

**Matthew W. Francis**  
Nuclear Science & Technology Directorate  
P.O. Box 2008, H303, MS-6172  
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## EDUCATION

The University of Tennessee, Knoxville January 2006 – May 2008  
Doctor of Philosophy with major in Nuclear Engineering  
Dissertation: *The Solubility and Diffusivity of Helium in Mercury with Respect to Applications at the Spallation Neutron Source*

The University of Tennessee, Knoxville June 2005 – May 2006  
Master of Science with major in Nuclear Engineering  
Thesis: *Long-Term Station Blackout Sequence and Mitigation MELCOR Model*

The University of Tennessee, Knoxville June 2001 – August 2005  
Bachelor of Science in Nuclear Engineering

## WORK EXPERIENCE

Oak Ridge National Laboratory August 2008 – present  
R&D Staff, Reactor and Nuclear Systems Division

The University of Tennessee June 2006 – July 2008  
Oak Ridge National Laboratory, Spallation Neutron Source  
Graduate Research Student under Dr. Arthur Ruggles

- Determined solubility of various noble gases in mercury for the Spallation Neutron Source

The University of Tennessee Fall 2007  
Graduate Instructor  
Course: NE 342—Thermal Science

The University of Tennessee August 2004 – May 2006  
Oak Ridge National Laboratory  
Graduate Research Student under Dr. Mario Fontana

- Analyzed severe accidents at nuclear power plants
- Created fault trees for MELCOR input deck

Southern Nuclear Company May 2002 – August 2004  
Cooperative Program

- Supported core design for Hatch (BWR), Farley (PWR), and Vogtle (PWR) Nuclear Power Plants
- Explored methods for power uprates, extended cycle lengths, and the use of robust fuel types

## PUBLICATIONS

### 2014

1. **M.W. Francis**, C.F. Weber, M.T. Pigni, and I.C. Gauld, *Reactor Fuel Isotopics for Nuclear Applications*, ORNL/TM-2014/464, Oak Ridge National Laboratory, Oak Ridge, TN, September 2014.
2. K.R. Robb, **M.W. Francis**, and L.J. Ott, "Insight from Fukushima Daiichi Unit 3 Investigations using MELCOR," *Nuclear Technology*, Vol. 186, Issue 2, p 145-160, May 2014.
3. K.R. Robb, **M.W. Francis**, and M.T. Farmer, *Ex-Vessel Core Melt Modeling Comparison between MELTSPREAD-CORQUENCH and MELCOR 2.1*, ORNL/TM-2014/1, Oak Ridge National Laboratory, Oak Ridge, TN, March 2014.

### 2013

4. **M.W. Francis** and V.J. Jodoin, *Historical Characterization of Fallout by Field Laboratories*, ORNL/TM-2013/123, Oak Ridge National Laboratory, Oak Ridge, TN, July 2013. (Official Use Only)
5. K.R. Robb, **M.W. Francis**, and M.T. Farmer, *Enhanced Ex-Vessel Analysis for Fukushima Daiichi Unit 1: Melt Spreading and Core-Concrete Interaction Analyses with MELTSPREAD and CORQUENCH*, ORNL/TM-2012/455, Oak Ridge National Laboratory, Oak Ridge, TN, February 2013.
6. **M.W. Francis** and V.J. Jodoin, *Effective Methods for Collecting Fallout in Urban Areas and in a Variety of Weather Conditions*, ORNL/TM-2012/268, Oak Ridge National Laboratory, Oak Ridge, TN, January 2013. (Official Use Only)

### 2012

7. K.R. Robb, **M.W. Francis**, and L.J. Ott, "Fukushima Daiichi Unit 3 MELCOR Investigation", Severe Accident Assessment and Management: Lessons Learned from Fukushima Dai-ichi, San Diego California, November 11-15, 2012, p 360 – 372. American Nuclear Society Embedded Topical Meeting.
8. Dean Wang, Ian C. Gauld, Graydon L. Yoder, Larry J. Ott, George F. Flanagan, **Matthew W. Francis**, Emilian L. Popov, Juan J. Carbajo, Prashant K. Jain, John C. Wagner, and Jess C. Gehin, "Study of Fukushima Daiichi Nuclear Power Station Unit 4 Spent-Fuel Pool", *Nuclear Technology*, Vol. 180, November 2012, p 205-215.
9. Randall Gauntt, Donald Kalinich, Jeff Cardoni, Jesse Phillips, Andrew Goldmann, Susan Pickering, **Matthew Francis**, Kevin Robb, Larry Ott, Dean Wang, Curtis Smith, Shawn St. Germain, David Schwieder, and Cherie Phelan, *Fukushima Daiichi Accident Study (Status as of April 2012)*, SAND2012-6173, Sandia National Laboratories, Albuquerque, NM, August 2012.
10. **M.W. Francis**, *Sample Collection Tools and Equipment for Use in a Post-Detonation Environment*, GNSTD/NSAT-012, Oak Ridge National Laboratory, Oak Ridge, TN, February 2012. (Official Use Only)

### 2011

11. **M.W. Francis**, *Technical Review Report on Sample Collection Methods and Tools for Special Nuclear Material*, GNSTD/NSAT-002, Oak Ridge National Laboratory, Oak Ridge, TN, April 2011. (Official Use Only)
12. **M. W. Francis** and J. R. Cheatham, "Determining Spent Nuclear Fuel's Plutonium Content, Initial Enrichment, Burnup, and Cooling Time with Isotopic Information," *Proc. INMM 52<sup>nd</sup> Annual Meeting*, July 17-21, 2011, Palm Desert, Calif.

### 2010

13. U. Mertyurek, **M.W. Francis**, and I. C. Gauld, *SCALE 5 Analysis of BWR Spent Nuclear Fuel Isotopic Compositions for Safety Studies*, ORNL/TM-2010/286, Oak Ridge National Laboratory, Oak Ridge, TN, December 2010.
14. I.C. Gauld and **M.W. Francis**, "Investigation of Passive Gamma Spectroscopy to Verify Spent Nuclear Fuel Content," in *Proceedings of INMM 51st Annual Meeting*, Baltimore, MD, July 11-15, 2010.
15. **M.W. Francis** and V.J. Jodoin, *Compendium of Tools and Techniques Used to Collect Local Fallout Debris Samples*, ORNL/TM-2010/208. Oak Ridge National Laboratory, Oak Ridge, TN, September 2010. (Official Use Only)
16. **M.W. Francis**, V.J. Jodoin and J. P. Lefebvre, *Study on the Ability to Predict Yield from the Stabilized Height of a Nuclear Cloud*, ORNL/TM-2010/209. Oak Ridge National Laboratory, Oak Ridge, TN, September 2010. (Official Use Only)

### 2009

17. **M.W. Francis** and A.E. Ruggles, "Helium Bubble Injection Solution to the Cavitation Damage at the Spallation Neutron Source", *Application of Accelerators in Research and Industry: 20<sup>th</sup> International Conference, 10-15 August 2008*, American Institute of Physics, Fort Worth, TX, 2009, p 59-62.