



Crew Endurance Management System

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Crew Endurance Resources

Welcome to the Crew Endurance Management System (CEMS) Newsletter, bringing you the latest information about sleep and endurance. Our goal is to support your personal knowledge and application of the principles of Crew Endurance Management.

Some of the information in this newsletter is derived from the National Sleep Foundation's weekly e-newsletter *NSF Alert*. If you'd like to receive this publication regularly, sign up with them [here](#) – it's free!

To receive the CEMS Newsletter by email, please register with us [here](#).

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Industry Leaders

Crew of *Viking Athene* Make Crew Endurance Training a Contest

By Steve Spearman, Technical Writer and Editor

When it comes to crew endurance training, the crew of the *Viking Athene* doesn't play around...or do they? "We have made a game of it--literally," says ship master Arild Lonning of the CEMS-based program that has crewmembers competing for prizes.

The training program was started up only last year, but the *Athene's* crewmembers have already shown unparalleled enthusiasm for it, prompting Johannes Syltevik, leader of the Environmental Health and Safety (EHS) committee, to comment, "They are the best in the class."



The idea behind the program is to take the H in EHS seriously. A key component of the program is the rewarding of individual effort. For every five training sessions (two and a half hours) completed, the participant receives a t-shirt. Twenty sessions



under one's belt means a gift voucher from a sporting-goods company. Forty sessions in the bank earns the crewmember a training jacket. The grand prize bestowed upon those who complete 100 sessions is a heart rate monitor watch.

Syltevik's praise should not be taken lightly. With only a spinning bike, a rowing machine, and a set of weights, the *Viking Athene* doesn't exactly qualify as a floating gymnasium. But modest training resources didn't stop the boat crew—which consists of only 14 people per shift—from signing up for the program to the tune of 582 registrations to date.

CEMS Risk Factors**Caffeine: Two-faced Friend to Nightshift Workers**

By Steve Spearman, Technical Writer and Editor

Caffeine is a powerful temptress. Who among us hasn't at some time or another reached for the coffee pot or a soda in an effort to stave off the drowsy effects of impending sleep? Those who work at night are particularly vulnerable to the lure of caffeine, and often rely on it as a means of managing an otherwise tiresome work schedule. But results from a recent study on caffeine and daytime recovery sleep conducted by the University of Montreal, suggest that nightshift workers should "just say no" to coffee and other caffeinated products.

While caffeine's effects on nocturnal sleep—delayed onset, frequent awakenings, reduction in deep sleep—are well-known and documented, this study undertook to look at the impact of caffeine taken at night on subjects who slept during the day.

Conducted by Dr. Julie Carrier of the University of Montreal's Department of Psychology, the double-blind, crossover* study concluded that caffeine negatively impacts sleep efficiency to a greater extent for subjects who slept during the daytime than for those who slept at night. This conclusion is important because it underscores the important role that circadian rhythms play in recuperative sleep.

In the study, thirty-four "moderate caffeine consumers" received either a placebo (lactose) or a divided dose of 200 mg of caffeine. Half of the participants followed their usual nocturnal sleep schedule while, the other half were deprived of sleep for one night and allowed to sleep during the next day. Compared to the placebo, caffeine was shown to negatively affect both groups by lengthening the time it took subjects to fall asleep, increasing stage 1 ("light" sleep—about 5 percent of total sleep time), and reducing both stage 2 (largest percent of total sleep time) and slow-wave ("deep" sleep) sleep, or SWS. However, the sleep-altering effects of caffeine proved to be much stronger for the group that slept during the day. And, this group alone experienced a reduction in both sleep duration and rapid-eye movement (REM) sleep.

These conclusions indicate that circadian rhythms have a greater influence on sleep than was previously understood. Researchers now believe that the circadian wake signal is strengthened in response to the reduction of SWS during daytime sleep caused by caffeine. As Dr. Carrier puts it:

"Caffeine makes daytime sleep episodes too shallow to override the signal from the biological clock that tells the body it should be awake at this time of day. We often use coffee and other sources of caffeine during the nighttime to counteract sleepiness generated by sleep deprivation, jet lag, and shift-work. However, this habit may have important effects when you then try to recuperate during daytime."

So, it's a good idea to think twice about getting a boost from that cup of joe or can of soda before you start your next nightshift—that short-term energizing effect may come back later to haunt you in your sleep.

*A double-blind, crossover study, as referenced above, is one where all subjects receive both the drug (caffeine) and the placebo in random order, and where neither the subjects nor the researchers are aware of who receives the drug and who receives the placebo, until the study concludes.

Physical Stressors

Fat Chance: Overeating and the Circadian Clock

By Steve Spearman, Technical Writer and Editor

New research from Northwestern University and Evanston Northwestern Healthcare (ENH) finds that overeating negatively affects the body's circadian clock, leading to unhealthy behavioral and physiological changes, including a disproportionate increase in body weight.

The circadian or biological clock regulates many critical aspects of metabolism, physiology, and behavior in living organisms, including fluid balance, body temperature, endocrine processes, oxygen utilization, sleeping and waking, and rest and activity. The clock operates in various organs and tissue in the body, including the brain, lungs, liver, heart, and skeletal muscles.

In the study, mice fed a high-fat diet exhibited disruptions in appetite control (a mechanism regulated by the circadian clock), causing them to take in extra calories during those times when they normally slept or rested. Researchers discovered that the overfed mice, in addition to gaining weight, underwent physiological changes to their genes responsible for encoding the circadian clock in the brain and in peripheral tissues. These changes reduced the further expression of these genes and adversely influenced the animal's circadian rhythms.

To control for other factors, the study used mice with identical genetic backgrounds who were fed a regular diet for two weeks before being split into two groups. One group continued with the regular diet for an additional six weeks; the other group was placed on a high-fat diet where 45 percent of calories came from fat. In just two weeks, the high-fat diet group experienced a sudden change in their normal sleeping and eating pattern in which they ate at times previous spent resting or sleeping. The other group did not exhibit this behavioral change.

According to Joe Bass, M.D., assistant professor of medicine and neurobiology and physiology at Northwestern and head of the division of endocrinology and metabolism at ENH, "It's not just that the animals (in the high-fat diet group) are eating more at regular meals. What's happened is that they actually shift their eating habits so that all excess food intake occurs during their normal rest period. Timing and metabolism evolved together and are almost a conjoined system. If we perturb the delicate balance between the two, we see deleterious effects."

This study underscores the delicate balances between control mechanisms in the body, mechanisms that are still not fully understood by medical science. It is hoped that further research into the relationship between diet and the circadian clock will yield breakthroughs in the prevention and treatment of obesity and diabetes.

News in Other Transportation Modes

Most Wanted: Mandatory CEMS Compliance

By Dave McCallum, Technical Writer and Editor

When it comes to training and teaching vessel crews the best way to reduce accidents and incidents caused by human fatigue, the Coast Guard has been using a voluntary program known as the Crew Endurance Management System, or CEMS.

On Nov. 8, the National Transportation Safety Board (NTSB), in an annual meeting to review transportation safety improvement issues found on its "Most Wanted List", reiterated its desire for the Coast Guard to make the program mandatory for all types of vessel crews.

Dr. Jana Price, an NTSB transportation research analyst, recommended to the five-member panel led by NTSB chairman Mark Rosenker that the Coast Guard establish a scientifically-based hours of service (HOS) regulation to set limits on hours of service, provide predictable work and rest schedules, and consider circadian rhythms and human sleep and rest requirements.

"We have been following up with the Coast Guard for a long time with their voluntary program, and although it has some merits, we don't feel that the voluntary program alone will do what it takes to take care of this problem (hours of service)," she said. "We would like to see (the Coast Guard) do what the recommendation asks for, which is, to change the regulation."

In Section 409(c) of the Coast Guard and Maritime Transportation Act of 2004, signed by President Bush on Aug. 9, 2004, "the Secretary [of Homeland Defense] may prescribe by regulation requirements for maximum hours of service (including recording and recordkeeping of that service) of individuals engaged on a towing vessel that is at least 26 feet in length measured from end to end over the deck (excluding the sheer)."

In making her recommendation, which the panel unanimously approved, Price also asked that the issue be downgraded from yellow to red. The panel also unanimously approved the change in classification. [The NTSB color-codes items on its "Most Wanted List" as red (unacceptable), yellow (acceptable, but progressing slowly), or green (acceptable and progressing in a timely manner), depending on how an agency is progressing with the issue in question.] Price stated that she and the rest of the NTSB staff were concerned that because CEMS is a voluntary program, it would be impossible for the program to be adopted or practiced by companies in the maritime industry. She pointed out that approximately half of the companies that participated in the Coast Guard's demonstration project in 2005 reverted to the 6-on, 6-off watch standard they had used before participating in the project. "Under these circumstances (6-on, 6-off), it would never be possible for crews to maintain the eight hours of uninterrupted sleep that is necessary to maintain alertness levels during working periods," Price said.

Dr. John Spencer, director of the NTSB's Office of Marine Safety, said he and his staff were concerned with vessel crews that use the 6-on, 6-off watch standard. Most of those crews, he said, operated on the U.S. inland waterways. Spencer added that he anticipates adding more marine issues to next year's watch list.

News in Other Transportation Modes

Hours of Service Rule Reinstated for Motor Carriers

By Dave McCallum, Technical Writer and Editor

The Federal Motor Carrier Safety Administration (FMCSA) has adopted an interim rule effective Dec. 27 in regards to its Hours of Service regulations for its commercial motor vehicle drivers. Drivers beginning their workday will now be allowed to drive for 11 hours within a 14-hour period after being off-duty for 10 consecutive hours. In addition, the interim rule allows motor carriers and their drivers to restart their weekly on-the-clock limits after a driver has had a minimum 34 consecutive hours off duty.

The interim rule puts back in place the requirements the FMCSA had previously adopted in 2003. Those requirements had been vacated by the U.S. Court of Appeals for the District of Columbia on July 24, 2007, because the Court found various faults in the proposed 11-hour driving limit and 34-hour restart.

However, in response to a motion by American Trucking Inc. and a subsequent response from FMCSA, the Court stayed its mandate until Dec. 27. According to the FMCSA, the interim rule is necessary to prevent confusion by motor carriers and drivers as to which HOS regulations are in effect once the Court's mandate becomes effective, as well as to limit the possible effects on delivery of essential goods and services by motor carriers.

Fatigue Proves Fatal in Tractor Trailer Accident

By Dave McCallum, Technical Writer and Editor

In a report released December 4, the National Transportation Safety Board (NTSB) cited fatigue issues as probable causes in a July 2004 accident involving a tractor trailer. The accident, which occurred near Chelsea, MI, claimed the life of the driver and injured two others. The report indicated that the tractor trailer driver had failed to get enough rest before heading out onto the highway.

Along with the fatigue issues, the NTSB found a lack of oversight and compliance by the company that owns the tractor trailer in following federal HOS regulations and requiring tamperproof driver's logs. The report stated that the company did not use proper paper logs and failed to collect and maintain proper electronic documentation, placing the driver in violation of federal HOS regulations.

According to reports, the truck driver did not react in time to slow-moving traffic in a work area on Interstate 94 East, causing the truck to slam into another tractor trailer, which in turn hit a station wagon. The driver of the second tractor trailer and the station wagon driver suffered minor injuries. The accident, according to NTSB chairman Mark Rosenker, is another reason for motor carriers to require on-board data recorders. "For the past 30 years, the Safety Board has advocated the use of on-board data recorders to improve hours-of-service compliance," he said. "The technology is available and proven. Now it's time to use it to make our roadways safer."

CEMS Training**Year-end CEMS Experts Class a Success**

By LCDR Vivianne Louie, USCG



FRONT, L to R: Mike Bowman, Trae Gandee, Jeff Bell, Brian Fletcher, Ron Robbins
BACK, L to R: Chris O'Toole, Vivianne Louie, Bill Stewart, Alan Dujenski, Ginger Duncan, Jason Adams, Jeremy Dyer

The CEMS Experts Training is provided for individuals who wish to conduct the Coast Guard's two-day Coaches Course. Much like the Coaches class, the topics covered during the three-day Expert's Course include the CEMS process, individual sleep requirements, light management, stress, diet and exercise. The instructor complement is typically comprised of Coast Guard and industry CEMS Experts with diverse backgrounds from shoreside management to vessel operators. With the wide range experience in the classroom, a considerable amount of time is spent discussing lessons learned, tactics and strategies for implementing good crew endurance practices.

The second and final CEMS Expert's Course for 2007 was held from December 4th through 6th in St. Louis, Missouri. AEP Memco graciously hosted the course at the Drury Inn at Creve Couer and provided the conference room, lunch and light refreshments for the three-day course. The class included attendees

from the "brown water" fleet as well as those from the Pacific Northwest and represented Kirby Corporation, AEP Memco, Ingram Barge Company, Marquette Transportation, Alan R. Dujenski & Associates, and Tidewater. The success of the class would not have been possible without the expertise and support of the seasoned instructors: Captain Mike Bowman (Kirby Corp.), Mr. Ken Davidson (ACL), Ms. Jo Ann Salyers (Salyers Solutions) and new instructors: Capt. Bill Stewart (AEP Memco), Mr. Ron Robbins (Ingram), and Capt. Jeff Bell (ACL).

For more information, or to enroll in the next CEMS Experts Course, please contact LCDR Vivianne Louie at (202) 372-1358 or via e-mail at vivianne.w.louie@uscg.mil.

CEMS Training Classes

Coaches Classes

January 15: *SCI CME Paducah*

February 4-5: *Brock Training Center*

February 12-13: *SCI CME Paducah*

March 11-12: *SCI CME Paducah*

March 17-18: *Brock Training Center*

December 18-19: *New Orleans, LA*

Experts Classes

Spring class dates to be determined.

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Web Sites:

<http://www.uscg.mil/hq/g-m/cems/index.htm>

<http://www.uscg.mil/hq/g-w/g-wk/wks/CEM.htm>

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<http://www.uscg.mil/hq/g-m/cems/register.htm>