

Focus on Fatigue & Maritime Operations

Spills Prevention, Preparedness & Response

Why it matters

Fatigue reduces an individual's performance and may lead to environmental damage, personal injury, and ill health among seafarers. A study of U.S. Coast Guard investigated accidents found fatigue as a factor in 16% of critical vessel casualties and in 33% of personal injuries (McCallum, M., Raby, M., Rothblum, A. 1996).

What is fatigue?

The International Maritime Organisation (IMO) defines fatigue as a state of feeling tired, weary, or sleepy that results from prolonged mental or physical work, extended periods of anxiety, exposure to harsh environments, or loss of sleep. A person suffering from fatigue has impaired performance and diminished alertness.

There is a difference between fatigue and sleepiness. Sleepiness refers to the inability to stay awake even in situations in which wakefulness is required. Fatigue is a state of sustained exhaustion and decreased capacity for physical and mental work that is not immediately relieved by rest.

What causes fatigue?

There are many contributors to fatigue including lack of sleep, poor quality of rest, stress, and excessive workload. Seafarers are often exposed to stress due to isolation, long separation from family, high work demands, and long working days.

Sleep quality can be effected by noise from ship operations, vibration from the engine, and weather-related ship motion.

Effects of fatigue

Alertness is the optimum state of the brain that enables us to make conscious decisions. Fatigue has a proven negative effect on alertness which impairs job performance. This impairment occurs physically, emotionally, and mentally, showing up in a person's decision-making, response time, judgement, hand-eye coordination, and countless other skills.

Fatigue affects everyone regardless of skill, knowledge and training.

Fatigue: effect on seafarer health

Research shows sleep deficiency leads to physical and mental health problems. Fatigue is linked to many chronic health problems, including heart disease, kidney disease, high blood pressure, diabetes, stroke, obesity, and depression.

Fatigue: effect on vessel safety

The effects of fatigue are particularly dangerous in the shipping industry as the technical and specialized nature of vessels can require long stretches of intense alertness and concentration from crewmembers.

When people are fatigued they:

- Commit errors of attention and memory - for example, omitting steps in a sequence
- Take short cuts or fail to follow procedures to reduce the amount of work or finish faster
- Fail to notice, avoid, or react to a dangerous situations
- Fail to correctly problem solve expected or unexpected events

Sleep Science

Studies show that sleep is an active process during which the brain reorganizes, recharges, and removes toxic waste byproducts. All sleep does not have the same quality and does not provide the same recuperative benefits. Sleep must have three characteristics to be most effective.

1. Duration: Everyone's sleep needs are unique; however, it is generally recommended that a person obtain, on average, 7 to 8 hours of sleep per 24-hour day.
2. Continuity: Sleep should be uninterrupted. Six one-hour naps do not have the same benefit as one six-hour period of sleep.
3. Quality: People need deep sleep. Just being tired is not enough to ensure a good sleep. Sleep needs to be in synch with the biological clock to ensure quality sleep.

Fatigue Management

Fatigue is a problem for industries that operate around the clock, such as the maritime industry. However, management companies and seafarers can take steps to reduce fatigue and support safe operations.

References

- McCallum, M., Raby, M., Rothblum, A. 1996. [Procedures for Investigating and Reporting Human Factors and Fatigue Contributions to Marine Casualties](#)
- Strauch, B. 2015. [National Transportation Safety Board, USA Investigating Fatigue in Marine Accident Investigations](#)
- Oldenburg, M., Baur, X., Schlaich, C. 2010. [Occupational Risks and Challenges of Seafaring](#)
- IMO, MSC/Circ.1014. 2001. [Guidance on Fatigue Mitigation and Management](#)
- Paukszta, B., Grech, M., Kitada, M. 2022. [The Impact of the COVID-19 Pandemic on Seafarers' Mental Health and Chronic Fatigue: Beneficial Effects of Onboard Peer Support, External Support and Internet Access](#)
- Australian Maritime Safety Authority. 2020. [Fatigue Guidelines: Managing and Reducing the Risk of Fatigue at Sea](#)
- McVeigh, J., MacLachlan, M., Cox H., Stolz I., Fraser A., Galligan, M., Meachair, M. 2021. [Effects of an On-Board Psychosocial Programme on Stress, Resilience, and Job Satisfaction amongst a Sample of Merchant Seafarers](#)
- Hystad, S., Eid, J. 2016. [Sleep and Fatigue among Seafarers: The Role of Environmental Stressors, Duration at Sea, and Psychological Capital](#)

What can the management company do?

By providing adequate crewing and resources, a company can ensure that their processes and policies support safe, compliant, and productive operations. Fatigue risk control measures should:

- Identify and assess fatigue risks
- Use the principles of minimum safe manning ([IMO resolution A.1047\[27\]](#)) to assess operational workload requirements
- Provide crewing and resources for the workload required to operate the vessel safely
- Promote company-wide awareness of the risk of fatigue
- Provide a healthy shipboard environment

What can seafarers do?

To reduce fatigue, seafarers must use the time available for rest and sleep appropriately, and ensure their behavior does not create or increase the risk of fatigue. Specifically, seafarers can:

- Learn the signs and symptoms to recognize fatigue in themselves or others
- Take strategic naps (about 20 minutes is optimum)
- Take advantage of scheduled breaks
- Monitor and manage sleep
- Maintain physical fitness, exercise regularly
- Eat regular and well-balanced meals
- Report fatigue and fatigue related hazards



Lori Crews

Lori.Crews@ecy.wa.gov

(360) 561-9661



To request an ADA accommodation, contact Ecology by phone at 360-407-6831 or email at ecyadacoordinator@ecy.wa.gov, or visit <https://ecology.wa.gov/accessibility>. For Relay Service or TTY call 711 or 877-833-6341