



**Saskatchewan
Labour**

Occupational Health
and Safety

Managing Shiftwork

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Please note

This publication is not designed to interpret the legislation. It is not intended to be used in court. Please use the original legislation whenever you wish to interpret or apply the law.

To purchase copies of *The Occupational Health and Safety Act, 1993* or *The Occupational Health and Safety Regulations, 1996* contact the Queen's Printer in Regina at: (306) 787-6894. The FAX number is (306) 787-9779.

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Managing Shiftwork

Shiftwork is a fact of modern society. Critical services such as police and fire protection, health care, transportation, power, telephone and water are needed around the clock. Society demands and relies on these and other services and the production of certain goods around the clock. As a result, many workplaces operate 24 hours a day.

More and more people are working shifts. This has meant an increase in jobs in some work sectors. Although most people work shifts because it is part of the job, in some cases workers may prefer working shifts. To some people, working shifts may mean an increased income, a quieter work environment, or savings on child care expenses because both parents are not working at the same time.

Working shifts can affect a worker's health and safety. Shiftworkers have irregular patterns of eating, sleeping, working and socializing that may lead to health and social problems. Shiftwork can also reduce performance and attentiveness. In turn, this may increase the risk of accidents and injuries. Certain shiftworkers are more likely to encounter violent situations while working alone.

Employers and workers can work together to identify and control shiftwork hazards. Cooperation is essential. Section 82 of *The Occupational Health and Safety Regulations, 1996* addresses shiftwork. The employer, with the occupational health committee, must:

- (a) assess the risks to the worker's health and safety posed by the work; and
- (b) inform the worker about the nature and extent of the risks and how to eliminate or reduce them.

This publication will help employers, occupational health committees and workers identify and control the hazards of shiftwork. It will answer the following questions:

- What is shiftwork?
- How can shiftwork affect workers?
- What are the hazards?
- How can the hazards be controlled?

What is shiftwork?

Shiftwork usually means regularly scheduled work outside of the normal daytime working hours of 7:00 A.M. to 6:00 P.M. and includes:

- permanent night shifts, or other permanent shifts that extend into the evening or night (such as afternoon and evening shifts), or begin before 6:00 A.M.
- condensed work weeks, with extra long workdays
- variable or rotating shifts that change work times from day to evening or day to night. The change may occur weekly or monthly.

How can shiftwork affect workers?

The body has a 24 hour ‘biological clock’ (known as the *circadian rhythm*) that tells it when to sleep and when to wake up. Sunlight and darkness regulate this clock.

Normally, darkness triggers changes in the body that lead to sleep. When falling asleep, the body’s blood pressure, heart rate, breathing rate and temperature drop. Digestion also slows.

Certain repair and maintenance processes occur during a phase of sleep known as *delta sleep*. It takes the body some time to reach delta sleep. Subsequent phases of sleep are important to psychological well-being. Working during normal sleep hours affects the body's ability to digest food, rest, restore and repair itself and may affect a person’s sense of well-being.

Shiftworkers try to sleep during the day. Normally, daylight signals the body to prepare for activity. As the body wakes up, blood pressure, heart rate, breathing rate and temperature rise. The person feels more alert. It is harder to get to sleep, and to get sufficient sleep, when the body is prepared to be awake. Trying to sleep in short spurts may shorten the particular phases of sleep needed for body maintenance, repair processes and psychological well-being.

What are the hazards?

Problems associated with shiftwork can include:

- health hazards
- family and social issues
- safety hazards

Health hazards

Disrupted sleep and eating patterns interfere with digestion. Disruptions can result in sleep and stress-related disorders and may affect the cardiovascular system. Shiftwork often involves working in excess of 8 hours. These extended shifts can expose workers to more chemical and biological substances, noise, vibration and temperature extremes.

Gastrointestinal problems

Gastrointestinal problems, particularly ulcers, are more common among shiftworkers. Factors that may contribute to these problems include the following:

- Some shiftworkers may eat less at night, while others may over-eat, consuming nighttime snacks in addition to regular day meals.
- Shiftworkers often eat at night when digestion and other body functions are slowed down.
- Shiftworkers may eat less nutritious foods on night shifts. Often there is less access to nutritious meals at night and workers may rely on snack foods with a high fat content.
- Shiftworkers may drink more coffee to stay alert at night. Heavy coffee consumption increases the risk of developing ulcers.

Cardiovascular problems

Some studies note that cardiovascular disease and heart attacks occur more frequently in certain occupational groups that work shifts. However, the way in which shiftwork affects the heart is not at all clear.

Effects on the cardiovascular system may be partially due to the altered eating habits of shiftworkers. Disrupted sleep patterns can contribute to cardiovascular problems by increasing stress, blood pressure and smoking. Reduced physical activity can also contribute to such problems.

Sleep and stress-related disorders

Shiftwork decreases the quality and amount of sleep. The inability to sleep at night or to sleep well during the day produces a sleep deficit. An accumulated sleep deficit can lead to more serious problems, such as insomnia, excessive sleepiness during the day and chronic fatigue. Common complaints of shiftworkers include sleepiness at work, general fatigue, falling asleep on the job, muscle pains and/or stiffness, increased eye fatigue, frequent dizzy spells, mental exhaustion and irritability.

An accumulated sleep deficit may leave a person more vulnerable to stress-related disorders.

Drug and alcohol use

Studies indicate that, compared to day workers, certain groups of shiftworkers report using more alcohol, caffeine and nicotine. Shiftworkers may use these substances to help them stay awake on the job. Other study results show that some groups of shiftworkers report using more over-the-counter and prescription sleeping pills than day workers.

Risks from prolonged exposure to chemical and biological substances and other hazards

Workers on extended shifts may be exposed to chemical and biological substances, noise and vibration, and extreme temperatures for longer than normal working periods. They are, therefore, more likely to experience related health problems. Shiftworkers whose health is run down by a lack of sleep may be more susceptible to the health effects of hazardous substances.

Other illnesses

Certain health conditions—such as asthma, diabetes, epilepsy and depression—may be made worse by shiftwork.

Effects on pregnancy

A limited amount of research suggests that rotating or irregularly changing shifts may be associated with subtle effects on pregnancy.

Family and social issues

Shiftworkers usually have less time to spend with their family and friends. They are often at work when regular social activities are scheduled and at home when others are at work. Therefore, shiftworkers may spend less of their time-off involved in social or recreational activities. Fatigue may also prevent shiftworkers from enjoying those recreational and social activities that they are able to participate in. This may be particularly true of parents who have family duties after work. Parents, particularly single parents, may also have trouble arranging childcare. These restrictions may strain relationships.

Safety hazards

Safety problems associated with shiftwork include:

- performance
- risk of accidents
- violence

Performance

Most night workers complain of sleepiness. Sometimes they fall asleep on the job. Performing tasks that require alertness may be worse at night, when workers' bodies are prepared for sleep. Performance levels appear to be lowest between 3:30 A.M. and 5:30 A.M. An accumulated sleep deficit from prolonged shiftwork can decrease a worker's level of performance and alertness, regardless of the time of day.

Working extended shifts can also cause poor performance and decreased alertness. Performance deteriorates on extended work shifts where the work is physically or mentally demanding. Perception and decision-making ability may also be affected on extended shifts.

Risk of accidents

Shiftwork can lead to sleepiness and decrease performance, alertness, perception and decision-making ability. These factors can contribute to accidents and injuries. However, higher accident and injury rates have not been clearly linked to shiftwork because shiftwork is only one of many factors contributing to accidents and injuries.

Some evidence suggests that shiftworkers have a decreased ability to respond effectively to emergencies.

Violence

Certain types of shiftwork involve working alone at night. These workers may be more vulnerable to violence from customers, residents, inmates, etc.

How can shiftwork hazards be controlled?

Hazard controls for shiftwork include:

- organizational controls
- shift scheduling
- workplace design
- worker education and instruction
- violence policies

Organizational control options

- Limit shiftwork to essential jobs.
- Organize workloads so that the toughest and most dangerous tasks are completed early in the shift. Schedule less demanding tasks for late in the shift.
- Avoid scheduling demanding or dangerous tasks at the beginning of an early morning shift.
- Adjust the workload during the shift to prevent boredom.

- Ensure supervision is effective, particularly when accidents are more likely. Supervision is very important between 3:30 A.M. and 5:30 A.M. when performance is at its lowest. Younger workers appear to have more accidents at the start of a shift following a weekend. Older workers seem to have more accidents at the end of the shift.
- Supervise inexperienced workers more closely than others until they can do their jobs safely.
- Ensure shiftworkers have access to adequate meal facilities. Meals eaten on night shifts should be light, nutritious and easy to digest.
- Allow adequate meal and rest breaks. (For example, allow two short breaks and a meal break for each night shift).
- Implement effective emergency response procedures.

Shift scheduling

The risk to the worker depends on when the shift is scheduled during the day, the length of the shift, and the length and rotations of a series of shifts (shift schedule). Common shift schedules include compressed work weeks, rotating or variable shifts, and permanent afternoon, evening or night shifts.

- **Compressed work week** – These shifts usually involve three to four days of 10 to 12 hour shifts. Compressing the work week provides more time between shift schedules and may provide more opportunities for family and social activities. However, extended shifts can increase fatigue and decrease performance at the end of shifts. They also extend a worker's daily exposure to chemical, biological and physical hazards. Some families have problems arranging childcare during extended work shifts.
- **Permanent afternoon, evening or night shifts** – These shifts allow workers time to adjust, but are disruptive to their social lives. Permanent night workers may accumulate a greater sleep deficit than non-permanent night shift workers over time.
- **Rotating or variable shift schedules of different lengths** – These shifts are the most common type of shift work. After working a shift schedule or *rotation*, a worker usually has a break of one or more days, then begins a different rotation where shifts begin at another time of day.

Adapting to rotating shift schedules can be affected by the:

- *Length of the break before changing to a new shift schedule* – Workers rotated to a new shift schedule too rapidly or without a sufficient break may have trouble functioning.
- *Speed of the rotations* – Longer rotations of 10 to 14 days may allow more time for the body to adjust to a shift. Evidence suggests that the circadian rhythm may require three weeks to fully adjust to a new shift. Mental functions adjust more rapidly. Difficulties are most obvious during the first four shifts. Faster rotations of 2 to 3 days do not allow circadian rhythms time to adjust. However, the faster rotations allow the worker to quickly get through the usually more difficult night shift rotation.
- *Direction of the rotation* – Shifts rotating clockwise (morning, afternoon and night) cause fewer problems than those rotating counter clockwise.

Choosing the right shift schedule

- Employers should involve shiftworkers in designing shift schedules. Together they should strive to minimize the effects of shiftwork while maintaining productivity. When possible, workers should be allowed to choose shift schedules. When this choice is not possible, the worker's preference should be considered when assigning shift schedules. Fewer adverse effects are likely to occur when workers have the opportunity to choose shifts and/or help design shift schedules.
- Monitor shiftworkers for changes in their performance. Check for health complaints. Employers should be flexible about requests for changes in shift assignments. Where possible, offer alternate shift schedules to any worker who cannot adapt to a particular shift or who is more susceptible to the hazards of shiftwork, especially if the worker involved is pregnant or has a chronic illness.

The employer can involve shiftworkers by:

- Involving occupational health committees in developing shift schedules.
- Ensuring shiftworkers are represented at workplace occupational health committee meetings that deal with shiftwork issues.

In deciding on shift schedules:

- Avoid starting day shifts early in the morning (before 5:00 A.M.).
- Try to include some free weekends every month.
- Consider alternatives to permanent (fixed or non-rotating) night shifts.
- Minimize the number of consecutive long shifts, night shifts and overtime.
- Try to keep the schedule regular and ensure that workers know their schedule well in advance, so they can make arrangements for childcare and spend time with family and friends.
- Whenever possible, avoid scheduling two shifts within a 24 hour period. Check *The Labour Standards Act* [section 13.2(1)] for required breaks between periods of work in a 24 hour period.
- Where possible allow at least 24 hours of rest after each set of night shifts.

Schedule shifts according to the demands of the work:

- Avoid scheduling hazardous jobs at night that involve intense and continuous mental attention and effort, monotonous operations in dimly lit environments, and/or complex work procedures.
- Where possible, limit intense physical labour and intense, continuous, mentally demanding tasks to no more than 8 or 9 hours.
- For jobs involving intense mental effort, rapidly rotating shifts are recommended. Eight hour shifts are better than 12 hour shifts for such jobs.

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- Slowly rotating or permanent shifts are recommended for work involving sustained eye-hand coordination and intensive physical effort. This provides a greater chance for workers to adjust and remain alert. Experts recommend maintaining this shift schedule for at least three or four weeks.

Workplace design

An employer can use workplace design to improve conditions for shiftworkers by:

- Reducing night traffic, noise and distractions.
- Designing work areas to reduce physical, chemical and biological hazards and limit exposures to harmful chemical and biological substances. Exposures must not exceed the calculated equivalent of the contamination limits set out in *The Occupational Health and Safety Regulations, 1996 (Table 21)*. The listed contamination limits are based on an 8 hour day and must be adjusted for extended work shifts. For example, multiply the contamination limit by 8/12 (8 hours/12 hours) for a 12 hour shift.
- Ensuring that the work environment promotes alertness. Keep work and traffic areas brightly lit. Reduce glare and reflective surfaces. If feasible, allow workers to play music that will keep them awake.
- Maximizing safety and health controls. For example, provide good ventilation, temperature control, machine guarding and so forth.
- Avoiding isolating workers. Regularly communicate with employees working alone and otherwise protect their health and safety.
- Providing food preparation areas if a cafeteria is not available (e.g., provide a facility with a fridge, a microwave oven, etc.) and rest facilities. Consider providing some exercise facilities.

Worker education and instruction

Educate workers and supervisors about the hazards of shiftwork and their significance, including potential:

- health and safety difficulties
- performance problems and accident risks
- social and family problems

Workers should be told:

- How to recognize the symptoms of poor health that may be related to shiftwork.
- How to control shiftwork hazards and the workplace factors that can be used (e.g., the use of organizational controls, shift scheduling and workplace design).
- How they can minimize the effects of shiftwork on themselves.

Workers can minimize the effect of shiftwork on their health and social life by:

- Protecting their sleep periods by maintaining regular rest and wake routines, avoiding exercising for 2 hours before going to bed, keeping light out of the bedroom, disconnecting the phone, ensuring a quiet sleeping area and so forth.
- Eating nutritious meals, keeping a regular meal routine and selecting meals rich in carbohydrates—rather than heavy, fatty, high protein meals—before bedtime.
- Ensuring that family and friends understand the potential harmful consequences of shiftwork.
- Adjusting family and social life to spend sufficient social time with family and friends.
- Maintaining physical fitness.
- Learning strategies to remain alert while on the job.

Symptoms of poor health often appear and are more pronounced during the first year of shiftwork. Workers who are about to begin shiftwork for the first time should be encouraged to consult a physician, particularly if they have a chronic illness or are on long term medication. The physician should inform each worker about any personal health problems that working shifts could make worse.

Medical consultations are important because they may allow health problems to be detected early. Therefore, encourage night workers to consult their physicians regularly if sleep disorders or other health problems persist. Advise workers to tell their physicians about any changes in their jobs.

Violence policy

Employers in certain workplaces are **required** by *The Occupational Health and Safety Regulations, 1996* to develop a policy to minimize or eliminate the risk of violence (**regulation 37**). The policy must:

- Identify workers at risk and inform them about the nature and degree of the risk.
- Identify actions to minimize or eliminate the risk.
- Identify how violent incidents involving workers will be investigated and followed-up.
- Include worker training.
- Allow workers to have ready access to the policy.

Under *The Labour Standards Act* [**see section 15(4)(k) and Minimum Wage Board Order 1997**] employers in certain places of employment (e.g., hospitals, hotels, nursing homes, restaurants and educational institutions) must provide night workers with transportation to their residences, if their shift ends between 12:30 A.M. and 7:00 A.M.

Review

- Shiftwork usually means regularly scheduled work that is done outside normal daytime hours of 7:00 A.M. to 6:00 P.M. Schedules may require workers to work during normal sleep periods and rest during the day. Shiftwork disrupts body rhythms and can affect health and social well-being. Health problems associated with shiftwork may include:
 - gastrointestinal illnesses
 - cardiovascular illnesses
 - sleep and mood disorders
- Family life and social relations can be damaged by the isolation of shiftwork. The resulting stress may interfere with rest periods, worsen existing health problems, and, in some cases, lead to substance abuse.
- Shiftwork can also impair performance, decrease alertness and productivity and increase the risk of accidents and injuries.
- Employers can reduce risk by informing workers of the hazards of shiftwork and ways of minimizing the effects. Employers and workers can cooperate to control the hazards of shiftwork.

Employers can help shiftworkers adapt by:

- Involving shiftworkers, where possible, in developing and choosing shift schedules. The occupational health committee can help with this task.
- Using organizational controls, workplace design and workplace supports to minimize the hazards of shiftwork.
- Informing workers of the hazards and how they can be controlled.

For more information

- *Rotational Shiftwork: A Summary of the Adverse Effects and Improvement Strategies and The Extended Workday-Health and Safety Issues*, both by Ilene Stones. Order from The Canadian Centre for Occupational Health and Safety, 250 Main Street East, Hamilton, Ontario L8N 1H6. Phone: (905) 572-2981.
- *The Shiftworker's Handbook* by Marty Klein, Ph.D. Order from SynchroTech, 315 South 9th Street, Suite 211, Lincoln, NE 68508. Phone: (402) 474-4387.
- *Living with Shiftwork*. Order from the Ontario Natural Resource Safety Association, 690 McKeown Avenue, P.O. Box 2050, Station Main, North Bay, Ontario, P1B 9P1. Phone: (705) 474-7233 or toll free order FAX: 1-800-850-5519.
- *Sleep Secrets for Shift Workers & People with Off-Beat Schedules*, by David Morgan. Order from Whole Person Associates, 210 West Michigan, Duluth, MN 55802-1908. FAX: (218) 727-0505 or toll free: 1-800-247-6789.
- *Working Nights Health and Safety Guides*, by Dr. Martin Moore-Ede. Order from the Circadian Information Resource Guide, 125 Cambridge Park Drive, Cambridge, MA 02140-2314. Phone: (617) 661-2577 or FAX: (617) 661-2877.
- *Plain Language About Shiftwork*. National Institute for Occupational Safety and Health (NIOSH). Cincinnati, OH. Publication # 97-145. Phone: (513) 533-8326.
- *A Brief Guide to Shiftwork Hazards*. 1998. Schur Goode Associates, Saskatoon. Phone: (306) 975-1114.
- *Working 'Round the Clock. A Survival Guide for Shift and Night Workers*. Carolyn Schur. Schur Goode Associates, Saskatoon. Phone: (306) 975-1114.

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