



# Drowsy **Driving**

Sleep Deprivation, Fatigue, and HOS Regulations  
in Trucking Cases

**exigent**

*According to the National Highway Traffic Safety Administration (NHTSA), drowsy driving resulted in 91,000 police-reported crashes, 50,000 people injured, and 800 deaths in the United States in 2017.<sup>1</sup>*

In addition to the already high number of drowsy driving crashes cited by NHTSA, current estimates for annual traffic deaths attributable to driver drowsiness range from 2 percent to 20 percent.<sup>2</sup> Although estimates may differ on the number or percentage of crashes caused by drowsy driving, sleep deprivation, fatigue, and drowsy driving are a critical traffic safety issues in the United States today.

<sup>1</sup> <https://www.nhtsa.gov/risky-driving/drowsy-driving>

<sup>2</sup> NHTSA Drowsy Driving Research and Program Plan. March 2016.

# Effects of **Sleep Deprivation**

*The majority of drowsy driving crashes are caused by a driver experiencing a microsleep or actually falling asleep at the wheel. In addition to drowsiness, the effects of sleep deprivation include:*

- Decreased alertness
- Increased reaction time
- Degraded attention and vigilance
- Increased distractibility and confusion
- Decreased motivation
- Increased probability of driving performance errors

Sleep deprivation and fatigue directly cause driving performance errors such as a failure to maintain lane position, failure to maintain a consistent speed, and failure to see hazards on the roadway. Sleep deprivation and fatigue can also cause changes in mood and motivation. A drowsy driver may disregard safety procedures and may have little motivation to adhere to the rules of the road or safe driving practices. Sleep deprivation can also increase risk-taking behavior and lead to poor decision-making.

# Causes of **Drowsy Driving**

*Drowsy driving research has found that time of day is the single most important factor contributing to fatigue and reduced alertness when driving and is the single best predictor of drowsy driving crashes.<sup>3</sup>*

In fact, drowsiness episodes are 8 times more likely between midnight and 6am than during other times of the day. One study found that drivers are 20 times more likely to fall asleep while driving at 6am than at 10am.<sup>4</sup> Long-distance truck drivers on overnight or early morning routes are more susceptible to the effects of sleep deprivation because of disruptions to their natural sleep patterns caused by working nights or long and irregular hours.

Additional sleep-related factors that may contribute to fatigue include how much total sleep a driver has gotten, what time the sleep occurred, and the quality of the sleep. In addition, environmental conditions (e.g., darkness, monotonous driving environment), underlying medical conditions (e.g., sleep apnea) and drug use (e.g., methamphetamine, drugs that cause drowsiness) may also contribute to fatigue.

<sup>3</sup> Wylie, C., Shultz, T., Miller, J., Mitler, M., and Mackie, R. (1996). Commercial Motor Vehicle Driver Fatigue and Alertness Study: Project Report (FHWA/MC-97-002). Washington, D.C.: Federal Highway Administration.

<sup>4</sup> Harrison, Y., and Horne, J. (1999). One night of sleep loss impairs innovative thinking and flexible decision making. *Organizational Behavior and Human Decision Processes*, 78(2), 128-145.

# Hours of Service (HOS) Regulations

*In effort to reduce drowsy driving crashes in the trucking industry, the Federal Motor Carrier Safety Administration (FMCSA) instituted federal hours of service (HOS) regulations. The goal of enacting HOS regulations was to eliminate the type of drowsiness that can lead to crashes.<sup>5</sup>*

Despite FMCSA's goal of eliminating drowsy driving crashes, fatigue and sleep deprivation in the trucking industry continue to contribute to crashes every day.

Surveys of long-haul truck drivers indicate that a majority of drivers (65%) reported symptoms of drowsiness such as yawning, feeling drowsy or sleepy, and struggling to stay alert while driving and 13% of drivers reported actually falling asleep at the wheel.<sup>6</sup> In fact, a 2013 survey of truckers conducted by the American Transportation Research Institute found that 66% of drivers indicated **increased fatigue** while driving as a direct result of the new HOS rules that became effective in July 2013.<sup>7</sup>

HOS regulations have not completely eliminated drowsy driving crashes in the trucking industry because HOS regulations do not eliminate all of the underlying causes of drowsy driving. For example, HOS regulations allow drivers on the road during the early morning hours when they are most vulnerable to the effects of fatigue; they allow drivers to work irregularly scheduled and overnight shifts; they allow early wake times; and they do not regulate how much sleep a driver actually gets. That means that drowsy driving crashes can and do occur regardless of whether a driver violated HOS regulations.

<sup>5</sup> <https://www.fmcsa.dot.gov/regulations/hours-of-service>

<sup>6</sup> Dinges, D and Maislin, G. (2006). Truck Driver Fatigue Management. (Project Report FMCSA-RRR-06-008). Washington, D.C.: U.S. Department of Transportation.

<sup>7</sup> <http://atri-online.org/2013/11/18/atri-study-identifies-significant-operationaland-economic-impacts-from-new-hours-of-service-rules/>

# Human Factors Investigations of Drowsy Driving

*Human Factors investigations of drowsy driving crashes consider the underlying scientific causes of sleep deprivation and fatigue to answer two main questions:*

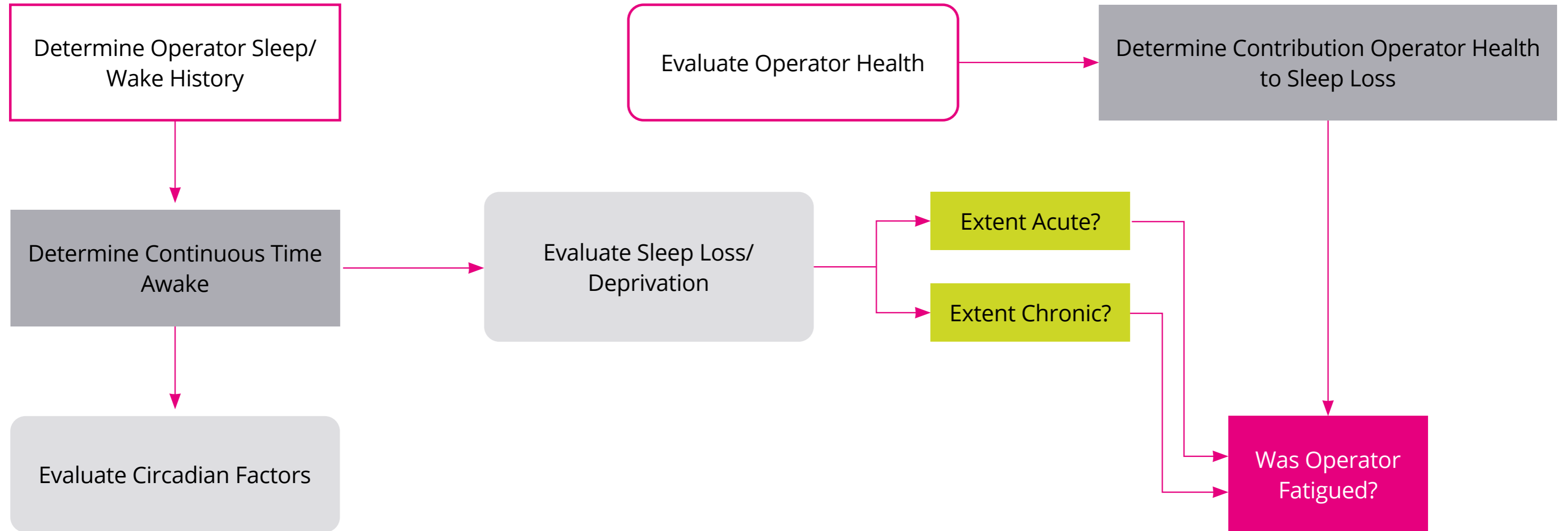
- Was the driver fatigued or sleep-deprived at the time of the crash?
- Was fatigue or sleep deprivation a cause of the crash?

The National Transportation Safety Board (NTSB) developed a scientific method for investigating fatigue in transportation incidents which allows human factors experts to reliably determine if a driver was fatigued at the time of the collision and if fatigue was a cause of the collision.<sup>8</sup>

**Figure 1** shows the NTSB method for determining if an operator (e.g., driver) was fatigued. The analysis includes evaluating the driver's sleep/wake history, circadian factors, sleep loss/deprivation, and operator health.

<sup>8</sup> Price, J. and Coury B. (2015) A Method for Applying Fatigue Science to Accident Investigation. Review of Human Factors and Ergonomics, Vol. 10, pp. 79-114.

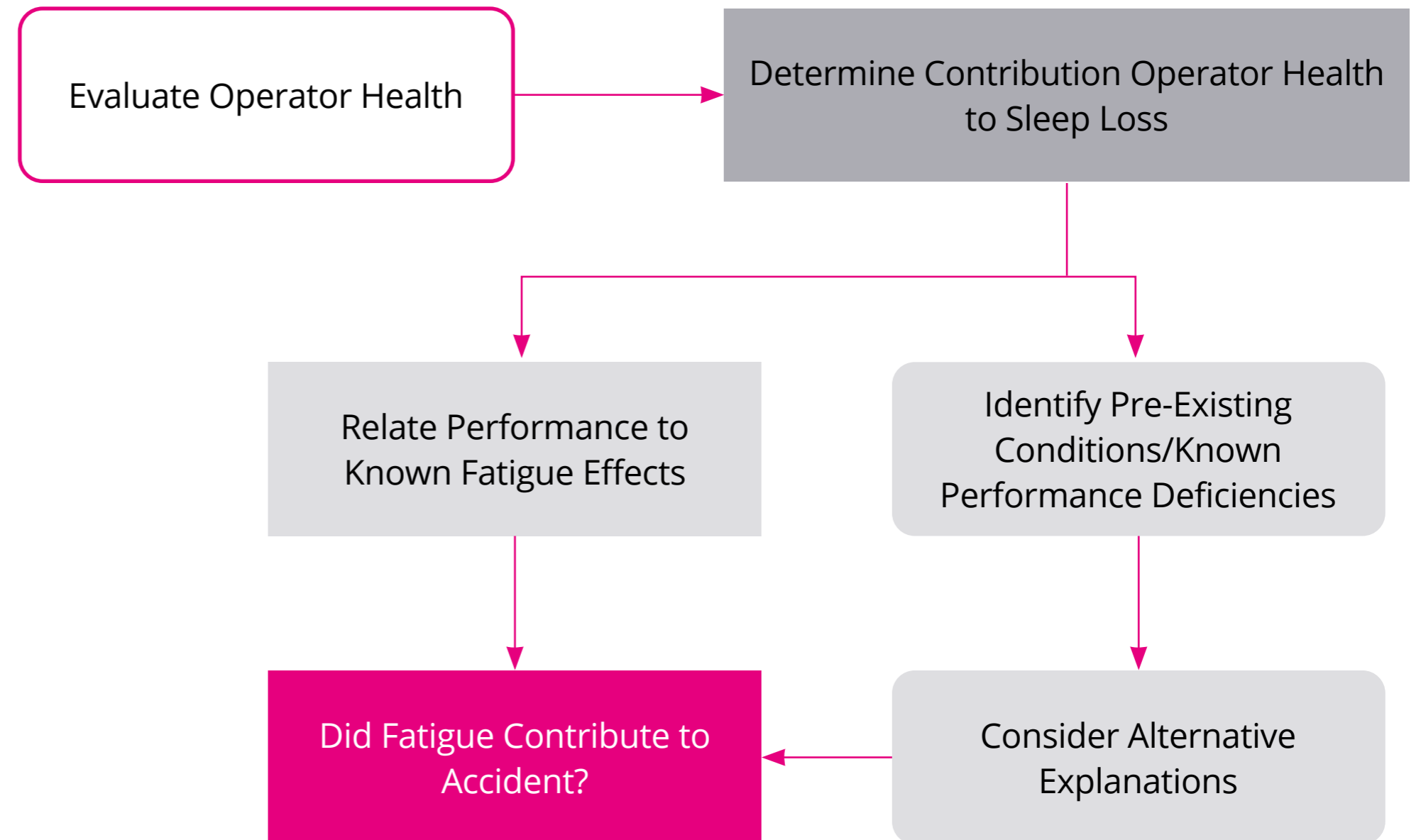
## Step 1: Was Operator Fatigued?



Adapted from Price, J. and Coury B. (2015) A Method for Applying Fatigue Science to Accident Investigation. Review of Human Factors and Ergonomics, Vol. 10, pp. 79-114.

## Step 2: did Fatigue Contribute to the accident?

**Figure 2** shows the NTSB method for determining whether fatigue was a cause of a collision. The analysis includes evaluating operator performance under the conditions present at the time of the collision and explicitly analyzing whether a driver was exhibiting the known effects of sleep deprivation at the time of the collision.



Adapted from Price, J. and Coury B. (2015) A Method for Applying Fatigue Science to Accident Investigation. Review of Human Factors and Ergonomics, Vol. 10, pp. 79-114.



*In summary, many factors contribute to drowsy driving. The effects of drowsy driving on safety are devastating and are likely to continue to be a major safety issue for the foreseeable future. Lastly, drowsy driving crashes are not limited to the trucking industry. All drivers are subject to the effects of fatigue and sleep deprivation with equally dangerous consequences for the driving public.*

*If your case involves drowsy driving, contact Dr. Nancy Grugle to discuss how fatigue or sleep deprivation may have played a role in the collision.*

**Nancy L. Grugle, Ph.D., CHFP**

Human Factors Expert | Forensic Consulting

Telephone. 610.255.2171

Email. [NGrugle@exigent-group.com](mailto:NGrugle@exigent-group.com)

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