U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Fitness for Duty

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Initiated by: AFS-200 **Change:**

1. PURPOSE. This advisory circular (AC) was developed to demonstrate acceptable methods of compliance with Title 14 Code of Federal Regulations (14 CFR) part 117, § 117.5, Fitness for Duty. While the methods outlined in this AC are not the only means of compliance, the guidance contained herein provides concepts for developing appropriate processes and procedures to comply with § 117.5 and instituting appropriate operator-specific fatigue countermeasures. The guidance also provides a means to educate flightcrew members in the potential of fatigue induced by commuting.

2. AUDIENCE. Flightcrew members, air carriers, employees of air carriers responsible for scheduling flightcrew members for operations conducted under part 117, pilot labor organizations and airline industry trade organizations.

3. REGULATORY REFERENCES.

- Title 14 CFR Part 91, § 91.13, Careless or Reckless Operation,
- Title 14 CFR Part 117, Flight and Duty Limitations and Rest Requirements: Flightcrew Members, and
- Title 14 CFR Part 121, Operating Requirements: Domestic, Flag, and Supplemental Operations.

4. RELATED MATERIAL (current editions):

- AC 117-2, Fatigue Education and Awareness Training Program,
- AC 120-100, The Basics of Aviation Fatigue,
- AC 120-103, Fatigue Risk Management Systems (FRMS) for Aviation Safety, and
- Safety Alerts for Operators (SAFO) 09014, Concepts for Fatigue Countermeasures in Part 121 and 135 Short-Haul Operations.

5. DEFINITIONS.

a. Fit For Duty. Part 117 requires each flightcrew member assigned to a flight duty period (FDP) to be fit for duty prior to commencing a flight. Section 117.3 defines "fit for duty" as being physiologically and mentally prepared and capable of performing assigned duties at the highest degree of safety.

b. Fatigue. Fatigue is characterized by a general lack of alertness and degradation in mental and physical performance. Fatigue manifests in the aviation context not only when pilots fall asleep in the cockpit during flight, but perhaps more importantly, during the task-critical takeoff and landing phases of flight. Reported fatigue-related events have included procedural errors, unstable approaches, lining up with the wrong runway, landing without clearances, and poor decisionmaking.

c. Types of Fatigue. There are three types of fatigue: transient, cumulative, and circadian:

(1) Transient fatigue is acute fatigue brought on by extreme sleep restriction or extended hours awake within 1 or 2 days.

(2) Cumulative fatigue is fatigue brought on by repeated mild sleep restriction or extended hours awake across a series of days.

(3) Circadian fatigue refers to the reduced performance during nighttime hours, particularly during an individual's "window of circadian low" (WOCL) (typically between 2:00 a.m. and 05:59 a.m.).

d. Symptoms of Fatigue. Common symptoms of fatigue include:

- Measurable reduction in speed and accuracy of performance,
- Lapses of attention and vigilance,
- Delayed reactions,
- Impaired logical reasoning and decisionmaking, including a reduced ability to assess risk or appreciate consequences of actions,
- Reduced situational awareness, and
- Low motivation.

e. Sleep and Performance. Scientific research and experimentation consistently demonstrate that adequate sleep sustains performance. For most people, 8 hours of sleep in each 24 hours sustains performance indefinitely. Sleep opportunities during the WOCL are preferable, although some research indicates that sleep at other times to protect the total amount of sleep is more important than obtaining all sleep during the WOCL. Within limits, shortened periods of nighttime sleep may be nearly as beneficial as a consolidated sleep period when augmented by additional sleep periods, such as naps before evening departures, during in-flight rest periods while other flightcrew members are at the controls, and during layovers. Sleep should not be fragmented by interruptions or environmental conditions such as temperature, noise, and turbulence, which can impact how beneficial sleep is and how performance is restored.

6. FITNESS FOR DUTY–A JOINT RESPONSIBILITY.

a. Joint Responsibility. Part 117 places a joint responsibility on the certificate holder and each flightcrew member. In order for the flightcrew member to report for an FDP properly rested, the certificate holder must provide the flightcrew member with a meaningful rest opportunity that will allow the flightcrew member to get the proper amount of sleep.

Likewise, the flightcrew member bears the responsibility of actually sleeping during the rest opportunity provided by the certificate holder instead of using that time to do other things.

b. Regulatory Obligations. Each flightcrew member must report for any FDP fit for duty, which includes being properly rested and prepared to perform his or her assigned duties. Fitness for duty is a joint responsibility between the air carrier and the flightcrew member. Part 117 imposes regulatory obligations on both air carriers and flightcrew members with regard to fitness for duty. The joint responsibility is established in § 117.5(b), which requires that no certificate holder may assign and no flightcrew member may accept an assignment to a FDP if the flightcrew member has reported for a FDP too fatigued to safely perform his or her assigned duties.

c. Labor and Management Relations. Air carriers and flightcrew members typically handle this joint responsibility in the context of labor/management relations and collective bargaining agreements. Although not all flightcrew members are represented by a labor organization, those that have labor agreements frequently address this issue in those agreements.

d. Replacing a Flightcrew Member. Although a flightcrew member may report for duty well-rested and prepared to perform their assigned duties during the course of their assigned FDP, circumstances may occur resulting in the flightcrew member becoming too fatigued to continue their assigned FDP. If a flightcrew member reports being too fatigued to continue the assigned flight duty period, the certificate holder may not permit that flightcrew member to continue his or her FDP. The certificate holder must remove that flightcrew member and replace him or her with a flightcrew member that is fit for duty.

e. Dispatch or Flight Release. Section 117.5(d) requires that each flightcrew member must affirmatively attest they are fit for duty. This can be accomplished by signing the dispatch or flight release (as applicable) prior to commencing each flight stating that they are indeed fit for duty.

f. Reporting Fatigued Flightcrew. Flightcrew members and other employees should be cognizant of the appearance and behavior of fellow flightcrew members displaying signs of fatigue. If a flightcrew member (or any other employee) believes another flightcrew member may be too tired to fly, the FAA encourages each flightcrew member and other employees to voluntarily inform their employer when they observe a fatigued flightcrew member.

7. MITIGATING THE POTENTIAL FOR FATIGUE.

a. Causes of Fatigue. The Federal Aviation Administration (FAA) defines fatigue as a physiological state of reduced mental or physical performance capability resulting from lack of sleep or increased physical activity that can reduce a flightcrew member's alertness and ability to safely operate an aircraft or perform safety related duties. The primary contributor to fatigue is lack of proper sleep. The root-cause for flightcrew member fatigue may be a combination of scheduling and flightcrew members not obtaining the proper amount of rest during their assigned sleep opportunity.

b. Effects of Fatigue. Small reductions in sleep over a given time period create the accumulation of sleep loss, which is referred to as sleep debt. The effects of fatigue are predicated upon the degree of the individual's sleep debt, but not specifically limited to that sleep debt. The only way to eliminate cumulative sleep debt is to obtain sleep because it addresses the underlying physiology of sleep loss. The effects of fatigue manifest in slightly different ways for each person; however, there are common effects that are associated with tiredness, e.g., weakness, lack of energy, lethargy, depression, lack of motivation, sleepiness, decreased alertness and situational awareness, and poor decision-making skills. Fatigue decreases a person's ability to perform cognitive tasks and increases variability in performance as a function of time on task.

c. Recovery Sleep. To reverse the effects of fatigue, people must receive "recovery sleep." The period for recovery sleep may be different for each person because one person's need for required sleep may vary from that of another person. Some people may require eight hours of continuous sleep while others may require more than eight continuous hours.

d. Managing Fatigue. There are two central elements in managing or mitigating the effects of fatigue. First, each air carrier should prepare their schedules in a manner that accommodates enough time to allow an appropriate sleep opportunity. Secondly, flightcrew members must take full advantage of each sleep opportunity to ensure they receive adequate sleep and are properly rested before starting a FDP.

e. Removing Flightcrew Members. Each flightcrew member is required by § 117.5 to be properly rested to safely perform their assigned duties. Equally, each air carrier has the responsibility to ensure that no flightcrew member is scheduled (assigned), or may continue a FDP, if that flightcrew member has reported to the air carrier that they are too fatigued to perform their assigned duties. Air carriers must remove a flightcrew member from their FDP if that flightcrew member has reported their self as being too fatigued to safely perform their assigned duties.

8. MANAGING REST.

a. Rest and Sleep Opportunities. Rest opportunities and sleep opportunities are two separate issues. A rest opportunity is an assigned period in which the flightcrew member is free from all duty prior to a duty assignment; while a sleep opportunity period resides within that rest period. The sleep obtained within the sleep opportunity is the essential element for being fit for duty.

b. Hours of Rest and Sleep. Managing rest and sleep opportunities are essential for reducing the risk of being unfit for duty due to fatigue. A joint responsibility is again placed on the air carrier and the flightcrew member in § 117.25(e)(f), which prescribes that no flightcrew member may accept an assignment for any reserve or FDP unless that flightcrew member is given a rest period of at least 10 consecutive hours immediately before beginning the reserve or FDP measured from the time the flightcrew member is released from duty. The 10-hour rest period must provide the flightcrew member with an opportunity of a minimum of 8 hours of uninterrupted sleep. If the flightcrew member determines that the rest period will not provide an opportunity of 8 uninterrupted hours of sleep, that flightcrew member must notify the certificate

holder. The flightcrew member cannot report for the assigned FDP until he or she receives a minimum of 8 hours of uninterrupted sleep opportunity.

c. Sleep Debt. This 8-hour sleep opportunity is the essential element in the flightcrew member obtaining restorative sleep, assuming the flightcrew obtains 8 hours of sleep. Without obtaining the appropriate restorative sleep, the flightcrew member starts accumulating a sleep debt. Accumulating a sleep debt over several days exposes that flightcrew to a potential fatigue event. The amount of recovery sleep required to repay the sleep debt is related to the total amount of sleep debt. The amount of sleep required to make up a deficit is less than the total number of hours of sleep missed; therefore, it does not take an additional 8 hours of sleep to make up for an 8-hour accumulated sleep debt. However, since it takes 8 hours of sleep to balance a normal day of wakefulness, it will require more than 8 hours of sleep per recovery day to repay the debt. In general, if a person has experienced several days of sleep restriction below the nominal requirement of 8 hours per day, full recovery of performance may require several days of 9 hours or more sleep per day. Therefore, it is imperative that flightcrew members utilize their sleep opportunities to obtain the required rest.

9. FATIGUE TRAINING.

a. Reasons for Fatigue Training. Fatigue-based training requirements are critical to informing flightcrew members, 1) how their personal behavior can unwittingly lead to fatigue, 2) aggressive scheduling practices can lead to fatigue, and 3) how to mitigate the risk of fatigue in an industry that does not follow a traditional work cycle.

b. Employees Eligible for Fatigue Training. Flightcrew members are not the only employees of the air carrier that need to be trained about the impact of fatigue and the safety of flight. Section 117.9 prescribes that applicable all employees of the certificate holder responsible for administering the provisions of part 117 including flightcrew members, dispatchers, individuals directly involved in the scheduling of flightcrew members, individuals directly involved in operational control, and any employee providing direct management (immediate supervisor) oversight of those areas must receive fatigue education and awareness training. The final rule requires the training frequency to be accomplished annually. The fatigue education and awareness training program must be designed to increase awareness of fatigue, the effects of fatigue on pilots and fatigue countermeasures. AC 117-2, Fatigue Education and Awareness Training Program, provides guidance in the development of the certificate holder’s Fatigue Education and Awareness Training Program.

10. COMMUTING STRESSES.

a. Methods of Commuting. There are several methods for commuting flightcrew members, which include air travel, train, bus and privately owned vehicles. While commuting to their domicile, flightcrew members encounter stress not normally experienced when living within the local area of their domicile. Examples of these stresses are: ensuring they arrive at their domicile for flight duty in a timely manner, planning for potential delays, preparing for potential changes in the mode of their commute, and adapting to sudden changes that are out of their control such as weather disruptions.

b. Commuting by Air. Commuting by air is a common choice for flightcrew members. This mode provides the greatest flexibility for the flightcrew member with regard to where they actually live. However, the total travel time between the flightcrew member's residence and their domicile has the potential for a long day. One part of this problem is the available air service into the domicile from the home location. Flexibility and creativity are essential elements to a successful commute and reducing stress. The downside to commuting is the total travel time involved with the commute, which lengthens the first day of duty and reduces total time.

c. Commuting Loss of Time. One of the biggest disadvantages to commuting is the loss of time off. Because all time commuting is accomplished during flightcrew members' time off, a lot of the flightcrew member's time off may be consumed by the commute. In an effort to compensate for the loss of time, flightcrew members will often commute to work just before their report time, which increases the level of stress and the level of fatigue for that day.

11. COMMUTING AND DEADHEAD TRANSPORTATION. There has been quite a bit of confusion on the part of the general public with regard to the terms "commuting" and "deadhead transportation" or "deadheading." Both are transportation terms normally used by the airline industry.

a. Deadheading. The airline industry refers to the term deadheading as any time that an air carrier assigns a flightcrew member to be transported by a mode of transportation, usually by air, from one location to another and that same flightcrew member is not functioning as an operating flight flightcrew member. Normally, the concept of deadheading is used to move a flightcrew member so that they can be in position to function as an operating flightcrew member for a flight or series of flights. In basic terms, deadheading is an air carrier means of matching crews with the location of their aircraft.

b. Commuting. In contrast, the concept of commuting involves an individual flightcrew member that does not reside within their domicile. This flightcrew member then uses some mode of transportation to get to and from the domicile. Most commuters prefer to commute by air as it provides them with the most flexibility. Unlike deadheading, the commuting flightcrew member is solely responsible for determining and using the mode of transportation to commute to and from their domicile. In basic terms, commuting is an individual initiated function.

12. COMMUTER INDUCED FATIGUE.

a. Commuting Fatigue. While commuting offers many benefits to the flightcrew member, the stresses associated with commuting can contribute to flightcrew member fatigue. More importantly, commuting can contribute to the length of a flightcrew member's day, which also has the potential for contributing to fatigue.

b. Commuting and Schedules. Commuters normally plan their commute so they have at least 3 options (3 flights) to arrive at their domicile before their report time. This can result in the flightcrew member arriving at their domicile several hours before their report time. If a flightcrew member's first day of their trip is scheduled for 10 hours of duty and their commute requires another 4 hours, assuming they arrive at their domicile 3 hours prior to their report time, the flightcrew member's first day could exceed 17 hours without a rest period. Since air carrier

schedules are designed to account for the scheduled flight duty time, the additional time associated with a commute may add to the flightcrew member's fatigue for that day as well as aggravating the cumulative fatigue for the duration of the crew's schedule that the carrier had planned.

c. Evaluating Commuting Habits. In an extreme example, a flightcrew member is scheduled for an 8 a.m. report time at their domicile to start a 12-hour FDP. To ensure arriving at their domicile prior to the report time, the flightcrew member elects to commute through the night on an air carrier. Assuming sleep occurred prior to starting the commute, the flightcrew member has the potential for being awake at least 23 consecutive hours at the conclusion of the 12-hour FDP. Essentially, the flightcrew member is exposed to a sleep deficit, which contributes to cumulative fatigue. This kind of behavior is irresponsible commuting and may contribute to an unsafe operating condition that is contrary to the Federal aviation regulations. To that end, it is imperative that flightcrew members seriously evaluate their commuting habits to reduce the potential for being fatigued as a result of commuting.

13. PRE-DUTY ACTIVITIES.

a. Activities. Flightcrew members residing in their domicile that engage in activities prior to reporting for duty may unknowingly expose themselves to fatigue risks similar to those pilots that commute to work. Such activities include, but not limited to, work around the house, car repairs, yard work and other employment activities.

b. Flightcrew in the Domicile Versus Commuting Flightcrew. The total time of wakefulness for a flightcrew member residing in their domicile that engages in activities prior to duty may be similar to one that commutes to their domicile. The potential exposure to fatigue risks for that duty day affects both flightcrew members similarly. Essentially, they are both awake for the same time period prior to starting their duty period. While this may not be an issue for a midmorning report time, unless a flightcrew member has taken a nap prior to reporting, a mid or late evening report time exposes a flightcrew member to more of a potential to a fatigue event.

c. Minimize Pre-Duty Activities. As part of Public Law (PL) 111-216, § 212(c), the National Academy of Sciences (NAS) conducted a study on the effects of commuting on pilot fatigue. Outlined in one recommendation of the study NAS concluded, "Pilots should avoid planning commutes or other pre-duty activities that result in being awake beyond approximately 16 hours before the scheduled end of duty, endeavor to sleep at least 6 hours prior to reporting for duty, and obtain more than 6 hours of sleep per day whenever possible to prevent cumulative fatigue from chronic sleep restriction. Pilots should also consider the amount of sleep and time awake in their decision making relative to when to inform their supervisors that they should not fly due to fatigue."

d. Reduce Risk of Fatigue. It is imperative that flightcrew members realize that extended periods of wakefulness prior to starting a duty period may contribute to pilot fatigue. Therefore, flightcrew members must take the appropriate fatigue mitigations by obtaining the proper rest prior to starting any duty period to reduce the exposure to a fatigue-related event.

14. FIT FOR DUTY–FLIGHTCREW MEMBER'S RESPONSIBILITY.

a. Window of Circadian Low. Individuals living on a regular 24-hour routine with sleep at night have two periods of maximum sleepiness, known as Windows of Circadian Lows (WOCL). The primary WOCL occurs at night, roughly from 2 a.m. to 6 a.m., a time when physiological sleepiness is greatest and performance capabilities are lowest. The secondary WOCL occurs in the afternoon, roughly from 3 p.m. to 5 p.m. For the purpose of this AC, part 117 defines the primary WOCL as a timeframe of 0200 to 0559. During this timeframe, flightcrew members may find their performance degraded as a result of the body requiring sleep.

b. Sleep Drive. The drive for sleep increases over time since the last sleep period and with any cumulative deficit in sleep relative to the average 8-hour day requirement. As a consequence, the sleep drive is at its lowest point in the morning, upon awakening. As the day progresses, the drive to sleep increases and the ability to sustain attention and engage in cognitive activities decreases. Once sleep begins, this drive gradually decreases until awakening.

c. Alertness. For the average person, the daily upswing in alertness produced by the circadian system tends to offset the decrease in alertness produced by depletion of the sleep regulatory process. The result is normal alertness and performance during the first 16 hours of continuous wakefulness. After about 16 hours of continuous wakefulness, most adults begin to notice reductions in the speed of performance and in alertness levels. However, the changes in behavior and alertness can be magnified by a prior history of insufficient sleep quantity and quality.

d. Fatigue and Performance. For the reason discussed in subparagraph 14c, Alertness, above, flightcrew members that conduct off duty activities prior to commencing flight duty must understand that their commuting behavior may contribute to the potential effects of fatigue. For example, if a flightcrew member has a midday report time for an 8-hour FDP, and the flightcrew member commutes on an early morning flight, there is a high likelihood of fatigue. Without some rest period before starting the FDP, taking into consideration the early morning wake that occurs during the WOCL, the flightcrew member could end up awake for 18 hours. Given this example, science has demonstrated that the flightcrew member's performance will be degraded. Such commuting practices, promotes the potential for not being physically fit for duty, which in turn elevates the risk for an incident, accident, or pilot deviation that may have been averted if the flightcrew member had received some rest prior to starting the FDP. This kind of activity, which may be contrary to Federal regulations, does not support a professional standard, and most importantly does not assure the carrier will operate to the highest level of safety.

15. FIT FOR DUTY–AIR CARRIER'S RESPONSIBILITY.

a. Responsibility. Section 117.5(a) does not place the burden of showing up fit for duty solely on the flightcrew member. Section 117.5(a), in conjunction with the other provisions of this rule, places a joint responsibility on the certificate holder and each flightcrew member. In order for the flightcrew member to report for an FDP properly rested as required by this section, the certificate holder must provide the flightcrew member with a meaningful rest opportunity that will allow the flightcrew member to get the proper amount of sleep. Likewise, the flightcrew member bears the responsibility of actually sleeping during the rest opportunity provided by the

certificate holder instead of using that time to do other things. The consequences of a flightcrew member reporting for duty without being properly rested are addressed by subparagraphs 15b, Unfit for Duty and/or 15c, Fitness for Duty, below, which prohibit the flightcrew member from beginning or continuing an FDP until he or she is properly rested.

b. Unfit for Duty. Whenever a flightcrew member reports to the air carrier that they are too fatigued to perform duties before or during their assigned FDP as prescribed in § 117.9, the air carrier may not assign the flightcrew member, and that flightcrew member may not accept a flight assignment.

c. Fitness for Duty. Since fitness for duty is a joint responsibility between the air carrier and flightcrew member, an air carrier should develop and implement fatigue countermeasure initiatives such as fatigue and commuting policies to assure the air carrier conducts each operation to the highest level of air safety. Equally, flightcrew members must commute in a responsible manner so as to prevent the potential effects of fatigue that may result as a contributing or causal factor to an incident, accident, or pilot deviation.

16. CONTACT INFORMATION. For more information about the content of this AC, please contact the Air Transportation Division (AFS-200), at 202-267-8166.

ORIGINAL SIGNED by
/s/ John Duncan for

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