



# Forest Service Aviation Safety Alert



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

**Discussion:** Indications from SAFECOM submissions, interviews with pilots, and air operations personnel have surfaced concerns regarding fatigue which requires risk management. During times of increased operational tempo, it's important for everyone to keep in mind how fatigue can affect personal performance. 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. Small errors and mistakes can be an indicator that fatigue is building. 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 and symptoms of fatigue. For pilots, even though crew day limitations are in place, they can still 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 should 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.
4. Monitoring each other for fatigue symptoms, as self assessment is unreliable.
5. Exercise, it improves energy levels and stamina.
6. Taking short naps and breaks.
7. Nutrition and Hydration; eating regularly scheduled balanced meals, not eating before bedtime and drinking 8 glasses of water per day.



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:

**MTDC - Work and Fatigue in Wildland Firefighting:** <http://www.fs.fed.us/t-d/pubs/htmlpubs/htm02512815/page03.htm>

**Fatigue Countermeasures in Aviation:** <http://www.asma.org/Organization/ashfa/Pages/Fatigue%20Countermeasures%20Position%20Paper.pdf>



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