Enhancing Aviation Safety: NTSB Fatigue Investigations and Recommendations

Mark R. Rosekind, Ph.D.
Board Member

Board of Directors Meeting
Coalition of Airline Pilots Associations
September 17, 2014
1) determining the probable cause of transportation accidents

2) making recommendations to prevent their recurrence
All Modes
Independent Federal Agency: Created in 1967

- >140,500 accident investigations
- 14,000+ safety recommendations
- ~ 2,300 organizations/Recipients
- 82% acceptance rate
“Swiss Cheese” Model (Reason)

Successive layers of defenses, barriers, and safeguards

Accident

Hazards
NTSB Go Team: 24/7/365

- Individual investigator
- Regional/limited team
- Major launch/Board Member
Key On-scene Events

Organizational Meeting
- Designate parties and party coordinators
- Establish and organize groups

Progress Meetings
- Summarize findings
- Info for briefings

Family Briefings

Press Briefings
NTSB Party System

• NTSB selects parties
  (No insurers, claimants, lawyers)

• Bound by rules of engagement
  (Responsive to NTSB direction)

• Verify factual reports written by group chairmen

“...persons, government agencies, companies, and associations whose employees, functions, activities, or products were involved in the accident and who can provide suitable qualified technical personnel to actively assist...”

Party Member Examples
• FAA (always)
• Equipment manufacturer
• Engine manufacturer
• Airline Pilots Association
• Air Traffic Controllers Union
NTSB Investigative Process

On-scene Investigation
Organizational Meeting
Groups and Parties
Progress meetings
Media Briefings
Press Releases

Preliminary Report
Fact finding
Depositions
Witnesses
Docket

Public Hearing
Fact finding
Depositions
Witnesses
Docket

Board Meeting
Docket
Findings
Conclusions
Probable Cause
Safety Recommendations

Final Report

Government in the Sunshine Act
NTSB: The Board

• Five Members:
  - President nominates
  - Senate confirms

Earl Weener
Member

Robert Sumwalt
Member

Chris Hart
Acting Chairman

Mark Rosekind
Member
Honorable John K. Lauber:

No Accident ≠ Safe Operation
Challenges of a 24/7 Society
Four Fatigue Factors +

- Sleep loss
- Continuous hours of wakefulness
- Circadian/time of day
- Sleep disorders
- Other considerations
Fatigue Risks

- awake/alert
- asleep

- reduced performance
- variability
Fatigue Risks

• degraded 20 – 50%+:
  - reaction time
  - memory
  - communication
  - situational awareness

• increased:
  - irritability
  - apathy
  - attentional lapses
  - microsleeps
Fatigue and Reaction Times

Alertness Reports Often Inaccurate

Graph showing subjective and physiological alertness over time, adapted from Sasaki et al., 1986.
Uncontrolled In-Flight Collision with Terrain
AIA Flight 808, Douglas DC-8-61, N814CK
U.S. NAS, Guantanamo Bay, Cuba, August 18, 1993

First NTSB aviation accident investigation
to cite fatigue as probable cause

• acute sleep loss, sleep debt, circadian disruption
Crew Sleep History

<table>
<thead>
<tr>
<th></th>
<th>8/16/93</th>
<th>8/17/93</th>
<th>8/18/93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capt.</td>
<td>8 h</td>
<td>9 h</td>
<td>2 h</td>
</tr>
<tr>
<td>F/O</td>
<td>8 h</td>
<td>9 h</td>
<td>2 h</td>
</tr>
<tr>
<td>F/E</td>
<td>9.5 h</td>
<td>15 h</td>
<td>6 h</td>
</tr>
</tbody>
</table>

Accident MGUM

Sleep | Wake | Duty

- Capt.
- F/O
- F/E
Observed Performance Effects

- Degraded decision-making
- Visual/cognitive fixation
- Poor communication/coordination
- Slowed reaction time
Uncontrolled In-Flight Collision with Terrain
AIA Flight 808, Douglas DC-8-61, N814CK
U.S. NAS, Guantanamo Bay, Cuba, August 18, 1993

“The National Transportation Safety Board determines that the probable causes of this accident were the impaired judgment, decision making, and flying abilities of the captain and flight crew due to the effects of fatigue…”
Owatonna, MN (July 31, 2008)

8 fatalities
“Contributing to the accident were . . . (2) fatigue, which likely impaired both pilots’ performance; . . .”
Asiana 214 (July 6, 2013)
San Francisco, CA (SFO)

3 fatalities
49 seriously injured
Contributing to the accident were . . .

(5) flight crew fatigue, which likely degraded their performance.
Fatal Aviation Accidents
(examples: fatigue cited)

• 8/97 Guam: 228 fatalities
• 6/99 Little Rock AK: 11 fatal
• 10/04 Kirksville MO: 11 fatalities
• 8/06 Lexington KY: 49 fatalities
• 7/08 Owatonna MN: 8 fatalities
• 2/09 Buffalo NY: 49 fatalities
• 6/09 Santa Fe NM: 2 fatalities
• 7/13 San Francisco, CA: 3 fatalities
NTSB Recommendations

- MOST WANTED 1990 - 2011
- >200 fatigue recommendations
Complex Issue:

Requires Multiple Solutions

- Scheduling Policies and Practices
- Education/Awareness
- Organizational Strategies
- Healthy Sleep
- Vehicle and Environmental Strategies
- Research and Evaluation
Manage Fatigue = Enhance Safety

• Culture change
• Get educated
• Acknowledge risk
• Take action!
Good sleep, safe travels.