



# CREW ENDURANCE MANAGEMENT

Published by the United States Coast Guard – Department of Homeland Security

Spring 2010

## Publisher's Corner

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When people are unfamiliar with something, they tend to steer clear of it out of fear or mistrust. You may find that this is how you feel about Crew Endurance Management.

This newsletter is dedicated to increasing your familiarity with Crew Endurance Management and its benefits. We invite you to read this issue of the newsletter to see what Crew Endurance Management (CEM) can mean to your personal safety, the safety of your vessel and crew, and to your health. We encourage your continued interest in Crew Endurance Management and we look forward to your return to read future issues of the CEM newsletter.

## Can You Afford To Let This Happen To You?

**W**hen you think about fellow crewmembers, how many can you identify as having diabetes, gastrointestinal disease, heart disease/stroke, obesity, or depression? How about yourself—has your doctor identified you as being at high risk for some of these diseases? Two articles published in 2008 and 2009 reveal that getting less than six hours of continuous sleep per

night, over a period of even six days, can predispose you to some of these diseases. Studies have also shown that your body is not the only part of you that suffers from such conditions.



Your brain doesn't function as well even after only one night of sleep of less than 6 hours. Memory, attention, decision-making, reaction time, and the ability to think clearly and quickly are all affected when you haven't had sufficient daily sleep. These conditions contribute directly to the loss of situational awareness shown to cause accidents and incidents in the maritime work environment.

So, do you have the opportunity to protect your safety and health with sufficient daily quality sleep? Let's consider some of the safety and health impacts when you do not get sufficient quality sleep each day.

### Your muscles

They lose reaction time and accuracy. This means that your legs and feet don't lift or step as accurately, the ability to quickly grab or lift things degrades, and eye discomfort such as dryness and redness occurs frequently. Thus, the risk for slips, trips, and falls occurring increases for crewmembers walking on the deck in the dark or on the tow of a vessel.

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## Your brain

It suffers declines in performance. When the brain doesn't have sufficient sleep, the brain cannot remember information well, it becomes slow to keep up with and take in information, and it cannot integrate thoughts to make decisions quickly and accurately. For a mariner navigating a vessel, these cognitive functions are critical in taking the appropriate actions to avoid accidents. Also, not getting sufficient daily sleep causes chemical changes in the part of your brain that produces rational thought to control your emotions. When it comes to the safety of the vessel, your brain's logical disconnection from your emotional state can result in riskier actions that can contribute to accidents.

## Your heart

It suffers from higher risk for diseases, irregular heartbeats, and stroke. The specific cause of this is still being examined. However, reduced daily sleep has been shown to cause inflammation in the body and, in concert with other diseases, can result in greater risk of heart disease. The relevance of this is increased risk for incapacitation of bridge or wheelhouse personnel.

These are just three examples of what can happen if you do not receive the recommended 7–8 hours of continuous daily sleep. You can access the articles in the links below to find out about the other effects and consequences of sleep loss on your safety and health.

From time to time, we have all told ourselves we can manage on less sleep. We may have also experienced pressure from peers who call us weak, lazy, etc., because we are exhausted and would rather sleep. However, sleep is a basic need, just like food, water, and oxygen. Many of us can probably recall when we have driven a car with very little sleep... and had to swerve to avoid an accident. If you are a parent, you warn your children to avoid driving if they are tired or haven't had enough sleep. So, knowing what you know, can you afford to let the consequences of sleep loss happen to you? 



<http://www.sott.net/articles/show/194559-Dying-to-Sleep>

[http://www.cbsnews.com/stories/2008/03/14/60minutes/main3939721\\_page4.shtml](http://www.cbsnews.com/stories/2008/03/14/60minutes/main3939721_page4.shtml)

## Managing Misinformation

### Availability of CEM Information

#### Misinformation

There is very little information about Crew Endurance Management (CEM) and the crew endurance management system (CEM System) available.

#### Truth

Information related to CEM and the CEMS has been around for well over 40 years. The research that went into CEM is available through many disciplines of study, including systems analysis, sleep, neuroscience, biology, and human physiology. Facts, processes, and practices from these disciplines have been included in a framework used to address the crew endurance risk factors that impact the physical and cognitive energy production of crewmembers in maritime operations.

So, when you hear there is little information available on CEM or CEMS, you should recognize that this is misinformation, and discourage its spread. Remember, uncontrolled misinformation will only hurt your CEM implementation efforts.



## Crew Endurance Management (CEM) for the Mariner



Crew Endurance Management, everyone is involved, and the burden to make improvements is a shared venture taken on by you and your organization.

Since its introduction in the maritime industry, CEM has ushered in a cultural change that recognizes shipboard fatigue in terms of daily human physiological, psychological, and social needs. The need to obtain sufficient daily sleep and to maintain stable sleep times is well known. Today many mariners recognize the adverse health effects induced by shift work, sleep disorders, loss of sleep, and unsupervised use of over-the-counter medications. There are many accounts of improved health and quality of life through CEM practices. Yet it is also possible to find many crewmembers and supervisors, both in military and commercial maritime work environments, who still believe that health and performance do not depend on obtaining adequate amounts of daily sleep.

Although the relevance of CEM practices to good health is widely disseminated, there are many individuals who have yet to discover that daily sleep protects their work performance, safety, and social life. This and future editions of the CEM newsletter, will provide you with tangible lessons learned through shipboard CEM implementation. We encourage you—whether you are practicing CEM or not—to become familiar with this information, and discover for yourself the protection to your health and work performance that CEM practices afford.

Let's begin with a basic definition of Crew Endurance (CE), Crew Endurance Management (CEM), and the Crew Endurance Management System (CEMS). This will show why CEM practices are developed and implemented.

### Crew Endurance (CE)

"Crew Endurance refers to the ability of crewmembers to maintain performance within safety limits while coping with job-related physiological, psychological, operational, and environmental challenges." Mariners face many challenges in their work environment that impact how effectively they can "endure" or continue performing their work. These challenges are categorized as physiological, psychological, or environmental in the Coast Guard's Crew Endurance Management program.

The following is a description and examples of each category of challenges:

*Physiological* – refers to hazards that impact your body's functions including body temperature maintenance and energy restoration. Examples of these hazards include insufficient daily sleep and circadian disruption. Left unmanaged, these hazards reduce your ability to maintain alertness, defend against infections, and recuperate from illness.



### Sleep, Food, Water, Oxygen, and Regular Rest and Eating times

*Psychological* – refers to hazards that impact your psychological well-being. During long voyages, you may experience a number of stressors associated with shipboard life. These challenges include:

Gradual build-up of stress when experiencing communication problems with managers and fellow crewmembers, and

Depression originating from social isolation from family and friends

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Environmental – refers to conditions in the work environment, such as temperature extremes, humidity levels, air quality, etc. Inevitably, crewmembers must endure exposure to many shipboard

conditions (stressors), inside and outside of the vessel, that challenge the physical limitations of their bodies. These challenges include exposure to:

**Excessive noise, motion,  
vibration, engine room heat, and  
extreme ambient temperatures**

The US Coast Guard recognizes that mariners face many of these hazards in their work environments, and that in some cases they are left to their own individual means to cope with these common shipboard stressors.

## Crew Endurance Management (CEM)

Crew Endurance Management is a course of action to identify and control shipboard stressors adversely impacting physical and mental (cognitive) resources that you need to perform your work safely and effectively. These shipboard hazards are known in CEM as “Crew Endurance Risk Factors.” (refer to Spring 2009 edition of CEM newsletter for more information.)



In the 24/7 maritime work environment, you are often required to work in less than ideal conditions. However, you are also expected to perform jobs that require

physical and mental energy (e.g., navigating a vessel in high traffic volume, making tow, moving tonnage during the night), and to do them safely.

Crew Endurance Management requires involvement at all management levels of the company that you currently work for. Management and supervisors are asked to become directly involved in the identification and control of shipboard stressors (crew endurance risk factors).

To perform work safely, your body needs to have both physical and cognitive resources to execute your job safely. Your body and brain need energy. Essentially, you need the daily opportunity to obtain appropriate amounts of sleep, nutrients, oxygen, and water. Simply put, when you cannot meet these basic human needs, you lack the energy needed to perform work.



We mention sleep! Do you know that, without doubt, sleep is necessary for restoring the energy your body needs to lift and carry loads, think, remember information, make decisions, and keep up with the many pieces of information about your surroundings? For any crewmember, not only for those navigating a vessel, the appropriate daily amount of quality sleep is critical for “situational awareness.” Lack of sufficient daily sleep compromises situational awareness. If situational awareness is compromised, then decision-making abilities break down and increase the likelihood that crewmembers will make errors. Today we know that human error contributes to more than 60% of accidents. Therefore, to prevent the risk of crewmembers losing situational awareness and their ability to avoid unwanted operational outcomes such as casualties and accidents, it is absolutely necessary to make Crew Endurance Management the highest priority.

When companies commit to implement CEM, all levels of an organization take responsibility for protecting safety, mariner health, the public, and the natural environment. Crewmembers cannot be left to their individual efforts to ensure shipboard safety.



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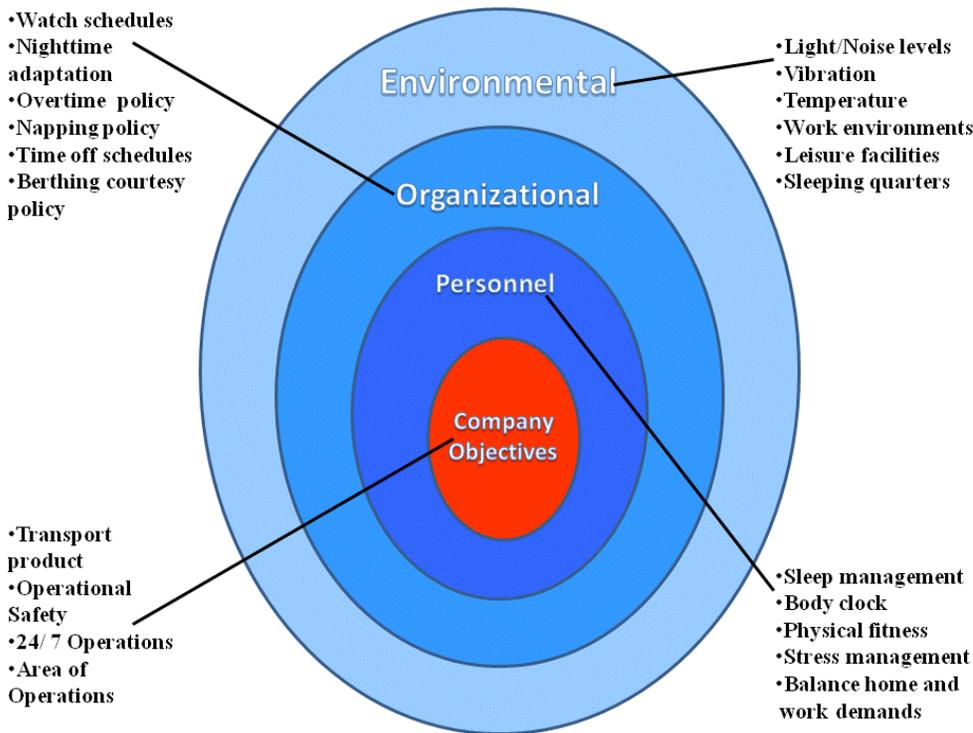


## The Crew Endurance Management System (CEM System)

The CEM System is a framework designed to identify and control the incidence and occurrence of hazards that deplete crewmember physical and cognitive energy levels in maritime work environments. The CEM System includes processes, practices, knowledge, tools, and resources to assist organizations to effectively implement CEM to reduce the incidence of crew endurance risk factors in the work environment.

The graphic below represents the CEM System.

## Crew Endurance Management System



The CEM System shows the different layers of the of the work system (e.g. personnel, organization, etc.). These layers have interrelated and interacting elements. Therefore, if an action or adjustment is taken in one layer of the work system, you can expect effects in one or more of the other layers. When implementing CEM, it is important to keep this fact in mind, particularly when developing strategies to control crew endurance risk factors. Otherwise, a 'fix' can trigger new or .

Effective use of the CEM System involves some level of training. The U.S. Coast Guard currently provides specific training to facilitate the successful implementation of the CEM System processes and resources.

If you are wondering, "How does this translate to practices to reduce the incidence of crew endurance hazards in operations?", we recommend that you consider one of the training sessions listed in the "Training Corner" of this newsletter and stay tuned for upcoming issues of the Crew Endurance Management Newsletter. 

**CEMS Web site: <http://www.uscg.mil/hq/cg5/cg5211/cems.asp>**



# Crew Endurance Management Implementation: Benefits and Challenges

An Interview with CAPT Mike Bowman

Captain Mike Bowman is one of a handful of CEM Experts who has implemented CEM and experienced its benefits firsthand. As Port Captain and CEM instructor for Kirby Inland Marine Corporation, Mike Bowman is a self-proclaimed CEM advocate. He continues to provide guidance and assistance to Kirby Corp employees who seek to implement CEM practices on their vessels or in their own lives.

The following excerpts from an interview conducted with Captain Bowman provide insight about the benefits and challenges from implementing CEM. We hope his insights will help you with your implementation efforts.

Newsletter: Captain Bowman, we appreciate you giving us your time and for participating in this interview. To begin, can you tell us how long you have been involved in CEM?

Captain Bowman: I have been involved with CEM since 2003. I attended CEM coaches training and, later, CEM Experts training. Now, I give CEM coaches training to Kirby wheelmen and steersmen, and travel to the boats to give 1-2 hour CEM awareness training for the crews.

Newsletter: We understand that, as Captain of a Kirby Corp vessel, you implemented CEM. Can you tell us what you did as part of your implementation?

Captain Bowman: When I first heard about CEM, I heard it was about changing the watch. I latched onto that because I never felt rested on the 6 on, 6 off. Everyone was changing their watches from the 6 on, 6 off to the 7,7,5,5 or the 8,8,4,4 and they didn't know how to manage it. Many of them switched back to the 6 on, 6 off after only a short time and they lost confidence in CEM. That really hurt our implementation efforts. On my boat, we changed our watch to the 8,8,4,4 watch

but we never went back to the 6 on, 6 off. We stayed with the watch schedule and added other changes too, mainly environmental changes like putting up lights in the galley, pillow-top mattresses on the beds, and blackout shades on the windows. We also pushed the watch change time back from 0600 to 0500 so that the afterwatch can avoid daylight in the morning.

Kirby has implemented policies that have made things better. We have policies that take into account travel

time limits and requirements for lodging when crewmembers travel to and from the vessel. We have policies that limit the amount of jumping from one boat to another so that crewmembers can stay working on one set schedule and not have to change. Boats also have courtesy policies such as planning which side the crew sleeps in, so they are not awakened

by activities such as chipping and sanding.

Newsletter: What was your crews' experience after implementing these practices?

Captain Bowman: We were able to get about 7 hours of sleep on our 8 hours off and had enough time to do other things, such as exercise, laundry, etc., on our 4-hour period off. We had to be disciplined about it though. Instead of going to the galley and using an hour to hang around and talk, we told ourselves to go to our rooms to sleep when we got off watch. Some days we took naps on the short period off, but that was not all the time. Getting the 7 hours straight did not wear us out, and when we left the boat we did not need a few days to recover.

Newsletter: What would you say is easy and what is challenging about implementing CEM?



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Captain Bowman: Easy is implementing the environmental changes. Difficult is convincing crewmembers, especially those with many years of experience in the industry, that they do not have to work the 6 on, 6 off and that they can change without anything bad happening to them.

Newsletter: Do you have any recommendations for other companies considering implementing CEM?

Captain Bowman: It is important that they get some traction. They can't give up too quickly. It doesn't do any good to change for one or two weeks. They need to keep working on it for at least six months for it to have traction. Change is hard and nobody likes change, but it needs to be done.

Newsletter: Are there any other insights that you would like to share?

Captain Bowman: Aside from things like getting management support and education, I think it is important that crewmembers hear from someone who experienced the difference. I am able to talk from experience. Get one or two captains who firmly believe in it and who are willing to sell it. Have them talk to the crewmembers. Because I had experienced the difference, I tell crewmembers who are resistant, "There is a good chance that I cannot convince you this works, but there is no way that you can convince me that it doesn't."

I think it would also be helpful to have captains talk to crewmembers in their specific type of operations. In Kirby Corporation, the canal division has been much more accepting of the changes than in the inland division. I am from the canal division, so the crewmembers can identify with me. It may have helped to have captains in the inland division share their experiences, demonstrate that change is O.K., and that CEM works.

Newsletter: As you know, there is a tremendous amount of misinformation currently out there that is keeping crewmembers from practicing CEM. What would you say about some of this misinformation and what implementation suggestions would you give these crewmembers?

Captain Bowman: CEM works! I have experienced the difference from having worked the 6 on, 6 off. I know that I feel better ever since I have been able to sleep seven or more hours straight. Once you've experienced the difference, you don't want to go back. I have had to go back to vessels that work the 6 on, 6 off and I will never go back to it. I hear this from many pilots now. I tell them not to just do it for a week or two, but to stick with it and give it a chance. Do the whole process (e.g. sleep, light management, diet, exercise) to get all the benefits.

Also, don't make a big change all at once, like we did. Go from the 6 on, 6 off to the 7 on, 7 off, 5 on, 5 off. This is a smaller step and it gives you time to get adapted before moving into the 8,8,4,4 watch. The point is—change is hard but CEM works. If you give it a chance and stick with it, I have no doubt you will benefit from it. 



## Training Corner

Provided by the USCG

Experts Refresher:

07/21 - 07/23/10 Seattle, WA

Contact: [CEMS@uscg.mil](mailto:CEMS@uscg.mil)  
or 202-372-1354  
for more information

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Additional classes can also be scheduled at your location.

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Crew Endurance Management Newsletter

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