

NATA Safety 1st® eToolkit

Welcome to the Seventh issue of the NATA Safety 1st® eToolkit, our monthly online safety newsletter, supporting the NATA Safety 1st® Management System (SMS) Initiative.

This monthly newsletter will highlight known and emerging trends, environmental and geographical matters as well as advances in operational efficiency and safety. Flight and ground safety has been enhanced and many accidents prevented because of shared experiences.



The NATA Safety 1st® Management System Initiative is now fully operational. Many of the tools discussed in this and other eToolkits will be provided as a part of the program.



SAFETY CASE STUDY:

Fatigue and its Effect on Ground Operations

In our quest to bring timely, easily transferable information to you for the prevention of accidents and incidents, and in examining a recent rash of ground damage events, we are focusing this Case Study on Fatigue and its effect on Ground Operations Safety. Over the past several months there have been a number of ground events that centered on the employees inability to maintain a suitable level of awareness and alertness on the ramp.

In several instances, several workers were badly injured and damage to aircraft and ground equipment was sustained in the hundreds of thousands of dollars. In most instances, the events included the worker driving a vehicle on the ramp during low light conditions, and just prior to coming off of shift.

Take this example, a worker on the third shift has been sitting in a line shack waiting for an early morning arrival (about one hour before his shift ends). The line shack is warm, the television is on and the employee is expected to greet the aircraft, remove the luggage and coordinate crew transport. While the worker sat in the line shack, he recalled his eyes felt heavy. He closes his eyes momentarily in the line shack, and then the call comes in – aircraft inbound. The ride from the line shack to the hard stand is about five minutes, as the worker



New SMS Participants

Company Name	City	State
Aero Sport Inc.	St. Augustine	FL
Atlantic Aero Inc	Greensboro	NC
Elliott Aviation - Moline	Moline	IL
Elliott Aviation - Omaha	Omaha	NE
Flightstar Corporation	Savoy	IL
Jet Aviation - Teterboro	Teterboro	NJ
Jetscape Services LLC	Ft. Lauderdale	FL
L.J. Aviation	Latrobe	PA
Million Air - St. Louis	Chesterfield	MO
Miracle Strip Aviation	Destin	FL
Prospect Aviation Corporation	Beaver Falls	PA
Ranger Aviation Enterprises	San Angelo	TX
Spectrum Jet Center	Hayden	CO
Tradewinds Aviation Inc.	Waterford	MI
Vail Valley Jet Center	Gypsum	CO

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SMS Participants

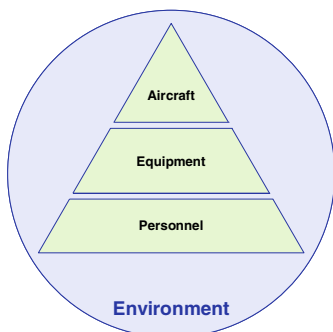
Please remember to report any accidents, incidents or near miss events to SH&E. Your EVENT REPORTING FORM is located in Appendix C of your NATA Safety 1st® Management System (SMS) manual. If you have specific questions call SH&E Safety First Toll-Free at 1-877-287-7896 or email us at Safety 1st@sh-e.com.

drives across a darkened remote ramp, his eyes are still heavy, a few yawns and then he last remembered seeing a rotating beacon – later that afternoon, he woke up in the hospital. Could this have been a MicroSleep event? Take a close read and let's determine if these conditions may have led up to this accident.



Man – Machine and Environment

Your workers' ability to maintain alertness and awareness to their surroundings will prevent accidents like these from occurring. But there are things you need to be aware of, that is, the physiological aspects of human performance and the causal factors that can diminish performance.



We are talking about awareness in relation to other **fixed** or moving objects, and Alertness in the form of being able to identify changing conditions, such as developing hazards and diminished personal performance. I think it would be safe to say that all of us have experienced, at time or another, that overwhelming need to shut ones eyes to get some quick rest. Hopefully, this was accomplished in a nice, comfortable easy chair away from hazards and imminent risk. However, we know differently. Many people have experienced this overwhelming impulse to close their eyes when in the act of operating equipment.

The condition is referred to as Micro Sleep and is more common than you would think. So let's get a primer on fatigue and its indicators and effects on our performance.

Fatigue is a threat to aviation safety because of how it affects performance. "Fatigue" is defined as "a non-pathologic state resulting in a decreased ability to maintain function or workload due to mental or physical stress." The term historically described a range of experiences from sleepy, or tired, to exhausted. There are two major physiological phenomena that have been demonstrated to create fatigue: sleep loss and circadian rhythm disruption.

Fatigue is a normal response to many conditions common to flight and ground operations because of sleep loss, shift work, and, in the case of aircraft flight operations - potentially long duty cycles. The only effective treatment for fatigue is adequate sleep

A fair portion of the material researched and used for this eToolkit came from sources such as the **Canada Safety Council** which is a national, non-government, charitable organization dedicated to safety. In addition, the **Road and Traffic Authority of New South Wales** has also provided some exceptional information, particularly in defining conditions associated with extreme fatigue; and Dr. Samuel Strauss.

Fatigue is a critical occupational safety concern for shift workers, especially workers in the transportation industry. Off the job, being overtired creates a risk for anyone who undertakes an activity that requires concentration and quick response -- from driving, to home repair, to skiing. And exhaustion is one of the most common health complaints for workers.

How sleep affects safety

Irregular working hours, monotonous work, long shifts, vibrations and certain prescription drugs increase drowsiness and reduce alertness. The costs are devastating in human terms, and the economic consequences are enormous. Worldwide, the National Institute for Working Life, a Swedish organization, estimates that sleep-deprived workers cost \$350 billion per year in productivity and accident related expenses.

Sleep is as basic to survival as food and water. Losing as little as two hours of sleep can negatively affect alertness and performance. Sleep deprivation affects a person's carefulness and ability to respond to an emergency.

Symptoms can include: decreased judgment, decision-making and memory; slower reaction time; lack of concentration; fixation; and worsened mood.

Studies monitoring brain activity show that one shift worker in five dozes off during the shift. Often, they do not realize afterwards that they have done so. Drowsy drivers, according to sleep researchers, may cause as many crashes as impaired drivers. Regardless of motivation, professionalism, training or pay, an individual who is very sleepy can lapse into sleep at any time, despite the potential consequences of inattention.

The Circadian Clock or Circadian Rhythm

The body's processes have peaks and low points during every 24-hour period. These are called circadian rhythms. Time cues -- such as sunlight and work/rest schedules keep the circadian clock "set." Crossing time zones or changing from a day shift to a night shift forces the circadian clock to move to a different schedule. Time is required to adjust to the new schedule. During the transition, symptoms similar to sleep loss can occur. Disruption of the circadian rhythm when combined with loss of sleep can create a dangerous increase in fatigue.

Circadian rhythms are physiological cycles that follow a daily pattern. We are "programmed" by our circadian rhythms to sleep at night and to be awake during the day. During nighttime hours and to a lesser extent during afternoon "siesta" hours, most types of human performance are significantly impaired, including our ability to drive.

Problems occur if we disrupt our natural sleep cycles (eg by staying awake during the night,), do not get enough sleep, or get poor quality sleep.

Circadian rhythms cannot be reversed. Even if you have been working nightshifts for many years, your body will still be programmed to sleep at night.

Sleep Debt

The human body requires a certain amount of sleep each night to function effectively. The average amount of sleep a person needs is 8 hours. When we reduce the number of hours we sleep at night we start to accumulate what is called a 'sleep debt'. Sleep debt is defined as the difference between the hours of sleep a person needs and the hours of sleep a person actually gets. For example, if a person needs 8 hours of sleep per night but only gets 6 hours of sleep one night, they have a sleep debt of two hours. These lost hours of sleep need to be replaced.

When we have sleep debt, our tendency to fall asleep the next day increases. The larger the sleep debt, the stronger the tendency to fall asleep. Sleep debt does not go away by itself. Sleeping is the only way to reduce your sleep debt.

Sleep Inertia

Sleep inertia is the feeling of grogginess after awakening and temporarily reduces your ability to perform even simple tasks. Sleep inertia can last from 1 minute to 4 hours, but typically lasts 15-30 minutes.

The severity of sleep inertia is dependent on how long you have been asleep and the stage of sleep at awakening. Effects can be severe if a person is very sleep deprived or has been woken from a deep sleep stage. However, sleep inertia can usually be reversed within 15 minutes by activity and noise.

Sleep inertia can cause impairment of motor and cognitive functions and can affect a person's ability to drive safely. Sleep inertia can be very dangerous for people who drive in the early morning hours and shortly after waking up from a sleep.

Microsleeps

Microsleeps are brief, unintended episodes of loss of attention associated with events such as blank stare, head snapping, prolonged eye closure, etc., which may occur when a person is fatigued but trying to stay awake to perform a monotonous task like driving a car or watching a computer screen.

Microsleep episodes last from a few seconds to several minutes, and often the person is not aware that a microsleep has occurred. In fact, microsleeps often occur when a person's eyes are open.

While in a microsleep, a person fails to respond to outside information. A person will not see a red signal light or notice that the road has taken a curve. Microsleeps are most likely to occur at certain times of the day, such as pre-dawn hours and mid-afternoon hours when the body is "programmed" to sleep.

Microsleeps increase with cumulative sleep debt. In other words, the more sleep deprived a person is, the greater the chance a microsleep episode will occur.

In one study of microsleep, participants were asked to press a button when a strobe light was flashed directly in their eyes every few seconds. During a microsleep they did not notice the light and were not even aware that they had been asleep.

Factors in the work environment

The environment and nature of the work can further magnify the effects of sleep debt and circadian rhythms. Environments with dim lighting, limited visual acuity (e.g. due to weather), high temperatures, high noise and high comfort tend to enhance fatigue. Also, a worker's susceptibility to fatigue is increased by tasks where attention must be sustained for long periods, and those which are long, repetitive, paced, difficult, boring and monotonous.



How to fight fatigue

Despite the fact that working nights and early mornings does not promote good health, shift work is a necessary part of today's work environment. Expensive machinery has to operate to its capacity. Goods have to arrive "just in time." Patients in hospitals need care around the clock and airports that operate 24 hour a day.

Lifestyle, operational constraints and physiological disorders are key components in the world of fatigue.

Workers can reduce fatigue through proper nutrition, stress control and exercise. A healthy diet provides longer-lasting energy and regular exercise is important.

Employers can consider shorter shifts, adding active tasks, like reconciling fuel shipments, aircraft arrival and departure data, thereby eliminating significant down or waiting time or inactivity. Developing employee rotation schedules that go in the direction of the sun (morning, afternoon, night) have been found to reduce the negative effects of fatigue on airport operations.

Employers should be on the lookout for potential sleep disorders or conditions that may exacerbate fatigue conditions. By identifying those conditions at your operation that add to fatigue, you can then take steps to control and eliminate them.

As in our example, the employee said he just didn't see the parked aircraft. Now, as spring approaches, days begin to get longer and your daylight/nighttime references begin to change. This is prime fatigue season and reason to assess how your employees and you, are working to maintain alertness.

For additional information: Loughborough Sleep Research Centre Dement, William C. 'Sleep Debt' 2000.

http://www.sleepquest.com/d_column_archive6.html

NATA is holding a competition for the worst White Bucket in the Industry. Send us a digital photo of your white bucket and we will choose one lucky (needy) recipient for a special prize during our March Fuel Quality Special Issue of eToolkit. Send your electronic photos to Amy Koranda at akoranda@nata-online.org

MISFUELING

By Walter Chartrand, Training Manager - Air BP Aviation Services

Some might say..."Oh great, another beauty pageant!" but in reality, should a Misfueling occur, things can get pretty ugly.

Refiners of fuel work very hard to ensure that fuel is made to a "specification" that is acceptable to the aircraft using it. Maintaining that quality is the challenge once the product leaves the refinery gates. There are numerous points of transfer where aviation products are filtered to remove dirt and water picked up during shipment. It is also essential that during these transfers that the correct grade of aviation product is transferred into the correct grade of storage tank or aircraft to avoid product contamination or misfueling (when an aircraft receives the wrong grade of fuel). Product contamination or misfuelings can lead to serious safety issues from damaged engines, to loss of life, or to an aircraft accident due to engine failure in flight. Hence, it is essential that proper checks are performed during transfer of aviation products to prevent any contamination/misfueling from happening. AIR BP Aviation Services recommends checks at the various transport points during transfer from a distribution terminal to aircraft as described below.

Transport truck distribution terminal loading racks have incorporated electronic loading systems to assist in loading the correct product requested. However, if the trailer being loaded has a contaminant or dissimilar product inside, the first opportunity for a misfueling could occur. This is the reason Air BP Aviation Services works so very hard and is so insistent on "product grade" dedicated transport trailers to haul our product. AIR BP Aviation Services also insists that a pre-loading check of the transport be completed to check for water or dirt that might have inadvertently entered the transport interior and that the driver/operator document this check.

The next opportunity to have a misfueling incident is at the point of delivery. Once the tractor trailer has arrived at the airport, the documentation should be checked to ensure the correct grade of fuel was loaded as requested, an API Gravity test should be performed on product sumped from the compartments and the results compared to the originating documentation. (Truck Loads with a difference greater than 1 API Degree between the documentation and the observed API check should not be

accepted unless further investigation shows no contamination is present). The fuel should be checked for quality by a visual examination for water, dirt and any discoloration before off-loading. Sounds simple, but occasionally we hear of someone delivering fuel into the wrong tank with serious consequences.

AIR BP Aviation Services recommends using dissimilar sized couplings at the fuel farm for each grade of product. This might not stop off loading into the wrong tank, but it might get those making or accepting the delivery to think!

An area not often considered as potential misfueling, but which can lead to serious problems, is when product is returned to storage after meter calibration from a meter proover tank by a state agency or contractor. Proover tanks are used to calibrate a number of different product and unless clean and dry, can lead to either contamination or, when returning aviation product back to storage, into the wrong grade of storage tank. Before any product is returned to storage, the grade of product should be verified and checked to ensure it has not been contaminated by water, dirt or other grade of products.

Next in the chain is how our airport refuelers are loaded. The chance for a misfueling to occur in a "top loading" operation is so high, the industry as a whole has moved to bottom loading of refuelers utilizing dissimilar couplings for Avgas and Jet Fuel.

And lastly, as fuel is put into aircraft, the operator fueling the aircraft should verify that the aircraft is equipped with a wing decal which describes the grade of aviation fuel that can be used in the aircraft and that this grade matches the fuel that will be dispensed from the airport fueling vehicle. In addition, all Jet Fuel over wing nozzles should be equipped with a "Duckbill or J Spout" nozzle (which due to its size, will not enter most, but not all, avgas fuel powered aircraft). All over wing nozzles should be aviation grade color coded, red for Avgas and Black for Jet Fuel, or have grade decals applied to them (Decals are available from GAMA).

Many times these safety devices are not used because of inconvenience or the "Duckbill or J Spout" is not returned to service after fueling an aircraft that will not accept this nozzle (mostly older helicopters). Wouldn't it be difficult to explain to surviving family members that the "Duckbill or J Spout" safety nozzle wasn't used because of this "inconvenience"?

If a line service technician sees that an aircraft does not have a decal at the fueling point that describes the proper grade of fuel for that aircraft or when using Jet Fuel nozzle spouts without a “Duckbill or J Spout” nozzle, they should confirm in writing with a flight crew member about the proper grade of fuel required by the aircraft and offer a FREE fuel grade decal.

Many Air BP operations use this as a marketing tool saying to the crew...“We know what type of fuel your aircraft takes but maybe the other facilities you visit

won’t. We care about you and we don’t want you to be misfueled.”

“CONFIRM, DON’T ASSUME” is Air BP Aviation Services program to help eliminate misfueling. This program addresses, with a training video and other training material, many of the areas described above in addition to offering FREE product grade decals to be given to the pilot. AIR BP branded FBO’s can obtain this training package and decals from an AIR BP Aviation Regional Technical Representative or Regional Sales Manager.

Lifting Safety

Check the Object or Load Before You Lift and Make Sure it is Packed Correctly

- **Test every load before you lift by pushing the object lightly with your hands or feet to see how easily it moves. This tells you about how heavy it is.**
- **Remember, a small size does not always mean a light load.**
- **Make sure the weight is balanced and packed so it won't move around.**
- **Loose pieces inside a box can cause accidents if the box becomes unbalanced.**

Is it easy to grip this load?

- **Be sure you have a tight grip on the object before you lift it.**
- **Handles applied to the object may help you lift it safely.**

Is it easy to reach this load?

- **You can be injured if you arch your back when lifting a load over your head.**
- **To avoid hurting your back, use a ladder when you're lifting something over your head.**

What is the best way to pick up an object and Avoid Back Injury?

- Use slow and smooth movements. Hurried, jerky movements can strain the muscles in your back.
- Keep your body facing the object while you lift it. Twisting while lifting can hurt your back.
- Keep the load close to your body. Having to reach out to lift and carry an object may hurt your back.
- "Lifting with your legs" should be done only when you can straddle the load. To lift with your legs, bend your knees, not your back, to pick up the load. Keep your back straight.
- Try to carry the load in the space between your shoulder and your waist. This puts less strain on your back muscles.
- Pace yourself. Take many small breaks between lifts if you are lifting a number of things.
- Don't overdo it--don't try to lift something too heavy for you. If you have to strain to carry the load, it's too heavy.
- Make sure you have enough room to lift safely. Clear a space around the object before lifting it.
- Look around before you lift, and look around as you carry. Make sure you can see where you are walking. Know where you are going to put down the load.
- Avoid walking on slippery, uneven surfaces while carrying something.
- Don't rely on a back belt to protect you. It hasn't been proven that back belts can protect you from back injury.
- Get help before you try to lift a heavy load. Use a dolly or a forklift if you can.

**In Next Month's
eToolkit...**

**Fuel Quality
Special Issue**



CONTINUING EDUCATION

Through continuing education, you and your team can enhance the professional skills needed to maximize personal and professional contributions to the day-to-day efficiency of your operation. We will provide learning opportunities in each monthly issue that may be of interest to you and your team.

General Education Offerings from NATA:

Aircraft De/Anti-Icing Online Training

Website: <http://www.nata.aero/events/index.html> (click Online Training)

Business Aircraft Deicing Guide

Website: <http://www.nata.aero/publications/index.html>

Seminars In Las Vegas During the March Convention!

- Financial Management Tools and Techniques for Aviation Service Businesses
- Growth Through Customer Service
- Line Service Supervisor Seminar
- NATA Safety 1st® Trainer Seminar
- Tax Seminar

Website: <http://www.nata.aero/events/index.html> Phone: 703/845-9000, ext 106

Information on NATA Safety 1st® Training

Online: <http://www.nata.aero/events/index.html>

Phone: (703) 845-9000, ext 127

Fax: (703) 845-8176

Mail: NATA
4226 King Street
Alexandria, VA 22302

Safety Training Tip:

Research shows lectures are the cheapest, most common and least effective training method. Hands-on demonstration to a small group, or one-on-one, beat out lecturing every time. Your best bet is to combine the two.

Aviation Safety and Security Offerings:

Embry-Riddle Aeronautical University's Center for Aerospace Safety/Security Education (CASE)

Website: http://www.avsaf.org/case/programs_events.html

Phone: 386/226-6928, Email: case@erau.edu

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Phone: 901/751-5400

Southern California Safety Institute

Website: <http://www.scsi-inc.com/>

Phone: 310-517-8844 ext. 5

The GW Aviation Institute Aviation Safety and Security Certificate Program

Website: http://www2.gwu.edu/~aviation/safetyandsecurity/ss_courses.html Phone: 703/726-8334

Transportation Safety Institute

Website: <http://www.tsi.dot.gov/divisions/Aviation/aviation.htm> Phone: 405/954-3614

University of Southern California

AVIATION SAFETY COURSE

Website: http://viterbi.usc.edu/pdfs/unstructured/aviation/Course_Schedule.htm Phone: 310/342-1345

The NATA Safety 1st® eToolkit is brought to you by NATA Safety 1st® SMS and SH&E. SH&E is the leading expert in safety and operational integrity evaluations and safety management consulting. SH&E has developed a proprietary evaluation methodology, called Safety Architecture, which is unique within the industry as it focuses on systemic surveillance and process evaluation. This is a systems and controls look at how an operator manages those technical functions that support aviation operations.



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