



High powered



By Helena Bryan

A supreme sense of caution is the key to reducing the disturbing frequency of electrical injuries on jobsites.

Electricity. It's both a fine friend and one hell of an enemy. A welcome presence at home, work, and play: it lights our way, keeps us warm, and powers our toys and tools. It can also burn internal organs, cause jolts severe enough to knock us on our knees, and stop short a heart's beat.

Unseen and unheard, it can maim and kill in surprisingly small doses and it doesn't discriminate. No jobsite is without it and no worker is immune to its potential impact. Yet for most employees – apart from those who work directly with electricity – the source of such enormous power is out of sight and out of mind. Until it's too late.

Every worksite is vulnerable to high-voltage hazards

No warning came for the 96 construction workers in B.C. injured by electricity, some of them fatally, from 2004 to 2008. Nor for the 53 accommodation and food services sector employees who died or were injured due to electrical contact during the same period. Nor the 35 who worked in landscaping, lawn maintenance, and auto body and security services. A total of 377 electrical contact incidents were recorded in those five years, an average of 75 a year, or one incident every five days, involving diverse sectors (see [Who's at risk?](#)) at an estimated price tag of \$10 million – and unimaginable costs to families, friends, and co-workers.

It only takes a small jolt

A big part of the problem, maintains WorkSafeBC engineer Seth Nair, is that electrical safety tends to be viewed as something for electricians and technical experts to worry about. “For most workers,” he says, “electrical dangers are simply not on the radar. To a roofer or painter, a fall is an obvious hazard; a frayed extension cord or overhead power lines are not.”

Yet that frayed cord or momentary contact with an overhead power line can kill somebody if the released current travels from one hand to the other through the heart, or it can burn vital organs like the kidneys or liver as it passes through them. “It doesn’t take a lot of voltage for the current to go through human skin,” Nair points out.

WorkSafeBC occupational safety officer Doug Fielding says most people fail to appreciate the potential hazards of electrical currents of 750 volts and under. He already has first-hand knowledge of the damage a high-voltage current can do. It was on his watch as project safety manager on the Canada Line construction that beloved security dog, Bosco, was killed when he stepped on a severed 24,000-volt streetlight electrical cable.

“At the same time, when people think of the hazards of electricity, they tend to think of the high-voltage kind – the kind associated with power lines,” he says. “These lines do pose a significant danger. But it’s critical to remember that 120 volts, the same as in any household dryer, can kill you too.”

West Vancouver firefighter Geoff Graham doesn’t have to be convinced. He clearly remembers hearing the terrible thud when 120 volts of electricity knocked his 118-kilo colleague to the floor during an apartment fire. “The in-ceiling heat grid fell down and made contact with his helmet,” Graham recalls.

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“When another firefighter and I grabbed him to drag him out, we could feel the tingling up our arms.” Graham wasn’t injured, but his colleague suffered burns to his internal organs and memory loss and had to take three months off work.

As well as damaging tender tissue, the current can cause “hooking on,” a term used to describe the involuntary muscle spasms that prevent letting go of the source of the current. “If you can’t let go and you sustain the shock long enough, eventually you’ll die,” Fielding says. “If you break the hook, you could fall and injure yourself. It’s not a position you ever want to be in.”

Start with an inventory of possible hazards

The first steps in keeping workers out of such positions are to recognize there’s a problem in the first place, to review Part 19 of the Occupational Health and Safety Regulation, and to develop an electrical safety program based on an analysis of worksite hazards (see [Need help getting started?](#)). Fielding describes how such a program might look. Substitution and engineering are the first lines of defence against electrical incidents, he says. “If you can provide a battery-operated tool instead of a plug-in, do so. You then need to decide on possible engineering controls: insulated, safety-rated tools, drills that have been designed so that the current doesn’t short or the cord doesn’t fray, or electrical cord connections made specifically for rainy or muddy conditions.”

Written procedures keep employees on track

Next up, Fielding says, is the development of written electrical safety procedures that “consider it live,” such as lockout and lockout inspection processes, as well as requirements that all bare wires be capped and taped, that a “qualified person” always does electrical repairs, and that cords and equipment be

inspected every day before work begins.

The program should also identify whether any personal protective equipment – properly fitted, dielectric safety shoes and insulating gloves, non-melting, flame-resistant clothing, and upper body, eye, face, and hard hat protection – is required and when. Arc flash protection should also be provided on any live equipment.

Ongoing training and monitoring vital

“Regular training and testing is a crucial part of electrical safety, particularly around lockout systems,” Fielding says. He points out that the construction sector – with the highest rate of electrical incidents – continues to focus on providing much-needed orientation and training programs. Fielding knows from his decades of experience in the pulp and paper and heavy construction industries that orientation and training, electrical safety discussions at safety meetings, pre-job hazard assessments, and adherence to written controls go a

long way to reducing electrical incidents.

After employees are trained to perform tasks according to the electrical safety program, they require routine monitoring to ensure any factors contributing to near misses can be corrected quickly. Firefighter Graham says his colleague’s near miss 14 years ago led to pre-planning and more rigorous protocols to address the shutting down of power before firefighting begins. Says Fielding: “Teach employees ‘Don’t act on impulse, report all electrical concerns, network with others in your industry, and bring in an expert to discuss problems and concerns.’”

Re-engineered equipment? New procedures and gear? Electrical code rules requiring labeling, arc flash, and arc blast protection? Training? It all sounds complicated and potentially costly. But to Fielding, who’s seen the damage electricity can wreak, the thinking is simple. “When it comes to electrical safety,” he says, “being just average is what will really cost you.”

Who’s at risk?

According to BC Hydro data related to electrical contact incidents involving high-voltage power lines, the following trades are at higher risk of suffering electrical contact incidents:

- carpenters
- concrete workers
- crane operators
- drill workers
- dump truck operators
- electricians
- excavation operators
- gutter installers
- general construction workers
- ironworkers
- painters
- roofers
- tree trimmers/loggers
- truckers
- window washers

Need help getting started?

One of the best electrical safety resources available, says WorkSafeBC occupational safety officer Doug Fielding, is the Canadian Standards Association handbook, *Workplace Electrical Safety*, a 148-page “bible” for sale on the CSA website (www.Shopcsa.ca). “This handbook has all the information an employer needs to develop an effective electrical safety program.” For those with no prior electrical knowledge, *Working Safely Around Electricity* provides a clear set of guidelines, and is available at WorkSafeBC.com. Other useful resources include, as follows:

- www.eiti.bc.ca. The Electrical Industry Training Institute (EITI) delivers BC Hydro’s training workshops, which target trade employees who work near or around high-voltage power lines, as well as first responders. The institute also provides electrical apprenticeship and journeyman upgrade training.
- www.eca.bc.ca. The Electrical Contractors Association of B.C. provides a range of training and educational resources on electrical safety.
- www.bchydro.com/safety/. BC Hydro offers workplace electrical safety tips, posters, and registration for the training workshops through EITI.
- www.worksafebc.com/publications/. Toolbox meeting guides, hazard alerts, safety bulletins, and a series of signs and stickers are available through WorkSafeBC’s web site.
- www.worksafemagazine.com. “Shock treatment,” in the July/August issue, offers a basic primer on electrical safety around high-voltage power lines. 