

Driver Fatigue Through Successive Nightshifts

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Coal Services (Health & Safety Trust) funded ARRB Transport Research Ltd. to investigate fatigue and performance in open cut mines. The main questions were to assess:

- What is the most important contributor to acute fatigue in open cut mining? Is it length of shift (eg. 8 hours Vs 12 hours) or is it time of day (eg. circadian effects)?
- What is the limit of successive day or night shifts before chronic fatigue affects operator performance in open cut mines?

The project methodology included utilising ARRB Fatigue Monitoring Devices in eight haul trucks, testing 24 subjects over several weeks. Operators worked a 14 night, 1 day off, 13 day roster of 12-hour shifts in a fly-in, fly-out operation with excellent opportunities for restorative sleep between shifts. A total of 3,500 hours of real-time data was collected. The fatigue monitor was also used in a driving simulator, where a further 14 subjects undertook alcohol and performance trials. A total of 28 hours of control data and 54 hours of experimental alcohol and performance data was captured for the study.

It can be argued that for a single night of driving haul trucks, there appears to be no affect on operator fatigue from the amount of time on task (for the 12 hours). The circadian influence had a stronger affect than working more than eight hours.

Of the fourteen nights worked at the site, nights thirteen, fourteen, seven and two respectively, were the worst. This presents a conundrum for policy makers who may like to place caps on working hours or rosters in the hope that it will alleviate the fatigue issue. It will not. The major finding within this study is the combined influence of circadian rhythms (human body clock) and individual variability. The lifestyle habits and the health of individuals have a profound effect on operator performance as shown by the strong positive correlation between high fatigue risk scores and poor performance. An individualistic

approach would appear to have the best chance of reducing high potential incidents due to fatigue through successive nightshifts.

The findings of this research study are of significant importance to the mining industry. It is said to be the first real set of objective data presented to the Australian mining industry that has been captured from within the industry. It is a large amount of data (3,500 + hours), which lends itself to scientifically valid interpretation.

The ARRB Fatigue Monitoring Device has been shown to be very good at measuring reduced driver performance due to alcohol intoxication. The performance measures relating to high potential incidents within the study, are found at blood alcohol concentrations of 0.02%. This adds strong support for setting alcohol tolerance levels at 0.02% blood alcohol concentration for the mining industry, as the corresponding level of performance can be considerably poor for some drivers.

Similarly, if the ARRB Fatigue Monitoring Device technology is utilised within any mining situation, there is strong evidence that the parameters of poor performance measures equate to the performance of drivers with a blood alcohol concentration of between 0.02% BAC and 0.05% BAC.

Recommendations

The findings clearly indicate that placing limits on successive nightshifts will not in itself alleviate the fatigue problems that are present during nightshift operations. In fact it could be argued that people may rely on limits to avoid the consequences of fatigue, rather than investigating other causal factors. The data collected from the fatigue monitoring devices, together with the fatigue risk scores and anecdotal evidence, create a strong case for arguing that each operator takes to work, health and lifestyle issues that impact on their subsequent performance. This is then compounded by circadian influences through the circadian trough (midnight to dawn), but may also manifest itself through other parts of the evening that are normally considered as 'high arousal' periods.

It would be wise to continue gathering such data at every opportunity to help in the continuing determination of ways to manage fatigue and performance. The current data has been obtained from a fly-in, fly-out site, whereby operators get adequate opportunity to obtain restorative sleep between shifts. Data needs to be captured from other sites that have nearby community living and fewer shifts for which to compare the data. This will assist to develop a more reasoned understanding of the number of successive nightshifts before performance begins to deteriorate below acceptable safety levels. Until such time, operators should be viewed as individuals and it should be accepted that their performance will vary from other operators and at different times of the day/night. This will not be managed by limits on operations.

Acknowledgments

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