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14.0 All-Terrain Vehicles (ATVs and Quads)

Introduction

Definition: All-Terrain Vehicles (ATVs) are a class of multi-wheeled vehicles; the most common types are 3- and 4-wheel machines. 4-wheel ATVs may be referred to as “quads”. Some, like the Argo, come with 6 or 8 wheels and are amphibious.

Handling an ATV is very different from other vehicles, including 2-wheel motor bikes. Operating an ATV is “rider active” where the rider must use his or her body movements to help control the machine. The all-terrain design creates a higher centre of gravity and makes these machines more susceptible to overturning, particularly on corners or at high speeds. ATVs should not be operated without adequate instruction from a certified or experienced instructor. As ATVs are designed for off-road use and are permitted on public roads in only a few regions, riders should be familiar with local ATV regulations. The use of ATVs is increasing as they allow access to areas that might otherwise be too remote or too costly to reach. They provide a convenient means of carrying equipment, supplies and samples, and may even replace pack animals in some places. However, they are not the safest off-road vehicle and they should only be used when necessary. When off-road conditions are suitable for their use, it is advisable to use four-wheel drive vehicles and side by side utility vehicles, which are generally safer than ATVs.

ATVs have considerable impact on the environment due to their large knobby tires and ability to negotiate rough terrain. Fragile ecosystems are easily impacted when new trails are created or ATVs get bogged down or stuck, whether they are in desert regions, wetlands, alpine areas or forests. Thin soils are easily broken by driving over the surfaces so that ruts and gouges rapidly expand in size. Refer to the Prospectors & Developers Association of Canada (PDAC) Environmental Stewardship Toolkit on the e3 Plus website at www.pdac.ca/e3plus and search the appropriate type of terrain (arid, wetland, alpine) for information regarding how to mitigate the environmental impact of exploration activities.

14.1 Risks and Hazards

Serious injury or death may result when an ATV is not operated according to the manufacturer’s instructions. Specific risks and hazards include but are not limited to:

- Serious injuries to the body (especially the head and back) caused by collisions, overturning, or lifting an ATV
- Crashes, flips, or collisions may be caused by:
 - Riding too fast for trail conditions, turning corners too fast
 - Lack of training and lack of skill to handle difficult terrain or obstacles
 - Overloading racks or trailers
 - Towing trailers too fast for ground conditions
 - Encountering other vehicles at blind corners or on narrow trails
 - Wildlife encounters
 - Encountering trees fallen across the trail

- Stranding caused by mechanical breakdown, running out of gas or oil
- Getting lost caused by lack of appropriate navigation equipment, lack of training
- Capsizing during a stream crossing caused by riding too fast or deep water
- Hypothermia caused by riding in cold or wet conditions with inadequate clothing
- Burns caused by hot engine parts
- Driver distraction can quickly turn into an incident. Stay Focused!

14.2 Responsibilities (Due Diligence) Regarding ATVs

As presented in section 1.2 Due Diligence, companies should be able to demonstrate due diligence with regard to employees' use of ATVs. Requirements to demonstrate this aspect of due diligence include but are not limited to the following measures.

Exploration Companies

- Develop written safe operating procedures (SOPs), site specific SOPs (as needed) and emergency response plans (ERPs) for the use of ATVs
- Make sure supervisors are trained so they are competent; provide training and education for employees regarding SOPs, ERPs and work site hazards etc.
- Carry out inspections and maintenance of ATVs
- Monitor the use of ATVs and implement consequences when SOPs are not followed.
- Documentation: Keep records of all training, accidents, incidents and corrective actions, mitigation of hazards, inspections, maintenance and infractions that apply to ATVs.
- Provide required personal protective equipment (PPE).
- Carry adequate insurance.

Project Supervisors

- Implement company SOPs and those in the ATV manufacturer's operator manuals.
- Place warning decals on ATVs and associated equipment in the local language, if possible.
- Advise, instruct and monitor employees and contractors regarding company SOPs, health and safety regulations, and the potential hazards of using ATVs.

Operators

- Follow company SOPs and training regarding company ATVs.
- Be familiar with and follow directions on the warning decals on ATVs and associated equipment.
- Use PPE and safety equipment as directed.
- Report hazards, dangers and defective equipment to a supervisor.
- Be familiar with project ERP procedures regarding ATVs.

14.3 Safe Operating Guidelines for ATVs

The following guidelines for safe ATV operation specifically apply to 4-wheel machines, although the same principles apply to all ATVs and to 2-wheel motor bikes. These guidelines may be used in conjunction with a manufacturer's operator manual to develop site specific safe operating procedures (SOPs).

1. Use 4-wheel ATVs with 4-wheel drive, as these are suitable for field work. Never use 3-wheel ATVs as they are less stable than 4-wheel ATVs. 3-wheel ATVs may be illegal in some jurisdictions.
2. Avoid the use of motorized 2-wheel bikes for field work. Choose a 4-wheel ATV rather than a 2-wheel motor bike. If a 2-wheel motor bike is used, the rider should be very experienced using the bike off-road in the specific terrain.
3. Comply with the ATV manufacturer's safe operating procedures in the manufacturer's operator manual. Most manufacturers supply comprehensive operation and maintenance procedures. Some manufacturers also supply safety videos for their machines.
4. Obey the laws of the country, province, territory, state or municipality that apply to ATVs.
 - ATVs are designed for off-road use only; in many regions it is illegal to operate them on paved roads, as their handling and control is adversely affected. Do not ride ATVs on public roads or on railroad tracks and right of ways where prohibited. Some jurisdictions list the highways where ATVs are allowed to operate on the shoulder portion.
 - Each ATV should carry valid registration and insurance documents, as required.
 - Operators may be required to carry a valid driver's license even if the ATV is not operated on a road. Companies may choose to specify that riders carry a valid driver's license. It may be advisable to obtain an international driver's license in some countries. Know the laws and regulations of the jurisdiction where you work.
 - Develop SOPs that address riding ATVs on slopes >5° if the manufacturer has not provided them in the operator's manual. Depending on the jurisdiction, Workers' Compensation Boards may require a company to develop SOPs for such terrain.
5. Riders should wear appropriate personal protective gear: Wear a Canadian Standards Association (CSA), Department of Transport (DOT) or Snell approved helmet equipped with a visor or goggles or safety glasses – especially if vegetation might hit your face. Wear additional protective gear that includes leather boots, gloves, long pants and a long-sleeved shirt or jacket. Some PPE items may be mandatory in some jurisdictions.
6. Carry and use required and recommended safety equipment for ATVs.
 - Carry a first aid kit, a survival kit, a tire repair kit, a tool kit with appropriate spare parts, a copy of the operator manual and appropriate communication equipment for the area (radio, satellite phone, mobile/cell phone). Depending on the location, it may be necessary to carry extra water and food, an axe, towing rope and signal flares.
 - At sites with heavy equipment where increased visibility is required, attach a bright coloured antenna flag mounted on a whip rod between 1.2 m to 2.4 m long and clamped onto the back of the ATV. Riders should wear high visibility reflective vests. Note: Do not use a whip in forested areas where it might catch on branches and whip back and hit the driver.

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7. Develop an emergency response plan (ERP). Include procedures that address breakdowns, an overdue ATV, an injured rider and other potential incidents.
8. Each project should establish a communication schedule with routine check-in times. Employees should adhere to the check-in schedule and inform the person in charge of changes in plans.
9. Inform the person in charge of the planned route and estimated time of return. Record the information on a map. The person in charge of the tracking system should be familiar with the ERP and know what to do if you do not return as expected.
10. New riders should receive training to operate and maintain ATVs. They should receive a copy of the ATV manufacturer's operator manual. New riders should read and understand the manual and be able to make minor repairs, as ATVs break down frequently. Keep a copy with the machine.
11. Use ATV racks to carry all equipment, including backpacks. When a rider wears a backpack, it significantly changes the centre of gravity of the machine. Avoid overloading the racks.
12. Always maintain a safe speed and keep the ATV under control. Obey any regulatory signs. Ride at the appropriate speed for your experience, your range of visibility, the terrain, weather and light conditions, and potential oncoming traffic. All of these factors play a role in determining the safe operating speed limit. Ride to reduce risk and avoid accidents.
13. Stay on established trails. Consider the impact of ATVs on the environment. It may be illegal to use ATVs in environmentally sensitive areas. Know the laws.
14. Travel using the "buddy system" whenever possible, especially on long traverses, but do not team two inexperienced operators together. Travel with separate ATVs for safety. If it is necessary to work alone, follow the guidelines in section 2.1.1. Working Alone vs. the "Buddy System". It is advisable to carry a satellite phone, which is the most dependable means of communications, especially in a remote area.
15. Obtain permission to cross private land. Leave gates as they are found.
16. Carry a passenger only if the ATV is designed for two people. The operator should use extra caution as the passenger's weight will affect the stability of the machine. A passenger should wear all required PPE and be instructed where to correctly position their feet on the footrests. Most ATVs are designed for a single rider only.
17. ATVs should not be used for chasing or harassing wildlife. Provincial and territorial legislation prohibits these actions.
18. Do not ride an ATV if you have consumed alcohol or if you have taken medication or drugs that might affect your ability to ride.
19. Companies should consider establishing guidelines regarding the use of company owned or leased ATVs for recreational purposes.
20. ATVs are generally not recommended for use in winter on snow. If they are used, the rider should have all relevant training and be aware of hazards associated with ice (refer to Chapter 15. Snowmobiles).
21. Be aware of the hazards along your regular path (fences, wires). Mark them with flagging tape if they are not be obvious.
22. It is not advisable to ride ATVs at night. If it is unavoidable, ride with the headlights turned on and wear reflective clothing. See and be seen. Ride slowly.

23. ATV riders should not wear headsets and listen to Ipods or other audio entertainment devices.

14.4 Equipment Lists for ATVs

Each ATV operator should wear personal protective equipment (PPE) and protective clothing. The equipment that should be carried depends on (1) the travelling distance to the work site, (2) the terrain, and (3) the time of year. Unless the trip is very short (i.e., less than 3 km), ATVs should carry repair tools, spare parts and emergency equipment because an ATV can travel farther in one hour than the operator may be able to walk in a day. Use the extensive equipment lists to help determine appropriate equipment for field or work site circumstances.

Personal Equipment

The following items are recommended or may be required in some jurisdictions for operators and passengers:

- Helmet (CSA approved, see section 14.7 Safety Precautions)
- Eye protection (visor and/or goggles)
- Boots
- Long sleeved jacket or shirt
- Long pants
- Gloves

Equipment List for ATVs

The items in bold should be considered essential.

- Communication equipment** (radio, mobile/cell phone, satellite phone, as appropriate)
- Compass and maps, Global Positioning System unit (GPS)** and extra batteries
- Operator manual**
- Spare ignition key**
- Tools, including manufacturer's tool kit**
- Tire inflation pump and repair kit**
- Spare parts** (e.g., spark plugs, headlight bulbs)
- Electrical tape, mechanical wire, duct tape**
- First aid kit**
- Water**
- Winch** (depending on location)
- Waterproof matches
- Knife
- Axe or saw
- Small shovel
- Survival kit
- Flashlight and extra batteries
- Written copy of the site ERP
- Log book

- Work gloves
- Fire extinguisher (as required)
- Bear spray, as required

Extra Equipment to Consider for Long Traverses

(Refer to Chapter 8. Survival for additional recommendations)

- Extra clothing
- Extra fuel and oil
- Block and tackle
- Extra batteries (as required)
- Large metal cup
- Food
- Large space blanket (1 per person)
- Signal mirror
- Tow strap
- 15 metres rope
- Emergency candle, sterno cans
- Lighter, additional fire making equipment
- Flares
- Batteries (as required)

14.5 Inspection, Maintenance and Fuelling Guidelines

Only use ATVs in good repair. Report all defects to a supervisor and have them repaired before a trip. Never operate an ATV with a fuel leak. Be prepared for breakdowns as these happen frequently in rough country. Record all inspections in the vehicle log book. While a daily inspection should be done, when ATVs are only used for very short trips it may be reasonable to perform thorough inspections less frequently.

Pre-ride Inspection

Inspect the vehicle before you set out each day. Use a two part inspection process – before and after – starting the engine.

Before starting the engine, inspect the following:

- **Equipment:** Make sure the appropriate required and recommended equipment is present and functioning (e.g., tire repair kit, radio, operator manual, first aid kit, survival kit, log book).
- **Tires:** Incorrect tire pressure can significantly affect ATV handling. Check the air pressure and the condition of the tires. Make sure they are free of cuts and gouges etc.
To inflate tires: Always follow the directions in the operator manual. The air pressure and tire circumference should be equal on both sides of the machine for safe handling. ATV tires are designed for low pressure so use a manual tire pump and a low pressure gauge rather than a high pressure system to control inflation. Tires go flat if not seated correctly. See photo below.

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- **Wheels:** Make sure the wheel lug nuts are tight, the axle nuts are tight, and the cotter pins are secure. Rock each wheel to check for worn wheel bearings and loose lug nuts. There should be no free play.
- **Oil and fuel:** Check the oil level, fuel level and filters according to the recommended procedures in the manual. Check for leaks. Check that the air filter is not damaged or blocked. Check the fuel filter as recommended. Start each trip with a full fuel tank. Know the range to expect from the fuel tank for the conditions where the ATV will operate and carry extra fuel and oil, as required.
- **Brake fluid:** Check the fluid level in the reservoir in ATVs that use brake fluid.
- **Radiator (if equipped):** Check the coolant level. Maintain the correct ratio of water and coolant.
- **Chain or drive shaft and chassis:** Check that the chain is properly adjusted, adequately lubricated, and is not worn. Chains stretch with age and use and it is imperative to keep them tight. Check for oil leaks if your machine has a drive shaft. Check for and remove any build-up of debris around the drive shaft, chain housing, cables, steering linkages and wheels. Look and feel for loose parts when the engine is off. Test the handlebars and footrests for looseness or excessive play. Check the major fasteners with a wrench at regular intervals. Some new ATVs have drive belts similar to those on snowmobiles. Check the shock absorbers.
- **Foot shifter:** Make certain that the foot shifter is correctly attached and in the right position. If there is a pull start rope, make sure it is not cut or frayed.

After starting the engine, inspect the following:

- **Controls:** Check that the throttle operates smoothly with the handlebars in all positions.
- **Lights:** Make certain all lights are clean, undamaged and working.
- **Brakes:** Check that all hand, foot, and parking brakes operate properly. Make sure they do not grab or pull the ATV to one side when applied.
- **Switches:** Make certain all switches work properly. Make sure the engine stop switch turns the engine off smoothly.



Figure 14.1: Check the tire pressure before setting out each day. Carry a low pressure tire gauge and a tire pump.
© Courtney Mitchell

Maintenance Guidelines

Periodic maintenance is essential due to the rough terrain where ATVs are used. Also, it is advisable to do an inspection following each trip to check for damage and attend to repairs at that time. Correct small problems before they become serious.

- Follow the maintenance schedule and procedures outlined in the manufacturer's operator manual.
- Maintain records of servicing, repairs and modifications to ATVs in the vehicle log book and elsewhere, as required.
- Shut off the ATV while repairs are carried out.
- Follow the instructions carefully when cleaning the air and fuel filters.
- Lubricate cables, chain and pivot points frequently with the correct lubricant according to the manufacturer's specifications. It may be advisable to use a graphite lubricant, as oil based lubricants allow grit to adhere and restrict the cable movement. Contain all lubricants during maintenance procedures.
- Brakes may need frequent cleaning and adjustment if the ATV is exposed to a lot of dust or mud.
- Service the ATV as required and at the end of the field season before storage.

Fuelling Procedures

- Fuel at a designated fuel site whenever possible. Fuel an ATV on the ground – not in the back of a pickup with a vinyl bed liner (see the last bullet below).
- Fuel only in an open well-ventilated area with the engine stopped.
- Do not fuel a machine near another machine with its engine running.

- Do not smoke. Do not allow open flames or sparks in a fuelling area.
- Use the correct fuel.
- Check the fuel level with a dipstick or flashlight – never use a lighted match, as fuel fumes are explosive.
- Do not overfill the tank. Close the tank cap securely when fuelling is completed.
- Clean up any fuel spills completely using spill kit materials as required. Dispose of contaminated materials in appropriately marked containers.
- Portable containers for fuel must be CSA approved. When filling portable containers, always place them on the ground outside a pickup bed, an enclosed vehicle or a trailer so the containers are properly grounded. The vinyl bed liners in pickups prevent proper grounding. Fuel flowing into a container or fuel tank can create static electricity and it is possible to generate a spark and cause fuel vapors to explode if the container (or ATV) is not grounded. Only fill the containers to 95% capacity, as fuel expands as it warms. Mark containers with a line to indicate “full”. If possible, store fuel containers in a cool location out of direct sunlight.

14.6 Training for ATV Operators

Training helps reduce risks that result in accidents. As a minimum, companies should make certain that employees who ride ATVs have the necessary training and skills to safely operate them. Experienced operators should complete a refresher training course every five years. Employees who are trained but have not ridden an ATV within two years should receive refresher training before operating an ATV again. Companies should keep records of training received by employees, which is a requirement of Workers’ Compensation Boards.

Training should take into consideration the need for site specific topics that address the local terrain, weather and specific hazards where employees work, as well as loading procedures, mechanical trouble-shooting and basic repairs. Training should cover the fundamental risks and hazards inherent to the ATV – large tires, high centre of gravity, fixed rear axle, rider exposure – and how to prevent accidents through the use of PPE, safe riding skills and safe operating procedures (SOPs). Most manufacturers provide operator manuals that include safe riding methods. Material in this chapter can be adapted as topics for safety meetings. All riders should be familiar with the operator manual of the machine they use.

Training programs are available from Canada Safety Council (CSC) certified instructors and training is best done by CSC certified ATV instructors. Information is available at the following website: <http://safety-council.org/training/atv-rider-course/>

Training should provide riders with the following:

1. A thorough understanding of ATV features and capabilities:
 - Include hands-on practice performing manoeuvring skills
 - Inspection routines, troubleshooting and minor repairs
 - If more than one type of ATV is on site, operators should be aware of the variation in controls, braking systems, transmissions, and the handling and performance of each type.
2. The ability to assess risks:

- Recognize that ATVs are dangerous vehicles, especially when combined with youthful machismo, speed and inexperience
 - Recognize their personal skill level and the degree of physical strength required to handle an ATV
 - Recognize how various terrain and weather conditions will affect their ability to ride the ATV safely
3. An understanding of how ATV safety procedures integrate with company, project or field camp SOPs and ERPs, communications procedures, survival procedures and other safety procedures.

New Riders

- New riders should learn to operate an ATV in a restricted area.
- Supervisors or trained employees should assess the competency of all new riders before granting permission to travel alone to work sites.
- New riders should be assigned to travel with experienced riders.

14.7 Safety Precautions

General Prevention and Preparation

- Be alert to weather conditions and possible changes when planning a traverse. A firm trail in the morning may become an impassable trail later in the day.
- Follow the project tracking and communication procedures. Leave your itinerary and estimated time of return on a map with someone in charge who knows how to respond if you do not return. Carry communication equipment to notify the project or camp of changes in plans. Carry a written copy of the project ERP.
- Be especially alert to dangerous situations at the end of the workday when you are tired.
- Avoid travelling alone. Use the “buddy system” with separate ATVs whenever possible.
- Ride within your ability.

Personal Protective Equipment (PPE)

PPE is often subject to occupational health and safety (OHS) governmental or institutional “Standards”, which vary between countries. When not subject to Canadian Standards, a company should apply a good Standard to the equipment they supply to their employees as a measure to promote health and safety.

- Helmets: Wear the correct helmet and fasten the chinstrap securely. Full face helmets offer the best protection. Helmets should be in good condition – no dents or cracks – and the inner foam padding should be in good shape. The following website has extensive information about ATV helmets:
<http://4wheeldrive.about.com/cs/beginningatv/a/atvriderhelmets.htm>
 - Use ATV helmets that comply with federal standards. Helmets should have a certification sticker from at least one of the following:
 - Snell Memorial Foundation M2005 Standard (highest testing standard)
 - US DOT sticker Standard FMVSS 218

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- Meet or exceed Standard D230 of the Canadian Standards Association (CSA)
- British Safety Institution Standard BS5361
- Australian Standard AS/NZS 1698:2006
- Helmet replacement: Replace any helmet that has been worn in an accident and damaged. Consider replacing helmets after five years, as their safety features deteriorate over time and they do not offer the same protection as when new. Helmets are stamped with the month and date of production. Replace a helmet immediately if it is damaged or shows signs of wear.
- Table 1 on the following website summarizes Canadian provincial and territorial ATV legislation regarding age restrictions and helmet requirements:
<http://www.cps.ca/english/statements/IP/IP04-01.htm#TABLE%201>
- Goggles or a visor should be worn to protect your eyes from whipping branches, insects and dust etc. Goggles should be free of scratches, shatterproof, and well ventilated so they do not fog up. Accidents can happen when something hits a rider in the face or eyes.
- Boots: Your feet are at risk because of the vehicle design. Wear leather boots and place your feet on the footrests close to the machine and keep them there at all times. Point feet inwards so they do not catch on rocks, stumps or branches.
- Clothing: Wear long pants and a long-sleeved shirt or jacket to protect your skin in an accident and from whipping branches. Do not wear loose clothing such as long scarves, which may get caught in moving parts of the ATV or on vegetation.
- Gloves: Wear comfortable gloves to protect your hands from trail hazards and for warmth.

Speed

- Ride at a safe speed appropriate for the current operating conditions, the type of machine, your ability and trail visibility. Be able to stop within the distance you can see.
- A “safe speed” may differ day to day and even during the day depending on ground, weather and visibility conditions.
- Excessive speed is dangerous and contributes to most accidents, as a rider cannot respond quickly enough to unexpected situations.
- Rapid acceleration may cause the front wheels to lift off the ground and the ATV to flip backwards (with you underneath).
- Go slowly to maintain control when going downhill.
- Slow down when travelling in rough terrain, confined areas with limited visibility, or where you might expect to encounter traffic or wildlife.
- Operate ATVs at a very slow speed within camp.

Terrain

- Learn to identify terrain that is unsafe for operating ATVs. Some hills are too steep. Some ground is too soft – or too wet – or too rough. Remember, ATVs have limitations. Know them and consider walking when ground conditions become too demanding. Use good judgement and avoid risky situations.

- Look ahead to watch for hazards and changing terrain conditions. Note the quality of the ground surface; observe upcoming obstacles as you approach them. These include ruts, holes, protruding rock surfaces, overhanging tree branches, wildlife, oncoming traffic, streams, swampy or muddy ground, and fallen trees.
- When approaching unknown terrain, reduce your speed so you can completely stop the ATV in less than the distance you can see. If terrain is very rough or steep, scout the route on foot in advance.
- Get to know the terrain you frequently travel and keep to planned routes. Don't take spontaneous short cuts.

14.8 Basic Safe Riding Skills

14.8.1 Correct Riding Posture

- Ride with your head and eyes up and look well ahead at the path you will take.
- Keep both hands on the handlebars at all times.
- Keep your knees in near the gas tank.
- Keep your feet on the footrest and point your toes inwards.

14.8.2 ATV Controls

Refer to the specific ATV operator manual for information and guidance specific to the ATV model.

- Know the location and operation of all controls. These include hand brakes, foot brake, parking brake, ignition switch, engine stop switch, starter (pull, kick, or electric), throttle, choke, shifter, clutch (if present), reverse gear (if present), lights on/off switch, fuel supply valve etc. Be able to locate and use the controls without searching for them. Your actions should be automatic.
- Know how to start the ATV correctly. Follow procedures outlined in the operator manual. Manual and fully automatic transmissions require different starting procedures.
- Know how to start a flooded engine. Know emergency starting procedures.
- If the ATV is equipped with a winch, follow instructions in the operator manual and use the correct accessory equipment. Wear PPE and make sure no one sits on an ATV or stands in the path of a potentially whipping winch cable during the winching process.

Shifting Gears

- Learn to shift correctly. Shifting procedures differ between various machines and whether the ATV has a manual or fully automatic transmission. Refer to the operator manual.
- Learn how to prevent a stall if the ATV has a manual clutch. This includes learning to recognize the sound of the ATV engine in order to shift gears efficiently and smoothly.
- Release the throttle before shifting gears so the ATV remains stable and the front wheels do not lift off the ground.

- If the ATV has a reverse gear, carefully follow the procedures outlined in the operator manual. The improper use of reverse may result in serious injury and/or damage to the ATV.

Braking

- Follow braking instructions in the operator manual. Know how the braking system works and use the correct braking techniques to prevent mishaps.
- Release the throttle before applying the brakes.
- Apply the hand brakes and foot brakes equally, if equipped.
- Shift to a lower gear, which allows the engine to slow the ATV.
- Brake while travelling in a straight line. Brake *before* entering a turn. Never brake while swerving to avoid an object. The ATV may overturn more easily if you brake while cornering or swerving, or apply too much braking force.
- Brake gently if the ground is slippery.
- If you unintentionally lock the wheels when braking, briefly release the brakes and reapply them more gradually.
- Never use your feet to slow the vehicle or brace against a rollover. Always keep your feet on the foot rests.

Parking

- Park completely off a trail and in a safe place when you stop.
- Park on flat ground. Avoid parking on soft or sloping ground, as the ATV may overturn.
- Set the parking brake or place the shifter in “park” if the ATV has a fully automatic transmission.
- If there is no parking brake, shift into a low gear when the motor is turned off to keep the machine from rolling.
- Chock the wheels if it is necessary to park on sloping ground.

14.8.3 Loads

Any load on an ATV – rider, passenger, backpacks, samples or equipment on racks – raises the centre of gravity. This makes the ATV less stable, more difficult to handle and easier to roll over.

- Do not overload ATV racks. Loads should not exceed the manufacturer’s weight limits. Distribute the load between the front and rear racks according to the guidelines in the operator manual. Poorly distributed loads make the ATV very difficult to control.
- Thoroughly secure all loads to the racks. Loads should not extend beyond the ATV where they might catch on rocks or vegetation. Do not place sharp objects on the front rack.
- Do not place loads so they obscure the rider’s ability to see the trail and safely ride.
- Place all backpacks on racks. Riders (and passengers) should *not* wear a backpack so they can dismount quickly in an emergency.

14.8.4 Towing Trailers

Passengers should not ride on an ATV that is towing a trailer even if the machine is designed for two people, as the stability is affected by the loaded trailer. Passengers should never ride in a trailer being towed by an ATV.

- When towing a trailer, follow the manufacturer's Gross Vehicular Weight Rating (GVWR). Check the operator manual regarding the maximum allowable tongue weight and the maximum allowable load limit.
- Make sure the ATV hitch is compatible with the trailer hitch. Use a trailer with a low centre of gravity and a wide wheel base.
- The ATV and the trailer must be level; it may be necessary to install a special extension to achieve this.
- Use tow chains for added security.
- Place loads slightly forward of the centre and equal distances from the sides of the trailer.
- Load and secure the cargo to prevent movement while underway; any movement would be hazardous to riders. Loads that shift can cause injuries.
- Use caution when disconnecting a trailer as the load may shift.
- When towing a trailer (or carrying heavy loads such as core boxes):
 - Slow down. The heavier the load, the slower the speed should be. It is harder to control the ATV with body movements when towing loads.
 - Use an ATV with 4-wheel drive capability, if possible.
 - Towing greatly increases the risk of roll over. Avoid sharp turns, hills and rough terrain. Carry less than the maximum load if it is necessary to haul on slopes or uneven ground.
 - Allow more distance to brake and stop. Do not skid or slide.
 - Block the wheels when parked.
- Pull loads using only the hitch or a tow bar. Do not drag loads using chains or ropes attached to rear racks because the ATV may flip backwards on a slope or with any sudden acceleration. Chains or ropes may become entangled with rear wheels or brake cables.
- If an ATV must tow another ATV, use a rigid straight bar whenever possible. If necessary, a tow rope or strap may be used. Secure the ATV being towed at the lowest point on the frame but avoid the steering components. If possible, a rider should ride on the disabled ATV to control the steering and brakes, but this must be done with utmost caution. Tow the disabled ATV as close as possible to the lead ATV to prevent the ATV under tow from hitting the lead ATV with any force if a sudden stop is necessary.

14.8.5 Transporting ATVs

Use appropriate means to transport ATVs, such as flatbed trailers or pickup trucks. Use caution when loading and unloading them and use a winch whenever possible.

- Depending on the terrain, it may be possible to back a pickup truck or trailer into the side of a bank if the height is right. An ATV can then be ridden carefully onto the truck bed or trailer.

ALL TERRAIN VEHICLES

- It is safer to load and unload ATVs using a trailer rather than a pickup truck, as the ramp angle is lower.
- Loading ramps must be secure. Ramps should have cleats or brackets so they can be securely attached to the truck or trailer and then secured with straps. Use proper ramps that have side boards to assist the tires staying on the ramp. Ramps should provide good traction (e.g., metal ramps with perforations, plywood ramps with cross-wise lath). It is very easy for an ATV to slide off when ramps are wet or muddy. Using wooden planks as ramps to load ATVs is not acceptable as they cannot be securely fastened and it is very easy to flip an ATV during loading, which may result in a serious crush injury or even death.
- Inspect the trailer: wheels, tires, floor, welds, anchor hooks, electrical hook-ups etc.
- Make sure additional cargo is secured on the truck or trailer and will not shift en route and damage the ATV.
- Loading
 - Choose a flat unobstructed site to load the ATV onto the truck or trailer.
 - Keep the ATV under control at all times to prevent it from rolling and hitting the back window or slipping off the ramps.
 - Remove all cargo from ATVs before loading them onto a truck or trailer.
 - Check that the wheels are centred over the ramps and use low gear or 4-wheel drive.
 - Winch the ATV onto the carrier. If this is not possible, ride the ATV slowly and carefully up the ramp and onto the truck or trailer.
 - Check that the ATV is centred on the trailer or bed of the truck.
 - Check that the ATV is in gear, the parking brake set, and the fuel line is shut off.
 - Secure the front and back of the ATV to the vehicle with approved straps, harnesses, blocks and/or chains that are in good condition to prevent the ATV from shifting while en route or being ejected during an accident.
- Unloading
 - Winch an ATV down the ramps. Never ride it backwards down the ramps off a trailer or pickup truck.
 - If this is not possible, keep your hands on the controls and roll it out to the ramps. Walk on the ground while controlling the brake as you move the ATV down the ramps.



Figure 14.2: The correct way to unload an ATV from the bed of a pickup truck. © Bill Hinde. Used with permission of the Farm and Ranch Safety and Health Association.

14.9 Safe Riding Strategies

Follow the riding instructions in the manufacturer’s ATV operator manual for negotiating turns, slopes and obstacles. Safe operation of ATVs requires the rider to be “rider active” and shift their body when turning, going uphill and downhill and riding over obstacles etc. Correct body actions should become automatic.

14.9.1 General Strategies

- Ride within your ability. Choose another route if there is any doubt whether you can safely cross specific terrain or an obstacle.
- Keep your eyes up and continuously scan for approaching hazards. Modify your speed, your riding techniques and your path of travel to accommodate hazards.
- Always be able to stop within the distance you can see. This is very important when climbing hills or riding in unfamiliar terrain.
- Don’t tailgate. If the route is dusty, leave extra space to maintain good visibility in order to assess approaching trail conditions and traffic. Remember that ATV models built before 2004 do not have brake lights.
- Never put your feet down to try to stabilize an ATV. You may injure your foot or leg.

- Always dismount on the uphill side if the ATV is about to tip over.
- Do not stand on the foot pedals while travelling on flat terrain.
- When travelling in confined areas, watch out for branches that might hit your head or body. Watch out for situations where you might wedge your hands or handlebars against a tree or rock. Do not use a whip and antenna flag in confined areas.
- Avoid rider fatigue. Wear suitable clothing for the weather, eat enough food to keep up your endurance and drink plenty of water to avoid dehydration. Take rest breaks. Know your limits and do not exceed them.
- Yield the right-of-way when you encounter uphill traffic.
- If you encounter mud, do not spin the tires as you will dig in the ATV and get covered in mud. Each day, clean out any mud build-up from the engine and chain etc.
- Stay on existing paths and trails. Do not take shortcuts. Preserve the environment; ATVs are capable of doing severe damage to the land.
- It is not advisable to use an ATV on snow. It is usually better practice to use a snowmobile – they have a lower environmental impact and are designed to operate under cold conditions. When circumstances allow for ATV use in winter conditions, riders should follow the applicable training and basic safe operating guidelines for snowmobiles and working on ice (refer to Chapter 15. Snowmobiles).
 - Use ATVs only where they will not adversely impact the environment. In snow, they are noted for digging up the path when wheels are spun to regain traction. This is likely to happen when riding on soft snow; therefore ATVs are best ridden on firm snow.
 - Follow the SOPs and measure the ice thickness before crossing any frozen lakes or streams to make sure it will support your weight plus all your equipment. Continue to measure the ice thickness on a regular basis, as the thickness can change rapidly and unpredictably.
 - Be trained to recognize and treat hypothermia and other cold injuries.
- To cross a road or railroad tracks, come to a full stop in a place with clear visibility. Never assume that you are seen by drivers on a road; they are looking for other vehicles, not for ATVs. Check carefully in both directions. Cross at 90°. It is not advisable to ride along railroad tracks or railway right of ways – it is often illegal to do so.
- If you encounter horseback riders or pack horses on a trail, yield the right of way to them and shut off the engine so the horses are not frightened by the noise.
- If you are an experienced rider but unfamiliar with a particular ATV, make a test run to become familiar with its controls and handling features.

14.9.2 Tips for Crossing Obstacles

Refer to the operator manual for specific manoeuvring instructions. Avoid crossing obstacles (and ruts) unless it is safe to do so. Some are too large to attempt. Be especially careful to shift your body to maintain stability if only two wheels on one side of the ATV cross the obstacle. General tips include:

- Cross obstacles and ruts as close to 90° as possible.
- Adjust the speed to maintain momentum.

- Stand on the footrests. Hold the handgrips firmly while keeping your knees and elbows flexed.
- Move your body weight slightly to the rear as the front wheels rise up over the obstacle.
- As the rear wheels contact the obstacle, move your body weight forward and centre yourself on the ATV.

14.9.3 Tips for Turning

Follow the specific turning techniques recommended in the operator manual. Some models have a solid rear axle and some have unlocked differentials. Know your machine and the techniques required for safe turning.

- Slow down *before* entering a turn.
- Turn the handlebars and look in the direction of the turn.
- Move your body weight forward and lean to the inside of the turn.
- If the ATV begins to roll during a turn, lean your body farther into the turn. Gradually reduce speed and widen the turn if possible.
- Avoid sharp turns when carrying loads or pulling a trailer – go slowly.
- Do not brake while swerving to avoid an obstacle.

14.9.4 Tips for Climbing Hills

Refer to the operator manual for specific instructions. Some ATVs can climb a steeper hill than they can safely descend! Analyze the slope carefully. Generally, when approaching a hill you should keep your weight uphill.

- Keep both feet firmly on footrests.
- Shift the ATV into a low gear and increase speed before ascending a hill.
- For small hills, shift your body weight forward by sliding forward on the seat; for steep hills, stand on the footrests and lean well over the front wheels in order to shift as much weight forward as possible. Always keep as much of your weight UPHILL as possible.
- If the hill is steep and you need to downshift on the slope to prevent stalling, release the throttle and shift quickly and smoothly while always keeping your body weight as far forward as possible. Do not allow the front wheels to lift, which might cause the ATV to flip backwards.
- If you lack power to continue uphill yet have enough forward momentum and enough space to turn around safely, do a U turn before you lose speed and then proceed downhill.
- If you are riding uphill and you lose *all* forward momentum, apply the parking brake before you roll backwards and dismount to the uphill side (or to one side if pointing straight uphill). You need to know the capabilities of the ATV you are riding and follow procedures in the operator manual. (Not all ATVs can do the same manoeuvres to get out of this situation.)
- Never attempt to ride downhill backwards. If you apply the rear brake the ATV could flip over backwards on top of you.

- Do not attempt to climb steep hills while carrying a passenger. They should walk up.
- Consider: If the hill is steep, transfer some cargo to the front racks to add weight to the uphill side of the ATV.
- Practice on small hills and gentle slopes before attempting higher, steeper hills.



Figure 14.3: Keep your weight uphill when ascending a slope. © Kim Bilquist

14.9.5 Tips for Descending Hills

Refer to the operator manual for specific instructions. Some ATVs can climb a steeper hill than they can safely descend! Generally, when descending a hill you should:

- Analyze the slope and check the terrain carefully. Choose the best route that goes as directly as possible downhill yet avoids obstacles.
- Avoid riding downhill at an oblique angle.
- Keep both feet firmly on the footrests. Never use your feet to slow down the ATV.
- Shift your body weight to the rear by sliding back on the seat. **KEEP YOUR WEIGHT UPHILL.**
- Use low gear – do not use neutral. Descend with the throttle closed and let the engine slow the ATV down. Apply the brakes gradually to reduce speed, as necessary.
- Consider: If the hill is steep, transfer some cargo to the rear racks to add weight to the uphill side of the ATV.
- Practice on small, gentle slopes before attempting to ride down long or steep slopes.



Figure 14.4 Keep your weight uphill when descending a slope. © Kim Bilquist

14.9.6 Tips for Traversing Slopes

Refer to the operator manual for specific instructions. Avoid traversing slopes whenever other safe routes are available; the ATV is less stable and therefore more like to roll over than when going straight up or down a slope. When you traverse a slope, it is very important to: keep your weight uphill

- Avoid traversing slopes with slippery, excessively rough or loose terrain.
- Keep both feet firmly on the footrests.
- Lean toward the uphill side of the ATV. You may put weight on the downhill footrest to increase traction, but it is most important to lean your upper body into the hill.
- Travel on the inside of a trail that traverses a hill as the outer edge of the trail may be loose or unstable.
- Steer slightly uphill to keep the vehicle moving in a straight line, if necessary.
- Avoid obstacles, ruts and holes as much as possible. They may increase the tilt of the ATV in the downhill direction, and thus increase the likelihood of a rollover.
- If the ATV begins to tip, turn the front wheels downhill if the terrain permits this; if the terrain does not permit turning downhill, dismount on the uphill side immediately.



Figure 14.5 Keep your weight uphill when traversing a slope and when turning downhill. © Kim Bilquist

14.9.7 ATV Retrieval Tips

ATVs are heavy machines and are labour intensive to extract. To avoid injuring your back, learn safe retrieval methods and use care when recovering an overturned or bogged-down ATV.

- ATVs may be very difficult to extract from mud or muck. Dig the mud away from the wheels to break the suction before trying to move the machine.
- Install a winch or carry a hand-operated ratchet winch or “come-along” if you work in swampy areas or in terrain where it is difficult to retrieve an ATV. A come-along is very useful for pulling an ATV out of mud or a ditch. As a come-along winch only has about 3 metres of cable, an additional tow strap or recovery strap may be required. Follow the directions in the winch manual, which should always be kept in the ATV tool box. For general information on winch safety, refer to section 13.6.6 Winches.
- Whenever possible, extract an ATV using a winch cable or tow strap. Secure the strap or cable at the lowest point possible on the ATV, which may be difficult if the vehicle is mired deeply in muck. Do not hook two winch cables together, as one of the towing hooks may fail and then whip backwards and cause serious injury.

14.9.8 Riding in Various Terrains

Refer to the Environmental Stewardship Toolkit on the e3 Plus website at www.pdac.ca/e3plus and search for various terrains for information about how to reduce the impact of ATVs on the environment.

- Follow existing paths and trails whenever possible and avoid making new ones.

- Remember that all surface runoff including flash floods increases erosion caused by ATV damage to the terrain – no matter what the climatic conditions.
- Don't spin tires to get out of mud – you will only dig in deeper.

The following are important types of terrain that are adversely affected by ATV use.

Arid Terrain: In desert regions, fragile ecosystems are easily damaged. Limit the use of ATVs to avoid widespread damage to desert pavement and dune systems. Repeated passes will break up the surface, which allows severe erosion by both wind and water to develop. Even desert varnish on bedrock is destroyed by ATVs crossing over it. Do not create multiple trails.

Alpine terrain: In mountainous regions, alpine areas are above tree line and often have steep slopes. They are easily scarred by ATV use. Avoid cutting across switchbacks on trails, which will widen a trail and encourage erosion. Avoid crossing meadows and steep hillsides. Do not drive across vegetation, which in some areas may be the only source of food for domestic and/or wild grazing animals.

Tropical terrain: Poor tropical soils such as laterites are easily eroded by ATV use. This is especially true during the wet season. It is important to minimize ATV use at this time of year.

Wet terrain: Whenever possible, avoid crossing swamps, marshes and streams, and ride back from lake shores when possible.

Forest regions: Avoid severe damage to surface terrain and decrease erosion to the vegetation and soil by placing crosswise "corduroy" logs on paths that are used continuously.



Figure 14.6: Ride safely and responsibly. A breakdown or running out of fuel may strand you in a remote area.
© Matt Turner

14.9.9 Riding in Water

Keep stream crossings to a minimum, as ATVs can cause severe environmental degradation to them. Consider constructing a bridge if a stream must be crossed more than a few times or more frequently than about twice a month. Refer to the Environmental Stewardship Toolkit on the e3 Plus website at www.pdac.ca/e3plus and search for *bridges and crossings, types of crossings, creek crossings, open bottom structures and closed bottom structures*. These references will help

determine the most suitable structure for the type of stream to be crossed. If traffic is restricted to ATVs, a bridge may be relatively simple, although it needs to be safe and secure.

- Obtain permission to cross a stream from the landowner or government agency, if required. Some jurisdictions require a permit from governmental fisheries authorities, otherwise stream crossings by ATVs or vehicles are illegal.
- When crossing a stream, choose a place to ford where both banks have a gradual slope. Do not ford where it will damage the banks, the stream bed or the location of fish spawning grounds.
- Check the stream depth, stream bed conditions and the current before entering the water. Walk through the stream to do this, if necessary.
- Most ATVs can safely operate in a river or creek up to 30 cm (1 ft) deep. Water should not come up higher than the footrests. Use caution, as ATVs overturn easily in deep water. Avoid riding in fast flowing water, as the large tires may float causing you to lose control of the machine.
- Proceed at a slow steady speed to avoid submerged obstacles and slippery rocks. If you enter water at high speed the ATV may slow down so suddenly that you are thrown off. Keep both feet firmly on the footrests and be prepared to shift your weight to prevent overturning.
- Test the brakes several times after crossing a stream. To dry the brakes, apply light pressure until they feel normal again.
- Wash the ATV using fresh water to prevent corrosion after it is ridden through salt water.

14.9.10 Riding in Sand (Deserts or Beaches)

From an environmental standpoint, it is best to avoid riding in sand dunes, especially where the dunes provide a barrier next to arable land or a coastline. Vegetation on dunes is easily destroyed by various means including the use of vehicles.

- Know the dune system. Different types of dunes present different dangers due to their configurations.
- Do not ride on vegetation, as it helps stabilize dunes. Ride only on barren sand dunes. Blowouts may develop when vegetation is damaged, which allows sand to migrate from where it was trapped. This may initiate the migration of an entire dune system.
- When riding in dunes, ATVs should be equipped with a bright-coloured antenna flag mounted on whip rods at least 1.2 m to 2.4 m long and clamped onto the back of the ATV. A light at the tip is essential if it is necessary to ride at night.
- Carry a GPS unit when finding your location may be a problem, as dune sands shift continuously.
- Adapt your riding strategy to the immediate conditions and do not rely on your memory of conditions from previous rides.
- Be prepared to make a U turn whenever you approach a crest in case there is a steep drop off on the other side.
- Beware of the visual distortions created by heat haze. Hazards may exist where there appear to be none.
- Wet, deep or fine sand may cause a loss of traction and cause the ATV to slide, tip or get bogged down.

- In some areas, assume wet sand is unstable and could be quicksand. Do not cross unless you know it is a safe area.

14.10 Utility Vehicles

Utility vehicles, such as Mules, Bobcat, Rhinos, Argos, may replace ATVs in some locations. They are generally safer than ATVs as they are driven like a truck rather than ridden like an ATV or snowmobile. They are useful for carrying more people and/or cargo between locations, but they have limitations. For example, many models cannot cover the same rough terrain or steep slopes as ATVs. Some are amphibious. Safe operating procedures that apply to ATVs should be applied to the operation of utility vehicles. Some special features should be noted:

- Utility vehicles are not designed to be driven on public streets, roads or highways. If the authorities having jurisdiction (AHJs) where the company operates permits them to be licensed and driven on public roads, the company should develop SOPs that specifically address this use of utility vehicles.
- Read the manufacturer's operator manual and be familiar with all danger and warning decals on the vehicle before driving it. Follow the SOPs in the manufacturer's operator manual.
- Some utility vehicles may require certified training, depending on company SOPs and/or jurisdictional legislation.
- Be familiar with the transmission features of the utility vehicle.
 - Some utility vehicles have gear shifts and can be manually downshifted to slow the vehicle as it is driven downhill.
 - Some utility vehicles are designed with a direction handle to go forward or reverse and the operator *must* control the vehicle speed when going downhill by pressing *both* the brake and the accelerator pedals. With this type of transmission, the direction handle can be changed from forward to reverse only when the vehicle is stopped and the engine is idling.
- Utility vehicles may be fitted with rollover protection (ROP) and seat belts. Drivers and passengers should wear seat belts when underway unless driving on ice.
- Wear a PFD if using an amphibious vehicle for transportation over water. Use caution when driving them in water, as they may (1) ride very low in water, (2) be challenging to manoeuvre, and (3) be easily swamped in choppy water.
- Perform daily routine inspections like those for ATVs.
- Follow the manufacturer's directions for the operation of the vehicle's accessories, such as the winch. If the vehicle is equipped with special mud tires, make sure they are installed according to the manufacturer's directions.
- Use caution when encountering obstacles in the route. Try to remove them or go around instead of driving over them.



Figure 14.7: Utility vehicles are usually safer to use than ATVs. © Courtney Mitchell

14.11 Resources

The Prospectors & Developers Association of Canada (PDAC) thanks the following for granting permission to include material from their publications.

- ATV Safety Institute
- Bombardier Recreational Products Inc.
- Canadian Off-Highway Vehicle Distributors Council
- Farm and Ranch Safety and Health Association
- Stephen Gall's ATV Safety Institute

Their permission does not imply that they endorse the PDAC Health and Safety Guidelines. The PDAC is solely responsible for the content of the Health and Safety Guidelines.

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