



NTSB National Transportation Safety Board

Human Behavior: The Most Significant Risk in Transportation Safety

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Psychiatry Grand Rounds
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UNITED STATES CODE, TITLE 49

CHAPTER 11—NATIONAL TRANSPORTATION SAFETY BOARD

SUBCHAPTER 1—GENERAL

Sec.
1101. Definitions.

SUBCHAPTER 2—ORGANIZATION AND ADMINISTRATIVE

1111. General organization.
1112. Special boards of inquiry on air transportation safety.
1113. Administrative.
1114. Disclosure, availability, and use of information.
1115. Training.
1116. Reports and studies.
1117. Annual report.
1118. Authorization of appropriations.

SUBCHAPTER 3—AUTHORITY

1131. General authority.
1132. Civil aircraft accident investigations.
1133. Review of other agency action.
1134. Inspections and autopsies.
1135. Secretary of Transportation's responses to safety recommendations.

SUBCHAPTER 4—ENFORCEMENT AND PENALTIES

1151. Aviation enforcement.
1152. Joinder and intervention in aviation proceedings.
1153. Judicial review.
1154. Discovery and use of cockpit voice and other material.
1155. Aviation penalties.

SUBCHAPTER 5—GENERAL

§1181. Definitions

Section 40102(a) of this title applies to this chapter.

SUBCHAPTER 6—ORGANIZATION AND ADMINISTRATIVE

§1113. General organization

(1) ORGANIZATION.—The National Transportation Safety Board is an independent establishment of the Executive Branch of the Government.

(2) APPOINTMENT OF MEMBERS.—The Board is composed of 5 members appointed by the President, with the advice and consent of the Senate. Not more than 3 members may be appointed from the same political party. The members shall be appointed on the basis of technical qualification, professional standing, and demonstrated knowledge of accident reconstruction, safety engineering, human factors, transportation safety, or transportation regulation.

(3) TERMS OF OFFICE AND REMOVAL.—The term of office of each member is 7 years. An individual may be reappointed to fill a vacancy occurring before the expiration of the term for which the predecessor of that individual was appointed for the remainder of that term. When the term of office of a member ends, the President may reappoint a successor if a successor is appointed and qualified. The President may remove a member for inefficiency, neglect of duty, or other cause.

(4) CHAIRMAN AND VICE CHAIRMAN.—The President shall designate, by and with the advice and consent of the Senate, a Chairman of the Board. The President also shall designate a Vice Chairman of the Board. The terms of both the Chairman and Vice Chairman are 2 years. When the Chairman is absent or unable to perform the duties of the office, the Vice Chairman shall perform the duties of the office.

Mission

The NTSB is charged with:

- 1) determining the probable cause of transportation accidents
- 2) making recommendations to prevent their recurrence



The NTSB is Responsible for Investigating:

**Aviation, highway, rail, marine, pipeline,
and hazardous material accidents**



PG&E/San Bruno Gas Pipeline Explosion





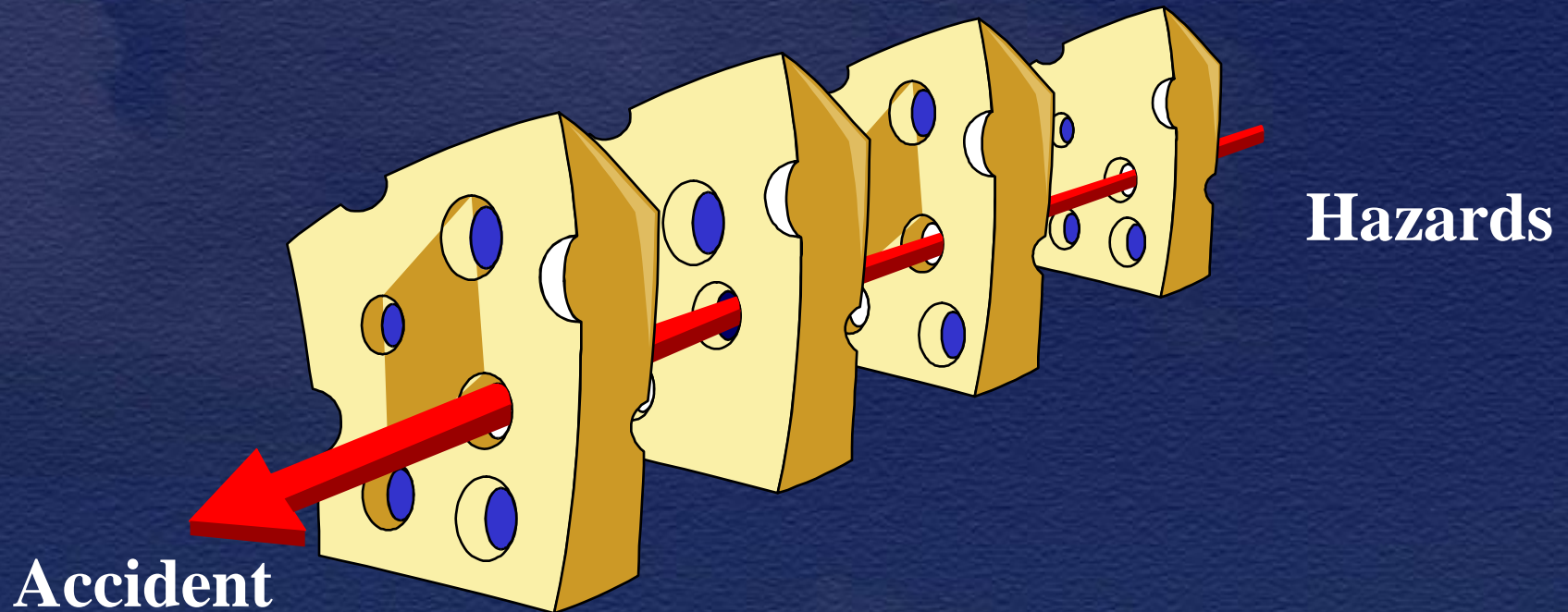
- 130,000+ accident investigations
- ~13,500 safety recommendations
 - 82% acceptance rate



Major product: safety recommendations

Moral compass and industry conscience

“Swiss Cheese” Model (Reason)



Successive layers of defenses, barriers, and safeguards

Human Behavior: The Most Significant Risk in Transportation Safety

- Fatigue
- Medications
- Alcohol impaired driving
- Distraction

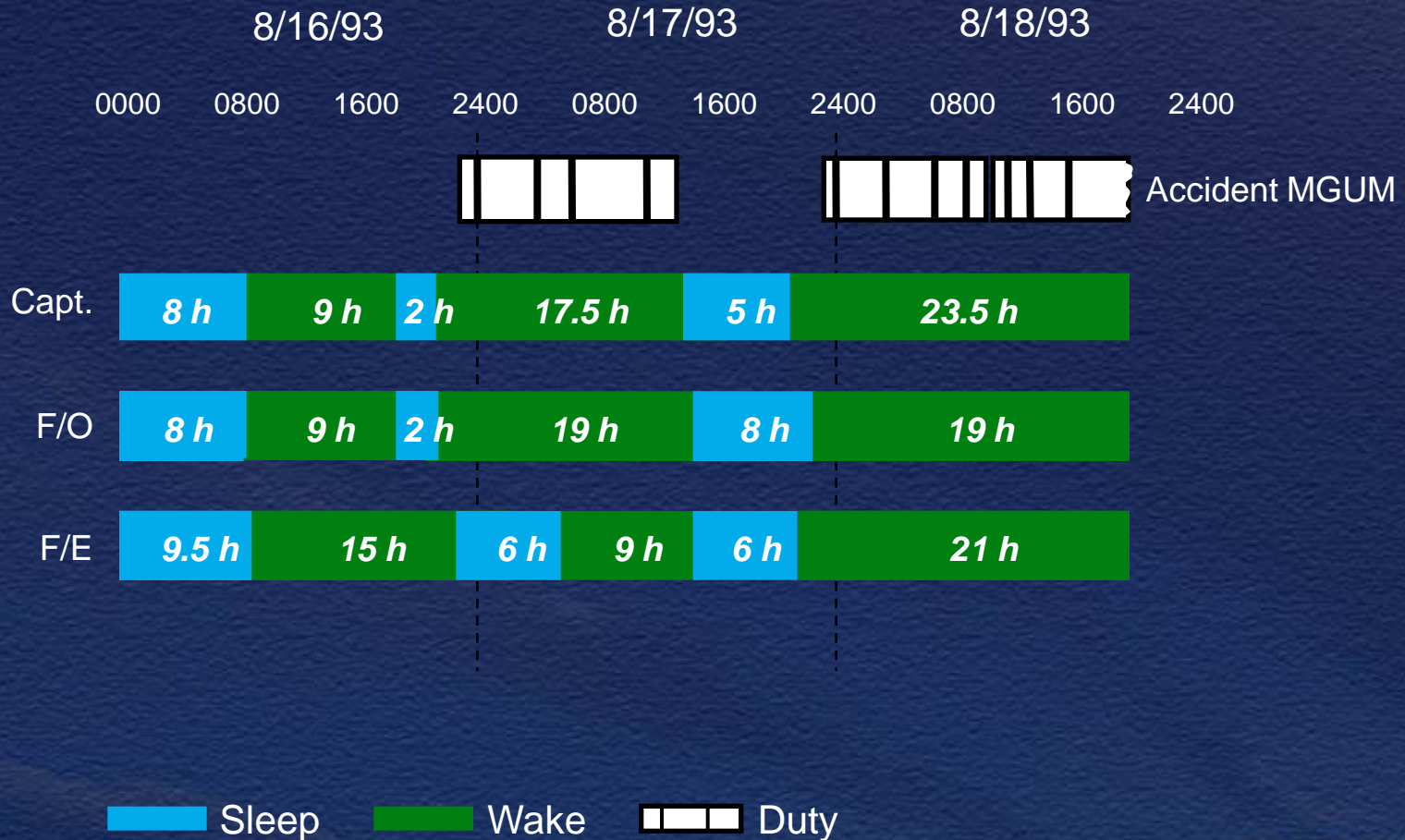
Guantanamo Bay Cuba

First NTSB aviation accident to cite fatigue as probable cause



- acute sleep loss, sleep debt, circadian disruption

Crew Sleep History



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...”

10 fatalities
3 serious injuries
2 minor injuries
5 no injuries

**Ford
Windstar**



**Hyundai
Sonata**

**Kia
Spectra**

Source: Oklahoma State Police

Probable Cause (fatigue)

“ . . . driver’s fatigue, caused by the combined effects of acute sleep loss, circadian disruption associated with his shift work schedule, and mild sleep apnea, which resulted in the driver’s failure to react to slowing and stopped traffic ahead by applying the brakes or performing any evasive maneuver to avoid colliding with the traffic queue. . . . ”



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Track Path Animation

Collision Between Two BNSF Railway Freight Trains
Red Oak, Iowa
April 17, 2011
DCA11FR002

NTSB



Probable Cause (fatigue)

“ . . . failure of the crew of the striking train . . . to operate in accordance with restricted speed requirements and stop short of the standing train because they had fallen asleep due to fatigue resulting from their irregular work schedules and their medical conditions.”

NTSB Most Wanted List

Critical changes needed to reduce transportation accidents and save lives.



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[HOME](#) [NEWS & EVENTS](#) [TRANSPORTATION SAFETY](#) [ACCIDENT INVESTIGATIONS](#) [DISASTER ASSISTANCE](#) [LEGAL](#) [ABOUT](#)

[Home](#) > [Transportation Safety](#) > [Most Wanted List](#)

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MOST WANTED LIST

A program to increase the public's awareness of, and support for, action to adopt safety steps that can help prevent accidents and save lives. The following are ten of the current issues.



Addressing Human Fatigue



General Aviation Safety



Safety Management Systems



Runway Safety



Bus Occupant Safety



Pilot & Air Traffic Controller Professionalism



Recorders



Teen Driver Safety



Addressing Alcohol-Impaired Driving



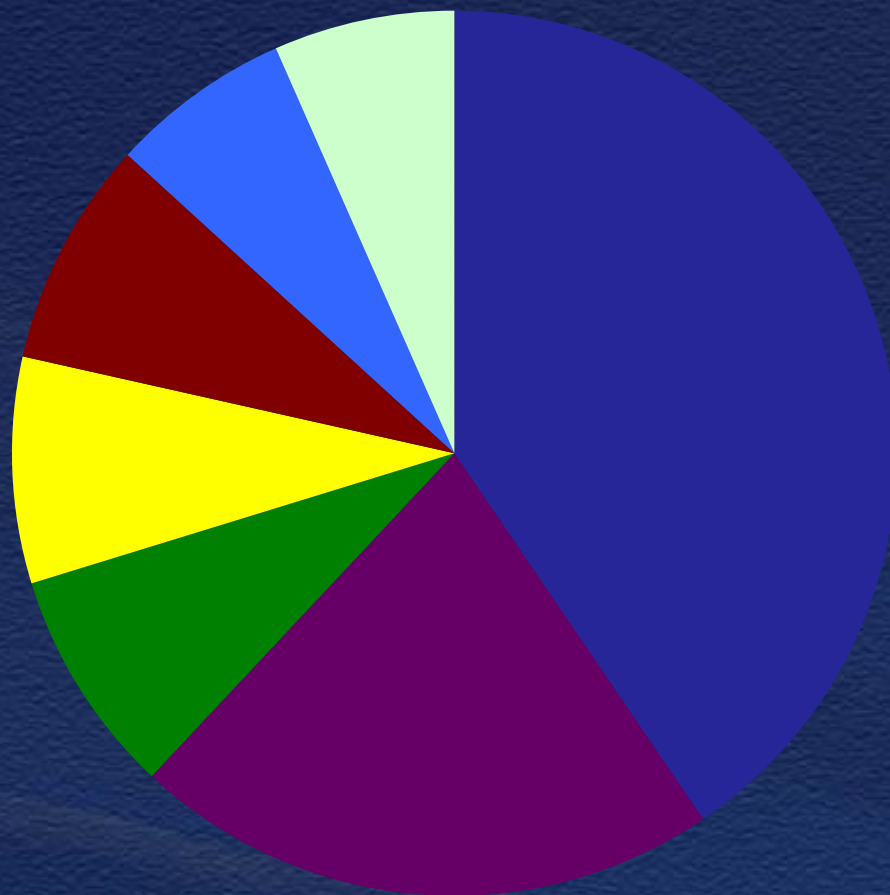
Motorcycle Safety



NTSB Recommendations

- MOST WANTED since 1990
- ~200 fatigue recommendations

Complex Issue: Requires Multiple Solutions

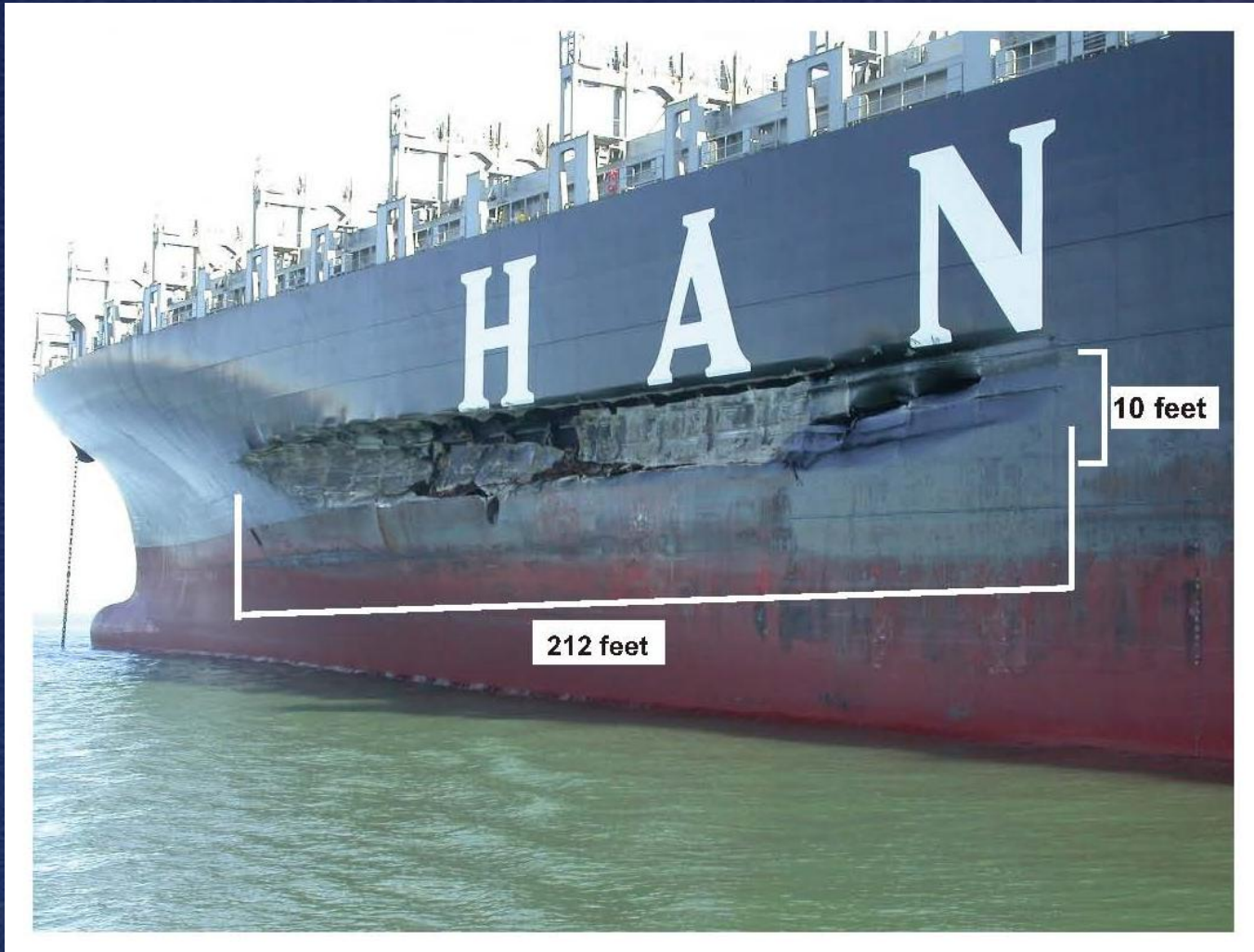


- Scheduling Policies and Practices
- Education
- Organizational Strategies
- Raising Awareness
- Healthy Sleep
- Vehicle and Environmental Strategies
- Research and Evaluation

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Cosco Busan (SF Bay, Nov. 2007)



Cosco Busan (SF Bay, Nov. 2007)

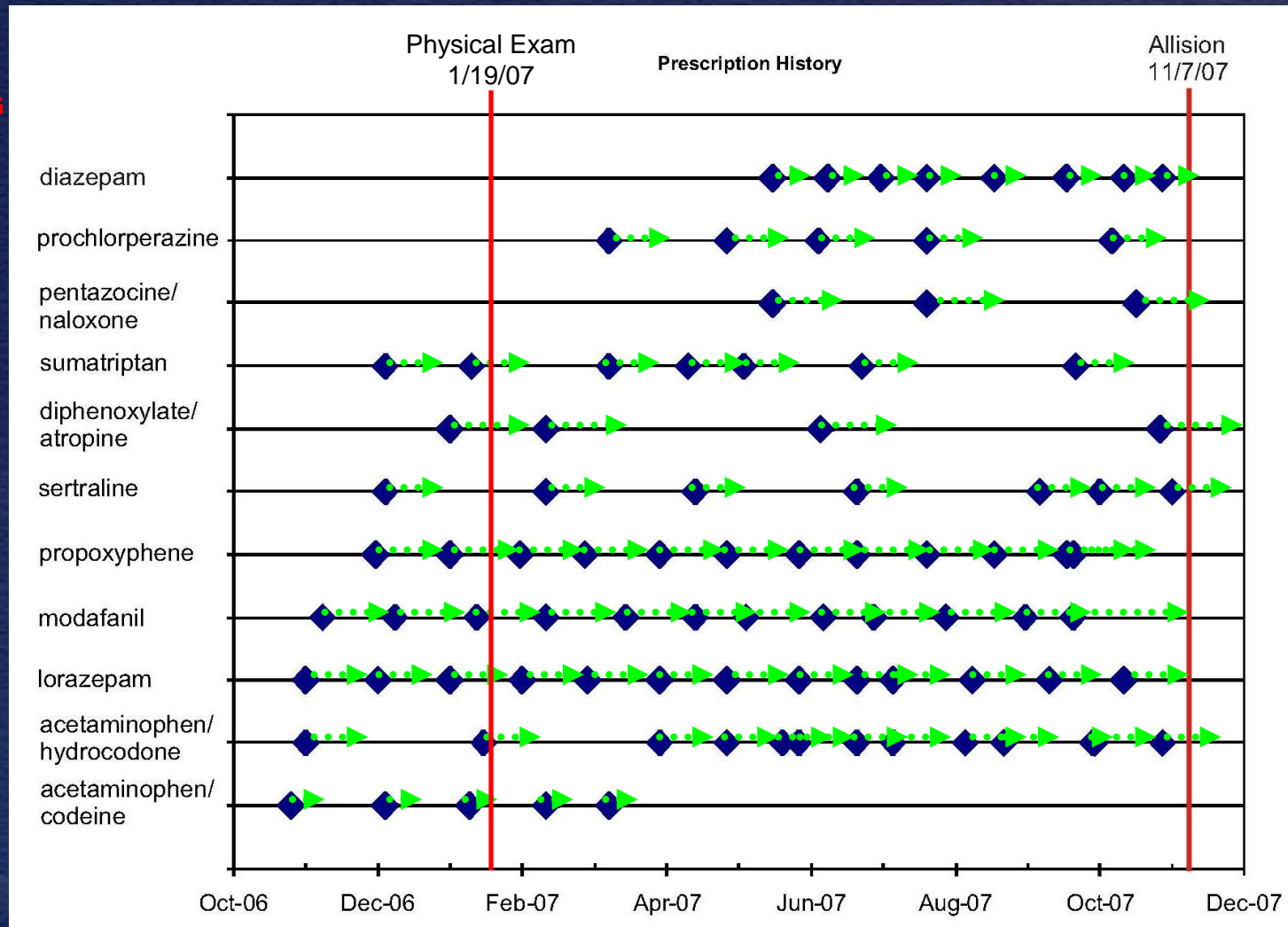
- Pilot - over 25 years experience
- Misinterpreted electronic chart and radar displays
- Navigated vessel directly toward the Delta tower of the bridge

Pilot Medical History

- History included:
 - chronic esophagitis
 - sleep apnea
 - “occasional” abdominal pain
 - glaucoma
 - “occasional” medication “for sleep”
- No other medications noted
- No additional review; “competent”

Prescription History

**IMPAIRING
ADDICTING**



Probable Cause/Contributors

“The failure to safely navigate the vessel in restricted visibility as a result of the pilot’s degraded cognitive performance . . . ”

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Carrollton, KY (May, 1988)



67 passengers, 27 fatalities, 34 serious injuries; driver: .28 BAC

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Alcohol Impaired Driving

- 2010: 10,228 fatalities, 345,000 injuries
- 31% of fatal crashes
- > 4X total of all other modes
- Daily fatalities > 27 in deadliest crash
- Annual economic cost: \$130+ billion

Alcohol Impaired Driving

- NHTSA:
 - estimates 88 impaired trips before being arrested once
 - repeat offender:
176 trips before being caught!

Alcohol Impaired Driving

- NTSB 2000 Recommendation:
 - establish comprehensive program designed to reduce the incidence of alcohol-related crashes, injuries, and fatalities caused by hard core drinking drivers

Alcohol Impaired Driving

- Strong laws
- Education
- High visibility enforcement
- Technology innovations
 - ignition interlock
 - DADSS
- Systems interventions
 - DWI courts

Incline Village, NV – Feb 2007



urine ethanol: 0.279 percent; chest blood ethanol 0.155 percent

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NTSB Forum

Reaching Zero: Actions to Eliminate Substance-Impaired Driving

May 15 -16, 2012

NTSB Conference Center
Washington, D.C.

ntsb.gov/ReachingZero

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Chatsworth, CA (Sept., 2008)



Survival Factors Factual Report - Photo 9 - Aerial view of accident area (Metrolink)

25 fatalities, 135 injuries

NTSB



Chatsworth, CA (Sept., 2008)



San José Factors Fact Report - Photo 15 - Firefighters during nighttime operations (LAFD)

25 fatalities, 135 injuries

NTSB



Probable Cause

“ . . . failure of the Metrolink engineer to observe and appropriately respond to the red signal . . . because he was engaged in prohibited use of a wireless device, specifically text messaging, that distracted him from his duties.”

Truck-Tractor Semitrailer Median Crossover
Collision With 15-Passenger Van
Munfordville, Kentucky
March 26, 2010



Accident Report

NTSB/HAR-11/02
PB2011-916202



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- crossed 60 ft median
- overrode cable barrier

Fatalities
truck driver
van driver
9 van passengers



Probable Cause

“ . . . the truck driver’s failure to maintain control of the truck-tractor combination vehicle because he was distracted by use of his cellular telephone.”

Multivehicle Collision
Interstate 44 Eastbound
Gray Summit, Missouri
August 5, 2010



Accident Report

NTSB/HAR-11/03
PB2011-916203



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Two fatalities

Probable Cause

“ . . . the initial Gray Summit collision was distraction, likely due to a text messaging conversation being conducted by the GMC pickup driver, which resulted in his failure to notice and react to a Volvo tractor that had slowed or stopped in response to a queue that had developed in a work zone.”

New Recommendations

To the 50 states and the District of Columbia:

(1) Ban the nonemergency use of portable electronic devices (other than those designed to support the driving task) for all drivers;

Success requires . . .

A culture change that supports
different attitudes and behaviors

Honorable John K. Lauber:

No Accident \neq
Safe Operation

Manage Human Behavior = Enhance Safety

- Promote change:
 - safety culture
- Acknowledge risk
 - Act!



NTSB