



National Transportation Safety Board

Managing Fatigue in Flight Ops: NTSB Investigations and Recommendations

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NATIONAL TRANSPORTATION SAFETY BOARD

- 1) determining the probable cause of transportation accidents**
- 2) making recommendations to prevent their recurrence**





All Modes

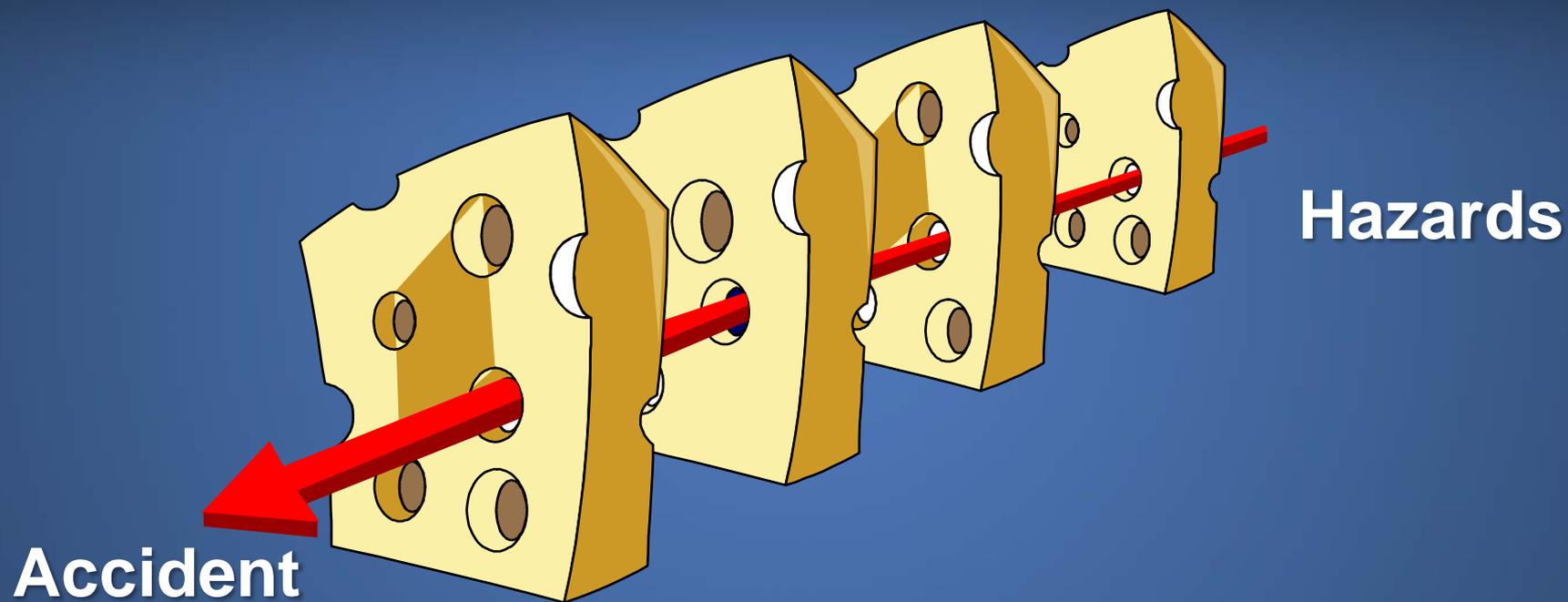


Independent Federal Agency: Created in 1967

- >132,000 accident investigations
- 13,500+ safety recommendations
- ~ 2,500 organizations/recipients
- 82% acceptance rate



“Swiss Cheese” Model (Reason)



Successive layers of defenses, barriers, and safeguards



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NTSB Characterized as:

‘moral compass and industry conscience’

NTSB Chairman Deborah A.P. Hersman



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Go! Flight 1002



- early starts, multiple segment days, sleep apnea



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Honorable John K. Lauber:

No Accident \neq
Safe Operation



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Uncontrolled In-Flight Collision with Terrain AIA Flight 808, Douglas DC-8-61, N814CK U.S. NAS, Guantanamo Bay, Cuba, August 18, 1993

First NTSB aviation accident investigation
to cite fatigue as probable cause

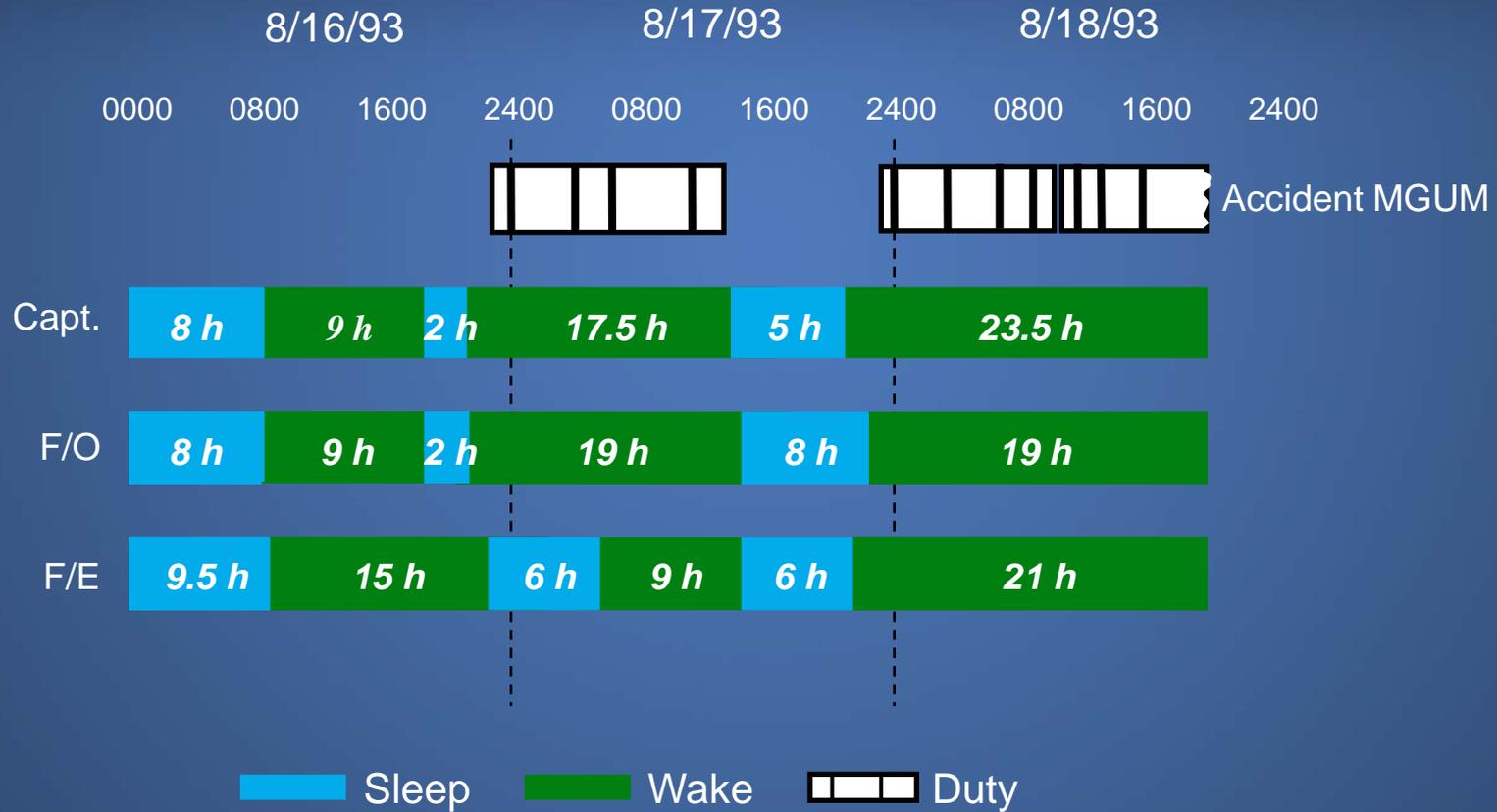


- acute sleep loss, sleep debt, circadian disruption



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Crew Sleep History



Observed Performance Effects

- Degraded decision-making
- Visual/cognitive fixation
- Poor communication/coordination
- Slowed reaction time



Uncontrolled In-Flight Collision with Terrain
AIA Flight 808, Douglas DC-8-61, N814CK
U.S. NAS, Guantanamo Bay, Cuba, August 18, 1993

“The National Transportation Safety Board determines that the probable causes of this accident were the impaired judgment, decision making, and flying abilities of the captain and flight crew due to the effects of fatigue...”



Owatonna, MN (July 31, 2008)



8 fatalities



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Owatonna Crew Fatigue Factors

- acute sleep loss (Capt/FO)
- cumulative sleep debt (FO)
- early start time (Capt/FO)
- excessive sleep need (Capt)
- insomnia (FO)
- self-medicate/prescription sleep med (FO)



Probable Cause/Contributing Factors

“Contributing to the accident were . . .
(2) fatigue, which likely impaired both
pilots’ performance; . . .”

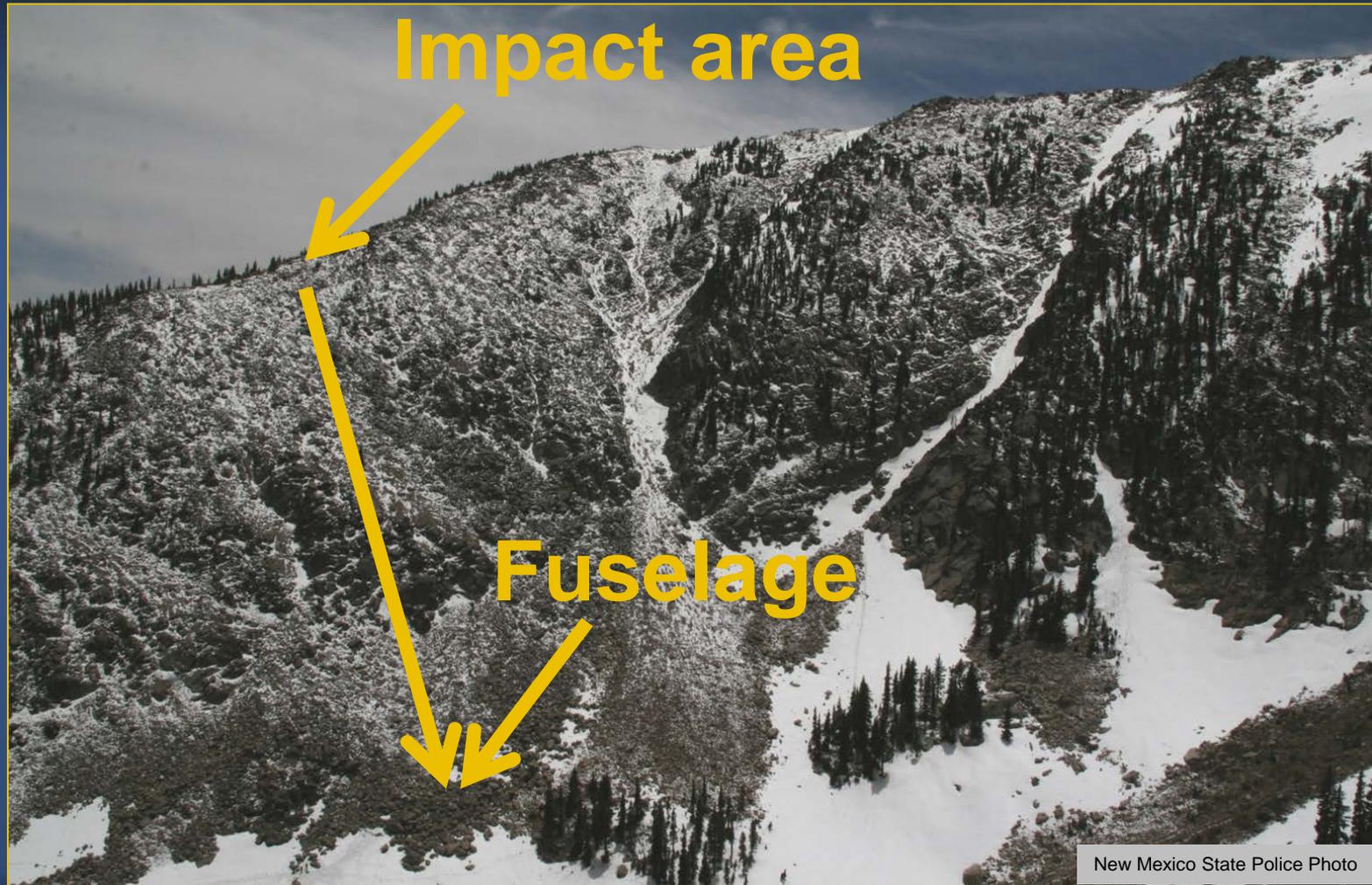


New Mexico State Police Helicopter Sante Fe, New Mexico (June 9, 2009)



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New Mexico State Police Helicopter Sante Fe, New Mexico (June 9, 2009)



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New Mexico State Police Helicopter Sante Fe, New Mexico (June 9, 2009)

- Contributing to the accident were . . .
the pilot's fatigue . . .
- Also contributing were . . .
lack of an effective fatigue management
program for pilots . . .

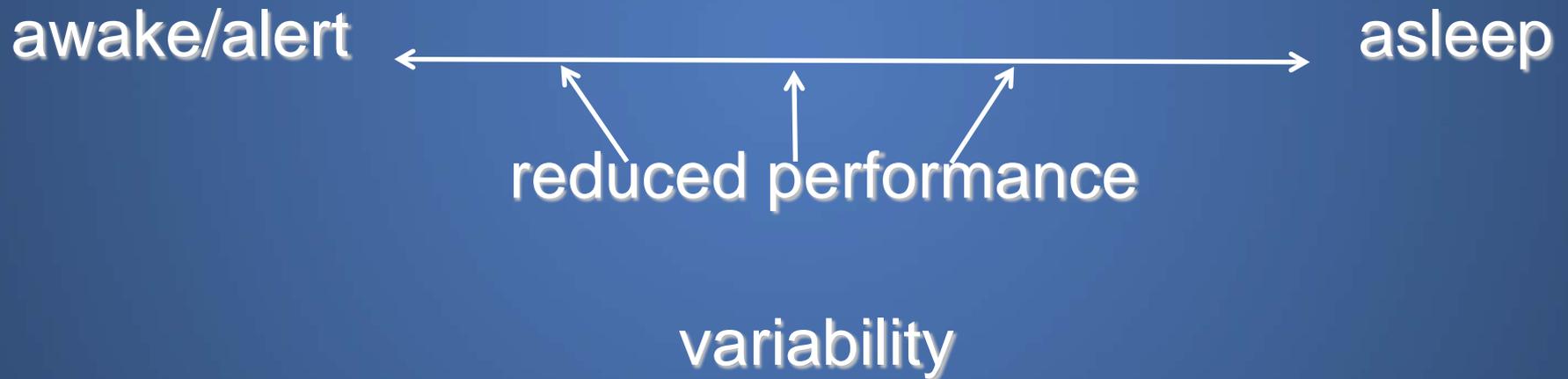


Challenges of a 24/7 Society



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Fatigue Risks



Fatigue Risks

- degraded 20 – 50%+:

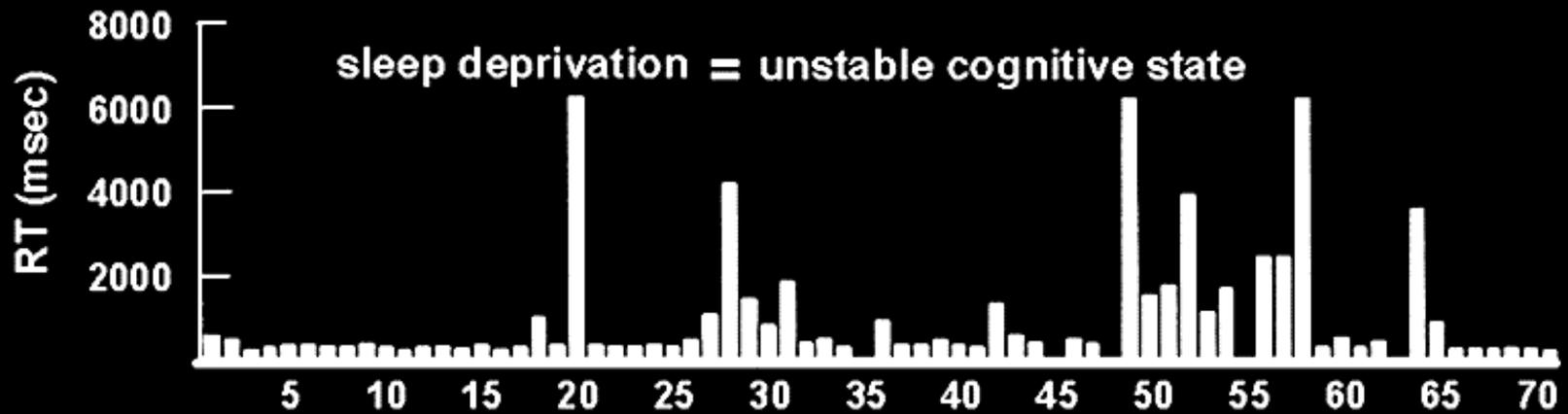
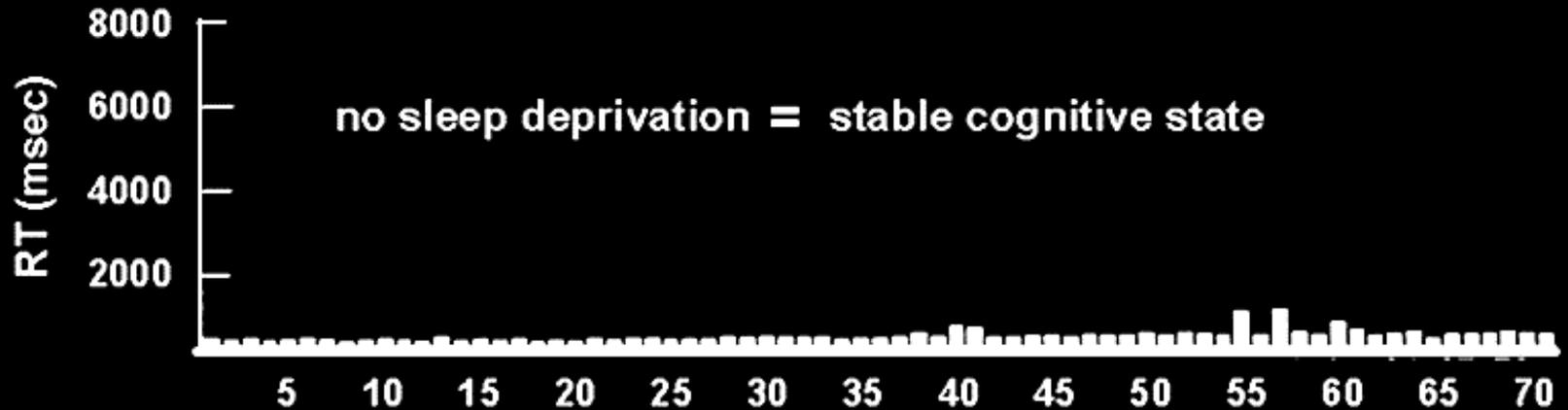
- reaction time
- judgment
- memory
- attention
- communication
- mood
- situational awareness

- increased:

- irritability
- attentional lapses
- apathy
- microsleeps

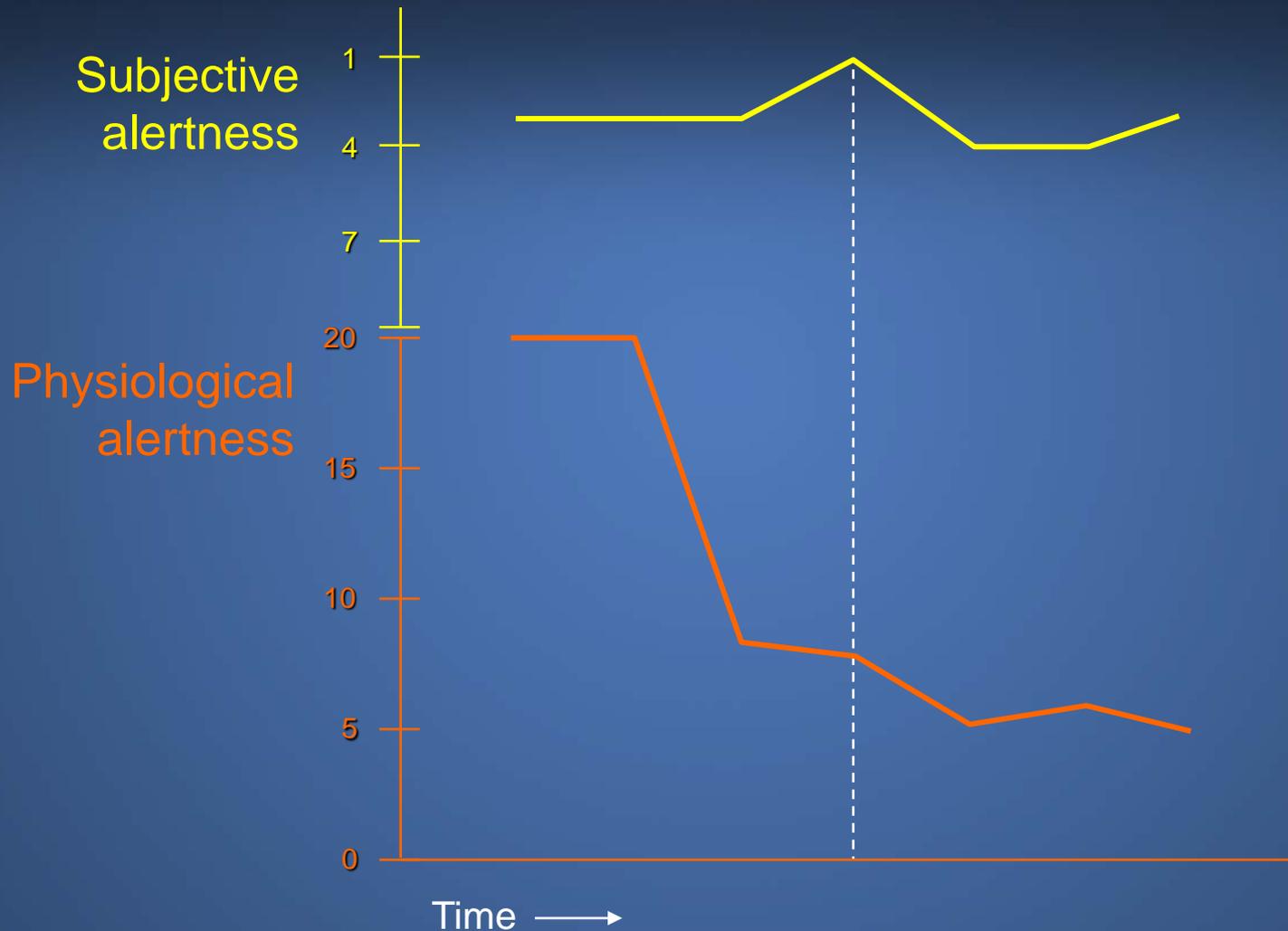


Fatigue and Reaction Times



consecutive RTs across a 10-min PVT performance task

Alertness Reports Often Inaccurate



Adapted from Sasaki et al., 1986



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Fatigue Factors

- sleep
- circadian clock
- hours awake
- sleep disorders





Home > Transportation Safety > Most Wanted List

SHRE [f](#) [t](#) [e](#) ...

MOST WANTED LIST

A program to increase the public's awareness of, and support for, action to adopt safety steps that can help prevent accidents and save lives. The following are ten of the current issues.



Addressing Human Fatigue



General Aviation Safety



Safety Management Systems



Runway Safety



Bus Occupant Safety



Pilot & Air Traffic Controller Professionalism



Recorders



Teen Driver Safety



Addressing Alcohol-Impaired Driving



Motorcycle Safety



NTSB Safety Recommendations: Fatigue

- MOST WANTED 1990 - 2011
- ~200 fatigue recommendations



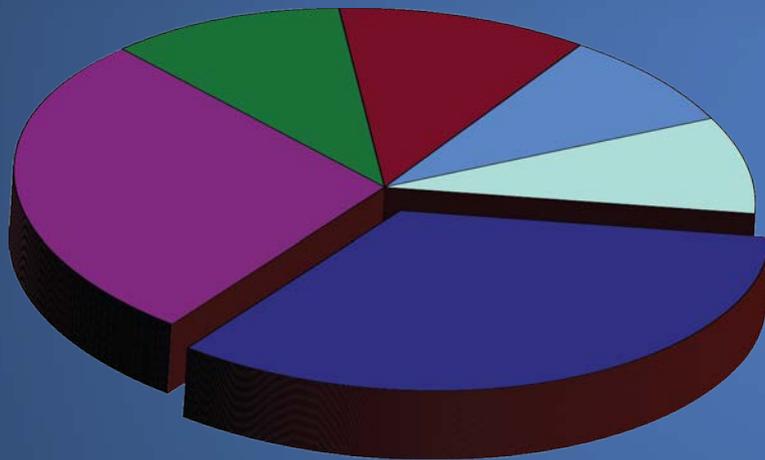
NTSB Safety Recommendations: Fatigue

- 40 years ago: May 10, 1972
- “Revise FAR 135 to provide adequate flight and duty time limitations.” (A-72-55)
- Classified “Closed-Unacceptable”



Complex Issue:

Requires Multiple Solutions



- Scheduling Policies and Practices
- Education/Awareness
- Organizational Strategies
- Healthy Sleep
- Vehicle and Environmental Strategies
- Research and Evaluation



Scheduling Policies and Practices

Victoria, Texas, January 2, 2008



Victoria, Texas Fire Department

- Day sleep, night drive, ~ 4 am WOCL



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NTSB Fatigue Recommendations: Hours of Service / Scheduling

- Science-based hours of service
- Allow for at least 8 hours of uninterrupted sleep
- Fatigue mitigation strategies in the hours-of-service regulations for passenger-carrying drivers who operate during the nighttime window of circadian low
- Reduce schedule irregularity and unpredictability

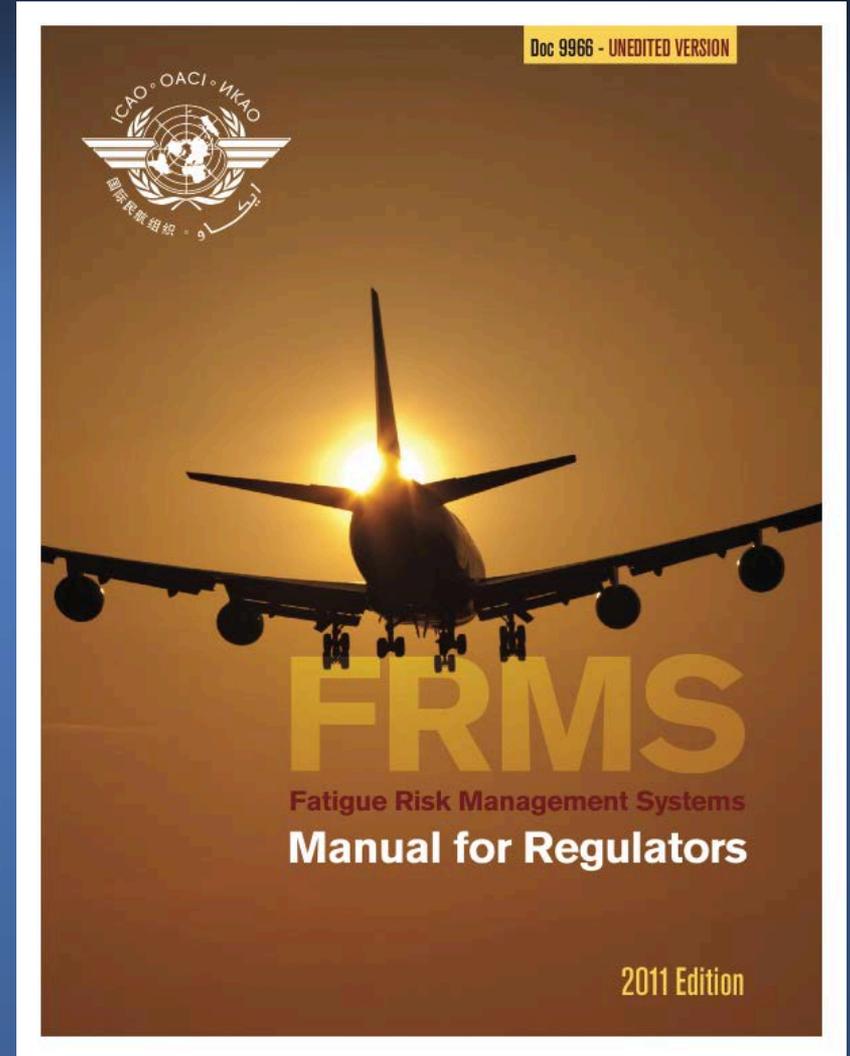
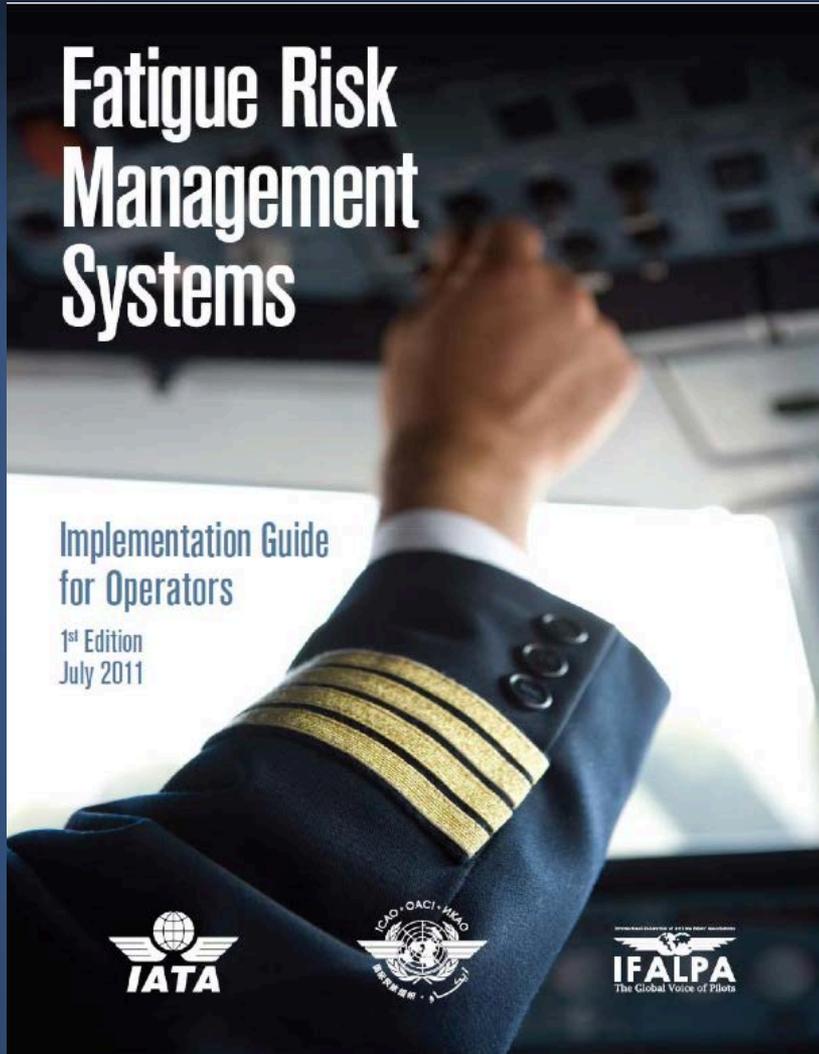


NTSB Fatigue Recommendations: Fatigue Management Systems

- Develop guidance based on empirical and scientific evidence for operators to establish fatigue management systems
- Establish an ongoing program to monitor, evaluate, report on, and continuously improve fatigue management programs implemented by motor carriers to identify, mitigate, and continuously reduce fatigue-related risks for drivers.



Examples



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NTSB Fatigue Recommendations: Education/Strategies

- Develop a fatigue education and countermeasures training program
- Educate operators and schedulers
- Include information on use of strategies: naps, caffeine, etc.
- Review and update materials



Manage Fatigue = Enhance Safety

- Promote culture change
- Educate everyone
- Acknowledge risks
- Take action!



Good sleep, safe travels.



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