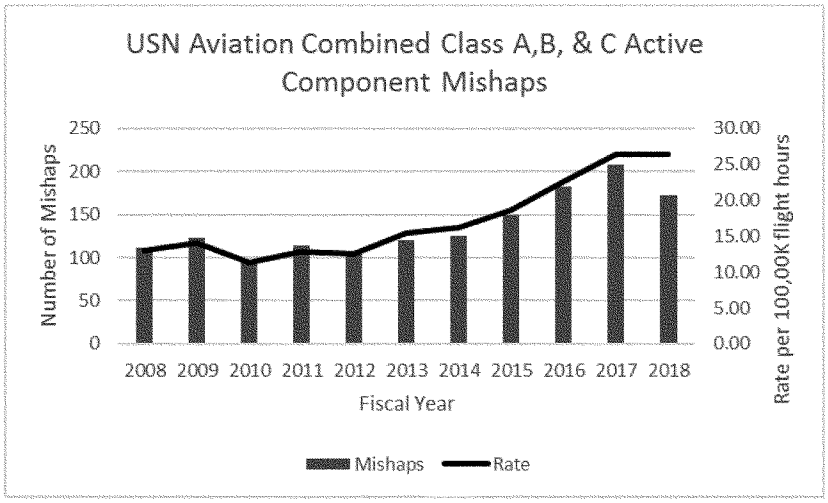
MAJOR AWARDS AND DECORATIONS
Legion of Merit with oak leaf cluster
Defense Meritorious Service Medal
Meritorious Service Medal with three oak leaf clusters Air Medal
Aerial Achievement Medal with silver oak leaf clusters
Air Force Commendation Medal
Air Force Achievement Medal with oak leaf cluster

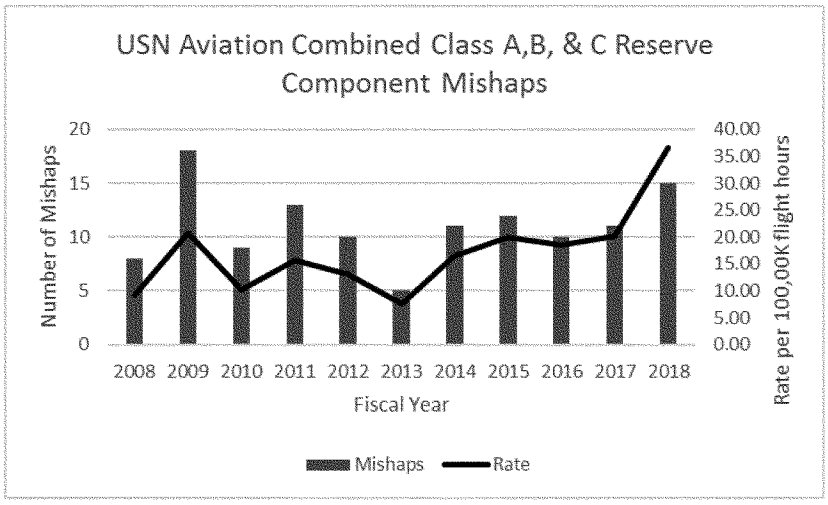
EFFECTIVE DATES OF PROMOTION
Second Lieutenant July 11, 1989
First Lieutenant July 11, 1991
Captain July 11, 1993
Major July 1, 1999
Lieutenant Colonel March 1, 2002
Colonel Aug. 1, 2007
Brigadier General May 2, 2014
Major General Dec. 3, 2017

(Current as of December 2017)

DOCUMENTS SUBMITTED FOR THE RECORD

JUNE 13, 2018


USN Aviation Combined Class A,B, & C Active Component Mishaps
Number of Mishaps
250
200
150
100
50
0
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Rate per 100,00K flight hours
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate


USN Aviation Combined Class A,B, & C Reserve Component Mishaps
Number of Mishaps
20
15
10
5
0
40.00
35.00
30.00
25.00
20.00
15.00
10.00
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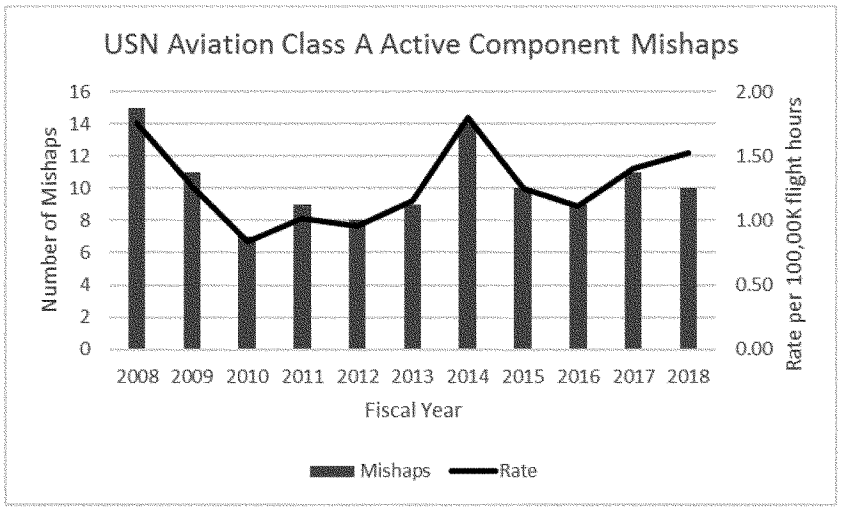
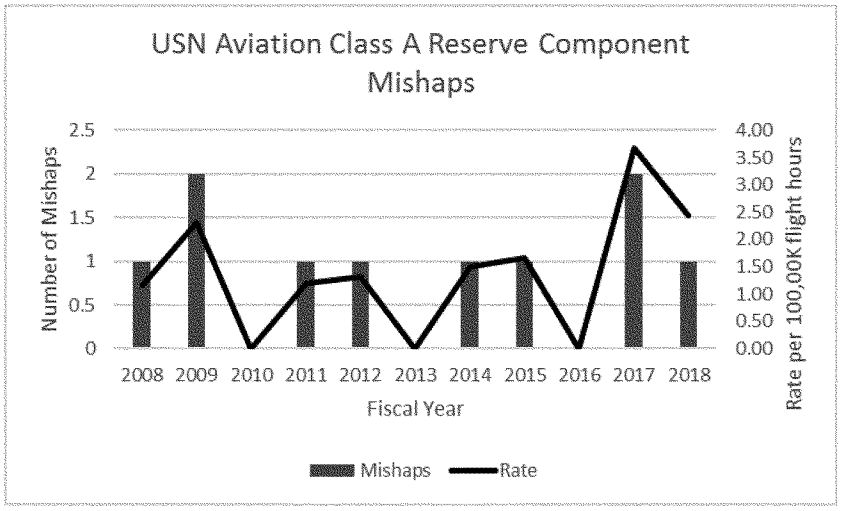
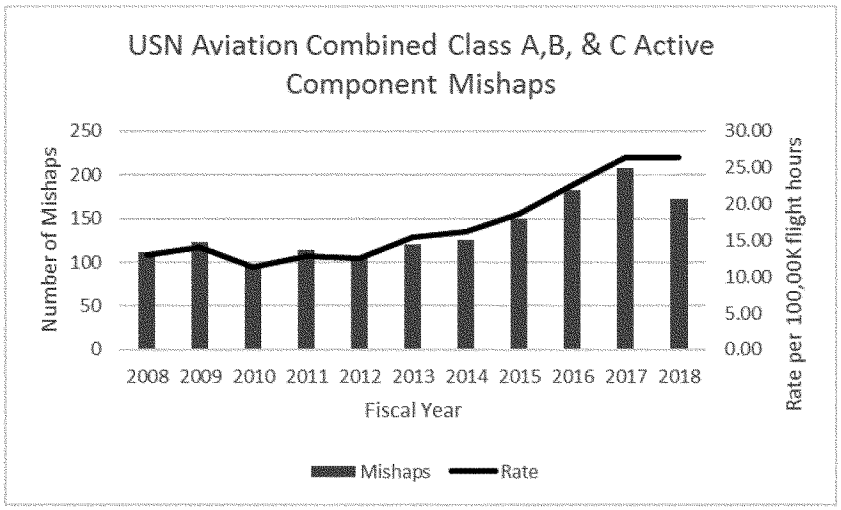
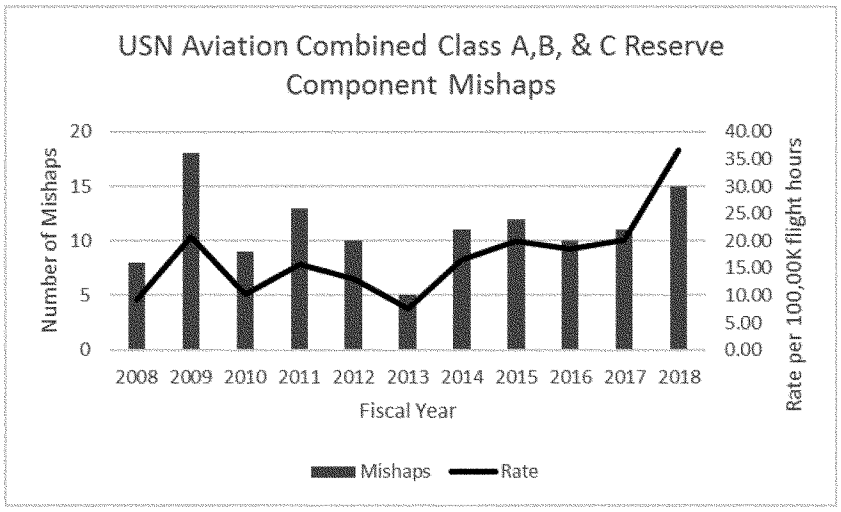
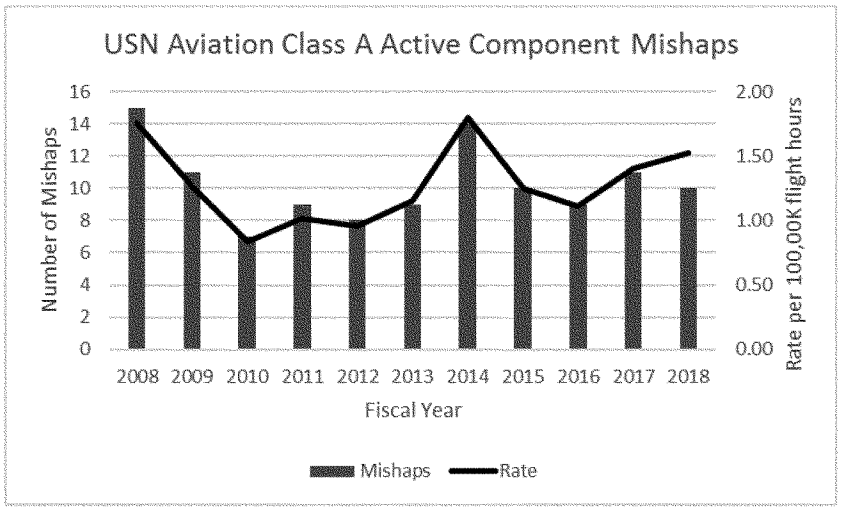
Rate per 100,00K flight hours
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

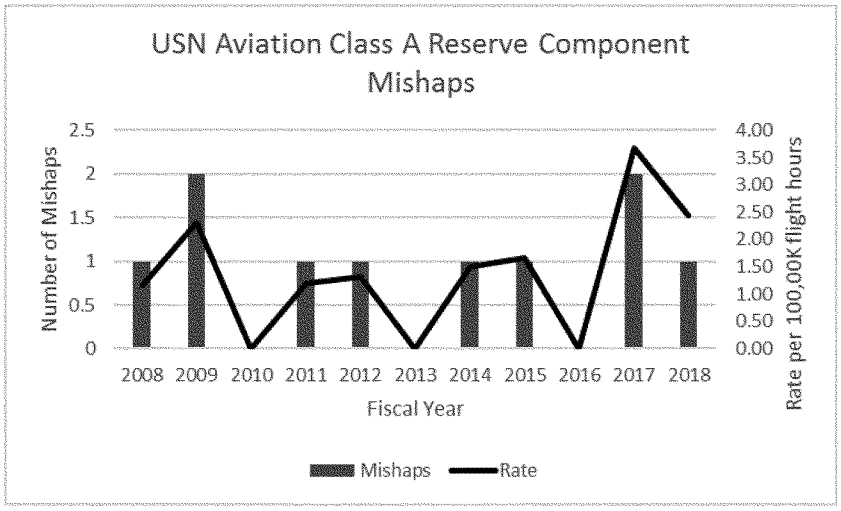

USN Aviation Class A Active Component Mishaps
Number of Mishaps
Rate per 100,00K flight hours
16
14
12
10
8
6
4
2
0
2.00
1.50
1.00
0.50
0.00
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

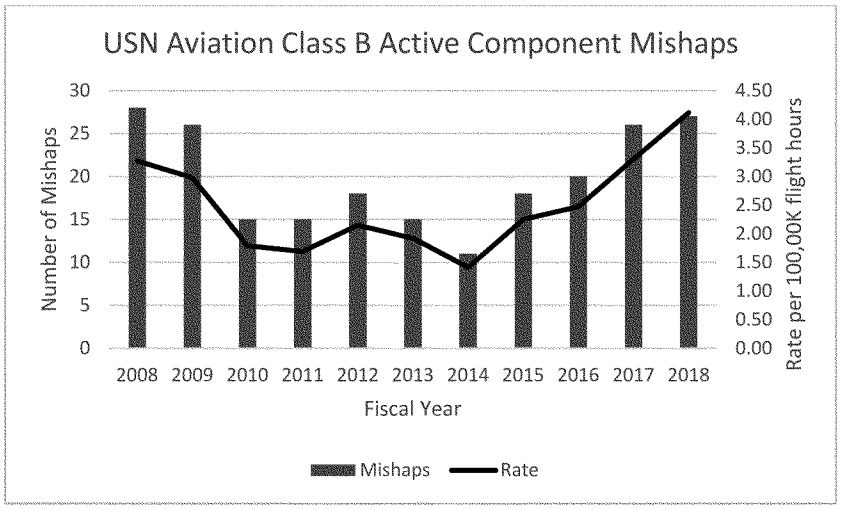

USN Aviation Class A Reserve Component Mishaps
Number of Mishaps
Rate per 100,00K flight hours
2.5
2
1.5
1
0.5
0
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

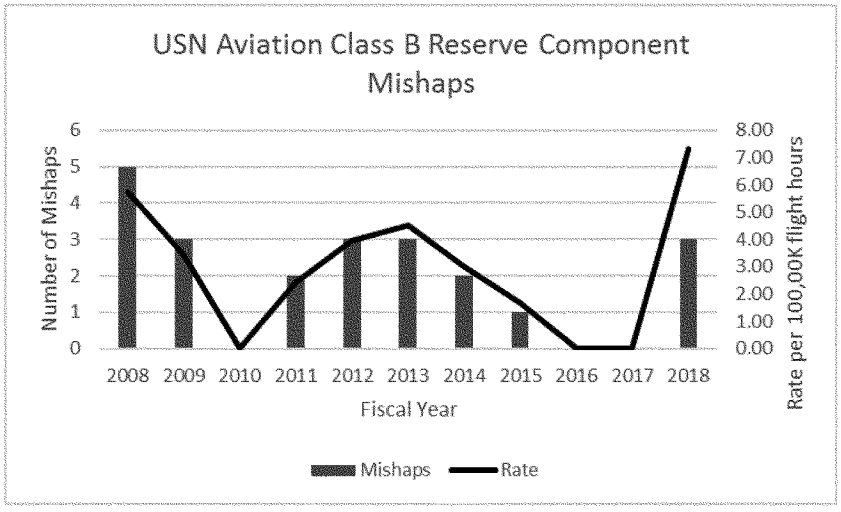

USN Aviation Combined Class A,B, & C Active Component Mishaps
Number of Mishaps
250
200
150
100
50
0
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Rate per 100,00K flight hours
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

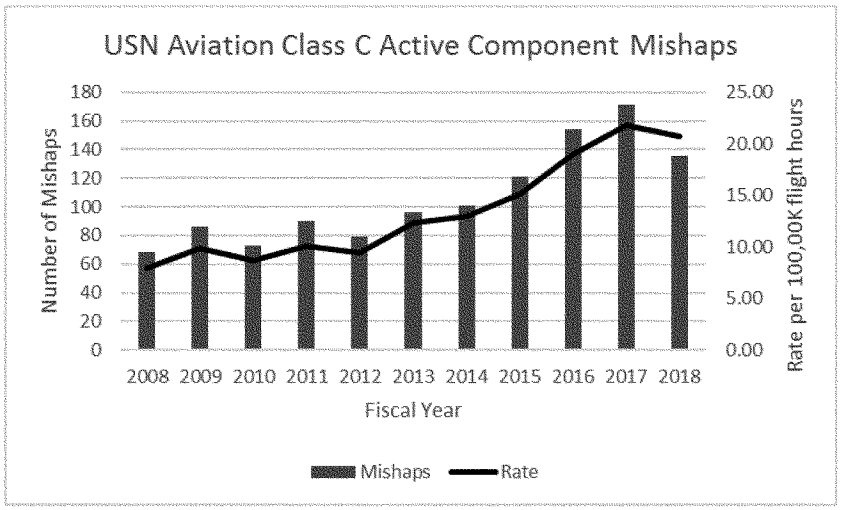

USN Aviation Combined Class A,B, & C Reserve Component Mishaps
Number of Mishaps
20
15
10
5
0
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Rate per 100,00K flight hours
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

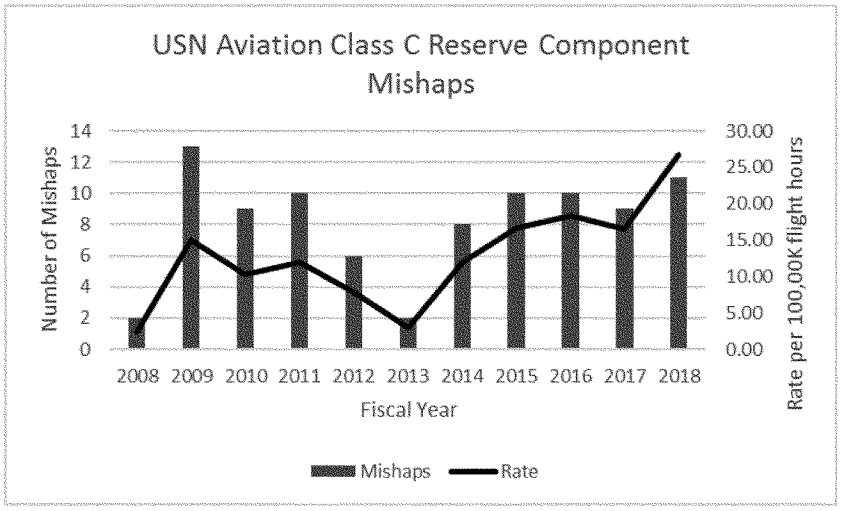

USN Aviation Class A Active Component Mishaps
Number of Mishaps
Rate per 100,00K flight hours
16
14
12
10
8
6
4
2
0
2.00
1.50
1.00
0.50
0.00
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

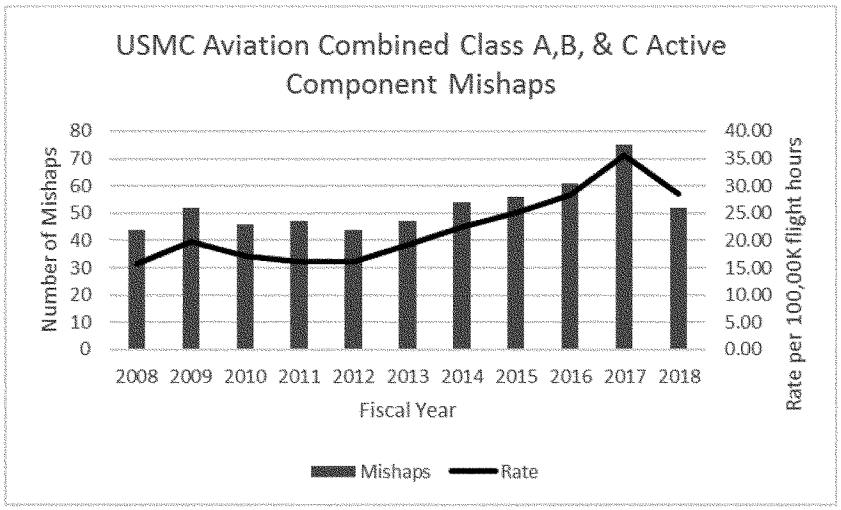

USN Aviation Class A Reserve Component Mishaps
Number of Mishaps
Rate per 100,00K flight hours
2.5
2
1.5
1
0.5
0
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

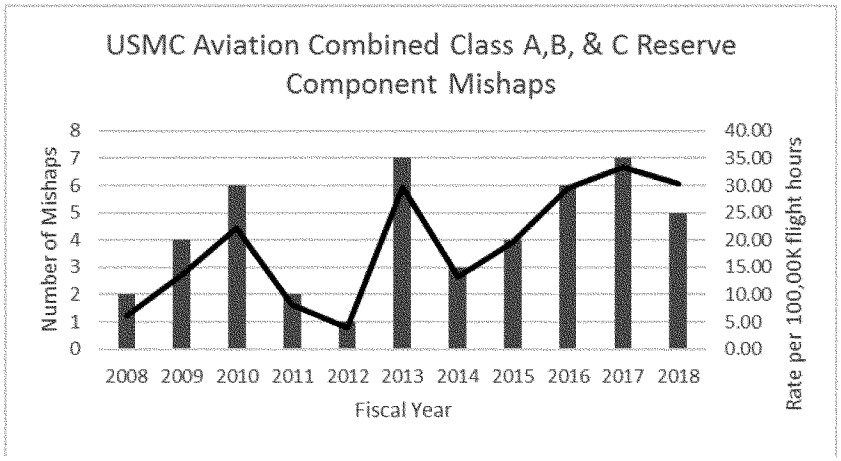

USN Aviation Class B Active Component Mishaps
Number of Mishaps
Rate per 100,00K flight hours
30
25
20
15
10
5
0
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

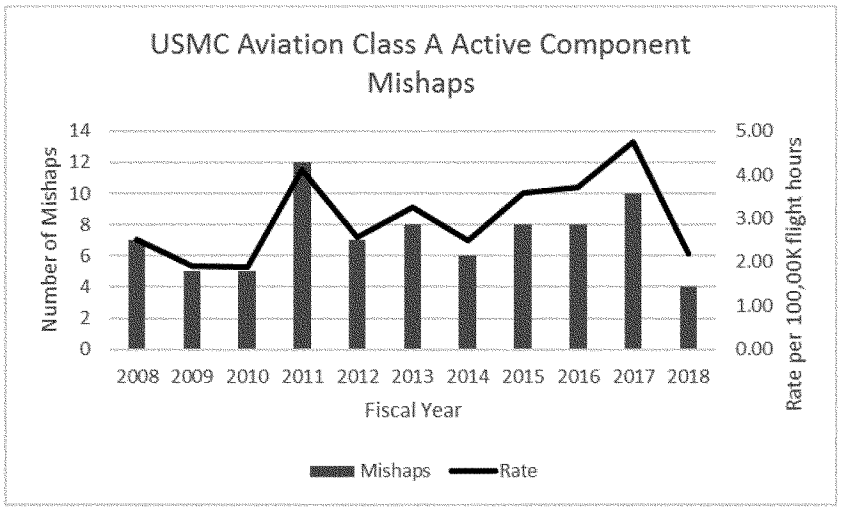

USN Aviation Class B Reserve Component Mishaps
Number of Mishaps
Rate per 100,00K flight hours
6
5
4
3
2
1
0
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

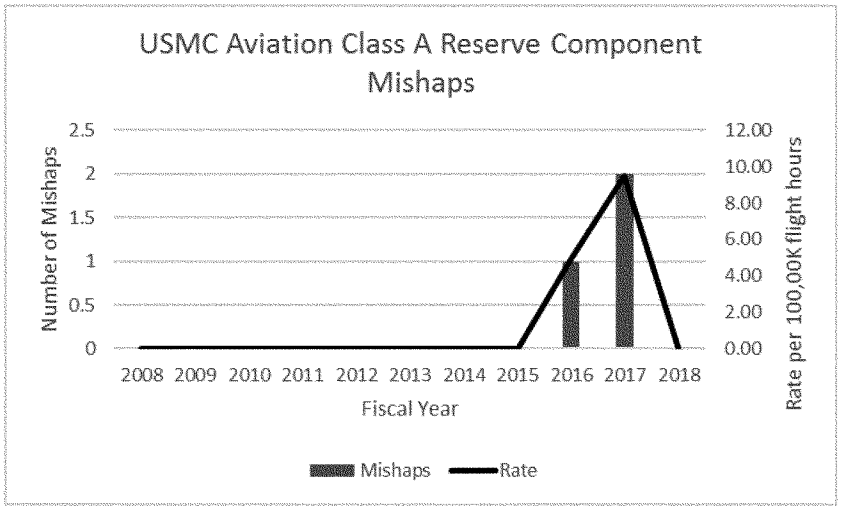

USN Aviation Class C Active Component Mishaps
Number of Mishaps
Rate per 100,00K flight hours
180
160
140
120
100
80
60
40
20
0
25.00
20.00
15.00
10.00
5.00
0.00
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

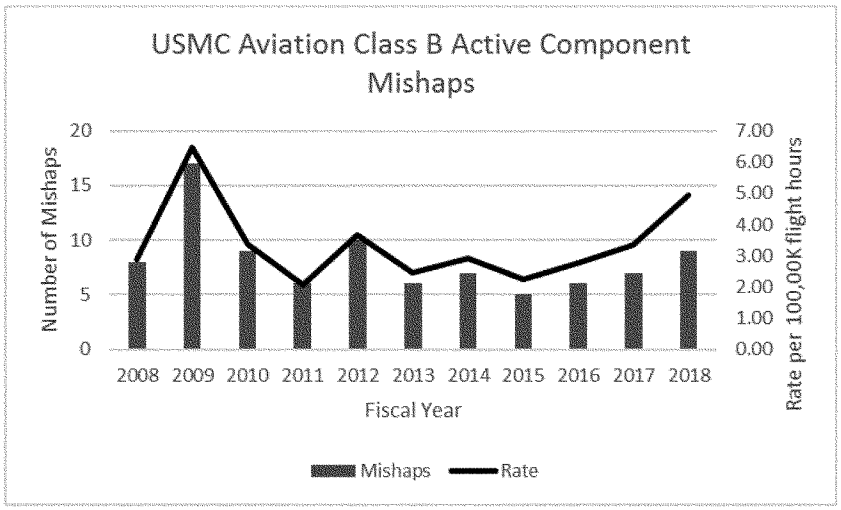

USN Aviation Class C Reserve Component Mishaps
Number of Mishaps
Rate per 100,00K flight hours
14
12
10
8
6
4
2
0
30.00
25.00
20.00
15.00
10.00
5.00
0.00
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

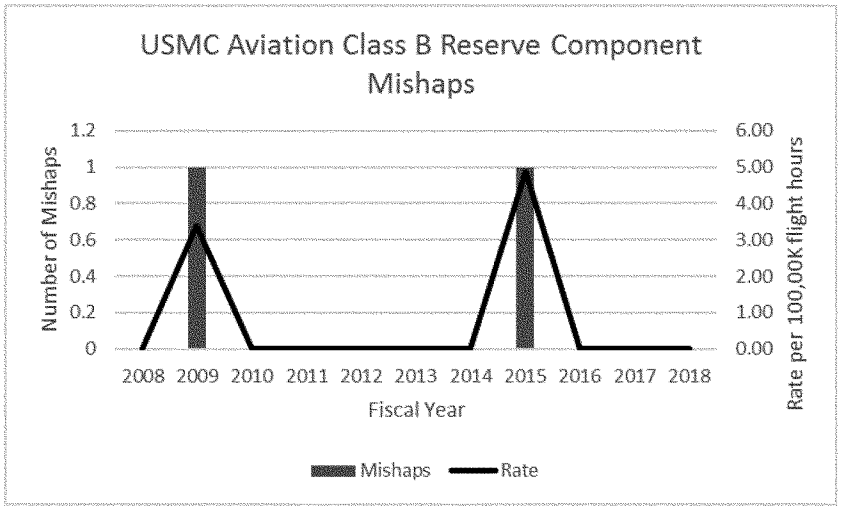

USMC Aviation Combined Class A,B, & C Active Component Mishaps
Number of Mishaps
Rate per 100,00K flight hours
80
70
60
50
40
30
20
10
0
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

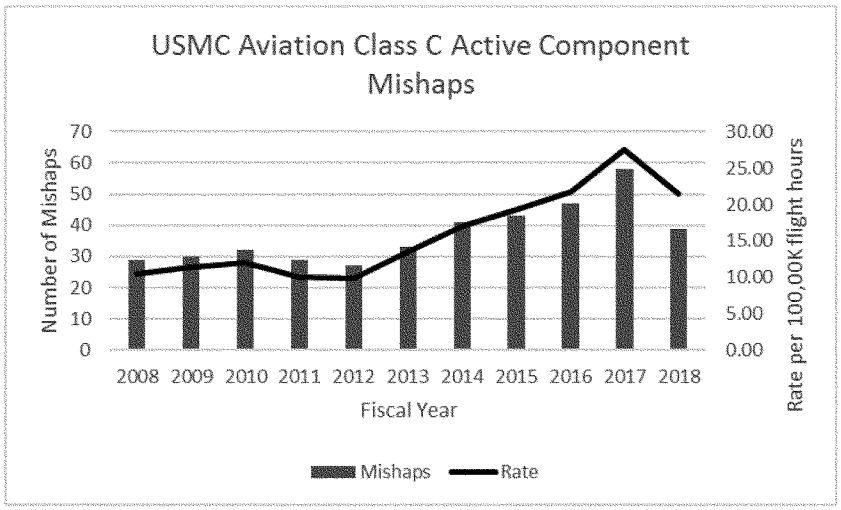

USMC Aviation Combined Class A,B, & C Reserve Component Mishaps
Number of Mishaps
Rate per 100,00K flight hours
8
7
6
5
4
3
2
1
0
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year

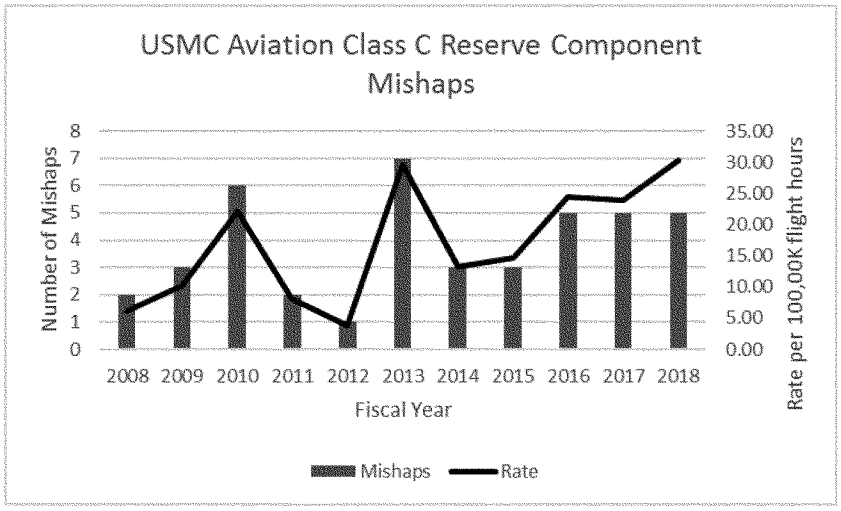

USMC Aviation Class A Active Component Mishaps
Number of Mishaps
Rate per 100,00K flight hours
14
12
10
8
6
4
2
0
5.00
4.00
3.00
2.00
1.00
0.00
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate


USMC Aviation Class A Reserve Component Mishaps
Number of Mishaps
Rate per 100,00K flight hours
2.5
2
1.5
1
0.5
0
12.00
10.00
8.00
6.00
4.00
2.00
0.00
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate


USMC Aviation Class B Active Component Mishaps
Number of Mishaps
20
15
10
5
0
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Rate per 100,00K flight hours
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate


USMC Aviation Class B Reserve Component Mishaps
Number of Mishaps
1.2
1
0.8
0.6
0.4
0.2
0
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Rate per 100,00K flight hours
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate


USMC Aviation Class C Active Component Mishaps
Number of Mishaps
70
60
50
40
30
20
10
0
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Rate per 100,00K flight hours
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate


USMC Aviation Class C Reserve Component Mishaps
Number of Mishaps
8
7
6
5
4
3
2
1
0
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Rate per 100,00K flight hours
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Fiscal Year
Mishaps
Rate

WITNESS RESPONSES TO QUESTIONS ASKED DURING THE HEARING

JUNE 13, 2018

RESPONSES TO QUESTIONS SUBMITTED BY MR. PANETTA

General FRANCIS. Manned and unmanned mishap rates differ greatly for a number of reasons. Among them are the redundancies engineered into manned aircraft that are not always present in unmanned systems, the level of training provided to operators of unmanned systems versus manned aviation, and the relative immaturity of the unmanned aerial system (UAS) community in maintenance, training, and support structure. The Army is still experiencing the growing pains of working hard and fast to provide support to commanders in combat with critical information through UAS.

With that, UAS mishap rates are down significantly since 2016 and 2017. In 2016 the Army executed a holistic look at UAS and made numerous recommendations, across the spectrum of Doctrine, Organization, Training, Material, Leadership and Education, Personnel, Facilities, and Policy, that are taking hold now and improving readiness and reducing mishap rates. In FY16 the Army's MQ–1C fleet experienced 12 Class A mishaps, in FY17 the number was reduced to nine, and so far in FY18 we have experienced only three. The mishap rate per 100,000 flying hours reduced from 10.03 in FY17 to 3.79 in FY18. We have similar reductions in total mishaps and rates in our smaller RQ–7B fleet with the Class B rate dropping from 20.73 in FY17 to 13.57 in FY18.

The Army is still pursuing many of the recommendations from the holistic review and we expect to see continued success with readiness rates and reductions in mishap rates in unmanned systems. [See page 18.]

Admiral LEAVITT. [See chart on next page.] [See page 18.]

Navy UAS Data

	FLIGHT HOURS									MISHAPS		
CY	MQ-4C	MQ-8B	MQ-8C	RQ-21A	RQ-23A	RQ-26A	RQ-4A	RQ-7B	Grand Total	Class A Events	Class A Rate (per 100,000 flight hours)	Remarks
2008							7.7		7.7			
2009							1511.1		1511.1			
2010		23.6					2043.8		2067.4			
2011		1791.5					2201.7		3993.2			
2012		2725.3					2140.8		4866.1	**4**	82.20	RQ-4A, 3 MQ-8Bs
2013		4448.1		258.7			2101.1	2065.5	8873.4	**3**	33.81	KMAX and 2 MQ-8Bs
2014		2370.6	3.3	155.0	74.1		3681.2	2623.4	8907.6			
2015		1517.9	39.8	300.2	53.8	106.1	3647.3	2748.3	8413.4			
2016		188.3	137.7	2015.5	68.5	124.5	3776.9	1648.5	7959.9			
2017	5.0	289.5	179.2	1488.9	111.9	25.3	3421.8	2522.1	8043.7			
2018	111.0	59.2	129.0	851.6	33.4	19.6	1318.9	648.8	3171.5			
Grand Total	116.0	13414.0	489.0	5069.9	341.7	275.5	25852.3	12256.6	57815.0	**7**	12.11	Total hours used as the denominator
											17.56	Rate using only flight hours for models capable of Class A (MQ-4C, MQ-8B, MQ-8C, RQ-4A)

Notes:

1. Due to field-level limitations on connectivity for UAS operations, not all flight hours populate the NAVAIR DECKPLATE authoritative database.
2. The Marine Corps had a Class A mishap for the KMAX/CQ-24A in 2013 but has not recorded any flight hours into the DECKPLATE system.
3. The RQ-7, 21, 23 and 26 production costs are below $2M and therefore do not meet the DoDI 6055.07 definition of a UAS that is capable of Class A property damage even when destroyed.

QUESTIONS SUBMITTED BY MEMBERS POST HEARING

JUNE 13, 2018

QUESTIONS SUBMITTED BY MR. TURNER

Mr. TURNER. What benefits are provided by individual service-specific data systems needed to collect mishap data?

General FRANCIS. The primary benefit of each service having their own data system is that it allows the service to identify and collect data points that are useful in analysis to support their unique mishap prevention programs. There are basic data points common across the services and relevant to all, but each service has data requirements beyond a one-size-fits-all approach. For example, the Army collects more data points on ground mishaps than the Air Force because the preponderance of our forces and mishaps are on the ground. More data points allows for easier data stratification in the Army's 8000-plus Class A–E ground mishap reports each year. Additionally, each service is able to adjust and adapt their data systems to meet emerging requirements to address emerging trends. We support Department of Defense data collection efforts and are developing a new mishap reporting tool that will feed point for point into the DOD database while also maintaining service flexibility.

Mr. TURNER. What steps, if any, have the safety centers taken to reassess the type of data that are collected as part of the services' mishap investigations in light of the recent increase in aviation mishaps?

General FRANCIS. Even though Army mishap rates remain well below 10-year averages, we have taken actions to assess and work toward not only identifying the right data to collect, but also ensure all necessary data is collected regardless of mishap level. A team of experts reviewed the complete data set currently in the Army Safety Management Information System database to ensure we go forward with collecting the right data while decreasing the burden on operational units in mishap reporting. To do so, we are developing a new reporting tool that will gather much of the information needed in a mishap report from sources of record while conducting in-progress audits to ensure investigators complete all required fields. We included all requirements from the OSD Minimum Data Elements of 2017, as well as elements that support service-specific analysis.

Mr. TURNER. What responsibilities do the military services' safety centers have for conducting analysis of the causes of mishaps and how does this compare with any analyses that OSD may conduct?

General FRANCIS. Department of Defense Instruction 6055.07 requires the heads of DOD components to collect, maintain, and analyze mishap data including human error, human factors, and human performance data identified in safety investigations. We continually analyze mishap data to discern trends, identify anomalies, and prepare prevention measures. One example of this analysis is that over the course of the last few months, we conducted an in-depth study of Class C mishaps. We know the difference between a Class A and Class C can be inches and seconds, and 73 percent of Army Aviation mishaps from FY13 to YTD FY18 are Class Cs. Currently, Class Cs are below 10-year averages but have remained relatively constant over last 5 years. Army Aviation experienced 324 Class C mishaps in the FY13 to YTD FY18 period. There were no discernible trends with regard to aircraft type, time of day, time of year, or environmental and material factors, and an assessment of the leading causal factors mirrors our Class A mishaps. Of the 324 Class C mishaps, 233 had human factors primary causes. Of those 233, 198 fell into categories of object strikes not including wildlife, engine exceedances, hard landings, and foreign object damage. Among the human factors cited were performance-based errors in 84 percent of mishaps, judgement errors in 11 percent, and possible indiscipline in 5 percent. While training deficiencies can be correlated with some performance errors, overconfidence, distraction, and confusion are more often cited as underlying preconditions. Poor crew coordination is also cited in one third of mishaps. This data is used in working with the U.S. Army Aviation Center of Excellence in developing both institutional training and requirements to the field in several forms. This project was briefed to the Assistant Secretary of Defense for Energy, Installations, and Environment and the Under Secretary of Defense for Personnel and Readiness. It is difficult to compare the analysis done at the service level with that done in

OSD, as the fidelity and focus of our analysis is internally focused and detailed, while OSD has a broader view including all the services.

Mr. TURNER. What are the key training gaps that have contributed to aviation mishaps and what actions have the military services taken to address these gaps?

General FRANCIS. We are seeing performance-based errors in many Class A through C mishaps, but these are not necessarily caused by training shortfalls. The underlying factors for these mishaps more often include complacency, overconfidence, distraction, or confusion. We are an Army that trains to standards and when Soldiers perform to those standards, we don't have accidents. There are times when units are challenged to meet training requirements. We recently investigated a mishap where recent flight school graduates were assigned less than 90 days prior to a major deployment. This situation created a significant individual training requirement for the unit simultaneous with preparing to deploy. Unfortunately, this is not an uncommon scenario in an aviation force that is 84 percent committed in support of not only combat operations, but also engagement and support missions.

Mr. TURNER. Learning the right lessons so we don't repeat the past is important—can you tell us how you take lessons you have learned from your safety investigations and use them to make recommendations that would stop future accidents from happening?

General FRANCIS. Mishap safety boards make recommendations across the spectrum of DOTMLPF–P at three levels: unit level, defined as battalion or below; higher level, defined as brigade, division, and corps or similar levels; and Army level, defined as Army Commands, Army Component Commands, and Direct Reporting Units. The USACRC has forwarded over 300 Army-level recommendations from FY13 to present. Mishap boards have made literally thousands of recommendations at unit and higher levels. Below are high level examples of how this is applied.

Doctrine—Recommendations to Army Training and Doctrine Command and Army G3/5/7 to make adjustments to doctrine

Organization—Recommendations to units and higher levels, as well as Army G3/5/7 and TRADOC to adjust organizations based on mishap prevention requirements

Training—Recommendations to units to review or adjust their local training programs and to TRADOC to adjust training base requirements or those placed on the field

Materiel—Recommendations to Army Materiel Command and acquisition authorities to follow up on materiel issues discovered in a mishap or risk decisions made during the acquisition process

Leadership and education—Recommendations to units and TRADOC concerning leader competencies, training, and selection

Personnel—Recommendations to Army G1 concerning manning

Facilities—Recommendations to unit and higher levels concerning facilities on airfields, as well as recommendations to Army G4

Policy—Recommendations to adjust local policies and standing operating procedures at unit and higher levels, as well as recommendations across the Army for policy adjustments indicated by investigation results

Mr. TURNER. What benefits are provided by individual service-specific data systems needed to collect mishap data?

Admiral LEAVITT. Over time each service has developed and refined their service-specific system to account for service unique needs. Service uniqueness encompasses operating environments, mission variance and institutional culture and history. Individual systems account for these differences and provide efficiency to the users.

Mr. TURNER. What steps, if any, have the safety centers taken to reassess the type of data that are collected as part of the services' mishap investigations in light of the recent increase in aviation mishaps?

Admiral LEAVITT. As Admiral Leavitt testified before the HASC in June, the Naval Safety Center is working to get ahead of mishaps with preventive mishap data analysis and informed risk identification through strategic partnerships. These collaborative efforts include the Navy and Marine Corps Public Health Center, the Digital Warfare Office, the Center for Naval Analysis, the Naval Post-Graduate School, the Army Analytics Group, and other organizations. All of these organizations are equipped to perform in-depth studies to gain a better understanding of the human, materiel and other factors that lead to mishaps thereby mitigations can be developed to stop a mishap before it happens. The Naval Safety Center is also increasing its organic analytical capabilities by acquiring enhanced technology and additional specialized manpower devoted to this effort.

The Naval Safety Center is the authoritative source for mishap data however, deeper analysis requires a holistic approach where data scientists can leverage readiness, manning, and other information to assess the overall health of a unit and the safety posture of the Navy and Marine Corps as a whole. The Naval Safety Center

is working with the Fleet and Type Commanders to develop mutually beneficial data sharing agreements that will allow for improvements in risk and hazard identification and analysis. This "deep dive" analysis should eventually lead to the identification of risk trends that become a predictive and preventative tool. The Naval Safety Center has been tasked with expanding its analytical workforce. This includes hiring contracted data scientists who will assist in the development of sophisticated risk models using these new data streams in addition to growing organic capabilities and capacity. Understanding the importance of working jointly, the Naval Safety Center and other Navy organizations have partnered with the Army Analytics Group for data aggregation and complex data analysis.

Mr. TURNER. What responsibilities do the military services' safety centers have for conducting analysis of the causes of mishaps and how does this compare with any analyses that OSD may conduct?

Admiral LEAVITT. The Naval Safety Center has been tasked with expanding its analytical workforce. As Admiral Leavitt testified before the HASC in June, the Naval Safety Center is working to get ahead of mishaps with preventive mishap data analysis and informed risk identification through strategic partnerships. These collaborative efforts include the Army Analytics Group, the Navy and Marine Corps Public Health Center, the Digital Warfare Office, the Center for Naval Analysis, the Naval Post-Graduate School, and other organizations. All of these organizations are equipped to perform in-depth studies to gain a better understanding of the human, materiel and other factors that lead to mishaps thereby mitigations can be developed to stop a mishap before it happens. The Naval Safety Center is also increasing its organic analytical capabilities by acquiring enhanced technology and additional specialized manpower devoted to this effort

The Naval Safety Center is the authoritative source for mishap data however, deeper analysis requires a holistic approach where data scientists can leverage readiness, manning, and other information to assess the overall health of a unit and the safety posture of the Navy and Marine Corps as a whole. The Naval Safety Center is working with the Fleet and Type Commanders to develop mutually beneficial data sharing agreements that will allow for improvements in risk and hazard identification and analysis. This in-depth analysis should eventually lead to the identification of risk trends that become a predictive and preventative tool.

OSD primarily pulls mishap data for analysis to inform policy. Statistically OSD serves as a clearing house for cross-service mishap information but is limited in their ability to conduct in-depth analysis due to limited access to data and a lack of service-specific expertise. However, analysis of mishap data is only one side of the coin. The other side of the coin is safety promotion and promulgation of mishap and hazard report (HAZREP) lessons learned. Using mishap analysis to inform safety promotion closes the information loop to assist in mishap prevention. For example, when a hazard is discovered during the safety investigation or at any point in the process, a non-privileged HAZREP is released by the mishap board to provide timely notification to the fleet and program managers. These HAZREPS allow the air worthiness authority (Naval Air Systems Command) to decide if groundings, inspections, or other mitigation actions are necessary before the continued employment of the type of aircraft or equipment involved is permitted. There have been several examples where a hazard has prompted the release of a HAZREP which resulted in an operational safety pause, conditional inspections, and even groundings long before the investigation report was released.

Within 10 days of the release of any Aviation Class A mishap report, a representative from the Naval Safety Center's Aviation Safety Directorate develops two products for fleet use and distribution. These products are the Mishap Executive Summary and Safety Officer Training Presentation. The Mishap Executive Summary is a two to three-page review of the event's mishap safety investigation report and is designed to be routed to the endorsing chain of command to facilitate briefing of Class A mishaps to higher echelon leadership. The Safety Officer Training Presentation is distributed to same or similar community unit safety departments with the intent of providing a training tool at the squadron level.

The Naval Safety Center continuously looks for cost-effective ways to create relevant lessons-learned products. One such innovation is the creation of sanitized mishap safety investigation reports that are distributed as a lessons-learned awareness product. This product is an abbreviated version of the original mishap investigation report with the elements of privileged information and PII redacted to enable the report to be more readily disseminated and used for fleet training. The sanitized report remains a "For Official Use Only" (FOUO) document and is required to be handled accordingly.

The Naval Safety Center aviation platform subject matter experts also produce periodic Safety Gram messages for their community safety representatives. Safety

Grams are sent via email and provide community safety trends, contain relevant and recent mishap investigation and hazard reports, and distribute type/model/series community lessons learned and best practices across all stakeholders.

The analysis of data collected from mishap safety investigations is key to understanding and communicating mishap information.

Mr. TURNER. What are the key training gaps that have contributed to aviation mishaps and what actions have the military services taken to address these gaps?

Admiral LEAVITT. While there is an assumed consensus that Class A mishaps are on the rise across the Defense Department writ large, NAVSAFECEN conducted a study of all USN Class A mishaps from FY13–FY17. The study revealed that USN Class A mishaps per 100,00 flight hours have remained statistically stagnant. Moreover, an in-depth review revealed that none of those mishap investigations sited deficiencies or a gap in training as a causal factor for the mishap.

Improving training syllabi/standards, improving NATOPS and standard operating procedures (SOPs) are key steps to address iterative best practices with regard to safety, but the study indicated there were no training gaps causal to the Class As. NATOPS, SOPs, or syllabi are not deficient. In addition, continued focus on safety via safety stand downs (now directed quarterly by Commander, Pacific Fleet) and promulgation of best practices across the fleet with regard to maintenance and flight operations highlight current issues and compliance with established procedures and flight manuals.

Mr. TURNER. Learning the right lessons so we don't repeat the past is important—can you tell us how you take lessons you have learned from your safety investigations and use them to make recommendations that would stop future accidents from happening?

Admiral LEAVITT. Once an investigation is complete the board will produce a report in which each causal factor is accepted or rejected and recommendations are made. Afterwards the endorsers, in turn, have an opportunity to concur or non-concur on every accepted and rejected causal factor and associated mishap recommendations. The endorsement chain is determined by the aircraft controlling custodian. Any endorser who determines that an investigation is incomplete or that the report is inadequate may reopen the investigation and require resubmission of the report, addressing specific areas of concern. Commander Naval Safety Center, acting as the Chief of Naval Operations' Special Assistant for Safety Matters, is the final endorser for all Class A safety investigation reports. For mishaps below Class A, the final endorser is the commander who can affect the closeout of the mishap recommendations. This process can be lengthy, as each endorser has 15 days and extensions are often granted. However, we do not wait until the report is fully endorsed to disseminate important safety information to the fleet.

When a hazard is discovered during the investigation or at any point in the process, a non-privileged hazard report (HAZREP) is released by the mishap board to provide timely notification to the fleet and program managers. These HAZREPS allow the air worthiness authority (Naval Air Systems Command) to decide if groundings or other inspections or mitigation actions are necessary before continuation of flight. There have been several examples where a HAZREP resulted in an operational safety pause, conditional inspections, and even groundings long before the investigation report was released.

Within 10 days of the release of any Aviation Class A mishap report, a representative from the Naval Safety Center's Aviation Safety Directorate develops two products for fleet use and distribution: a Mishap Executive Summary and Safety Officer Training Presentation. The Mishap Executive Summary is a two or three-page review of the event's safety investigation report, routed up the endorsing chain of command to facilitate briefing of Class A mishaps to higher echelon leadership. The Safety Officer Training Presentation is routed down the chain of command to community unit safety departments with the intent of providing a training tool at the squadron level.

A sanitized investigation report is a lessons learned awareness product the Naval Safety Center is beginning to produce. It is an abbreviated version of the original safety investigation report with elements of privileged information and PII redacted to enable the report to be more readily used for fleet training. The document remains For Official Use Only (FOUO) and is handled accordingly.

The Naval Safety Center aviation platform subject matter experts also produce periodic Safety Gram messages to for their community command safety representatives. Safety Grams are sent via email and provide community safety trends, attach relevant and recent safety investigation and hazard reports, and distribute community lessons learned and best practices across all stakeholders.

MISHAP RECOMMENDATIONS AND LESSONS LEARNED

The primary purpose of the aviation mishap review and oversight process is to prevent recurrence. Recommendations from mishap investigations, hazard reports, and lessons learned must be communicated and implemented.

After a mishap investigation is finalized, every causal factor is required to have at least one recommendation. Each agency is responsible for its assigned recommendation(s) or action items unless relieved by higher authority. Mishap recommendations vary, but common examples include changes to publications and procedures and technical equipment modifications. The Naval Safety Center tracks all open mishap recommendations and hazard recommendations assigned a risk assessment code of 1 or 2 (the two most serious categories based on probability and severity). The Naval Safety Center has also established a lessons learned program office with the sole focus of developing products aimed at various fleet audiences for education and training in order to get ahead of mishap recurrence by increasing the awareness of hazards and mitigation strategies. A typical lessons learned product is a two-page document capturing the highlights of the event and the key strategies to mitigate the risks in the future. The format and content, however, is tailored to fit the specific audience and requirement. The Lessons Learned division monitors and reviews incoming mishap and hazard reports to identify events as candidates for a Lesson Learned product. The division then closely coordinates with subject matter experts within specific communities in order to generate Lessons Learned from selected mishap reports and hazard reports that would be effective training aids in order to avoid repeat events. Generally, a Lesson Learned is warranted if the event(s) indicate a trend or if the causes of the event could be mitigated in the future by educating the fleet. A recent example includes a lesson learned product about maintainers in multiple aircraft platform squadrons using the wrong engine-oil which led to two Class A mishaps and several HAZREPs. Sharing this information across communities showed that the true extent of the problem went beyond one squadron or even aircraft platform.

The LL team seeks input from the fleet and joint services for both LL topics as well as drafted LL products. Generally, Lessons Learned are written by members of the LL division and SMEs from the cognizant safety directorates. The Lessons Learned division edits and publishes the smooth Lessons Learned after final vetting by the cognizant safety director. The process for sanitizing SIRs/SIREPs is similar.

Writing and disseminating a Lessons Learned does not necessarily require waiting until the completion of a mishap investigation. Often, a single Hazard Report or an identified commonality between a new safety event and preceding HAZREPs or mishaps is enough to both trigger and provide necessary data to write a Lessons Learned product. When it best suits the end product, Lessons Learned writing will be delayed until completion of the investigation report and endorsement process of a given mishap. A sanitized SIR/SIREP would clearly be tied to the completion of the investigation and endorsement process.

The Lessons Learned division focuses on a "PUSH" effort to deliver Lessons Learned products to fleet users. This is a more effective and rapid method than requiring fleet users to seek ("pull") the information from the NSC library. The LL division distributes published Lessons to the fleet via email to the cognizant Type Commander Safety Officers/Managers, Aircraft Controlling Custodian Safety Officers, NSC staff SMEs, and (when applicable) the Command Master Chief Petty Officer network. The team is expanding this distribution list to include Echelon IV Safety Officers in order to ensure effective delivery. For long term accessibility, the team also publishes Lessons Learned products to the Lessons Learned page of the Naval Safety Center CAC enabled website and to the Navy Lessons Learned Information System (NLLIS) under the "Safety Lessons Learned "Community of Practice.

Mr. TURNER. In previous testimony, we have heard Navy and Air Force officials testify that physiological episodes are the number one safety concern for the aviation community, and we too are concerned about the risk this poses to the aviators and pilots who put their lives on the line for this country. We know there is inherent risk to combat, but it seems like this is an unnecessary risk to the health of pilots and aircrew. Can you give us an update on what is being done, from a safety perspective, to solve the problem of physiological episodes?

Admiral LEAVITT. The Naval Safety Center is actively involved in the efforts to solve the problem of physiological episodes via the following three ongoing objectives:

1: Facilitating Event Reporting

The Naval Safety Center has developed and implemented a standardized reporting policy to better ascertain timely and accurate answers to the basic 5-Ws of each physiological event: who was involved, what happened, where did it occur, when did

it occur, and why did it occur. These questions are ultimately addressed through three separate but complimentary evidence data sheets, managed by the Naval Safety Center, that provide information from (1) involved aircrew, (2) aircraft maintenance, and (3) aeromedical observations.

Furthermore, as of OCT 2017, the Naval Safety Center is responsible for the development, training, and continued oversight of the Physiological Event Rapid Response Teams (PERRT), which are local, on-site personnel that investigate the event to determine the maintenance and human factors involved with each event. Each PERRT is comprised of an aviation safety officer, an aeromedical safety officer, a flight surgeon, and maintenance and/or engineering representatives—ensuring that all aspects of the event are investigated.

The Naval Safety Center also coordinates a validation/verification process for each event. This process provides a method for subject-matter experts, including Naval Safety Center aviation and aeromedical analysts, PERRT members, and aircraft-specific systems experts, to finalize the causal factors of why the event occurred as well as provide safety recommendations. Lastly, an important goal of the Naval Safety Center is to provide the involved aircrew with direct feedback about the results of the investigation. Each aircrew member involved in a physiological event is provided with the results of the validation/verification process.

2: Obtaining Better Data

The Naval Safety Center is continually revising and updating the evidence data sheets so that the information they obtain provides a more accurate representation of what is occurring during each event. Immediately following the reporting of an event, Naval Safety Center personnel maintain regular communication with PERRT members as they coordinate the completion and submission of evidence data sheets. Naval Safety Center is also responsible for training PERRT members, including flight surgeons and aeromedical safety officers. Ultimately, these efforts help obtain better data from an event.

3: Supporting Data Analytics

The Naval Safety Center maintains custody for all safety event data, including physiological events. Ongoing research efforts from various research entities work with the Naval Safety Center to analyze data from physiological events to better understand frequencies, trends, and other important aspects of this problem. Naval Safety Center is also collaborating with Navy/Marine Corps Public Health Center epidemiologists and data scientists on analyzing physiological event data. Goals of this collaboration are to develop epidemiological and biostatistics methodologies for analyzing datasets to help potentially uncover root causes of physiological events.

Mr. TURNER. What benefits are provided by individual service-specific data systems needed to collect mishap data?

General RAUCH. The Air Force possesses a comprehensive data collection system, the Air Force Safety Automated System, allowing report submissions from safety investigations across the globe while also providing searchable data for analysis of trends and other information to aid mishap prevention efforts at all organizational levels. This database ensures a secure, accessible environment to protect safety privileged information and allow all levels of command, from headquarters to installations, to access safety information and reports for safety programs, analysis, and awareness.

Mr. TURNER. What steps, if any, have the safety centers taken to reassess the type of data that are collected as part of the services' mishap investigations in light of the recent increase in aviation mishaps?

General RAUCH. The Air Force is continually evaluating its safety processes and data collection efforts to ensure timely and accurate information. Recently, Air Force Safety has implemented mobile applications to aid in the collection of hazard reporting that may highlight issues prior to a mishap occurring. In addition, the Air Force conducted Operational Safety Reviews at all wings with flying and maintenance functions in mid-2018 to obtain feedback from aircrew and maintenance personnel across the service. This information has been used to inform commanders at all levels of potential hazards and other issues and allow actions to mitigate and address these concerns from the field. Also, the Air Force is participating in an Office of the Secretary of Defense working group that examines the types and standardization of collected mishap data across the Department of Defense.

Mr. TURNER. What responsibilities do the military services' safety centers have for conducting analysis of the causes of mishaps and how does this compare with any analyses that OSD may conduct?

General RAUCH. Per Department of Defense guidelines, the Air Force investigates every mishap required by policy. Air Force safety investigations determine the causes of each individual mishap and provide recommendations to prevent future occurrences. In the case of higher-level aviation mishaps such as Class A and B, the

investigation is normally conducted by a board comprised of several personnel, including support and technical assistance from the Air Force Safety Center. The Air Force Safety Center also maintains oversight of the investigation's process, final report, and mishap recommendations. OSD, as well as the Air Force, may analyze aggregate causal data for trends or other analysis.

Mr. TURNER. What are the key training gaps that have contributed to aviation mishaps and what actions have the military services taken to address these gaps?

General RAUCH. The Air Force has not discovered a systemic training issue or gap that is contributory across numerous mishap events. Rather, an individual issue such as non-compliance with the intent of guidance or procedures is sometimes revealed during an investigation and adjustments to training to ensure awareness and prevent misunderstanding of procedures or technical order guidance may be an action in these situations.

Mr. TURNER. Learning the right lessons so we don't repeat the past is important—can you tell us how you take lessons you have learned from your safety investigations and use them to make recommendations that would stop future accidents from happening?

General RAUCH. Implementing the recommendations from safety investigations is a core aspect of mishap prevention. After a mishap, the safety investigation normally provides recommendations to prevent or mitigate the risk of future similar occurrences. All recommendations are input into a centralized safety database (Air Force Safety Automated System, or AFSAS) that allows tracking of their status. Every safety recommendation from an Air Force safety investigation is managed by the Convening Authority for the mishap, normally the Major Command (MAJCOM) commander for higher-level Class A and B mishaps. A formal structure of Hazard Review Boards, chaired by the Convening Authority, manages all safety recommendations until closure.

Mr. TURNER. In previous testimony, we have heard Navy and Air Force officials testify that physiological episodes are the number one safety concern for the aviation community, and we too are concerned about the risk this poses to the aviators and pilots who put their lives on the line for this country. We know there is inherent risk to combat, but it seems like this is an unnecessary risk to the health of pilots and aircrew. Can you give us an update on what is being done, from a safety perspective, to solve the problem of physiological episodes?

General RAUCH. The Air Force's Air Education and Training Command (AETC) recently conducted a Safety Investigation Board (SIB) that examined numerous physiological events in the T–6 training aircraft that provided numerous findings and recommendations to address the issue. In addition, the Air Force Physiological Event Action Team (PEAT), led by AF/A3 (with Air Force Safety participation), is currently examining the issue and potential mitigating actions across numerous platforms.

QUESTIONS SUBMITTED BY MS. ROSEN

Ms. ROSEN. Each of the military services' safety centers utilize separate, service-specific data systems that collect mishap data. In addition, the Office of the Secretary of Defense aggregates mishap data in its own Force Risk Reduction system. a. What benefits are provided by individual service-specific data systems needed to collect mishap data? b. To what extent do the safety centers collect consistent information as part of their mishap investigations? c. Where is there collection overlap and where do we differentiate the merged data analytics in order to amplify safety across DOD?

General FRANCIS. The individual services each have unique data requirements beyond the minimum required by OSD and face unique logistical and environmental challenges associated with the collection and reporting of safety information. Historically, the military departments each investigated their own mishaps and recorded their own data. The history of the USACRC dates back to an organization from the 1950s called the U.S. Army Board for Aviation Accident Research. As early as 1972, the organization was tasked with collection of all Army Aviation mishap data and became the U.S. Army Safety Center in 1978 when it was also given responsibility for ground safety. The current mishap database at the USACRC contains data going back to 1972, though much of the older data is unreliable at this point. The system we currently use was built on those roots and while it is Army centric, we do share data with the other services and OSD. The services collect much of the same data, though we may have a different naming convention or use different data points to provide the same answers. For example, rather than collecting a data point for "Area of Responsibility," the Army collects the country and

exact location of the mishap. I would note that a minimum set of data elements was developed jointly between OSD and the services in 2017. All will be included in our new database, as will data the Army uses for its own analysis. Our intent is that we will meet the 2017 requirement to seamlessly blend with OSD's minimum data elements. Each service forwards data to OSD for inclusion in the Force Risk Reduction (FR2) database. Again, the services collect many of the same basic data points, and modernization will ensure data provided in the future will more closely align the data each service collects, enabling more complex analysis at the OSD level.

Ms. ROSEN. Each of the military services' safety centers utilize separate, service-specific data systems that collect mishap data. In addition, the Office of the Secretary of Defense aggregates mishap data in its own Force Risk Reduction system. a. What benefits are provided by individual service-specific data systems needed to collect mishap data? b. To what extent do the safety centers collect consistent information as part of their mishap investigations? c. Where is there collection overlap and where do we differentiate the merged data analytics in order to amplify safety across DOD?

Admiral LEAVITT. Over time each service has developed and refined their service-specific system to account for service unique needs. Service uniqueness encompasses operating environments, mission variance and institutional culture and history. Individual systems account for these differences and provide efficiency to the users. All services are required to comply with a common DOD Instruction (6055.07). In recognition of a lack of standardization, an associated all-service working group developed a list of standard data elements that apply to all services. The current form of that group, the Safely Information Management Working Group, has been tasked with studying the current and future potential improvements to safety reporting through the Title 10 Section 2222 and DOD mandated BPR/BEA (Business Process Reengineering/Business Enterprise Architecture) system. This will result in future systems being much more standardized. Additionally, the services have already agreed on major initiatives in mishap prevention by standardizing human factors through the work of the Joint Service Safety Council Human Factors Working Group.

Common data and some service unique data is transferred periodically to OSD for aggregation and analysis. It is possible that trend identification is only possible after aggregating common data between the services (this could be very important in the F–35 arena).

Ms. ROSEN. Each of the military services' safety centers utilize separate, service-specific data systems that collect mishap data. In addition, the Office of the Secretary of Defense aggregates mishap data in its own Force Risk Reduction system. a. What benefits are provided by individual service-specific data systems needed to collect mishap data? b. To what extent do the safety centers collect consistent information as part of their mishap investigations? c. Where is there collection overlap and where do we differentiate the merged data analytics in order to amplify safety across DOD?

General RAUCH. The USAF established a requirement for a comprehensive, searchable safety database and fielded the Air Force Safety Automated System in 2007. This system allows collection of pertinent mishap data from any event worldwide and enables analysis of trends and other information for mishap prevention efforts. AFSAS also allows the tracking of causal factors from mishaps and the implementation of recommendations from safety investigations. In conjunction with Office of the Secretary of Defense direction, the Air Force standardizes numerous data fields in our database to ensure identical collection across the Department of Defense. In addition, the Air Force has worked extensively with the US Navy recently to ensure consistent data collection for physiological events as well as migrating overall data collection to similar software tools.

Ms. ROSEN. In Nevada we're proud to be home to Nellis AFB and Naval Air Station Fallon, the premier training sites for our nation's fighter pilots. We were saddened to lose one of our Thunderbirds at Nellis, Major Stephen Del Bagno, earlier this spring, when his F–16 crashed over the Nevada Test and Training Range. Can you please provide me an update on what led to this tragic event?

General RAUCH. The Safety Investigation Board (SIB) and Accident Investigation Board (AIB) investigations are complete for this mishap. SIB reports contain privileged safety information and are conducted solely to prevent future mishaps. According to the publically releasable AIB report, the Mishap Pilot experienced G-induced loss of consciousness (G–LOC) while maneuvering during a routine aerial demonstration training flight. The G–LOC lead to the MP's absolute incapacitation and the aircraft's impact with the ground.

QUESTIONS SUBMITTED BY MS. GONZÁLEZ-COLÓN

Ms. GONZÁLEZ-COLÓN. General Rauch's presentation included charts of the numbers and rates of the different classes of mishaps by fiscal year, including partial FY2018. Is there a breakdown of these rates and trends that separates Active vs. Reserve vs. National Guard components? Is there such for the other services? If so, I would ask that these breakdowns be submitted for this hearing record.

General FRANCIS. Breakdowns of Class A flight mishaps and rates by component are provided in the table below. For the past 10 years, the Army National Guard and Army Reserve have maintained mishap rates at or below the active forces. There are differences in the way they execute flying hours and their exposure to higher-risk environments, but their efforts in mishap prevention are to be commended along with those of the active force. The Army National Guard and Army Reserve are integral to the success of both Army Aviation and the total force.

Ms. GONZÁLEZ-COLÓN. All our forces have been operating at an intensified level worldwide for almost 17 years now. Both people and machines are being deployed more often and for longer times than what was customary. Even though our people and our gear are the best in the world, this rate of use can degrade performance and shorten the useful life of the hardware. Have you been able to observe an influence of this in the numbers, rates or types of mishaps?

General FRANCIS. We have not seen a recognizable mishap trend of any kind indicating that extensive deployments have degraded the safety of our aircraft or crews. The few materiel issues we have experienced have not been due to excessive flying hours on airframes, but failures of parts or systems that are routinely replaced based on time or condition. The most recent catastrophic materiel failures we have experienced could not be attributed to excessive use as the parts that failed are routinely inspected and replaced when necessary.

Ms. GONZÁLEZ-COLÓN. There are several aircraft systems that have been kept on duty for many decades and are expected to be for a few more (B52, KC135, C130)—is there an observed trend relating mishaps and aircraft age, or whether the aircraft has had the latest upgrades?

General FRANCIS. There are no observed trends in Army Aviation mishaps relating to aircraft age or lack of upgrades. During the last 10 years, the Army has retired the UH–1 and OH–58 fleets. We continually put aircraft through inspections and upgrades to ensure continued safe operations.

Ms. GONZÁLEZ-COLÓN. There is also a concern that the Guard and Reserve Components may be falling behind in getting any needed upgrades or in replacement of equipment as priority is given to Active Component. Would the services' witnesses comment on this concern?

General FRANCIS. The Army relies on Army Guard and Reserve Aviation as an integral component for success and acts to modernize the total force based on operational requirements and within fiscal constraints. This will result, for instance, in the Army National Guard's Blackhawk fleet being fully modernized 2 years ahead of the Regular Army. To date, we have not seen any major mishaps that indicate issues with Army National Guard or Army Reserve equipment or upgrades.

Ms. GONZÁLEZ-COLÓN. General Rauch's presentation included charts of the numbers and rates of the different classes of mishaps by fiscal year, including partial FY2018. Is there a breakdown of these rates and trends that separates Active vs. Reserve vs. National Guard components? Is there such for the other services? If so, I would ask that these breakdowns be submitted for this hearing record.

Admiral LEAVITT. [The charts referred to can be found in the Appendix on pages 83–92.]

Ms. GONZÁLEZ-COLÓN. All our forces have been operating at an intensified level worldwide for almost 17 years now. Both people and machines are being deployed more often and for longer times than what was customary. Even though our people and our gear are the best in the world, this rate of use can degrade performance and shorten the useful life of the hardware. Have you been able to observe an influence of this in the numbers, rates or types of mishaps?

Admiral LEAVITT. The Naval Safety Center does not collect data regarding aircraft/aircrew readiness numbers. That information is collected in the Defense Readiness Reporting System-Navy, a classified information source monitored by other DOD organizations. However, USN Class A rates have remained relatively constant during the last 10 years with no statistical significance to the fluctuation in the Class A mishap rate during the last 10 years.

Aviation mishap rates for all classes are calculated per 100,000 flight hours. Total USN flight hours averaged 942,000 between FY08 and FY12, in the years before sequestration. In the last five years, flight hours have averaged about 90,000 less than before sequestration; however, this has not had a statistically significant impact on

the Class A mishap rate. USMC flight hours are about a third of the USN's, averaging 302,000 between FY08 and FY12. In the last five years, those averages have dropped by approximately 50,000 hours. USMC Class A rates are showing an increase over the last 10 years. The majority of both USN and USMC Class A mishaps occur during flight operations as opposed to flight-related or aviation ground mishaps.

USN Class B mishaps show a more even dispersion between flight, flight-related, and aviation ground mishaps than USN Class A mishaps. USMC Class B mishaps are nearly evenly split between flight and aviation ground mishaps.

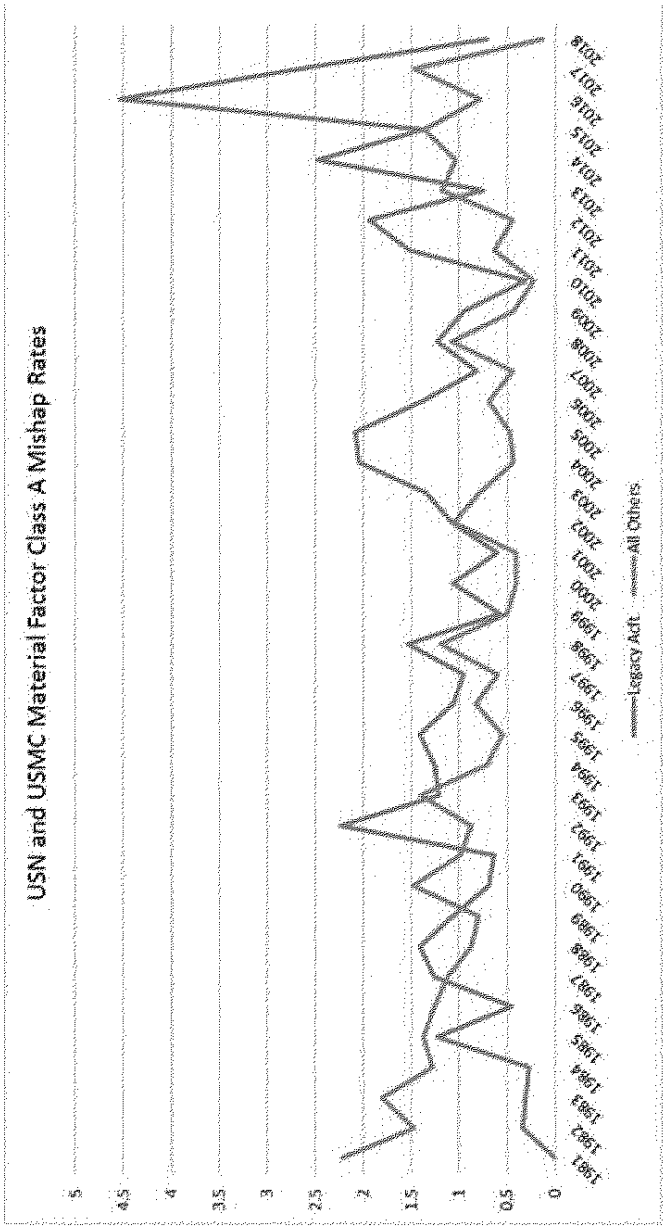
Class C mishaps have continued to rise over the past 10 years for both the USN and USMC. The majority of these mishaps are aviation ground mishaps, rather than flight or flight-related mishaps, and occur during maintenance evolutions.

Human factors account for nearly two-thirds of all mishap causal factors. The Human Factor Analysis and Classification System (HFACS) was implemented by the DOD in 2011 to assist mishap investigators with root cause analysis. Two HFACS, Fatigue and/or Task Oversaturation/Under-saturation causal factor preconditions, could potentially indicate issues with high operational tempo, however out of 453 USN and USMC Class A–C mishaps from FY11–FY17, only 30 mishap reports cited these HFACS preconditions.

Data collected by the Naval Safety Center does not show a correlation relating high operation tempo as a principle factor influencing mishap type or rates.

Ms. GONZÁLEZ-COLÓN. There are several aircraft systems that have been kept on duty for many decades and are expected to be for a few more (B52, KC135, C130)—is there an observed trend relating mishaps and aircraft age, or whether the aircraft has had the latest upgrades?

Admiral LEAVITT. [See graph on next page.] Comparative mishap analysis of legacy Naval aircraft platforms in programs to extend their service lives and all other Naval aircraft platforms indicates a correlation of extended service life and increased mishaps due to material failure. As figure 1 illustrates, Naval aircraft with extended life programs (E–2, C–2, AV–8B, F/A–18A–D, and MH/CH–53E) that experienced a Class A mishap as a result of a material factor are experiencing those mishaps at a greater rate than Naval aircraft not in an extended life program. The Naval Safety Center's mishap reporting system does not differentiate aircraft with or without the latest system or material upgrade and therefore cannot measure the impact of aircraft upgrades and mishap occurrence.



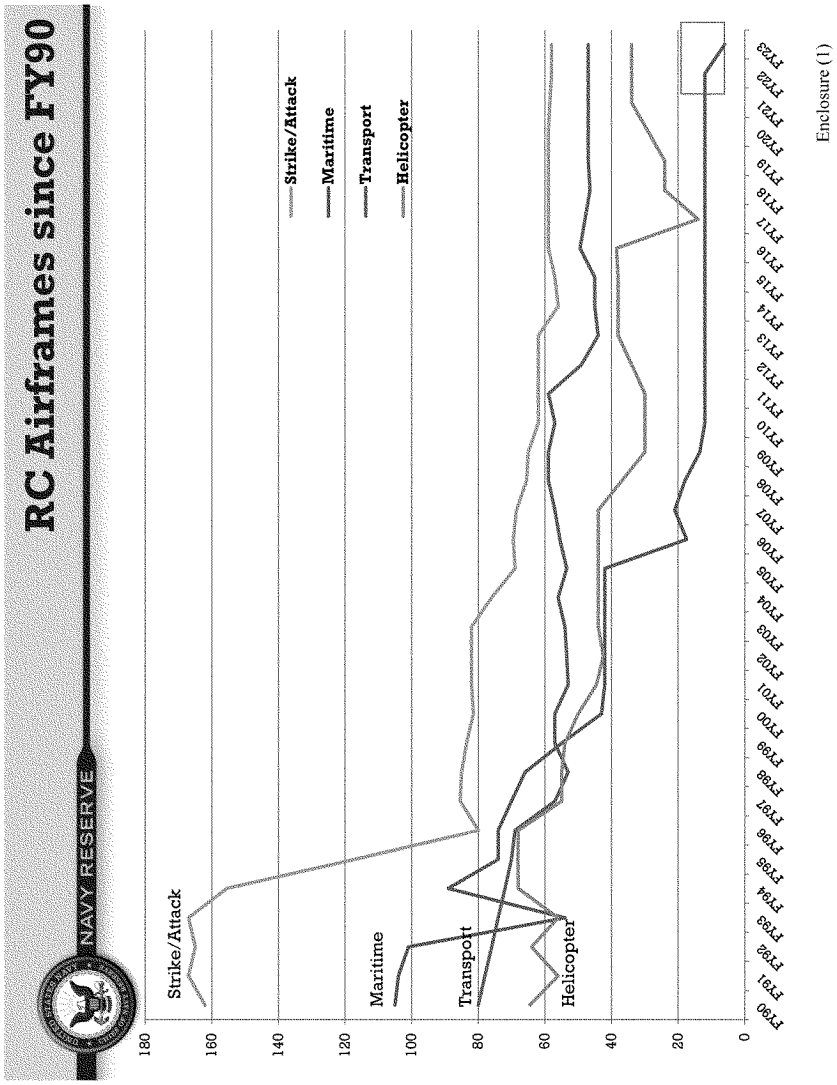
Note: The original chart was color-coded. When reading the chart above, the lower line at the left, beginning at zero, represents legacy aircraft; the higher line at the left represents all others.

Ms. GONZÁLEZ-COLÓN. There is also a concern that the Guard and Reserve Components may be falling behind in getting any needed upgrades or in replacement of equipment as priority is given to Active Component. Would the services' witnesses comment on this concern?

Admiral LEAVITT. [See graph on next page.] Since 2001, similar to the Active Component, Navy Reserve equipment has been steadily declining in capacity (Enclosure 1) and capability due to the constant demands of warfare and budgetary constraints. Navy, as a total force, is working to ensure the Reserve Component has capability equal to the Active Component, ensuring strategic depth is maintained in the Reserve Force. In some cases, an increase in capability of a Reserve squadron over that of an Active Duty squadron is necessary due to the unique mission requirements (e.g. HSC–85). However, independent of the budget landscape, recapitalization of Reserve hardware routinely falls to the bottom of the priority list (unfunded or not). Reserve aircraft like the F–5 for Adversary training, F/A–18 as strategic reserve and P–3C for anti-submarine warfare are almost obsolete. Congress has been especially helpful in providing funding for new NP–2000 propellers for our aging C–130T aircraft. Our C–130T aircraft are at approximately 60% of their life expectancy. Currently, there remains no plan to transition the last 2 squadrons of P–3C aircraft to the P–8A aircraft in the Navy Reserve. The current strike plan continues to be a "waterfall" strategy that transitions legacy aircraft from the Active Component to the Reserve. The Navy Reserve's only rotary wing dedicated SOF support squadron is transitioning from the HH–60H to the MH–60S and are losing SOF-peculiar capabilities unique to the legacy aircraft.

The Navy Reserve relies heavily upon Congressional Adds to keep its equipment on par with the Active Component and remain deployable. Recapitalizing Navy Reserve equipment will enable members who leave Active Duty to continue to serve in the Navy Reserve, using the same systems capability they had in the Active Component.

NGREA is a helpful tool to ensure capability parity is maintained, however, platforms like manned airframes cannot be purchased with Service NGREA funding.



Ms. GONZÁLEZ-COLÓN. General Rauch's presentation included charts of the numbers and rates of the different classes of mishaps by fiscal year, including partial FY2018. Is there a breakdown of these rates and trends that separates Active vs. Reserve vs. National Guard components? Is there such for the other services? If so, I would ask that these breakdowns be submitted for this hearing record.

General RAUCH. Air National Guard and Air Force Reserve mishap occurrences were included in the overall Air Force charts provided for the presentation.

The breakout of Air National Guard aviation Class A mishap events over the last five years is:

FY14 = 2 Class A mishaps, rate = 0.80 mishaps per 100K flying hours
FY15 = 2 Class A mishaps, rate = 0.67 mishaps per 100K flying hours
FY16 = 5 Class A mishaps, rate = 1.74 mishaps per 100K flying hours
FY17 = 2 Class A mishaps, rate = 0.72 mishaps per 100K flying hours
FY18 = 5 Class A mishaps, rate = 1.44 mishaps per 100K flying hours

For the Air Force Reserve, the Class A breakout is:
FY14 = 0 Class A mishaps
FY15 = 3 Class A mishaps
FY16 = 1 Class A mishap
FY17 = 0 Class A mishaps
FY18 = 0 Class A mishaps

Note, due to the heavy incorporation with active-duty flying hour programs, separate Air Force Reserve mishap rates cannot be accurately accomplished.

Ms. GONZÁLEZ-COLÓN. All our forces have been operating at an intensified level worldwide for almost 17 years now. Both people and machines are being deployed more often and for longer times than what was customary. Even though our people and our gear are the best in the world, this rate of use can degrade performance and shorten the useful life of the hardware. Have you been able to observe an influence of this in the numbers, rates or types of mishaps?

General RAUCH. Operational tempo is always a concern that local commanders and safety offices continually monitor and address. Air Force Safety has not ascertained any enterprise level trends directly correlated to decreased capability of personnel or equipment due to increased use or deployment. Every aircraft flown meets airworthiness requirements regardless of age or frequency of use and overall aviation mishap trends for major Class A mishaps have generally trended lower.

Ms. GONZÁLEZ-COLÓN. General Rauch, aware that it may be early in the investigative process for specifics, and of course respecting the protection of sensitive information, what can you tell us about the state of the investigation on the May 2 Air National Guard tragedy in Charleston, insofar as the steps and stages that have been gone through and what would be next?

General RAUCH. The Safety Investigation Board (SIB) and Accident Investigation Board (AIB) investigations are complete for the Puerto Rico Air National Guard WC–130 mishap that occurred on 02 May 2018 immediately after departure from the Savannah/Hilton Head International Airport. SIB reports contain privileged safety information and are conducted solely to prevent future mishaps. The publically releasable AIB report identified multiple causes for the mishap. First, the mishap crew did not reject the takeoff when the number one engine failed to provide normal parameters. In addition, the crew did not properly execute appropriate after takeoff and engine shutdown checklists and procedures. Finally, the crew improperly applied rudder controls after takeoff that led to the aircraft stalling ad departing controlled flight.

Ms. GONZÁLEZ-COLÓN. There are several aircraft systems that have been kept on duty for many decades and are expected to be for a few more (B52, KC135, C130)—is there an observed trend relating mishaps and aircraft age, or whether the aircraft has had the latest upgrades?

General RAUCH. There are no trends connecting aircraft age to mishaps, other than the fact that newer generation aircraft, such as the F–22, F–35 and CV–22, are increasingly the source of more expensive mishaps simply due to the cost of repairs and parts of these aircraft and corresponding DOD mishap reporting criteria. The Air Force utilizes the Aviation Structural Improvement Program (ASIP) to ensure the desired level of structural safety, performance, durability, and supportability throughout the aircraft's service life. Aircraft upgrades provide performance enhancement and bring technological advances to older aircraft, but airworthiness remains independent of aircraft age.

Ms. GONZÁLEZ-COLÓN. There is also a concern that the Guard and Reserve Components may be falling behind in getting any needed upgrades or in replacement of equipment as priority is given to Active Component. Would the services' witnesses comment on this concern?

General RAUCH. From a safety perspective, there has not been an increase in any type of mishap with Air National Guard or Air Force Reserve aircraft due to lack of upgrades.

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