

Attachment A
AS2R-ROPM-019

NTSB HUMAN FATIGUE INVESTIGATION METHODOLOGY (HFIM) STUDY

GENERAL INSTRUCTIONS AND DATA FORMS

- All accidents involving Part 135 or Part 91k operations should be included in the study.
- Please fill out the attached questionnaire and the sleep activity log for each flight crew member.
- Please make an effort to obtain toxicological tests and FAA medical records in **all** accidents, not just fatalities. If you need assistance, please contact Mitch Garber or Jana Price.
- Interview pilots/witnesses/family members as soon as possible to promote accurate reporting.
- Use local time expressed in military time for all questions pertaining to time
- If it is available, request ATC transcripts and recorder readouts for possible evidence of pilot error or unresponsiveness
- Any questions? Contact Jana Price¹ by phone 202-314-6512 or email pricej@ntsb.gov.
- When finished, please send completed forms using one of the following methods:
 - Scan forms and email to Jana Price at pricej@ntsb.gov
 - Fax forms to Jana Price at 202-314-6599
 - Mail forms to Jana Price at NTSB, RE-10, 490 L'Enfant Plaza East, SW, Washington DC 20594

Use the following **source codes** on all forms:

- 1 – Pilot self report
- 2 – Interview with family member
- 3 – Interview with coworker
- 4 – Interview with witness
- 5 – Flight and duty logs
- 6 – Work schedules
- 7 – Recorder data
- 8 – Medical records
- 9 – Time stamped evidence (e.g., receipts, phone records, hotel receipts)
- 10 – Wreckage
- # – Other (add explanation)

BASIC ACCIDENT INFORMATION

Investigator Name: McKenny NTSB Number: WPR10FA371

Accident Location: Tucson, AZ Accident Date: 7.28.2010 Accident Time: 1342

INITIAL SCREENING QUESTIONS (Source Codes: 2, 5)

Did the accident occur between 0300 and 0600? Yes No Unk,

Were any pilots' sleep lengths reduced by 2 hours or more (compared to their normal sleep lengths) during any of the 3 days before the accident? Yes No Unk

Had any pilots been awake for 16 hours or longer at the time of the accident? Yes No Unk

Does the evidence suggest inaction or inattention on the part of the pilot(s) (e.g., a delayed response to an alarm or an oncoming obstacle)? Yes No Unk

¹ Note that Jana will be on Maternity leave between May-Aug 2009. In her absence, please contact Aaron Dietz at aaron.dietz@ntsb.gov or 202-314-6519.

NTSB HUMAN FATIGUE INVESTIGATION METHODOLOGY (HFIM) STUDY

DETAILED METHODOLOGY – COMPLETE SEPARATE FORM FOR EACH FLIGHT CREWMEMBER

Pilot Name: Kelley, Alexander Pilot Role: Captain First Officer

Sleep/Wake History: (Source Codes: 2, 5)

(If possible, complete attached sleep/activity log first, and use it to answer these questions)

How long was the most recent sleep period? 9 hours minutes, Unk

Total amount of sleep in the 24 hours prior to the accident? 9 hours minutes, Unk

Total amount of sleep in the 72 hours prior to the accident? 27 hours minutes, Unk

How long had the pilot been awake at the time of the accident? 7 hours minutes, Unk

How long had the pilot been on-duty at the time of the accident? 6 hours 30 minutes, Unk

How long had the pilot been flying at the time of the accident? 0 hours 10 minutes, Unk

Did the pilot have a regular work schedule? Yes No Unk

If yes, what was the pilot's typical work schedule: Days Afternoon/Evenings Nights Rotating Unk

Had the pilot's work schedule changed substantially during the 72 hours prior to the accident (e.g., from a day to a night shift)? Yes No Unk

On off duty days, What is the pilot's normal bedtime? 2130 Unk

How much sleep does the pilot usually get per night, on average? 8-9 hours minutes Unk

What is the pilot's normal wake time? 0600 Unk

Is there any evidence that the pilot was affected by jet-lag? Yes No Unk

If yes, please describe the evidence (e.g., number of time-zone crossings) _____

Did the pilot work more than one job? Yes No Unk

How many hours per week did the pilot average on duty across all jobs? 84 hours Unk 7 days on, 7 days off

How many hours per week on average was the pilot on-call? 84 hours Unk

Sleep Quality: (Source Codes: 2)

Were there factors in the pilot's environment that interfered with the pilot's sleep in the 72 hours preceding the accident? Yes No Unk

If yes, check all that apply:

- Light Phone Calls
 Noise Household Responsibilities
 Other _____

Health/Medical Factors – (Contact Mitch Garber if you need assistance with interpreting toxicological results or medical records): (Source Codes: _____)

Height 6 ft 3 in Unk

Weight 212 lbs Unk

Neck circumference (collar size) _____ in Unk (wore a XL shirt)

Did the pilot report the use of any drugs/medications regularly? Yes No Unk

If yes, name of medicine ED medication Dosage _____ How often? occasionally

Had the pilot taken any drugs/medications within 24 hours of the accident? Yes No Unk

If yes, name of medicine _____ Dosage _____ When? _____

Did the toxicology results reveal any ethanol in the pilot's system? Yes No Unk

If yes, what was the amount (mg/dl)? _____ blood _____ urine _____ vitreous (do not report if no fluids were tested or if the vitreous ethanol was not from ingestion)

Did the toxicology results reveal the presence of any drugs in the pilot's system? Yes No Unk

If yes, what was the drug(s), and the amount detected?

Drug _____ Amount _____ Source Blood Urine Tissue
Drug _____ Amount _____ Source Blood Urine Tissue

Did the pilot have a history of sleep problems, or health problems that affected sleep? Yes No Unk

Did the pilot have a history of snoring while sleeping? Yes No Unk

Did the pilot have a history of sleepiness or nodding-off during the day? Yes No Unk

Is there evidence that the pilot ever talked to a physician about sleep problems? Yes No Unk

Had the pilot been diagnosed with a sleep disorder? Yes No Unk

If yes, what sleep disorder? _____

The pilots wife said she was familiar with sleep apnea symptoms, and the pilot always slept soundly, with out interruptions.

Pilot Performance/Behaviors: (Source Codes: None)

During the accident flight...

Did the pilot overlook or skip tasks or parts of tasks (e.g., checklists, or routine procedures)? Yes No Unk

Did pilot focus on a few factors to the exclusion of more important information (e.g., fixating on weather or navigation while ignoring other tasks)? Yes No Unk

Was there evidence of delayed responses or unresponsiveness from the pilot (e.g., delayed responses to ATC)? Yes No Unk

Was there evidence of impaired decision-making from the pilot? (e.g., decision to fly into unsafe conditions) Yes No Unk

Is there evidence that the pilot was sleepy at the time of the accident (e.g., said he was tired, was observed by others yawning or nodding off)? Yes No Unk

Additional Questions: (Source Codes: _____)

Is there evidence that the pilot had fallen asleep during vehicle operation in the past? Yes No Unk

Had the pilot received fatigue management training from his current employer? Yes No Unk

Had there been prior employee or labor union complaints about the operator in terms of fatigue-related issues? Yes No Unk

Were there any unusual operational factors that might affect pilot alertness, such as flight delays or extended duty periods? Yes No Unk

If yes, what were they? _____

Were there any environmental factors that might affect pilot alertness, such as low lighting, or lack of access to food/drink? Yes No Unk

If yes, what were they?: _____

ANALYSIS:

It is important to establish two factors before concluding that flight crew fatigue contributed to an accident. First, determine whether the flight crew was susceptible to the effects of fatigue based on sleep lengths, sleep disturbances, circadian factors, time awake, and/or medical issues.

In general, if any of the following were true, there is an increased likelihood that the pilot was impaired by fatigue:

- The event occurred between 0300 and 0600
- The pilot had one or more days with acute sleep loss (e.g., four hours less sleep than normal per night)
- The pilot had multiple days with chronic sleep loss (e.g., 1-2 hours less sleep than normal per night)
- The pilot recently encountered a major shift in circadian cycle, such as moving from day to night shifts, or flying across multiple time zones.
- The pilot had been awake for more than 16 consecutive hours at the time of the accident.

Second, if it is determined that a flight crew member was likely experiencing excessive fatigue, evaluate information concerning performance and behaviors that may have contributed to the accident to determine whether they were consistent with the effects of fatigue.

If you determine that the pilot was probably impaired by fatigue, but you do not find that 1) the pilot's actions contributed to the accident, or 2) that the pilot's actions did contribute to the accident, but that those accidents were probably not influenced by fatigue, then fatigue should be listed as a finding rather than as a probable cause or contributing factor.

Fatigue as a Factor:

Based on your analysis, do you believe that crew fatigue was a factor in this accident? Yes No Unk

Please write any additional comments below or on the back of this page. _____

Sleep/Activity Log

Use the key at the bottom of the page to depict the time of the crash and the sleep/wake/duty times for the pilot in the days leading to the crash. Start with the day/date of the crash fill in the 3 preceding days along the left. Then, interview the pilot about the time he/she began and ended each duty period and sleep period for each day before the crash. Include naps as well as main sleeps. Enter any comments in the space below the timeline.

Accident Number: WPR10FA371

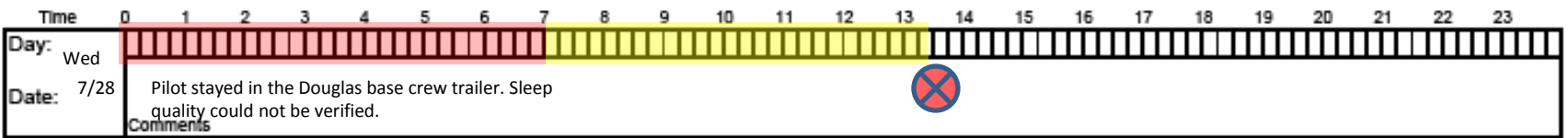
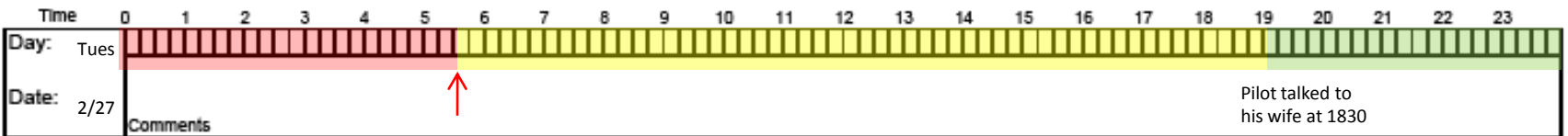
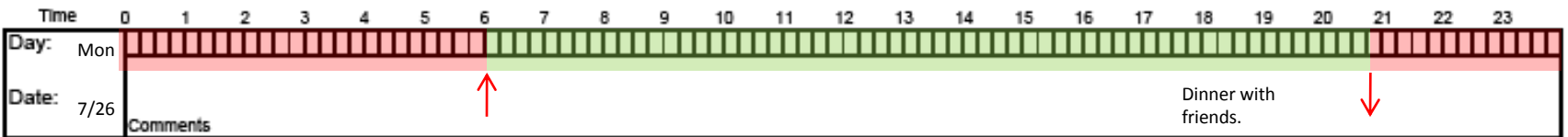
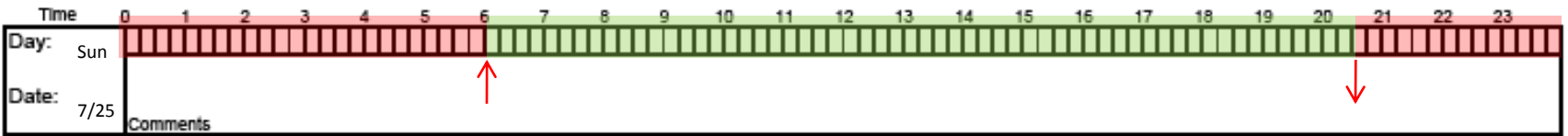
Accident Date: 7.28.2010

Date Completed: 8.7.2010

Pilot Name: Kelley, A.

ASI Name: McKenny, V.

Source Codes: 2,5



EXAMPLE



KEY: ↓ = went to bed ↑ = woke up [red bar] = asleep [yellow bar] = on duty [blue X] = crash [green bar] = Off Duty