



# DEVELOPING A FATIGUE RISK MANAGEMENT PLAN:

A Guide for Towing Vessel Operators

July 2018

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# INTRODUCTION

## How to Use the Guide

AWO and its members have been working with the Coast Guard to prevent and manage fatigue risks in the tugboat, towboat and barge industry for nearly two decades. As in any 24/7 transportation industry, towing vessel crewmembers are regularly exposed to risk factors that may cause or exacerbate fatigue. Managing and mitigating these risks is important to reduce the likelihood of fatigue-related accidents.

With the goal of taking a proactive approach to fatigue prevention and management and reducing this risk of fatigue-related accidents, AWO's Fatigue Risk Management Working Group developed this guide to help member companies develop a fatigue risk management plan to incorporate into their existing safety management systems. Increased utilization of fatigue risk management plans by transportation companies is one of the National Transportation Safety Board's Most Wanted Safety Improvements for 2017-2018. Fatigue risk management plans take a comprehensive, customized approach to addressing fatigue within a company, including policies and practices to address a wide range of fatigue risk factors and mitigation measures. This guide is tailored to the unique operational and environmental challenges of the towing industry. However, because towing vessel operations and design vary widely across the industry, the guide is not intended as a "one-size-fits-all" approach.

***Before implementing any element of this guide, you should conduct a fatigue risk assessment and identify mitigation measures you already have in place.***

Before implementing any element of this guide, AWO member companies should conduct an assessment to evaluate their specific operating environment(s) for fatigue-related risks, and identify policies and procedures that are already in place to mitigate these risks. Following the risk assessment, the guide can help companies understand how to link their existing fatigue mitigation measures into a comprehensive fatigue risk management plan. Some of the guide's suggested practices may overlap with a company's existing policies and procedures. Others may be implemented to close a gap that a company has discovered, or can be considered by a company seeking to expand its fatigue prevention efforts. Some measures discussed in the guide may not apply to a particular company's operations at all. The Fatigue Risk Management Working Group intends the guide to be a toolbox in which every AWO member company can find useful tools to address their specific fatigue challenges, enhancing safety of our shared waterways.

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# Core Elements

The Fatigue Risk Management Working Group has identified four core elements that it considers to be most important in a fatigue risk management plan. These elements are agreed by experts to have the greatest potential to positively impact the management of fatigue risks and improve industry safety. A company looking to develop or enhance its fatigue mitigation program may consider focusing on these four core elements.

## Education

In order to play their part in managing fatigue risks, towing vessel crewmembers must understand the effects of poor sleep on their alertness, performance and safety, as well as know how fatigue mitigation strategies can improve sleep quality and duration. It is also important for crewmembers to educate family members about fatigue so that they can support crewmembers' efforts to obtain adequate sleep at home. A fatigue risk management plan should ensure that fatigue information is included in a crewmember's health and safety orientation, incorporate continuing education into subsequent refresher training, and maintain awareness through routinized, weekly or monthly discussions of related topics.

### *Educational Topics to Consider:*

- Why fatigue awareness and risk management is important
  - Sleep biology basics
  - Adverse effects of sleep loss and fatigue on performance and health
  - Correlation between fatigue and accidents
- How to mitigate fatigue
  - Utilizing anchor sleep/nap sleep strategies
  - Adopting good sleep hygiene
    - Managing environmental risk factors, including light, noise, temperature and vibration
    - Avoiding stimulants such as nicotine and caffeine prior to bedtime
  - Employing countermeasures to combat fatigue
    - Careful caffeine use to promote alertness
    - Application of lighting to reduce fatigue
  - Relationship between sleep and wellness
    - Positive impact of a healthy diet and regular exercise on sleep
  - Recognizing and managing risk factors that can cause or exacerbate fatigue
    - Stress and anxiety
    - Sleep disorders
    - Medications and their side effects
- How the company is helping its crewmembers manage fatigue
  - Company policies and procedures related to fatigue

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- Resources provided by the company
    - Educational resources
    - Wellness resources
    - Resources to manage environmental risk factors

## Environment

For crewmembers on live-aboard towing vessels, environmental factors may inhibit the ability to obtain quality sleep. Simple engineering solutions and behavior modifications to improve the sleep and vessel environments can improve crewmembers' sleep quality. A fatigue risk management plan should outline how a company plans to provide sleeping quarters and a work environment that are conducive to sleep. The plan should also include regular assessments of the towing vessel and surveys of its crewmembers to identify potentially beneficial environmental adjustments.

### *Engineering Controls to Consider in the Sleep Environment:*

- Use blackout shades or curtains to reduce light intrusion in sleeping quarters
- Equip the vessel with light dimmers in sleeping quarters and common areas to help crewmembers transition from on-duty to off-duty
- Provide good quality mattresses, pillows and bed linens for crewmembers
- Install individual temperature controls for each room to ensure sleep comfort
- Provide white noise machines to reduce noise disruption
- Take steps to dampen sound and vibration in sleeping quarters, including installing sound insulation, utilizing double doors, and installing baffles over louvers
- Post signage outside sleeping quarters to remind on-duty crewmembers to minimize disturbances for those who are resting

### *Engineering Controls to Consider in the Vessel Environment:*

- Utilize wheelhouse lighting and temperature controls to increase alertness for crewmembers on the back watch
- Install "soft floors"
- Ensure that any smoking area is in a location that minimizes noise and smells for crewmembers trying to sleep
- Provide pre-shipyard surveys to crewmembers to solicit feedback on improvements or modifications that can be made during drydockings to enhance the sleep and work environments onboard the vessel

### *Behavioral Controls to Consider:*

- Establish "common courtesy" policies to reduce noise. Examples include:
  - Where possible, use doors away from sleeping quarters to ensure crewmembers trying to sleep are not disturbed by nearby doors opening and closing, and do not slam doors
  - Limit the television/radio/conversation volume in the galley and other common areas near sleeping quarters to ensure sleeping crewmembers are not disturbed
  - Avoid holding crewmember meetings and drills in the middle of rest periods
  - Avoid sharp increases or decreases in vessel thrust while crewmembers are sleeping

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- Share common courtesy policies with vendors and others, such as persons involved in fueling or fleeting operations

## Work Readiness and Fatigue Reporting

A key component of a fatigue risk management plan is the shared responsibility of a towing vessel crewmember to report ready for duty, and of a company to allow adequate opportunity for crewmembers to rest and provide a process for reporting when they have not been able to obtain sufficient rest and/or feel fatigued.

### *Elements of a Fatigue Reporting Policy and Related Procedures to Consider:*

- Crewmembers should report for hitches and for shifts or watches rested and ready to perform assigned duties
- Companies should commit to providing adequate opportunity for crewmembers to rest between rotations, shifts or watches
- Establish a policy and procedures for crewmembers to report inadequate rest and/or fatigue, and for captains and shoreside management to take action if a crewmember makes a report
  - A crewmember should not be penalized for reporting fatigue unless he or she repeatedly reports for work unrested and unready for duty
- Ensure that the authority of the master clearly includes the monitoring of crewmember work readiness and alertness, and encourage the master to permit or direct crewmembers to take additional rest when needed
- Ensure crewmembers regularly assess themselves and each other for signs and symptoms of fatigue
  - Incorporate fatigue assessments into Job Safety or Job Hazard Analyses, pre-operations meetings, watch change meetings, etc.
  - Empower crewmembers to exercise stop-work authority, if applicable, when they believe fatigue has the potential to jeopardize safety

## Performance Measurement

As part of a fatigue risk management plan, companies should implement a process to regularly monitor and evaluate their fatigue management practices. This will allow them to assess whether and how these practices are being implemented, evaluate whether they are working and determine whether modifications are needed.

### *Performance Management Tools and Metrics to Consider:*

- Establish a baseline in advance of implementing new fatigue mitigation measures to better track the measures' impacts and enable benchmarking
- Employ relevant data:
  - Ensure incident and near miss reporting and investigation procedures include consideration of fatigue as a causal or contributing factor
  - Track rates of fatigue-related incidents and near-misses

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- Assess fatigue-related incidents and near misses to evaluate trends and determine whether certain operations or environmental factors present higher risks, and identify and implement additional risk mitigation measures
  - Monitor fatigue reporting for trends and address recurring risk factors
  - Include knowledge assessments in fatigue training and education
  - Incentivize and track crewmember participation in fatigue prevention efforts
  - Utilize internal audit processes to verify documentation of fatigue training and education, assess crewmember awareness of fatigue risk management, and evaluate implementation of fatigue mitigation measures
  - Solicit feedback from crewmembers, through surveys or other means, about what is working, what is not, and suggestions to manage fatigue risks

## Other Elements

### Wellness Program

Many companies have implemented wellness programs to promote employees' physical and mental health. As part of a fatigue risk management plan, companies should use their wellness initiatives to educate crewmembers about the relationship between sleep and health (that poor health can impair sleep and that poor sleep can have negative impacts on health), encourage healthy behaviors and provide access to physical and mental health care, as practicable.

#### *Fatigue-Related Components of a Wellness Program:*

- Education regarding:
  - Adverse effects of sleep disruption and loss on physical and mental health, including higher risks of cardio-metabolic disease and diabetes
  - Importance of maintaining a healthy diet and regular exercise regimen in improving health and sleep
- Resources provided by the company to promote healthy behaviors, including:
  - Nutrition plans and healthy eating options and incentives
  - Exercise opportunities and access to exercise equipment
  - Health and wellness coaching
  - Strategies and resources to manage work-related and personal stress
- Support provided by the company for proactive health management, including:
  - Access to preventative physical and mental health screenings and treatments
  - Medical benefits
  - Assistance to crewmembers to manage chronic health conditions
  - Consider providing technological tools to crewmembers, such as fitness or sleep tracking devices, to incentivize healthy habits and the monitoring of sleep factors

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## Sleep Disorders

Although promoting awareness of and screening for sleep disorders may be part of a company's wellness program, sleep disorders – including obstructive sleep apnea – can so degrade sleep quality and duration and contribute to chronic fatigue that they should be a special focus of a fatigue risk management plan.

### *Best Practices for Sleep Disorders to Consider:*

- Educate crewmembers about the health impacts of, and risk factors for, sleep disorders
- Review existing medical benefits to see if sleep disorder screenings are covered
  - If so, encourage crewmembers to utilize this benefit
  - If not, consider whether it is possible for your company to offer this benefit, or utilize free online resources to assess crewmember risk, such as [The Anonymous Sleep Disorders Screening Tool](#)

## Commuting

Commuting can both impact sleep and be impacted by sleep. Especially if crewmembers commute daily, commute time can have a significant impact on the time available to sleep. In addition, driving while fatigued increases risks to the driver and to others. A fatigue risk management plan should evaluate the commute times and practices of crewmembers, identify risks and implement feasible risk mitigation measures. The manner in which commuting is addressed in the plan will vary based on the company's and vessels' operations. For example, companies operating live-aboard vessels will have a different approach to commuting than companies whose crewmembers return home every day following a shift.

### *Commuting Best Practices to Consider:*

- Educate crewmembers and their family members about the risk relationship between commuting and sleep duration and quality
- For day boats:
  - Shift watch schedules so that crewmember commutes do not coincide with peak traffic times, to decrease the amount of time spent driving to or from work
  - Consider establishing a living radius policy, or consider a job candidate's proximity to the job site during the hiring process
- Provide drivers, or offer other forms of transportation, to get crewmembers home at the end of a rotation
  - Designate drivers that have obtained adequate rest
  - Utilize group vans
- Consider establishing a long-distance crew change policy to require mandatory rest periods at designated intervals while commuting for extended periods of time or before beginning/after completing work
  - Provide barracks or hotel rooms for crewmembers to sleep before or after a shift or rotation

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## Duty Hours

Statutory requirements limit the number of consecutive hours towing vessel crewmembers can work in non-emergency situations. Fatigue risk management plans should reiterate the statutory requirements and the allowable exceptions.

### *Duty Hour Considerations:*

- Companies should provide vessel captains and crewmembers with guidance on what types of emergency situations may necessitate additional hours of work
- If emergency situations require crewmembers to work longer than the statute provides, companies should allow crewmembers additional rest to recover from lost sleep as soon as practicable

## Sleep Strategies

The total amount and quality of sleep a crewmember obtains during a 24-hour period is more important to fatigue and performance than whether that sleep occurs in an uninterrupted or consolidated period. Therefore, the key to a good sleep strategy is for crewmembers to plan their activities within the on-duty and off-duty periods dictated by their watch schedule to obtain 7 to 8 hours of sleep per 24 hours. A fatigue risk management plan should educate and encourage crewmembers on square or rectangular watches to implement anchor sleep/nap sleep strategies to obtain an adequate amount of rest, and alert crewmembers to other ways in which they can maximize sleep opportunities.

### *Sleep Strategy Best Practices to Consider:*

- Educate crewmembers about anchor sleep/nap sleep strategies that can be employed within their watch schedules to obtain adequate sleep
- Encourage crewmembers to sleep as much as possible during their off-duty periods
  - When possible, schedule crewmember meetings, drills, and audits and inspections near the beginning or end of shifts to create blocks of time for sleep
  - Permit crewmembers to eat, shower, nap or exercise during downtime while on duty to maximize time for rest while off duty
- Educate crewmembers and their families about the importance of maintaining a regular sleep/wake cycle on the vessel and at home
  - Establish a routine before going to bed to help the body wind down and fall asleep faster

## Sustainability

The long-term success of a fatigue risk management plan as a means of assessing and addressing a company's fatigue challenges depends on making the plan sustainable. Sustainability involves the integration of fatigue risk management into the safety culture of the company, and buy-in for fatigue mitigation measures from shoreside management, captains and crewmembers.



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*Sustainability Best Practices to Consider:*

- Reinforce the company's commitment to preventing and managing fatigue during management visits to vessels and facilities
- Educate personnel with dispatch and human resources responsibilities about the plan and encourage them to consider sleep and fatigue impacts in their oversight of crewmember activities
- Designate a fatigue coach or alertness advocate on each boat, in each division or for each hitch, and provide him or her with tools – including incentives and rewards – to encourage crewmember adoption of and participation in fatigue mitigation measures
- Ensure the continued relevance of the plan by updating it as sleep science and technology evolve, and consider emerging best practices at regular intervals
- Provide crewmembers with up-to-date fatigue-related content for safety huddles and briefings on an ongoing basis

## Conclusion

This guide would not have been possible without the hard work of the Fatigue Risk Management Working Group and input of many AWO members, government partners and academic experts. AWO encourages member companies to put it to use. Once an evaluation of your company's specific fatigue-related risks and current policies and procedures for managing fatigue is complete, we suggest that you return to this guide and identify the elements and best practices that you can incorporate into your safety management system to close gaps and expand your existing fatigue mitigation measures into a strategic, comprehensive fatigue risk management plan. There is no single, simple solution to prevent and mitigate fatigue. However, a safety management system that takes a proactive approach to fatigue prevention tailored to a company's unique operations will support towing vessel crewmembers in obtaining the sleep they need and reduce the risk of fatigue-related accidents on our waterways.