inconsistencies associated with various types of operations (domestic, flag, and supplemental under part 121 and commuter and on-demand under part 135) have continued to make application and interpretation burdensome. A number of petitions to amend the various sections were received (discussed in more detail later), as well as hundreds of letters concerning the interpretation of rest requirements for flight crewmembers assigned to a reserve status. Therefore, on June 15, 1992, the FAA announced [57 FR 26685] the establishment of the Flight Crewmember Flight/Duty Rest requirements working group (ARAC Flight/Duty Working Group) of the Aviation Rulemaking Advisory Committee (ARAC).

The ARAC had been established by the FAA in January 1991 [46 FR 2190, January 22, 1991] as a vehicle for convening representatives of interested groups to assist the FAA in addressing regulatory problems in a forum that could use, in a less formal setting, many of the regulatory negotiation techniques that had been used by the 1983–1985 flight time limitations advisory committee. The working group's task was to determine whether regulations pertaining to air carrier flight duty and rest requirements are consistently interpreted and understood by the FAA, air carriers, and pilots; to evaluate industry compliance/practice regarding scheduling of reserve duty and rest periods; and to evaluate reports of excessive pilot fatigue as a result of such scheduling. The working group was to develop recommendations for advisory material and a regulatory revision as appropriate.

Between its creation on June 15, 1992, and June 30, 1994, the ARAC Flight/Duty Working Group met on numerous occasions. The chairman of this working group (Dr. Donald E. Hudson of the Aviation Medicine Advisory Service) submitted a preliminary report on February 1, 1994, and a final report on June 30, 1994. The report indicated that while the working group did not reach a consensus on the specific issues, the working group did agree on four major areas that the FAA should address in future rulemaking actions: Absence of a duty time limitation; reserve scheduling; back-side-of-the-clock operations; and scheduled reduced rest. Each of the four areas is briefly described here. Three areas are specifically addressed in this rulemaking and one, back-side-of-the-clock operations, is partially, though indirectly, addressed.

Continuous or indefinite duty could occur under the current rules if flight crewmembers complete their daily schedule when delays encountered are beyond the control of the certificate holder, no matter how long it extends their duty period. The reserve scheduling issue concerns questions such as, do the same rest period requirements apply to flight crewmembers assigned to reserve duty as the rest period requirements that apply to flight crewmembers assigned to scheduled flights? Back-side-of-the clock operations refers to the question whether special duty limitations and rest requirements should be developed for operations that are scheduled during a flight crewmember's normal sleep cycle. The scheduled reduced rest issue concerns whether certificate holders should be allowed to schedule reduced rest in advance or whether reduced rest should only be allowed to deal with unavoidable delays.

Because no consensus could be reached, Dr. Hudson's final report included proposals submitted by several members of the working group. It also stated that there is enough clear scientific guidance available to assist the FAA in establishing a regulatory ''safety floor'' that will both address the identified issues and not unfairly penalize carriers economically. The report further stated that there is not any physiological justification for having different work rules for part 121 and 135 operators.

NASA Research Program

In 1980, in response to a Congressional request, the National Aeronautic and Space Administration (NASA) Ames Research Center created a Fatigue/Jet Lag Program to examine whether there are safety problems due to transmeridian flying and fatigue in association with various factors found in air transport operations. Since its inception, the program has pursued the following three goals: (1) to determine the extent of fatigue, sleep loss, and circadian disruption in both domestic and international flight operations; (2) to determine the impact of these factors on flight crew performance; and (3) to develop and evaluate countermeasures to reduce the adverse effects of these factors and improve flight crew performance and alertness. In 1991, the NASA Ames Program was renamed the NASA Ames Fatigue Countermeasures Program to highlight the increased focus on the third goal. Since the beginning of the program, NASA has worked in close cooperation with the FAA and with the airline industry to collect data and to provide the findings of its extensive research as quickly as possible. This research is fundamental to this proposal.

NASA Technical Memoranda reveal general principles pertinent to scheduling flight crewmembers. The memoranda include but are not limited to the following:

1. Crew Factors in Flight Operations II: Psychophysiological Responses to Shorthaul Air Transport Operations. (NASA Technical Memorandum 108856, November 1994)

2. Crew Factors in Flight Operations: Factors Influencing Sleep Timing and Subjective Sleep Quality in Commercial Long-Haul Operations. (NASA Technical Memorandum 103852, December 1991)

3. Principles and Guidelines for Duty and Rest Scheduling in Commercial Aviation. (NASA Technical Memorandum, 1995)

Copies of these memoranda have been placed in the public docket for this rulemaking.

These memoranda state that sleep, awake time off, and recovery are primary considerations for maintaining alertness and performance levels. Adequate sleep is essential to maintain alertness and performance, a positive mood, and overall health and well-being. Each individual has a basic sleep requirement. The average sleep requirement is for 8 hours in a 24-hour period. Losing as little as 2 hours of sleep in a 24-hour time period can result in acute sleep loss, which will promote fatigue and degrade subsequent performance and alertness. Over days, sleep loss will accrue into a cumulative sleep debt which can only be reversed by sleep. An individual who has obtained required sleep performs better even after long hours awake or during altered work schedules. An individual who is fatigued typically shows a decline in performance by requiring more time to complete a given task. Two nights of an individual's usual sleep requirement will typically stabilize the sleep pattern and restore acceptable levels of waking alertness and performance. More frequent recovery periods reduce cumulative fatigue more effectively than less frequent ones. For example, weekly recovery periods afford a higher likelihood of relieving acute fatigue than monthly recovery periods. Consequently, regulations that ensure minimum days off per week are critical for minimizing the effects of cumulative fatigue over longer periods of time.

The NASA findings and recommendations have been summarized in a 1995 NASA Technical Memorandum titled ''Principles and Guidelines for Duty and Rest Scheduling in Commercial Aviation.''