



Contractor Electrical Safety Guide



*Working together for a
safer New Brunswick.*



Énergie NB Power

Stop. Think. Live.
Attention. Pensez. Vivez.





Electricity has revolutionized our civilization. Think of what modern life would be like without electric lights, television sets, computers or appliances. Electricity is the key to our advanced society and it enables us to live in comfort.

When treated with respect, electricity gives us many benefits, but each year New Brunswickers are injured or killed in electrical mishaps. For this reason, NB Power and WorkSafeNB are joining forces to give you the information you need to work safely around electricity.

We believe even one accident is too many. Please take the time to review the following information. If you have any further questions, contact NB Power or WorkSafeNB.

Sincerely,

Duff Boyd
Director of Health and Safety
NB Power

Richard Blais
Director, Chief Compliance Office
WorkSafeNB

Working together for a safer New Brunswick.
Nous travaillons tous à faire du Nouveau-Brunswick une province plus sûre.

www.nbpower.com | www.worksafenb.ca
www.energienb.com | www.travailsecuritairenb.ca

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For more information contact
1 800 663-6272
www.nbpower.com

WHAT IS ELECTRICITY?

Electricity is a type of energy. It occurs in nature as lightning, so in a way, the electricity we use is man-made lightning.

Electricity flows along wires without causing any harm unless it is somehow interrupted, so keep a minimum safe clearance between yourself, or any conducting object, and the power line at all times.

Electrical utility line/equipment voltage	Safe distance
0 to 750 volts	(.9 m) 3 feet
751 to 100,000 volts	(3.6 m) 12 feet
100,001 to 250,000 volts	(5.2 m) 17 feet
250,001 to 345,000 volts	(6.1 m) 20 feet

Electricity has a unique characteristic that is important to remember: it seeks the fastest and shortest route to the ground if it is interrupted. If you are the object that interrupts the flow, the electricity will be conducted through you to the ground, causing injury or death.

HIGH VOLTAGE UTILITY OVERHEAD WIRING IS NOT INSULATED – VIOLATE THE MINIMUM SAFE CLEARANCES AND YOU CAN BE INJURED OR KILLED.

Most wires and extension cords found in the home have a protective outer covering, so we can touch them and not come in direct contact with live wires.

Outside overhead wires are not insulated with a protective outer covering; they are bare. Most electrical accidents are caused by people making contact with overhead wires. If you touch them with a kite, ladder, crane, irrigation pipe or TV antenna, the current will be directed to the ground through the object and you, causing injury or death.

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0 to 750 volts	(.9 m) 3 feet
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When moving large machinery, post a guard to see that your equipment does not come closer than the minimum safe clearances. If there isn't enough clearance, take another route or call the utility to raise the wires. We have specialized equipment to do the job. Never attempt to raise wires yourself.

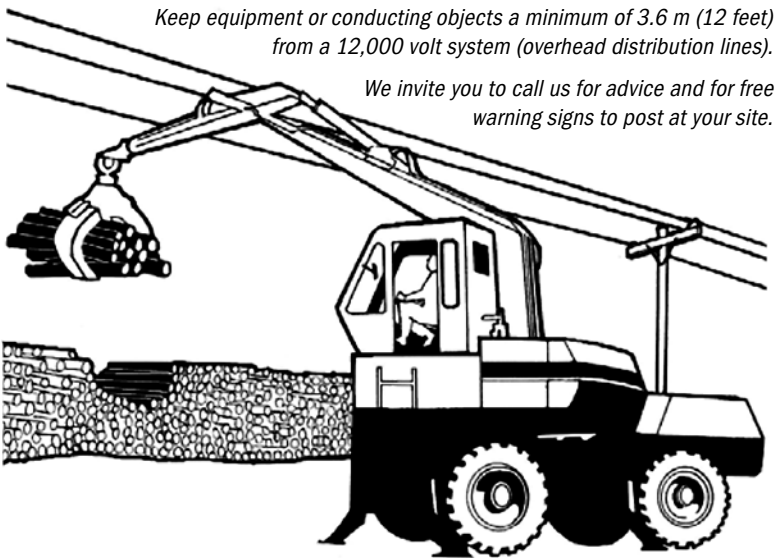
Keep equipment or conducting objects a minimum of 3.6 m (12 feet) from a 12,000 volt system (overhead distribution lines).

We invite you to call us for advice and for free warning signs to post at your site.

When logs are piled for future pickup and/or delivery, they should be piled away from overhead power lines.

Piling logs underneath overhead power lines could cause hoisting equipment or even logs to contact the energized wires, which could cause a serious injury or fatality.

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When logging operations are carried out around power lines, adequate clearances must be maintained at all times in compliance with provincial regulations. Reference to clearances stipulated in provincial regulations can be found under minimum safe clearances.*

* Subsection 289(1) Regulation 91-191 under the Occupational Health and Safety Act of New Brunswick.

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Before you cut, **LOOK UP FOR LINES**. It could save your life. If a tree falls onto a line, please contact NB Power at **1 800 663-6272**

NB Power cares for the safety of its customers. Please help us help you to make sure you are working in a safe environment by contacting NB Power for a free presentation on electrical safety in your workplace.

Did you know?

NB Power offers the following free services:

- Locating and marking underground wiring
- De-energizing and insulating overhead lines
- Raising overhead lines
- Providing warning signs for hazard zones
- Safety seminars

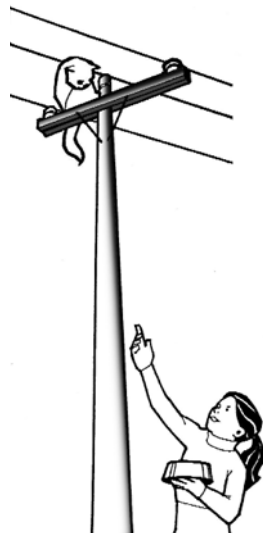
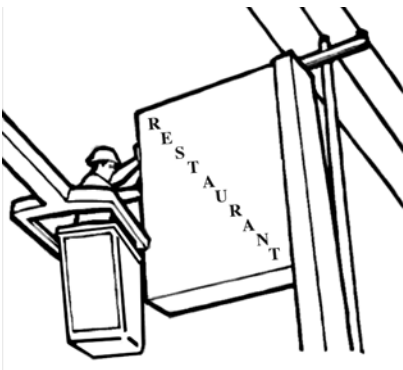
Water is a conductor of electricity and because all trees contain a certain amount of water, electricity easily passes through them. Therefore, great care must be taken when pruning or removing trees. Make sure the branch or tree being cut doesn't come within the minimum safe clearance.

When erecting a sign, place it away from overhead power lines in accordance with provincial regulations.

Sometimes a pet cat will go up a power pole. Resist the urge to climb up after it, otherwise you'll put yourself and your pet in great danger. No one should climb a power pole except a trained line worker. Usually, the cat will come down on its own if you make sure there are no dogs present. Call to it nicely and offer it food.

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Keep conducting objects a minimum of 3.6 m (12 feet) from a 12,000 volt system (overhead distribution lines).



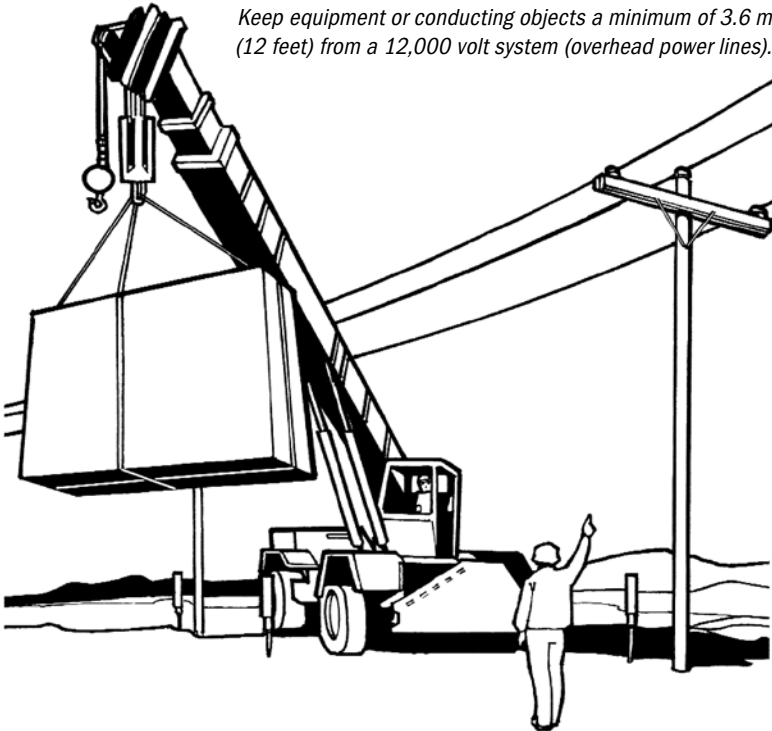
Before starting construction work, NB Power cautions workers to look over each work site and to check for power lines.

After the job is finished, great care should be taken in dismantling scaffolds and lowering cranes. Often this is the most dangerous part of the job since workers on the site may have become oblivious to the surrounding wires.

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We invite you to call us for advice and for free warning signs to post at your site.

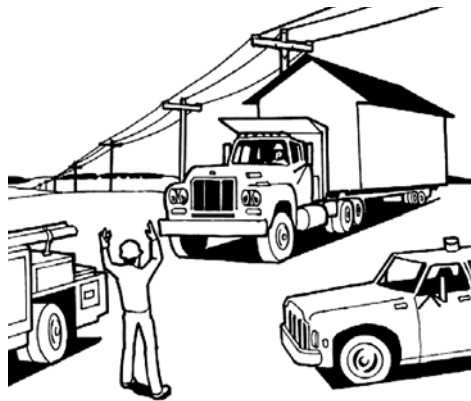
Keep equipment or conducting objects a minimum of 3.6 m (12 feet) from a 12,000 volt system (overhead power lines).



If a crane or truck does make contact with overhead power lines, remain in the equipment, warn others to stay away and ask someone to call the utility at once (1 800 663-6272). Try to lower or swing the crane boom away from the wires. Reverse the truck to free it, if possible. The best course, if you can't free it, is to stay in the equipment until someone from the utility comes and tells you it is safe to leave. If you must leave before then, due to the vehicle being on fire, jump free so your body doesn't touch the equipment and the ground at the same time. Keep your feet together as you jump. Take short, shuffle steps keeping both feet as close together as possible. Move in this manner from the vehicle for at least 10 metres (33 feet).

Moving loads over 4.15 metres high (13 ft. 6 in.) requires a government permit and perhaps an NB Power escort to assist in the move. Always call NB Power before moving any oversized piece of equipment.

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UNDERGROUND WIRING CAN BE AS DANGEROUS AS OVERHEAD WIRING – CALL THE UTILITY BEFORE YOU DIG.

Today, underground wiring is becoming much more common in residential areas and is found on some farms, too. If you plan to dig, check with your telephone, natural gas and electric utility to find out the approximate location of buried lines. Underground power wires are insulated and protected, but if damaged, are as dangerous as uninsulated overhead power lines.



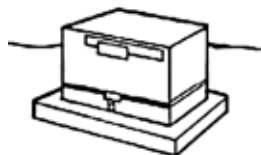
When operating excavation equipment or posthole diggers, be sure to know where the underground utilities are. When planting trees, installing fence posts or digging trenches, don't forget the underground utilities.

KEEP OUT OF FENCED SUBSTATIONS AND GENERATING STATIONS. DON'T CLIMB POWER POLES OR TOWERS. WATCH FOR DAMAGED OR OPEN POWER TRANSFORMER ENCLOSURES ON RESIDENTIAL STREETS.

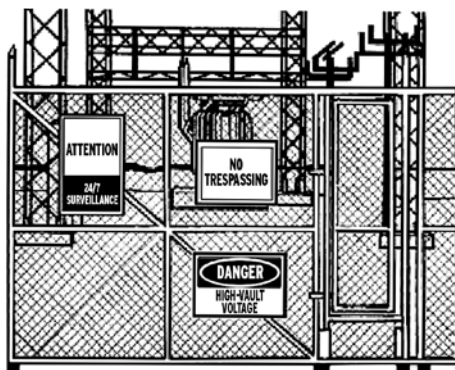
Equipment in substations and powerhouse enclosures transmit tremendous amounts of voltage.

Always respect areas marked with HIGH VOLTAGE warning signs. Only qualified personnel from the utility should venture into these areas, or climb power line poles or towers.

Transformer enclosures are frequently seen on residential streets. If you see an open or damaged transformer enclosure, report it immediately to NB Power (1 800 663-6272) and keep others away. It could be dangerous.



Never try to open an enclosure or poke wires, sticks or other objects into it. Significant amounts of electricity pass through these street installations – don't let that electricity pass through you.



IF YOU SEE VANDALS AT WORK, CONTACT THE POLICE RIGHT AWAY.

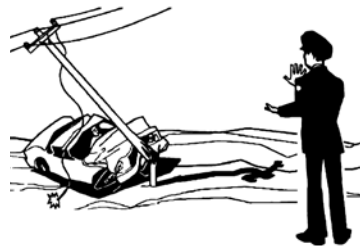
When vandals damage NB Power property, they put their friends and neighbours at risk. Service to hospitals, fire alarms and the community can be disrupted, endangering the lives of innocent people. Vandals also put themselves in danger of falling lines, close contact with electrical equipment, and criminal prosecution.



STAY AWAY FROM FALLEN OVERHEAD WIRES.

Auto accidents can cause broken poles and fallen wires, which must be considered live and dangerous. If you are involved in such an accident stay in your vehicle, try to reverse away from the wire, warn others to stay clear and ask someone to call the utility at once (1 800 663-6272). If you must leave your vehicle, as in the case of fire, jump free, making sure you don't touch your car and the ground at the same time. Keep your feet together as you jump. Take short, shuffle steps keeping both feet as close together as possible. Move in this manner from the vehicle for at least 10 metres (33 feet). Once free, call the utility immediately.

Storms can also damage poles or wires. Keep away from a fallen wire, whatever the cause of damage. Even if a wire doesn't spark, it could be live. Inform the utility at once.



Fallen wires must always be considered live and dangerous.

TALK TO NB POWER WHEN YOU NEED ELECTRICAL ADVICE OR ASSISTANCE.

Whenever you dig, plan to move buildings or need to know about clearance regulations on the job site, talk to NB Power. If you see a disconnected or fallen wire, an open power transformer enclosure, or a kite caught in overhead wires – please call us immediately.

Call NB Power if you would like electrical advice or assistance.

1 800 663-6272

What happens when someone comes in contact with an electrical current?

Electricity causes uncontrolled muscle spasms or convulsions. Even low voltage electricity can cause such sustained muscular contractions that victims are unable to free themselves. The signals from the brain can't compete with the electrical charge to allow them to loosen their grip. A convulsion may be powerful enough to throw someone from the wire, but if not, a rescuer must intervene to turn off the current to separate the victim from the circuit.

MINIMUM SAFE CLEARANCES WHEN WORKING NEAR OVERHEAD POWER LINES

Subsection 289(1) *Regulation 91-191* under the *Occupational Health and Safety Act* of New Brunswick.

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For more information contact
1 800 222-9775
www.worksafenb.ca

PART OF OUR DAILY ROUTINE

The majority of us use electricity every day on the job. This kind of familiarity can create a false sense of security. It's important to remember that electricity is always a potential source of danger.

The basic rule is simple: consider all electrical wires and equipment to be live until they are tested and proven otherwise.

When we consider electrical hazards on the job, we should watch:

- **Tools**
- **Cords**
- **Panels**

Tools

- Only use properly grounded or double-insulated tools.
- Make sure the casings of double-insulated tools are not cracked or broken.
- Always use a ground fault circuit interrupter (GFCI) when using portable electric tools outdoors or in damp or wet locations. GFCIs detect current that may be leaking to the ground from a tool or cord, and shut off power before injury or damage can happen.
- Any shock or tingle, no matter how slight, means that the tool or equipment should be taken out of service until checked and repaired.
- Never bypass broken switches on tools or equipment by plugging and unplugging the cord. Shutting off power will take too long in an emergency.
- Before drilling, nailing, cutting, or sawing into walls, ceilings, and floors, check for electrical wires or equipment.

Cords

- Make sure tool cords, extension cords, and plugs are in good condition.
- Never cut off, bend back, or cheat the ground pin on three-prong plugs.
- Make sure extension cords are the right gauge for the job to prevent overheating, voltage drops, and tool burnout.
- Check extension cords and outlets with a circuit-tester before use.
- Use cords fitted with dead front plugs. These present less risk of shock and short circuit than open front plugs.
- Don't use cords that are defective or that have been improperly repaired.
- Don't wire cords into outlets. Disconnecting takes too long in an emergency.
- Protect cords from traffic – from vehicles or pedestrians. For example, a cart that is pushed over a cord repeatedly can weaken the cord, making it dangerous. Also, pedestrians can trip over cords, leaving them halfway unplugged, which is also hazardous.

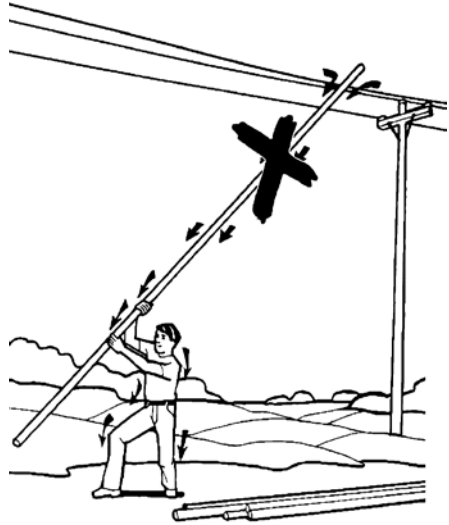
Panels

- Temporary panel boards must be securely mounted, protected from weather and water, easily accessible to workers, and kept clear of obstructions.
- Use only fuses or breakers of the recommended amperage. For example, if the electrical system is rated for 30 amps, don't use a fuse or breaker that's higher than 30 amps.
- Follow established procedures when locking out panels.



WHAT YOU NEED TO KNOW

Electricity tries to flow to a ground through all possible pathways. As much current will flow through a pathway as its conductivity will allow. Electricity flows readily through conductors and hardly at all through insulators. Copper is a good conductor that lets virtually all current flow, while rubber is an insulator that resists almost all flows. Most things are somewhere in between and will allow some current to flow.



SKIN RESISTANCE

- If you touch a live wire, one of the key factors to determine whether you get a tingle or a strong shock is how good or how bad a conductor your skin happens to be at the moment of contact. Very dry skin is estimated to have a resistance of 100,000 ohms, or enough to cut the amount of current from a 110-volt line to about one milliamp (tingle territory). Wet or sweaty skin, on the other hand, has only about 1,000 ohms of resistance, which would let about 110 milliamps of current flow from the same 110-volt line. This would be sufficient to paralyze your muscles so you can't let go and possibly stop your heart from beating.
- The current's effect on your body will depend on several factors: your body's resistance to the current, the conditions affecting the contact (such as the wetness and the amount of body contact), the current pathway in your body and the duration of the contact.

SPARKS CAN FLY!

- Electricity can jump across gaps – the higher the voltage, the larger the gap it can cross.
- Some of the worst electric shock accidents happen when a person places some part of their body in the gap between a source of electrical current and a ground. While the current may not have been strong enough to jump the gap before, it can do so if you happen to be touching either the source or the ground and thereby shorten the distance. This is why just coming close to high-tension wires is all it takes to be injured.

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HOW PEOPLE GET HURT

- If current flows through a person's heart, which only takes about a tenth of an amp of current, it can shock the heart into fibrillation. This is fatal within a few minutes if no one defibrillates the heart.
- If electrical current jumps or arcs, the flash can blind people nearby. This occasionally happens when people open electrical boxes to turn off the power while there is a load on the line.
- If the arc is strong or close enough, it can superheat the surrounding air and set clothes and hair on fire. The sudden increase in pressure of the superheated air can cause an explosion. This is commonly known as an arc flash/arc blast.
- If a great deal of current flows through the body, it can cause sudden and violent heating that may actually vaporize fluids and cause tissues to explode.

For additional copies of this booklet contact:

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