The Safety Sigma

Mission Readiness through Operational

Spring 2012 **Volume III, Number 2**

From the Director: A Matter of Perspective

CAPT Bob "Cosmo" Conway, USN – Director

What is safety? If you've sat in my class at ASC or ASO School you know that I define it simply as the absence of damage, breakage or injury. But for something so simple, why is it so globally misunderstood? Depending on your experience you've probably seen it embraced, hated, segregated, incorporated, inculcated or shunned, or any combination of these. Why?

I believe the answer lies with the way we have been brought up using that word throughout our childhood and professional lives. "Be safe!", "Safety is the Priority" and "Safety first" are familiar phrases to us and I will submit that the majority of us think that safety is a process, a program, a goal or some separate thing that we apply to our "normal" processes. And when we do apply "safety", we minimize the potential damage, breakage and injury. My perspective is a bit different.

BLUF: Safety is purely a result. Reduction of damage, breakage and injury stems from increasing levels of excellence, not increasing "safety". What does that mean? Let me ask you a few questions to frame this.

NATOPS, MILPERSMAN, SOPs, SORMs, squadron instructions, wing instructions, OPNAV instructions (USMC, read MCO here), DOD instructions, tactics manuals and the like – are these considered "safety" manuals or "safety" instructions? I think most of you are saying "no" or "not specifically". How about NAVOSH instructions, are these considered safety instructions? I think most would answer "yes," but I contend that NONE of these are safety instructions, including NAVOSH – stay with me here. Rather all these are just rules and regulations to govern our units. But when engaged by appropriate and effective leadership, the potential excellence of our organizations is maximized. The more the levels of excellence are raised within the unit, the more the risk of damage, breakage and injury is reduced. The more this risk is reduced, the more the potential of hazards manifesting themselves into mishaps is minimized. The result is a larger absence of damage, breakage and injury – aka "safety".

My advice is to not focus on increasing safety levels in your commands but rather focus on raising excellence levels. We use "Root Cause/Hazard Analysis" to be a force multiplier in reducing "safety" issues within our commands because attacking the root cause is much better than playing Whack-a-Mole with the resultants. By the same token we can increase levels of excellence using the same analysis method by exploring the root causes of excellence in your commands (sounds weird, doesn't it?). Find out what root causes yield the byproducts of success like mission accomplishment, high morale and retention, then compare these findings to what you expect them to be. Finally, craft a plan of action to deal with shortfalls to raise the bar.

What you may find are happier Marines/Sailors, better efficiency, higher work output, more success and the like, including an increased absence of damage, breakage and injury. And the best part is that all this can be obtained without ever uttering the word "SAFETY"!

The USS Abraham Lincoln launches an F/A-18E of VFA-137 while operating in support of 5th Fleet operations. (Photo by Petty Officer 2nd Class Jonathon P. Idle, US Navy)

INSIDE

Man:	You're Getting Warmer!
Machine:	a) Density, b) Temp, c) Pressure, d) All the Above?
Medium:	How to Dismantle a Good Aviation Safety Program
Mishaps:	HFACS and the SIR
Semper P:	Learning From a Near Miss
CRM:	What is Effective CRM?

"Doc" Bank Award: ASO student recipients

SAS Hail and Farewell

Man: You're Getting Warmer!

CDR Jack "Bags" Wyland, MC, USN – Aeromedical

According to the National Oceanographic and Atmospheric Association (NOAA), the winter of 2011-2012 ranked as the 4th warmest on record for the contiguous US with average temperatures nearly four degrees Fahrenheit above long term averages. NOAA predictions through midsummer are for continued above normal temperatures for all but the Pacific Northwest and Alaska. Outside of the US, many current deployments are to regions known for their elevated temperatures.

A CENTURY OF MARINE AVIATION

29 March, 1913

1st Lt A. Cunningham receives orders for temporary aviation duty at Marblehead [MA], as "an actual flyer of heavier-than-air craft."

- *100 Years of Marine Corps Aviation: An Illustrated History*, by Roxanne M. Kaufman

High temperatures can significantly affect flight safety. Aviators are aware that related changes in aerodynamic properties require planning and maneuver limitations. Equally important, though, is the body's physiologic and psychological response to high temperatures. Individuals possessing a good understanding of the issue will plan properly, continually assess themselves and those around them, and are more likely to avoid a hazardous heat related event.

In the military aviation community, factors associated with heat related human stress include the environment (temperature, humidity and ventilation), uniforms (flight gear, coveralls…), personal protective gear and level of exertion while on the job. Often, operational needs are such that personnel are faced with a combination of all these factors further multiplying the risk. Early effects of high temperatures can range from mild to severe, while long term effects can include loss of flight status.

Proper preparation is crucial to maintaining function in a hot environment. Maintenance of good health should begin well before exposure to high temperatures. Once in the environment, acclimatization is a complex process that begins within a few days of arrival yet can take around two weeks to complete. Extra care must be taken until then. Proper hydration is critical from arrival until final departure from a hot environment. Thirst is a moderately good indicator of hydration status but this sensation can begin to lag in very hot or high workload environments. Urine color, while also not infallible, allows for a simple approximation of hydration status with pale yellow corresponding to adequate hydration. Aircrews should understand that flying in a slightly dehydrated state in order to avoid having to use relief systems can be hazardous. Better solutions need to be implemented. Fatigue and illness can make individuals more susceptible to heat stress; thus personal awareness and proper scheduling is paramount. When able, consideration should be given to scheduling extended events at times other than during the hottest part of the day. This can require increased effort on the part of leadership and schedulers, but doing so may allow units and personnel to support high OPTEMPO periods for a longer duration.

Heat stress issues are not confined just to aviators but can also impact ground personnel. Any member of the team can be detrimental to the mission when not performing at their best. Well thought out maintenance procedures that involve shading of the work station, aircraft, and cockpit can significantly lower the temperatures that all workers are exposed to. Likewise, the usage of properly functioning environmental control systems cannot be stressed enough. Finally, non-punitive policies that allow personnel to assess and remove themselves from a duty status when they judge their abilities to be degraded due to heat stress should be implemented. The operational flight environment carries enough risk as it is. We don't need to increase the risk through poor planning and procedures. Fly Well!

An HSC-12 MH-60S attached to CVW 17 conducts ordnance transfer aboard the USS Carl Vinson (Photo by Mass Communication Specialist Seaman Apprentice Andrew K. Haller, US Navy)

Machine: a) Density, b) Temperature, c) Pressure, d) All the above?

LtCol Stephen "Bender" Dickerson, USMC – Rotary Wing Aerodynamics Instructor

Have you seen the recent AH-64 video from the snow covered mountains of Afghanistan? If not, then take a moment to use your favorite search engine and type in the keywords "apache helicopter snow." The video hit most media outlets around 22 March of this year. We can all sit here (wherever

you are presently sitting) and armchair quarterback this mishap, but that isn't the point of this article. What I hope you may give a moment to think about is the relationship between altitude, temperature, and density. You may remember seeing a similar topic mentioned in this publication about two years ago, but let's now look at this with an eye toward temperature.

Supporting Operation Havasupai and the Toys for Tots program, a CH-46E of HMM-764 lands in the Grand Canyon to deliver special cargo. (Photo by Sgt A. J. Parson, USMC)

Whether your wings are hamstrung by being fixed in place, have the joy of rotating over your head, or have some indecisive mixture of the two, all wings are charged with the same task: utilization of the flowing mass of air around them to impart forces to the aircraft structure. Two of the predominant forces we think about are lift and drag. In the most general sense, forces exerted on a body equal the mass of the body multiplied by the acceleration of that body (Newton's second law). After some manipulations and partial derivatives courtesy of Jean Le Rond d'Alembert, Leonhard Euler, and Daniel Bernoulli, the equation which you all know and love so well can be seen:

$$L = \frac{1}{2}\rho V^2 S C_L$$

Take note of the Greek letter rho (ρ), which is used to denote density. Remember that density is mass per volume. So again thinking big picture, we have forces used to keep our aircraft in the air and to maneuver, and those forces are related to the mass of air passing around our wings. That mass of air depends on how many air particles are stuffed into the space around our aircraft. So what are the factors that play a role in the amount of air particles stuffed into the immediate vicinity of our aircraft?

The relationship which we use to tie in the properties of the air (temperature, density, and pressure) is the Ideal Gas Law: pressure (p) is equal to density (ρ) multiplied by temperature (T) and the gas constant for air (R). Put another way, density is pressure divided by the gas constant and temperature:

$$\rho = \frac{P}{RT}$$

We are all accustomed to the idea that as temperature increases the air will become less dense. We also like to think that cold air is dense and our aircraft will feel like it is flying "better." Likewise, as aviators we tend to realize that at higher altitudes the air is less dense than what we encounter closer to our sea-level air stations and ships. Where we tend to sometimes get into trouble is the combination of cool temps and elevations which are higher than normal, but not so high that our instincts scream "check the charts." Unfortunately, as aviators have found in the past, the devil is in the details and trouble could be lurking at those "reasonable" altitudes. Beware letting your knowledge and bias regarding temperature overrule your knowledge and bias of altitude! Remember that the two are linked and as aviators we must think of both when evaluating the environment that our aircraft uses to fly.

A CENTURY OF MARINE AVIATION

1 April, 1953

While operating at night with the 1st MarDiv, pilots use searchlights on targets, improving their close air support.

- *100 Years of Marine Corps Aviation: An Illustrated History*, by Roxanne M. Kaufman

Medium: How to Dismantle, or Lay Waste, a Good Aviation Safety Program

CDR Bob "Opus" Hahn, USN (ret) – Academic Director / Programs Instructor

Most all squadrons have terrific aviation safety programs in place. ASOs do a great job, and have done everything the schoolhouse has taught them. Time now to shake things up. Time to tear down your aviation safety program just for the exercise of rebuilding it later. The question then is, how best to dismantle, or lay waste , to an excellent aviation safety program?

If I were to dismantle an aviation safety program, the most efficient way to do it would be to start at the top – eliminate the CO billet. (Just think of all the money you could save, too by not paying an O-5 salary to someone!) The CO is the squadron's most important safety officer; he or she gives teeth, meaning, and credibility to the safety program, so with him or her gone you've dealt a crushing blow to the program. Without the CO to set the tone, the leadership example for safety, the whole safety culture in the squadron would diminish rapidly. Think of what a signal this would send to the squadron. Squadron personnel would quickly conclude that safety can't be very important to the Navy or Marine Corps if they will eliminate the CO's billet. Decisions such as who will be the CO or ASO, another safety leader, telegraph to the organization's personnel what is important to the

organization. A decision to eliminate aviation safety leadership billets tells personnel up and down the chain of command that safety is not an important value to the organization.

If we can't get rid of the CO there are still other ways to ruin a good aviation safety program. I would consider not complying with safety programs. The various programs' requirements are listed in a table in the Programs Textbook you received in ASO school. Rip out those pages and stop complying. By non-compliance you will immediately send a signal of non-professionalism to the squadron. Complacent attitudes will quickly multiply as nothing is important, and everything can be put off. Didn't want to do all those post-flight reports? Then don't! If you're lucky, you might not have a mishap right away, and you could use that as (false) proof that you didn't need any of these programs to begin with! Be careful here because safety is tightly linked to professionalism. Failure in safety professionalism will rapidly spill into other areas of squadron operations, so if your intent is to ruin only safety and nothing else, you may wish to avoid this technique.

The past and the present unite aboard NAS Jacksonville. Two P-3Cs are joined by a P-8A and Broad Area Maritime Surveillance (BAMS) UAS. (Photo by Petty Officer 2nd Class Pedro A. Rodriguez, US Navy)

A more focused approach to neutering an aviation safety program would be to eliminate safety training. Terminate safety lectures. In addition to eliminating good technical information, the subliminal reminder that safety is important is lost when safety training disappears from the squadron routine. Stop reading and discussing HAZREPs and SIRs. If you do, you will not derive any benefit of the lessons learned from others' experiences. You will be ignorant of issues that may affect your platform. Stop conducting mishap training drills. If you do, the disfunction of your aviation safety training program will be public and apparent to all if the AMB had to really convene and do its job for real. Be careful with this technique too, because safety training is closely integrated with all the things we do in aviation.

OPNAVINST 3750.6 Refresher:

For any data recorders, HUD recorders contaminated by water, fuel, hydraulic fluid, foam, etc., soak and rinse them in de-ionized or distilled water to flush any sources of corrosion. Keep them immersed until sealed in an airtight container for shipping/transport.

- Ch 7, par 716.c.7.b

Now that I think about it, we've achieved a lot of good practices in naval aviation safety. Maybe instead of dismantling your program, you should ferret out the things or practices that are not working right, and improve them. The naval aviation safety program is yours – keep it strong.

Mishaps: HFACS and the SIR

LCDR Kurt "POTY" Uhlmann, USN – Reporting Instructor

Human Factors (HFACS) plays a major role in the SIR process. Countless man hours and research have been devoted to the development of the current HFACS model. At first glance of the current model, many AMB members and ASO's will see that HFACS can be helpful in the development of causal factors but do not completely understand how to use the HFACS model to their benefit. Within the HFACS model there lies a second function known as the nano codes. These two distinct functions of HFACS must be understood in order to make HFACS an effective tool in assisting the AMB and ASO in exploring the Causal Factors of a mishap or hazard.

First let us begin with HFACS as a tool for developing Causal Factors. It is extremely important that the AMB and ASO understand that the development of a Causal Factor (CF) is their responsibility. The AMB/ASO will write the CF based on the evidence that they found during their investigation. Often times AMBs attempt to use the nano codes as the CF of the mishap/hazard. This is incorrect!!! The AMB/ASO must develop the CF on their own using the format of "Who did What" for human factors. With that being said let's look at how to use HFACS to explore possible CF. Let us use the example of the CF "Mishap Pilot failed to flip the correct switch". If after our investigation the AMB/ASO concludes that the Act of the Pilot flipping the switch was causal, do we stop there and write the report and end our investigation? No we must look into other possibilities that influenced that act. HFACS helps you do that. Looking at the HFACS flow chart you can see four separate categories: Acts, Preconditions, Supervision, and Organizational Influences. We know that the "MP failed to flip the switch," but why? Looking at Acts on the HFACS flow chart explores the why. Was it an error or violation? If it was an error, then why did

the error occur? Was there an issue with training, was there a perception error, did he make a bad judgment and why? Look at preconditions and look into Environmental Factors, Conditions of the individual, and Personal factors. Continue up the flow chart to address all the possible influences on that act. It is vital that the AMB open their minds and look at any possible influence on the act. If the AMB/ASO does not identify the root cause of the mishap/hazard, and work to eliminate it from a community or squadron, this same mishap could occur again. For example, the causal Factor "MP failed to flip the switch" no doubt was causal, but what if everyone was trained the same way and the entire command understood that flipping the switch was what they thought they should do? What if the switch was labeled improperly or was installed incorrectly? HFACS enables you to peel the onion back to get to the root cause and also identify all the causes of the mishap/hazard.

Secondly, HFACS must be used to label the CFs that were developed by the AMB/ASO. This is called nano coding your CF. Leave this for the last thing you do prior to submission of the SIR/HAZREP. You will have to code the accepted human causal factors only. Don't worry if you forget which CF to nano code because WAMHRS directs you to nano code when it sees an accepted human factor. Why are we nano coding these causal factors? We are doing it for the various organizations that run studies of human causal factors. As an AMB/ASO you know the event best and therefore have the best understanding of how to label the CFs with the provided nano codes. Use the HFACS chart and drill down to the area of the CF, then look at the nano codes associated with that area and select one. For a further explanation of each nano code refer to the 3750 appendix L. Remember, nano code last after you have completed your report and are ready to submit the CF that you have developed.

Semper Paratus: Learning From a Near Miss

LCDR Ally "Showgirl" Shuler, USCG – Coast Guard Instructor

In the June 2000 edition of the *Western Journal of Medicine*, James Reason, the father of the Swiss cheese model wrote the following:

> "Effective risk management depends crucially on establishing a reporting culture. Without a detailed analysis of mishaps, incidents, near misses, and 'free lessons,' we have no way of uncovering recurrent error traps or of knowing where the edge is until we fall over it. The complete absence of such a reporting culture within the Soviet Union contributed crucially to the Chernobyl disaster. Trust is a key element of a reporting culture, and this in turn, requires the existence of a just culture – one possessing a collective understanding of where the line should be drawn between blameless and blameworthy actions. Engineering a just culture is an essential early step in creating a safe culture."

So in order to create a safe culture in Coast Guard Aviation, and more specifically at each individual Air Station, we need to clearly avoid the blame trap while conducting safety investigations. Creating trust and openness in reporting identifies hazards early and allows us to discuss and implement mitigating factors. Reporting near misses can be as simple as a wardroom "true confessions" talk, or as involved as writing a Class D mishap report to share with the fleet. At any rate, we need to continue to encourage and allow the free flow of information between aircrews, commands, and FSO's.

Reason explains in the Swiss cheese model that each slice of cheese is a defensive layer that prevents a severe mishap from occurring. The holes that in the Swiss cheese are created by two factors: active failures, or unsafe acts; and latent conditions, which include various things such as design flaws, poor procedures, and management issues. Although unsafe acts are more difficult to prevent, latent conditions can be managed through a proactive safety program! Identifying these conditions will prevent mishaps.

An H-65 conducts an ice landing alongside the Coast Guard Cutter HEALY during operations off Nome, AK in January. (Photo by Seaman David Flores)

So how do we define a near miss? Using Reason's model, we can say that there was a significant hole in the Swiss cheese, but another defensive layer was put in place to cover that hole. The mishap did not occur because, at some point along the way, the hole was blocked. So when a near miss occurs, here are the questions that we ask ourselves: What created the holes in the first place? How many defensive layers broke down and contributed to a near-catastrophe? What were they? But we often forget the next step: What did we do right? What procedures, programs, or equipment did we put in place or enable to prevent a full scale mishap? Not only can we report the things that went wrong, but we can praise the things that went right!

This is where the line is drawn in the sand of blame. If aircrews know that sharing the information of a near miss will result in personal retribution, they are going to be much less likely to report the incident. If reporting an incident or pointing out a latent condition does not result in some form of action to remove that condition, people are also going to be less likely to report because they do not think that they can make a difference.

Near misses should be treated as a rare gift. We are given the chance, with no loss of life or property damage, to examine both latent conditions and active failures that could prevent the next big catastrophe. Instead of looking for whom to blame, let's work smarter to identify latent condition and to continue to improve and preserve the excellent aviation safety record that we have attained in the Coast Guard.

Crew Resource Management: What is Effective CRM?

LT Bruce "Cabbage Patch" Lindsay, USN – CRM programs

Effective CRM is a subjective and largely experience-based skill set that has become a somewhat nebulous subject in aviation training lately. If you ask any NATOPS Instructor or CRM Instructor; "What is effective CRM?", you will probably get a blank stare followed by the exclamation, "Well, I know it when I see it!" Sure we all know the acronym "DAMCLAS" and could probably recite a 90% correct textbook definition for any one of the specific seven skills, but do we truly know how to instruct, and identify effective CRM behaviors?

Aircrew of VMM-365 remain vigilant during operations over the Helmand Province of Afghanistan. (Photo by Cpl Lisa M. Tourtelot, USMC)

If you asked us at the CRM Schoolhouse; "What is effective CRM?", our "Instructional Model Manager" response would be something along the lines of; "Effective CRM is the use of all the seven skills in order to effect successful mission accomplishment while avoiding an undesired aircraft state." These undesired aircraft states are essentially unsafe conditions, or "errors" which could eventually lead to a safety of flight issue or possibly a mishap. The aforementioned errors can be summarized by any deviation from aircraft, crew, or organizational expectations and/or intentions.

Throughout our aviation careers and flight experiences we have learned that utilization of the Crew Resource Management and Operational Risk Management skills are necessary to recognize the threats of our daily missions and operational environments. Developing strategies to manage or mitigate these threats (which would otherwise increase the potential for errors and possibly lead to us into an unsafe condition, or an undesired aircraft state), is one of the key learning points and tenants of highlighting effective CRM.

Ultimately, our entire effort to reduce errors, or to mitigate the consequences of errors can be captured within the guidelines of the US Navy's CRM Program motto; "*Supporting Mission Accomplishment Through Enhanced Aircrew Performance."* It is recommended that we continue to use all the tools available to us, as professional aviators, in order to operate effectively and to avoid the negative consequences of uncorrected errors within our aircraft. Utilizing effective CRM thus ensures that we have effective mission accomplishment during our daily flight operations.

Doc Bank Memorial Distinction: ASO student recipients

The *Milt "Doc" Bank Memorial Distinction*, recognizes the student or students in each graduating ASO class that best exemplify the characteristics of the late, great Milt "Doc" Bank, PhD: motivation, intelligence, imagination and aptitude as a potential future ASO Instructor. The recipients of this award in ASO Class 12-2 were Captain Sean Stamps, USMC, of Marine Medium Tiltrotor Squadron 166 at Marine Corps Air Station Miramar, CA and Lieutenant Scott Urbashich, USN, of Fleet Air Reconnaissance Squadron 1 at Naval Air Station Whidbey Island . The recipients in ASO Class 12-3 were Lieutenant Dan Hurd, USCG, of Coast Guard Air Station Washington and Lieutenant Commander Derek Dawson, USN, of Commander, Strike Fighter Wing Atlantic at Naval Air Station Oceana, VA.

SAS Hails and Bails:

Several new faces have appeared recently in the hallways of the School of Aviation Safety. LCDR Jeremy "Ricky Bobby" Niles, USN, will soon be teaching the Reporting syllabus alongside LCDR "POTY" Uhlmann. LCDR Mike "Spock" Chenoweth, USN has joined the ranks of SAS and will be teaching Programs courses as well as covering SAS Special Projects. Upstairs in the CRM department, LCDR Brendan "OB" O'Brien, USN, has checked aboard and will be the next CRM Department Head. LT Chad "Old Bones" Paulus, USN, has also joined the CRM Department where he will be teaching the 7 Critical Skills.

The Safety Sigma is published quarterly by the Naval School of Aviation Safety located at NAS Pensacola, Florida. If you have a question for the staff, or are interested in attending Aviation Safety Officer, Aviation Safety Command, or Crew Resource Management Instructor training, please visit our website at https://www.netc.navy.mil/nascweb/sas/index.htm or call (850) 452-3181. **If you would like to submit** a short article for publication, please contact LtCol Stephen "Bender" Dickerson at (850) 452-5145 or stephen.m.dickerson1@navy.mil.