Dr. ROBERT A DURHAM, PhD, FIEEE

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Publications

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IPR2024-00197
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Dr ROBERT A DURHAM, PhD, FIEEE

Robert A Durham is the Principal of D^2 Tech Solutions, a technology related firm concentrating on Mechanical and Electrical systems and energy conversions. He also serves as a Principal Scientist of THEWAY LABs, Tulsa, OK, an engineering and energy consulting firm that provides design and failure analysis of facilities and system installations.

Dr. Durham's work experience is broad and encompasses all areas of the energy industry. Dr. Durham spent 11 years with AEP/CSW, at the time the country's largest utility, in electrical engineering positions in the power generation and transmission planning departments. He then accepted a position as Manager of Electric Infrastructure for New Dominion, LLC., a major independent energy producer in Oklahoma. Dr. Durham then moved on to hold the position of Vice President of Engineering and Project Management for EDG Power Group, an Engineering Procurement and Construction company specializing in design and construction of small to medium size power generating facilities. Dr. Durham left EDG Power Group to accept his current positions. Dr. Durham has been accepted as an expert and offered testimony in several jurisdictions.

Dr. Durham's extensive client list includes the development of a broad spectrum of forensic, electrical and facilities projects for many companies. He has also taught University offered courses in electrical engineering review for board licensure. He has published five books, six magazine articles and over 40 other technical papers and articles. Dr. Durham's extensive work on standards and electrical systems has resulted in his elevation to Fellow of the IEEE, the highest grade of recognition in the electrical technology industry.

Dr. Durham received the B.S. in electrical engineering from the University of Tulsa in 1992 and the M.E. in Technology Management from The University of Tulsa in 1997. Tulsa, OK. In 2004, Dr. Durham received a PhD in Engineering Management from Kennedy Western University.

Degrees Earned

BSEE, with Honors, The University of Tulsa
Master of Engineering, The University of Tulsa
PhD , Kennedy Western University

Area of Specialization

lightning & grounding
failure analysis & forensic engineering
electrical power systems & safety
power generation
utility industry competition
economics & management
petroleum & chemical industry
electrical / mechanical energy conversion

Registration

Professional Engineer - Oklahoma
Professional Engineer – Texas
Professional Engineer – California
Professional Engineer – New Hampshire (Inactive)
Professional Engineer – Kansas
Professional Engineer – North Carolina (Inactive)
Professional Engineer – Missouri
Professional Engineer – Arkansas
Professional Engineer – Virginia (Inactive)
Professional Engineer – Illinois (Inactive)
Electrical Contractor - Oklahoma

Work History

D^2 Tech Solutions, Inc. 2002 - 2022
Principal

THEWAY Corp. 2004 - 2022
Principal Scientist

EDG Power Group, Inc. 2002 - 2004
Vice President Engineering & Project Management

New Dominion, LLC Mgr Electric Infrastructure	2000 - 2002
Central & Southwest, Inc Electrical Engineer	1989 - 2000

Professional Memberships

Fellow	Institute of Electrical and Electronic Engineers
Diplomate	American College of Forensic Examiners, International
Member	National Association of Fire Investigators
Voting Member	National Fire Protection Institute, Electrical Section
Executive Member	Petroleum and Chemical Industry Committee, IEEE
Diplomate, Past Board Member	American Board of Forensic Engineering and Technology
Member	IEEE Standards Association
Past Chair	Production Subcommittee, IEEE IAS/PCIC
CFC	American College of Forensic Examiners
Member	International Association of Arson Investigators
CFEI, CVFEI	National Association of Fire Investigators
Past Chair	Tulsa Section IEEE
Chair	IEEE RP1017.1 Working Group
Chair	IEEE RP1017.2 Working Group
Chair	IEEE RP1017.3 Working Group
Chair	IEEE RP1017.4 Working Group
Past Chair	IEEE PCIC Standards Subcommittee
Secretary	IEEE Petroleum and Chemical Industry Committee

Honors and Awards

Fellow of the IEEE

For contributions to submersible electrical equipment analysis and multi-point ground method in hazardous petroleum and chemical environments.

Honor Societies

Tau Beta Pi, national engineering honors
Eta Kappa Nu, national electrical engineering honors

Dr. Durham's publications have often successfully competed for outstanding paper awards from journals of the Institute of Electrical and Electronic Engineers (PCIC and IAS). This is an

international competitive peer review and evaluation of papers that provide a significant contribution to the advancement and understanding of electrical applications.

IEEE Industry Applications Society, New Orleans, LA: Prize Article for "Data Quality and Grounding: Considerations in a Mixed Use Facility"

PCIC, Cincinnati, OK: Prize Paper for "Grounding and Bonding Conductors: Solid, Stranded, Bare or Insulated"

PCIC, New Orleans, LA: Prize paper for "Industrial Design Application for Power Distribution over Extra-Long Distances"

PCIC, Philadelphia, PA: Prize paper for "Paradigm Shifts and Impact on Engineers and Industry"

Transactions on Industry Applications, Orlando, FL: Prize Paper for "Lightning, Grounding, and Protection for Control Systems".

PCIC, Denver, CO: Prize Paper for "Grounding System Design for Isolated Locations and Plant Systems"

PCIC, St. Louis, MO: First place for "Lightning, Grounding, and Protection for Distributed Control and Communications Systems: A Retrofit".

Publications

Electrical Engineering in a Nutshell, Dr. Robert A Durham, Dr. Marcus O. Durham, ISBN 978-1466236795, 2011

Electrical Failure Analysis for Fire and Incident Investigations, Marcus O. Durham, Robert A. Durham, Rosemary Durham, Jason Coffin, ISBN 978-1463773472, 2011

Leadership and Success in Relationships and Communication, Marcus O. Durham and Robert A Durham, ISBN 978-1463758769, 2011

Leadership and Success in Organizations, Culture & Ethics: Group or Horizontal Interactions, Marcus O. Durham and Robert A Durham, ISBN 978-1466250338, 2011

Leadership and Success in Economics, Law & Technology: Society or External Influence, Marcus O. Durham and Robert A Durham, OK,ISBN 978-1466250461, 2011

How Should Generating Asset Acquisitions by Regulated, Vertically Integrated Utilities be Overseen in Today's Quasi-Regulated Electric Utility Environment? A Dissertation Presented to the Faculty of the School of Engineering Kennedy-Western University, KWU Press, Thousand Oaks, CA, 2004

R. A. Durham, M. O. Durham and T. W. Gillaspie, "Lightning Protection at Petrochemical Facilities - Part 3 Alternative Systems," *2022 IEEE Petroleum and Chemical Industry Committee Conference (PCIC)*, Denver, CO 2021.

R. A. Durham, M. O. Durham and T. W. Gillaspie, "Lightning Protection at Petrochemical Facilities - Part 2 Standards Requirements," *2021 IEEE Petroleum and Chemical Industry Committee Conference (PCIC)*, San Antonio, TX, 2021.

R. A. Durham, M. O. Durham and T. W. Gillaspie, "Petrochemical Facility Lightning Protection Primer: Part 1: History and Basic Science," in IEEE Industry Applications Magazine, vol. 27, no. 2, pp. 47-56, March-April 2021, doi: 10.1109/MIAS.2020.3024492.

R. A. Durham, S. J. Szczecinski and M. O. Durham, "Factors Impacting Selection of Grounding and Bonding Conductors," in *IEEE Transactions on Industry Applications*, vol. 56, no. 5, pp. 4652-4661, Sept.-Oct. 2020, doi: 10.1109/TIA.2020.3005637.

R. A. Durham, M. O. Durham and T. W. Gillaspie, "Lightning Protection at Petrochemical Facilities - Part 1 History and Background Science," *2019 IEEE Petroleum and Chemical Industry Committee Conference (PCIC)*, Vancouver, BC, Canada, 2019, pp. 205-214, doi: 10.1109/PCIC30934.2019.9074531.

R. A. Durham, S. J. Szczecinski and M. O. Durham, "Grounding and Bonding Conductors: Solid, Stranded, Bare or Insulated?: Copyright Material IEEE, Paper No. PCIC-2018-03," *2018 IEEE Petroleum and Chemical Industry Technical Conference (PCIC)*, Cincinnati, OH, USA, 2018, pp. 19-28, doi: 10.1109/PCIC31437.2018.9080442.

F. P. Feletto, R. Durham, E. Bortoni and J. Costa, "IMPROVENT OF MV CASCADED H BRIDGE INVERTER (CHBI) VFD AVAILABILITY FOR HIGH POWER ESP OIL WELLS," in *IEEE Transactions on Industry Applications*.
doi: 10.1109/TIA.2018.2866481
URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8443149&isnumber=4957013

F. Feletto, R. A. Durham, E. da Costa Bortoni and J. G. C. Costa, "Techniques to improve MV cascaded H bridge inverter (CHBI) VFDs availability applied to drive high power esp oil wells," *2017 Petroleum and Chemical Industry Technical Conference (PCIC)*, Calgary, AB, Canada, 2017, pp. 363-370.
doi: 10.1109/PCICON.2017.8188756
URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8188756&isnumber=8188605

R. A. Durham, M. Azambuja, F. P. Feleto and M. O. Durham, "PD testing of motors for hostile environments," *2015 IEEE Petroleum and Chemical Industry Committee Conference (PCIC)*, Houston, TX, 2015, pp. 1-8.
doi: 10.1109/PCICON.2015.7435106
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Durham, Robert A.; Brinner, Thomas R., "Oilfield electric power distribution," Petroleum and Chemical Industry Technical Conference (PCIC), 2014 IEEE , vol., no., pp.429,442, 8-10 Sept. 2014 doi: 10.1109/PCICon.2014.6961908
URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6961908&isnumber=6961868

Durham, Robert; Durham, M.O. "What Does Grounding Have To Do with Fire & Injury", Fire Protection vol 40 no 2, Fire Protection Association of Southern Africa, June 2014.

Durham, M.O.; Durham, R.A., "Does a Unified Energy Equation Contain the Higgs Field?," Access, IEEE , vol.1, no., pp.505,508, 2013
doi: 10.1109/ACCESS.2013.2276623
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Durham, R.A.; Durham, M.O.; , "Does Corrugated Tubing +Lightning =Catastrophic Failure?," *Industry Applications, IEEE Transactions on* , vol.48, no.4, pp.1243-1250, July-Aug. 2012
doi: 10.1109/TIA.2012.2200069
URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6202685&isnumber=6238414

Durham, R.A.; Durham, M.O.; , "Lightning, grounding, and protection for control and communications systems: Re-evaluated," *Petroleum and Chemical Industry Conference Europe Conference Proceedings (PCIC EUROPE), 2011* , vol., no., pp.1-11, 7-9 June 2011
URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5936962&isnumber=5936950

Durham, M.O.; Durham, R.A.; , "Lightning dangers on corrugated tubing carrying hydrocarbons," *Petroleum and Chemical Industry Conference (PCIC), 2010 Record of Conference Papers Industry Applications Society 57th Annual* , vol., no., pp.1-9, 20-22 Sept. 2010 doi: 10.1109/PCIC.2010.5666860
URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5666860&isnumber=5666816

Brinner, T. R.; Durham, R. A.; , "Transient-Voltage Aspects of Grounding," *Industry Applications, IEEE Transactions on* , vol.46, no.5, pp.1796-1804, Sept.-Oct. 2010
doi: 10.1109/TIA.2010.2059551
URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5523987&isnumber=5577442

"CSST Response to Lightning and Transients – A Technical Analysis", Marcus O Durham and Robert A Durham, *Fire & Arson Investigator*, July 2009 Vol 60, No 1.

Brinner, T.R.; Durham, R.A.; , "Transient voltage aspects of grounding," *Petroleum and Chemical Industry Technical Conference, 2008. PCIC 2008. 55th IEEE* , vol., no., pp.1-9, 22-24

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Durham, M.O.; Durham, R.A.; Hulett, R.H.; , "History and Development of IEEE Standards for Downhole Cable," *Industry Applications, IEEE Transactions on* , vol.43, no.2, pp.436-443, March-april 2007
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Durham, M.O.; Durham, R.A.; , "Data quality and grounding," *Industry Applications Magazine, IEEE* , vol.12, no.3, pp. 67- 73, May-June 2006
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doi: 10.1109/PCICON.2005.1524554
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Durham, M.O.; Durham, R.A.; , "Data quality and grounding considerations in a mixed-use facility," *Petroleum and Chemical Industry Technical Conference, 2004. Fifty-First Annual Conference 2004* , vol., no., pp. 1- 7, 13-15 Sept. 2004
doi: 10.1109/PCICON.2004.1352768
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Durham, R.A.; Durham, M.O.; , "Covering all the bases - industrial power system design in a utility environment," *Industry Applications Magazine, IEEE* , vol.9, no.6, pp. 14- 20, Nov.-Dec. 2003
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Durham, M.O.; Durham, K.D.; Durham, R.A.; , "TVSS designs," *Industry Applications Magazine, IEEE* , vol.8, no.5, pp. 31- 36, Sep/Oct 2002
doi: 10.1109/MIA.2002.1028388
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Durham, M.O.; Durham, R.A.; Durham, K.D.; , "Applications engineering approach to Maxwell and other mathematically intense problems," *Petroleum and Chemical Industry Conference, 2002. Industry Applications Society 49th Annual* , vol., no., pp. 31- 38, 2002
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Durham, M.O.; Durham, R.A.; , "Ground systems design considerations for vessels [in petroleum industry]," *Industry Applications Magazine, IEEE* , vol.7, no.6, pp.41-49, Nov/Dec 2001
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Durham, M.O.; Durham, R.A.; , "Interaction and design of grounded systems for tanks and vessels ," *Petroleum and Chemical Industry Conference, 1999. Industry Applications Society 46th Annual* , vol., no., pp.195-202, 1999
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Durham, M.O.; Durham, R.A.; Anderson, D.; , "What are standardized equations for acceptance of hi-pot tests and for voltage drop?," *Petroleum and Chemical Industry Conference, 1998. Industry Applications Society 45th Annual* , vol., no., pp.281-287, 28-30 Sep 1998
doi: 10.1109/PCICON.1998.727989
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Durham, M.O.; Durham, R.A.; , "Changing paradigms for engineering," *Industry Applications Magazine, IEEE* , vol.4, no.2, pp.52-60, Mar/Apr 1998
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Durham, R.A.; Durham, M.O.; , "Electric re-regulation and effects on industrial customers," *Petroleum and Chemical Industry Conference, 1997. Record of Conference Papers. The Institute of Electrical and Electronics Engineers Incorporated Industry Applications Society 44th Annual* , vol., no., pp.69-78, 15-17 Sep 1997
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doi: 10.1109/PCICON.1996.564859
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Durham, M.O.; Durham, R.A.; , "Grounding system design for isolated locations and plant systems ," *Petroleum and Chemical Industry Conference, 1995. Record of Conference Papers., Industry Applications Society 42nd Annual* , vol., no., pp.145-153, 11-13 Sep 1995
doi: 10.1109/PCICON.1995.523949
URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=523949&isnumber=11530

Durham, M.O.; Durham, R.A.; , "Lightning, grounding and protection for control systems," *Industry Applications, IEEE Transactions on* , vol.31, no.1, pp.45-54, Jan/Feb 1995
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Durham, M.O.; Durham, R.A.; , "Lighting, grounding, and protection for distributed control and communications systems: a retrofit," *Petroleum and Chemical Industry Conference, 1993, Record of Conference Papers. The Institute of Electrical and Electronics Engineers*

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URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=337392&isnumber=7922

"Generalized Electrical Failures", Durham, R.A., Durham, M.O., Coffin, J.A. *Proceedings of 46th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2013.

"Common Ways your Electrical Installation does you Harm", Durham, R.A., Durham, M.O., Coffin, J.A. *Proceedings of 44th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2011.

"Ignition or Shock, is Grounding the Culprit?", Marcus O Durham, Robert A Durham, Rosemary Durham, Jason A. Coffin, *Proceedings of 43rd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2010.

"Unraveling the Myths of Low Energy Ignition", Marcus O Durham, Robert A Durham, Curtis L. Ozment, Jason A. Coffin, *Proceedings of 42nd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2009.

"Lightning, Transient & High Frequency Impact on Material Such As Corrugated Tubing", Marcus O. Durham & Robert Durham, Proceedings of 41st Annual Frontiers in Power Conference, OSU, Stillwater, OK, October 2008.

"Lightning Damage an Act of God, or Act of Negligence?", Marcus O. Durham, Robert Durham, Randall Overton, Curtis Ozment, Proceedings of 40th Annual Frontiers in Power Conference, OSU, Stillwater, OK, October 2007.

"The Flat Earth Society Perception of Grounding", Marcus O. Durham & Robert Durham, Proceedings of 39th Annual Frontiers in Power Conference, OSU, Stillwater, OK, October 2006.

"The IEEE Standards Process, A Case Study", Marcus O. Durham & Robert Durham, *Proceedings of 38th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2005.

"Engineering Management: A Course For Survival", Marcus O. Durham, Robert A. Durham, & Rosemary Durham, *American Society of Engineering Educators*, Pittsburg, KS 2004.

"Eleven Ground Systems and Connections", Marcus O. Durham & Robert Durham, *Proceedings of 37th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2004.

"Engineering Management, An Oxymoron?", Marcus O. Durham, Robert Durham & Rosemary Durham, *Proceedings of 37th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2004.

"Corrosion and Electrical Safety", Marcus O. Durham & Robert Durham, *Proceedings of 36th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2003.

"Applications Engineers Don't Do Hairy Math", Marcus O. Durham, Robert A. Durham, and Karen D. Durham, *Proceedings of 35th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2002.

"Tests and Correlations for TVSS", Marcus O. Durham, Karen Durham, and Robert Durham, *Proceedings of 34th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2001.

"Grounding Systems Interaction," Robert A. Durham and Marcus O. Durham, *Proceedings of 33rd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2000.

"A Cost Effective, Numeric Technique for Projecting Quality of Insulation and Impending Failures," Marcus O. Durham and Robert A. Durham, *Proceedings of 33rd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2000.

"An Engineering Selection for Size of Long Conductors Considering Factors in Addition to NEC," Marcus O. Durham and Robert A. Durham, *Proceedings of 33rd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2000.

"Grounding Systems Interaction," Robert A. Durham and Marcus O. Durham, *Proceedings of 32nd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1999.

"Can Electrical Insulation and Conductor Performance Be Predicted?" Marcus O. Durham and Robert A. Durham, *Proceedings of Production Operations Symposium*, SPE 52161, Oklahoma City, OK, March 1999

"Engineering Paradigms: Change, Opportunity and Benefit," Robert A. Durham and Marcus O. Durham, *Proceedings of 31st Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1998.

"Electric Re-regulation and Impact on Users," Robert A. Durham and Marcus O. Durham, *Proceedings of 30th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1997.

"Remote Transmitter and Distributed Control Grounding and System Protection," Robert A. Durham and Marcus O. Durham, *Proceedings of 27th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1994.

Robert A Durham, PhD, PE
Expert Witness
Previous Four Years from February 14, 2023

Attorney	Case	Location	Issue	
Denton Law	Robbins v. Madewell	Mayes County, OK	Fire / injury	Trial
Baker Botts	IPR 2023-00558	USPTA PTAB	Intellectual Property	Depo
Haynes Boone	Nabors v. Helmerich & Payne et al	Northern District, TX	Intellectual Property	Trial
McDermott Will & Emery LLP	Halliburton V. U.S. Well Services	Western District, TX	Intellectual Property	Trial
Jones, Oten & Jewell	Davis v. Tapp	Garfield County, OK	Fire / Injury	Trial
Haynes & Boone	Nabors Driling v. Helmerich & Payne et al	Northern District, TX	Intellectual Property	Depo
Mattingly Law	Fulton v. Aviagen et al	Muskogee County, OK	Building Codes	Trial
Baker Botts	US Well Services v. Halliburton	Western District, TX	Intellectual Property	Depo
Kelly, Morgan	Montanez v. Deepwell Energy Svcs	Ector County, TX	Flash Fire / Injury	Depo
Baker Botts	IPR 2021-01316	USPTO PTAB	Intellectual Property	Depo
Baker Botts	IPR 2021-01238	USPTO PTAB	Intellectual Property	Depo
Baker Botts	IPR 2021-01315	USPTO PTAB	Intellectual Property	Depo
Baker Botts	IPR 2021-01065	USPTO PTAB	Intellectual Property	Depo
Clancy & Thompson	Borth v. Phillips & Sons Trucking et al	Canadian County, OK	Injury	Depo
Baker Botts	IPR 2021-01034	USPTO PTAB	Intellectual Property	Depo
Baker Botts	IPR 2021-01033	USPTO PTAB	Intellectual Property	Depo
Baker Botts	IPR 2021-01032	USPTO PTAB	Intellectual Property	Depo
Stephen Jones	Davis v. Tapp	Garfield County	Fire / Injury	Depo

Kelly, Morgan	Calvillo v. On Point	Travis County, TX	Flash Fire / Injury	Depo
Hartline Barger	Ramirez v. Home Depot	Southern District, TX	Electrical Failure / Fire	Depo
Mcafee & Taft	Hale v. Southeast Colorado Power Association	Baca County, CO	Electrical Failure / Fire	Depo
Hartline Barger	Siqueros v. Templo Monte Horeb et al	El Paso County, TX	Injury	Depo
Naman, Howell	Lentz v Brenntag Pacific et al	Upton County, TX	Flash Fire / Injury	Depo
Craft Law Firm	Cason v. Cimarex et al	Victoria County, TX	Flash Fire / Injury	Depo
Naman, Howell	Lentz v Brenntag Pacific et al	Upton County, TX	Flash Fire / Injury	Depo