

SOCIETY OF UNITED STATES NAVAL AEROSPACE PHYSIOLOGISTS

# NEWSLETTER

VOLUME 14, ISSUE 2      22 AUGUST 2016



# NEWSLETTER

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## FROM THE PRESIDENT

I am honored to have the opportunity to serve as the President of our Society and privileged to be able to write my first “from the President” message. When I joined this community almost 15 years ago, it never crossed my mind that I would eventually be in this position. I’m grateful and humbled to be able to speak to you all in this capacity.

The vision for the Society over the course of the next 10 months: Bring the Society into the 21<sup>st</sup> Century. This may sound somewhat odd since we’ve been living in this century for some time now and are very much accustomed to working with technology. However, our Society has really not made it out of the 90’s. During our first meeting, the SUSNAP Board of Governors (BoG) established a list of goals to work towards.

Goal 1: Electronic Dues Payment. We have already made progress with the creation of a SUSNAP PayPal™ account and with that the ability for members to pay and/or renew their dues online. This may not

sound like a huge accomplishment, but it is a simple first step and provides a significantly easier method for members to pay their dues.

Goal 2: SUSNAP Website. If you Google™ SUSNAP, the top results have absolutely nothing to do with our Society. Bing™ is slightly more helpful as it provides a few links to actual Naval Aerospace/Operational Physiologist (NAOP) related items and even a past SUSNAP Journal. At any rate, you can see where I’m going here; we are behind the times. The concept of the website would allow us to create a living archive for the Society. Where we came from, where we are now, and where we are going as a Society, along with a way for us to promote who we are and what we do. I could see this easily becoming one of our greatest recruiting tools as well. LT Daniel “Opie” Logsdon has stepped up to the plate as our Webmaster. He is currently working to develop the website over the next few months. Thank you Opie for taking the lead here and bringing us into

the digital age!

Goal 3: SUSNAP Partnership in Education (PIE) Award. I have to be honest; I “borrowed” this idea from the Aerospace Physiology Society (AsPS). The idea is fairly straight forward. Each year, a SUSNAP member would sponsor the nomination of a teacher that they feel has inspired his or her students to an interest in science. The intent of this effort is to recognize a teacher for what they do. This is an easy way to give back to the community, while at the same time promoting what we, as healthcare scientists, do within the community and helping to further foster student’s interest in science. We are working on the details of the award and the associated process and will communicate that information soon.

Goal 4: Emeritus Member Sponsorship. Like any society or association, recruiting and retaining new members, while keeping existing members, is always a concern. CAPT (ret) Norton proposed that each year, an emeritus and/or lifetime member sponsor a



## UPCOMING EVENTS

- *SAFE Symposium*  
31 Oct-2 Nov 2016  
Dayton, OH
- *USNAC*  
9-13 Jan 2017, Pensacola, FL
- *APT 8409 Graduation*  
4 Nov 2016, Pensacola, FL
- *Aeromedical Officer Graduation*, 3 Feb 2017  
Pensacola, FL

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## FROM THE PRESIDENT (CONT.)

new, junior officer member by paying their dues for their first year or two in the Society. The eligible new member would be a student NAOP and their dues would be covered upon them receiving their wings. CAPT (ret) Norton has graciously offered to cover the first SNAOP, LT Christopher Greil, when he graduates in February. If any other members are interested in sponsoring an intern, please let me know.

Goal 5: Quarterly Newsletter Publication: As of today, we are back on track for a regular quarterly release for our Newsletter. LCDR (sel) Tom "Charlie" Annabel and LT Nathan

"Noakster" Noakes have stepped up and volunteered to serve as the Co-Editors from here on out. I can't say THANK YOU to them enough for taking on this daunting challenge. Newsletter editor is no small task. Their main focus will be berating all of you for future Newsletter submissions. The Newsletter can't exist without submissions from you! Please get involved and help make the Newsletter a continued success.

As you can see, we have a very busy 10 months ahead of us as a Society. Our main efforts will be the website and the PIE Award. If you feel you can assist

with either of these two goals in any way, please reach out to a BoG member and offer your support. We will provide updates to both efforts as we make progress.

In closing, I'd like to, again, thank you for the opportunity to serve as the President of SUSNAP. I'm very excited to see the growth and advancement of our Society, as well as increased involvement from all our members, over the next few months. Please contact a member of the BoG if you would like to become more involved in anyway.

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## THE WRONG STUFF: ENERGY DRINKS

LT JARRETT MOORE



*“.....70% OF SUPPLEMENT COMPANIES DO NOT FOLLOW THE MINIMUM QUALITY CONTROL STANDARDS.”*

The energy drink industry has exploded over the past decade and is now a \$13.5 billion dollar enterprise. The supplement industry is still leading the charge with \$37.5 billion dollars in profit each year. The growth of these industries is due in part to the Dietary Supplement Health and Education Act of 1994. This act loosened previous regulations and essentially opened up Pandora’s Box for consumers. Supplement manufacturers are mandated to register with the FDA; however, they are not required to gain product approval prior to marketing. The FDA also mandates that product labels must be “truthful” and not “misleading”. But, marketing teams for many of these companies have found clever ways around these rules by creating suggestive labels with ambiguous descriptions. A quick review of the book *How to Lie with Statistics (Darrell Huff 1954)* gives wonderful insight into the “truth” behind these labels. Finally, the FDA is not required to take action against a supplement company until after the product has reached the market. This is akin to the Navy releasing survival equipment into the fleet without ever testing its effectiveness. Sadly, this is just the tip of the iceberg, and the news gets worse with the FDA estimating that 70% of supplement

companies do not follow the minimum quality control standards. This is daunting news for the aviation community who already operate in extreme environments that affect the human body to a great extent.

During the summer of 2010, the Walter Reed Army Institute of Research found that 44.8% of deployed service personnel in Afghanistan consumed at least one energy drink per day<sup>4</sup>. They also found 13.9% of deployed service personnel consumed three or more energy drinks per day<sup>4</sup>. The service members who consumed three or more energy drinks per day were more likely to report the following issues: less than four hours of sleep per night, more likely to report sleep disruption due to stress and illness, and more likely to fall asleep during briefings or guard duty<sup>4</sup>. Other surveys found that 53% of active duty military personnel have consumed an energy drink in the last thirty days<sup>17</sup>. The individuals in these surveys all reported at least one symptom: loss of sleep, rapid heart rate, nervousness and anxiety<sup>17</sup>. A similar survey of college students, ages 18-24, indicated that 67% of those surveyed consumed energy drinks because of insufficient sleep<sup>14</sup>. Of those surveyed, 22% reported having headaches and 19% reported heart

palpitations after consuming an energy drink<sup>14</sup>. It is also important to realize that these are self-reported numbers which may severely underestimate actual energy drink consumption. Energy drinks are clearly being utilized as a fatigue countermeasure and a band aid for fatigue despite the fact that they can cause severe side effects.

Today, there are over twenty-thousand plus emergency room visits per year due to energy drink overconsumption. Researchers in 2014 found 65% of military personnel experience at least one side effect after consuming energy drinks<sup>17</sup>. This is no surprise due to the fact that many of these beverages contain multiple stimulants other than caffeine such as, epigallocatechin gallate (EGCG), Evodiamine, yohimbe, synephrine, ephedra, and 1,3-dimethylamylamine. Although 1,3-dimethylamylamine sounds like the primary fuel source for the Star Trek Enterprise, it is actually a powerful stimulant capable of increasing systolic blood pressure by 20% and diastolic blood pressure by 17% in healthy adults<sup>1</sup>.

Ephedra is a commonly used Chinese herb that is used for weight loss and energy. Both 1,3-dimethylamylamine and Ephedra have both been

## THE WRONG STUFF: ENERGY DRINKS (CONT.)

LT JARRETT MOORE

*“BOTH 1,3-DIMETHYLAMYLAMINE AND EPHEDRA HAVE BOTH BEEN BANNED BY THE FDA; HOWEVER, SEVENTY-NINE COMPANIES WERE CAUGHT DURING A SIX MONTH PERIOD IN 2015 HIDING THESE INGREDIENTS IN THEIR PRODUCTS.”*

banned by the FDA; however, seventy-nine companies were caught during a six month period in 2015 hiding these ingredients in their products. Ephedra has been linked to numerous cardiac events and deaths in individuals under the age of thirty<sup>9</sup>.

EGCG is commonly used in fat burners and energy shots as a natural source of energy derived from green tea. There are two cases of liver failure due to taking products containing EGCG<sup>19</sup>. EGCG is a strong antioxidant that in high doses may cause mitochondrial toxicity<sup>15</sup>. Because some supplements have such high concentrations of some ingredients, clinically dangerous dosages can be reached much more easily. Evodiamine is another commonly used ingredient in energy drinks and fat burners that in vitro has been shown to have thermogenic properties similar to capsaicin<sup>13</sup>. Few studies have been performed on the safety and efficacy of evodiamine in humans.

In the early 1990s, yohimbe was used as an FDA approved treatment for erectile dysfunction. Very few, if any, doctors utilize it today; however, it is now commonly used in fat burning supplements and energy drinks. Yohimbe has been shown to increase mean arterial blood pressure after consumption<sup>9</sup>. When yohimbe is used in

conjunction with ephedra and caffeine, it increases diastolic blood pressure and decreases ejection fraction (the fraction of outbound blood pumped from the heart with each heartbeat)<sup>20</sup>. Researchers have warned against the use of yohimbe for anyone with higher blood pressure<sup>9</sup>. This is of concern because many of these other stimulants can increase blood pressure. A recent probe of the forty-nine supplement brands containing yohimbe found only 22% of the companies listed the correct amount of yohimbe in the supplement which ranged from 23% to 147% of the amount that was actually present<sup>5</sup>. This is a dangerously wide range when considering the side effects yohimbe is capable of eliciting. It was also found that only 18% of the companies even listed the adverse effects on the label<sup>5</sup>. Finally, only 4% of the companies listed the correct dosages and side effects warning on their labels<sup>5</sup>.

Bitter orange extract, or synephrine, is a stimulant that has been linked to multiple cardiac events which occurred shortly after the subjects took fat burners containing synephrine<sup>3, 11, and 12</sup>. Today many energy drinks and pre-workout supplements contain synephrine. In 2010, clinical studies found that 20% of drug-induced liver injuries

were related to energy or fat loss supplements<sup>7</sup>. This is a horrifying find and an event we have already witnessed within the Navy. Late 2014, a young Sailor collapsed during physical training and ended up needing a liver transplant. Three hours after the incident the young man had a 107.2°F core temperature. It was surmised that the synephrine in the energy beverage contributed to the high core temperature. He also was diagnosed with rhabdomyolysis. This is generally a condition where excessive exercise breaks down so much muscle tissue that the kidneys shutdown because they can no longer process the byproducts from the muscle tissue. A few case studies have shown that it may be possible to cause rhabdomyolysis by over consuming energy drinks<sup>8</sup>. Dehydration and the energy supplement use were both considered factors in the case. It is not clear whether or not the energy supplements directly caused the event, but the Sailor did consume a pre-workout supplement containing caffeine and synephrine.

There have been a number of cases of cardiac events occurring after the consumption of energy drinks. In one case study, a 26 year old civilian male (non-obese) had a habit of consuming eight to ten

## THE WRONG STUFF: ENERGY DRINKS (CONT.)

LT JARRETT MOORE

*".....STUDENT PILOTS WERE SLOWER AND LESS ACCURATE WHEN EXECUTING EMERGENCY PROCEDURES THAN THOSE WHO DID NOT CONSUME ENERGY DRINKS PRIOR TO THE FLIGHTS."*

energy drinks per day (Monster & Rockstar) and ended up having a myocardial infarction (STEMI) which required a stent<sup>16</sup>. He had no family history of cardiovascular disease or coronary arterial disease. This is an extreme example of what might happen if a young Sailor or Marine heavily abuses these beverages. Other research has shown that energy drinks may increase the QT intervals, increase blood platelet aggregation, and can cause endothelial dysfunction which is strongly associated with myocardial infarctions<sup>21</sup>. These measurements were all taken one hour after the energy drink was consumed by healthy 22±2 year olds. The researchers in this study stated it is important to see the effects of other lesser known ingredients to determine which ones or combinations of ingredients are causing issues<sup>20</sup>.

As physiologists, we are well aware of the dangers of using these beverages and supplements; however, young adults ages 18-24 may not have the same beliefs and perceptions. Lucky for us, researchers from Oklahoma State University took the time to survey student pilots about their perceptions of energy drink usage in aviation. What the researchers found was actually quite shocking. The researchers

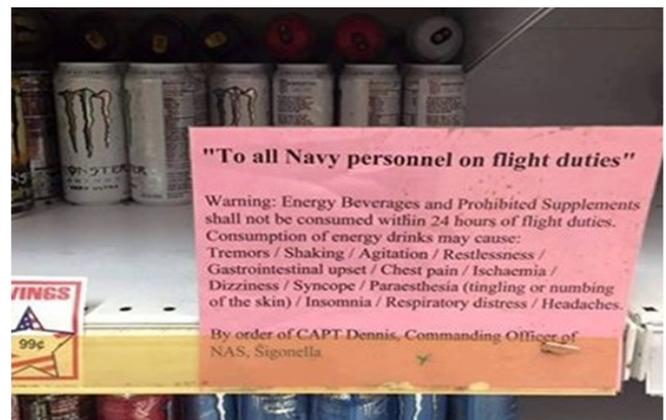
found that 60% of students consumed energy drinks or saw other students consuming energy drinks on the same day as piloting an aircraft<sup>2</sup>. At the same time, 67% of the students surveyed personally disclosed that energy drinks affect their ability to control the aircraft<sup>2</sup>. Previous research from Oklahoma State University found that energy drink usage prior to flight did have an effect on motor control and decision making. During this study, student pilots were slower and less accurate when executing emergency procedures than those who did not consume energy drinks prior to the flights<sup>6</sup>. The students who consumed energy drinks took an additional ten seconds to achieve straight and level flight after a complex turn than those who did not consume energy drinks<sup>6</sup>.

Mass availability is a tremendous enabler for energy drink usage for military personnel.

Research conducted by the Air Force found that 33.4% of military personnel have energy drinks available in their immediate work area<sup>18</sup>. Eliminating energy drinks may not be a viable option, but recent steps have been taken to address this issue from another angle.

For now, education is the viable weapon we have to combat misinformation about efficacy of these beverages. Progress is currently underway with the CO of Sigonella recently posting a warning poster in the energy drink section at the NEX to all aviation personnel which reminded them aviation personnel *should* be grounded for 24 hours after consuming energy drinks.

Hopefully this article arms you with the ammunition to educate your Sailors and Marines on the dangers of these substances.



## THE WRONG STUFF: ENERGY DRINKS (CONT.)

LT JARRETT MOORE

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## COLD WEATHER MEDICINE PART TWO: BROWN ADIPOSE TISSUE WOULD BE NICE RIGHT ABOUT NOW.

LTJG JAMES "SID" SALASSI

We last left off with my egress from a CO's terribly cold pond. I left that lab thinking that I had just endured some great science. I felt like J. B. S. Haldane, testing his own theories on himself and his son [1]. The best part was that this was only the third day of the course and there was much to learn and experience in the next two and a half weeks.

By the end of week one we were expected to be proficient in several knots and use of the SKED litter, a piece of back-boarding equipment that can be wrapped up to the size of a large yoga mat. The SKED is utilized for vertical and horizontal extraction in mountainous terrain and is invaluable if used correctly. If used incorrectly it can kill rather than save the patient being extracted. The knots would prove to be an integral part of the last three days in the mountains during our final exercise (FX).

The second week was filled with academics, both mountain medicine related as well as basic gear orientation for the Marine naïve. Training was mostly geared towards preparing the students for the

FX, of which the goal was to evade the enemy, locate and extract a patient, and transport them to our soon-to-be manmade landing zone (LZ). During this time the hiking was arduous and we were constantly eating. The caloric requirement increased to around 4000 kcals/day for males and 3500 kcals/day for women [2], and it was empirical to realize how easy it was to become dehydrated in cold weather. Some of the hydration savvy only had dark yellow colored urine whereas those who neglected to hydrate had dark brown and sometimes red urine. The truth of the matter was that tactical dehydration was in full effect because of the perceived hassle of fetching and boiling water for the necessary amount of time. Though disinfection only requires water to reach a boil for a matter of seconds to kill 99% of pathogens [3], the time it took to reach a boil would sometimes take 20-30 minutes due to the ambient air temperature. It was common to hear Soldiers and Marines cursing the cold air, a sound we understood to mean that they had just spilled their almost-boiled water.

During the second day we were forced to hunker down our camps because of a blizzard. What was meant to be a day of avalanche and land survival turned into an actual night of legitimate survival. We were instructed to ditch our tents and only pack one meal, a shovel, and any form of fire starting equipment; it was survival night. Our team created a "t-trench," which is similar to a snow coffin. Neither name instilled confidence but both are amazingly effective. A t-trench looks like it sounds: a length of eight feet, depth of six feet, width as required, and a "T" and the base with steps for entry/exit with an even deeper sub-base of about a foot in order to attract cold air from the trench. Branches and twigs were used to elevate our bodies from the ground and a tarp was used to cover our trench from the foot of snow we didn't know was coming that night. We made a fire using techniques similarly taught during an Aviation Survival Training Center's aviation life support systems brief: lint covered in Vaseline, a Blast-match, and tinder from available tree bark. Sparking tools are invaluable in certain situations, and I will always



## COLD WEATHER MEDICINE PART TWO: BROWN ADIPOSE TISSUE WOULD BE NICE RIGHT ABOUT NOW (CONT.).

LTJG JAMES "SID" SALASSI

carry one as a means secondary to waterproof matches. Our trench was filled with three bodies and we all agreed that it was the warmest night of sleep during the FX. Other teams weren't as lucky. Two students started manifesting early signs and symptoms of frostbite. The docs managed their feet and the full symptoms never presented.



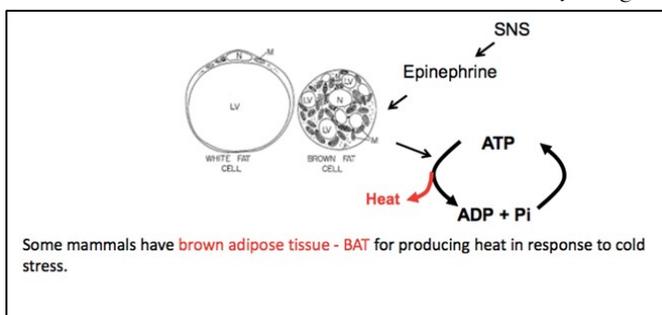
Upon reaching the peak of the mountain a select few were chosen to lead a team to the peak, an elevation just over 10,500 feet. Almost textbook, as soon as we reached 10,200 feet one Marine suddenly became nauseous, light-headed, and what he described as "weak." Hypoxia had surfaced and downed its first victim. The extraction and transportation was tedious and took half a day, but was otherwise uneventful. Our class was taught how to create an LZ for Fallon Search and Rescue (SAR) by using



our snowshoes to stamp down the snowy ground for a surface area of about half a football field. Unfortunately, because the weather had created unfavorable conditions, SAR was unable to extract our patient. That night we succumbed to the second blizzard of the FX. This night was cold—the kind of cold that left my body begging for brown adipose tissue. Brown adipose tissue, arguably absent in adults [3], is utilized in infants and some mammals as a form of *nonshivering thermogenesis* (NT). NT occurs through a variety of chemical means, sympathetic in nature, without muscular contraction via brown adipose tissue. Brown fat is brown due to a high density of mitochondria. To make brown fat combust and allow mammals to gain heat, an uncoupling protein (UCP) is stimulated via epinephrine, and rather than an end product of adenosine triphosphate (ATP), UCP "uncouples" the terminal reaction and catalytically harnesses heat [4]. This process is an evolutionary requirement for survival in the cold or dormant mammal. Certain mammals such as Reindeer and Huskies

are so efficient at warmth due to rete systems in their brain and periphery, respectively, that they actually have to dump heat in a similar cold environment during periods of work. This occurs with a countercurrent exchange vascular system [5] that operates similar to how oil is cooled in an aircraft; animals are kicking our butt in the extremes! I digress. With the class fatigued in all forms, we had completed the FX and many lessons were learned and debriefed.

To have done this for three days wasn't easy by any means, and it definitely provided insight into long-term military considerations. How might our military perform if we have to defend the North Pole? The idea isn't far-fetched and similar survival techniques have been taught in the South in our Navy's past. Historically, the United States has been studying cold weather survival since the 1950's. VXE-6, which has since stood down, provided logistical support for The National Science Foundation's Operation *Deep Freeze* in Antarctica [6]. What challenges might our aircrew have to deal with if put in situations



## COLD WEATHER MEDICINE PART TWO: BROWN ADIPOSE TISSUE WOULD BE NICE RIGHT ABOUT NOW (CONT.)

LTJG JAMES "SID" SALASSI

of evasion, patient extraction or survival in the cold? A review of Ernest Shackleton and the Endurance will be presented in the next installment of Cold Weather Medicine in next quarter's SUSNAP Newsletter.

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## ACQUISITION CORNER

*PMA202 LSS ISSC UPDATE*

LCDR SEAN "CREATURE" MCCARTHY



Welcome to the Acquisition Corner, grab a cup of caffeine (trust me you'll need it) and sit down for a tale of intrigue. Some of you have been here before, but to set the scene for all I must rehash the knowns. NAVAIR is a very large entity basically made up of 3 components, NAVAIR HQ; Naval Air Warfare Center – Aircraft Division (NAWCAD); and Naval Air Warfare Center – Weapons Division (NAWCWD) The NAWCAD 4.6.7 Protection and Sustainment Division is in the NAWCAD 4.6 Human Systems Department spaces physically on board NAS Patuxent River. LT Lippert and I are the only NAOs currently within NAVAIR 4.6. However NAWCAD

4.6 rarely funds or tasks us. I am funded 100% by PMA-202 (Aircrew Systems) to be the Life Support System In-Service Support Center (LSS ISSC) Team Lead. Me and my team are all administratively controlled by NAWCAD 4.6 (except for one contractor). PMA-202 falls under NAVAIR HQ generally. CDR Repass is a NAVAIR 1.0 member assigned to PMA-202, but he can fully explain his billet structure better than I.

So with that background out of the way, everyone now is refreshed with how NAWCAD 4.6 and PMA-202 interact. My LSS ISSC team is tasked solely with supporting and managing sustainment

items. We are not part of any acquisition team so any new products in development are not my responsibility UNTIL they TRANSITION (\*key DOD Acquisition term) to sustainment. The transition is a big deal. There is a large responsibility of formally accepting the program to sustainment. What this means is that there may be unresolved issues with the development of the product or contract issues and I have to argue whether I will accept the product or not. If the issues are too significant sometimes I can deny the product and keep it with the acquisition team until they resolve the issues. Sometimes (especially when the

## ACQUISITION CORNER

*PMA202 LSS ISSC UPDATE (CONT.)*  
LCDR SEAN "CREATURE" MCCARTHY



acquisition program has no more funding or time to resolve the issues) the product is forced into sustainment. Once the product is in sustainment, there it stays until it becomes obsolete to the Fleet or unsustainable. However, due to the nature of the LSS business and the PMA-202 State of the Art (SOA) Program, I often get involved with SOA assessments of commercial of the shelf (COTS) items. These are not acquisition programs, instead they are COTS products that would be authorized and then managed in the LSS manuals that do fall under my responsibility. Which leads me to the manuals, the LSS ISSC team is not responsible for every life support product in the Fleet. Since there are five ISSC teams under PMA-202

some products like the whole Aviation CBR system do not belong to me. Some of the oxygen systems stuff, all night vision, and all parachute stuff belong to other ISSC teams. Some of the LSS products are even platform owned like some radios for the C-12s and headsets for the E-2s.

The current issues that I spend most of my time on as the Team Lead are Life Preserver Units, Radios, Life Rafts, and Eye Protection. Of these, it is the LPU's that are the closest shark to the boat for me. As many of you know there is an inconsistent pull force requirement for LPU-34, LPU-37 and to a lesser extent LPU-36 activation. I spend much of my brain power managing the activities toward a stabiliza-

tion of this issue and push for resolution. The bottom line is that the stitching change we pushed out in April is a stabilization and significantly reduces the pull force needed to activate the LPU's. Additionally the LPU-36 has shown to be effective during two over water mishaps involving three aircraft this Spring.

I know there is never enough information that you can get from us up here at Patuxent River and that one, not so short, article in a quarterly journal is never going to answer all of your questions, but please keep the questions coming and I'll keep writing run-on sentences!

Sean.m.mccarthy@navy.mil

## CONCEPT OF PRIVILEGE

LCDR KIM "PINTO" LITTEL

In my time here at the Naval Safety Center, I've received a multitude of requests for SIRs, HAZREPs, PHYSEPs and other various data from our community. The requests are a great thing, and it makes me confident that we as a whole are teaching the Fleet the latest and greatest on mishap lessons learned. But also in fielding these requests, I've received

questions on what protocol is for briefing SIRs, what is releasable and to whom. For many (any ASO school graduate), this will likely be a refresher. But for those who have not yet attended ASO school, please tune in (ASTCs Interns especially)!

First let's cover the various investigative bodies. There are five major investigative bodies that can potentially surround an aviation mishap.

There's the Aviation Mishap Board (AMB), the Judge Advocate General (JAG) Investigation, the Field Flight Performance Board (FFPB), the Field Naval Aviator / Flight Officer Evaluation Board (FNAEB/FNFOEB), and the National Transportation Safety Board (NTSB). The purpose of the NTSB's investigation is to determine cause and make recommendations



## MISHAP LESSONS LEARNED

CHARLIE ANDERSON CAPT, MSC, USN (RET)

During my latest move (to Richmond, VA to be nearer grandkids) I came across a long forgotten box with notes from several of my old aircraft mishap investigations. As I leafed through them many memories were awakened of: lives lost; lessons learned; and the skills involved in determining what really happened in hope the causes would never be repeated. After reviewing my notes I thought it would be a shame to let some of these lessons fade and that it may be worthwhile to share some of the tidbits gleaned from long ago. I hope you find this both interesting and of help when you find yourself in positions of finding out “what happened?”- whether it be in mishap investigation or duties as a Naval officer.

I know most of the current AOPs have never met me and probably don't even know who I am, so a very short background to set the stage. I was designated AP #65 in 1972 and started at the APTU, NAS Miramar, CA (back when it was “NAS” Miramar; we operated out of “APTUs”; and mishaps were officially called “accidents”). In 1974 I was chosen to be one of the original AMSOs

when that program was started. After many moves through the AMSO billets, APTUs, COMNAVAIR staffs, the Model Manager, and Specialty Leader positions I was blessed to serve in two Commanding Officer positions and the Command Leadership School in Newport, RI. I retired in October of 2001 as CO of the Naval School of Health Sciences, San Diego, CA.

As one of the original six AMSOs (and serving in primary and collateral duty AMSO billets for about eleven sequential years) I believe I was directly involved in more aircraft mishap investigations than any AOP. I was a full board member for over 40 mishaps (yes, 40 – the Navy had a much higher accident rate back then) and literally hundreds of others (both mishaps and incidents through chain of command endorsements and consultations). My full board membership record was greatly assisted by the old F-8 and the then brand new F-14. Those two aircraft fell out of the Southern California skies with unfortunate regularity. As for other types of aircraft, I've lost the actual count, but know that I've been an investigation board member for almost two dozen different types during those 11 years.

Okay, enough of the “cred” building, now for literally the first file I pulled out of that box I found – one that was straight forward, but with an interesting conundrum. This mishap occurred about midway through my ASMO tours. As it would happen, it had one of the more simplistic, yet interesting, perplexities I experienced. What I'd like to do is present some facts of the situation and let you hone your investigative and critical thinking skills to see how well you can piece together what really happened from the human factors perspective. I'm going to ask some questions and make some observations in a sequential order. See how quickly you can pick out the salient facts and deduce “What Happened?” Please note that for at least one of the issues you will have to have some knowledge of aircraft “accident” physics.

Situation: An A-4 Skyhawk was experiencing engine problems, the pilot declared an emergency, and was returning to NAS Miramar. He was on short final, having just crossed the freeway at the end of runway 24L when he experienced complete engine failure at an altitude of approximately 150-200 feet. He successfully ejected and landed safely in the desert scrub just short of the runway threshold and very, very close to his fiercely burning aircraft

## MISHAP LESSONS LEARNED (CONT.)

CHARLIE ANDERSON CAPT, MSC, USN (RET)

wreckage. He was convinced the fireball was going to burn and collapse his chute, but he landed safely. However, during the first few minutes after landing the pilot suffered third degree burns to both hands, followed by traumatic explosive injury to his buttocks. Any first thoughts on how these injuries were caused?

Below and to the left are two pictures of the helmet he was wearing which I retrieved from the accident site while the ground was still smoldering – the helmet is in the same condition as when I first came across it. Please examine the helmet, note its condition, and then address the questions below.



1. Do you see any apparent contradictions in the physical conditions of the helmet?
2. There are three items/conditions that you should have zeroed in on.
3. Note the condition of the reflective tape.
4. What is covering some parts of the helmet that would not normally be found given the condition of the reflective tape?
5. Given these first two conditions (assuming you've gotten them), how do you explain the pristine condition of the dry weed in the visor housing?

Okay – that was admittedly a little obtuse and it would be difficult to score 100% yet, so here's a little more info: This was obviously a very low level ejection. The pilot did narrowly avoid having his parachute melted as he descended in very close proximity to the fireball. He landed right next to the ensuing fuel fed ground fire and was actually engulfed in the spreading flames at the perimeter of the fire for several seconds. He rolled out of the fire and lay on the ground for several minutes until fire and rescue crews arrived. There's still a little more to the dynamics of what happened here, but go back and revisit the above questions and see if you have refined your ideas, then read on.

**Spoiler alert:** Here's what I hoped you would observe and conclude.

The three seemingly paradoxical things of interest are: blistered reflective tape; soot covering the blisters; the dry, completely unsinged, and pristinely clean desert plant twig.

The reflective tape is blistered indicating that it was exposed to very high heat levels for at least several seconds (caused by the ground fire and his lying in it). There is a layer of soot over the blistering. The soot would not be pre-

sent unless (here comes the necessary knowledge of what temperatures are necessary to blister tape/not burn off soot/etc.) it was deposited after the tape was blistered, otherwise it would have been burned off as the tape was blistering (the soot was deposited as the pilot lay on the ground in the smoke after he rolled out of the flames).

Why does the twig not have any soot on it if he were in the smoke before the first responders arrived? Because he was "blown" away from the smoke by the explosive rupture of the emergency oxygen tank attached to the upper seat pan (he was still breathing via emergency oxygen as his mask was still attached and the helmet visor still down – a condition which protected his facial area from the flames). He was close enough to the flames that the heat caused the tank to explode causing injury to his buttocks. As he rolled from the force of the rupture and left the area of smoke, the twig was lodged in his visor.

**Bonus Question** – Note that the right side of the oxygen mask is unhooked. This was done by the pilot before fire and rescue arrived and took the helmet off him. He had to unhook it relatively quickly. Why?

Answer – When the Emergency O2 bottle

## MISHAP LESSONS LEARNED (CONT.)

CHARLIE ANDERSON CAPT, MSC, USN (RET)

exploded, the pressure to the regulator dropped causing it to shut down. He could no longer breathe and, although a struggle due to his burned hands, he unlatched his mask.

One last thing, his injuries – except for the buttocks trauma and the third degree burns to his hands he was not otherwise injured. Why did he suffer the severe burns to his hands and nowhere else?

You got it, he wasn't wearing his gloves! The burns resulted in his being

permanently grounded. As in many of the mishaps, little things make a big difference. Less than ten seconds more and he would have touched down. If the gloves were on he would have had minor to no burns and would have flown another day.

Okay, that's the short and sweet of this one. I hope you both enjoyed this and, especially, learned something useful. This is a rather simple example compared to some of the other challenges presented during other

investigations. I have an abundance of even more insightful /interesting experiences, so if you'd like more let the editor know and I'll dig deeper into my files.

PS – A personal “Thank You” to all of you for your service – retired hindsight serves to deepen the understanding and appreciation of what you are doing now and what it means for the future.



*The object of SUSNAP is to advance the science, art, and practice of Aerospace Physiology and its application to Naval Aviation and the mission of the U.S. Navy; to foster professional development of its members and enhance the practice of Aerospace Physiology within the Navy; to strengthen professional and fraternal ties; and to optimize solidarity and the professional standing of U.S. Naval Aerospace Physiologists.*

LEADERS BECOME GREAT, NOT  
BECAUSE OF THEIR POWER, BUT  
BECAUSE OF THEIR ABILITY TO  
EMPOWER OTHERS...  
-JOHN MAXWELL

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