Unit	1005
Title	Recognize Hazards Related to General Forestry
Document type	Learning Resource

BC **Forest Safety**

In consultation with industry subject matter experts, the BC Forest Safety Council (BCFSC) facilitated the production of this material.

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Feedback is welcome and may be sent to training@bcforestsafe.org.

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Unit Introduction

By the end of this unit you will be able to demonstrate knowledge of:

- Recognize, evaluate and control hazards
- Health hazards
- General hazards
- Environmental hazards

Section 1005-1: Recognize, Evaluate, and Control Process

Circumstances constantly change in a forestry environment. When working outdoors, you will need to continuously recognize the hazard(s), evaluate the level of risk associated with that hazard, and determine what control measure to put in place. This is called the R-E-C process and it will help you stay on top of changing hazards, remove the element of surprise, and adjust appropriately to any added risk.

The REC process

The R-E-C process has three steps:

1	Recognize the hazard	
2	Evaluate the situation/hazard	
3	Control the hazard	

Recognize the hazard

To help you recognize the potential hazards of any given situation, ask the following questions:

- What might pose a risk of injury to me or other workers?
- What hazards might my work environment create?

Evaluate the situation or hazard

Use your experience and knowledge, and that of others, to make a sound decision on how to proceed, based on the hazard.

Get assistance if needed. Never feel as though you have to make the decision all on your own.

Remember there is strength in numbers. Learning from the knowledge and experience of co-workers can prevent a serious injury or fatality.

Control the hazard

The best way to control a hazard is always avoid or eliminate it. If this isn't possible, you can minimize the risk with safe work procedures, including the following:

- Take the time to do an accurate assessment of the situation

- Take the time to take extra steps or precautions
- Use site-specific procedures – these procedures will differ from company to company and worksite to worksite
- Use proper personal protective equipment
- Use proper body positions
- Use your tools in a safe way

Section 1005-2: Health Hazards

What you will learn in this section

By the end of this section you will be able to demonstrate knowledge of the following key point:

2.1 Common toxins in the workplace, their effect on the worker, and the means to control the hazard

Key Point 2.1 Common Toxins in the Workplace

Exposure to chemical and biological substances can be harmful to your health. WorkSafeBC has created a table of exposure limits for workplace toxins.

The Workers Compensation Act and the OHS Regulation provide three levels of protection for workers:

- core requirements
- general chemical and biological requirements
- pesticide-specific requirements

Core Requirements

This section lists the responsibilities of employers, workers, supervisors, owners, and suppliers which you have gained knowledge of in other parts of this training.

General Chemical and Biological Requirements

OHS Regulation section 5.48 provides established exposure limits for a worker's exposure to hazardous chemical subtances.These address all hazardous materials including pesticides and cover matters such as:

- information requirements
- storage
- occupational exposure limits
- use of control measure
- personal hygiene and washing facilities
- emergency procedures

Common Workplace Toxins

Some common workplace toxins include:

- pesticides and herbicides
- toxic plants
- asbestos
- silica
- exhaust emissions
- misting
- nitroglycerin
- oil and gas

Pesticides and herbicides

Pesticides are chemicals used to kill fungus, bacteria, insects, plant diseases, snails, slugs, or weeds. These can be very dangerous to our health and can work by ingestion or by touch and death may occur immediately or over time.

Herbicides are used to kill undesirable plants or “weeds”. Some herbicides will kill all the plants they touch while others are designed to target specific species.

Workers should avoid skin contact, inhalation or ingesting pesticides and herbicides.

The employer must:

- ensure that pesticides for use in the workplace have been registered and labeled by the manufacturer in accordance with the Pest Control Products Act (Canada)
- provide a Safety Data Sheet (SDS) or its written equivalent for all pesticides used at the workplace

Ensure that employees have reviewed and understand the company Safe Work Procedure for handling and use of pesticides and herbicides.

Toxic plants

Toxic plants include the following:

- Devil's club
- Giant hogweed
- Spurge Laurel

Devil’s Club

- Grows up to 6 metres in height and thrives in areas of moist woods and along streams.
- The stem and leaves are covered with sharp prickles that can cause damage and irritation to eyes and skin
- Wear long sleeved shirts, long pants and heavy leather gloves to protect yourself

Figure 1: Devil’s club

Giant Hogweed

- Grows up to 5 metres in height and is considered an invasive plant
- The stem hairs and leaves contain a clear, highly toxic sap that can cause burns, blisters, and scarring when it contacts the skin
- Wear heavy, water-resistant gloves and water-resistant coveralls that completely cover the skin

Figure 2: Giant hogweed

Spurge Laurel

- It is found along roadsides, in areas of moist woods, and lowland areas. It grows up to 1.5 meters in height
- Toxins are found in the bark, sap, and berries. If contacted, the sap causes skin rashes, nausea, swelling of the tongue, and coma

Figure 3: Spurge laurel

Asbestos

Asbestos is a natural material made up of tiny fibres that is used as thermal insulation. It has been linked to causes of certain cancers. The employer must ensure that a risk assessment is done before any abrasive blasting activity, high pressure washing, or related cleanup is started in areas that contain asbestos.

These activities may release a harmful level of an air contaminant from a surface or coating containing a toxic heavy metal or asbestos.

Figure 4: Asbestos

Silica

Silica is a common substance found in sand, rock, and building materials such as concrete and brick.

Cutting, grinding, or drilling these materials releases dangerous crystalline silica dust into the air.

The best way to reduce the risk of exposure to silica dust is to eliminate the source of exposure.

Figure 5: Silica

Exhaust emissions

Exhaust gas is emitted because of the combustion of fuels such as natural gas, gasoline, petrol, biodiesel blends, diesel fuel, fuel oil, or coal.

It is discharged into the atmosphere through an exhaust pipe, flue gas stack, or propelling nozzle.

The exhaust from diesel fuel can cause health effects ranging from cough and eye irritation to wheezing and difficulty breathing. Recent evidence shows it can cause cancer. Diesel exhaust has been declared a human carcinogen.

Check that fuel tanks, catalytic converters, exhaust pipes, and mufflers are dry with no build-up of foreign material. Matted grass and mud, for example, can cause a fire due to the heat of the catalytic converter.

Chainsaw operators may be exposed to increased exhaust when working in tight places and should be aware of the effects of carbon monoxide and exhaust emmissions. Carbon monoxide is a colorless, odorless and tasteless gas that is slightly less dense than air. Carbon monoxide poisoning typically occurs from breathing in carbon monoxide at excessive levels. This can happen to chainsaw operators that are working in confined, not well ventilated areas.

Symptoms of carbon monoxide poisoning are:

- headache
- weakness
- dizziness
- nausea or vomiting
- shortness of breath
- confusion
- blurred vision
- loss of consciousness

If you think you or someone you are working with may have carbon monoxide poisoning, get into fresh air and seek medical care.

Misting

Misting is an engineering control used to control road dust. It is designed to knock down airborne dust using water or a chemical.

Be aware when misting is being applied and use the appropriate personal protective equipment (PPE) to protect yourself.

Figure 6: A truck misting

Nitroglycerin

Nitroglycerin is a heavy, colorless, oily, explosive liquid. It is used as an active ingredient in the manufacture of explosives, mostly dynamite.

It can be absorbed by the skin. Use the appropriate personal protective equipment (PPE) to protect yourself.

Oil and gas

Oil and gas can cause skin irritation. It might be spilled when transferring fuel or overfilling fuel containers.

Make sure to wear gloves while refueling and only fill to recommended levels.

Oil and gas can also cause fire or explosions. Remember the following:

- Do not smoke while refueling.
- Keep oil and gas in CSA approved containers.
- Keep the containers in safe place out of the sun
- Keep the containers separate from crew during transport.
- Do not use mixed fuel to start a fire.
- Do not start the chainsaw if clothes are saturated with fuel.

Learner Activity

Select the devil's club from the following pictures.

Select the giant hogweed from the following pictures.

Now check your answers on the next page.

Answer

1. Select the devil's club from the following pictures.

   Answer:

2. Select the giant hogweed from the following pictures.

   Answer:

Section 1005-3: Operational Hazards

What you will learn in this section

By the end of this section you will be able to demonstrate knowledge of the following key point:

3.1 Potential hazards from machines

Key Point 3.1: Potential Hazards from Machines

Potential hazards related to working around equipment include:

- overloading
- damage to machine
- injury from machine maintenance
- equipment breakdown on steep slopes
- noise from machines and vehicles
- overhead hazards
- danger trees

Overloading

Overloading occurs when the demand on a piece of equipment exceeds its rated capacity. This condition usually results in a breakdown of the equipment or collapse of the system sometimes beyond the possibility of repair.

Damage to Machine

When machines and equipment are damaged they become unreliable and develop additional hazards. Those additional hazards may include:

- missing guarding
- oil and fuel leaks
- increased vibration

Damaged machines should be repaired or removed from service in a timely manner to eliminate or control the hazard.

Injury from Machine Maintenance

Undertaking maintenance and repairs on machinery can result in injuries such as lacerations, fractures and amputations. Many of these injuries are caused by hands being struck by or caught in tools, equipment and rotating machinery.

When preparing to work on a piece of equipment, make sure that the equipment is locked out or de-energized before beginning any maintenance or repairs. Control the hazardous energy which can include inertia/gravity when equipment elements are elevated, or large machine hoods are raised.

When working on a piece of equipment make sure that you are wearing the appropriate PPE for the job. Check to ensure the machine you are performing maintenance on has been properly secured and locked out. Using the correct tool or equipment for the

job will help reduce the chances of injury when working on a machine.

Equipment breakdown on steep slopes

Completing repairs while a machine is on a steep slope poses significant hazards and risks. If it is not possible to move the machine to a stable location, take the following steps:

- before exiting the cab, ensure the machine is stable. Lower the boom, blade, or attachments and release the loads to increase stability
- durvey the area for hazards such as danger trees, debris, partially cut trees, unstable logs
- engage and confirm lockout procedures before undertaking any checks or repairs
- conduct only those repairs necessary to allow moving the machine to flat ground

Always be prepared for potential break downs and have appropriate footwear and clothing in the cab so that you can safely walk out.

Noise from Machines and Vehicles

Machines and equipment are one of the most common causes of harm to a workers' hearing. If you are working around machines or equipment, make sure that you are wearing the proper approved hearing protection for the noise exposure you will be in contact with.

Overhead Hazards

Within the forestry occupation there is always a risk of overhead hazards. Examples of overhead hazards are:

- improperly felled trees, lodged or leaning trees
- dead limbs and snags
- broken branches
- overhead grapple loads
- stems falling off trailers
- machine implements and attachments that fall when there is a sudden loss of hydraulic pressure

To mitigate or control overhead hazards, ensure that:

- all workers have the appropriate PPE on at all times – hard hat and high visibility clothing
- a safe distance of at least two tree lengths is maintained from falling areas
- you do not place yourself under any object that can move due to gravity or loss of hydraulic pressure such as lodged trees, logs in loader grapples, raised equipment attachments and logs not properly loaded when binding and unbinding
- awareness of overhead electrical lines is maintained
- everyone new to the area is oriented to the site safety plan

Danger Trees

Machines cause vibrations and soil disturbance that may further destabilize danger trees. Examples of danger trees affected by heavy machinery include:

- unsecurely lodged trees or unsecure hang-ups – a tipped tree that is likely to shake free of the support trees and fall to the ground
- dislodged but hung-up limbs or tops at risk of shifting free when machinery operates nearby

CAUTION!

If you believe that you have identified a danger tree that can affect your work area and are unsure of how to proceed, stop and ask your supervisor.
Don’t assume!

Section 1005-4: Environmental Hazards

What you will learn in this section

By the end of this section you will be able to demonstrate knowledge of the following key points:

4.1 Hazards related to steep terrain and terrain stability

4.2 Adverse condition hazards in the workplace related to operations

4.3 Wildlife and insect hazards in the workplace

Key Point 4.1: Hazards Related to Steep Terrain

Figure 7: Steep slope

The topography, shapes and features of land surfaces, found in forestry activities can create hazards. Steep terrain and slope are two hazards that must be understood.

It is important to know the slope percentage you are working on, taking into consideration how far and with what force a tree or log will roll or slide. In general, steep slopes are considered to be those slopes that are more than 30% inclined.

Operating logging equipment on steep slopes decreases machine stability which can result in a roll-over. Such events can result in serious injury/fatality, significant environmental damage and lost production time due to required machine repairs.

OHS Regulation 26.16 states that a steep slope hazard assessment must be completed by a qualified person and a site-specific steep slope procedure must be developed before harvesting operations begin.

Considerations when developing a steep slope assessment include:

- slopes greater than 35% for wheeled machines
- slopes greater than 40% for tracked machines
- unstable ground which includes:
    - shallow soil depth over bedrock

    - over-saturated
    - recently burned ground
- ground roughness-boulders, rock outcrops, hummocks, and gulley’s
- unsafe slopes below operating areas
- how weather such as rain, snow or ice impacts the slope

Key Point 4.2: Hazards Related to Adverse Conditions

All forestry workers must be aware of the conditions they are working in. It is important to assess the worksite and surrounding area to identify the hazards and safe work practices relating to different weather and fire behavior conditions. Table 1 outlines the hazards of adverse conditions, the impact and the means to control the hazard.

Hazard	Impact	Means to Control
Fire	Monitor the weather	• If you notice that the work area is exceptionally dry and hot, check with the supervisor regarding the forest fire risk classification requirements before continuing work. • Additional precautions may need to be taken, for example, spark watch, working early shifts or predicted weather readings (Fire Index Rating).
After a fire	Burned ground can impact secure footing	• Test security of footholds. • Choose safe log lengths.
	Tree or log can become unstable and slide.	Assess to ensure log is stable and supported before starting the work activity.
	Rolling ground debris can be set free by work activities.	Ensure site assessment for work activity is conducted to address hazards.

Hazard	Impact	Means to Control
Wind/blowdown	Often, trees and danger trees are brought down by wind, and overhead hazards dislodge and fall unexpectedly.	The worker should check the canopy regularly for overhead hazards. If it is too windy for your comfort level, move to a protected area. Know company shutdown criteria and evacuation procedures. Supervisors must establish wind speed shutdown criteria that considers: • Seasonal wind patterns • Site exposure • Tree species
Lightning	Monitor the weather.	Know company shutdown criteria and evacuation procedures. Allow enough time to find and take cover in a safe shelter, such as hard-top vehicle, thick canopy of immature trees, harvesting machinery. Stay away from bodies of water and metal objects. Turn off radio and communication equipment. Spread out, do not stand in a group. Stay at least 10 m (33ft) away from the highest potential conductor. Do not be an isolated tall object—avoid open areas such as meadows, ridges, and mountain tops, and do not be connected to anything that may be an isolated tall object.
Earthquake	Conduct road and slope assessment after an earthquake.	
Danger trees	Identify and monitor progressively with work.	
Snow	Can cause reduced	Monitor canopy load and

Hazard	Impact	Means to Control
	visibility and muffled sound. Reduced visibility can affect the ability of air evacuation in case of an emergency. Extra care should be taken when walking in the bush as hazards may be hidden under the snow. Can cause reduced visibility of ground debris. Use extra care as large snow chunks can become dislodged.	compact escape routes. Ensure safe distances are maintained (two-tree lengths rule). Perform man-check procedures more frequently as cold weather reduces an injured worker's chances of survival.
Rain	Rain can reduce visibility and muffle sounds. It can make it hard to see overhead hazards and hear nearby workers and equipment. Heavy rain can impact access/egress from the worksite by means of swollen streams, road washouts, landslides and roads flooding. Blowdown also occurs more readily in saturated ground.	Know company shutdown criteria and evacuation procedures. Saturated soils or slippery ground can impact secure footing. Make secure footholds. Tree can become unstable and slide. Assess to ensure timber is stable and supported before continuing to work. Ensure safe distances are maintained.
Fog/smoke	Fog and smoke can reduce visibility and muffle sounds. It can make it hard to see overhead hazards and hear nearby workers and equipment. Smoke can cause breathing and vision problems. Excessive smoke can	Ensure safe distances are maintained. If fog does not allow you to see and accurately assess the surrounding work areas, stop until work conditions improve. Wear a mask and eye protection.

Hazard	Impact	Means to Control
	cause visual impairment. Helicopter evacuation might not be possible.	
Dust	Dust and debris can cause cuts and scarring to the cornea of the eye.	Wear appropriate eye protection to stop dust from getting in the eyes.
Heat	Heat can cause equipment to overheat and potentially cause an equipment fire.	Know company shutdown criteria and evacuation procedures in the event of a fire.
Cold	Extreme cold can cause an increase in the brittleness of timber and steel.	Know company shutdown criteria. Tree can become brittle. Assess to ensure timber is stable and supported before continuing to work. Take extreme care when working with steel in cold temperatures as it may crack or break suddenly and without notice.
Exposure to the Sun	Long term exposure to the sun (UV rays) can cause skin cancers (85,000 annual diagnoses and 1,500 deaths per year)	Always cover up, use sun screen, wear UV rated clothing, and polarized sun glasses

Table 1: Adverse condition hazards

Key Point 4.3: Wildlife and Insect Hazards

On-the-job wildlife sightings are one of the most enjoyable aspects of working in the woods. However, proper education and safe work practices are critical to ensure your safety.

During your site assessment always follow a systematic approach. Check the work area for wildlife and insect hazards including beetle infestations, ticks, wasps, hornets, bees, bears, cougars, moose and elk.

Safety Equipment

Your personal first aid kit should include bear spray, a bee sting kit, and an up-to-date antihistamine.

If you have allergies you must carry an epinephrine auto injector (EpiPen) and a medical signifier such as a bracelet, necklace, or card that contains information about your condition.

Bees, Hornets, and Wasps

Wasps, hornets, yellow jackets, and bees can cause similar adverse reactions in people when stung. Evaluate the worksite to determine if there are nests located on the ground or in the surrounding trees.

Allergic reactions are the most serious reaction to a sting and require immediate medical attention. Be alert to signs of bees, hornets, and wasps and practice avoidance!

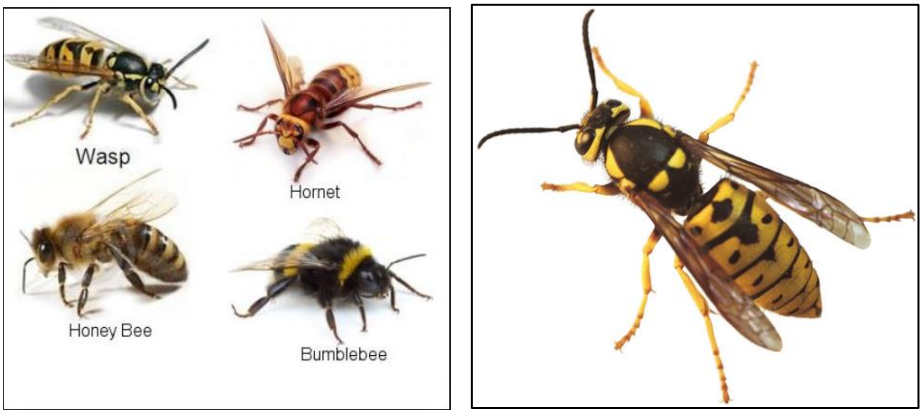

Figure 8: Bees, hornets, wasps and a yellow jacket

Ticks

Ticks live in long grass and in wooded or overgrown areas. Their season runs April to October and peaks from June to August.

Some ticks in southern BC are known to be infected with Lyme's disease. Risk areas include Vancouver Island, the Gulf Islands, the Lower Mainland, and Southern Interior. Workers should be aware that the tick area extends as far north as the Peace region of BC.

Prevention measures against ticks include:

- wear long-sleeved shirts and long pants in light colours. Tucking your pants into your socks also keeps ticks from crawling underneath them
- use an insect repellent containing DEET or Icaridin on all exposed skin
- perform a tick check after every day spent in tick habitat

Figure 9: Tick

Bears

Bears are everywhere. We see them:

- on the side of the highway
- on logging roads
- on the way to a bush camp
- near towns
- in the bush when working

Bears will usually shy away from human contact, but remember, just because you don't see a bear does not mean they aren't around.

Respect all bears - they all can be dangerous. When you see a bear remember:

- never approach a bear, especially one with cubs
- never attempt to feed a bear
- be defensive - never surprise a bear
- carry the appropriate equipment such as bear spray
- work in groups
- keep camps clean and garbage free so bears are not attracted to your location
- call for help on the radio and let someone know your location

The BC Forest Safety Council has developed a Bear Safety Resource Package that provides information on bears and encounters with bears.

Figure 10: A grizzly and a black bear

Cougars

Cougars are typically shy and reclusive animals. Occasionally they will investigate a worker in the bush. Always carry bear spray with you. Cougars may be on the ground or in trees.

If you encounter a cougar:

- do not run
- face the cougar
- stand up tall
- maintain eye contact with the cougar
- yell at the cougar

Figure 11: Cougar

Wolves

As one of British Columbia's top carnivores, wolves play an important role in structuring predator–prey systems. They are also a threat to livestock and in very rare cases to human safety.

If you encounter a wolf:

- raise your arms and wave them in the air to make yourself appear large, use a loud firm voice and try to convince the animal you are a threat, not prey
- back away slowly and do not turn your back
- maintain eye contact
- make noise and throw sticks and rocks
- use your bear spray if they approach close enough

- call for help on the radio and let someone know your location

Figure 12: Pack of wolves

Moose and Elk

Moose and elk inhabit a large part of the province and are one of the largest animals in the bush. In the spring, the cow moose are very protective of their calves. In the fall the bull moose and elk are very aggressive during the mating season. They will migrate down to their winter habitat which can put them near highways.

If you encounter a moose/elk remember:

- if it is a cow moose with a calf, maintain eye contact and back away as quickly as possible
- if it's a bull moose or elk during the mating season, maintain eye contact and back away as quickly as possible. If he charges, take cover behind a tree or any other available object

Other safety practices include:

- being aware of increased traffic on the roads and in the woods during hunting season
- placing "No Hunting" signs around your worksites to let hunters know there are workers in the area
- maintaining awareness of the potential for wildlife on roads during the winter season, and especially during dawn and dusk conditions. Slow down and stay alert

Figure 13: A moose and elk

Self-Quiz

1. Whose website can a reference guide to limits of exposure to toxins in the workplace be found? (1005.1.1)
   - ☐ WorkSafeBC
   - ☐ Work BC
   - ☐ BC Ministry of Environment
   - ☐ BC Ministry of Public Safety
2. What is critical to consider when working around equipment? (1005.2.1)
   - ☐ Size of equipment
   - ☐ Type of wood harvested
   - ☐ Safe and hazard zones
   - ☐ Experience of operator
3. What does NOT have to be done by regulation before working on steep slopes? (1005.3.1)
   - ☐ Set up winch assist
   - ☐ Have an ETV nearby
   - ☐ Complete a First Aid assessment
   - ☐ Complete a hazard assessment
4. What must be done in fire season? (1005.3.2)
   - ☐ Increase number of partner check ins
   - ☐ Maintain spark watch or work early shifts
   - ☐ Limit use of heavy equipment
   - ☐ Stop work when temperature exceeds 25 degrees Celsius

Now check your answers on the next page.

Self-Quiz Answers

1. Whose website can a reference guide to limits of exposure to toxins in the workplace be found? (1005.1.1)

   Answer: **WorkSafeBC**

2. What is critical to consider when working around equipment? (1005.2.1)

   Answer: **Safe and hazard zones**

3. What does NOT have to be done by regulation before working on steep slopes? (1005.3.1)

   Answer: **Set up winch assist**

4. What must be done in fire season? (1005.3.2)

   Answer: **Maintain spark watch or work early shifts**