

EVOLUTION NOT REVOLUTION RISK MANAGEMENT of SHIFTWORK

**ELIZABETH MAHON
SIMTARS**



Risk Management of Shiftwork

ACARP funded project for 18 mths to be completed August 2002

Objective: To develop a risk management framework for shiftwork in the mining industry

Project sites: 4 x surface, 2 x underground, 1 x coal haulage contractor

Managing shiftwork

Why manage shiftwork?

- Regulation
- Health and safety of workforce
- Productivity and costs

What do we need to know to manage shiftwork?

- Identify hazards
- Analyse the risks
- Assess the risks



Why Risk Assessment?

Advantages

- + Supports better decision making
- + Applied to any situation
- + Identify possible controls and risk treatment options
- + Identify residual risk

Limitations

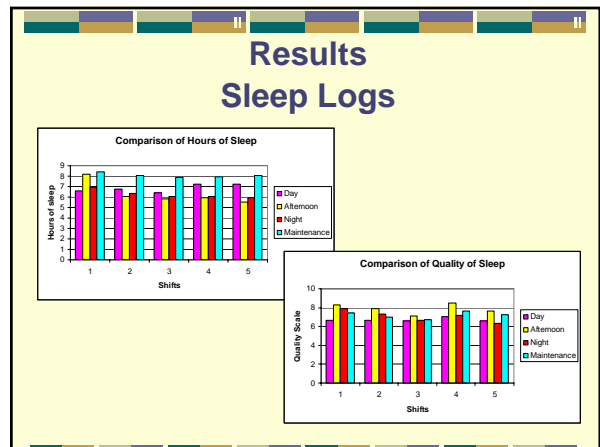
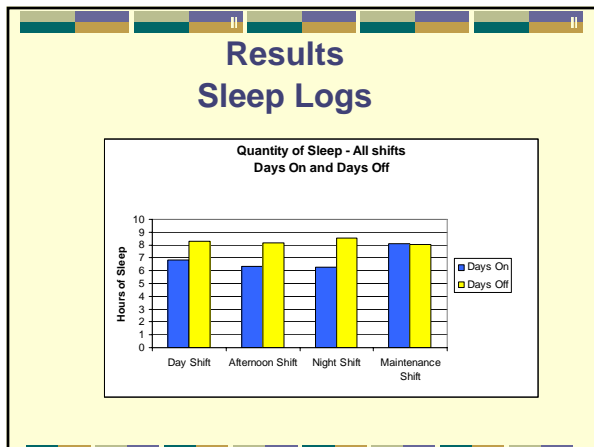
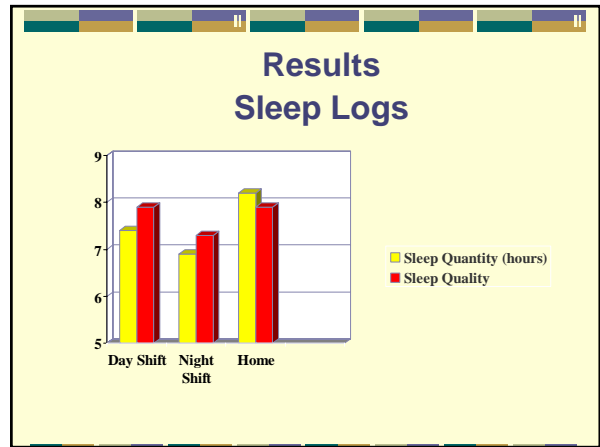
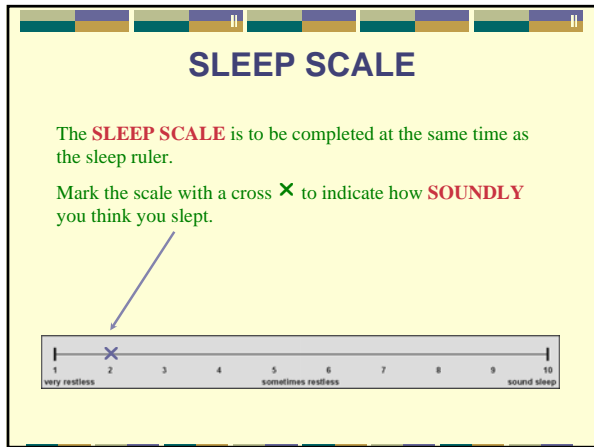
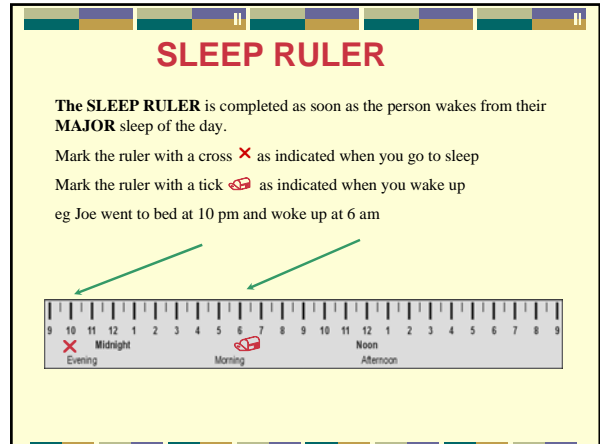
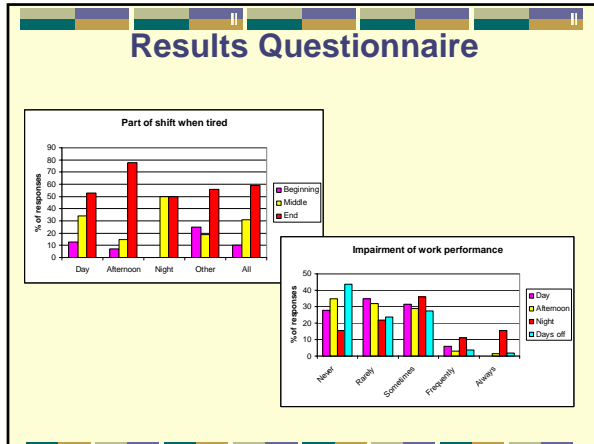
- ❖ Subjective nature of data
- ❖ Results can be influenced by the perceptions of the risk assessor and risk manager
- ❖ Controls influenced by perceptions and norms

Stage 1 – Data Gathering

- Lifestyle questionnaire
- Sleep logs
- Alertness logs
- Mine accident/incident/overtime information

Lifestyle Questionnaire

- Demographics
- Diet
- Exercise
- Alcohol and drugs
- Smoking
- Shiftwork and individual
- Shiftwork and family



ALERTNESS LOG

On work days - complete the log when:

- you arrive at work
- throughout the workday
- when you arrive home

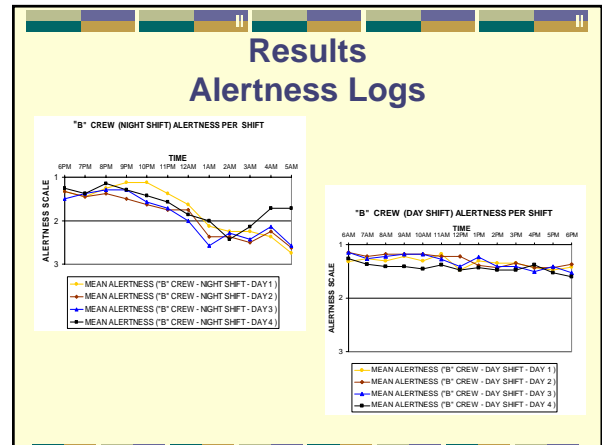
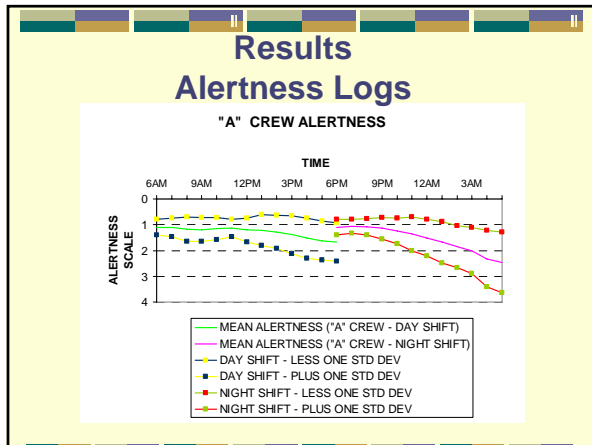
Please indicate overtime

On days off - just record as "day off"

Hours	Break (X)	Activity (eg driving)	Alertness (use scale)
0100			
0200			
0300			
0400			
0500		Driving to work	1
0600		Start work	1
0700		Driving	1
0800		Loading	1
0900		Loading/unloading	2
1000	X	Cab break (15mins)	2
1100		Walking/driving	1
1200	X	Cab break (30mins)	3
1300		Driving	3
1400		Driving/unloading/loading	4
1500	X	Cab break	4
1600		Maintenance	3
1700		Maintenance	2
1800		Finish work	2
1900		Driving home	3
2000			
2100			
2200			
2300			
2400			

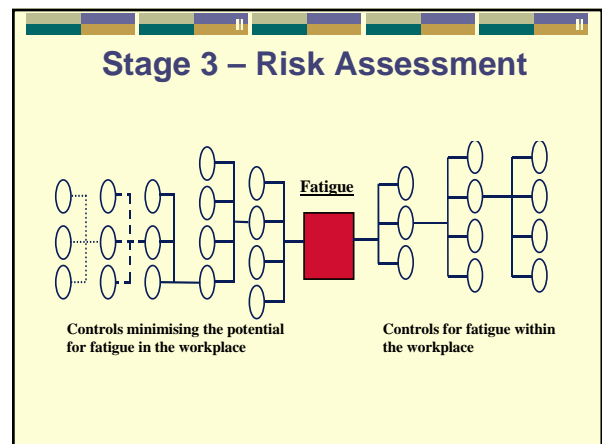
ALERTNESS RATING

Feeling active, alert or wide awake	1
Functioning at high levels but not at your peak, able to concentrate	2
Awake but relaxed; responsive but not fully alert	3
Somewhat foggy, let down	4
Sleepy woozy fighting sleep prefer to lie down	5



Stage 2 – Fatigue Training

- Introduction to shiftwork
- Fatigue - what we need to understand
- Sleep and activity
- Managing fatigue
- Monitoring fatigue



Risk Definition and Classification

CONSEQUENCES

- 1 = No fatigue resulting
- 2 = Low levels of fatigue not affecting activity
- 3 = Level of fatigue will cause moderate level of impairment
- 4 = High level of fatigue causing significant impairment
- 5 = Very high level of fatigue causing serious impairment and/or leading to sleep

Risk Definition and Classification

LIKELIHOOD

- A = Fatigue is expected to occur in most circumstances
- B = Fatigue will probably occur in most circumstances
- C = Fatigue should occur at some time
- D = Fatigue could occur at some time
- E = Fatigue may occur only in exceptional circumstances

Qualitative Risk Analysis Matrix Level of Risk

Likelihood	Consequences				
	1	2	3	4	5
A	S	S	H	H	H
B	M	S	S	H	H
C	L	M	S	H	H
D	L	L	M	S	H
E	L	L	M	S	S

Definition of fatigue

Fatigue is caused by **physical** or **mental** exertion or insufficient **sleep** that results in a markedly **reduced performance** or **reduced ability** to carry out a task



Causes of Fatigue

Work related

- similar issues across individuals
- managed at an organisational level

Non-work related fatigue

- highly variable between individuals
- managed at an individual level

Work related fatigue - causes

Roster organisation

- regularity of roster
- length of roster cycle
- speed of rotation



Work scheduling

- duration and timing of work
- recovery between and within work periods
- type of work and workloads

Work related fatigue

Mine A	Mine B
Body clock vs work pattern H	Night - body clock including start and finish time H
Overtime – running on other shifts H	Afternoon Finish 12 am H
Noise and vibration H	Timing and unpredictability of overtime –pre or post shift H
Work postures H	Stress H
Heat and humidity H	
Time of start/finish of shift H	

Non-work related fatigue

- **Human factors** 
- **Environmental** 

Non-work related fatigue - Human factors

- **Diet and exercise**
- **Medical conditions**
- **Alcohol and drugs**
- **Family life**
- **Social/sporting commitments**
- **Level of knowledge**



Non-work related fatigue Human Factors

Mine A	Mine B
Lack of sleep - H	Second job H
Sleep disorders – H	Sleep disorders H
Travel time - S	Diet and Exercise S
Use of alcohol - S	Management of shiftwork S
Lack of sleep – S	Family commitments S
Diet S	General health S
	Financial situation S


Non-work related fatigue - Human factors

Days per Week Alcohol is Consumed

Frequency of exercise

Non-work related fatigue Environmental Factors

- **Sleeping conditions**
 - **light**
 - **temperature**
 - **noise**
- **Weather conditions**
- **Road conditions**



Non-work related fatigue - Environmental factors

	Mine A	Mine B
Time of day	H	No high or significant environmental risks identified
Community setting	H	
Accommodation when resting	H	
Weather – wet season	S	

- ### Stage 4 – Risk Management
- **Managing fatigue - an integrated approach**
 - Personal
 - Occupational
 - **Differences between DI/DO, FI/FO and community based**

- ### Risk Treatment - Work related Rostering and Scheduling
- **Principles of roster design**
 - Length of shift
 - Number of shifts in a row
 - Overtime
 - Scheduling of work tasks throughout shift
 - Breaks
 - **Guidelines- major points common to all**

- ### Risk Treatment Options
- **Hours of work**
 - establish policies and procedures
 - **Rostering practices**
 - incorporate “best practice” and research
 - **Education and training**
 - industry specific
 - presentations, brochures, videos
 - **Technology**
 - **Research - including site specific**
- 

- ### Results of risk assessment
- **Fatigue risks specific for each work area**
 - **Detailed information on needs and controls for individual operations**

- ### Management of fatigue
- **Self management**
 - Education and awareness programs to identify fatigue indicators in self
 - **Peer management**
 - Education and awareness programs to identify fatigue indicators in self and others – work as a team
 - **Supervisor management**
 - Education and awareness programs to identify and manage fatigue in self and others

Management of fatigue

- **Site Management options**
 - Education and awareness programs
 - Employee assistance program
 - Informed roster planning
 - Informed task scheduling
 - Identification of fatigue critical tasks and development of additional controls
 - Recording, monitoring and review of indicators

Conclusion

- **Risks associated with shiftwork in the mining industry need to be managed.**
- **Risks cannot be managed until they have been identified and assessed**
- **Ongoing monitoring of situation is essential**

Acknowledgements

- **ACARP**
- **All participating project mines, workers and management.**

