



Interagency Aviation Safety Alert



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Subject: Fatigue in Aviation Operations
Area of Concern: All Aviation Activities
Distribution: All Aviation Users

Discussion: 2007 was a very active fire season. Aviation resources were utilized extensively in the fire suppression effort. People and resources were stretched to the limit. Indications are that 2008 will be just as busy. During times of increased operational tempo, it's important for everyone to keep in mind how fatigue can affect personal performance. Department of Interior and Forest Service reports show that human factors account for approximately 80% of all aircraft accidents. Fatigue is a critical component in the human factors chain of events. Signs and symptoms of fatigue include irritability, impatience, impaired communication and decision making, forgetfulness, increased reaction times, and inattention. There is no simple measurement for fatigue. Even self-assessment is unreliable since the greater the impairment, the poorer the assessment.

The best predictors of fatigue include:

1. Sleep debt - the number of hours of sleep needed minus the number of hours of sleep obtained times the number of days. For example, you need 8 hours of sleep at night in order to be at your optimum performance but only get 6 hours of sleep. By the end of the week, you have built up a 10 hour sleep debt ($2 \times 5 = 10$).
2. Circadian disruption - changing numerous time zones or working rotating shifts can make it very difficult to get the sleep you need.
3. Sleep disorders - sleep apnea and narcolepsy are just two of many sleep disorders that cause fatigue.
4. Hours of continuous wakefulness - In 1997, Dawson and Reed authored a study entitled Fatigue, Alcohol, and Performance Impairment. The study was conducted to show the performance impairment correlation between fatigue and alcohol intoxication. The study showed that after 17 hours of sustained wakefulness, cognitive performance decreased to a level equivalent to blood alcohol content (BAC) of .05%, the legal limit in some states. After 20 hours, the BAC equivalent was .08%. After 24 hours - .1%

Recommendations: Everyone associated with aviation operations must be aware of the effects of fatigue. For pilots, even though crew day limitations are in place, they can be excessive during high tempo operations. The National Transportation Safety Board (NTSB) has sited fatigue as a significant contributing factor in aviation accidents and has included it on their Most Wanted List of actions needed by federal agencies. Managers at every level must ensure that every precaution is taken and that proper risk management is used to mitigate the effects of fatigue. Mitigation strategies could include: (1) "grounding" guidelines for both overly fatigued aircrew and ground support personnel; (2) Planning ahead for high tempo operations; (3) Briefing all personnel on good sleep requirements. Remember, fatigue is a physiological state; not due to motivation or attitude.

More information on fatigue in fire and aviation are available at the following web sites:

USFS Fire Training: <http://www.fs.fed.us/fire/training/fatigue/fatigue.pdf>

Air Force Research Lab, Fatigue Countermeasures: <http://www.hep.afrl.af.mil/HEPF/Brochures/index.html>

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Aviation Risk Management and
Training Systems