



Volume 2, Number 2

Spring 2009

WINGMAN

Airmen Taking Care Of Airmen

The United States Air Force Journal of Occupational, Operational and Off-Duty Safety



First merged edition of Air Force safety magazines !



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Airmen Taking Care Of Airmen

The United States Air Force Journal of Occupational, Operational and Off-Duty Safety

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Commercial Prefix (505) 846-XXXX
Wingman is online at <http://afsafety.af.mil>

PURPOSE—The Air Force Safety Center publishes *Wingman* quarterly, as part of the program to prevent ground mishaps. Contents are not directive unless so stated. **REPRINTS**—Air Force units may reprint *Wingman* articles without further authorization. Other organizations must advise the editor of the intended use before reprinting. This coordination will ensure that articles are accurate and contain the most current information. The appearance of specific commercial products, commodities or services is for information purposes only and does not imply Air Force endorsement. Some individuals in this publication are not Air Force members and may not conform to Air Force appearance standards. **DISTRIBUTION**—One copy for each five Air Force members. To establish or change requirements, Air Force units must contact afsc.semm@kirtland.af.mil, Voice—DSN 246-1983; Fax—DSN 246-0931 or by mail:

Wingman
HQ Air Force Safety Center
9700 G Avenue SE, Ste 282 B
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GROUND



WEAPONS



SPACE



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Front cover: U.S. Air Force photo by Tech. Sgt. Michael Boquette
Digital illustration by Felicia M. Hall

POSTAL INFORMATION— *Wingman* (ISSN 1055-7725) is published quarterly by HQ AFSC/SEM, 9700 G Avenue SE, Kirtland AFB, NM 87117-5670. Periodicals postage paid at Albuquerque, NM, and additional mailing offices. POSTMASTER: Send address changes to *Wingman*, Attn: Executive Assistant, HQ AFSC/SEM, 9700 G Avenue SE, Kirtland AFB, NM 87117-5670.

CONTRIBUTIONS & FEEDBACK— *Wingman* welcomes reader contributions, comments and constructive criticism. The editor may revise contributed material to improve clarity, while retaining the author's intended meaning.

To discuss your story idea, contact the managing editor by telephone, e-mail or fax.

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Air Force Safety Magazines Merge



GWENDOLYN DOOLEY

Chief, Media, Education, and Force Development Division
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Beginning with this issue, *Flying Safety Magazine*, *Weapons Journal*, and *Wingman* magazines are now combined into a single quarterly publication, under the *Wingman* name. We know a lot of information is coming at you from various sources — MAJCOM safety magazines (AETC, ACC, AFSOC, AMC, USAFE), sister-service safety magazines, pamphlets, brochures, videos, the Internet, and elsewhere. That's one reason we've merged the three previous Air Force-level safety magazines into one that covers all safety disciplines: aviation, ground, space, and weapons safety.

Our major concern during this merger was to ensure we kept our current readers' interest and increased readership. The Army Combat Readiness/Safety Center completed a similar consolidation about two years ago, and we looked to that peer for lessons learned. If they can succeed, so can we.

We gained consensus during the September 2008 Senior Safety Advisory Council, when the MAJCOM chiefs of safety met here at the center. We pressed forward to phase out the previous magazines, revised contracts, increased subscribers, updated equipment and software, and increased staff.

Some may be concerned — change is “new” and some-

times difficult to immediately embrace. As editor-in-chief, I assure you there will be absolutely no degradation in this magazine. We'll continue to provide “There I Was” stories, seasonal information, trend-based focus areas, safety award winners, “Spotlights” on superior performers, and more.

We'll carry forward the knowledge, skills, and abilities to ensure this combined *Wingman* garners the same world-class, award-winning accolades as the previous individual titles did. We'll keep working with the subject-matter experts in the Analysis (SEA), Aviation (SEF), Ground (SEG), Human Factors (SEH), Space (SES), and Weapons (SEW) divisions. We'll continue to follow the vectors provided by the Safety Center's executive director and the Air Force chief of safety.

We'll continue to use articles written by students attending our education and training courses. In case you didn't know, the Flight Safety Officer course students provided the bulk of the articles used in *Flying Safety Magazine*. As I continue to slightly digress — the October 2007 *FSM* article “Clarity in Communication” by Capt. Abby Ponn, graduate of FSO Class 07D, received the nationally renowned MarCom 2008 Gold Award in the “Writing/Feature Article” category.

Now that you have our promise to you, in writing, here's what we'd like to have from you: articles, notifications of special events and superior performers, suggested improvements, requests to join our mailing list — anything that will help us help you prevent mishaps, save lives, and preserve the assets of American airpower.

There's one more thing I'd like from you. When you finish reading this edition of the new, improved, combined *Wingman*, please send me an e-mail at afsc.sem@kirtland.af.mil. Tell me what you think about this path we've taken. We welcome and appreciate all feedback. 🦅

Gwen Dooley

Editor-in-Chief

Note: The MarCom Awards program is administered and judged by the Association of Marketing and Communication Professionals. The Association oversees awards and recognition programs, provides judges and sets standards for excellence. Winners range from individual communicators to media conglomerates and Fortune 50 companies. Winners are categorized based on points for Platinum, Gold, or Honorable Mention. The AFSC magazines received 10 MarCom 2008 awards.

Spring *Wingman* Highlights Current Issues in Four Disciplines



WILLIAM C. REDMOND
Executive Director
Air Force Safety Center
Kirtland AFB, N.M.

In this edition of *Wingman*, the Safety Center's Media, Education and Force Development division chief explains the rationale for combining our three previous safety publications into this quarterly document, with pages devoted to each of the safety disciplines. We believe this consolidation will enable us to deliver a more focused Air Force-level safety magazine for the warfighter. I like it because focus of effort is a tried and true principle of war. Safety is all about making the mission happen anytime, anywhere, with the right risk.

In the Aviation section, several authors address the hazards inherent in training and the high operations tempo, and how to deal with bird/wildlife aircraft strike hazards. This is important because of the higher incidence of aircraft mishaps we see when the weather improves and our aircrew training picks up. As we go to print, we've

seen one of the most successful returns from holidays ever. Our mishap rates reflect the good judgment, skill at scheduling, crews and missions, and our leadership at the squadron, group and wing. Let's build on that as we push out this spring.

Ground articles cover the danger of driving and walking on "black ice," recount the lowlights of a memorable fishing trip, and tell the story of a car crash that destroyed the vehicle but left the driver unharmed. As we go to print, our three latest fatalities were vehicle passengers. A good wingman never goes off duty in risk management; don't let the other person kill you! Just as in aviation, the Air Force experiences a March-April spike in motorcycle deaths, as the weather gets better. If I could reverse one trend this spring, it would be that alcohol contributed to 15 of our Fiscal Year 08 PMV-4 deaths. Our commanders, chiefs, shirts, supervisors, and our safety professionals can minimize that spike this year by ensuring that we're armed and ready to ask the tough questions, that our people do the right trip planning, that we have wingman participation, that everyone in the organization knows how fatigue dulls reflexes, and most importantly, how risk increases when people drink and drive.

The Weapons section highlights the publication of the long-awaited AFMAN 91-201, *Explosives Safety Standard*, gives us an update on environmental restoration at the site of a significant nuclear mishap, informs us about deployed security operations in the AOR, and honors the long and distinguished service of our recently retired chief of the Weapons Safety Division here.

For the first time, a Safety Center magazine includes information on the final frontier. The Space section includes an overview of the many issues our Space Safety Division is tracking, lessons learned about how to safely deactivate support facilities, and some news from NASA that's relevant to the Air Force mission. It also details what Space safety is doing for the space warfighter.

We hope this consolidated safety magazine meets the needs and expectations of our readers. That's the goal we've set for ourselves as we strive to make *Wingman* a must-read for Airmen everywhere. Let us know your opinion — we'll review and consider all reader comments. I am an e-mail away for critiques — william.redmond@kirtland.af.mil.

Air Force Safety is ready to support your efforts 24/7, anytime and anywhere. All of us at the Safety Center are here to help Airmen stay safe, on and off duty, as they accomplish great things for the Air Force and our nation. 



The Media, Education & Force Development Division

The Air Force Safety Center Media, Education, and Force Development Division serves as the foundation of excellence in ensuring the continuous professional development of all personnel assigned to safety staffs and/or supporting safety, Air Force-wide. As the leader in safety learning and performance, the division provides education and training to achieve work-related competencies, performance, and fulfillment to aid mishap-prevention efforts. The program provides the requisite safety education and training to enhance safety knowledge, skills, and abilities that enhance aerospace power by eliminating mishaps through proactive hazard identification and risk management. The education and training encompass all safety disciplines: aviation, ground, weapons, and space, to ensure mission-ready capabilities are preserved for the United States Air Force. The program addresses current and future mishap-prevention requirements and opportunities by providing education and training primarily through classroom-based courses focused on the blended-learning concept. With the recent conversion from contractor instructors to Air Force civilian employee instructors, plans are in progress to increase learning opportunities through distance-learning and satellite-broadcast courses.

Courses taught at the AFSC:

- Flight Safety Officer Course (20 days)
- Aircraft Mishap Investigation Course (10 days)
- International Flight Safety Officer Course (50 days)
- Safety and Accident Investigation Board President Course (3 days)
- Mishap Investigation Non-Aviation Course (8 days)
- Chief of Safety Course (4.5 days)
- Operational Risk Management Course (3 days)
- Safety Managers Course (5 days)

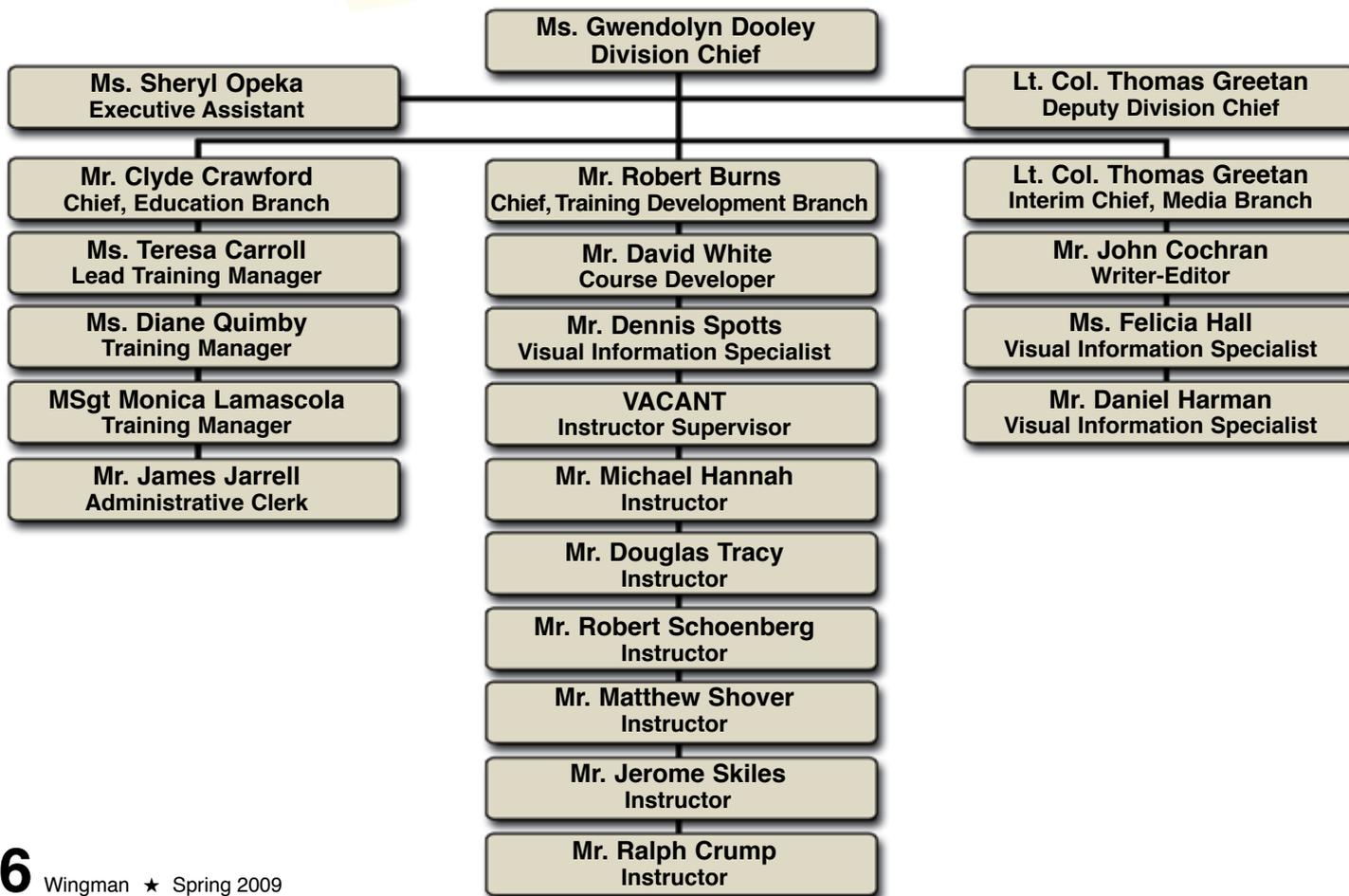
Courses contracted for Air Force-wide delivery:

- Various OSHA technical courses
- Voluntary Protection Program courses
- Traffic Safety Program Management courses

The division also provides all Airmen enhanced knowledge of safety by marketing safety events, issues, and concerns through print and multimedia products, such as award-winning magazines, posters, brochures, and videos. Historically, the division published and distributed three Air Force-level safety periodicals: *Flying Safety Magazine*, *Weapons Journal*, and *Wingman*. Effective in January 2009, all three magazines were combined under the *Wingman* title. 

Note: For more details on the division, go to the AFSC Web site at <http://afsafety.af.mil> or <http://www.afsc.af.mil>.

ORGANIZATIONAL CHART





Blue 2's Engaged!

COL. SID "SCROLL" MAYEUX
Chief, Aviation Safety Division
Air Force Safety Center
Kirtland AFB, N.M.

New day, new jet! I mean a NEW jet, like a new Viper straight from the Fort Worth plant, smellin' like an '08 Shelby GT straight from AAFES ... nice.

Welcome to the new and improved *Wingman* magazine! Call it a sign of the times, but we're doing more and better with less. *Flying Safety Magazine* has gone "mission complete," landed, and is buttoned up in the Tab-V. You'll see me and the rest of your aviation safety bros and sisters in these *Wingman* pages now, along with a few new squadron mates.

For instance, turn your eyes south about three inches and say "hello" to your new maintenance super, Chief Master Sgt. Sandy Stacy. Chief Stacy is the eyes, ears, heart, and soul for all things maintenance here at the Air Force Safety Center. She's a former Thunderbird line crew chief and a deacon from the Holy Church of What's Going On, particularly when it comes to maintenance resource management — MRM.

Problem? Well, if she isn't actually turning wrenches,

generating launches, and leading Airmen, the chief isn't happy. So to set her loose, Chief Stacy has personally handled six Class A mishap board investigative efforts. Listen up when the chief speaks — she's my sort of line chief. In today's issue, Chief Stacy opens up a new corner where our maintainers can talk maintenance.

Wingman is leaner, which forces us to get straight to the critical learning points. I don't have as many pages to dedicate to aviation safety, so my task is to bring you the straightest skinny possible. It won't be a whole magazine's worth, but I promise each edition will certainly be worth the read when it comes to aviation safety.

In today's mission, we've got to concentrate on training and AEF spin-up. It's March. The winter weather we discussed in December is breaking, the days are getting longer, and the birds are migrating north. Everyone is talking about RAP. Whether they like the musical genre, RAP is what drives our warfighting readiness.

We look forward to the RAP ramp-up, but be alert. Over the last 10 years, we've experienced 594 January and 572 February mishaps. But in March, the mishaps ramped up to 724, in correlation with the higher flying hours and ops tempo. As we look at the mishaps, simply stated, we are rusty and need to sharpen the sword. Don't jump straight into the many-v-many war if you aren't even up to a basic BFM or 2v1 ACM ride. Walk before you run. Back to basics.

Flying Safety Magazine has gone west, mission complete. *Wingman* is on station! 🦅 **Blue 2's engaged!**

Maintenance Spoken Here!



CHIEF MASTER SGT. SANDY STACY
Aviation Safety Division
Aircraft Maintenance Safety Manager
Air Force Safety Center
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Maintainers are some of the busiest people in the Air Force. You work in the daytime and nighttime, work 12-hour shifts, and work weekends. Your mission is to fix the planes to meet the flying schedule. In between jobs, you do CAMS, fill out the logbook, and get something to eat. You don't have time to train, do you?

Training is something you do on "training days," isn't it? Once a quarter or once a month, maintenance units set aside one day to do training and that's plenty, isn't it? Or is it? In today's Air Force, there are many training tasks to accomplish. You have chemical warfare and other war skills-type training. You have fire extinguisher, egress, confined spaces, and other recurring maintenance-related training. Oh, and let's not forget the ancillary training we all have to accomplish annually online. These are all important training events, and each one adds something to our ability to be professional Airmen and maintainers. So take that one day and complete all your required training, and then get back to work.

Speaking of work, how many of you realize training of another kind is also your job? Probably one of the most important jobs you have is training the next generation of maintainers. Where would

you be if the generation before you hadn't taught you? Remember your first trainer? He/she probably had a tremendous effect on how you do maintenance today. Remember your first week on the flight line or in the backshop? You had to learn how to read and write all over again. TOs and aircraft forms were difficult to read at first. Remember trying to figure out just how the heck you were going to fix the pilot's complaint that "autopilot altitude hold drops off in a 4G turn"? How were you going to duplicate, on the ground, a 4G turn? That's when your trainer went to work.

They showed you where to find autopilot in the troubleshooting tree. They showed you how to decipher the pilot's write-ups. They showed you how to hook up the power unit and the mule. They showed you how to "safe" the aircraft for maintenance, troubleshoot the write-up, and after you were done fixing the problem, they showed you how to do the paperwork to document what you'd done. Without your trainer, you'd still be out on that first job. So the next time you're sent out to train the new person, remember your first trainer.

What you teach will have a lasting effect. Remember to show them the right way to do the job. When you show them the right way, you're also showing them the safe way. Not only safe for you, but for the ones flying the plane. So, take the time to check out the TOs, the torque wrench, and all the proper PPE. It'll be time well spent. 🦅

Go Postal

LT. COL. JOEL S. DICKINSON
U.S. Air Force Flight Standards Agency
Tinker AFB, Okla.



Aviation

As a flight safety officer learns in FSO school, there is no “new” way to crash an aircraft. In the 100 years since the first U.S. military fatal mishap in 1908 that brought down a Wright Flyer, killing Lt. Thomas Selfridge and injuring Orville Wright, the U.S. military has crashed all types of air vehicles in all types of ways — but the root causes of mishaps today are the same as those of our first mishaps. While we’ve improved safety, we must attack the root causes of some modern mishaps. The main differences between then and now: design and engineering, materials, experimentation with and increased knowledge of the laws and forces that govern powered flight, risk-mitigation procedures, policy and training. While incredibly effective over the past 100 years, these methods of improving aviation safety came slowly, trial-and-error style, with one exception: risk management.

The leaders of the early Army Air Corps made risk-management decisions at very high levels, especially when compared to today’s combat units. One historical example demonstrates the mishap-reducing effectiveness of placing risk-acceptance and decision-making authority at a high level.

In February 1934, during contract and political disputes,

President Franklin Roosevelt canceled the nation’s airmail contracts with civil carriers. The Army Air Corps volunteered to “go postal” and temporarily carry the nation’s airmail while the Postmaster General initiated new contract bids. The effort was remarkable. With only 10 days’ notice, the Air Corps divided the U.S. into sectors, built military airmail routes, deployed aircraft, maintainers and pilots to new expeditionary bases, and began flying the mail — and did it all with no per diem.

However, within the first few weeks, amid horrible weather conditions, with ill-equipped aircraft and inexperienced pilots, 20 crashes claimed the lives of 10 pilots. While the military aviators themselves knew and accepted the risks in those early days of aviation, the spate of crashes in such a short time resulted in a fierce public outcry. Local commanders were adamant that the mission continue. At the squadron and group levels, it was important to demonstrate the capability of the Army Air Corps. The crews responded to their local leadership and continued to fly despite these horrendous losses. On March 9, President Roosevelt summoned U.S. Army Chief of Staff, Gen. Douglas MacArthur, and U.S. Army Air Corps Chief, Lt. Gen. Benjamin Foulois, to the White House. He wasted no time in blasting Lt. Gen. Foulois for the recent deadly crashes: “General, when

will these air killings stop?” he roared. Lt. Gen. Foulois’ reply was automatic: “Only when airplanes stop flying, Mr. President.” Of course, neither rain nor snow nor dark of night would stop the mission. But, to these senior-level decision makers, the costs did not outweigh the benefits. While the President did not issue an order to stop flying that day, Lt. Gen. Foulois did. He ordered a 10-day stand-down, effective immediately, to consult with his field commanders on reducing mishaps.

The term “operational risk management” didn’t exist in 1934, but it was certainly executed — and from the highest possible level. In the days following his stand-down order, Lt. Gen. Foulois visited with his airmail zone commanders, Lt. Col. Henry “Hap” Arnold, Maj. Horace Hickam, and Maj. B.Q. Jones, to discuss flying operations. In consultation with his commanders, he implemented risk-control measures: ordering the funding for immediate installation of new two-way radios in as many aircraft as possible, ramped-up training at the instrument flying school, reduced night flying, changed routes to circumnavigate the most dangerous mountainous areas, and raised weather minimums. He also fully supported Capt. Ira Eaker’s novel suggestion to Lt. Col. Arnold of adding co-pilots to many sorties, thus realizing a double benefit of giving experience and training to newer pilots on each mission and the beginning of crew resource management decision making in military aviation.

During the stand-down, lending support to the Army Air Corps’ mishap-reduction efforts from the absolute highest levels of leadership, President Roosevelt issued the following order to the Secretary of War: “The continuation of deaths in the Army Air Corps must stop. I wish you would issue new instructions to the Air Corps. In these instructions, please make it clear that if on any route, on any day, the conditions of weather, personnel or equipment are such as to give rise to any doubt as to the safety of moving the mail, that is from the standpoint of human safety, the mail shall not and will not be carried. Finally, if the responsible officers believe that carrying of any part or all the mail ought to be stopped at any time, you will be prepared to stop it immediately.”

The result of this emphasis from such high levels became not merely mission accomplishment, but safe mission accomplishment. The effort was as remarkable as the initial airmail push was effective. Over the remaining weeks of Army Air Corps duties in flying the mail, only one fatal crash occurred. Maj. Hickam’s investigation of the mishap determined the pilot ignored the rules set in place to reduce risk and intentionally entered a thunderstorm. This was a clear case of dangerous “mission-hacking.” Aircrews and their line supervisors must guard against this perceived need to “press on” in the face of significant increased risks.

Fast forward more than 70 years. On separate occasions in 2007, Air Combat Command’s Commander, Gen. John D.W. Corley, repeated Lt. Gen. Foulois’ action when faced with mishaps resulting in part from F-15 structural longeron issues. He issued safety stand-down orders for the affected F-15 fleet. This was another clear example of senior leaders executing their responsibility to fix dangerous conditions. Pilots were ready to fly, operations officers and commanders were ready to execute their missions despite the increased risk, but our senior leadership wasn’t prepared to push the risk to that level without proper safeguards in place. An executive decision to stop flying ensured the root causes of those mishaps would be addressed.

Risk management is now and has been in the forefront of U.S. Air Force senior leaders’ decision making since before the service was born. The leaders of our Air Force are committed to safe global air operations. But, though we have our leader’s support, it’s ultimately up to us as operators and first-line supervisors to heed President Roosevelt’s warning to “knock it off” when conditions warrant. Ops officers and commanders must prioritize safe mission accomplishment over simple metrics like “tons carried,” “bombs dropped,” or “sorties generated.” They are the first line of defense and must make the call if needed. Ops supervisors who misprioritize the effort risk losing aircraft and crews on missions of lesser importance. There is no doubt that our combatant commanders expect us to operate in an arena of increased threats and risk in combat. But they also expect us to get the mission done without unacceptable losses. The failure of line supervisors to judge each mission, each crew, and each launch, based on the ultimate goal of safe mission accomplishment, introduces a level of risk that our senior leaders have demonstrated they are unwilling to accept.

Risk management, as a practice and a process, does



more than just reduce mishaps — it increases the Air Force’s combat capability. We are faced with annual budget crunches, reductions in manning, and increases in mission types, complexities, and frequencies. The constant mitigation of identified risks, as a mindset, enhances our ability to safely get the mission done. Risk management must be considered a force multiplier. Our combat aviators willingly, enthusiastically, and repeatedly launch into the arena of increased risks. It’s up to ops supervisors and squadron and group commanders in the combat zone to first and foremost be committed to safe mission accomplishment. This requires an adherence to our first core value: integrity. Ops supervisors, even in the combat zone, must make the call to terminate when conditions warrant.

In our modern, ultra-capable Air Force, saying “no” to a mission is sometimes not well-received. It’s also not usually required, since we build flexibility into our operations plans to ensure mission completion. But caution is indicated here, as well — sometimes it’s easy to

build back-up plans into a mission so that the complexity increases beyond the crew’s capabilities. Or, inversely, so few concrete decisions will be made during pre-flight planning — the “we’ll-see-how-it-goes-and-then-make-a-decision” syndrome — that crews will launch without necessary guidance.

I once had an occasion, as a deployed KC-10 squadron ops officer in the early days of Operation Enduring Freedom, to terminate and delay a series of combat air-refueling missions based on a series of incidents involving crew rest, crew qualifications, weather, and possible fuel contamination. The Combined Air Operations Center was unhappy to learn they would not get their mighty Extenders as planned that day. The pressure to resume ops immediately was immense and came from both the crews and wing leadership. Subsequent investigation eliminated the fuel-contamination worry, and some deft crew-swapping enabled us to resume ops in just a few hours. The most surprising aspect of the day, however, was that I had to repeatedly justify my decision to stop



launches to each of my commanders. Privately, my chain of command questioned my intelligence, judgment, and even my qualification to serve in the position in the hours immediately after my decision. But publicly, they praised the decision.

The incident shows that the mission accomplishment metric, and not actual safe mission accomplishment, is often the priority. Line supervisors charged with getting the combat mission done must often launch crews and aircraft that they wouldn't choose to under peacetime conditions. Safe mission accomplishment requires unit commanders and ops officers to look their crews in the eyes and only launch those missions they deem safe. When risks to aircrews or aircraft outweigh the benefits of a particular mission, supervisors must modify the mission to a more acceptable risk level, or even cancel it outright.

Crews and pilots have a significant role to play in safe air operations. We must adhere to our third core value

— excellence in all we do — by being the professional aviators our nation needs. We must take our training seriously, know our aircraft systems and limitations, the threats we routinely face, and the tactics we use to mitigate those threats. We must ensure we're proficient, not just current, in all aspects of our roles as aviators. We should rehearse our sorties often, conduct thorough pre-mission planning, and always adhere to established rules and standards. If we're the professional aviators we're expected to be, then our ops supervisors can be assured of our capability to safely get the job done.

2006 was the safest year for aviation in USAF history. With the firm knowledge that our senior leadership is as attuned to safe operations as it is to mission accomplishment, we can make the coming years safer yet. As demonstrated, the issue isn't with senior leaders, but with ops supervisors and aircrews. Making the call to terminate based on safety must always be honored, and the decision must be respected, both publicly and privately.

We can't engineer our aircraft to "showroom-new" condition or write rules prohibiting mistakes or poor judgment, but we can continuously assess risk, implement controls, and place the decision making at the appropriate authority.

Remember the Army Air Corps lesson learned when they decided to "go postal" — know when scales tip toward costs outweighing benefits, and involve your unit leadership immediately. We can't expect to eradicate mishaps — Murphy's Law, manufacturing or design defects, employment of aircraft long past their designed life spans, "acts of God" in nature, and even aircrew error rule out the possibility of a "perfect" safety record. Where man and machine are intertwined, there will be mistakes.

First-line supervisors must consider it their duty to ensure those mistakes are relatively insignificant, through clear risk assessment and proper command authority decision making. With this mindset, we can safely deliver global reach and power — better and more accurately than any other force on the planet. Remember, when your unit gets its orders to "go postal" — be ready to make the call before the four-star has to. ✈️

Note: All historical information and quotes excerpted from "A Few Great Captains," by Dewitt S. Copp, © 1980, Air Force Historical Foundation, EPM Publications, Langley, Va.





If I Knew Then What I Know Now — Combating Fatigue

1ST LT. MICHAEL ARMSTRONG
82nd Aerospace Medicine Squadron
Sheppard AFB, Texas

We've all said it at least once: “If I knew then what I know now, things would have been different.” As a boom operator, my squadron’s high ops tempo kept me deployed quite a bit. I often had the feeling of fatigue, but always thought I could just “man up” and muscle through it. I now know, as an aerospace physiologist, that’s a lot easier said than done. As I teach aircrews about fatigue and countermeasures, I often reflect on some of those painful times I spent in the jet, just trying to keep awake. If I knew then some of the stuff I know now, I could have made it through those times a lot easier. I want to tell of one mission I was on and how it really opened my eyes to some of the problems fatigue can introduce.

We deployed shortly after the Sept. 11 attacks, flying every

day, with minimum crew rest between flights. My crew had been doing this since the beginning of the operation and was about three weeks in without a day off. To put this in perspective, an average day consisted of waking up in the middle of the night, eating breakfast (usually an MRE), doing mission planning, mission briefing, preflight, and then an eight- to 12-hour flight. Usually it was the middle of the day by the time we’d get back to the tent, and it wasn’t easy to get good sleep in that environment. I would usually get five or six hours. After a couple of weeks, everyone was feeling the effects of fatigue. It should have been a clue when guys took naps after completing the preflight and waiting for the take-off time.

On this sortie, we had taken off around 11 p.m. for a scheduled six-hour flight, but shortly after arriving in our track, we heard our receivers being diverted to other tankers. We knew it was going to be a long night. While burning holes in the sky, we started our normal routine

of rotating naps. Normally when awakened, you would feel almost worse than before your nap.

About eight hours into the sortie, we got our first set of F-18s to refuel. The refueling was uneventful, and as we were finishing, we received a call that our next set was about 15 minutes out. I decided to just stay in my position (which is much like a bed) until the next guys showed up. The next thing I remember was my pilot on the intercom asking if I had visual of the receiver, and opening my eyes to see an F-14 about five feet from contact. I was able to make it through the refueling, but I was definitely not on my best game. The rest of our refueling that night was a total struggle. I was glad it was probe and drogue refueling, which takes a lot less effort from the boom operator. It opened my eyes to the potential for mishaps due to fatigue.

I now know a lot more about how to combat fatigue, and there are many things I could have done to overcome it. The first thing is just knowing the insidious nature of fatigue — sleep can just sneak up on you, and no matter how much you think you can gut it out, you're eventually going to succumb to it. There are some good ways to combat falling asleep at inopportune times. In crew aircraft, getting up and walking around can get your blood flowing, which can help a lot. In aircraft where you can't get up, just flexing your muscles in your seat can get the blood flowing. Something as easy as talking can help both you and the rest of your crew or flight by keeping your mind active. The strategic use of caffeine before the critical phases of flight can give you a slight boost of energy to get you through the short term. Eating a snack, chewing gum, and eating sunflower seeds are other ways to keep more alert. All these strategies keep our brains active, which can help us avoid boredom or monotonous



tasks that lull us to sleep.

The best way to truly combat fatigue is to get some sleep — a short 20-minute nap can have a huge effect on improving your mental process. The drawback of a nap is the potential for sleep inertia, which is a lethargic feeling caused by waking from a deep stage of sleep. You can avoid some sleep inertia by limiting your naps to 20 minutes or if you have the time, then 90 minutes; both cases should wake you in the REM stage of sleep when your brain is more active. Once you're back on the ground, strive to get a good eight or more hours of sleep a night. I know that's easier said than done. I've also found that ear plugs and an eye patch can really help. The most important thing to remember is that sleep is the only true way to overcome fatigue. ✈





Preparing Before Stepping

MAJ. TOM DOHERTY
47th Flying Training Wing
Laughlin AFB, Texas

The mission was pretty vanilla — a student instrument sortie in which we planned to depart home station, fly to a remote airfield in southern Texas, shoot a standard VOR procedure, turn, and come back home. To make things even better, I was flying with a strong student, and he was almost through the instrument phase and getting ready to check. The weather was clear and a million; a perfect sortie for me as a new T-6 IP to be flying.

Things had gone relatively smoothly, and we found ourselves on a nine-mile ILS final into our home station. Suddenly, an unexpected, but not entirely uncommon, aural tone sounded. We hadn't been airborne long enough to get low-fuel light. Maybe it was a fuel bal (fuel balance annunciator indicating a fuel imbalance of greater than 30 pounds for more than two minutes). As trained, my eyes glanced up to the master warning, master caution, and fire lights on the top of the glare

shield. A master warning was illuminated. There went my previous theories, but I've had master warnings before in this airplane. It goes off when our onboard oxygen generating system experiences a temporary hiccup and illuminates the OBOGS light on our caution and warning panel on the lower right side of the instrument panel. Oil pressure, fuel pressure, emergency hydraulic pressure, and other serious problems will set off the master caution light, but those only happen during stand-up and an EP sim.

I glanced down to see the OBOGS warning illuminated. Wait a second, no it wasn't; the CHIP was illuminated. That comes on when a magnetic sensor detects iron chips in the oil system, generally from failed bearings or gears. The engineers probably chose CHIP on the Caution and Warning panel because "Dude, your only engine is about to quit, and I hope you have a back-up plan" was too long. That's what the CHIP light was politely telling me.

What happened next I'm completely confident any decent IP would have done. I declared an emergency, performed a precautionary emergency landing, and egressed on the runway. I learned other things about flying that day,

which I want to pass on to my fellow aviators.

As I was relatively new to the T-6, this was my first EP. After the adrenaline wore off and I was at groundspeed zero, I realized that these situations, while rare, don't just happen in the sim or during a stand-up scenario. I'm sure I'm not the only one who, although I took them seriously, approached EP sims this way. Remember, every time they idiot-proof something, they also build a better idiot.

All the "what-if" questions started flooding my mind. What if the weather was poor? What's the minimum weather to perform a PEL? What if I wasn't close to home? For risk-mitigation purposes, we're only allowed to practice PELs at a few OG-approved airfields, and only in day VMC. But that doesn't limit the possibilities to when you're going to perform one. Ask yourself, "Have I thought through EP scenarios other than how I've practiced?"

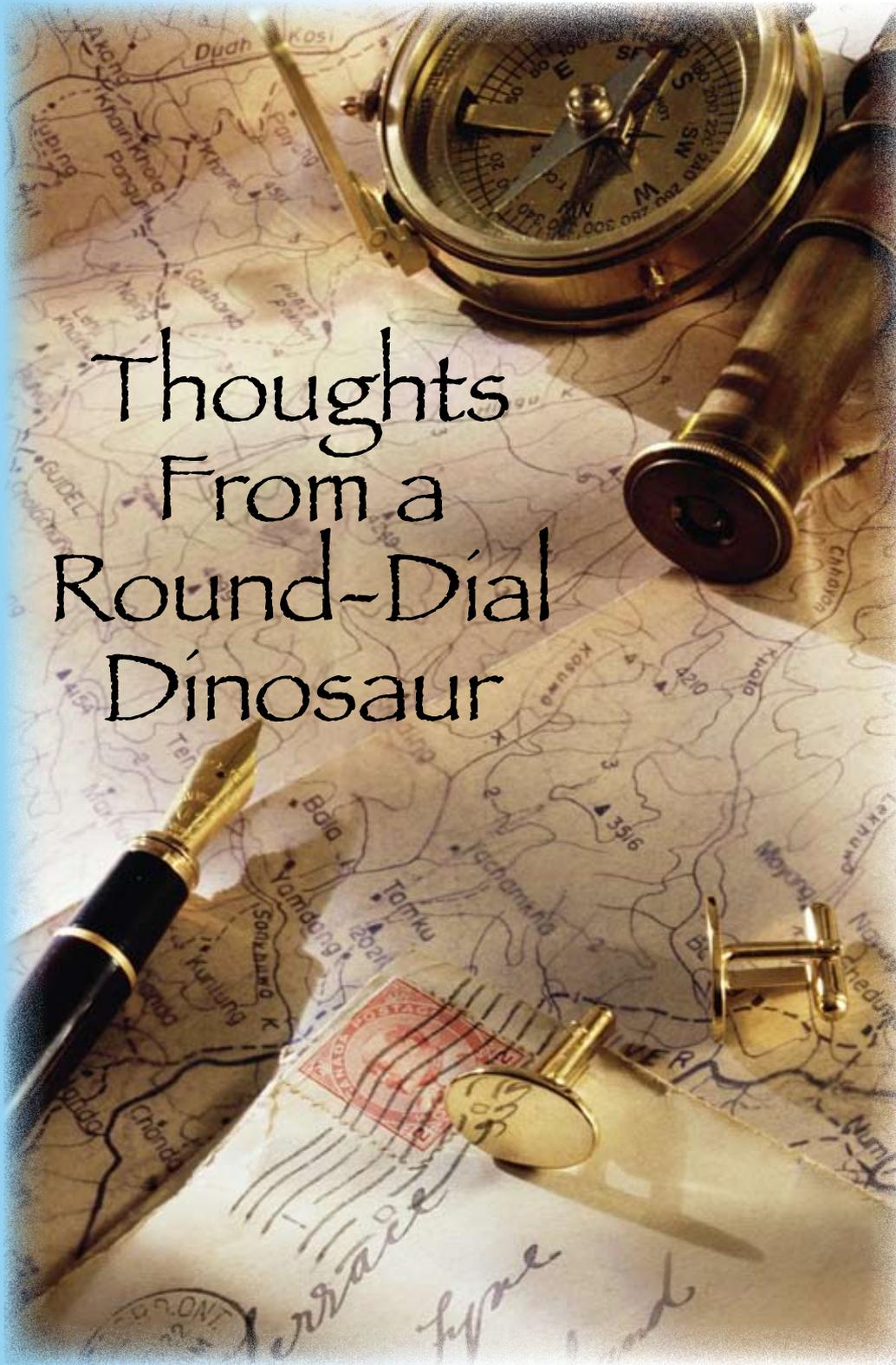
What assumptions did I have that weren't accurate? I was an IP in a heavy, four-engine aircraft nine months before this sortie. In that case, very few EPs require that I put the aircraft on the ground NOW, even in a "land-as-soon-as-possible" EP. We would run the checklist as a crew, coordinate radio duties, and probably fly an ILS to a full stop to a long, towered, probably military runway. Not so in this case. My new environment required me to reassess the way I was going to handle any abnormal situation, not necessarily just an emergency.

Finally, how am I going to communicate my intentions to a pedestrian? OK, pedestrian isn't fair. Tower and ATC staff are very knowledgeable of basic "pilot stuff," but if they don't know the grave nature of a "CHIP light," they probably do know the grave nature of "impending engine failure."

Communication is one of six key CRM topics on which all aviators receive annual training. It doesn't just refer to intra-cockpit or intra-flight communication, but also to your controllers on the ground who may be responsible for dozens of different types of aircraft at any time. Ask yourself what phrases you use on a day-to-day basis that may be second nature to you, yet possibly completely foreign to a controller. How else can you rephrase them to layman's terms?

The good news is solutions are fairly easy. Grab a cold beverage after flying and talk about the what-if scenarios with your buddies. I promise you, even if you've thought about everything, the review would be good for you, and you have an obligation to pass your thorough assessment to your squadron-mates. If you haven't, chances are others haven't, either. If you've been in the squadron a while, find a way to get others to talk about these things. You have the opportunity to be a mentor to these people. Imagine the pride of having other pilots use your techniques and lessons learned! In the process, you may just reveal an assumption or two that may need changing. ✈





Thoughts From a Round-Dial Dinosaur

LT. GEN. RONALD F. SAMS
The Inspector General, USAF
The Pentagon
Washington, D.C.

There I was ... Flight Level 390 ... suddenly I noticed ... everything looked normal. That's not the typical way flyers tell stories, is it? Well,

maybe this is a normal story in today's computer-controlled, autopilot flight management, multifunction GPS-integrated glass cockpits.

It's difficult for a round-dial analog dinosaur like me to fully understand these digital superautomated flight decks. When I graduated from UPT in 1973, I thought a "flight director" was a big deal. You could actually see which way to turn toward the course you wanted to intercept on the horizontal situation indicator. You could even do your own point-to-point navigation.

We thought things were automated in the old days. All you had to do was maintain your altitude, heading, and airspeed, while remembering to tune in the correct TACAN, listen to the correct Morse-code identifier, and set the HSI course (not to be confused with radial) for intercept. Next, you had to make sure the bearing pointer didn't lock on 40 degrees in error. That was easy, as long as you were keeping a mental picture of where you were in space and your airplane's geographical position in relation to the station.

Where you were maintaining your mental picture, you kept a map or chart close by.

Occasionally, ATC would ask for a position report and estimate to the next position. That was also easy, as long as you had been calculating distance-time problems. Your ground speed between waypoints was known because of your near-Ph.D. proficiency with your "whiz wheel." In addition, you couldn't forget to continually visually scan for other air traffic while cross-checking multiple engine instruments. You had to make sure

that none of the gauges exceeded any of those numerical limits that you had to memorize for stan/eval exams.

When I think back on those days, it seems you had to continually multitask yourself in order to know where the aircraft were, where you were going, and when you were going to be there. Things are much different today. Let me return to my story at FL 390.

From my passenger seat behind the cockpit, I had a clear view of the instrument panel. Between the pilot and co-pilot seats was a large, flat-screen flight-management/navigation display that made situational awareness nearly instantaneous.

The tiny airplane symbol was superimposed over a bright yellow GPS course display. The upcoming three waypoints were displayed, as well as flying time to each waypoint, and fuel that would be burned. A magenta arrow displayed the wind direction, indicating we had 121 knots on the tail. The margins of the display included heading, true course, magnetic course, ground speed, altitude, and airspeed. TCAS was superimposed on the display, showing all airplanes within 80 miles, plus color-coded radar patterns of weather ahead.

It took only seconds to see where we were, where we were going, and when we would get there. In addition, all engine instruments were “green” and contained almost no numerical markings. If a limit was approached, the gauge would turn yellow, or turn red if a limit was exceeded. The computer (monitoring everything) would alert the flight crew of the problem, then display what appropriate action was being taken.

On this flight, everything was “normal.” The computers were flying the airplane — the pilots’ weren’t. Instead of map or chart, the aircraft commander had a large college textbook on her lap. I watched her make numerous notes in the margins of the text. I assumed she was studying for a big test. She occasionally would write notes in a black binder balanced on the glare shield. From my position, I noticed radio calls occasionally interrupted her study.

On the other side of the cockpit, the co-pilot was reading from a large notebook that looked like a collection of associated directives. From my vantage point, I would estimate that 90 percent of the flight crew’s efforts involved reading, and maybe 10 percent involved actually looking at flight data displays. Why engage your brain in “just flying,” when digital computer



displays allow us to do other things?

Today’s modern flight decks are marvelous and vastly more reliable than the old wall of round dials I used to stare at. Glass cockpits provide better situational awareness, accurate navigation, and much-improved monitoring of aircraft systems compared to the old days. I also believe they provide for better decision making. But any time we’re flying, shouldn’t we be paying attention to what’s in front of us?

Are today’s computer-controlled cockpits so automated, so accurate, so reliable ... so boring, that we’ve lost our passion for flying, or have we surrendered our airmanship to microprocessors? That’s not my definition of multitasking. ☞☛

Note from the AFSC Human Factors Division: *The bottom line here is best stated by Christopher Wickens, a renowned Human Factors expert: "When pilots attend to two widely separated sources of visual information for two tasks, it becomes difficult to accomplish both tasks concurrently." You cannot maintain situational awareness on the aircraft's position and the position in your textbook at the same time, and do both effectively.*

Springtime and BASH



EUGENE A. LEBOEUF
Air Force Safety Center
Chief, USAF BASH Team
Kirtland AFB, N.M.

It's springtime, and a young Airman's thoughts turn to ... bird/wildlife aviation strike hazards, of course. Spring brings mowing and garden work, but also brings one of our migratory periods. Migratory season happens twice a year and peak migratory months occur in October and May. Those two months alone account for 15 and 12 percent, respectively, of the average annual BASH data total back to 1985. Of these two periods, the spring migration is normally less intense than the fall, for several reasons. During fall migration, many young, newly hatched birds are on the wing and facing a steep learning curve. By the time spring migration occurs, hunters and other predators have greatly reduced the number of returning migrants, and those survivors are much more wary for their experiences.

BASH had a very good year in 2008, and one would like to think the low strike numbers and dollar damage were a direct result of hard work and attention to detail. Whereas these efforts most certainly may have resulted in reduced strikes and damage, it's difficult to identify mishaps prevented by any one BASH effort. This lack of direct validation should never be a reason to lower your guard or excuse your planning for future success, and with the onset of spring migration approaching, preparation is in order.

AFI 91-202 tells us that each installation with a flying mission must develop a contingency plan that lists responsibilities and procedures for wildlife control. This contingency plan includes the establishment of a Bird Hazard Working Group. This diverse group, consisting of representatives from multiple organizations around

the base, is where successful BASH plans are developed, reviewed, and altered, as necessary.

Flexibility is an integral component of all BASH programs, so it should come as no surprise that a successful program is responsive to changing conditions. BHWG meetings were established as the proper forum to review past performance of a BASH plan, and to prepare for any needed changes. This group is normally chaired by the vice wing commander or equivalent, and includes a broad range of base representatives. Aviation safety, airfield operations, civil engineering, and even the golf course manager could all play vital roles in steering the BASH plan.

Why would the golf course have anything to do with a BASH plan? As a BASH plan is deployed, the removal of one target species from the airfield, such as Canada geese, may increase problems at the golf course. If the golf course staff harass the geese, and the flock ends up going back to the airfield, the problem is actually made worse by keeping the geese airborne and more of a risk to flight operations. Having all members attend BHWG meetings allows them to properly discuss follow-through on control operations, and not trade one problem for another. Likewise, if operations staff identify a drainage problem that appears to be attractive to geese on the airfield, they can directly address the problem with civil engineering. As the meeting minutes are written and maintained IAW AFI-91-202, paragraph 7.11.1.4.3, these problems and solutions become a matter of record. Success in dealing with wildlife hazards is rarely guaranteed, but using a team approach and planning properly for contingencies is the best way to keep strikes to a minimum.

When you get hit with spring fever, and thoughts begin to drift to shopping at the big box store for fertilizer and garden supplies, contact the members of your base BHWG and plan your strategy for the arrival of spring BASH season. 



The Aviation Well Done Award is presented to 1st Lt. Neil M. Gorham, 35th Fighter Squadron, Kunsan Air Base, Korea. On March 26, 2008, 1st Lt. Gorham returned to Kunsan and while preparing for landing, he experienced a potentially hazardous F-16 landing gear malfunction. As he lowered his landing gear, he noted the sound and feel of gear movement, but a quick cross-check of his instruments revealed an unsafe-gear indication. Low on fuel and grasping the seriousness of the situation, 1st Lt. Gorham executed a perfect go-around, maintained allowable gear-airspeed limits, and promptly communicated the situation to his flight lead, who was on short final for landing. Upon hearing his radio call, the flight lead executed a low approach, acquired the visual, and began a reform of the two aircraft. Once rejoined, the flight lead conducted a visual inspection of 1st Lt. Gorham's aircraft, but was unable to determine if the gear was down in the locked position. He ran the emergency procedures checklist; however, when he raised the gear handle, the landing gear did not retract. He recycled the gear while monitoring instruments for safe-gear indications. Still unable to determine if the gear was down and locked, and lacking other safe-gear indications, 1st Lt. Gorham elected to proceed with a runway approach-end cable arrestment as called for by the checklist. His subsequent flawless approach and landing resulted in a near-perfect approach-end arrestment, safely stopping his crippled aircraft on the runway. The outstanding leadership and superior skill displayed by 1st Lt. Gorham under extreme circumstances reflect great credit upon himself, Pacific Air Forces Command, and the United States Air Force. 🦅


The Aviation Well Done Award is presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Mishap Prevention Program.

The Aviation Well Done Award is presented to the crew of Deadly 14, Maj. Fredrick Atwater and Senior Airman Dwayne Vannoy, 11th Reconnaissance Squadron, Nellis Air Force Base, Nevada. On April 21, 2008, Deadly 14, an MQ-1B Predator, was flying a student training sortie. Nine hours into the flight and well after sunset, the infrared night-landing camera jammed, causing the displayed image to be inverted. After several attempts to correct the problem and with no suitable camera available, the crew declared an emergency and returned to the airfield. After assessing the situation, Maj. Atwater conducted two low approaches and determined that landing conditions were adequate. Senior Airman Vannoy backed up the pilot with timely airspeed, altitude and vertical velocity calls. On the next approach, the team expertly guided the aircraft and was able to touch down without incident. The crew's decisive actions, ingenuity and alertness saved the MQ-1B from destruction and preserved a vital Air Force asset for the Global War on Terror. The outstanding leadership and superior skill displayed by the crew of Deadly 14 reflect great credit upon themselves, Air Combat Command, and the United States Air Force. 🦅

Aviation



Class A Aviation Mishaps

FY09 (through Dec. 18)

	Class A Mishaps		
	FY09	Same Date in FY08	Total FY08
ACC	1	1	9
AETC	1	1	6
AFMC	0	0	1
AFRC	0	0	3
AFSOC	0	0	0
AFSPC	0	0	0
AMC	0	1	4
ANG	0	2	3
PACAF	0	1	1
USAFE	0	0	0
AF at Large	0	0	0
Total	2 / 0.47	6 / 1.40	27 / 1.37

Flight Rate Producing

Nov 12 F-16C → Engine fire; aborted takeoff; departed runway; no injuries

UAS

Nov 02 MQ-1B → Crashed after takeoff

Dec 04 MQ-1B → Electrical malfunction; destroyed during landing

- A Class "A" aviation mishap is one in which there is loss of life, injury resulting in permanent total disability, destruction of a USAF aircraft, and/or property damage/loss exceeding \$1 million.
- These Class A mishap descriptions have been sanitized to protect privilege.
- Unless otherwise stated, all crew members successfully ejected/egressed from their aircraft.
- Reflects all fatalities associated with USAF aviation category mishaps.
- "→" Denotes a destroyed aircraft.
- USAF safety statistics are online at http://afsafety.af.mil/stats/f_stats.asp
- **If a mishap is not a destroyed aircraft or fatality, it is only listed after the investigation has been finalized (as of Dec. 18).**

Ask Mr. Safety



JOHN COCHRAN

Air Force Safety Center
Media, Education and Force Development Division
Kirtland AFB, N.M.

Editor's note: This is a new feature, in which we answer readers' safety-related questions. Here's the first one:

Q: Dear Mr. Safety,

I've been reading *Wingman* for a while, and I have to say, it's caused me to become more safety-conscious in my daily life. For example, I no longer smoke while cutting my hair with a gas-powered weed eater — I've switched to an electric one. That's just background information, though. The real reason I'm writing is to ask you this question: In your opinion as a safety expert,

is it OK to prop a small television on the side of the tub while I'm soaking in a bubble bath? That's right; I'm a rugged he-man who enjoys a relaxing immersion up to my neck. After the long, demanding days I put in at work, it's "me" time. What's it to you? Anyway, as a busy man, I need to use my off-duty time wisely, so I often multitask this way. I've got to keep up with my reality shows, but sometimes I wonder if this habit is really a good idea. I'd say a good 51 percent of the TV's base is in contact with the top of the tub wall at any given time. I asked my wife's opinion, and she said it's fine with her. She's really a wonderful person, letting me do what I want. Can I give her a shout out? "Hey, baby, you're the best!" I hope you choose my question for your column. I look forward to reading your response in the next edition. Maybe my better half will read it to me while I relax in the tub.

Sincerely,
Double Duty

A: Dear Double Duty,

First of all, thanks for writing — it's always great to hear from loyal *Wingman* readers. After all, people like you are the reason I have a job! Even though we might lose a few of you folks from time to time, there always seem to be more coming up. Thank goodness for the next generation, I always say.

As to the specifics of your question, although we never like to interfere with what responsible adults do in the privacy of their own homes, the practice you described is not something we can condone here at the Safety Center. Beyond the risk of electrocuting yourself, think of your poor wife. If that TV falls into the bathtub with you, it's likely to short out your whole house's electrical system, leaving her in the dark. She could stub her toe! So, if you want to be a good wingman for her, we recommend not balancing the TV on the edge of the bathtub. I know that's not what you wanted to hear, but hey, I call 'em like I see 'em. Man up and get out of that tub, Pruney! Do something useful around the house.

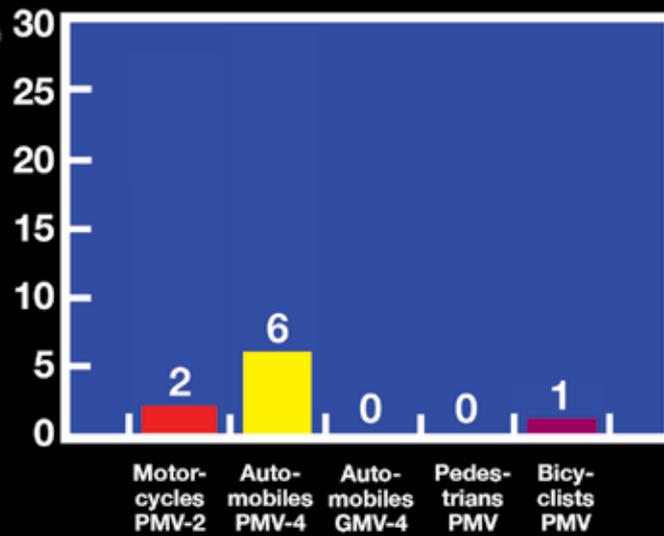
Thanks again for writing. We hope that you, or your survivors, will keep reading the magazine and stay in touch. After all, you're much more than just readers to us — you're our meal ticket. 

➤ Wingman = Vigilance & Responsibility!

Snapshot on Safety

Motor Vehicle Fatalities

Total FY09
As of Dec. 17



LARRY JAMES

Air Force Safety Center
Ground Safety Division Contractor
Kirtland AFB, N.M.

Extreme Heights and Complacency Don't Mix

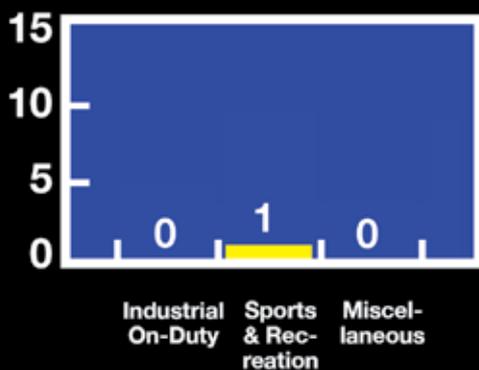
On a clear summer morning, Airmen 1, 2 and 3 were tasked to change light bulbs 53 feet above a hangar floor. The task required the use of an 80-foot boom-lift. Only Airman 1 was qualified to operate or ground-spot the boom-lift operation. Airman 1 failed to perform the pre-use inspection of the boom-lift to be certain that the lift and all safety devices were functioning properly. Airmen 1 and 2 entered the basket of the boom-

lift to operate the lift and change the bulbs. Airman 3 was the ground-spotter. Airmen 1 and 2's personal protective equipment included safety harnesses and lanyards, but they weren't donned and secured properly. Hard hats were required, but not used. While positioning the boom-lift in place to replace a bulb, without the stabilizers extended, the boom tilted in the direction of the counterweight. Airman 3 noticed the wheels nearest him lift off the floor and yelled at Airmen 1 and 2. The lift fell, striking several objects on its way to the floor, and came to rest near a personnel entrance. When the basket hit the floor, Airmen 1 and 2 were thrown out. Airman 2 was slung by his harness and lanyard into the hangar door. Airman 1 was transported to the nearest hospital, where he was pronounced dead from internal

Compared to this time last year :

- ☠ Off-Duty PMV fatalities up 87%
- ☠ Off-Duty PMV-4 fatalities up 175%
- ☠ Off-Duty PMV-2 fatalities down 25%
- ☠ Last three fatalities were passengers

Non-Motor Vehicle Fatalities Total FY09



injuries. Airman 2 was admitted to the ICU in a coma from head and neck injuries.

Lessons Learned:

Training is paramount. Lack of training, complacency, failure to follow written procedures, lack of appropriately used PPE, and improper supervision were factors in this accident. Proper training could have prevented this mishap, and proper risk-management principles could have compensated for these factors. Never operate any equipment that you're not trained and qualified to use. Always check equipment before use, and follow all operational and safety procedures at all times.

Good Times Can End Quickly

Late on a dark October evening, four Airmen were joy riding on a narrow, winding country road. They were talking, laughing, and having a good time. While participating in the conversation and laughter, the driver's attention was diverted from what she was doing, and before she realized it, the vehicle entered a sharp left curve and left the road on the right. The vehicle struck a boulder, rolled down an embankment, and came to rest in about 5 feet of water. Two passengers were able to exit through a rear window and summon help; however, the driver and front-seat passenger were trapped. The passenger was unconscious, and her head was under water. It took 20 minutes for rescuers to extract the driver and passenger from the vehicle. The passenger was placed on life support, but the next day was removed from it and pronounced dead. The driver did not sustain any injuries. The driver was under the influence of alcohol at the time of the accident.

Lessons Learned:

Drinking and driving is never acceptable. Even if you're not legally drunk, your ability is impaired. Intoxicating beverages can slow your reaction time and decrease your attentiveness. These factors are especially pertinent on a dark and winding road, and the combination created all the conditions necessary for this accident. Never drink and drive, and remember that as the vehicle operator, you're responsible for the safety of all who ride with you. Though sometimes it seems that driving is easy, it requires constant attention to keep up with all the internal and external inputs that affect your ability to complete the trip safely.

Changing Road Conditions Lead to Two-Vehicle Accident

On a cold January morning, an Airman was traveling on a four-lane highway. The temperature was 17 degrees, and the roads were covered with light snow and ice. As the highway merged from a four-lane asphalt road into a two-lane concrete highway, the vehicle began to fishtail. The Airman lost control on the slick road and slid sideways into oncoming traffic. A school bus coming from the other direction hit the Airman's vehicle on the passenger-side front door, fatally injuring the Airman.

Lessons Learned:

Failure to apply risk management is the major contributor to this mishap. Bad weather and road conditions, and the Airman's failure to respond properly to them, were factors. As the weather gets colder, every vehicle operator must be aware that at every surface change there is a higher probability that a loss of traction can occur. The posted speed limit indicates the maximum safe speed under the best conditions. As conditions worsen, the speed at which you can maintain control of your vehicle decreases. Be aware of your driving conditions and adjust appropriately. Remember, during winter conditions, when temperatures may drop below freezing at night, black ice, invisible to the naked eye, can occur. ☠

An Accident Waiting to Happen

JOHN A. WOODEN

Consolidated Safety Services, Inc.
Air Force Safety Center
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You may have wondered why some clichés and sayings are so appropriate. One such saying is, “an accident waiting to happen.” Many of us have seen co-workers and associates make decisions, and the first thing that pops into our heads is that they’re accidents waiting to happen. Regardless of what you do, say or wish, you can’t prevent the accident from happening. It’s frustrating, to say the least, and more frustrating if the accident involves our loved ones.

For me, the accident waiting to happen was my 22-year-old son, who was involved in a car accident recently with an 18-wheeler on I-75 South on the outskirts of Atlanta, Ga. Though the accident completely totaled his grandfather’s car, he was able to walk away unscathed. If you’re familiar with the traffic in the Atlanta metropolitan area, you know it can be treacherous. I had to take a step or two back as I realized how close I came to losing my

only son and oldest child. As I looked at the pictures of the demolished car, I knew it truly was God’s will that he walked away without a scratch. If someone would have shown those pictures to me and asked how I thought the driver fared, I would have surely said the driver didn’t make it.

After speaking to my son, I recognized how this accident could have been avoided. He was on his way to visit his great aunt, who was terminally ill in a hospital 60 miles away. He had just gotten off work after working a 12-hour shift. Additionally, he’d had trouble sleeping the night before.

An accident waiting to happen

My son learned a lesson on the risks of driving while fatigued and distraught. As a father who had always talked to his kids, I was initially disappointed and upset. I asked myself, “Why hadn’t he listened to what I said over the years? Why must he learn everything the hard way?”

After I beat myself up on these questions and many more, I realized my frustration was not only with my son. In my

Ground





20-plus years on active duty, I had briefed or counseled countless Airmen before the weekend. I had a policy of safety briefings every Friday — and not just on three-day or holiday weekends. Occasionally, inevitably, I would get a phone call over the weekend or the next duty day that Airman, Sgt. or Lt. John or Jane Doe was involved in an accident over the weekend. The news would be heartbreaking and heartrending.

In 2007, the National Highway Traffic Safety Administration reported 41,059 deaths were attributed to traffic accidents, while injuries totaled 2,491,000. The Federal Highway Administration reported 12,998 fatalities were related to alcohol impairment, while an estimated 10 to 20 percent of accidents were attributed to fatigue and mental stress. More than half of these deaths and injuries could have been avoided if motorists had calculated the risk of driving while impaired, fatigued, or stressed.

Accidents waiting to happen

What can we do to decrease these numbers? “Continue to educate and emphasize safety and risk management,” is the easy answer. It’s also the right answer. NHTSA’s Annual Assessment of Motor Vehicle Traffic Crash Fatalities and People Injured showed a 3.9 percent decline in motor vehicle deaths, from 42,708 in 2006 to 41,059 in 2007. This reduction is the largest in number and percentage of deaths since 1992. It also represents the fifth consecutive year that passenger-car occupant fatalities have declined, and the second

consecutive year for light-truck occupant fatalities. NHTSA reported 2007 was the eighth consecutive year of reduced numbers of people injured in motor vehicle mishaps.

Unfortunately, motorcyclist fatalities and injuries continued to increase for the 10th consecutive year. These statistics are attributed to motorcyclists taking too many risks, and in some cases, having no regard for their safety or the safety of others.

However, the silver lining in the declining statistics is motorists are listening and adhering to traffic safety education and risk management. The vigilance of designated-driver programs, wearing seat belts, taking the keys, and catch-a-cab initiatives are saving lives and decreasing the number of motor vehicle injuries.

My son was fortunate to be wearing his seat belt. The state trooper on the scene told him it probably saved his life. It was some consolation to me that my son had listened to something I said.

Yes, there are still accidents waiting to happen. Drivers should mitigate the risk of turning that key when they are fatigued, stressed, or alcohol-impaired, by choosing not to get behind the wheel. From the continued decline in motor vehicle fatalities and injuries, I think the easy answer is working. Continual education that further emphasizes safety and risk management is the key to making sure your co-worker, friend or loved one is not the next accident waiting to happen. 🚗

Up the Creek – With a Paddle

ED SCOTT

Ground Safety Division
Air Force Safety Center
Kirtland AFB, N.M.

If you're a bass fisherman, you've probably heard of Lake Barkley, Tenn. This 118-mile-long lake has many "fingers," long extensions of water that are home to some world-class bass fishing. One spring, Bob, a co-worker, native Tennessean, and fanatic bass fisherman, offered to show me some of his "sweet" spots (and maybe he didn't want to be out in his boat alone — hey, we were safety guys). I think he also wanted to show me his new bass boat with the BIG motor. Bob was persuasive enough that I took two weeks off work for a fishing trip he said I'd never forget. He was right.

After unloading the boat into the lake and stowing our gear, Bob pushed in the power, and the boat lurched forward fast enough to make me hold onto my hat. Good thing, too, as my hat (and SPF 50 sunscreen) were put to good use that day. Bob got a good laugh out of our roles that day — he as the Skipper and me as Gilligan. I had to admit it was a fast boat. In less than an hour, we were casting for the big ones! Sunny and warm at first, but things cooled down a bit when the clouds rolled in later in the day.

Bob was right about the bass! Big ones! After a fantastic day fishing, it was nearing sundown and time to head back for a grilled fish dinner. But it didn't happen. When

U.S. Air Force photo by Master Sgt. Jack Braden



Bob tried to start the motor, it wouldn't start, and he continued until the battery died trying. The trolling motor battery was drained, too. While trying to figure out why the motor wouldn't start, we also discovered the flashlight batteries were nearly dead. That three-second check we had done didn't tell us much about how good last year's batteries were. (Ask your father about non-alkaline batteries.) I'll add that it's difficult to fix a motor when your only tools are an anchor and a fire extinguisher.

So, we were stranded, probably miles from the main channel and other boats, with only frogs and an occasional owl to keep us company. The situation was not hopeless, however, as we did have a paddle. Yes, ONE paddle, used primarily to push away from docks, stumps and other obstacles. While Bob liked his toys, age and cigarettes had taken their toll, and he could not do strenuous activity. As the paddle obviously fit my hands, I quickly discovered there was a big difference between paddling a canoe at summer camp in daylight and a bass boat in a small, dark ocean.



U.S. Air Force photo by Senior Airman Becky J. LaRaia

Without a map or compass (GPS didn't exist), we had to feel our way along the shore. Although Bob claimed he knew the lake "like the back of my hand," that only applied in the daylight, and a big lake looks a lot different by dim flashlight on a dark night. Obviously, we couldn't hike over the hills in the dark. We would have gotten lost for sure. So, Bob held the flashlight while I paddled the boat. Fortunately, we didn't run across any snakes. A snake in the boat in the dark would have been a good time only for the snake. After several very long, weary hours of paddling, we finally reached the main part of the lake. A short time later, we heard another boat whose



U.S. Air Force photo by Master Sgt. Jack Braden

owner was kind enough to tow us the remaining miles to the docks.

I could tell Bob felt bad about the situation, as he offered to buy dinner. I was too tired to argue, so I let him.

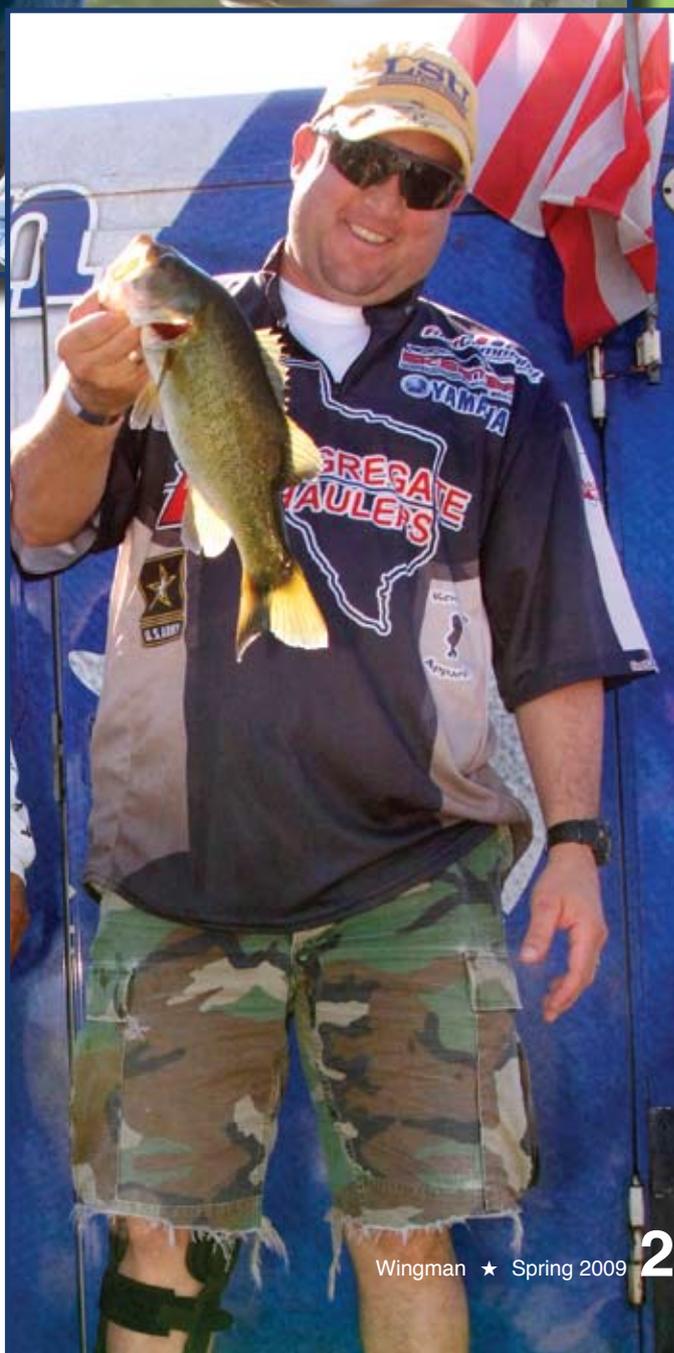
The next day, with the boat motor not working, we fished from the docks for awhile and went home a few days early. Bob then had the BIG motor repaired, got a CB radio (ask your father), AND he bought a new 25-horsepower outboard motor as a backup, just in case the BIG motor didn't start.

At least the local papers didn't hear about us. Two professional safety guys getting lost on the lake would not look good. Especially if one was a Tennessee native.

Yes, we went fishing again, but, unless BOTH motors were working, the boat never left the dock. We made sure we had a map of the lake and that we knew where we were, a compass, fresh batteries in the flashlights, spare batteries, and plenty of drinking water. We also told someone else about our plans and when we'd return, so potential rescuers would know where to look for us!

While being "up the creek without a paddle" is bad, you really don't want to be "up the creek with a paddle," either. I learned that on the fishing trip I'd never forget. 🚣

U.S. Air Force photo by Michael Tolzmann



The Meltdown

GARY COLE

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Ahhhh, spring is finally here! Just when you thought the Earth was going into a permanent deep freeze and you'd be waving goodbye to the sun for the last time as it dipped below the western horizon, the trees start budding and green starts emerging from the ground. It seems almost overnight the sun came back from its rest, and you can actually start to feel the warmth of its rays as it peeks out of the clouds. The snow has melted, and now you can actually drive on dry roads and walk on dry sidewalks. You can start letting down those winter guards, start walking around outside with a purpose, and go back to your old driving habits: speeding down the freeway 2 feet from the bumper in front of you, taking corners on two wheels, and swerving in and out of traffic, all while texting your girl and changing a CD. Nothing like the onset of spring!

"Not so fast, my friend," as football analyst Lee Corso would say. One killer's still lurking: black ice, Old Man Winter's parting shot. Daytime temperatures create melting snow and running water, but nighttime temperatures and even daytime shadows can turn innocent water into deadly, invisible ice.

What's a body to do? For starters, you can try slowing down. While driving, if there's water on the road and the temperature is in the 30s or below, assume deadly ice is below. You need to revert to your winter driving habits: slowing down, anticipating stops and turns, and avoiding sudden changes in direction or speed. Pay particular attention to bridges and overpasses, where the heat from the ground can't keep water from freezing. If you're driving in mountains, increase that vigilance tenfold. The temperatures can be well above freezing and still present ice hazards due to lingering shadows and cooler ground temperatures.

Though not as critical as sliding off the road at 80 mph

in your car, walking on ice can lead to severe injuries, as well. Winter walking techniques should still be fresh in your mind, but let's cover a few, in case spring fever has destroyed some of your memory cells:

- Use short, shuffling steps that keep the flats of your feet in constant contact with the ground.
- Maintain your center of balance. Don't carry so many items that you can't instantly swing your arms wildly around to keep from falling. Doing so will amuse onlookers to no end, and we could use some comic relief. Don't keep your hands in your pockets, for the same reason.
- Wear the right footwear to keep you walking upright.

Again, be ready to revert to these techniques in an instant when the temperatures are low, no matter how innocent the patch of "water" looks.

Finally, one factor seldom gets the attention it needs: where you pile the snow during the winter. Melting snow has presented hazardous ice conditions for weeks on end, simply because snow-removal teams piled snow on the uphill side of parking lots and walkways. Long after the final snowfall, banks of snow innocently melt during the day, but at night leave an ice rink for employees to walk across in the mornings. Most of these conditions are completely preventable; simply relocate the snow bank to lower or less-hazardous locations. If you don't like that idea, work with your snow-removal team during the winter to coordinate better methods. Supervisors, don't just stand at your office window and watch a parade of walking wounded go to the clinic every morning. Get out and survey the big picture — take action to remove the hazards, if possible. Who knows? You might save another noggin from a knot or serious injury.

This article should help to keep you focused on the dangers of black ice, both in driving and walking. Don't ignore your winter precautions just because you feel your first ray of springtime sun. Don't let Old Man Winter get the last laugh at your expense. ☛

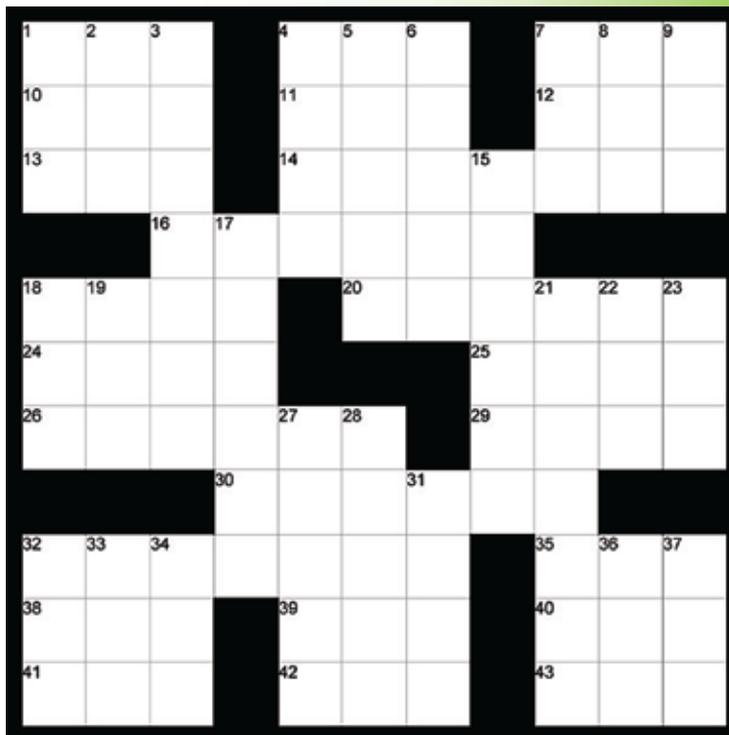
Drive Safely

CAPT. TONY WICKMAN
USAF Public Affairs
Ramstein AB, Germany



ACROSS

1. “___ Sam”; Sean Penn movie
4. USAF commissioning source
7. ___ High; former USAF slogan
10. Number cruncher, in brief
11. Music genre
12. USAF E-4
13. Among others, in brief
14. Winter driving need
16. Guarantee
18. “Mamma Mia” uses this ‘70s band’s tunes
20. Type of weather to avoid when driving
24. Tim Conway character
25. Assert
26. Shirt part
29. Complete
30. Car device indicating turn
32. New Zealand reptile
35. Energy
38. Cleopatra killer
39. Bulgarian money
40. Epoch
41. Pollen collector
42. Pig’s pen
43. Tree product



DOWN

1. Road hazard
2. Prone
3. Ghastly
4. Spheres
5. Anklebone
6. Needed when you get a flat tire
7. Query
8. Fury
9. Rug
15. State home to Nellis AFB
17. Practicing good habits could make you the ___ driver on the road
18. Commercials
19. Manute ___; formerly tallest NBA player
21. Changes over time
22. Oscar-winning director ___ Howard
23. Female sheep
27. Glass containers
28. Wading bird
31. Seafaring service
32. Bill
33. Employ
34. Mock
36. Gershwin or Eaker
37. Driving tool to navigate by



DRIVING SAFETY



Ground

CHIEF MASTER SGT. ROBBIE BOGARD

Air Force Safety Center
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In my 24 years in the Air Force, I've received many safety briefings, and provided many, many more. As a safety investigator, I've examined many fatal mishaps in which common threads all too often emerge. Although our traffic-related fatal mishap numbers are decreasing across

the Air Force, the common threads remain.

While recently reviewing several traffic-related fatal mishap reports, certain phrases and sentences alarmed me. These frequently appear in police reports across the country, and similar words have appeared in mishap reports since the beginning of the Air Force Mishap Prevention Program.

Our vehicles are getting safer every year, via such safety features as air bags, electronic stability control, anti-lock brakes, and more, yet fatal mishaps continue every day in our society. Below are some tips to prevent mishaps, as well as highlights (in *italics*) of findings in recent Air Force traffic fatalities.

Personal Protective Equipment

PPE will only function if used. Year after year, people continue to die because they were unbelted in cars or did not wear helmets on motorcycles. While PPE won't make you invincible, it's proven to significantly reduce your chances of injuries in a mishap.

... further investigation revealed that although a helmet was attached to the motorcycle, operator was not wearing a helmet. Alcohol was a factor.

... passenger was not wearing a seat belt, was ejected, and sustained fatal injuries.

... it is suspected the operator was complacent and did not securely fasten the chin straps on the helmet. The helmet came off when operator impacted the ground.

Operating Under the Influence

I don't think there's anyone who, in a sober state of mind, doubts that driving under the influence of alcohol and/or drugs is a bad thing. However, both alcohol and drugs impair judgment, so what once seemed like a bad idea may now not seem so bad, although it still is. Take the time to plan your activities, so you too don't end up hurting yourself or somebody else in a moment of bad judgment.

... operator's blood alcohol concentration was .24.

... after drinking for approximately 5 hours, operator elected to drive his vehicle while intoxicated, with three passengers.

... operator was administered a posthumous urine and alcohol screening, which revealed a blood alcohol content of .31 and an extremely high presence of marijuana equaling .23 mg/l.

Speed

Advances in technology have allowed recent automobiles and motorcycles to perform to levels unthinkable just 20 years ago. Modern cars also handle better and are insulated from exterior noise so you now feel as though you are in a powerful, safe cocoon. Although modern technology has improved our vehicles, the laws of physics have remained constant. An unsafe speed is an unsafe speed, often with tragic results. Slow down out there.

... vehicle went into the dip, became airborne and bounced, scraping the road surface at least twice before its left rear tire departed the road surface into the mud and grass.

... as operator leaned into the curve, the right foot peg made contact with the road. Operator's right foot slipped off of the foot peg and snagged the ground. The peg and foot contact with the ground caused vehicle to stand up out of the leaning position and wobble out of control.

... operator was attempting to change lanes to squeeze between a PMV-4W in the right lane and

another PMV-4W in the left lane, when he struck the rear of the PMV-4W in the right lane.

... through police investigative techniques, police traffic investigators calculated vehicle's speed to be between 91 and 106 miles per hour (in a 55-mph zone) at the time of the mishap.

... although a helmet was attached to the motorcycle, operator was not wearing a helmet

player, and more. Distractions while driving can prove to be deadly.

... at the time of the mishap, operator was talking on a cell phone to best friend.

Distractions

I'm sure all of us have been distracted while driving. While modern technology has made cars faster and safer, it has also placed information overload on the driver. This includes programming global positioning systems, texting on your mobile phone, selecting a song on your MP3

Attitude

Every one of us is the best driver in the world, while everyone else on the road falls into the "idiot" category. We all have different attitudes about driving, and each of us needs to examine our own. For most of us, driving is the most dangerous thing we do.

... operator's license from his home of record was suspended six times and revoked three times

... also considered a factor was "overconfidence," which is defined as "a factor when the individual overvalues or overestimates personal capability, and creates an unsafe condition." Operator's "overconfidence" in driving capability led to decision to drive at an excessive speed.

... operator's license from his home of record was suspended six times and revoked three times.

Driving is a very serious, very risky business. Please take your time, slow down, share the road, and have a good attitude when it comes to your driving. The life you save may be your own. 

Safety Shorts



Spring Safety

Now that Old Man Winter has taken his yearly sabbatical, it's time to put those cold, dark days of winter behind us. It's also time to get down to the business of spring. To avoid that unpleasant visit and long wait at the emergency room, here's some information that may make you pay more attention to those safety precautions you know are out there, but may not have captured your attention.

While working around the house can be very rewarding, hundreds of thousands of injuries occur each year as a result of mishaps related to electric tools, ladders and lawn mowers. About 220,000 people make emergency room visits due to ladder mishaps each year. More than 87,000 people are treated in hospital emergency rooms for lawn-mower injuries or are casualties of burns, dismemberment, electric shock, falls, and thrown objects. Another 76,000 people sustain injuries from power garden tools, such as trimmers, lawn edgers and pruners.

Know the task you're accomplishing, wear appropriate safety gear, let out ladders completely before stepping on the first rung, know your environment, and consider the risks before you perform a new task.

(Source: Underwriters Laboratories, Inc.)

New Public Pool and Spa Requirement

On Dec. 19, 2007, President Bush signed into law the Virginia Graeme Baker Pool and Spa Safety Act. All public pools and spas must have installed ASME/ANSI A112.19.8-2007-compliant drain covers before Dec. 20,

2008. Other suction outlets in the pools, such as slides, spray-feature suction outlets, and skimmer equalizer lines, must also conform.

These federal requirements are enforced by the Consumer Product Safety Commission. These changes may require modification to the various drains and suction systems of pools and spas.

Year-round pools had until Dec. 19, 2008 to comply with the new requirements, while seasonal pools closed during the winter must comply by their opening day. Additional information is available at www.cpsc.gov/pssa.pdf.

(Source: Consumer Product Safety Commission)

Safety Idea

The Anti-Terrorism Advisory Council of the Eastern District of Wisconsin has come up with a great idea that may save lives or prevent assaults. Put your car keys beside your bed at night. If you hear a noise outside your home, or someone trying to get into your house, press the "panic button" for your car. The alarm will go off, and the horn will continue to sound until either you turn it off or the car battery dies.

If your car alarm goes off when someone is trying to break into your house, odds are the perpetrator won't stick around. No criminal wants to take the chance that the neighbors will look out the window and call police.

Think of this — when you're getting in or out of your vehicle, you already have a security alarm system in your hand. These alarms have very good range and can usually turn the car alarm on from most places in your house. ■

(Source: Department of Justice)



Deployed Defenders

CAPT. JASON SLEGER

386th Expeditionary Security Forces Squadron
Balad AB, Iraq

Security Forces excel at a variety of mission sets, which vary in differing degrees from home station to the deployed environment. Many Air Force career fields deploy and are able to rely heavily on experience gained from their in-garrison mission. Security Forces are different, in that many of their deployed missions are executed outside the wire and involve direct interaction with locals, a decisively different mission from the one executed at home station.

In-garrison missions require Security Forces to emphasize internal security functions, while local law enforcement officials provide external security. Gates, internal patrols, and sensor fields are important, but are all defense measures. This concept works well in a nonpermissive environment, such as the United States, but it fails to properly secure an installation when terrorist activity permissively exists near the base, the base security zone. Defensive systems are useful while reacting to an attack, and if robust enough, may encourage an adversary to move to an easier target. While a strong defense is vital, it's not enough. Preventing an attack and the first defense-in-depth layer for an air base begins outside the wire, with Security Force patrols interacting with the indigenous population.

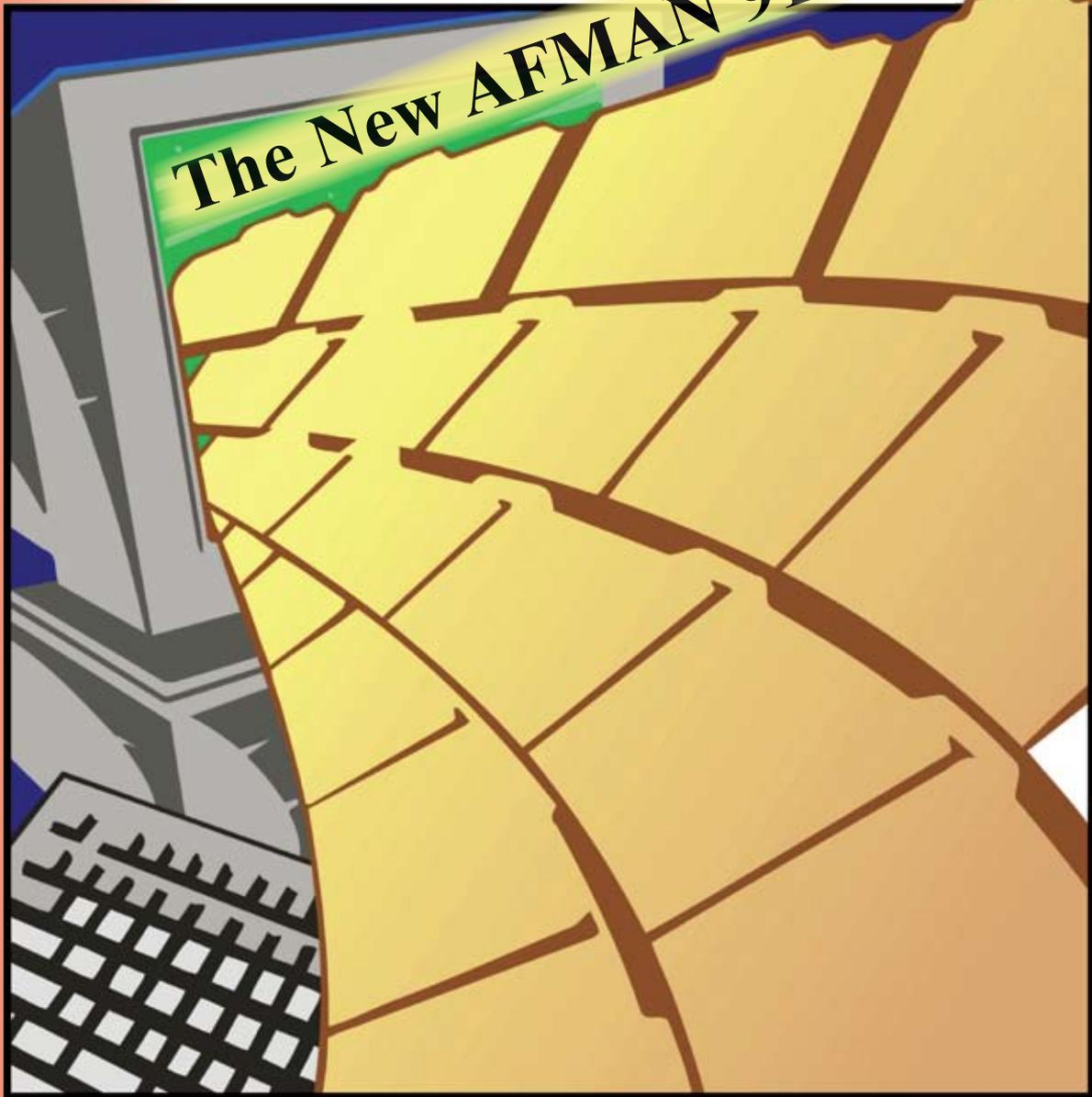
Law-enforcement training uniquely qualifies Security

Forces Airmen to perform and excel while conducting outside-the-wire missions. Community policing is an aspect of the career field that can translate to the deployed environment. However, policing dependents and military members does contain certain differences from building rapport and developing relationships with other cultures. For successful counterintelligence, surveillance and security operations within the BSZ, staff must be chosen carefully, trained by cultural advisers, and supported by other units, such as Air Force Office of Special Investigations and Intelligence.

There are several reasons why Security Forces are essential for outside-the-wire operations. AFOSI is lead on executing counterintelligence missions, but they are and will always be limited by manpower. Furthermore, they cannot maintain a 24/7 presence within the BSZ; Security Forces can. AFOSI can benefit greatly from using Security Forces and its contacts. Additionally, Security Forces can easily develop relationships with other units on the installation, and draw in expertise to be used outside the wire. An example is the use of force protection specialists charged with third-country national escort duties. They are rich in talent, have an incredible array of experiences, and may hold other surprises, such as untapped language skills.

When properly planned, supported, and executed, outside-the-wire operations can provide a wealth of intelligence, bridge vast cultural gaps, and serve as an offensive means to protect an air base. Preparation of the battlefield is vital, and when career fields work together, outside-the-wire operations will save lives and resources. 

The New AFMAN 91-201



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By now, most in the weapons safety community have discovered a completely revised AFMAN 91-201, *Explosives Safety Standard*, on the Air Force's e-publishing Web site. This manual, dated Nov. 17, 2008, is the culmination of a six-year rewrite effort, and represents the hard work and expertise of countless weapons safety managers, past and present. For those who have begun the daunting task of converting your thought processes to match the flow and philosophy of the new manual, you may have concluded that there are some serious

growing pains awaiting us, even to the extent of wondering why such a drastic change was needed. After all, the previous manual had served us well for more than seven years. Most weapons safety managers were trained in its use, had acquired considerable experience in its application, and, most importantly, had a personal copy, complete with notes, tabs, and highlighted references. As good as the old manual was, however, its service life had long since expired.

The previous manual was approved for use Oct. 18, 2001, for implementing requirements of DoD 6055.9-Std, *DoD Ammunition and Explosives Safety Standards*. The chosen format for the AFMAN, unfortunately, bore no resemblance to the DoD standard, and created significant difficulties when cross-referencing between

the two. If clarification of the AFMAN was needed, weapons safety managers had to expend considerable time and effort in locating and interpreting the parent guidance. This lack of standardization also made it difficult to incorporate changes from the DoD standard into the AFMAN. Consequently, 11 policy memoranda were issued over the last five years to keep pace with the changing criteria, but were never successfully incorporated into the AFMAN in the form of an interim change. There were also instances where the guidance provided was not fully supported by DoD standards. For these and other reasons, a new manual was desperately needed. We wanted a manual that would fully implement all published DoD guidance, have the same look and feel of the parent DoD standard, and correct interpretation deficiencies by using the same language of the DoD standard as much as possible. By following these guidelines, the new manual would be easier to use and maintain.

What's so different in the new AFMAN? The most obvious improvement is the number of chapters and verbiage used. The previous AFMAN used only seven chapters to incorporate all DoD and USAF-specific criteria. The new manual has 14 chapters. The additional chapters provide a more logical separation for individual topics and align with the DoD standard concerning content, but not necessarily chapter numbers. For example, the first four chapters of the new manual closely match the first four chapters of the DoD standard. Our manual does, however, differ in the remaining chapters, such as Quantity-Distance and Siting criteria, now in Chapter 12 of the AFMAN, are in Chapter 9 in the DoD standard. This disparity was necessary to allow USAF-specific guidance to be placed in more logical locations.

Another difference is the new Q-D tables in Chapter 12. The old Table 3.3 has been broken into Tables 12.1, 12.2, and 12.3. These tables are Air Force-unique and are a summation of applicable DoD tables, formatted into the most common paired relationships on our installations. Most of the remaining tables, as well as the language used throughout, were incorporated directly from the DoD standard. This makes it easier to maintain the currency of our manual, and also reduces interpretation errors in the criteria.

Although these changes are probably the most noticeable, we should mention others. For example, considerable time and effort has been devoted to improving the guidance presented in areas such as electromagnetic radiation, contingency operations, and Q-D separation criteria for hardened aircraft shelters.

Even with all the changes in format and improvements in guidance provided, a tremendous amount of work is still ahead. This manual will never become dormant, as in the past. For this reason, interim change one is already in the making.

Interim change one is tentatively scheduled to begin in the spring of 2009 and should be published by the end of the year. So far, we have more than 32 items listed for review. While many are basic clean-up chores for the guidance provided, others are intended to improve the usefulness of the manual. For example, many have suggested we include an attachment containing an explosives site plan review checklist to increase the accuracy of ESPs submitted. This checklist will contain review areas, such as the transmittal letter, AF Form 943, maps and drawings, exceptions, and additional coordination requirements, when applicable. The checklist and all other change items will be vetted through the weapons safety community before inclusion into the final interim change. The interim change coordination process will be similar to the process used to coordinate the draft AFMAN, and is intended to improve the final product and ease the transition to the new guidance with as little pain as possible.

Will there be growing pains? Absolutely. For those who've been around long enough, the transition to the new AFMAN will remind them of when we changed from the old AFR 127-100.

We hope the effort expended during the coordination process will alleviate the pain of change, but we still expect a steep learning curve for the next few months. Remember, this is our manual. It is a living document that will continue to change and improve in the years to come. If you have suggestions, make them known. In the end, this AFMAN will only be as good as the effort we put into it. ♀

Recent Remedial Action Success on BOMARC Nuclear Weapons Accident Site

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Introduction

In a 2006 article, we addressed the legacy of Air Force nuclear weapons maintenance and accidents (see *Weapons Journal*, Vol. 25, No. 2). This article focuses on recent success in the environmental restoration of the 1960 Boeing Michigan Aeronautical Research Center nuclear weapons accident site. Among the continental U.S. nuclear weapons accident sites, BOMARC is the only one that had the release of weapons-grade plutonium, and represents a major milestone among Department of Defense restoration activities involving radiological contaminants.

Nuclear Weapons Accident History

In the history of the U.S. nuclear weapons program, 32 accidents have been categorized as “broken arrows.” A broken arrow is “any incident that includes the seizure, theft, loss, or accidental destruction of a nuclear device.” Twenty-nine occurred from 1950 to 1980 while the Air Force had custody of the weapons. Some occurred overseas, but most were in CONUS. Among the CONUS sites, the June 7, 1960 accident involving a nuclear warhead on a BOMARC missile left the largest amount of radioactive residual material. The residual radioactivity left from this accident is greater than the residual from all other CONUS accidents combined, excluding gaseous emissions. The two primary causes for release of radioactive material from nuclear weapons accidents were fire or detonation of high explosives in the warhead. Some nuclear weapons accident sites did not release radioactive material, with the most notable being the Damascus, Ark. accident, where a Titan II missile exploded and blew the missile silo cover off. The warhead was damaged but intact. That was the most recent US nuclear accident. Areas affected from CONUS accident sites are on current and former Air Force installations and private lands.

Background on the BOMARC Accident

On June 7, 1960, an explosion in a helium tank took place in Shelter 204, causing a fire in a nuclear-tipped, liquid-fueled BOMARC missile at McGuire AFB, N.J. The fire burned uninhibited for about 30 minutes. Facility staff conducted fire-fighting activities for 15 hours, using water as a suppressant. As a result of using the water,

materials from the shelter flowed under the front shelter doors, down the asphalt apron and street between the row of shelters, and into the drainage ditch leading outside the site-boundary fence. Figure 1 shows a photograph of the affected shelter, while Figure 2 shows an aerial photograph of the site, illustrating the flow pattern of run-off water. The primary radiological material released was WGP, with much lower levels of radioactivity from uranium. The primary radiations emitted from WGP are α -particles, which have very limited penetration range in materials. WGP released to the environment primarily presents internal radiation hazards, requiring the material to be inhaled, ingested or internalized through wounds. External radiation from dispersed WGP is insignificant.



Figure 1

Initial Remedial Actions

The day after the accident, teams conducted air sampling at the site, as well as radiological surveys of the shelter interiors, concrete pad, asphalt road in front of the shelter, and soil areas. Specialized instruments like the field instrument for detection of low-energy radiations (FIDLER) were not available. Therefore, contamination surveys were accomplished with the Eberline PAC-1S α -scintillation meter/probe combination, which uses the same detection technology as the modern ADM-300 and its α -probe. Warhead debris inside the shelter was placed in plastic bags, sealed in cans, and shipped to the Atomic Energy Commission, part of which is now the Department of Energy. Contamination on the concrete pad and asphalt was washed down with water and allowed to dry. On June 10, 1960, teams applied 110 gallons of paint to contaminated concrete surfaces on the interior and front of the shelter, and to contaminated asphalt areas. The teams accomplished this to fix (retain) contaminated material and thereby limit translocation of contamination to other areas and reduce airborne re-suspension. Later that year, a team poured a four-inch steel-reinforced concrete cover over the apron, covering an area from Shelter 208 to the drainage ditch area, just west of the last shelter in the



Figure 2

row. They also poured asphalt over contaminated soil areas in the drainage area next to the pad between the rows of shelters. These efforts allowed continued use of the site without the requirement for personal protective equipment. The site ceased operational use in 1972.

Restoration Begins

From the late 1960s until the late 1980s, the USAF Radiological Health and the Occupational and Environmental Health Laboratories primarily conducted periodic monitoring. Most of these surveys differentiated between affected and nonaffected areas based on measurements with FIDLERs, used soil samples to assess vertical spread of the contamination in soils, and assessed the integrity of engineering controls. In the mid-1980s, the public and state of New Jersey became interested in the Air Force program to remediate the site, which initiated activities under the Installation Restoration Program. The AF chose to remediate the site using the Comprehensive Environmental Response, Compensation, and Liability Act process. In 1989, the AF initiated a remedial action/feasibility study, completing the study in 1992. The AF published a record of decision, deciding to implement the preferred option of excavation of plutonium-contaminated soil and off-site disposal. However, since a suitable disposal site was not available, remedial actions were delayed until 1995, when the Envirocare site in Utah could accept plutonium waste. In 1995 and 1997, the AF conducted two characterization efforts to better define the



Figure 3

lateral and vertical extent of the contamination. Figure 3 shows the areas with the greatest degree of contamination in orange. For most areas, contamination above the remedial action criterion was limited to 2-4 feet. An area in front of Shelter 204 had contamination above the criterion at depths of 16 feet.

Restoration of Primary Contaminated Areas

In 1999, Chem-Nuclear Systems and IT Corporation contracted to perform the clean-up. Public concern over the potential for transport of waste soils and debris by truck prompted a delay in the remedial efforts until transport issues were resolved. Lakehurst Naval Air and Engineering Station and Fort Dix eventually negotiated a truck/rail transport option that afforded truck transport of metal waste containers completely on DoD property before their transfer to rail cars at a newly constructed rail spur on Lakehurst NAES. Local public officials and the N.J. Department of Environmental Protection deemed the option acceptable. Remediation started in March 2002, with an initial concentration on the demolition of Shelter 204 and above-grade parts of Shelters 202 and 206. Figure 4 shows an aerial photograph of activities.



Figure 4

Figure 5 contains a photograph of shelter demolition, while Figure 6 is of concrete pad demolition and excavation of contaminated soils between the shelters. The last area remediated was the drainage ditch area (Figure 7). From mobilization until completion, restoration of the primary areas took about 26 months. It took 65 separate rail shipments to dispose of about 22,000 cubic yards of contaminated soil and debris. Teams conducted final site status radiological surveys on 9.5 acres of the facility to ensure that the remedial actions met the goals, with more than 1,200 confirmatory soil samples.

Restoration of Secondary Contaminated Areas

In 1998, the AF Safety Center and Air Mobility Command agreed that evaluation of areas outside the primary contaminated area would be best accomplished after teams removed the greatest source of contamination. First, there were some concerns that removal actions on the more highly contaminated areas could cross-contaminate adjacent areas that were previously uncontaminated. Second, there was some general belief that the secondary contaminated areas would require minor soil removal based on historical information. Lastly, there were some concerns over the discrete nature of the contaminant and the ability to effectively survey these areas. To address this, before final survey and remedial actions, groups conducted limited-scope characterization efforts.

Cabrera Services, Inc. conducted a field investigation of secondary areas, with specific interest in discrete particle characteristics. Generally, many of the secondary areas had evidence of discrete particles dominating the contamination. Figure 8 shows a site plot, noting locations of discrete particles removed during investigation and remedial action. Most locations of the contamination in the secondary areas were attributed to vehicle and pedestrian activity during the original accident response. Some redistribution of contamination occurred after the accident, since the 300-series shelters were constructed after the accident and contained some minor contamination in a few exterior areas. Most of the contamination being in discrete particle form has a significant impact on projected risks.



Figure 5



Figure 6



Figure 7



Figure 8

Most of the particles were physically too large to be suspended in the air by wind and site activities. For suspended particles, physically they are too large to be inhaled and deposited in sensitive parts of the lung. Figure 9 contains a scanning electron microscopy image of a particle removed and evaluated by the University of Nevada, Las Vegas. From the finer zoom, the surface has evident pore and fracture features that are attributable to the rapid cooling of the particle during initial formation (Cabrera, 2008). Retention of these features after more than 45 years in the environment is a testament to their long-term stability. Teams completed remedial efforts and final status surveys of secondary contaminated areas in 2007. They removed and disposed of 64 cubic yards of contaminated soils. AFSC estimated that the contamination removed from secondary contaminated areas had about 0.1 percent of the total contamination left on-site post-accident.

The Safety Center’s Role

Under AFPD 91-1, *Nuclear Weapons and Systems Surety*, and AFI 40-201, *Managing Radioactive Materials in the U.S. Air Force*, the AFSC Weapons Safety Division has responsibility for regulatory oversight on radioactive materials associated with nuclear weapons accidents and maintenance activities. AFSC has also provided technical assistance to AMC and the 305th Air Mobility Wing, McGuire AFB, N.J., during preparation and remediation.

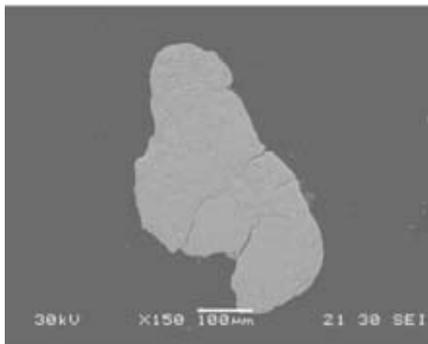
Final Site Closure

Completion of the record-of-decision-preferred option is almost complete, pending a couple of minor tasks. A minor remedial action on pits in 11 shelters near the former location of Shelter 204 was conducted in the fall/winter of 2008-2009. This action will remove hydraulic fluids from launcher systems and low-level radiological contamination from the pits. A draft final status report for shelter interiors is undergoing review by the state of New Jersey, and the 305 AMW. Pending successful completion of these actions, the AF should be able to issue response-complete documentation in 2009.

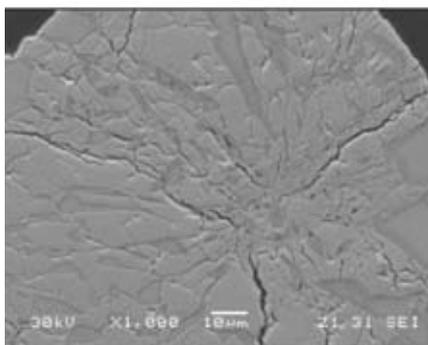
Acknowledgements

The successful execution of this remedial action project has been a partnership among many parties, including: HQ AMC/A7C, Scott AFB, Ill.; 305 AMW, McGuire AFB, N.J.; Fort Dix, U.S. Army; Lakehurst Naval and Engineering Station, U.S. Navy; state of New Jersey Department of Environmental Protection; the USAF School of Aerospace Medicine, Occupational and Environmental Health Department; USAF Center for Engineering and Environment; Duratek Services, Inc. (now part of Energy Solutions); Shaw Environmental and Infrastructure; and Cabrera Services, Inc.

Figure 9. Scanning Electron Microscopy Image, 0.8 $\mu\text{Ci } ^{239}\text{Pu} + ^{240}\text{Pu}$ Particle Evaluated by Radiochemistry Research Group, Harry Reid Center and Department of Chemistry, University of Nevada, Las Vegas, Nev.



a. SEI x 150



b. SEI x 1000

AFSC Weapons Safety Division Chief Retires



Col. Barry Olson retired Oct. 24, 2008, after 28 years of Air Force service. For the past four years, he served as the Chief of Weapons Safety at the Air Force Safety Center, where he was responsible for weapons safety certification, testing and mishap-prevention programs for all nuclear, conventional and directed-energy weapons systems, and overseeing the Air Force nuclear surety programs. Among his assignments, Col. Olson served as officer in charge of Training and Resources, 2701st Explosive Ordnance Disposal Squadron, at Hill AFB, Utah; operations officer of the Utah Test and Training Range; lead nuclear surety inspector, Air Force Logistics Command; chief, EOD Flight, Riyadh Air Base, Saudi Arabia; and OIC, 43rd Aircraft Maintenance Unit, 21st Fighter Wing, Elmendorf AFB, Alaska. He also served as chief of Nuclear Stockpile Maintenance

at the Defense Threat Reduction Agency, and commander of the 649th Munitions Squadron at Hill AFB, Utah. Before assuming his position at the Safety Center, Col. Olson was deputy director for logistics inspections at the Air Force Inspection Agency.

His decorations include the Legion of Merit, Bronze Star Medal, Meritorious Service Medal with three oak leaf clusters, Air Force Commendation Medal with oak leaf cluster, Army Commendation Medal, Air Force Achievement Medal with oak leaf cluster, National Defense Service Medal with bronze star, Southwest Asia Service Medal with three campaign stars, Global War on Terrorism Service Medal, Humanitarian Service Medal, and two Kuwait Liberation Medals — one each from Saudi Arabia and Kuwait. 🦅

U.S. Air Force photo by Dennis Carlson

Space Safety Division in Review

LT. COL. ROBERT McBRIDE

Air Force Safety Center
Space Safety Division
Kirtland AFB, N.M.

Space can never be the sole province of any nation. The immensity and the unbounded character of space prohibits claim by any entity to any region or segment of space. The exploration of space, discovering new worlds, and reaching out to the heavens to learn about the universe — and ourselves — has been an aspiration of man from the dawn of civilization. One can only imagine what went through the minds of early pioneers, such as Copernicus and Galileo. The dreams of man were realized with the dawn of the Space Age. Sputnik's journey into Earth's orbit in 1957 proved we could use space for our purposes. The launch of Telstar 1 in 1962 proved there was a business case for using space. Since then, the space community has continued to grow, innovate, and expand. However, the human endeavor and its unprecedented success in exploring and commercializing space have come about at a tremendous cost to the space environment.

Fifty years of space operations has inundated the space around Earth with vast amounts of man-made debris. The U.S. Space Surveillance Network currently tracks more than 13,000 objects 10 centimeters or larger.



Photos courtesy of NASA



Operational spacecraft comprise only 6 percent of total. SSN estimates that there are more than 300,000 objects between 1 and 10 cm in Earth orbit, which it cannot track. Traveling more than 7 kilometers per second, a 1-cm object has enough energy to be potentially fatal to a spacecraft. Consider two recent events that have brought the issue of space debris to public attention.

On Feb. 11, 2007, China tested a new direct-ascent, anti-satellite system, the SC-19. The test destroyed a Chinese FY-1C weather satellite in a 537-nautical-mile sun-synchronous polar orbit. The test was the largest recorded creation of space debris in history. It created at least 2,317 pieces of trackable size (golf-ball size and larger), increasing total number of tracked objects in Earth orbit by more than 22 percent. NASA estimates that the number of debris pieces larger than 1 cm is greater than 35,000. The debris-cloud generated by the impact extended from less than 125 miles to more than 2,292 miles, encompassing all of low-Earth orbit. Most of the debris has mean altitudes of 528 miles or greater, which means most will remain in orbit for more than 20 years.

On Feb. 21, 2008, the U.S. Missile Defense Agency intercepted a failed National Reconnaissance Office satellite, designated USA 193, using a modified Standard Missile 3 fired from the USS Lake Erie in the Pacific Ocean. Unlike the Chinese ASAT test, the SM-3 intercept occurred at an altitude of 133 miles and was timed to occur at the lowest possible altitude.



U.S. Navy photo

More than 50 percent of the event debris re-entered the atmosphere within the first two orbits. The remaining debris re-entered within 40 days.

The growing debris population poses a grave danger to future spaceflights. That danger will only increase as man's activities in space increase. The space-launch manifest continues to grow more crowded each year, averaging one space launch each week. The Federal Aviation Administration's Office of Commercial Spaceflight forecasts nearly 500 commercial launches over the next 10 years. This figure does not include scientific and military launches. More countries are ramping up their space operations and joining the space enterprise. Consider two recent events:

- On Sept. 27, 2008, China became only the third nation, after the USSR and USA, to conduct an on-orbit extra-vehicular activity. The 13-minute event tested China's new EVA suit and demonstrated its technical ability to conduct a safe spacewalk, necessary if it is to achieve its aim of building a space station by 2010.

- On Oct. 22, 2008, India launched its first unmanned moon mission, Chandrayaan-1. Chandrayaan is India's entry into an emerging Asian space race. China and Japan have also recently sent spacecraft to the moon. South Korea is building its own space program. Following in China's footsteps, India is expected to begin a manned space program, too, though the decision has yet to be made. However, this new endeavor is only a

sideshow to the real work of the Indian space program. India's 39-year-old space program is perhaps unique in that the Indian Space Research Organization has long prioritized the practical uses of space science over pure scientific research or high-profile missions. With a population of 1.2 billion, most of whom live in remote, undeveloped villages, India uses satellite technology to link these communities to the rest of the world, providing communications, education, telemedicine, and a host of other services. The ISRO is planning a second version of Chandrayaan, and hopes to land a rover on the moon in 2010 or 2011. ISRO also plans to send a person into space by 2014.

Nations with manned space programs will have to carefully consider the dangers of sending humans into this environment. NASA's Vision for Space Exploration may be in jeopardy if it cannot find ways to mitigate this threat. NASA has been directed to retire the

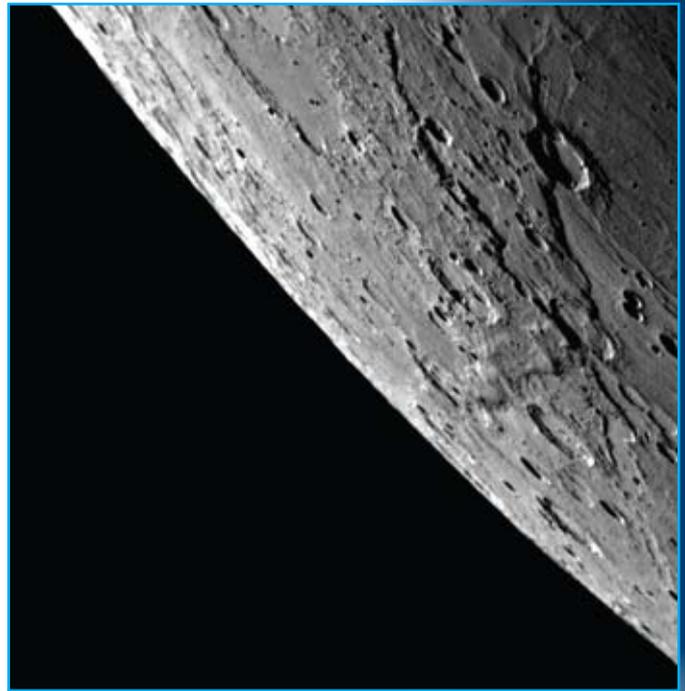


Photo courtesy of NASA

Space Shuttle fleet by 2010 and transfer the staff, funding, and facilities to the Constellation program. The program will build the next generation of launch, cargo, and crew vehicles to serve the International Space Station and return humans to the moon. NASA's current schedule has some 26 Ares flights between 2014 and 2021, carrying 65 people between Earth, the ISS, and the moon. Each of these flights will have to traverse this increasingly hazardous environment.

Commercial space-launch companies are also nearing manned-spaceflight capability. Under a NASA Commercialization of Space program, SpaceX is developing the Dragon spacecraft and Falcon 9 launch vehicle to provide the U.S. with cargo services to the ISS. The maiden flight of Dragon/Falcon 9 is scheduled for June 2009 from SpaceX's Space Launch Complex at Cape Canaveral, Fla. Two subsequent flights will be completed by 2010, culminating with Dragon berthing with the ISS.

The Air Force Safety Center Space Safety Division staff is carefully monitoring these and other developments to ensure Air Force space safety policy takes into account these rapidly evolving events. To accomplish this mission, we need to work with all the players in the space business. The Secretary of the Air Force has challenged us to interact with other Department of Defense and civil agencies, the private sector, and international organizations to build a comprehensive space safety program across the space enterprise. We're endeavoring to build expertise in the many diverse areas that directly affect space operations. We're opening a dialogue with scientists and researchers to understand the effects of space weather on DoD spacecraft and to develop



methods and tools to mitigate them. We're collaborating with NASA, the FAA, and international organizations to develop strategies to limit the creation of orbital debris. The division is building contacts within the frequency-management and network-operations communities to characterize the threat to critical space command and control and TT&C networks posed by an increasingly crowded spectrum, and the unintended consequences of cyber warfare. Ultimately, our success will depend on our ability to educate senior leaders on the growing threats to our space systems; systems on which we're becoming increasingly dependent, if not totally reliant on. 

Space



Photos courtesy of NASA

Site Deactivation Safety

EDWARD BROWNE

Air Force Space Command
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There are lessons learned from improperly deactivating support facilities; in particular, those identified to be put in caretaker status for potential re-use. Special consideration must be observed in the deactivation process to prevent future loss.

Depending on changing mission circumstances, your wing's Facilities Utilization Board may identify facilities to be deactivated in accordance with Air Force requirements. Mission-support facilities are prone to caretaker considerations based on their increased potential for future re-use. When putting facilities in caretaker status, we must consider things like security, safety, configuration control, and preservation when being evaluated against available sustaining resources. Deactivation procedures that aren't clearly documented and communicated can result in significant and preventable Air Force loss. The following description is an example of what can happen without such preparation:

- A launch-support building that had been put in caretaker status was lost to fire, costing Air Force Space Command \$2.3 million. The cause was a lack of well-documented shutdown procedures, weak communication between base agencies, and failure to follow through on known deficiency corrective actions.

- The facility had an identified fire hydrant leak, as well as undocumented electrical-fixture arcing deficiencies. Subsequent measures were taken to secure the facility, turn off the complex water/hydrant system, disconnect the electrical system from the main grid, shut down the fire-alarm panel, and remove alarm maintenance from the recurring work program schedule, including quarterly inspections of the sprinkler system. While the facility was shut down, new flow switches that used telephone lines to transmit fire-suppression system status were never installed.

- About four months later, the building manager requested electrical service be restored, as a potential user of the facility wanted to tour it. Once the tour was complete, no action was taken to turn off the electric service, as the building manager was unaware of the fire-suppression and electrical-arcing deficiencies. The fire department was not notified that power had been restored. As a result, no actions were taken to reactivate the fire-suppression system or install new telephone-reporting flow switches.



You guessed it — an electrical fire broke out. Contributing to the loss severity was the inability of the fire department to suppress the fire quickly, due to the dry hydrant next to the building. The complex water valve could not be located in the time of need, and fire suppression was only available from tanker trucks from the base and surrounding mutual-aid fire departments. The location of the facility's main water valve was incorrectly depicted on the base map.

The lessons learned focus on ensuring adequate written procedures and notifications are in place as facilities are taken in and out of various caretaker-status configurations, such as accessing, performing interim maintenance, and re-activating. Due to the many agencies involved in facility-support operations, it's critical that local procedures be developed that clearly and continuously document and communicate facility status. 

18-Year-Old Solid Rocket-Motor Casing Found in Australia

NICHOLAS L. JOHNSON

NASA Orbital Debris Program Office
Chief Scientist

The Australian outback finally revealed a nearly two-decades-old secret in July, when a launch-vehicle rocket-motor casing was found during a routine muster of cattle on a 3-million-acre pastoral property. First spotted by Arthur Taylor while flying a Cessna aircraft in the muster operation, the casing appeared in relatively good condition and didn't seem very old. Michael White forwarded many photos of the object to the NASA Orbital Debris Program Office, including one with a clear serial number next to the nozzle attachment point. Using the serial number, NASA Kennedy Space Center staff was able to trace the motor casing to a Delta 2 launch vehicle used June 12, 1990, to deliver the Indian INSAT-1D geosynchronous spacecraft from Cape Canaveral Air Force Station, Fla. This solid rocket motor served as the launch vehicle's third stage (U.S. Satellite Number 20645, International Designator 1990-051C), which carried the payload from a low-altitude parking orbit into a geosynchronous transfer orbit of 135 kilometers by 39,750 km, with an inclination of 27.2



The launch vehicle rocket-motor casing

degrees. Re-entry of the stage occurred a few months later. The object joins similar solid rocket-motor casings found in Saudi Arabia, Thailand, and Argentina during the past several years. 🐦

NASA's Orbital Debris Chief Scientist Receives Awards

NASA Orbital Debris Program Office
Houston, Texas

Nicholas L. Johnson, NASA's Chief Scientist for Orbital Debris, received two high-level awards for his outstanding work in support of the successful engagement of the USA-193 spacecraft in February 2008. In a special ceremony July 30, Gen. Kevin Chilton, commander of the U.S. Strategic Command, and Rear Adm. Douglas McClain, director of global operations for USSTRATCOM, presented him the Joint Meritorious Civilian Service Award from the chairman of the joint chiefs of staff. USA-193 was a classified military satellite that contained a tank with about 450 kilograms of toxic hydrazine fuel in a frozen state. The citation for the award stated that Johnson "properly characterized the risk associated to natural and post-kinetic intercept re-entry of the satellite, and through analytical expertise and superb communication ability, he enabled senior leaders to make critical satellite re-entry mitigation decisions." On June 19,



Gen. Kevin Chilton presented Nicholas Johnson with the Joint Meritorious Civilian Service Award.

2008, Johnson received the NASA Distinguished Service Medal, the agency's highest award from the administrator. 🐦

ISS Maneuvers to Avoid Russian Fragmentation Debris

NICHOLAS L. JOHNSON
NASA Orbital Debris Program Office
Chief Scientist

On Aug. 27, 2008, the International Space Station conducted its first collision-avoidance maneuver in five years, to evade a piece of debris from the Russian spacecraft Cosmos 2421. Europe's automated transfer vehicle, the "Jules Verne," burned two of its main engines for slightly more than five minutes to push the large complex out of harm's way. Cosmos 2421 had experienced three major fragmentations from March through June, creating about 500 large pieces of debris and an unknown number of smaller pieces. By mid-September, 480 pieces of fragmentation debris had been officially catalogued by the U.S. Space Surveillance Network, of which about half were still in orbit. Since Cosmos 2421 was about 60 kilometers above ISS at the time of the fragmentations, all debris either were initially in orbits routinely transiting the ISS orbital regime or were in higher orbits that would later pass through the ISS orbit. ■



The Jules Verne automated transfer vehicle

Photo courtesy of NASA

Safety Center Receives 10 Awards for Communication Excellence

The Air Force Safety Center received 10 awards for excellence and creativity in an annual international competition that recognizes outstanding achievement by marketing and communication professionals.

The 2008 MarCom Creative Awards offered 230 competitive categories for marketers and communicators involved in conceiving, writing, and designing marketing and communication print, visual, and audio materials. Thousands of contenders came from corporate marketing and communication departments, advertising agencies, public relations firms, design shops, production companies, and freelancers.

An illustration in *Flying Safety Magazine* and the logo for *Wingman* magazine were evaluated against a high standard of quality, creativity, and resourcefulness, and found to be among the most outstanding entries in the competition. Each received the highest honor, a Platinum Award, placing in the top 18 percent of entries in their categories.

Four submissions were judged to exceed the high standards of the industry norm, winning Gold Awards by placing in the next tier of 18 percent.

Four more AFSC entries received Honorable Mentions, placing in the next 10 percent of entries. 



The “Critical Days of Summer Safety Campaign” will begin May 22 and go through Sept. 7, focused on the hazards Airmen face during the summer.

Check out seasonal information on the Air Force Safety Center Web site (www.afsc.af.mil) to help you build local briefings and plans to prevent mishaps at your location.

