GUIDE TO SAFE WORK: FATIGUE MANAGEMENT

AN EMPLOYER'S GUIDE TO DESIGNING AND IMPLEMENTING A FATIGUE MANAGEMENT PROGRAM

VERSION 2

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This document and future revisions and additions are available from Enform. If you have questions or comments about this document, please contact us at

Enform
1538 - 25 Avenue NE
Calgary, AB T2E 8Y3
Phone: (403) 250-9606
Fax: (403) 291-9408
E-mail: safety@enform.ca
Website: www.enform.ca

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PREFACE

PURPOSE

The purpose of this document is to help companies design and implement an effective fatigue management program, which can contribute to reducing the incidents and injuries among their workers.

AUDIENCE

The intended audience of this document includes oil and gas industry supervisors, managers, health and safety personnel, senior management and executives, fatigue management committees, stakeholder groups and anyone else responsible for designing and implementing a fatigue management program.

SCOPE AND LIMITATIONS

This guide includes information about workplace fatigue, fatigue management issues and strategies, and how to design and implement a fatigue management program. It does not go into detail about the science of fatigue, appropriate and inappropriate remedies for fatigue, and effective personal approaches to prevention. These topics are introduced in a companion publication entitled, *Guide to Safe Work: Fatigue*, produced by Enform in an infoflip format.

REVISION PROCESS

This is the first revision to the original document entitled "*Fatigue Management: Enform Guide to Safe Work*." It has been revised in conjunction with the new *Guide to Safe Work: Fatigue*, an infoflip designed for frontline staff. For details on the specific process for the creation and revision of guides to safe work, visit the Enform website at www.enform.ca.

REVISION HISTORY

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1	January 2003		
2	February 2007	February 2009	Document edited to be more consistent as a corporate guide and edited for flow and clarity.

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2003 DEVELOPMENT COMMITTEE

Name	Company / Organization Represented
Ray Cislo	Alberta Human Resources and Employment
Stefan Colhoun	Precision Drilling - Computalog
Kenn Edgecombe	Edge Safety
John Hawkins	BP Canada
Derek Hibbard	CAODC
Michele Hinkl	HSC Solution
Terry Holzer	Workers' Compensation Board of Saskatchewan
Rick Hutchins	Nova Chemicals Inc.
Peter Jones	Workers' Compensation Board of Alberta
Lane Kranenburg	Alberta Motor Transportation Association
Wayne Lilley	Alberta Transportation
Don Melnychuk	Nadon Consulting Ltd
Agnes Murrin	Talisman Energy
Allen Oxtoby	Suncor
Bob Scott	Schlumberger
Craig Sluser	Enbridge Pipelines Inc.
Marcel Therrien	Paramount Resources

2006 EDITING COMMITTEE

The 2006 editing committee was formed with the leadership of the Fatigue Task Group of the CAPP National Safety Leadership Team. The Editing Committee used the original development committee where possible to assist in the editing process. Enform gratefully acknowledges the time and energy provided by the individuals listed below:

Name	Company / Organization Represented
John Artym	Penn West Energy Trust
Bill Bain	Suncor Energy Inc.
Kate Christie	Enform
Ryan Groot	Enerplus Resources Fund
Brent Harrison	EnCana Corporation
Paul Hilferty	ConocoPhillips Canada

Terry Holzer	Saskatchewan Workers' Compensation Board
Wayne Lilley	Alberta Transportation
Don Melnychuk	Nadon Consulting Ltd.
Agnes Murrin	Talisman Energy
Allen Oxtoby	Suncor Energy Inc.
Sian Pascoe	Canadian Association of Petroleum Producers
Mike Peters	Canadian Association of Petroleum Producers
Murray Sunstrum	Enform
Coba Veldkamp	Synergos (consultant)
Deborah Walsh	Canadian Association of Petroleum Producers
Kelly Wisoley	Suncor Energy Inc.

EXECUTIVE SUMMARY

Fatigue has become a common subject recently for companies examining the health and safety hazards facing their operations. The impacts of fatigue extend to both home and the workplace. Studies have suggested fatigue can have an impact similar to alcohol impairment. Employers therefore have safety and business reasons to deal with fatigue as part of an overall health and safety program.

Recognizing the factors that impact fatigue is important, and this extends beyond traditional factors such as scheduling, and work types. Workplace culture also plays an important role in managing fatigue by allowing fatigue factors to be identified and managed.

An employer building a fatigue management program will need to involve multiple employee levels, and a steering committee is often useful in developing the program. Fatigue management components such as program objectives, work practices and procedures, recognition and assessment and processes can all be combined to create an effective program. Once a program has been structured, consideration needs to be given to building employee competency in managing fatigue, and ongoing program evaluation.

There is a wealth of information on fatigue available, and a few resources are listed at the end of this document.

SECTION 1: WORKPLACE FATIGUE

HOW FATIGUE CAN AFFECT HEALTH AND SAFETY

Fatigue is a feeling of tiredness or exhaustion that comes from physical or mental exertion; it is a message to the body to rest. It can be aggravated by acute lack of sleep or an accumulated sleep debt. It causes slower reaction time and can result in poor decisions, more mistakes, decreased performance, and dangerous lapses from microsleeps and automatic behaviour. No one is immune to fatigue and its effects have an impact on the fatigued person's workplace, family, and community.

Fatigue has a significant influence on health and safety both at work and at home. When it comes to work and fatigue, research demonstrates that the probability of a workplace incident rises and falls with alertness. The highest rate of industrial incidents is usually found among shift workers and catastrophic incidents are more likely at times when workers are most prone to sleep: between midnight and 6 am and between 1 pm and 3 pm. On the roads, more vehicle collisions occur in the early morning hours than at other times, a time when the fewest vehicles are on the road but when people experience the greatest degree of sleepiness. An analysis of incidents involving commercial trucks found that drivers in fatigue-related incidents had slept an average of five and a half hours during their last sleep period, compared with eight hours for drivers in non-fatigue-related incidents. Also, evidence shows that the one hour lost in the switch to daylight savings time increases collision rates by seven percent. In the week following the change to daylight savings, fatal incidents (on and off the job) increase by six and a half percent.[1]

An Australian study[2] measured the effects of fatigue and rated them against those of alcohol impairment. Findings suggest that after only 20 hours of sustained wakefulness, a person may be as impaired as someone with a blood alcohol concentration of 0.10 percent. The results of this study support the suggestion that even moderate levels of sustained wakefulness reduce performance to an extent greater than is currently acceptable for alcohol intoxication. Since about half of shift workers typically spend at least 24 hours awake on the first night shift of their work period, these findings have important implications. The results are also important for anyone working extended hours over multiple days or weeks without adequate periods of rest. As sleep debt is cumulative, similar performance impairments should be expected in workers fatigued by that.

WHY MANAGE WORKPLACE FATIGUE

There is a moral imperative to manage workplace fatigue. The ill effects of fatigue can be reduced significantly and therefore it is the right thing to do. There is also the business case

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[1] **Factors that affect Fatigue in Heavy Truck Accidents Volume II***: Case Summaries*; National Transportation Safety Board http://www.ntsb.gov/publictn/1995/SS9502.htm

[2] **Fatigue-related crashes:** *An analysis of fatigue-related crashes on Australian roads using an operational definition of fatigue*; Kim Dobbie http://www.atsb.gov.au/publications/2002/Fatigue_related_sum.aspx

for managing fatigue. The costs of various program elements vary with some interventions requiring very little money. The benefits, however, can be substantial including avoiding the costs of incidents and reducing worker absence and turnover. A fatigue management program can also provide proof of a company's due diligence in meeting fatigue-related and hours-of-service legal requirements.

HOW FATIGUE MANAGEMENT PROGRAMS CAN HELP

Fatigue management programs have become more common in response to the effects of fatigue mentioned above. Similar to other programs such as for substance use and dependency, a fatigue management program is part of an overall health and safety program. Often, it is made a part of a "fitness for duty" policy. It is meant to help company increase awareness for the issue of fatigue, manage the risk factors and hazards, and prevent related injury and illness.

SECTION 2: UNDERSTANDING FATIGUE MANAGEMENT

This section provides information on fatigue management for consideration when designing and implementing a program. Additional details can be found in the appendices and the supplemental resources.

Most people need about eight hours of sleep a day—some a bit more and some a little bit less. However, those who do not get enough sleep each day can develop a sleep debt that adds up for them over time. A single night's shortened or disrupted sleep may not affect worker performance, but an accumulated sleep debt can. The resultant fatigue can lead to the following hazardous conditions, effects, or behaviours:

- inability to see properly
- slower reflexes and reactions
- microsleeps (up to 60 seconds where the brain goes to sleep and worker blacks out no matter what they are doing)
- automatic behaviour (where worker does routine tasks but is not having any conscious thoughts)
- inability to make good decisions or plans
- inability to solve problems
- inability to concentrate, including wandering thoughts
- decreased alertness and watchfulness
- inability to remember things just done, seen, or heard
- inability to notice things the worker usually would notice
- more mistakes than usual
- failure to respond to changes in surroundings or situation
- poor logic and judgement, including taking risks the worker usually would not take
- inability to respond quickly or correctly to changes
- inability to communicate well
- inability to handle stress
- moodiness (e.g. , giddy, depressed, irritable, impatient boredom, restlessness, depression, giddiness, grouchiness, and impatience).

Studies also show fatigued workers more often are absent, sick, quit, and cause more incidents than other workers. They also work slower, check their work more, rely more on co-workers, and avoid complex tasks.

Aside from sleep debt, fatigue can occur and affect workplace health and safety for a variety of reasons, including the following:

- work scheduling

- work task type and length
- work and workplace conditions
- worker health and stress, and
- workplace safety culture.

These topics are covered in more detail below in this section.

WORK SCHEDULING

The time of day when people work has a significant bearing on fatigue. For this reason, fatigue management programs should address work scheduling, including such issues as long hours of physical or mental activity, breaks, rest between workdays, shift work, extended or compressed workweeks and day-off patterns, being on call, traveling in multiple time zones, etc.

CHOOSING AN OPTIMUM SCHEDULE

When choosing work schedules, the risks can be better managed when companies take into account employee needs, industry requirements and competitiveness. Optimum scheduling is efficient, effective, and appealing:

- Efficient in terms of the total costs to the company for a particular schedule including both direct labour expenses and indirect cost factors, such as: rates of absenteeism, turnover, incidents, and injuries, which research has linked to the physical adaptation and social compatibility of shift schedules.
- Effective in terms of the extent to which a particular schedule hinders or facilitates employees' adjustment to the schedule.
- Appealing in terms of the desirability of a work schedule, that is the extent to which a particular schedule matches employees' needs and preferences.

SHIFT WORK CHARACTERISTICS

A significant amount of research has gone into understanding how shift work characteristics impact fatigue. Some key characteristics that need to be considered include:

- Shift length (hours) and times
- Fixed shift schedules
- Rotation of shifts
- Days off
- Weekends off

See Appendix B for additional information.

BREAKS

In general, companies should schedule tasks to allow for sufficient rest breaks and recovery time and should provide access to proper nutrition, suitable rest areas, and opportunities for physical activity. They should also avoid the use of extended/multiple-pay schedules whenever possible but if it is not possible, they should increase the number of rest and nutrition breaks for workers.

TRAVEL

For work in remote locations, companies should make sure workers are on site a full 12 hours before their first shift. In that period of time, the workers should be expected to prepare for their shift even if it means eight hours of sleep. Employees should treat their work-related travel time as they would regular work time in terms of fatigue management (e.g. scheduled rest breaks and physical activity breaks). If workers have a long drive ahead of them to get home after working away for extended days, they should be required to rest before getting behind the wheel.

WORK TASK TYPE AND LENGTH

Fatigue and its effects are made worse by two kinds of work: boring or simple tasks that last half an hour or more and complex, mentally challenging tasks. The boring ones aren't stimulating enough to keep a tired mind on the task and the challenging ones are too stimulating for a tired mind to cope with. For effective fatigue management, this fatigue factor should be considered when jobs and tasks are designed. In general, jobs should be structured to minimize fatigue hazards of duration, repetition, and monotony. As an example, some typical upstream petroleum tasks that carry these risks are listed in Table 1 below.

Table 1: Typical Upstream Petroleum Tasks Carrying Fatigue Risks

Boring / Simple Tasks	Mentally Challenging Tasks
Driving to /from worksite (a complex task often treated as a simple one)	Driving to /from worksite
Monitoring gauges	Flow rate calculations
Waiting on lease	Load lift parameters
Repetitious tasks	Determine mud viscosity
Fire watch / safety watch	Determine G force on centrifuges
Clean equipment	Equipment start up

WORK AND WORKPLACE CONDITIONS

Work and workplace conditions can also aggravate fatigue. Taxing environments such as outdoors in the cold or heat, or in a factory with a lot of noise or poor ventilation increase worker susceptibility to fatigue. Even simply being away from home for long periods can fatigue a worker. Also, the need to wear certain personal protective equipment (PPE) such as respirators and heavy clothing can contribute to fatigue.

In general, a company should take the following measures for work and workplace conditions that can contribute to fatigue:

- Create a work environment that promotes alertness
- Implement engineering and administrative controls to avoid or greatly reduce exposure
- Ensure sufficient resources of personnel, equipment, and support
- Structure hours of work to avoid the hottest or coldest periods of the day
- Provide additional fluid/nourishment
- Adjust time factors to incorporate the additional physical requirements and challenging environmental and physical conditions
- Select PPE appropriate to the situation and/or condition that exists and limiting the duration of tasks requiring PPE that affects performance or that places additional physical demands on the worker

WORKER HEALTH AND STRESS

Workers' health and stress levels can also contribute to how they are affected by fatigue. If they have conditions such as diabetes or hypertension or short-term illnesses like colds or allergies, they can be more easily fatigued. What's more, the over-the-counter (OTC) or prescription medication they take for an illness or disease could affect their sleep or make them drowsy. For example, some cold medicine, back pain medicine, nausea medicine and

muscle relaxants can cause drowsiness. In addition, sleep disorders are also conditions that make fatigue worse. These are physical or neurological sleep problems such as insomnia, sleep apnea, REM behavior disorder, sleepwalking, restless legs syndrome, or periodic limb movement syndrome.

Stress is well known to have a detrimental effect on physical, mental, and emotional health. Whether it is due to issues at work or at home, stress can lead to problems such as the following, which can increase a worker's vulnerability to fatigue at the workplace:

- Chest pain
- Decreased sex drive
- Headaches
- Indigestion
- Muscle aches
- Stomach/bowel problems
- Substance abuse
- Weight changes
- Anxiety
- Depression
- Forgetfulness
- Irritability
- Resentment
- Insomnia
- Fatigue

Good fatigue management takes into account this role of health and stress in dealing with workplace fatigue.

WORKPLACE HEALTH AND SAFETY CULTURE

A workplace that rewards productivity over health and safety has a culture that is not likely to take fatigue seriously as a hazard. To be successful, any fatigue management program would need to be built on the foundation of an effective, functioning workplace safety culture. Alternatively, if such a positive health and safety culture does not yet exist, implementing a fatigue management program could be a key intervention to help create such a culture. A company with a culture supporting a fatigue management program would take measures such as the following:

- It would promote and communicate corporate message stressing the importance of fatigue management.
- It would recognize individuals who applied fatigue management strategies.
- It would include fatigue management planning as a measure of job performance and post job evaluations.
- It would ensure that incentive programs did not contribute to fatigue.
- It would not penalize workers who refuse to work because of work-related fatigue (e.g. rest period would not be deducted from sick days, holidays, or banked-time days).

SECTION 3: DESIGNING A PROGRAM

This section outlines some options for designing a fatigue management program. While representatives from a range of companies have agreed that this advice seems appropriate for their organizations, the specific approach and its terminology might not be suitable for all.

GETTING STARTED

INITIATING PROGRAM DEVELOPMENT

Typically, one person or group spearheads the effort to develop a company fatigue management program and they will usually be asked to provide company senior management and executives with evidence of the issues associated with fatigue, the solutions available through a program, and the costs and benefits to the company. Senior management and executives will need to support the program financially and through policy direction and program success will be greatest if their involvement, commitment, and accountability are secured at the beginning.

COLLECTING INFORMATION

Fatigue and sleep are complex issues. A lot of information is available about them from individuals and organizations, in traditional and web-based formats. Before forming a committee to design a fatigue management program, you may find it helpful to put together a file of applicable, credible, useful information that can be given to committee members to inform them on the topic of fatigue and your business. That way, all committee members will have the same knowledge base from which to draw conclusions and contribute to program development. This guide will provide you with some of that information, and lists references to further sources in **APPENDIX A**.

STAKEHOLDER ENGAGEMENT

Using a steering committee, task group or working group to develop your program helps promote increased input and wider support. You will likely want to try to include staff from different levels and types of work in all phases of program development and implementation, including frontline workers, supervisors, managers, occupational health and safety personnel, and executives. Just make sure that staff selected (either by management or by their co-workers) will provide quality input and are respected by their co-workers. As with other company work, you will also want to ensure that members' roles and responsibilities are clear to them at the outset. The tasks could be divided equitably based on skills and available time. Because so many people with individual commitments and priorities are involved, committee work can often go off course or become delayed. To counteract this, at the beginning you will likely want to set clear, achievable work goals and timelines that can be used to track and refocus committee progress.

DEVELOPING THE COMPONENTS

There are many elements that can be part of a fatigue management program. Some, such as a statement of the objectives of the program, are essential. Others, such as practices and procedures for shift work, would be included only if they applied to the way a company was run. The following five components include lists that are not exhaustive but outline the typical component characteristics and topics used in fatigue management programs. You will want to select the ones that apply to your company's business and customize them as appropriate. You will also want to connect them or integrate them with your current health and safety management system. If your company or committee has additional issues or ideas, do not feel that you are limited to these lists.

COMPONENT 1: CLARIFYING THE OBJECTIVE OF THE FATIGUE MANAGEMENT PROGRAM

A well-received and implemented program has a clear objective statement that typically uses inclusive language and covers:

- a brief introduction for context.
- the objective, purpose or overarching goal of the program.
- a policy statement.
- to whom and in what situations the program components apply.
- how it will be monitored, enforced and upgraded.

COMPONENT 2: SAFE WORK PRACTICES AND PROCEDURES

Safe work practices are the rules that apply for a certain topic and the procedures are the exact steps to be taken in particular situations. Both tend to discuss reasons, roles, and responsibilities. For fatigue, you should consider developing safe work practices and procedures to address the following four areas:

1. Recognizing the effects, signs, and symptoms of fatigue and selecting appropriate corrective actions;
2. Assessing the causes and contributing factors for fatigue and taking preventative action to eliminate them or reduce their impact;
3. Assessing and documenting a worker's level of fatigue;
4. Reporting fatigue assessments for incidents and considering fatigue in investigations.

You can refer to Section Two above for information on fatigue management issues and strategies that may relate to your company. Other fatigue information sources are listed in **APPENDIX A**.

COMPONENT 3: RECOGNITION AND ASSESSMENT OF FATIGUE

Workers too fatigued to work safely may present a hazard to themselves and others. Effective fatigue management programs discuss this hazard and detail how a worker, co-workers, or supervisors can recognize it (for example, from the symptoms listed at the beginning of Section Two). Managing fatigue also means recognizing and assessing it as a possible factor in workplace incidents. Normal incident investigation questions should provide the investigator with an indication if fatigue could have been a contributing cause of an incident.

See Appendix C for additional details on recognizing fatigue proactively as a hazard and reactively during incident investigation.

COMPONENT 4: SUPPORTIVE PROCESS PLANS

To implement the items covered in your fatigue management program, you may need to develop some supportive processes. For example, if one of the ways your company hopes to eliminate or reduce the impact of causes or contributing factors of fatigue is to have facilities for naps, or provide premade meals, or make referrals in the EFAP (Employee & Family Assistance Program), or make sure that camps are close enough to rigs and construction sites, processes will need to be planned to ensure that those are arranged. In addition, some items may require more work or new procedures for other staff or departments. For example, hiring practices may change and managers and the human resources department may need to adapt. A benefit of planning for these issues in the program is that they are not overlooked or rushed during implementation.

COMPONENT 5: IMPLEMENTING THE PROGRAM

Once your research is complete and the committee has agreed on what to include in the program, the wording can be finalized. See Appendix D for further suggestions on writing up the program.

When you launch the program, you will have to distribute any relevant documents to those who need them and replace any old documents that have been updated.

Your fatigue management program should indicate what kind of training will be needed. Simply implement the initial training as specified in the program. After the initial training is complete, training will need to continue to support the program and to reach staff not covered initially. You will want to consult the program to determine what type of ongoing training needs to be done and make appropriate arrangements to carry it out.

COMPONENT 6: BUILDING COMPETENCY

To maximize the value generated from your program, your staff will need to be competent to manage fatigue. This means the program should detail training specifics, such as the following:

1. Training plan – when, where, and to whom training is given (e.g. , initial training vs. ongoing training, training during orientation, during a special session, during regular safety meetings, one time or regularly, etc.)

2. Trainers – who gives the training (e.g. supervisors, management, safety personnel, consultants, etc.)

3. Training methods – how the training is given (e.g. self-directed, one-on-one, or in groups; paper, video, or electronic; lecture style or participatory; evaluation or no evaluation; setting pass/fail mark; etc.)

4. Training resource material for trainer and trainees – what is needed for the training (e.g. PowerPoint slides and equipment for trainer, handouts or information booklets or wallet cards for trainees, etc.)

5. Training content – what needs to be learned. To help ensure the success of your fatigue management program, all your staff should receive training in the following areas:

    - their roles related to fatigue
    - how the program is customized to your company
    - the place of the fatigue management program within your health and safety program
    - the effects, signs, and symptoms of fatigue
    - the causes and contributing factors for fatigue
    - appropriate and inappropriate corrective action for fatigue
    - Effective fatigue prevention techniques

    The corresponding Enform *Guide to Safe Work: Fatigue* (infoflip) designed for workers, could be used to cover these last four topics.

    Also, supervisors and senior management would benefit from additional training that deals with the following:

    - Assessing and documenting a worker's level of fatigue.
    - Monitoring and enforcing fatigue management program policy, practices, and procedures.
    - Reporting fatigue assessment for incidents.
    - Considering fatigue in investigations.
    - Promoting effective fatigue prevention techniques.
    - Supporting the fatigue management program.

- Reporting program feedback.

6. Ensure competency – how competency will be verified. Performance standards need to be determined along with mechanisms for verifying competency.

COMPONENT 7: PROGRAM EVALUATION

Any effective program requires regular, formal evaluation (e.g. quarterly or annually) to determine whether it is meeting its goals and objectives. If these are not being met, then the program can be revised and improvements made. During program development, you will probably want to create an evaluation plan, which could include the following:

- Predetermined review dates.
- Senior management and executive commitment to carry out and act on the reviews as scheduled.
- A feedback method involving all affected personnel and incorporating management accountability and participation.
- A reliable data collection method (empirical and anecdotal).
- A meaningful analysis process with evaluation criteria based on overall program goals and specific performance objectives.
- An efficient program document revision process.

APPENDIX A: INFORMATION SOURCES

The list of documents and information sources provided below includes any documents or websites consulted in the research for this guide or referred to within this guide and several additional sources that are useful for reference for basic information on fatigue science, health and safety, and programs. This list is not exhaustive and any web addresses listed are current at the time of publication but are subject to change.

Document Name or Information Source	Availability
Alberta Motor Association – Crash Causes	http://www.ama.ab.ca/cps/rde/xchg/SID-53ED365C-FC4CB968/ama/web/advocacy_safety_Crash-Causes.htm
Canada Safety Council – Fatigue	http://www.safety-council.org/info/OSH/fatigue.htm
Canadian Centre for Occupational Health and Safety – Shift work	http://www.ccohs.ca/healthyworkplaces/topics/shiftwork.html
Canadian Centre for Occupational Health and Safety – What is fatigue?	http://www.ccohs.ca/oshanswers/psychosocial/fatigue.html
Guide to Safe Work: Fatigue Management – A Worker's Guide to Preventing Incidents and Injuries Related to Fatigue	http://www.enform.ca/assets/files/enform_fatigue_2006.pdf
National Sleep Foundation	http://www.sleepfoundation.org
Workers' Compensation Board of Alberta – Working Safely Behind the Wheel	http://www.wcb.ab.ca/pdfs/driving_safely.pdf
WorkSafe Alberta – Fatigue, Extended Work Hours, and Safety in the Workplace	http://www.hre.gov.ab.ca/documents/WHS/WHS-PUB_erg015-1.pdf

APPENDIX B: WORK SCHEDULING

WORK SCHEDULING

The time of day when people work has a significant bearing on fatigue. For this reason, fatigue management programs should address work scheduling, including such issues as long hours of physical or mental activity, breaks, rest between workdays, shift work, extended or compressed workweeks and day-off patterns, being on call, traveling in multiple time zones, etc.

CHOOSING AN OPTIMUM SCHEDULE

When choosing work schedules, the risks can be better managed when companies take into account employee needs, industry requirements and competitiveness. Optimum scheduling is efficient, effective, and appealing:

- Efficient in terms of the total costs to the company for a particular schedule including both direct labour expenses and indirect cost factors, such as rates of absenteeism, turnover, incidents, and injuries, which research has linked to the physical adaptation and social compatibility of shift schedules.
- Effective in terms of the extent to which a particular schedule hinders or facilitates employees' adjustment to the schedule.
- Appealing in terms of the desirability of a work schedule, that is the extent to which a particular schedule matches employees' needs and preferences.

SHIFT WORK CHARACTERISTICS

Shift Length (Hours) and Times

People have a daily internal clock that sets circadian rhythms, which are the times for sleep, alertness, eating, digestion, and other body functions. These rhythms are repeated approximately every 24 hours and are designed for high activity during the day and low at night, when people usually sleep. For this reason, circadian principles are more easily applied to eight-hour shifts (this relates to the effectiveness of the schedule). However, many employees favour 12-hour shifts, as they get a third more days off (this relates to the appeal of the schedule). Worker age can be an important factor for appeal of shift length. Older workers are less able than younger ones to adjust to the frequent changes that shift work requires and so an eight-hour day shift suits an older worker better.

Strategies exist to try to help make shift work less intrusive into natural sleep habits and social activities. One is to have the shift end at a time when the shift worker can still get some sleep during "normal" sleep time (e.g. a shift of 10 am to 6 pm, 6 pm to 2 am, and 2 am to 10 am). Also, staggering the length of shift can be done. For example, the day shift is made to be ten hours, afternoon eight hours, and night only six hours.

Another consideration in selecting shift hours and times is the timing of the shift change. Research on incident rates, performance, employee health, and the social well-being of shift

workers, all point to the value of having later start times for a variety of reasons. First of all, shifts requiring workers to wake up before 5 am cause more circadian desynchronization than night shifts. Getting off work in the early morning (between 2 am and 5 am) is considered also undesirable and frequently unsafe, especially related to driving.

Whatever shift schedule a company uses, their employee input will be important. With employee input and using some of the above shift scheduling techniques in this section and sections below, a schedule can be set up that serves both employer and employee needs.

Fixed Shift Schedules

Fixed shift schedules are ones where employees are placed on a particular shift with the intention that they will remain on the shift throughout their time with the company, or at least until they are reassigned to another fixed shift. Rotating shifts involve continual movement of employees across two or more shifts. Many researchers and shift workers alike have argued strongly for fixed shift systems as they enable employees to reset their internal clocks, thereby reducing the stress caused by changing work schedules.

However, being assigned to a permanent night shift has one area of major concern: fixed night schedules work best only if workers maintain the same sleep/wake pattern on their time off—not reverting to daytime schedules on their time off. This will likely not happen, as most of the world operates on day schedules. Similarly, fixed afternoon shifts can create social desynchronization because the most desirable social time of the day is considered to be between 5 pm and 9 pm so although fixed to work hours provide stability, they do have some drawbacks.

Rotation of Shifts

Whether using long or short rotations of shifts, companies need to keep in mind that it takes at least one week for the circadian rhythm to adapt to a schedule change. A long rotation consists of working a stretch of night shifts for four to six weeks. With this long stretch of time, a worker would probably need to work nights only twice a year. With a period this long, a person's circadian rhythm has a better chance of changing to the night shift time period. But again, to make this work, workers must keep their sleep/wake times the same even on their days off. A problem for many people, as they tend to return to a day-oriented lifestyle on their days off, leaving their circadian rhythm chronically disoriented.

A short rotation would involve no more than three night shifts in a row. This quick changeover keeps the circadian rhythm from fully resetting and is considered to create less circadian desynchronization than weekly or long rotations. An example of a short rotation is the 1/1/1 rotation: one day shift, one afternoon shift, and one night shift followed by two days off.

Whether long or short rotation is used, a clockwise direction is the easiest on the circadian rhythm and a counterclockwise direction runs counter to the natural circadian rhythm (see Figures 1 and 2 below).

Figure 1: Clockwise Rotation of Shifts (Recommended)

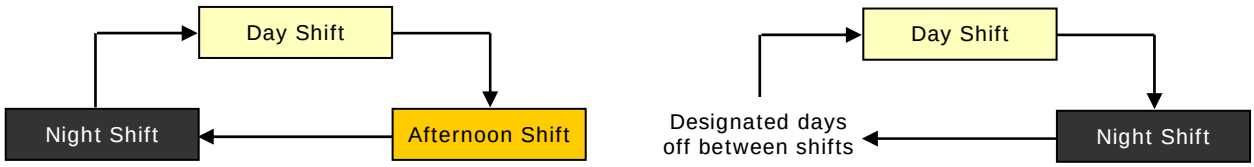
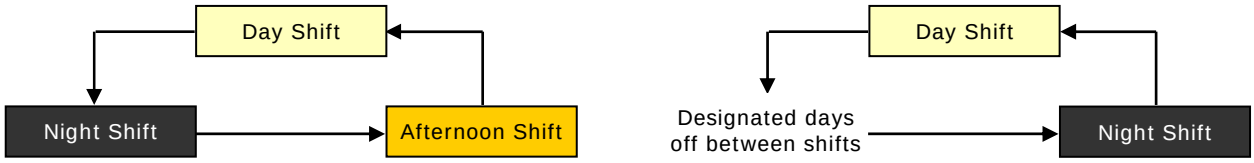


Figure 2: Counterclockwise Rotation of Shifts (Not Recommended)



Days Off

Employee preference and scientific research both support the use of schedules which have at least two consecutive days off after each set of shifts. Where this is not possible, due to efforts to create longer periods of off time elsewhere in the shift cycle, it is recommended that a minimum of 48 hours follow every on-duty period, with some shift sets being followed by three or more days off time.

One factor related to the quality of off time is the number of consecutive off-duty days available in the work schedule. A second factor to consider in designing quality off time is the timing of those off-duty periods. Many eight hour schedules assign an extended off-duty period to follow the day-shift sequence, leaving only minimum off time after the evening shifts, night shifts, or both. Yet, it is the latter shift that places the most stress on employee health and welfare, and therefore requires the most restoration effort. Employees not granted sufficient leisure time often are drawn to activities that tax their bodies to maximize their free time. Younger workers frequently shorten their sleep periods, returning to work fatigued. Older workers tend to need to use their off time to recover and return to work resentful that they “slept their time away.” Work schedules involving night shifts must design recovery time into the off-duty pattern so there is sufficient opportunity for rest and recuperation following the night shift.

Weekends Off

North American culture traditionally follows a five-day work week and places great value on weekend time. Shift workers, like the rest of the work force, generally want to maximize their time off. It is important to consider the days of the week on which each new shift starts and stops. For example, a schedule that maximizes weekend time and also allows for

recovery time would make Thursday the last shift of the night shift assignment. This would let employees use Friday as a recovery day and still have the benefits of a free weekend, so they can remain connected to their family and community.

- Workers in certain segments of the upstream petroleum industry face schedules out of sync with a five-day work week. This is usually due to operational requirements such as 24-hour operations in remote and temporary locations. This poses a greater challenge in managing fatigue. Workers need to be able to plan ahead. Schedules should be set well in advance and for as long as possible.

APPENDIX C: RECOGNITION AND ASSESSMENT OF FATIGUE

AS A HAZARD

If a supervisor suspects that a worker is too fatigued to be fit for work, having a standard procedure ensures consistency. The following questions may be helpful for developing of a worker fatigue assessment tool for supervisors:

- How many hours did the employee work in the past week?
- What is the pattern of hours worked in the past week?
- Do environmental factors pose an additional load?
- Does the employee's condition match the mental, physical, and emotional demands of the work?
- What is the physical intensity of work?
- Does the employee's physical fitness match the work demands?
- Is the employee suffering from acute sleep loss?
- Does the employee have a sleep debt?
- Is the employee required to work at a time out of sync with the waking cycle of the employee's circadian rhythm?
- What events are currently going on away from work? Is the employee experiencing life stressors?
- How well has this employee coped in the past?
- Does the employee get support at work and at home?

IN INCIDENT ANALYSIS

Managing fatigue also means recognizing and assessing it as a possible factor in workplace incidents. Normal incident investigation questions should provide the investigator with an indication if fatigue could have been a contributing cause of an incident. If fatigue is considered a potential cause, the investigator can examine additional fatigue related questions such as the following:

- When did the worker last sleep?
- Where did the worker last sleep?
- How long did the worker sleep the last time?
- Did the worker have a restful sleep?
- What was the time of shift?
- How many consecutive hours had the worker worked?
- What and when was the worker's last break between shifts?
- How many days had the worker worked in a row?
- How many hours did the worker work on those days?

If an investigator already knew or strongly suspected fatigue to be a contributing cause of an incident, the investigator could also assess the following:

- Work schedule
- Work task type and length
- Work and workplace conditions
- Worker health and stress
- Workplace health and safety culture

Such in-depth examination should reveal if or to what extent fatigue is a cause or contributing factor in a workplace incident.

APPENDIX D: DOCUMENTATION

WRITING UP THE PROGRAM

Once your research is complete and the committee has agreed on what to include in the program, the wording can be finalized. As usual for safety documentation, you will want to be aware of the needs and limitations of readers during the writing. Also, you may wish to try to keep the style consistent with other health and safety-related policies, practices, and procedures in your company.

Bear in mind that other documents may need to be modified or created as a result of the new program, such as the following:

- A new training component may need to be added to orientation checklist forms for new staff
- New checkboxes and spaces may need to be added to hazard report forms or incident report forms
- New questions may need to be added to incident investigation forms
- New topics may need to be added to safety meeting forms
- New criteria may need to be added to annual performance review forms
- New elements may need to be added to safety recognition programs

It would be a good idea during program design to take a look at all your company forms and health and safety documentation to check for and revise any cross-over points or address any gaps by adding new documents.

GETTING FEEDBACK AND APPROVAL

Once all the documentation has been prepared, you will likely have to circulate it to required personnel for feedback and approval. The feedback stage may need to be repeated until all are satisfied. Upon approval, you can move on to planning for implementation.

PLANNING FOR IMPLEMENTATION

Once your program and any related forms and new or modified documents are approved, you can produce them for all required staff (and website or intranet as required). For any forms or documents to be updated and replaced, you should plan to have them returned to the office or destroyed.

By this time, employees will probably know your company has been working on the fatigue management program for a while. However, you could create anticipation that they are soon going to get the program to read and follow. For example, you could bring it up at safety meetings or build interest by providing facts about fatigue up until the release of the program.

Before you implement it, you will want to consult the program you designed and make sure all supportive processes described there are ready for implementation. The program should also already include plans for what kind of training needs to be scheduled. You can follow the requirements of the program and make arrangements for the initial stage of training to correspond with release of the program into your company.