

Michael L. Wiggins, Ph.D., P.E.

William M. Cobb & Associates, Inc.
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EDUCATION:

Ph.D., Petroleum Engineering
Texas A&M University, May 1991

M.Eng., Petroleum Engineering
Texas A&M University, August 1988

B.S., Petroleum Engineering
Texas A&M University, May 1979

WORK EXPERIENCE:

2006 - 2013; 2016 - Present

William M. Cobb & Associates, Inc. (Dallas, Texas)

Senior Vice President 2016 – Present

President 2011 – 2013

Senior Vice President 2006 – 2010

- Perform technical and economic studies of oil and gas reservoirs for reservoir management, waterflood and EOR assessment and design, reserve determination, and production optimization
- Provide expert witness testimony involving petroleum engineering functions and industry practices
- Teach petroleum engineering industry courses in the areas of reservoir management, reservoir engineering, waterflooding, well completions and performance, and economic evaluations.

3/2013 – 6/2015

Mid-Con Energy Operating, LLC (Dallas, Texas)

President 8/2014 – 6/2015

Executive Vice President 3/2013 – 7/2014

- Served as chief engineer and chief operating officer for an independent upstream E&P company. Duties included supervising management staff, technical evaluation of waterflood and improved oil recovery projects, reserve determination and reporting, and reservoir management programs.

- Provided management direction for company that resulted in growing net production by 60 percent from 3100 BOEPD to 5000 BOEPD and net reserves by 60 percent to 28 MMBOE during this period. Led efforts that resulted in over \$300 million in acquired properties.

1991 - 2006

The University of Oklahoma (Norman, Oklahoma)

Professor, School of Petroleum and Geological Engineering

- Taught undergraduate and graduate level petroleum engineering classes in areas of reservoir management, reservoir and production engineering, and petroleum economics
- Conducted research in the areas of flow through porous media, reservoir recovery processes, well performance, reservoir and production engineering, artificial lift, and environmental management

1987 - 1991

Texas A&M University (College Station, Texas)

Graduate Assistant, Petroleum Engineering Department

- Conducted research in the areas of well performance and reservoir management
- Assisted in teaching an introductory course on engineering and computers

1986 - 1987

Independent Consulting Engineer (Liberty, Texas)

- Performed reservoir projections and economic analysis on oil and gas properties under consideration for acquisition and divestment

1985 - 1986

ITR Petroleum, Inc. (Houston, Texas)

Petroleum Engineer

- Performed duties of a production engineer for operated and non-operated properties in South Texas and Oklahoma

1981 - 1985

Templeton Energy, Inc. (Houston, Texas)

Petroleum Engineer

- Prepared drilling and completion programs for company operated properties primarily in Kansas, Oklahoma, Louisiana, and Texas

- Managed all production operations in Texas, Louisiana, Mississippi, Oklahoma and Kansas
- Supervised engineering, technical, clerical and field personnel

1980 – 1981

***The Bertman Companies (Liberty, Texas)
Petroleum Engineer***

- Supervised the operations of a small independent on the upper Texas Gulf Coast

1979 – 1980

***Sun Gas Company (Lafayette, Louisiana)
Production Engineer***

- Performed production engineering and field duties on properties in the upper Texas Gulf Coast, North Louisiana, and Mississippi

RESEARCH FUNDING:

Secured funding for and participated in 13 externally funded research projects while at the University of Oklahoma. Total external funding was 2.5 million dollars. Served as Project Director and Principal Investigator for 11 of these projects. Projects were funded by the U.S. Department of Energy, U.S. Environmental Protection Agency, Sandia National Laboratories, and various exploration and production companies including Phillips Petroleum, Marathon, Kerr-McGee, Devon Energy, and Anadarko Petroleum.

TEACHING ACTIVITY:

Academic teaching experience includes petroleum engineering courses at both the graduate and undergraduate level in reservoir engineering, production engineering, and petroleum economic evaluation. Industry short course teaching activity includes courses in petroleum reservoir management, basic reservoir engineering, well completions and performance, and petroleum economic evaluation.

GRADUATE STUDENT ACTIVITY:

Supervised 18 graduate students through degree completion, four doctoral students, and 14 masters students. Theses encompassed a range of topics related to fluid flow in porous media, reservoir engineering, production engineering, well performance, artificial lift, and environmental issues.

TECHNICAL AND PROFESSIONAL SOCIETIES:

- Society of Petroleum Engineers

- General Chairman, 2016 Improved Oil Recovery Conference 2014-2016
 - Carll, Lucas, and Uren Award Committee, 2010-2012
 - 2010 Annual Technical Conference and Exhibition Program Committee
 - Member of Reservoir Monitoring Technical Program Subcommittee, Annual Technical Conference and Exhibition, 2008-2010
 - Board of Directors, 2004 - 2006
 - Executive Editor, SPE Production and Facilities, 2001-2004
 - Elected Distinguished Member by Board of Directors, 2003
 - General Chairman, 2003 Production and Operations Symposium 2001-2003
 - Recipient of the Mid-Continent Region Service Award, 2002
 - Program Chairman, Oklahoma City Chapter, Reservoir Engineering and Economic Study Group, 2001-2002
 - Member of the Waterflooding Subcommittee, SPE Reprint Series, 2000-2002
 - Program Chairman, 2001 Production Operations Symposium, 2000-2001
 - Director, Oklahoma City Chapter, 1999-2001
 - Review Chairman, SPE Production and Facilities, 1998-2001
 - Served on the Engineering Registration Committee, 1996-1999
 - Member of the Reservoir Management Subcommittee, SPE Reprint Series, 1996-1998
 - Program Committee, SPE Production Operations Symposiums, 2009, 2007, 2005, 2003, 2001, 1999, 1997, 1995, 1993
 - Recipient of the Outstanding Technical Editor Award, 1996, 1997, 2009
 - Technical Editor, SPE Production and Facilities, 1995 to present
 - Member, Petroleum Computer Conference Committee, 1995 - 1997
 - Approved ABET Petroleum Engineering Visitor, 1993 to present
 - PI EPSILON TAU, The National Petroleum Engineering Honor Society, 1978
- Society of Petroleum Evaluation Engineers
 - American Society for Engineering Education
 - Network of Excellence in Training (NExT)
 - Petroleum Engineering Peer Review Board, 2000 – 2010
 - University of Oklahoma, Norman
 - General Chairman, Conference on Naturally Fractured Reservoirs
 - Recipient, Petroleum and Geological Engineering Distinguished Achievement Award, 2000
 - College of Engineering Dean's Senior Advisory Committee, 1999 – 2000
 - Student Chapter Faculty Advisor, 1991-1996

REGISTRATION:

- Registered Professional Engineer, States of Texas and Oklahoma

PUBLICATIONS:

- Akhimiona, N. and Wiggins, M.L.: "An Inflow Performance Relationship for Horizontal Gas Wells," paper SPE 97627 presented at the 2005 SPE Eastern Regional Meeting, Morgantown, WV, 14-16 September.
- Wiggins, M.L. and Wang, H-S.: "A Two-Phase IPR for Horizontal Oil Wells," paper SPE 94302 presented at the 2005 SPE Production & Operations Symposium, Oklahoma, OK, 16-19 April.
- Anklam, E.G. and Wiggins, M.L.: "Horizontal Well Productivity and Wellbore Pressure Behavior Incorporating Wellbore Hydraulics," paper SPE 94316 presented at the 2005 SPE Production & Operations Symposium, Oklahoma, OK, 16-19 April.
- Ogunsina, O.O. and Wiggins, M.L.: "A Review of Downhole Separation Technology," paper SPE 94276 presented at the 2005 SPE Production & Operations Symposium, Oklahoma, OK, 16-19 April.
- Anklam, E.G. and Wiggins, M.L.: "A Review of Horizontal Wellbore Pressure Equations," paper SPE 94314 presented at the 2005 SPE Production & Operations Symposium, Oklahoma, OK, 16-19 April.
- Gallice, F. and Wiggins, M.L.: "Comparison of Two-Phase Inflow Performance Relationships," SPEPF (May 2004) 100-104.
- Brown, R.L., Wiggins, M.L. and Gupta, A.: "Seismic Determination of Saturation in Fractured Reservoirs," SPE Journal (September 2002) 237-242.
- Penuela, G., Hughes, R.G., Civan, F. and Wiggins, M.L.: "Elongated-Slab Models for Interporosity Flow in Naturally Fractured Reservoirs," paper NFR-003 presented at the 2002 Conference on Naturally Fractured Reservoirs, 3-4 June 2002.
- Penuela, G., Civan, F., Hughes, R.G., and Wiggins, M.L.: "Time-Dependent Shape Factors for Interporosity Flow in Naturally Fractured Gas-Condensate Reservoirs," paper SPE 75524 presented at the SPE Gas Technology Symposium held in Calgary, 30 April - 2 May 2002.
- Penuela, G., Hughes, R.G., Civan, F., and Wiggins, M.L.: "Time-Dependent Shape Factors for Secondary Recovery in Naturally Fractured Reservoirs," paper SPE 75234 presented at the SPE/DOE Improved Oil Recovery Symposium, Tulsa, April 13-17, 2002.

- Striz, E.A. and Wiggins, M.L.: "A Coupled Model to Predict Interformation Flow Through an Abandoned Wellbore," SPE Production and Facilities (February 2002) 11-22.
- Gasbari, S. and Wiggins, M.L.: "A Dynamic Plunger Lift Model for Gas Wells," SPE Production and Facilities (May 2001) 89-96.
- Goel, N., Wiggins, M.L. and Shah, S.: "Analytical Modeling of Gas Recovery from In Situ Hydrates Dissociation," Journal of Petroleum Science and Engineering (April 2001) 113-125.
- Brown, R.L., Wiggins, M.L. and Gupta, A.: "Seismic Determination of Saturation in Fractured Reservoirs," paper SPE 67278, Proceedings 2001 SPE Production and Operations Symposium, Oklahoma City, OK, March 25-28.
- Brown, R.L., Wiggins, M.L. and Gupta, A.: "Problems Calibrating Production and Seismic Data for Fractured Reservoirs," paper SPE 67317, Proceedings 2001 SPE Production and Operations Symposium, Oklahoma City, OK, March 25-28.
- Wiggins, M.L.: "Analytical Inflow Performance Relationships," ASME Journal of Energy Resources Technology (March 1999) 24-30.
- Wiggins, M.L., Nguyen, S.H., and Gasbarri, S.: "Optimizing Plunger Lift Operations in Oil and Gas Wells," paper SPE 52119, Proceedings 1999 SPE Mid-Continent Operations Symposium, Oklahoma City, OK, March 28-31.
- Wiggins, M.L. and Startzman, R.A.: "An Approach to Reservoir Management," Reservoir Management, Reprint Series No. 48, SPE, Richardson, TX (1998) 9-15.
- Gallice, F. and Wiggins, M.L.: "Comparison of Two-Phase Inflow Performance Relationships," paper SPE 52171, Proceedings 1999 SPE Mid-Continent Operations Symposium, Oklahoma City, OK, March 28-31.
- Striz, E.A. and Wiggins, M.L.: "A Coupled Model to Predict Interformation Flow Through an Abandoned Wellbore," paper SPE 49151, Proceedings 1998 SPE Annual Technical Meeting and Exhibition, New Orleans, LA, Sept. 27-30.
- Wiggins, M.L., Broussard, N.J., and Rieke, H.H.: "Advisory Boards: Leveraging Industry Resources," paper SPE 39491, Proceedings 1997 SPE Annual Technical Conference and Exhibition, San Antonio, TX, Oct. 5-8.

- Lee, W.J., et al.: “Enhancing Partnerships Between Engineering and Education: Roles for SPE,” paper SPE 39492, Proceedings 1997 SPE Annual Technical Conference and Exhibition, San Antonio, TX, Oct. 5-8.
- Sabins, F. and Wiggins, M.L.: “Parametric Study of Gas Entry into Cemented Wellbores,” SPE Drilling and Completion, (Sept. 1997) 180-187.
- Sabins, F. and Wiggins, M.L.: “Supplement to SPE 28472, Parametric Study of Gas Entry into Cemented Wellbores,” paper SPE 39494, SPE, Richardson, TX.
- Gasbarri, S., Gupta, A.J., and Wiggins, M.L.: “Inflow Performance of Reservoirs Produced by Intermittent Lift Methods,” paper 97-135, Proceedings 48th Annual Technical Meeting of The Petroleum Society, Calgary, Alberta, Canada, June 8-11, 1997.
- Gasbarri, S. and Wiggins, M.L.: “A Dynamic Plunger Lift Model for Gas Wells,” paper SPE 37422, Proceedings 1997 SPE Production Operations Symposium, Oklahoma City, OK, March 9-11, 1997.
- Wiggins, M.L., Russell, J.E., and Jennings, J.W.: “Analytical Development of Vogel-Type Inflow Performance Relationships,” SPE Journal (Dec. 1996) 355-362.
- Almisned, O.A. and Wiggins, M.L.: “Utilization of Software Engineering in Modeling a Petroleum Engineering Problem,” paper SPE 36003, Proceedings 1996 SPE Petroleum Computer Conference, Dallas, TX, June 2-5, 1996.
- Wiggins, M.L. and Evans, R.D.: “Reserves and Resources of Oil and Gas,” Encyclopedia of Earth Sciences, E.J. Dasch (ed.) MacMillian Library Reference, New York, NY (1996).
- Wiggins, M.L.: “Generalized Inflow Performance Relationships for Three-Phase Flow,” 1994 SPE Annual Transactions, Richardson, TX (1995).
- Anklam, E.G. and Wiggins, M.L.: “E&P Waste Management Practices,” Proceedings 1995 International Petroleum Environmental Conference, New Orleans, LA, Sept. 25-27.
- Anklam, E.G. and Wiggins, M.L.: “Waste Trends in Oil and Gas Operations,” Proceedings 1995 WERC Technology Development Conference, Las Cruces, NM.
- Han, D., Wiggins, M.L. and Menzie, D.E.: “An Approach to the Optimum Design of Sucker-Rod Pumping Systems,” paper SPE 29535, Proceedings 1995 SPE Production Operations Symposium, Oklahoma City, OK, April 2-4.

- Poe, B.D., Elbel, J.L., Wiggins, M.L. and Spath, J.B.: "Prediction of Future Well Performance Including Reservoir Depletion Effects," paper SPE 29465, Proceedings 1995 SPE Production Operations Symposium, Oklahoma City, OK, April 2-4.
- Sabins, F. and Wiggins, M.L.: "Parametric Study of Gas Entry into Cemented Wellbores," paper SPE 28472, Proceedings 1994 SPE Annual Technical Conference and Exhibition, New Orleans, LA, Sept. 26-28.
- Wiggins, M.L. and Ankam, E.G.: "Managing E&P Waste Lessens Impact," American Oil & Gas Reporter (Aug. 1994) 78-83.
- Wiggins, M.L.: "Generalized Inflow Performance Relationships for Three-Phase Flow," SPE Reservoir Engineering (Aug. 1994) 181-182
- Wiggins, M.L. and Zhang, X.: "Using PCs and Monte Carlo Simulation for Assessing Risk in Workover Evaluations," SPE Computer Applications (June 1994) 19-23.
- Wiggins, M.L. and Zhang, X.: "Using PCs and Monte Carlo Simulation for Assessing Risk in Workover Evaluations," paper SPE 26243, Proceedings 1993 SPE Petroleum Computer Conference, New Orleans, LA, July 11-14.
- Wiggins, M.L.: "Generalized Inflow Performance Relationships for Three-Phase Flow," paper SPE 25458, Proceedings 1993 SPE Production Operations Symposium, Oklahoma City, OK, March 21-23.
- Wiggins, M.L., Choe, J. and Juvkam-Wold, H.C.: "Single Equation Simplifies Horizontal, Directional Drilling Plans," Oil & Gas Journal (Nov. 2, 1992) 74-79.
- Wiggins, M.L., Russell, J.E. and Jennings, J.W.: "Analytical Inflow Performance Relationships for Three-Phase Flow in Bounded Reservoirs," paper SPE 24055, Proceedings 1992 SPE Western Regional Meeting, Bakersfield, CA, Mar. 30-Apr. 1.
- Wiggins, M.L., Russell, J.E. and Jennings, J.W.: "Analytical Development of Vogel-Type Inflow Performance Relationships," paper SPE 23580, Proceedings 1992 SPE Permian Basin Oil and Gas Recovery Conference, Midland, TX, Mar. 18-20.
- Wiggins, M.L.: "Methods Predict Oil Well Performance," American Oil & Gas Reporter (Sept. 1991) 64-67.

- Wiggins, M.L., Jochen, V.A. and Jennings, J.W.: “Prediction of Oilwell Performance in Bounded Reservoirs,” Proceedings 1991 Southwestern Petroleum Short Course, Lubbock, TX, Apr. 17-18.
- Mukerji, P., Wiggins, M.L. and Jennings, J.W.: “Inflow Performance Relationships for Oil-Water Systems Above the Bubble Point,” Proceedings 1991 Southwestern Petroleum Short Course, Lubbock, TX, Apr. 17-18.
- Wiggins, M.L. and Juvkam-Wold, H.C.: “Simplified Equations for Planning Directional and Horizontal Wells,” paper SPE 21261, Proceedings 1990 Eastern Regional Meeting, Columbus, OH, Oct. 31-Nov. 2.
- Wiggins, M.L. and Startzman, R.A.: “An Approach to Reservoir Management,” paper SPE 20747, Proceedings 1990 SPE Annual Technical Conference and Exhibition, New Orleans, LA, Sept. 23-26.
- Wiggins, M.L. (ed.): A Manual for Petroleum Reservoir Management, Crisman Institute for Petroleum Reservoir Management, Petroleum Engineering Department, Texas A&M U., College Station, TX (May 1989).