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June 30, 2008

Mr. Jerry Murray
Oregon Public Utility Commission
550 Capitol St. NE, Suite 215
Salem, OR 97301

Dear Mr. Murray:

Subject: Comments Regarding Implementation of 2007 NESC Arc-Flash PPE Requirements

After attending the June 17, 2008 workshop regarding a requested delay in implementation of the 2007 NESC arc-flash safety requirements, I would like to offer comments regarding some of the issues raised during this meeting.

I am an electrical engineer, registered in the State of Oregon. Over the past five years I have conducted numerous arc-flash hazard studies, primarily based on the methods defined in IEEE 1584-2002 and NFPA 70E-2004. Since the 2007 NESC was published, I have incorporated these requirements and recommendations where applicable. In addition, I have conducted seminars on performing arc-flash hazard studies, based on the procedures in IEEE 1584.

My comments mainly relate to technical issues involved with determination of arc-flash hazards in the workplace.

1. Calculation of arc-flash hazards is always an approximation and calculation methods will continue to improve and evolve. In the June 17th workshop, concern was expressed regarding the variety of calculation methods available and the variation in results that can occur when comparisons are made. Because of the highly unpredictable nature of electrical arcs, prediction of the amount of heat energy and blast energy released during faults is not an exact science. There is much effort on-going right now in performing additional testing under a variety of conditions. It is anticipated that there will be significant evolution in the techniques used to calculate arc-flash hazards as standards such as IEEE 1584 and NFPA 70E are updated in the future. It is also reasonable to expect that the various standards and regulations that attempt to address this safety issue will be harmonized over time as better data and methods are developed. However, this process will take many years, and it does not seem appropriate to delay implementation of requirements that will increase safety because there is disagreement regarding the best technique to estimate the potential hazard.

2. Any protection is better than none. For any particular arcing fault scenario, various calculation methods and tables may yield varying results. However, there is no doubt that a worker wearing the minimum PPE required by any method used will be much safer than a worker wearing no PPE at all. A worker wearing PPE rated for 4 cal/cm² who is exposed to a higher energy level, such as 8 cal/cm² will be much better protected than a worker wearing typical cotton clothing. A potential third-degree burn could be reduced to a second-degree burn, and a potential second-degree burn could be reduced to a first-degree burn. The worker's company and their underwriters could save hundreds of thousands of dollars in medical expenses.

3. Regulations must allow for arc-flash calculation methods to evolve and improve. Neither the 2007 NESC nor NFPA 70E-2004 specify a particular calculation method to be used to determine arc-flash hazards. In both standards, simplified tables are provided that can be used in lieu of an actual arc-flash hazard assessment. Both standards thus allow for implementation of a basic arc-flash safety program without requiring a complete study, while allowing for future improvements in methods used to calculate arc-flash hazards. I would encourage the Oregon PUC to NOT stipulate a particular calculation method that must be used since this will severely limit the ability of utilities to take advantage of new information on arc-flash hazards that is continually forthcoming. We currently use several calculation methods to determine arc-flash hazards depending on the application and it is important that experienced engineers performing arc-flash analysis have the flexibility to incorporate new technical findings and use the best available methods for determining arc-flash hazards.

I realize there are many other non-technical issues related to implementation of the 2007 NESC requirements, such as costs, availability of PPE, among others. My main reason for offering these comments is to advise the PUC that arc-flash calculations methods will continue to evolve for many years and any rules relating to arc-flash hazards and PPE requirements should take this fact into account.

Thank you for the opportunity to offer these comments.

Sincerely,

CVO Electrical Systems, LLC



David Castor, P.E.
Owner