Bringing Attention to All Electrical Hazards

Electrical Safety is a topic worth repeating. It is covered by both government and private organizations. The Occupational Safety and Health Administration (OSHA) has developed regulations addressing electrical hazards. Organizations, such as the Institute of Electrical and Electronics Engineers (IEEE) and National Fire Protection Association (NFPA), have also created consensus standards to address electrical issues. In particular, the NFPA developed 70E – the Standard for Electrical Safety in the Workplace. While a great deal of this standard appears to apply to work done by electricians only, all on the work site can benefit from an awareness of the hazards it addresses and the precautions it offers.

The first benefit of NFPA 70E is that it has brought attention to the fact that electrical mishaps can present many hazards. The one we are most familiar with is shock. However this is not always addressed completely. In addition to the shock, there are the hazards associated with an arc flash. An arc flash (or arc blast) is a type of electrical explosion that results when a short circuit occurs through air. When an object offering a path to ground or a lower voltage comes near an exposed live circuit or part the current will flash over. Of course there is also the fire hazard associated with electricity.

Looking more closely at the shock hazard you need to understand a little more about the body and electricity. Your body uses electrical impulse to move your muscles. When an electrical current passes through any object, heat will be generated. Looking at these two factors together will help to explain what happens when you get a shock. The external source of electricity during a shock will over power the electrical impulses of your nerves. This external electrical source can cause muscles to contract so much and so violently that bones will break. If this electrical source passes through the heart it can takes over your heart muscle causing it to stop beating. The sites where the external current enters and exits the body will be burned from the heat generated from the movement of the current. It can also burn anything in its path between these two points including nerves, blood vessels and internal organs.

When an arc flash occurs energy is released into the environment in the form of light, noise, heat and pressure. The temperatures associated with an arc-flash can reach as high as 35,000^{o} F. The high-intensity flash that is released can permanent damage to a worker's eyesight. Pressures that are released from an arc flash can reach thousands of pounds per square feet. The pressure alone can be damaging, but when combined with the molten metal formed from the heat that is released, shrapnel can shoot out at speeds in excess of 700 mph. The noise that is created can exceed 160 dB, a level that will cause permanent hearing damage.

Last, but not the least of the dangers from electricity is fire. The extreme heat generated by the flash has been seen to ignite almost any substance it comes in contact with. However, even without an arc flash, the heat is generated any time electrical current is forced through an object that has with high resistance can reach high enough levels to cause a fire. This can be best illustrated by considering the

amount of heat generated when a homeowner at Christmas overloads an extension cord, and then places the cord under a carpet, trapping the heat beneath the carpet with the extension cord. This captured heat will melt the insulation on the cord and ignite the carpet.

With the knowledge of many of the possible hazards associated with electricity, it is important that you recognize the potential for electrical danger. This can be accomplished by simply observing warning signs. These can include experiencing a tingling sensation when you touch an electrical appliance or other metal object. This is the sign of a very mild shock that can indicate a more serious problem with a tool or piece of equipment that needs to be addressed before a more dangerous shock incident can occur.

An easy way to prevent any one else from being injured is to tag and remove the source of the shock from service. Another sign of a potential electrical issue is a persistent burning smell coming from an appliance, tool, room, or area. This odor can be indicative that the appliance or piece of equipment is overheating or malfunctioning. The offending appliance or piece of equipment should be unplugged and tagged and removed from service until it can be repaired or, if necessary, replaced. Listening to the precautions offered in on the job safety talks on electricity and by observing the boundaries and behaviors established for qualified and unqualified workers can help to keep all employees safe and heading home to their families.

For additional help with safety and OSHA compliance, take advantage of the resources available through NCMA. These resources include the NCMA Block Plant Safety Software. The software is available from NCMA at (703) 713-1900 at a cost of $150 for up to 3 plants/year (nonmember $450).