Technical Report Documentation Page

1. Report No.	2. Government Accession Number	3. Recipient's Catalog No.
CG-D-13-01		

4. Title and Subtitle

U.S. COAST GUARD GUIDE FOR THE MANAGEMENT OF CREW ENDURANCE RISK FACTORS - VERSION 1.1

5. Report Date
September 2001

6. Performing Organization Code
Project No. 3302.4.2

7. Author(s) Carlos A. Comperatore, Anita M. Rothblum, Pik Kwan Rivera, Leonard C. Kingsley, David Beene, Antonio B. Carvalhais

8. Performing Organization Report No.

9. Performing Organization Name and Address

U.S. Coast Guard
Research and Development Center
1082 Shennecossett Road
Groton, CT 06340-6096

U.S. Coast Guard
Office of Safety and
Environmental Health
2100 Second St., SW
Washington, DC 20593-0001

10. Work Unit No. (TRAIS)

11. Contract or Grant No.

12. Sponsoring Organization Name and Address

U.S. Department of Transportation
United States Coast Guard
Human Resources (G-W)
Operations (G-O)
Washington, DC 20593-0001

13. Type of Report & Period Covered
Final Report

14. Sponsoring Agency Code
Commandant (G-WKS)
Commandant (G-OCU)
U.S. Coast Guard Headquarters
Washington, DC 20593-0001

15. Supplementary Notes
The R&D Center's technical point of contact is Dr. Carlos Comperatore, (860)-441-2751, email: ccomperatore@rdc.uscg.mil.

16. Abstract (MAXIMUM 200 WORDS)

A ship's endurance depends on how long it can support operations at sea without replenishing supplies or requiring in-port maintenance. Similarly, crew endurance can be described as a function of physiological and psychological factors that support crew members' ability to perform their jobs effectively. Recent studies of Coast Guard personnel on cutters, at small boat stations, and at air stations have shown that some of our traditional work practices can lead to poor endurance, which translates to poor readiness. This *Guide* will show you how to manage crew endurance. It explains the different endurance risk factors and takes you step-by-step through the process of identifying these risks at your unit and implementing the controls necessary to improve crew endurance and mission effectiveness. These practical methods have been tested and proven on Coast Guard cutters, at Coast Guard air stations, at small boat stations, and on commercial vessels.

17. Key Words

alertness
crew endurance
fatigue
performance (human)
readiness
risk factors
stress
U.S. Coast Guard

18. Distribution Statement
This document is available to the U.S. public through the National Technical Information Service, Springfield, VA 22161

19. Security Class (This Report)	20. Security Class (This Page)	21. No of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED		

Form DOT F 1700.7 (8/72) Reproduction of form and completed page is authorized.

EXECUTIVE SUMMARY

Crew endurance is more than just "fatigue." It encompasses many different physiological and psychological factors, such as the quality and duration of sleep; the stability of the person's body clock; environmental stressors, such as heat, cold, noise, and ship motion; emotional states and stress levels; diet; and physical conditioning. Just as a ship's endurance determines how long it can support operations at sea, crew endurance determines how effectively personnel can do their jobs.

According to the National Sleep Foundation's 2001 Sleep in America Poll, 63% of adult Americans do not get 8 hours of sleep per night – the required amount of sleep for good health, safety, and optimum performance. The majority of our operational personnel also gets insufficient sleep. Recent studies of Coast Guard (CG) crews on cutters, at small boat stations, and at air stations have shown that some of our traditional work practices may lead to decreased alertness that could compromise readiness: *70% of the CG personnel studied exhibited signs of compromised alertness.* While we might like to believe that we can be *Semper Paratus* under any conditions, this simply is not the case: long work hours, frequent schedule rotations, insufficient sleep, and extreme environmental conditions take their toll on the human body, leaving even Coast Guard personnel less-than-ready for duty. If we are to be *"always ready"* we must make crew endurance a top priority. If your unit experiences any of the following, you are at risk for compromised endurance and readiness:

- insufficient sleep duration (< 7-8 hrs.);
- poor sleep quality (awakenings);
- breaking sleep into multiple "naps;"
- main sleep during the daytime;
- rotating between day and night work;
- long work hours (>12 hr.);
- no opportunities to make up lost sleep;
- poor diet (high fat, sugar, caffeine);
- high workload;
- high stress;
- lack of control over work environment or decisions;
- exposure to extreme environment (cold, heat, high seas);
- no opportunity to exercise;
- family stress (child and parent care, divorce, finances);
- isolation from family.

The good news is that *crew endurance can be managed*. Through research studies on CG cutters, at small boat stations, and at air stations, we have developed practical, proven methods to identify and manage crew endurance risks that could compromise the safety and effectiveness of Coast Guard operations. This *Guide* will take you step-by-step through the process of understanding what endurance is, identifying endurance risk factors in your operation, exploring unit and personal options, and successfully implementing changes that will improve endurance *and* increase mission effectiveness. The methods discussed in this *Guide* go well beyond scientific theory. These are practical, workable methods to improve crew endurance that have been successfully implemented and proven

on Coast Guard cutters, at Coast Guard air stations, at small boat stations, and on commercial vessels. In short: ***this works.***