Transportation Operator Fatigue: Health and Safety Concerns

Some Operational Issues in:
Trucking, Bus/Motorcoach, Railroad, Local Transit, Commercial Aviation, and Maritime Inland-Waterways

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NIOSH Total Worker Health Symposium Oct. 7th, 2014
National Occupational Research Agenda (NORA) Recognizes special occupational concerns of transportation workers

- Common issues associated with transportation equipment-operators’ health, wellness, on-the-job fatigue, and safety persist in all modes of public and commercial transportation.
- **Equipment operator alertness** is paramount to safe transport of people and goods.
- **Operator fatigue** can beget poor performance, threaten safety, lead to crashes, result in injuries or deaths.
  - Transportation operators in trucking, bus/motorcoach, railroad, local transit, commercial aviation, and inland waterway towboat operations, all must maintain continuous alertness while driving, flying, or steering high-tech yet “dangerous” vehicles.
Lengthy work schedules have implications for worker health in all modes of transportation

• **Interactions** of operational work schedules, job stresses, individual fitness, lifestyle, health, and wellness
  – **all** affect operator levels of alertness and fatigue, and may prompt public safety concerns

• Decades of substantial **research**, still ongoing, aims to:
  – delineate consequences of **long daily work hours** on operator health,
  – establish correlations between **long weekly work hours** and higher risks of sleep loss, and fatigue-related crashes or incidents

• **Long work hours each day**, accumulating over successive weeks, are associated with **poorer health**, increased work-related and non-work-related injury rates, increased illness, a greater risk of unhealthy weight gain, cardiovascular disease, and other ailments (from DOT-FMCSA and NIOSH statements)
The common problem

- In all modes of public transportation, repeated, extensively long, arduous, irregular work schedules result in inadequate sleep before work shifts, then fatigue develops on the job—e.g., NTSB “recommended” transit train operators be afforded time off between daily tours of duty, to permit operators at least 8 hours of uninterrupted sleep.

- In these special work forces, the lack of physical exercise, poor nutrition, a high incidence of obesity, and numerous job stresses complicate operators’ work-life and threaten worker’s short and long term health.

- Such conditions ultimately threaten job-work safety.

Chicago, CTA Crash March 2014
We all need a **sufficient quantity of quality sleep** each day

- Most adults perform reasonably well at work if we obtain **7-8 hours sleep** every 24-hrs - note, sleep can be packaged differently
- Preferably, we should take long sleep bouts vs. splitting sleep periods; but we can also augment shorter sleep periods with **nap taking**
- When we **shortchange ourselves of daily sleep** **on-the-job alertness** wanes, our productivity declines - long work schedules become detrimental to job performance
- We develop **acute fatigue** by working too long, sleeping too little over just a few days in our work week – resolved by **more sleep** (weekends)
- We develop **chronic fatigue** when we accumulate **sleep debts** over weeks of doing this, especially if accompanied by other job and life stressors (e.g. family problems) – requires **more complicated solution**
Equipment operator fatigue is common in transportation employees

- **Sustained alertness** wanes when operators work long work shifts (>10-12 hrs) especially when experiencing daily shortages of needed sleep (i.e. <7-8 hrs sleep per day) – longer “time-on-task” (how long one drives) is critically important as well

- **Circadian rhythm physiology** dictates workers will experience **two** lull periods (~ 45-min. each) in performance, mood/attitude in **mid**-afternoon ~1 to 4:30 p.m.; and if **working through the night**, again from about 1 to 4:30 a.m.

- **Developing fatigue** degrades performance, productivity, leads to poor judgments, **slower reaction times**, unsafe actions, occurrence of accidents, incidents, injuries, even deaths

- **Prescribed Hours of Service (HOS)**- safety advocates and legislators impose **HOS rules** for operators and employers in attempt to ensure work/rest schedules provide opportunities for **obtaining enough sleep**, restoral of alertness, and ultimately to maintain safe operating practices

- **Shortened lists** of **transportation HOS** for each Trans. mode follow
Commercial Truck Driver HOS

- Permits 11 hrs of driving per duty shift
- but, only after 10 hrs off-duty time
- Maximum 14-hour on-duty workdays*
- A 30-minute rest break is required before exceeding 8-hrs of driving
- Drivers using sleeper berth provision must take at least 8 consecutive hours in the sleeper berth, plus 2 more consecutive hrs in berth, off-duty or in combination of the two

- *This “14-10” hr schedule helps driver maintain natural sleep-wake cycle ~ circadian rhythm physiology
- DOT Part 395 HOS of Drivers (DOT-FMCSA, July 2013)

- 60/70 hr weekly work limits
- That is, may not drive after 60/70 hrs on duty in 7/8 consecutive days
- Driver may “restart” a 7/8 day weekly period after taking 34+ more hrs off-duty
- but, must include 2 periods of rest from 1 to 5 a.m. This requires “longer weekend” rest periods including nighttime sleep to help combat cumulative fatigue

- North American Fatigue Management Program (NAFMP) is available for on-line training, on the web as of July 2013
Interstate Bus/Motorcoach HOS

- Bus/motorcoach operators may drive a maximum of 10-hrs at a stretch after having 8 consecutive hrs off-duty*
- Cannot drive after 15-hr duty day limit, following 8 consecutive hrs off-duty
- The 15-hr “on-duty” time includes loading passengers, their luggage, eating meals, refueling, rest breaks
- Legitimate “off-duty” time during the day is not counted toward the 15-hr duty day limit
- Intrastate regs. are under jurisdiction of each state; most mimic Fed HOS rules; but some have higher daily limits (e.g., FLA has 12-hrs driving – 16 hrs duty limits)

- **Weekly work limits** include 60/70 hour weekly limits
- That is, after 60 hrs of driving and on-duty time in 7 consecutive days a driver may not drive a full day; but may work/drive up to 70 hrs in 8 consecutive days
- * This presents age old problem of not maintaining work day/rest periods in synch with one’s bodily circadian rhythms (~24 hr day)
- Issues of **split-shift** work/sleep schedules are common for many bus operators
Railroad HOS: Commuter or Intercity Rail Passenger Operations

- Train operators must have at least 8 hours off-duty following a work period (even if he/she had <12 hours on duty)
- But, after an employee has been on duty for 12 hours, he/she must take at least 10 hours off-duty
- Therefore, the minimum off-duty periods are 8 or 10 consecutive hours depending on whether 12 continuous hours were worked. There is a 4-hour minimum for interim rest period.
- Emergency exceptions of 4-hour extensions are permitted, but no more than 3 times in 7 days.
- Regulation dictates a series of rules for 14 consecutive calendar days situations
- RR employees must take 2-complete days off in every series of 14 consecutive days
- RR employees are frequently short-changed of rest/sleep due to commuting back and forth between place of work and their homes.
- Operators on “extra board” on-call status accumulate more overtime - ultimately more sleep loss and fatigue.
- 49 CFR 228.405 Federal Railroad Administration (FRA)
## HOS for Local Transit Rail & Bus Operations

### Rail Operators

- American Public Transportation Assoc. (APTA) *recommends* rail operators not work longer than 16-hr shifts and <14 aggregate hrs of work
- *Recommends 10 hrs off between shifts*
- In extreme circumstances, may suspend HOS req. to meet critical trans. needs
- 38 rail transit agencies employ human operators of trains; 24 of them *limit* work days to <14 hrs, ensuring at least 10 hrs off between shifts
- Municipality differences (e.g. Portland, OR requires 7-hrs off between shifts; work no more than 70 hrs in 7 days, take at least 1 day off after 13 consecutive days of work)

### Bus Operators

- Most local bus drivers *required* to take 9-10 hrs off between shifts
- In some localities, “extra board/on call” drivers (substitutes) have shorter min. off-duty time requirements
- Many public transit agencies force bus/train operators work split shifts
- Labor unions, contract agreements dictate different arrangements
- APTA recommends *Fatigue Toolbox* training for train operators

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![Fatigue Toolbox](image)
Limits for U.S. Inland Waterways: Towboat & Barge Operations

- Daily **on-duty limit is 15-hrs**
- but, no HOS regulations per se
- However, US Code 8904c gives the U.S. Coast Guard authority to establish them
- Generally, crews stay on a towboat for ~28 days of continuous operations; followed by 2 weeks off-duty
- “Traveling down a river” for a month is different from working in one place: “in-harbor operations”
- Workforce obesity & sleep apnea are thought to be significant problems

- The long-standing **preferred practice** is: towboat crews work/rest in alternating 6-hr shifts -- referred to as the **square watch system: 6-6-6-6**
  - That is, each crew member has a total 12 hrs on-duty and 12 hrs off-duty each 24-hr day
  - Which means they employ **split-sleep** schedules
  - On-going research examines alternative work/rest schedules
  - USCG’s **Crew Endurance Management System** (CEMS) training is available (2003)
Passenger Carrying Scheduled Commercial Aviation HOS

- Pilots must have **10 hrs off-duty** between flight duty periods, with rest opportunity for a **minimum of 8 hrs uninterrupted sleep** during that period*
- Pilots limited to **8 or 9 hrs flying** depending on their start times
- Pilots are required to take **30 consecutive hours off-duty** in any 7-day period
- **Fatigue management training** is included for pilots (usually by carrier/employer)
- * These are **new HOS rules by Federal Aviation Administration**, as of - January 2014

- Aviation HOS rules for pilots are somewhat **complicated**
- Slightly **different rules** for **different types of duty** operations: commuter and short-haul flights, cross-country, overseas, daytime vs. nighttime flying
- Flexibility: pilots can exceed hours under extenuating circumstances (e.g., weather)
- HOS rules do not apply to cargo operations, w/much night flying (e.g., UPS, FedEx) - an on-going safety debate in the industry
Current **obvious** work problems

- Long haul, over-the-road **truck drivers** have a unique plight with **driver fatigue issues** – essentially they **live** in their truck for weeks.
- **Split work shifts** are common within several industries (e.g., transit bus and train operators)
  - e.g., begin work at 4:30 a.m., work split shifts; get home at 7:30 p.m. – its like working 15 hrs but getting only 8 hrs pay
  - studies show repeated **long split shifts** can lead to serious health problems and operator fatigue.
- Operators (especially transit drivers) seeking **overtime** pay often worsen their situation by engaging in “double back” shifts; they live with **chronic fatigue**.
- **Labor Union** involvement, collective bargaining agreements on overtime complicate scheduling practice considerations.
- Many employers **do not screen operators** for undiagnosed sleep disorders (e.g., **obstructive sleep apnea**).
- **Training on operator fatigue**, adopting healthy sleep habits is spotty.
Attempts to **resolve** some transportation work-life problems

- Safety advocates, gov’t legislators, regulators promote **prescriptive hours-of-service** (HOS) rules to **restrict** operators from over-working; **if** HOS are followed, there is **success** for most workers
- HOS rules are configured to permit operators to obtain adequate rest/sleep (7-8 hrs sleep) between work stints, **most 10 hrs off duty**
- Health & Wellness (H&W) advocates are making **slow progress** convincing employers (e.g., carriers) of the value (**ROI**) of employee H&W programs in their work settings
- Transportation workers must buy-in to tenets of **living a healthy lifestyle** at home and at work – it is still **a tough sell** to enact behavioral change, but a lot of people are working on it
- Enlightened carriers are successfully **implementing** numerous employee health, wellness, and fatigue management programs
Current Health-Related Initiatives

- **Medical examiners** - DOT-FMCSA’s National Register of Certified Medical Examiners who do commercial physical exams
  
  - as of May 2014 - med. examiners must complete a training course and pass an exam showing they understand med. standards & physical demands of driving a CMV – prevents “doctor shopping”

- **Screening for sleep disorders** - transportation communities becoming attuned to need to screen operators for sleep disorders, & get them treatment
  
  - Obstructive Sleep Apnea (OSA) – FMCSA will address sleep apnea through a formal rulemaking process – contentious issues abound

- **Education/training** about operator fatigue – e.g., North American Fatigue Management Program (NAFMP)
  
  - Internet-based, 10 module sets of PowerPoint slides in English & French
  - geared to truck & bus operators, but could apply across all modes
  - contains information for drivers, their families, carriers, shippers, receivers
Operator Fatigue Countermeasures

• Get sufficient sleep **before** making lengthy trips
• Take rest breaks from operating equipment, e.g., truck and bus driving, etc. – such drivers **can stop** if they choose to
• **Napping** – strategically placing **naps** into the work day can be a useful technique to ward off drowsiness
  – research on aviation experience **shows utility of workplace napping**
  – Transportation industries have **not yet** come to grips with this viable fatigue countermeasure
• **Recovery** sleep - acknowledge its importance
  – on weekends – get more long uninterrupted sleep periods
• **Light stimulant use** e.g., caffeine, modafinil (i.e. Provigil®)
  – functional energy drinks (e.g., Red Bull®) - not so good for you
• **Sleep-inducers** - try synthetic hormone melatonin
• **Overall fitness** is a **plus** for withstanding stressful working conditions
Regarding operator fatigue: What is next? Where do we go from here?

• **Put into practice** what we already know about operator alertness, fatigue, etc.
  – not much more research is needed on “fatigue” per se (heresy ?)

• Convince employers and equipment operators **better scheduling** can help prevent fatigue-related incidents
  – bio-mathematical modeling can assist some schedulers
  – concern is not only for length of duty; must be cognizant of the two circadian rhythm lulls of the 24-hr work day
  – operators must plan for the inherent risks of drowsiness between 1 and 4 a.m. (dark of night) and again from 1 to 4 p.m. (mid-afternoon)

• Carriers must work with the other players (e.g., shippers & receivers, tour operators, dispatchers, et al.) to **help operators** avoid “detention times” or delays in making deliveries, getting unloaded, forced split-shifts on work and sleep
Transportation Operator
Fitness, Health, Wellness, and Safety:
Integration into Total Worker Health

• Equipment operators should adopt a “personal” health, wellness and fitness lifestyle for their own good, & for everyone’s safety
  – (but good luck meeting this tough goal !)
• Employers, families, safety advocates, all should play a role in this quest for healthy operators
• From an economic standpoint some healthy worker elements are becoming obvious: health care costs, insurance, lawsuits, retention, etc. Eventually, they will get appropriate attention.
  – Employers will see the merits and ROI value of implementing employee health, wellness, & fitness programs, including fatigue mgmt
  – Screening and treating sleep disorders like apnea will become standard transportation industry practice
  – We all must “keep up the good fight” to make it happen
• The following “extra” slides depict historical progress on issues
  – each with its own story – which we will save for another day
22 “Extra” Backup Slides Follow:
Some historical records of efforts already achieved

Transportation Operator
Fatigue Assessment/Management
& Training Programs
Health & Wellness Programs

“Trucking is about heart and muscle - the truck driver’s heart and muscle to be exact. Our industry will not succeed unless we have healthy drivers.”

John Hausladen, President, Minnesota Trucking Association
Train-the-trainer course sponsored by OMC (FMCSA) & ATA was developed at Star Mountain, Inc. Alexandria, VA.

This 4-hr train-the-trainer course was taught nationally by G.P. Krueger for FMCSA/ATA to over 4500 trucking safety managers, fleet trainers, safety inspectors et al. 1996-2006.

Materials included PPT slides, video, numerous handouts, fatigue knowledge appraisal quiz, et al.
The Alert Driver:

A Trucker's Guide to Sleep, Fatigue, and Rest in our 24-Hour Society

19-min. VHS Video
1997

Over 20,000 VHS videos & 75-page booklet distributed by ATA & FMCSA

By Carla J. Reissman

© 1997 American Trucking Associations, Inc.
2200 Mill Road
Alexandria, VA 22314-4677
Toolbox for Transit Operator Fatigue

Sponsored by the Federal Transit Administration

2002

TOOLBOX FOR TRANSIT OPERATOR FATIGUE

NATIONAL RESEARCH COUNCIL

TRANSPORTATION RESEARCH BOARD

TCRP REPORT 81

TRANSIT COOPERATIVE RESEARCH PROGRAM

Toolbox for Transit Operator Fatigue

JUDITH GERTLER
Foster-Miller, Inc.
Waltham, MA

STEPHEN POPPEN
Rantau Consulting
Milton, MA

DAVID NELSON
Kari O'Mara
KCO and Associates, LLC
Andover, MA

2002

Research Sponsored by the Federal Transit Administration in Cooperation with the Transit Development Corporation

NATIONAL RESEARCH COUNCIL

TRANSPORTATION RESEARCH BOARD — NATIONAL RESEARCH COUNCIL

NATIONAL ACADEMY PRESS
WASHINGTON, D.C. — 2002
COMMERCIAL TRANSPORTATION OPERATOR
FATIGUE MANAGEMENT REFERENCE

July 2003

U.S. Department of Transportation
Human Factors Coordinating Committee

2003

COMMERCIAL TRANSPORTATION OPERATOR
FATIGUE MANAGEMENT REFERENCE

July 2003

Prepared for:
U.S. Department of Transportation
Research and Special Programs Administration

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Gerald Krueger, The Wexford Group International

Work Performed Under Other Transaction Agreement No. DTRSS-01-T-003

Federal Railroad Administration
Federal Aviation Administration
Federal Motor Carrier Safety Administration
Maritime Administration
United States Coast Guard
Crew Endurance Management Practices
A Guide for Maritime Operations

Carlos A. Comperatore & Pik Kwan Rivera
Prepared for
U.S. Department of Transportation
United States Coast Guard
Marine Safety and Environmental Protection (G-M)
Washington, DC 20593-0001
Fatigue in Aviation: A Guide to Staying Awake at the Stick

158 pages, 13 chapters, incl. nature of fatigue, sleep, physiology, aviation applications, countermeasures & much more

JOHN A. CALDWELL, JR.
J. LYNN CALDWELL

2003

ASHGATE
FMCSA Sponsored 25 Truck & Bus Safety Synthesis Studies - CTBSSP

www.trb.org  click on publications, by series: CTBSSP
Synthesis 9

Literature Review on Health and Fatigue Issues Associated with Commercial Motor Vehicle Driver Hours of Work

A Synthesis of Safety Practice

2005

COMMERCIAL TRUCK AND BUS SAFETY SYNTHESIS PROGRAM

Synthesis 9

Literature Review on Health and Fatigue Issues Associated with Commercial Motor Vehicle Driver Hours of Work

PETER ORNS
SUSAN BUCHANAN
University of Illinois at Chicago School of Public Health
Chicago, IL

ALISON SH tutorial
DANIEF DAVIS
Human Factors North, Inc.
Toronto, Canada

with

DAVID DRAKE
University of Pennsylvania School of Medicine
Philadelphia, PA

GEOE BENOKIDDER
MaineWay Services
Fryeburg, ME

2005

Benefit Areas
Operations and Safety • Public Transit • Freight Transportation

Research Sponsored by the Federal Motor Carrier Safety Administration

TRANSPORTATION RESEARCH BOARD
WASHINGTQN, D.C.
2005
www.trb.org

www.trb.org click on publications, by series, CTBSSP
Contains thorough coverage of “Driver Fatigue” in the Context of Corporate Safety & Driving

2009
The Handbook of Operator Fatigue

Edited by
GERALD MATTHEWS
University of Cincinnati, Ohio, USA
PAULA A. DESMOND
Dell Inc., USA
CATHERINE NEUBAUER
University of Cincinnati, Ohio, USA
and
P.A. HANCOCK
University of Central Florida, USA

510 pages; 30 chapters; incl.
Work Scheduling, Fatigue in Aviation, Countermeasures for Driver Fatigue, etc.

2012

ASHGATE
Program developed by consortium of gov’t (FMCSA & Transport Canada) & industry agencies; final product by VA Tech Trans Ins. (VTTI)- made available in summer 2013

Whole program includes 10 modules ranging from 30-80+ PPT slides each

Electronic on-line in 2013
This work led to FMCSA/ATRI’s Gettin’ In Gear Program of H&W for Commercial Drivers

Design, Development and Evaluation of Truck and Bus Driver Wellness Programs

Final Report

June 2000


Prepared for:
Federal Motor Carrier Safety Administration
Office of Research and Technology
MC-RTR
400 Seventh Street, SW
Washington, DC

Prepared by:
Sue Roberts
Sue Roberts Health Concepts
1515 Linden Street, Suite 220
Des Moines, IA 50309

Jim York
Private Fleet Management Institute
National Private Truck Council
66 Canal Center Plaza, Suite 600
Alexandria, VA 22314
3-hr train-the-trainer course contained manuals for instructors & truck/bus drivers, audio tapes, VHS video, driver testimonials, work sheets, & countless updated H&W handout materials

Developed by
Gerald P. Krueger & Rebecca M. Brewster
at ATRI August 2002

A train-the-trainer course taught country-wide by G.P. Krueger to over 2,500 trucking safety & risk managers, HR folks & other trucking officials (2002-2006)
This chapter reviews important health and wellness topics pertaining to commercial truck, bus, and motorcoach drivers, with discussion focused on those factors that directly affect driving safety. Some driver health issues are addressed in less detail here because they are not so obviously connected to driving safety per se. Numerous health and wellness topics to select from include those as far reaching as:

- Epidemiological surveillance of diseases, illnesses, job injuries, and resultant OSHA statistics portraying incidences of commercial vehicle driver injuries and death;
- Proper diet, nutrition, limiting alcohol and tobacco use, maintaining proper weight and physical fitness levels, psychological and physical stress, workload, participating in stress alleviation programs;
- Health and safety consequences of shiftwork, irregular and extended work schedules, missed or broken sleep, circadian rhythm disruption, loss of driver alertness, and driver fatigue;
- Sleep maladies, sleep disorders, chronic partial sleep deprivation, resultant drowsiness, and driver fatigue;
- Whether declining driver fitness and health lead to driving safety risks, e.g., a lack of alertness;
- Whether leading a health-conscious lifestyle makes drivers behaviorally more apt to be safe on the roads; and if so, identifying how to foster healthy lifestyles through general wellness education programs;
- Whether wellness programs advocating healthy lifestyles actually make sizeable differences in driving safety now, while the CMV driver is still employed—or only improve a driver’s quality of life and possibly extend life expectancy; and
- Medical checkups and health criteria used to qualify CDL holders to drive CMVs—determining certification and training for medical personnel who certify drivers on CDL physical exams.

It is the intent of this chapter to dwell on health and wellness topics that have a clear link to driving safety. For example, although chronic tobacco smoking may affect one’s health, it is not so readily apparent that smoking by itself or its accompanying health consequences directly impact driver safety.

At a conference on truck driver occupational health and safety (Saltzmann and Belzer, 2003) it was pointed out that in 2001, truck drivers accounted for more than one-eighth of the fatal occupational injuries (799 of 5,900) in the United States, while CMV drivers only accounted for a relatively small percentage of the total of American workers at risk.
Identifying H&W Programs for Commercial Drivers – 2005-2007

www.trb.org, click on publications by series: CTBSSP
2007

Truck Driver Occupational Safety and Health
2003 Conference Report and Selective Literature Review

Report Published in Summer 2007

Truck Driver Occupational Safety and Health
2003 Conference Report and Selective Literature Review

Gregory M. Saltzman† and Michael H. Belzer‡

Revised February 8, 2007

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

†The Wayne State University Truck Driver Occupational Safety and Health Conference was held April 24-25, 2003, at the Detroit Metro Airport Doubletree Hotel, Detroit, MI.

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12-month programs for professional drivers designed to enact simple changes in their personal health & safety. Includes C-Ds, motivational talks, a 12-mo. daily game book aimed at making lifestyle improvements – being an athlete in life requires specific skills in order to “play” at their best.  

[occupationallathletics.com](http://occupationallathletics.com)
ROADCOOKIN'
A long haul driver’s guide to healthy eating

2008

ISBN: 1-4392-2077-8
209 pages

Includes sections on:

- Your weight & health
- Heart healthy diet
- Diabetic diet
- Quick start 2,000 calorie day
- Plug & play meals
Includes chapters on stress, sleep, exercise, nutrition, harnessing change meal planning on the road,

REAL MEALS on 18 WHEELS:
A GUIDE FOR HEALTHY LIVING ON THE HIGHWAY

2011

By
Kathryn Clements, RD
Harriet Hodgson, BS, MA

www.realmeals18wheels.com
CTBSSP SYNTHESIS 19

Effects of Psychoactive Chemicals on Commercial Driver Health and Performance: Stimulants, Hypnotics, Nutritional, and Other Supplements

A Synthesis of Safety Practice

2011

COMMERCIAL TRUCK AND BUS SAFETY SYNTHESIS PROGRAM

CTBSSP SYNTHESIS 19

Effects of Psychoactive Chemicals on Commercial Driver Health and Performance: Stimulants, Hypnotics, Nutritional, and Other Supplements

A Synthesis of Safety Practice

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American Transportation Research Institute

2011

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Research Sponsored by the Federal Motor Carrier Safety Administration

TRANSPORTATION RESEARCH BOARD
WASHINGTON, D.C.
2011
www.TFRI.org

www.trb.org click on series: CTTBSP
Research on the Health and Wellness of Commercial Truck and Bus Drivers

Summary of an International Conference

Gerald P. Krueger, Rapporteur

November 8-10, 2010
Baltimore, Maryland

Sponsored by
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Federal Motor Carrier Safety Administration

In Partnership with
National Institute for Occupational Safety and Health

June 2012

www.trb.org
Developing Best-Practice Guidelines for Improving Bus Operator Health and Retention

Part I: A Transit Workplace Health Protection and Promotion Practitioner’s Guide

Part II: Final Research Report

2014
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