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Proactive Fatigue Management Managing Your Fatigue & Performance

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Current State of Fatigue

- ◆ Fatigue has become recognised as a contributing factor in workplace incidents
- ◆ Relationship between fatigue & the combination of sleep, work periods & time of day is complex
- ◆ Humans cannot predict how long they can remain awake
- ◆ Personnel will not always comply with fatigue management programs
- ◆ 'Duty of care' requirement for all people



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ARRB Pro-Active Fatigue Management System

- ◆ Combining practical technology with 'best practice' fatigue management.
- ◆ Developed over the past two years in conjunction with the mining industry (eg. Thiess, Rio Tinto).
- ◆ Initial three stages funded by ACARP



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ARRB Fatigue Monitor



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ARRB Fatigue Monitor

- ◆ Fitted to haul trucks and other similar vehicles
- ◆ A stimulus - reaction task capable of early fatigue detection
- ◆ Random presentation of light & sound
- ◆ Personal baseline used for testing
- ◆ Concept based on slow reactions indicating effects of fatigue




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ARRB Fatigue Monitor


STIMULUS - RESPONSE TASK

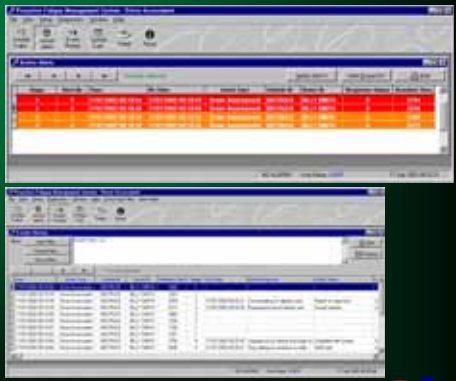
- ◆ Forced choice - left or right
- ◆ Divided attention - out of sightline
- ◆ Reaction times to stimuli measured
- ◆ Slow/wrong reaction speeds up stimulus interval period
- ◆ Devices only operational during forward motion




ARRB Fatigue Monitor

- ◆ Personal 'touch-key' used to log onto system
- ◆ Tests throughout the whole shift, unlike 'fit for duty' testing
- ◆ Devices linked to control room via radio systems
- ◆ Early warning to operator and supervisor
- ◆ Data used for fatigue management


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Device Concept

- ◆ Other devices wake sleepy people, the ARRB system takes a risk management approach
- ◆ Based on the concept that once someone gets tired, they are a liability
- ◆ If a driver gets sleepy once, he/she is likely to continue driving sleepy

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Lowered Performance



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Temporary Recovery



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Relapse of Low Performance



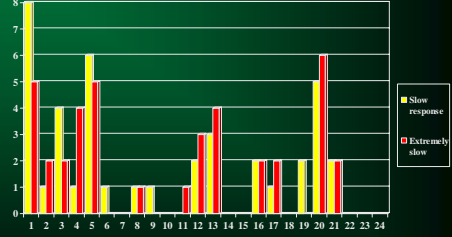
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Results from trials


- ◆ Data shows that the device detects early warning signs of fatigue through slow reactions
- ◆ Time of day performance effects shown
- ◆ Clear circadian patterns
- ◆ Some anomalies in the data

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Slow Responses Indicating Fatigue



Hour	Slow response	Extremely slow
1	5	0
2	2	2
3	4	4
4	2	4
5	4	6
6	5	0
7	0	1
8	1	1
9	0	1
10	0	0
11	1	0
12	3	0
13	4	0
14	0	0
15	2	2
16	2	0
17	2	0
18	0	2
19	0	2
20	6	5
21	2	0
22	0	0
23	0	0
24	0	0

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Pro-Active Fatigue Management


FATIGUE MANAGEMENT BASED UPON:

- ◆ Decades of fatigue research
- ◆ Reviews of sleep & performance
- ◆ Reviews of technological measures of performance
- ◆ Industry 'shop floor' experience

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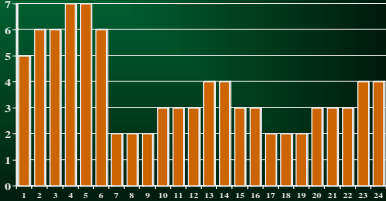
Fatigue Management Training The Human Machine

- ◆ Major aspects of diet
- ◆ Simple ways to get fitter
- ◆ Issues with illnesses
- ◆ Medications & illicit drug use


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Fatigue Management - The Human Machine

- ◆ Normal circadian patterns
- ◆ How the patterns are affected




Hour	Value
1	5
2	6
3	6
4	7
5	7
6	6
7	2
8	2
9	2
10	3
11	3
12	4
13	4
14	3
15	3
16	2
17	2
18	2
19	3
20	3
21	3
22	4
23	4
24	4

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Fatigue Management - Sleep & Performance

- ◆ Sleep debt (Banked Tiredness) and how to discharge
- ◆ Determination of adequate sleep
- ◆ Quality sleep conditions
- ◆ Understanding tiredness and how it eventuated
- ◆ Performance loss and inherent dangers
- ◆ Restorative sleep and rest


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Proactive Approach to Fatigue Management

- ◆ Fatigue management package will consist of:
 - ◆ Fatigue Management Training
 - ◆ Use of FMD and other information to establish personal fatigue profile
 - ◆ Corrective action for personnel with fatigue issues
 - ◆ Ongoing monitoring, utilising personal data as feedback

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Benefits to mining

- ◆ It will save lives and reduce injuries
- ◆ Reduce costs associated with accidents, inc damage & down-time
- ◆ Data can be used to identify shifts & rosters that place employees 'at risk'
- ◆ Data can be used to proactively plan new shifts and rosters to better manage fatigue
- ◆ Provides a risk management approach to 'fit for duty' legislation

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