Transportation Trends and Driver Fatigue in the Oil and Gas Extraction Industry

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National Institute for Occupational Safety & Health

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NIOSH Mission

• Part of the Centers for Disease Control & Prevention (CDC)
• Generate new knowledge in the field of occupational safety and health
• Transfer that knowledge into practice
• Not regulatory
Video from Natl. Road Safety Foundation: Kevin’s Dad

- [http://www.nrsf.org/programs/drowsy-driving](http://www.nrsf.org/programs/drowsy-driving)
Session Objectives

- Fatality statistics
- Challenges to addressing driver fatigue in oil and gas extraction
- Factors affecting driver fatigue
- 8 tips for preventing driver fatigue
Number and Rate of Fatal Work Injuries

**Note:** Fatality counts from BLS Census of Fatal Occupational Injuries. Worker Estimates from BLS Quarterly Census of Employment and Wages (2013). Rate per 100,000 workers per year. Includes NAICS 211, 213111, 213112. *Data for 2014 are preliminary.*
Number and Rate of Fatal Work Injuries

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Most Frequent Fatal Events

- **Falls**: 8% (116 fatalities)
- **Exposure**: 9% (126 fatalities)
- **Fires/Explosions**: 14% (202 fatalities)
- **Other**: 2% (27 fatalities)
- **Transportation**: 42% (597 fatalities)
- **Contact with Objects/Equipment**: 25% (354 fatalities)

Total Fatalities: **1,422**

Data Source: BLS CFOI
Number and Rate of Motor Vehicle Fatalities

Data Source: NIOSH Oil and Gas Program
Note: Fatality counts from BLS Census of Fatal Occupational Injuries. Worker Estimates from BLS Quarterly Census of Employment and Wages. Rate per 100,000 workers per year. Includes NAICS 211, 213111, 213112..
Number and Rate of Motor Vehicle Fatalities

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatalities</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>2005</td>
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<td>2006</td>
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<td>2007</td>
<td>43</td>
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<td>2008</td>
<td>37</td>
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<td>2009</td>
<td>20</td>
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<tr>
<td>2010</td>
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</tr>
<tr>
<td>2011</td>
<td>45</td>
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</tr>
<tr>
<td>2012</td>
<td>52</td>
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<tr>
<td>2013</td>
<td>38</td>
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<tr>
<td>2014</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>39</td>
<td></td>
</tr>
</tbody>
</table>

Data Source: NIOSH Oil and Gas Program
Note: Fatality counts from BLS Census of Fatal Occupational Injuries. Worker Estimates from BLS Quarterly Census of Employment and Wages. Rate per 100,000 workers per year. Includes NAICS 211, 213111, 213112..
Number and Rate of Motor Vehicle Fatalities

Deaths per 100,000 workers

Data Source: NIOSH Oil and Gas Program
Note: Fatality counts from BLS Census of Fatal Occupational Injuries. Worker Estimates from BLS Quarterly Census of Employment and Wages. Rate per 100,000 workers per year. Includes NAICS 211, 213111, 213112..
1. (2014, Texas) 3 workers died, 24 hour shift, no designated driver, no on-site resting area, isolated site, only 1 was wearing seatbelt

2. (2013, Texas) 3 workers died after logging 190 hours; worked 14 days straight (13.5 hours per day)

3. (2012, Texas) 2 workers died late at night, isolated site, bunkhouse was full.
Number of fatalities and fatal crashes in OGE by state, 2011-2014

Texas
North Dakota
Oklahoma
New Mexico
Kansas
Wyoming
West Virginia
Colorado
Utah
Pennsylvania
Ohio
Other

Fatalities
Crashes

*Data were generated with restricted access to the CFOI Research file.
<table>
<thead>
<tr>
<th>Body Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger cars</td>
<td>5</td>
</tr>
<tr>
<td>Light trucks and vans--Utility vehicles</td>
<td>4</td>
</tr>
<tr>
<td>Light trucks and vans--Vans</td>
<td>5</td>
</tr>
<tr>
<td>Light trucks and vans--Pickup trucks</td>
<td>65</td>
</tr>
<tr>
<td>Light trucks and vans--Other light trucks</td>
<td>-</td>
</tr>
<tr>
<td>Large trucks -- Medium trucks</td>
<td>19</td>
</tr>
<tr>
<td>Flatbed</td>
<td>6</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
</tr>
<tr>
<td>Large trucks -- Large trucks</td>
<td>53</td>
</tr>
<tr>
<td>Enclosed Box</td>
<td>4</td>
</tr>
<tr>
<td>Cargo Tank</td>
<td>32</td>
</tr>
<tr>
<td>Flatbed</td>
<td>7</td>
</tr>
<tr>
<td>Grain/ Chips/Gravel</td>
<td>-</td>
</tr>
<tr>
<td>No Cargo Body Type</td>
<td>4</td>
</tr>
<tr>
<td>Farm/Construction equipment</td>
<td>3</td>
</tr>
<tr>
<td>Unknown</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>156</td>
</tr>
</tbody>
</table>

*Data were generated with restricted access to the CFOI Research file.*
TEXAS Roadway Fatal Events by Vehicle
U.S. Oil & Gas Extraction Industry, 2011-2014

Source: BLS CFOI
Condition or impairment of drivers of vehicles with fatally injured OGE occupant(s), 2011-2014

Asleep or fatigued: 18
Driver distracted, details unknown: 16
Driver drinking: 15
Driver vision obscured by environmental conditions: 7
Drug involvement: 6

*Data were generated with restricted access to the CFOI Research file.
Seating position and restraint use of fatally injured OGE occupants, 2011-2014

Vehicle Passenger

- 20
- 29

Driver

10 72 54

*Data were generated with restricted access to the CFOI Research file.

“Other/Unknown” vehicle occupant position category not shown here.
Fatal crash frequency by time of day, 2011-2014

*Data were generated with restricted access to the CFOI Research file.*
Manner of collision in fatal crashes in OGE, 2011-2014

- Not a collision with motor vehicle in transport
- Angle
- Front to Front
- Front to Rear

*Data were generated with restricted access to the CFOI Research file.*
Most Frequent Fatal Events
U.S. Oil & Gas Extraction Industry, 2003-2014

- **1333** Total Fatalities
- **41%** (550) Transportation
- **26%** (340) Contact with Objects/Equipment
- **14%** (187) Fires/Explosions
- **9%** (114) Exposure
- **8%** (109) Falls
- **2%** (33) Other

Data Source: BLS CFOI
Motor Vehicle Fatalities by Seatbelt Status
U.S. Oil & Gas Extraction Industry

N=202

Seatbelt: 12%
No Seatbelt: 38%
Ejections: 12%

38% Unknown Seatbelt Status

Source: Retzer et. al., 2013
Other Factors Associated with Fatal Motor Vehicle Crashes

- **Short Service Employees**
  - < 1 yr. with Current Employer: 31%

- **Company Size**
  - < 100 Workers: 56%
# Texas Motor Vehicle Fatalities by Company Type

## Oil and Gas Extraction Industry

<table>
<thead>
<tr>
<th>Company Type</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support Activities</td>
<td>8</td>
<td>20</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>Drilling Operations</td>
<td>4</td>
<td>6</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Operators</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
</tbody>
</table>

- : Data not reportable due to small size

Source: BLS CFOI
Texas Motor Vehicle Fatalities by Vehicle Type
Oil & Gas Extraction Industry, 2011-2014

- Pick-up/SUV: 34%
- Semitrailer, tractor trailer, tanker truck: 17%
- Other: 49%

Data Source: BLS CFOI
At least 15-20% of crashes involve driver fatigue.
Session Objectives

Challenges to addressing driver fatigue in oil and gas extraction
Personal Factors Affecting fatigue

• Long commutes to start shift
• Desire to be at home with family until last minute
• Sleep is low priority

Source: NORA Oil and Gas Motor Vehicle Workgroup Discussion on Driver Fatigue
Operational Demands in the Oilfield

• Critical path nature
• Calling crews out early
• If you won’t do it, somebody else will
• Company man is a consultant
• Paid by the mile/load

• Disconnect between corporate policy and practice
• No good place to rest
• Conflicts with priorities of operators/dispatchers

Source: NORA Oil and Gas Motor Vehicle Workgroup Discussion on Driver Fatigue
Session Objectives

Factors affecting driver fatigue
1. Time of day/circadian rhythms
2. Length of time awake
3. Sleep debt (cumulative)
4. Medications and Health Conditions
5. Mundane tasks
Alertness over a 24 hour period

The graph shows the alertness level over a 24-hour period, with different levels of alertness indicated by color. The alertness levels are divided into:
- Peak Alertness
- Slightly Impaired
- Reduced Alertness
- Dangerously Drowsy

The graph includes time markers from 12 PM to 12 AM to illustrate the alertness levels throughout the day.
Fatigue Is Like Intoxication

17 Hours Awake = .05% BAC

170 LBS male over 2 hrs.

24 Hours Awake = .10% BAC

170 LBS male over 2 hrs.

Dawson & Reid, 1997; Williamson & Feyer, 2000; Falleti et al. 2003; Arendt et al. 2005; Howard et al., 2007; Yegneswaran & Shapiro, 2007; Elmenhorst et al., 2009)

SLEEP IS IMPORTANT FOR LIFE AND HEALTH

• During sleep, our brain & body are BUSY recovering from the day and getting us ready for a new day

• Inadequate sleep has deleterious effects
Cumulative Sleep Debt

- **Hours of Sleep**
- **Sleep need**
- **Sleep debt**
- **Actual sleep**

**Formula:**

\[ \text{Sleep Need} - \text{Actual Sleep} = \text{Sleep Debt} \]

**Note:** Sleep debt grows cumulatively over time.
Critical Misconceptions About Ability to Overcome Poor Performance Due to Sleep Loss

• DO NOT recognize declines in own poor performance

• NO EVIDENCE that experience, motivation, professionalism help

(Arendt et al., 2005; Van Dongen 2009)
Session Objectives

8 tips for preventing driver fatigue

3 on education, 4 on employer strategies, 1 on data collection
Educate Drivers about Sleep and Warning Signs

1. Need at least 7-9 hours of continuous sleep per day

Warning Signs:
• Yawning or blinking frequently
• Difficulty remembering the past few miles driven (microsleeps)
• Missing your exit
• Drifting from your lane/hitting rumble strip

What to do:
• Pull over to rest or change drivers
Educate Drivers about Impact of Health

Physical Activity:
- Two and a half hours per week

Nutrition:
- Avoid sugar-rich and low-fiber carbohydrate foods

Medications and health conditions:
- Chronic diseases; prescriptions/over-the-counter

http://www.roadwisexr.com
Do you have a sleep disorder?
See your doctor if you spend enough time in bed but:
- You consistently take more than 30 minutes to fall asleep.
- You consistently awaken several times or for long periods.
- You take frequent naps.
- You often feel sleepy, especially at inappropriate times.

OTHER RESOURCES
- http://www.cdc.gov/niosh/topics/workschedules
- http://www.cdc.gov/sleep
- http://www.sleepfoundation.org/
- http://drowsydriving.org/

For more strategies on how to sleep better and to reduce the risks associated with fatigue, visit
http://www.healthysleepfortruckers.org

This site contains information for both truck drivers and trucking companies.

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January 2012
Downloads

The following downloads are in English. To download these files in a different language, please select the appropriate website language.

The North American Fatigue Management Program offers its training in a number of formats, allowing users to select the one that best fits their individual needs. For the most comprehensive training experience, including online testing, you are encouraged to use the NAFMP Online Courses. Once there, you can register as a user of the system, free of charge, and work through the training at your own pace. Commercial truck and bus fleets can encourage their drivers and other personnel to register and complete the appropriate courses.

The PowerPoint versions below are formatted in PowerPoint version 2010. A free PowerPoint reader is available here if you do not currently have PowerPoint version 2010.

Powerpoint Versions (with audio narration)

This version of the NAFMP training allows users to view and hear the training but does not allow for knowledge testing and scoring. This option is best suited for users who simply want to step through the training at their computer without participation in any of the quizzes or other knowledge checks.

a. Module 1 (MS Powerpoint)
Alert Light Duty Drivers to Sleep Disorders

Approximately 90 different sleep disorders; affects 70 million Americans

See doctor if you:
• Take more than 30 minutes to fall asleep
• Wake several times during sleep or for long periods
• Take frequent naps
• Often feel sleepy, especially at inappropriate times
Encourage workers to “Stop the Job” instead of driving fatigued; intervene with co-workers too.
Consider Use of Technologies

Example: MiX Mobileye
In-vehicle tracking:
- laneway departures
- proximity to other vehicle and pedestrians
- headway distance
- speed limit infractions

Example: OPTALERT
- wearable fatigue monitors based on blink rate, eyelid closure and other eye metrics
Examine your operations for activities that put workers at risk for driver fatigue

- Crews that regularly drive after wakefulness periods 17 hours or longer (including commute and work time)
- Contractor activities
- Early morning commutes (4-6am)
- Night and rotating shifts
- INCLUDE LIGHT DUTY VEHICLES
• Limit driving distances
• Limit commute time before shift
• Ensure rested driver available
• Plan rest breaks and locations
• Mandate Seatbelt use

OGP Land Transport Safety Recommended Practice, Journey Management:
Provide On-site or Nearby Resting Areas

- Block out all light (curtains, eye mask)
- Block out noise (ear plugs, white noise app, silence phones)
- Keep temperature cool
- Comfortable
Incorporate Fatigue into Incident Investigations/Tracking

- Identify if fatigue factors were present (time of day, etc.)
- Determine #/severity of fatigue factors
- Reconstruct sleep/awake/on-duty schedule for 72 hours
- Number of days worked in a row
- Encourage near miss reporting
Be a Good Example:
How are You Doing?
Resources

National Road Safety Foundation
http://nrsf.org/programs/drowsy-driving

Drowsy Driving Prevention Week Materials
http://drowsydriving.org
NIOSH Oil and Gas Extraction Field Survey
In Permian Basin next week! Consider participating!

Objectives
- Identify health and safety concerns of workers
- Determine factors that contribute to motor vehicle incidents

Participants
500 oil and gas workers in 5 states

Content
General Topics
- Demographics
- Health and personal habits
- Workplace/Job characteristics
- Safety culture

Topics of Concern
- Tank gauging and sampling
- Drivings behaviors
- Chemical exposures
- Respirable silica

Results
Guide interventions and future research
Regarding young OGE workers:

“The biggest challenge is impressing upon them that driving is a critical part of their job and not simply something they do every day to get to a job site. Young or new employees try hard to make a good impression on their supervisors so they work hard and often end up rushing things. Many have inadequate safe driving schools or an inappropriate attitude about work related driving....It’s our job to build a culture of driving safety into their work routine to ensure they get home safely every day.”

Colonel Mark Trostel, Driving Safety Advisor, Encana Oil and Gas
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