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DEPARTMENT OF TRANSPORTATION
Federal Railroad Administration

Notice of Safety Advisory 2004-04; Effect of Sleep Disorders on
Safety of Railroad Operations

AGENCY: Federal Railroad Administration (FRA), DOT.

ACTION: Notice of Safety Advisory.

SUMMARY: FRA is issuing Safety Advisory 2004-04 to alert the railroad community, and especially those employees occupying safety-sensitive positions, to the danger associated with degradation of performance resulting from sleep disorders that are undiagnosed or not successfully treated. Alertness (vigilance) and unimpaired cognitive functions are important to the safety of railroad operations. Of particular concern to FRA are those employees who dispatch or operate trains or who inspect and maintain signal systems. Many of these employees work unpredictable schedules and long hours, making it difficult for them to achieve adequate rest even if otherwise healthy. This advisory contains suggested measures that railroads and employees should utilize to prevent work-related errors and on-the-job accidents as a result of sleep disorders.

FOR FURTHER INFORMATION CONTACT: A. Scott Kaye, Office of Safety, RRS-4, Mail Stop 25, Federal Railroad Administration, U.S. Department of Transportation, 1120 Vermont Avenue, NW, Washington, DC 20590. Telephone 202-493-6303.

SUPPLEMENTARY INFORMATION:

Factual Background

On November 15, 2001, Canadian National Railway Company/Illinois Central Railroad Company (CN/IC) southbound Train 533 and northbound Train 243 collided near Clarkston, Michigan. Both crewmembers of Train 243 were fatally injured, and both crewmembers of Train 533 sustained serious injuries. The track and equipment damaged in the accident was valued at approximately \$1.4 million. The National Transportation Safety Board (NTSB) determined that the probable cause of the accident was crewmembers' fatigue, which was primarily due to the engineer's untreated, and the conductor's insufficiently treated, obstructive sleep apnea. NTSB Report No. RAR/02/04. Sleep apnea is a sleep disorder characterized by cessations of breathing during sleep, and therefore partial awakenings during a sleep period.

Sleep disorders represent a serious health problem in American society and a significant economic concern. Moreover, untreated sleep disorders can result in impaired work performance, including possible loss of alertness and situational awareness, which could in turn present an imminent threat to transportation safety. In general terms, sleep disorders range from fairly common disorders, such as insomnia (the inability to initiate or maintain sleep) to relatively rare sleep disorders such as narcolepsy (inappropriate and uncontrollable sleep

episodes). Railroad employees who typically work on-call are especially vulnerable to sleep disorders such as circadian rhythm disorders,¹ and shift work sleep disorder,² a relatively recent addition to sleep disorders listed in the Diagnostic and Statistical Manual of Mental Disorders published in 1994 by the American Psychiatric Association (better known as the DSM IV), which cuts across all types of shift work jobs. Studies of on-call work schedules that lead to alterations in the timing or duration of sleep and the sleep-wake cycle have also been shown to lead to significant sleep and circadian rhythm disturbances in railroad workers.³

One of the more common sleep disorders is sleep apnea, affecting as many as 18 million Americans. Researchers estimate that the prevalence of sleep apnea in the general population is between 8-12%, depending on the measure used (mild, moderate or severe). Some researchers have also estimated the prevalence of severe sleep apnea in the general population between 3-5%, about 90% of whom are still undiagnosed, clearly demonstrating a significant problem. Obstructive sleep apnea, circadian rhythm disorders, and rotating shifts, have been found to be significant predictors of work-related accidents.⁴ Although severe sleep apnea is considered one of the more debilitating sleep disorders and is a significant risk factor for on-the-job accidents, it is also one of the most easily diagnosed and treated of all sleep disorders.

According to the National Sleep Foundation, untreated sleep disorder sufferers are three times more likely to have automobile accidents. The National Highway Traffic Safety Administration estimates that more than 100,000 auto crashes annually may be fatigue-related. These incidents result in an estimated 1,500 deaths and tens of thousands of injuries and lasting disabilities. Sleep disorders also tend to be more prevalent in an aging population. The average age for a railroad operating employee is now approaching 50.

While the impact of sleep disorders is unique to each individual and can be related to a variety of other factors and medical conditions such as obesity, depression, age and gender, evidence is clear that significant risks exist for those with undiagnosed and untreated sleep disorders. Some of these risks include excessive daytime sleepiness, greater risk of cardiovascular disease, memory loss, and increased risk of accidents to name a few. For these and other reasons, the NTSB has been concerned about the impact of sleep disorders and other medical conditions on railroad safety.

Following its investigation into the collision near Clarkston, Michigan, the NTSB issued three recommendations to FRA:

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¹ Elshaug, A. Reid, K. and Damson, D. 1998, The circadian effects of irregular work schedules on sleep. In W.P. Colquhoun (ed.), *Aspects of Human Efficiency* (London: English Universities), 273-282.

² 2004, National Sleep Foundation Workshop on Shift Work Sleep Disorder, March 4-5, Washington, DC.

³ Pilcher, J. and Coplen, M. 2000, Work/Rest Cycles in railroad operations: effects of shorter than 24-hour shift work schedules and on-call schedules on sleep. *Ergonomics*, Vol. 43, No. 5, 573-588.

⁴ Ohayton, M, Lermoine, P., Arnaud-Briant, V., and Dreyfus, M., 2002, Prevalence and consequences of sleep disorders in a shift worker population. *Journal of Psychosomatic Research*, 53, 577-583.

“Develop a standard medical examination form that includes questions regarding sleep problems and requires that the form be used, pursuant to 49 CFR part 240, to determine the medical fitness of locomotive engineers; the form should also be available for use to determine the medical fitness of other employees in safety-sensitive positions.” (R-02-24).

“Require that any medical condition that could incapacitate, or seriously impair the performance of, an employee in a safety-sensitive position be reported to the railroad in a timely manner.” (R-02-25).

“Require that, when a railroad becomes aware that an employee in a safety-sensitive position has a potentially incapacitating or performance-impairing medical condition, the railroad prohibit that employee from performing any safety-sensitive duties until the railroad's designated physician determines that the employee can continue to work safely in a safety-sensitive position.” (R-02-26).

FRA agrees with the safety concerns as expressed by the NTSB. This Safety Advisory, which has been developed after consultation with industry parties participating in the North American Rail Alertness Partnership, is an initial step in addressing the concerns identified by the NTSB.

However, in evaluating the recommendations, FRA has noted the importance of addressing these needs within a proper framework of accountability, scientific credibility, professional discipline, and fairness. Further, FRA notes that conditions that could threaten employee fitness for duty are not limited to sleep disorders. Accordingly, in the fall of 2003, FRA awarded a contract for a comprehensive study to determine the need for, and options for implementing, medical standards for railroad employees in safety-critical occupations. Upon receipt of a final report from that study, FRA will evaluate the appropriate framework for addressing in greater detail the NTSB's recommendations.

While FRA has regulations that address the fitness of employees, the regulations are limited to hearing and vision requirements for locomotive engineers (49 CFR part 240) and the control of alcohol/drug use (49 CFR part 219). FRA also enforces the hours of service law (49 U.S.C. 21101-21108), which specifies the maximum hours of duty and minimum periods of release for certain safety-critical employees.⁵

Need for Action Now

The FRA and NTSB have investigated numerous human factor accidents that were the result of errors caused by loss of alertness or loss of situational awareness. While there are no existing data to justify the inference that undetected or untreated sleep disorders were a causal factor, several factors, including the Clarkston, Michigan collision, data extrapolated from other modes of transportation, and the prevalence of sleep disorders within the general population, clearly demonstrate that there is a threat to railroad operations from undiagnosed or incompletely treated sleep disorders.

This threat exists, not only in train operations, train dispatching, and signal maintenance, but also in the operation of motor vehicles, on-track equipment, and other machinery. Approximately 35% of all train accidents reported to FRA are attributed to human

⁵ The hours of service law is an important defense against excessively long hours of work. However, it was enacted prior to completion of the major body of fatigue research. Although FRA may not vary the terms of the statute, FRA is empowered to authorize pilot projects directed at fatigue mitigation upon joint petition of the railroad and employees affected. FRA continues to encourage development of approaches to fatigue prevention and mitigation, especially with regard to providing predictable work schedules that do not induce fatigue and that offer ample opportunity for rest.

factors, of which fatigue, and more particularly, sleep disorders, play an undetermined role. Most employee casualties in train incidents and non-train incidents also involve a human factor component.

Recommended Actions

Therefore, FRA recommends that railroads and representatives of employees, working together, take the following actions to promote the fitness of employees in safety-sensitive positions: (1) Establish training and educational programs to inform employees of the potential for performance impairment as a result of fatigue, sleep loss, sleep deprivation, inadequate sleep quality, and working at odd hours, and document when employees have received the training. Incorporate elements that encourage self-assessment, peer-to-peer communication, and co-worker identification accompanied by policies consistent with these recommendations.

(2) Ensure that employees' medical examinations include assessment and screening for possible sleep disorders and other associated medical conditions (including use of appropriate checklists and records). Develop standardized screening tools, or a good practices guide, for the diagnosis, referral and treatment of sleep disorders (especially sleep apnea) and other related medical conditions to be used by company paid or recommended physicians during routine medical examinations; and provide an appropriate list of certified sleep disorder centers and related specialists for referral when necessary.

(3) Develop and implement rules that request employees in safety-sensitive positions to voluntarily report any sleep disorder that could incapacitate, or seriously impair, their performance.

(4) Develop and implement policies such that, when a railroad becomes aware that an employee in a safety-sensitive position has an incapacitating or performance-impairing medical condition related to sleep, the railroad prohibits that employee from performing any safety-sensitive duties until that medical condition appropriately responds to treatment.

(5) Implement policies, procedures, and any necessary agreements to--

(a) Promote self-reporting of sleep-related medical conditions by protecting the medical confidentiality of that information and protecting the employment relationship, provided that the employee complies with the recommended course of treatment;

(b) Encourage employees with diagnosed sleep disorders to participate in recommended evaluation and treatment; and

(c) Establish dispute resolution mechanisms that rapidly resolve any issues regarding the current fitness of employees who have reported sleep-related medical conditions and have cooperated in evaluation and prescribed treatment.

FRA acknowledges that some of the above recommendations may have already been institutionalized in one form or another by various segments of the industry; in this case, FRA suggests a review of current policies and procedures for relevancy.

FRA believes that the recommendations set forth above, if implemented by industry parties, could advance the successful management of sleep disorders. Taken together with the results of FRA's broader study of potentially impairing medical conditions, lessons learned could provide a sound foundation for more formal action by industry, government, or both.

Issued in Washington, DC, on September 21, 2004.

Grady C. Cothen, Jr.,

Acting Associate Administrator for Safety.

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