

**Department of Energy 2009 Fire Safety Workshop
Fire Safety Research**

Circuit Response to Cable Fires[†]

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The commercial nuclear power industry and its regulators are currently dealing with a challenging fire safety issue with potential implications for other applications. Grouped cable fires have been attributed to large industry losses throughout the world. In specific industries, e.g. nuclear, one significant concern is the potential for spurious operation of electrical equipment due to fire-induced cable failures. These types of failures may cause false indications within a control room and/or actuation of physical components such as a motor operated valve (MOV). Sandia National Laboratories (SNL), sponsored by the Nuclear Regulatory Commission Office of Nuclear Regulatory Research (NRC/RES), has developed cable monitoring equipment as well as testing procedures to determine and analyze the various failure modes and effects on circuits commonly found in nuclear power plants. The experimental facilities at SNL provide an opportunity to investigate circuit response in both a small scale radiant heat apparatus and an intermediate scale compartment. This presentation will discuss the nature of the circuit failure modes and effects issue, ongoing efforts to investigate fire-induced cable failure modes and effects, and efforts to refine analysis methods supporting fire risk assessments.

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Mr. Jason Brown is a Member of the Technical Staff in the Risk and Reliability Analysis Department at Sandia National Laboratories. He joined Sandia in 2005, and has since worked on various U.S. Nuclear Regulatory Commission (NRC) sponsored fire safety and fire risk research programs. Mr. Brown is a recent graduate of Worcester Polytechnic Institute with a undergraduate degree in Mechanical Engineering and a graduate degree in Fire Protection Engineering.

Mr. Steve Nowlen is a Distinguished Member of the Technical Staff in the Risk and Reliability Analysis Department at Sandia National Laboratories. He joined Sandia in 1983, and has since worked on several U.S. Nuclear Regulatory Commission (NRC) sponsored fire safety and fire risk research programs. He is currently the Sandia principal investigator for the NRC-sponsored fire research programs which include efforts in fire Probabilistic Risk Assessment (PRA) and experimental investigations of fire phenomena. He has authored numerous papers and reports in related subjects. He is also co-chair of the Fire PRA Standard Working Group under the joint American Nuclear Society (ANS) – American Society of Mechanical Engineers (ASME) Committee on Nuclear Risk Management.

Mr. Frank Wyant has been with SNL since 1980 and is currently with the Risk and Reliability Department (6761). He is currently the principal investigator for four digital I&C research program for the U. S. Nuclear Regulatory Commission Office of Nuclear Regulatory Research. Mr. Wyant is also a coauthor of the EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities, NUREG/CR-6850, that documents state-of-the-art methods, tools, and data for the conduct of a fire PRA for commercial nuclear power plant applications. His contributions to this document focused on circuit analysis and cable failure mode probability assessments. He was the principal investigator of the Hemyc and M.T. Fire Barrier Performance Verification Testing Program and was the Technical Lead for the recent CAROLFIRE Cable Test Program. In the past, Mr. Wyant has provided technical support to NRC Regions II, III, and IV during numerous triennial fire-protection inspections.