

**Carlos A. Barrera, Ph.D., P.E**  
**Senior Engineer**

**Professional Profile**

Dr. Carlos A. Barrera is a Senior Engineer in Exponent's Thermal Sciences practice in Menlo Park. Dr. Barrera's background in chemical and nuclear engineering provides an excellent foundation for his consulting work in the analysis and investigation of fires, explosions, product failures, and chemical process upsets. His areas of expertise and interest include chemical plant operations, the paper industry, HAZOP, and "what-if" studies for chemical processes, as well as unitary operations characterization and design, project management, and industrial safety and risk analysis programs. He has extensive knowledge in ionizing radiation detection, radioactive source handling, computational radiation transport, and digital image processing and reconstruction.

Prior to joining Exponent, Dr. Barrera was a Graduate Research Fellow at the Lawrence Livermore National Laboratory in Livermore, CA, where he conducted research on radiation detection at the National Ignition Facility; in particular he worked on the development of neutron imaging for inertial confinement fusion experiments. Before joining Berkeley, he was a project engineer for The Dow Chemical Co. in Colombia, where he was in charge of design, planning, and execution of capital and improvement projects for three production units, as well as coordinator of the local safety program. Also in Colombia, he conducted his undergraduate research in pollution control methods for the paper industry.

**Academic Credentials and Professional Honors**

Ph.D., Nuclear Engineering, University of California at Berkeley, 2007

M.S., Nuclear Engineering, University of California at Berkeley, 2004

B.S., Chemical Engineering, Universidad Pontificia Bolivariana Medellin, Colombia, 1998

Student-Employee Graduate Research Fellowship (SEGRF), Lawrence Livermore National Laboratory, 2004–2007; Distinguished Undergraduate Chemical Engineering Student Universidad Pontificia Bolivariana, 1996

**Licenses and Certifications**

Licensed Chemical Engineer, California, #CH 6378

HAZOP and other PHA techniques leader training by ASME/CCPS; Hazard Identification (HAZID) for the process industries by CCPS; 40-Hour Hazardous Waste Operations and Emergency Response training program in accordance with OSHA 29 CFR Part 1910.120; Fire Investigation 1A certification by the State of California Fire Marshal

## **Languages**

Spanish

## **Publications**

Barrera C, Hosseini K, Kemal A. Transient reservoir conditions and leak flow rate for a choked orifice: Basic Principles, Estimation and Applications. Proceedings, 7<sup>th</sup> Global Congress on Process Safety, Chicago, IL March 13–16, 2011. American Institute of Chemical Engineers ISBN 978-0-8169-1067-10.

Barrera C, Kemal A. Condensation induced water hammer: Principles and consequences. Proceedings, 6<sup>th</sup> Global Congress on Process Safety, San Antonio, TX March 21–25, 2010. American Institute of Chemical Engineers ISBN 978-0-8169-1064-9.

Barrera C. Experimental component characterization and Monte Carlo-based image formation and reconstruction for the neutron imaging system of the national ignition facility. Ph.D. Thesis, University of California at Berkeley, 2007.

Barrera C, Moran M, Morse E. Image reconstruction algorithms for inertial confinement fusion neutron imaging. Review of Scientific Instruments 2006 Oct; 77.

Moran M, Koch J, Landen O, Haan S, Barrera C, Morse E. Imploded capsule fuel temperature and density measurement by energy-dependent neutron imaging. Journal de Physique IV 2006; 133:925.

Moran M, Koch J, Haan S, Hatchett S, Barrera C, Morse E. Downscattered neutron imaging. Review of Scientific Instruments 2004; 75:3592.

Moran M, Koch J, Barrera C, Morse E. Neutron scintillators for downscattered neutron imaging. Inertial Fusion Sciences and Applications 2003, American Nuclear Society, pp. 888–891, La Grange Park, IL, 2004.

Barrera C. Characterization of scintillator materials for downscattered neutron imaging. M.S. Thesis, University Of California at Berkeley, 2004.

Barrera C, Zapata J. Reduction of COD in black liquors by acid treatment. B.S. Thesis, Universidad Pontificia Bolivariana, Medellin, 1998.

## **Presentations and Published Abstracts**

Barrera C, Moran M, Morse E. Performance modeling of the NIF neutron imaging system. 34<sup>th</sup> IEEE International Conference on Plasma Science, Albuquerque, NM, June 2007.

Barrera C, Moran M, Morse E. Image characterization study for ICF neutron imaging. 48<sup>th</sup> Annual Meeting of the APS DPP, Philadelphia, PA, October 2006.

Barrera C, Moran M, Morse E. Image reconstruction algorithms for ICF neutron imaging. 16<sup>th</sup> Topical Conference on High-Temperature Plasma Diagnostics, Williamsburg, VA, May 2006.

Moran M, Barrera C, Morse E. Model-based analysis of an ICF neutron imaging system. 47<sup>th</sup> Annual Meeting of the APS DPP, Denver, CO, October 2005.

Moran M, Koch J, Landen O, Haan S, Barrera C, Morse E. Imploded capsule fuel temperature and density measurement by energy-dependent neutron imaging. 4<sup>th</sup> International Conference on Inertial Fusion Sciences and Applications, Biarritz, France, September 2005.

Barrera C, Moran M, Morse E. Study of organic scintillators for neutron imaging. 32<sup>nd</sup> IEEE International Conference on Plasma Science, Monterrey, CA, June 2005.

Barrera C, Moran M, Morse E. Simulation and analysis of pinholes for neutron imaging. 46<sup>th</sup> Annual Meeting of the APS DPP, Savannah, GA, November 2004.

Barrera C, Moran M, Koch J, Haan S, Hatchett S, Morse E. Downscattered neutron imaging. 15<sup>th</sup> Topical Conference on High-Temperature Plasma Diagnostics, April 2004.

Barrera C, Moran M, Morse E. Characterization of neutron scintillators for downscattered neutron imaging. 45<sup>th</sup> Annual Meeting of the APS DPP, Albuquerque, NM, October 2003.

### **Prior Experience**

Student Employee Graduate Research Fellow, Lawrence Livermore National Laboratory, 2004–2007

Graduate Student Researcher, University of California, Berkeley, 2001–2004

Project Engineer, The Dow Chemical Co., 1998–2000

### **Professional Affiliations**

- American Nuclear Society (member)
- American Institute of Chemical Engineers (member)
- ASTM International (voting member)
  - Member of the ASTM E10 “Nuclear Technology and Applications” committee
  - Member of the ASTM E58 “Forensic Engineering” committee

### **Deposition /Trial Testimony**

*Salgado-Rodriguez v. Leland Stanford Jr. University et al.*, Superior Court of the State of California for the County of Santa Clara, Case No. 1-06-CV-09719, August 2006.