Tara J. Olivier

Metal Fires and Their Implications for Advanced Reactors

2009 DOE FP Workshop

Abstract

Demonstrating safety is vital for public safety and acceptance of reactor designs that utilize liquid metal coolants. Using liquid metal coolants introduce unique safety risks including metal fires. Sandia National Laboratories current research goals include linking metal fire phenomenology to advanced reactor requirements and safety issues, enhancing existing fire models with metal surface reaction capability, and performing discovery experiments to support model validation. Based on the literature review, the most significant thermal hazard occurs in a sodium spray fire since spray fires maximize the surface-to-volume ratio and thus the heat release rate. The development of the computational models will include the ability to estimate the heat release rate of sodium spray and pool fires. This will consist of extending existing spray and pool-surface combustion models to include surface reactions. The discovery experiments will be performed to assess the understanding provided by the current computational models. The computational model predictions will be compared to the experimental results to assess the model's predictive performance. The final outcome of this research will be the development of guidance for appropriate mitigation techniques based on the acquired understanding and knowledge. The research to be presented will include the state of knowledge assessment along with the preliminary results of the experimental and computational benchmarking.

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Education:

M.S. in Fire Protection Engineering, Worcester Polytechnic Institute, (WPI) (2007)

B.S. in Mechanical Engineering, WPI (2005)

Relevant Courses: Enhancements to FDS, Combustion, Process Safety Management, Fire Modeling, Failure Analysis, Performance Based Design, Fire Dynamics, Fire Protection Systems, Building Fire Safety, Operations Risk Management

Work Experience:

2005-Present	**Member of the Technical Staff, Sandia National Laboratory, Risk and Reliability Analysis Department** Albuquerque, NM
2004-2005	**Volunteer Lab Assistant: Fire Testing for the U.S. Navy** Holden Labs, Holden MA - Testing the Performance of Fire Fighting Clothing - Monitoring the Flow Controller and Thermocouples

Research and Professional Experience:

2008 Sodium Fast Reactor Safety Training, Japan Atomic Energy Association
2007 EPRI/NRC-RES Fire PRA Course

Selected Publications:

Olivier, T.J., R.F. Radel, S.P. Nowlen, T.K. Blanchat, and J.C. Hewson, *Metal Fire Implications for Advanced Reactors, Part 2: PIRT Results*, SAND2008-6855. Sandia National Laboratories, Albuquerque, NM, September 2008.

Olivier, T.J., T.K. Blanchat, J.C. Hewson, S.P. Nowlen, R.F. Radel, *Metal Fires and Their Implication for Advanced Reactors*, ANS PSA 2008 Topical Meeting-Challenges to PSA during the nuclear renaissance. Knoxville, TN, September 7-11, 2008, on CD-ROM, American Nuclear Society, LaCrange Park, IL (2008).

Olivier, T.J., R.F. Radel, S.P. Nowlen, T.K. Blanchat, and J.C. Hewson, *Metal Fire Implications for Advanced Reactors, Part 1: Literature Review*, SAND2007-6332. Sandia National Laboratories, Albuquerque, NM, October 2007.

Olivier, T.J. *and S.P. Nowlen, 2008*, *A Phenomena Identification and Ranking Table (PIRT) Exercise for Nuclear Power Plant Fire Modeling Applications, NUREG/CR-6978, November 2008.*

Professional Activities:

- Member of ANS Trinity Section (2008)
- Member of SFPE (2005-Present)