Federal Aviation Administration – Regulations and Policies
Aviation Rulemaking Advisory Committee

Air Carrier Operations Issue Area
Controlled Rest on the Flight Deck Working Group

Task 1 – Preplanned Rest in Cockpit

Task Assignment

FILE COPY

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Aviation Rulemaking Advisory Committee; Air Carrier Operations Subcommittee; Controlled Rest on the Flight Deck Working Group

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of establishment of Controlled Rest on the Flight Deck Working Group.

SUMMARY: Notice is given of the establishment of a Controlled Rest on the Flight Deck Working Group by the Air Carrier Operations Subcommittee of the Aviation Rulemaking Advisory Committee. This notice informs the public of the activities of the Air Carrier Operations Subcommittee of the Aviation Rulemaking Advisory Committee.

FOR FURTHER INFORMATION CONTACT: Dr. R. Curtis Graeber, Manager, Flight Deck Research Avionics/Flight Systems, Boeing Commercial Airplane Group, P.O. Box 3707, MS 33HH, Seattle, WA 98124–2207; telephone (206) 393–6688; fax (206) 477–0778.

SUPPLEMENTARY INFORMATION: The Federal Aviation Administration (FAA) established an Aviation Rulemaking Advisory Committee (56 FR 2190, January 22, 1991) which held its first meeting on May 23, 1991 (56 FR 20492, May 3, 1991). The Air Carrier Operations Subcommittee was established at that meeting to provide advice and recommendations to the Director, FAA Flight Standards Service, on air carrier operations, pertinent regulations, and associated advisory material. At its October 1, 1991, meeting (56 FR 46349, September 11, 1991), the subcommittee established the Controlled Rest on the Flight Deck Working Group.

Specifically, the working group's task is the following:

To determine the feasibility of preplanned rest in the cockpit during long-range flights and, if feasible, determine the criteria for the establishment of such rest periods.

The Controlled Rest on the Flight Deck Working Group will be comprised of experts from those organizations having an interest in the task assigned to it. A working group member need not necessarily be a representative of one of the organizations of the parent Air Carrier Operations Subcommittee or of the full Aviation Rulemaking Advisory Committee. An individual who has expertise in the subject matter and wishes to become a member of the working group should write the person listed under the caption **FOR FURTHER INFORMATION CONTACT** expressing that desire and describing his or her interest in the task and the expertise he or she would bring to the working group. The request will be reviewed with the subcommittee chair and working group leader, and the individual advised whether or not the request can be accommodated.

The Secretary of Transportation has determined that the formation and use of the Aviation Rulemaking Advisory Committee and its subcommittee are necessary in the public interest in connection with the performance of duties imposed on the FAA by law. Meetings of the full committee and any subcommittees will be open to the public except as authorized by section 10(d) of the Federal Advisory Committee Act. Meetings of the Controlled Rest on the Flight Deck Working Group will be not be open to the public, except to the extent that individuals with an interest and expertise are selected to participate. No public announcement of working group meetings will be made.

Issued in Washington, DC, on October 17, 1991.

David S. Potter,

Executive Director, Air Carrier Operations Subcommittee, Aviation Rulemaking Advisory Committee.

[FR Doc. 91–25491 Filed 10–22–91; 8:45 am]

BILLING CODE 4910–13–M

Recommendation Letter

AIR LINE PILOTS ASSOCIATION

535 HERNDON PARKWAY □ P.O. BOX 1169 □ HERNDON, VIRGINIA 22070 □ (703) 689-2270

March 10, 1993

Mr. Anthony J. Broderick
Associate Administrator for Regulation and Certification
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, D.C. 20591

Subject: Proposed Advisory Circular, Controlled Rest on the Flight Deck

Dear Mr. Broderick:

The Aviation Rulemaking Advisory Committee Air Carrier Operations Interest Area met in January to discuss, among other issues, a proposed Advisory Circular (AC) entitled Controlled Rest on the Flight Deck. A final copy of the proposed AC is included as Attachment 1. This proposed AC was prepared by the Controlled Rest on the Flight Deck Working Group.

The working group was established by the FAA on October 23, 1991 and was assigned the following task:

> To determine the feasibility of preplanned rest in the cockpit during long-range flights and, if feasible, determine the criteria for the establishment of such rest periods.

Dr. Curt Graeber of the Boeing Company was the working group chairman. The working group drew heavily from a research study performed by NASA. The report of this study, "Effects of Planned Cockpit Rest on Crew Performance and Alertness in Long-Haul Operations", is currently being published. This study demonstrates that naps during flight significantly improve post-nap performance. Throughout the working group discussions on this proposed AC, the group felt that the AC would propose measures to alleviate fatigue arising from flight operations and should in no way serve as a basis for modification or easing of those regulations pertaining to flight time limitations and rest requirements.

When this proposed AC was first presented to the Air Carrier Operations Subcommittee, several objections were raised by the Allied Pilots Association (APA). Among other issues, APA objected strenuously to the proposed allowance of controlled rest on two-crew airplanes. The working group discussed the objections and made revisions to the proposed AC in an attempt to be responsive to the APA concerns.

In November, 1992, APA published a report entitled "The Allied Pilots Association's Objections to the Proposed 'Controlled Rest' Advisory

Circular ("Cockpit Napping") for U.S. Certificated Air Carriers". A copy of that report was transmitted to me on January 13, 1993 and is Attachment 2. In the interest of brevity, Appendix B of their report contains reports or operational summaries from three NASA Technical Memoranda and is not included in the attachment. If you would like a copy of Appendix B, it is available from APA.

The proposed AC, as revised, was discussed at the January 13, 1993 meeting of the Air Carrier Operations Interest Area. The objections raised by APA were discussed and/or addressed at the meeting. Among their objections were the following:

- The Task Authority of the Working Group Was Exceeded.
- NASA Research Does Not Support the Proposed Advisory Circular.
- The Proposed Advisory Circular Goes Far Beyond Available Data:
  a. Critical Differences Between Two- and Three-Crew Operations Ignored,
  b. Current In-Flight Crew Rest Practices Would be Degraded,
  c. NASA did not Study Two-Pilot Operations or Domestic Operations, and
  d. Prevention of Sleeping by "Alert" Pilot Not Addressed.
- Regulatory and Legal Concerns.
- Sleeping on Duty is Not the Answer; the Flight/Duty Time Regulations Need to be Overhauled.

These objections are discussed in detail in the APA report.

The Air Line Pilots Association (ALPA) shares some of the concerns expressed by APA. In a letter sent to me February 1, 1993, these concerns were enumerated. According to ALPA, controlled rest on the flight deck should be used only on aircraft certificated for three crew members involved in long range operations up to twelve hours duration. Several recommended changes are offered to the January 14, 1993 version of the proposed AC which will address ALPA's concerns. In addition, ALPA proposes two additional areas which should be addressed by the FAA prior to implementation of the proposed AC. These are initiation of further research which would demonstrate the ability of crewmembers to respond to an emergency situation when a crewmember is resting and establishment of FAA policy regarding a captain's authority and responsibility while resting on the flight deck. A copy of the ALPA letter is Attachment 3.

Dr. Graeber discussed the proposed AC at the January 13, 1993 meeting of the Air Carrier Operations Subcommittee. The objections of APA and ALPA were also presented and discussed. A number of the members of the working group were also present at the meeting. After lengthy discussion of the issues and objections, the working group made several changes to the AC. It was not possible to develop a complete

consensus on the proposed AC, even with the changes. The working group presented the AC to the subcommittee with the recognition and discussion of the remaining objections.

The subcommittee felt it was appropriate to send the proposed AC, as modified at the meeting, to the FAA with the acknowledgement that there are objections to it. These objections had been addressed but not resolved. Dr. Graeber sent me a letter on January 14, 1993 in which he discussed the issues, objections, and need for the advisory circular. He included a letter from one of the NASA researchers who performed the controlled rest research and which addresses some of the APA objections to the proposed AC. He also included a copy of the proposed AC, as revised. Dr. Graeber's letter is Attachment 4.

We would like to be able to present you a non-controversial document with all members of the working group in complete agreement regarding its details. That is not possible. The majority of the working group feels the AC can serve a beneficial purpose in improving aviation safety by reducing operational fatigue. There is not complete consensus on some of the application provisions and other details.

If we may be of further assistance to you in this matter, please don't hesitate to call upon us.

Sincerely,

William W Edmunds Jr

William W. Edmunds, Jr.
Assistant Chairman
Aviation Rulemaking Advisory Committee

WWE:amr
attachments

cc: ARAC Air Carrier Operations
Controlled Rest on the Flight Deck Working Group

Recommendation

A P A ALLIED PILOTS ASSOCIATION

P.O. Box 5524 • Arlington, Texas 76005-5524 • 214-988-3188

January 13, 1993

Mr. Bill Edmunds, Chairman
ARAC Air Carrier Operations Subcommittee
c/o ALPA Safety Department
1625 Massachusetts Ave. N.W.
Washington, D.C. 20036

Dear Bill:

Approximately four weeks ago APA sent you a confidential working draft of the APA's Objections to the Proposed Controlled Rest Advisory Circular. We had previously submitted our preliminary objections in writing, and later verbalized the increasing breadth of our concerns at meetings of the Controlled Rest Working Group and the Air Carrier Operations Subcommittee.

Enclosed is a signed copy of APA's formal statement of objections to the proposed Advisory Circular. As you can see, it is far too comprehensive to be reduced to a single paragraph or even a page in a letter of transmittal. The statement of objections is 30 pages long and the appendices, containing related source documents contains an additional 100 pages.

Due to the extremely serious safety implications of the proposed procedure, APA has devoted considerable time and effort to create a complete statement of our objections. Pursuant to our request at the last meeting of the Air Carrier Operations Subcommittee (noted in the minutes of that meeting), it remains our request that the entire document be made a part of the record and be transmitted to the FAA with the proposed Controlled Rest Advisory Circular. As we discussed, to ease the Subcommittee's administrative burden APA will furnish signed copies directly to all ARAC members, to the Air Carrier Operations Subcommittee, and to the FAA, with a copy of this letter attached. We will also provide additional copies to other interested parties upon request.

Thank you for your attention to this matter. Your assistance in making APA's objections a part of the official record is appreciated.

Sincerely,

Capt. Brian A. Mayhew
ARAC Representative For the APA

BAM/clc
cc: R. T. LaVoy/B. B. Bickhaus/M. P. Cronin/A. J. Broderick
ARAC Members/Air Carrier Operations Subcommittee
Enclosure

000030 JAN 19 '93

THE ALLIED PILOTS ASSOCIATION'S OBJECTIONS TO THE PROPOSED "CONTROLLED REST" ADVISORY CIRCULAR ("COCKPIT NAPPING") FOR U.S. CERTIFICATED AIR CARRIERS

Presented To

The Aviation Rulemaking Advisory Committee (ARAC)

Prepared at the direction of Captain Richard T. LaVoy, President

By Captain Brian A. Mayhew and Captain Michael P. Cronin

November 19, 1992

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Sleep and Wakefulness in International Aircrews (NASA Technical Memorandum #88231)	

I.
INTRODUCTORY STATEMENT

Based on a thorough review of the Draft Advisory Circular and discussions at A.R.A.C. Operations Subcommittee meetings, the Allied Pilots Association believes that the Draft Advisory Circular on Controlled Rest is not consistent with the public interest.

The APA objects to the Draft Advisory Circular because: It contradicts current Federal Aviation Regulations and Aircraft Certification Standards, U. S. airline Operating procedures, and Crew Resources Management principles; and U. S. laws concerning the duty of care expected of common carriers, their agents and employees; it exceeds the stated task authority given the ARAC Working Group; and because it goes far beyond the available scientific support. The APA finds references to cockpit napping on two-pilot aircraft in any operation, and in the domestic ATC environment in any aircraft, exceptionally objectionable.

These objections are stated in the interest of protecting the flying public and ensuring that the currently prevailing standards for safety of flight are not diminished on U. S. certificated air carriers.

II.
TASK AUTHORITY EXCEEDED

The following is the Task Authority granted by the FAA to the ARAC Controlled Rest Working Group, as published on October 23, 1991 in the Federal Register:

> ***"Specifically, the working group's task is the following: To determine the feasibility of preplanned rest in the cockpit <u>during long-range flights</u> and, if feasible, determine the criteria for the establishment of such rest periods."***

The Draft Advisory Circular does not limit cockpit napping to "long-range" flights as specified by the Task Statement. The proposed Advisory Circular states that its applications may be extended to domestic U.S. operations, very few of which are "long-range" and to two-pilot operations as well. Indeed, during the most recent meeting of the Air Carrier Operations Subcommittee, one representative stated it was his understanding that cockpit napping would apply to domestic U. S. operations of every type. He specifically mentioned bank check carriers as an example, which are characterized by short-haul flights using small aircraft. The proposed Advisory Circular encourages the development of cockpit napping procedures in a wide range of operations not included in the Task Authority.

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APA has reviewed the following NASA studies and determined that none of them provides scientific support for the Advisory Circular as drafted. Copies of the Operational Summaries from the following NASA Technical Memoranda (and draft NTM) are attached as Appendix B:

* (Draft #103884) Effects of Preplanned Cockpit Rest On Crew Performance and Alertness in Long-Haul Operations by Rosekind, Graeber, Dinges, Connell, Rountree, Spinweber, and Gillen (1992)

  (#103852) Factors Influencing Sleep Timing and Subjective Sleep Quality In Commercial Long-Haul Flight Crews by Gander, Graeber, Connell, and Gregory (1991)

  (#88231) Sleep and Wakefulness in International Aircrews by Graeber (1986)

***Note:** Draft copies of NTM #103884 were circulated by NASA to the FAA, the participating air carriers, and the ARAC working group that drafted the proposed Advisory Circular. NTM #103884 will be in press at the NASA publications branch in January, 1993.

IV.
THE PROPOSED ADVISORY CIRCULAR GOES FAR BEYOND AVAILABLE DATA

The scientific research upon which the proposed Advisory Circular is supposedly based did not include observations or an analysis of "controlled rest" on two-pilot aircraft, or on any type of aircraft during operations in the domestic route/ATC environment, or during actual emergencies. The scope of the NASA Cockpit Napping Study (by Rosekind, Graeber, et al) was limited to long-range international operations, over water, in three-crew aircraft (without an augmented crew), during normal revenue operations. Since actual emergencies were not observed, the study cannot provide scientific conclusions about the impact of a partially asleep crew on proper handling of in-flight emergencies or abnormal situations. NASA allowed a 20-minute period for an awakened pilot to regain his faculties and situational awareness. That luxury will not exist following a critical, unplanned emergency, such as the cargo door failure and decompression experienced on a trans-Pacific United B-747. Neither does the NASA study provide data about cockpit napping during operations in the U.S. domestic ATC environment with its relatively dense VOR airways system for any type of aircraft. The following are quotes on point from NASA's Technical Memoranda:

(Draft #103884) *"The primary goal was to determine the effectiveness of a preplanned cockpit rest period to improve performance and alertness in nonaugmented, 3-person long-haul flight operations."*

(Draft #103884) *"It must be acknowledged that every scientific study has specific limitations that restrict the generalizability of the results. This study involved only one trip pattern on a commercial airline carrier. The study was conducted on transpacific flights to utilize the opportunity of scheduling the preplanned rest periods during the low workload portion of cruise over water...Also, the highest levels of accumulated fatigue, that probably occurred during the final trip legs, were not studied except for log book and activity data.*

(Draft #103884) *"This study involved B747 aircraft flown by 3-person crews. The specific application of these results to the 2-person cockpit were not addressed in this study. It is important to remain cognizant of these limitations when attempts are made to generalize the study results to questions that extend beyond the scope of the specific scientific issues addressed here."*

(Draft #103884) *"The preplanned nap appeared to provide an effective, acute relief for the fatigue and sleepiness experienced in nonaugmented 3-person long-haul flight operations. The strength of the current results does support the implementation of preplanned cockpit sleep opportunities in nonaugmented long-haul flight operations involving 3-person crews."*

(Draft #103884) *"The Rest Group was allowed a preplanned 40-minute rest period during the low workload, cruise portion of flight over water. Pilots rested one at a time, on a prearranged rotation, with 2 crewmembers maintaining the flight at all times...The rest opportunity was divided into an initial preparation period (3 mins), followed by the 40 minute rest period, followed by a recovery period (20 mins)...The rest was terminated at a present time by a researcher and the resting pilot was fully briefed prior to re-entering the operational loop."*

A. Critical Differences Between Two- and Three-Crew Operations Ignored

APA believes that some unintended results will flow from the inclusion of the two-pilot aircraft (even those with augmented crews) and from the inclusion of domestic operations, in an Advisory Circular based on a study of three-crew aircraft on long-haul, overwater flights. By including two-pilot aircraft and domestic operations on two and three crew aircraft late in the process, these consequences may not have received the in-depth consideration they deserve.

Current Federal regulations limit all domestic operations regardless of crew complement to eight hours of flight time between rest periods, 14 CFR 121.471(a)(4), and limits two-pilot crews in flag (international) air carriers to a maximum of eight hours flight time between rest periods (14CFR 121.481.a). Flight time beyond eight hours in a duty period on an aircraft designed for two-pilot operation is possible under 14 CFR 121.483 only by providing an additional pilot for in-flight relief. Responsible scheduling practices

under these current regulations should obviate the need for cockpit napping in those operations.

There are fundamental differences between the application of the cockpit napping concept on the three-crew aircraft vs. two-crew aircraft, even when the two-pilot crew is augmented by a relief pilot. On the three-crew flight deck with one crew member napping, the remaining two alert crew members are at their normal duty stations with full access to all necessary flight controls, navigation/communication gear, and vital systems controls such as fuel, electrical, hydraulics and pressurization.

On a two-pilot aircraft, even with a relief pilot in the flight deck jumpseat, when one pilot is napping in a pilot seat, only one alert crew member (the other operating pilot) has access to flight navigation, communications, and/or systems controls. Even when an alert relief pilot is available on the flight deck on two-pilot aircraft, he/she must be buckled into a cockpit jumpseat, which on many aircraft types is affixed to the aft cockpit bulkhead. Though alert, the relief pilot cannot reach essential flight/navigation/communication systems controls and cannot assist the alert operating pilot with either routine or emergency duties without getting out of the jumpseat.

Leaving the jumpseat to stand behind the pilot seats is not a practical alternative in turbulence, with a loss of cabin pressure, in an emergency descent, or in other situations where the alert relief pilot's assistance could be critical to the safe completion of the flight. Further, the light/indicator switches on modern two-pilot aircraft are positioned to be visible/operated only from the pilot seats.

It is possible that following an explosive decompression at the extremely high cruising altitudes typically used by two-pilot aircraft such as the Boeing 757/767, a sleeping pilot may not recover his faculties in time to don an oxygen mask. The time of useful consciousness (T.U.C.) without oxygen at flight level 410 is measured in seconds, so it is entirely possible that a pilot sleeping in a pilot seat may lose consciousness and may be unable to assist the alert pilot. Neither would an alert crew member in a cockpit jumpseat be able to assist in any meaningful way because he/she could not reach the controls and switches for aircraft systems/flight/communications/navigation.

B. Current In-Flight Crew Rest Practices Would Be Degraded

At the May 12, 1992 meeting, members of the Operations Subcommittee agreed that is was not their intent that cockpit naps be taken in a cockpit jumpseat on either two or three-crew aircraft. They stated that such rest should be taken at the normal duty station (pilot or flight engineer seat). This recognizes a practical necessity because cockpit jumpseats on many aircraft do not recline and are notoriously uncomfortable.

At the May 12 and September 16, 1992 meetings, members of the Operations Subcommittee seemed to agree with APA's position that various aviation constituencies

including oversight groups, Congress, and the media would take a dim view of any cockpit napping procedure that permitted one crew member to be sleeping in a crew rest seat (in the cabin) or in a bunk, while a second crew member is napping in a pilot seat -- because this would mean that there would be only one alert pilot on the flight deck. If the ARAC accepts that premise, then it is logical to assume that for cockpit napping to be used on two-pilot aircraft, even with an augmented crew, the relief pilot would be required to be in a cockpit jumpseat. As a practical matter, this would eliminate the use of a crew rest seat (in the cabin) or a bunk while "controlled rest" is being used.

C. NASA Did Not Study Two-Pilot Operations or Domestic Operations

As previously mentioned, the various NASA studies cover only long-range international operations on three-crew aircraft under normal conditions. These flights are characterized by a series of long overwater legs, utilizing inertial navigation, and entail severe circadian rhythm disruption caused by rapid crossing of multiple time zones over a period of days. The following is a quote from NASA's Technical Memorandum Draft #103884:

> *"Long-haul flight operations often involve rapid multiple time zone changes, sleep disturbances, circadian disruptions, and long, irregular work schedules. These factors can result in fatigue, cumulative sleep loss, decreased alertness, and decreased performance in long-haul flight crews. Thus, operations effectiveness and safety may be compromised due to pilot fatigue. One natural compensatory response to the sleepiness and fatigue experienced in long-haul operations is the occurrence of both unplanned, spontaneous napping and non-sanctioned rest periods. The occurrence of these activities is supported by anecdotal, observational, and subjective report data from a variety of sources."*

Readily available solutions currently exist to counter fatigue caused by excessive duty in that environment, especially during peacetime commercial operations. The use of relief crew members, on-board rest facilities, and proper scheduling practices that factor in human limitations, have proven to be effective countermeasures for pilot fatigue in both civil and military applications. Because these measures are known to be effective and are currently in use by most U. S. airlines, the purported rationale for the proposed cockpit napping Advisory Circular breaks down.

When in-flight crew rest is needed, it can and should be provided in a responsible manner, using proven methods that place public safety first. Admittedly, these currently available safety measures are more costly than the use of cockpit napping, but that is not a valid reason to abandon procedures that are known to be effective, in favor of new procedures known to have critical safety deficiencies.

D. Prevention of Inadvertent Sleeping by "Alert" Pilot Not Addressed

During at least two NASA studies, pilots were observed to fall asleep in an uncontrolled fashion due to fatigue, even when it was pre-briefed that they must remain awake. On several occasions when one pilot was taking a sanctioned cockpit nap, the designated alert pilot also fell asleep. This phenomenon is far less likely to occur during the controlled conditions of the NASA study than during unobserved line operations using cockpit napping procedures. The pilots in the study were wired to recording devices and were aware that they were being observed by two scientists in the cockpit jump seats -- yet the designated "alert" pilots still fell asleep inadvertently, leaving the aircraft and its passengers without a qualified pilot awake at the controls. It must be emphasized that this occurred on non-augmented crews, operating without a relief pilot and without the opportunity to use on-board rest facilities. This speaks volumes about the safety value of relief crew members and crew rest facilities currently provided by most U. S. carriers on long-haul flights. The following are quotes on point from NASA's Technical Memoranda:

(Draft #103884) *"There were two NASA researchers on the flight deck during the in-flight data collection periods. While they were instructed to minimize their interactions and presence, there is no question that having two extra individuals on the flight deck may have potentially altered the regular flow of cockpit conversation and interaction."*

(Draft #103884) *"An interesting finding emerged from analysis of the physiological data collected during the No-Rest Group 40-minute control period. While instructed to continue usual flight activities, 4 No-Rest Group pilots fell asleep (a total of 5 episodes) for periods lasting from several minutes to over 10 minutes."*

(Draft #103884) *"The period from one hour prior to top of descent (TOD) through descent and landing was analyzed for the occurrence of brain and eye movement microevents indicative of reduced physiological alertness."*

(Draft #103884) *"There was at least one microevent* [of reduced physiological alertness] *identified in 78% of the No-Rest Group and 50% of the Rest Group."*

(Draft #103884) *"The 24-hr rest/activity patterns, in combination with the subjective logs, demonstrated that 86% of the 21 subjects accumulated a sleep debt that ranged from 4 to 22 hrs and averaged approximately 9 hrs by the ninth day of the duty cycle."*

(Draft #103884) *"Further analysis demonstrated that the cockpit nap did not significantly alter the cumulative sleep debt observed in the Rest Group."*

(Draft #103884) *"The speed of falling asleep in the Rest Group (5.6 mins) is comparable to that seen in moderately sleep deprived individuals. A diagnostic guide for excessive sleepiness in sleep disorder patients is a sleep latency of 5*

mins or less. Also, there were five episodes of sleep that occurred during the control period in four No-Rest Group pilots that had been instructed to continue the usual flight operations."

(#103852) *"Naps were also reported, both during layovers and on the flight deck."*

(#103852) *"Such first naps were not very common and were associated with the acute sleep debt imposed by overnight eastward flights crossing five or more time zones (67%) or the prolonged wakefulness associated with westward flights crossing five or more time zones (25%)."*

(#103852) *"On the flight deck, crew members were observed to be napping at least 11% of the available time. The average duration of these naps was 46 min (range 10-130 min)."*

This known serious deficiency in the proposed cockpit napping procedures (uncontrolled, inadvertent sleeping by the designated "alert" pilot) calls into question the whole concept of encouraging cockpit crew members to sleep on duty. It is known that inadvertent sleep happened in addition to whatever sleep was permitted as "controlled rest" on non-augmented crews, flying long-haul international flights. It is known that the level of fatigue experienced by non-augmented airline crews scheduled in accordance with the minimum standards set by current U.S. flight/duty-time regulations caused uncontrollable/inadvertent sleeping by designated "alert" pilots even in a controlled study environment, with two observers on the flight deck. How then is inadvertent sleeping by the "alert" operating crew member supposed to be controlled as a practical matter in normal (unobserved) line operations? The Draft Advisory Circular is very vague on this critical point.

V.
RESPONSIBILITY AND PUBLIC TRUST

The proposed Advisory Circular will undoubtedly be used in the future as justification for proposals to increase flight/duty time limits and eliminate current crew rest facilities. With that in mind, it is useful to contrast the flight/duty limits of airline pilots crossing tens of time zones in a matter of days with that of airline dispatchers who live and work in the same time zone. Dispatchers are limited by FAA regulations to ten hours on duty (14 CFR 121.465 (b)(1)). For inexplicable reasons, pilots are allowed to remain on duty for much longer periods, even on two-pilot aircraft.

It must be pointed out that for flight crews, time on duty always exceeds flight time, sometimes substantially. Current regulations do not directly address time on duty for flight crews. Creative interpretation of 14 CRF 121.471 would seem to allow as much as sixteen hours on duty without a rest period so long as scheduled flight time does not

mins or less. Also, there were five episodes of sleep that occurred during the control period in four No-Rest Group pilots that had been instructed to continue the usual flight operations."

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(#103852) *"Such first naps were not very common and were associated with the acute sleep debt imposed by overnight eastward flights crossing five or more time zones (67%) or the prolonged wakefulness associated with westward flights crossing five or more time zones (25%)."*

(#103852) *"On the flight deck, crew members were observed to be napping at least 11% of the available time. The average duration of these naps was 46 min (range 10-130 min)."*

This known serious deficiency in the proposed cockpit napping procedures (uncontrolled, inadvertent sleeping by the designated "alert" pilot) calls into question the whole concept of encouraging cockpit crew members to sleep on duty. It is known that inadvertent sleep happened in addition to whatever sleep was permitted as "controlled rest" on non-augmented crews, flying long-haul international flights. It is known that the level of fatigue experienced by non-augmented airline crews scheduled in accordance with the minimum standards set by current U.S. flight/duty-time regulations caused uncontrollable/inadvertent sleeping by designated "alert" pilots even in a controlled study environment, with two observers on the flight deck. How then is inadvertent sleeping by the "alert" operating crew member supposed to be controlled as a practical matter in normal (unobserved) line operations? The Draft Advisory Circular is very vague on this critical point.

V.
RESPONSIBILITY AND PUBLIC TRUST

The proposed Advisory Circular will undoubtedly be used in the future as justification for proposals to increase flight/duty time limits and eliminate current crew rest facilities. With that in mind, it is useful to contrast the flight/duty limits of airline pilots crossing tens of time zones in a matter of days with that of airline dispatchers who live and work in the same time zone. Dispatchers are limited by FAA regulations to ten hours on duty (14 CFR 121.465 (b)(1)). For inexplicable reasons, pilots are allowed to remain on duty for much longer periods, even on two-pilot aircraft.

It must be pointed out that for flight crews, time on duty always exceeds flight time, sometimes substantially. Current regulations do not directly address time on duty for flight crews. Creative interpretation of 14 CRF 121.471 would seem to allow as much as sixteen hours on duty without a rest period so long as scheduled flight time does not

exceed eight hours. No duty time limitations whatsoever are apparent from a reading of the regulations for flag air carriers, although 24 hours seems implied by the specification of required rest based on flight time within the previous 24 hours (14 CFR 121.480-493). Even at unionized U. S. airlines, a crew may be required to remain on duty for up to fourteen hours without a rest period or augmentation by a relief pilot.

It is clear that pilots are most directly responsible for the safe conduct of a flight, and have a greater opportunity to cause a loss of life and property by a fatigue-induced mistake or lapse in judgment. Current flight/duty time regulations that allow pilots to be on duty longer and to be more fatigued than dispatchers do not appear to be consistent with the FAA's mandate to ensure the maximum practical level of public safety.

VI.
OPERATIONAL SAFETY CONCERNS

If the proposed Advisory Circular is adopted, what will ensure that designated "alert" crew members will remain awake? The draft Advisory Circular offers no advice on this critical point, even though NASA observed that even under controlled conditions, inadvertent sleeping by designated "alert" pilots occurred. What then does the "controlled" aspect of "controlled rest" consist of? It is more of a sales slogan than scientific term. The vague wording of the Advisory Circular could conceivably permit a company-issued alarm clock to be used. This Advisory Circular could provide the basis to substitute alarm clocks for the proper crew complements and proper scheduling practices that are currently used by most U. S. airlines to ensure that rested and alert flight crews are at the controls.

The Proposed Advisory Circular Leaves Major Questions Unanswered:

- Who is legally "in command" while the Captain is sleeping on duty?
- Who is responsible for violations, mishaps, incidents and/or accidents while the "pilot-in-command" is sleeping on duty?
- Will increased qualifications and licenses be required for First Officers if the Captain is allowed to sleep on duty?
- Must designated "alert" pilots hold a current flight engineers license and be current as an F/E on that aircraft if the flight engineer is allowed to sleep on duty?

VII.
REGULATORY AND LEGAL CONCERNS

A. Aircraft Certification Standards Contradicted

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All U. S. transport category aircraft are currently certified with a minimum crew complement. Presumably, current regulations contemplate that all crew members required for certification will be alert while at their duty stations. Does the FAA intend to redefine or waive current aircraft certification standards and operating manual requirements for crew complement if the cockpit napping Advisory Circular is adopted? Will the manufacturers be required to recertify all current aircraft for a lesser number of alert flight crew members? Will prior certification tests that were accomplished with the required flight crew complement participating be declared invalid with a lesser number of alert crew members operating the aircraft? NASA recommended (and the proposed Advisory Circular reiterates the recommendation) that a newly-awakened crew member be given a recovery period free of all duties for fifteen or twenty minutes. Surely such a person cannot be counted on in a critical and unexpected emergency. Recall what NASA Technical Memorandum Draft #103884 has to say about the need for a recovery period for awakened crew members:

> *"The rest opportunity was divided into an initial preparation period (3 mins), followed by the 40 minute rest period, followed by a recovery period (20 mins)...The rest was terminated at a present time by a researcher and the resting pilot was fully briefed prior to re-entering the operational loop."*

B. Approved Operating Procedures/Operating Manuals Invalidated

Two-pilot and three-pilot operations are currently governed by FAA-approved procedures designed to require the active and coordinated participation of the entire (required) flight crew complement. Those procedures are designed to provide a system of checks and balances and to provide the best available input during critical decisions/actions. That fundamental principle is incorporated in all U.S. airline operational procedures and is the foundation of FAA-mandated Crew Resource Management (CRM). The Draft Advisory Circular violates these proven principles without comment.

Will airlines that adopt cockpit napping be required to amend their FAA-approved operating manuals and training programs to provide various versions of emergency/abnormal procedures, e.g. "Emergency Descent With All Crew Members Awake," "Emergency Descent With Captain Asleep," "Emergency Descent With F/O Asleep," "Emergency Descent With F/E Asleep"? All airline emergency/abnormal procedures currently in effect depend on close crew coordination. The proposed Advisory Circular would eliminate the very foundation of CRM – proper crew coordination.

C. Single Pilot Operations Created

Current regulations prohibit single-pilot operation of large transports. The proposed Advisory Circular violates that basic principle by providing official guidelines by which airline aircraft can be flown with only one pilot awake on duty. If that is the intended result, the FARs should be rewritten, an NPRM issued, and an opportunity for

public comment provided. This is a huge change in operating and regulatory philosophy. The draft Advisory Circular further reduces the number of alert crew members that airline passengers and shippers currently pay for and currently expect to be alert when on duty.

D. Physiological Needs Redefined

Current federal regulations allow a crew member to be absent from his/her station briefly for physiological needs. Are cockpit sleepers considered "absent" under that regulation? Is sleeping on duty a physiological need? If sleeping on duty is recognized by the Advisory Circular as a physiological need for flight crews, what does that say about the adequacy current flight and duty time regulations and the level of safety provided by the current scheduling practices used by some operators?

From the flying public's point of view, the responsible approach would surely be to create flight/duty time regulations, and to require scheduling practices that recognize the physiological limitations of human beings whose mental alacrity and sound judgment is critical to the safe operations of the aircraft.

E. Duty of Care For "Common Carriers" And Captain's Responsibility Ignored

While the FAA may decide that it will not violate pilots for sleeping on duty within the guidelines of the proposed Advisory Circular, will the FAA also agree to ignore any other violations that occur while a pilot is sleeping on duty? Will a pilot sleeping on duty be violated for infractions by the alert pilot? Will federal, state, and local courts find pilots and their airlines guilty of negligence and liable for damages if a pilot is sleeping on duty and loss of life or property results? The ARAC Working Group did not research these liability problems and NASA's research does not address the issue.

The Captain's responsibility for things that go wrong while he/she is asleep is a major legal and regulatory issue. Recall the public's predictable reaction to the Exxon Valdez disaster. The Captain was chastised for not taking into account the limited capacity of his fellow deck officers before he went to sleep during a long duty day, even though company policy permitted him to sleep while underway. One must understand that sleeping was permitted by policy but not required, so the captain and his company were deemed to be grossly negligent and were legally responsible for the aftermath. When incidents occur while a crew member is sleeping, as they surely will, the Captain will inevitably find his judgement as to "who sleeps when" closely scrutinized with predictably adverse results.

F. No Coordination With International Authorities

There has been no coordination with ICAO, or with regulatory agencies in

sovereign nations whose airspace U. S. airlines transit and with whose regulations they must comply. What will their "enforcement attitude" be towards incidents that occur while crew members are sleeping on duty?

U. S. Flight crews involved in incidents/accidents on foreign soil are subject to action under the laws of those jurisdictions. How will a French or Greek or Egyptian or Argentinean court rule on questions of negligence, liability, and criminal responsibility? In many foreign countries, pilots are subject to immediate incarceration following an aircraft accident involving serious injury or death. Neither the Air Carrier Operations Subcommittee, nor its Working Group has obtained advice from the FAA General Counsel on these regulatory legal questions, nor from ICAO, nor from legal authorities in other ICAO nations.

VIII.
COCKPIT NAPPING EPITOMIZES CHOOSING ECONOMICS OVER SAFETY

Cockpit napping in general, and the inclusion of two-pilot and domestic operations in particular, will result in a significant increase in risk to the flying public by permitting U. S. airline aircraft to be operated with only one alert crew member the controls, assuming he/she has not also fallen asleep inadvertently. This will seriously degrade safety during a critical emergency such as an explosive decompression, and it will negate the checks and balances currently available during routine operations.

Proponents of cockpit napping argue that it will improve (or legitimize) the crew rest practices currently used by a few operators who are not willing to provide a properly-augmented crew and proper on-board rest facilities on long-haul operations. But if the vast majority of operators who currently do provide relief pilots and a crew rest facility were to adopt cockpit napping procedures instead, a significant degradation of current scheduling/crewing practices and in-flight crew rest would result – and therefore public safety would be adversely affected.

IX.
CONCLUSION: SLEEPING ON DUTY IS NOT THE ANSWER

If the objective is enhanced safety of flight, an overhaul of flight/duty time regulations is required. Current regulations, to a large extent, leave safe crewing and scheduling practices to be settled as a matter of contract, where a contractual relationship exists between pilots and their airlines. The baseline federal regulations were written long ago, when trans-ocean flights in propeller aircraft required days of flying with multiple stops and layovers, rather than the 8 to 16 hours required today.

The effects of "jet lag", more properly called Circadian Rhythm Disruption, are well

FAA Action – Not Available