

Curriculum Vitae
RON THOMAS
Tulsa, OK

EDUCATION:

Louisiana State University
Baton Rouge, Louisiana
Ph.D. in Chemistry (December 1975)

Southwestern State Oklahoma University
Weatherford, Oklahoma
B.S. in Chemistry (1968)

SPECIALIZATION: Dr. Ron Thomas has more than thirty five years of oilfield/laboratory experience in both managerial and technical positions. He has worked for Schlumberger Dowell, Saudi Aramco, and PEI in the U.S. and internationally (France, Saudi Arabia, Singapore, Indonesia, Angola, Viet Nam). During the past 15+ years his work has primarily focused on managing PEI, LTD along with training and mentoring of young engineers. He has published more than 40 technical publications including Chapter 13 in the 3rd Edition of the *Reservoir Stimulation* book by Nolte/Economides. Dr. Thomas also served as the editor of the Matrix chapters in the *Reservoir Stimulation* book. He holds 8 U.S. patents (Clay Acid, OilSEEKER (VES), and Organic Clay Acid), and numerous international patents.

JOB EXPERIENCE:

3/03 to present

**President and Senior Consultant – PRODUCTION ENHANCEMENT
INTERNATIONAL, LTD**

President of PRODUCTION ENHANCEMENT INTERNATIONAL, LTD., a consulting firm directed at providing stimulation engineering services with emphasis on practical training and student mentoring. Responsible for consultant hiring/performance reviews, preparation of training material/quality, class scheduling, marketing, and contracts. As Senior Consultant, responsible for worldwide reservoir and matrix engineering training for oil/gas operators, and Schlumberger including NExT. Conduct training classes for ~300 students per year. Developed advanced training material and presentations designed to link reservoir engineering technology directly to matrix stimulation engineering. Responsible for well test, system analysis (Nodal), and matrix stimulation software training. Awarded patent “Method of Treating Subterranean Formations to Enhance Hydrocarbon Production Using Proppants,” United States Patent 7,392,843. Recently responsible for design and evaluation of successful Pre-Salt matrix treatments offshore Angola for oil/gas operator.

9/99 – 11/02

Science Specialist – Saudi Aramco

Responsible for a variety of projects in the Stimulation Group, Aramco R&D Center in Dhahran, Saudi Arabia, with a focus on high temperature sandstone acidizing (Jauf and Unayzah reservoirs). Other projects include the field validation of commercial matrix treatment design software in Arab-D injectors, a laboratory study directed at the formation of tachyhydrite in dolomitic limestones, and compatibility studies. Additional research interests include stimulation of horizontal wells, and fracture conductivity. Published three SPE papers, and an article in the Saudi Aramco Journal of Technology on high temperature matrix acidizing of the Jauf reservoir. Published numerous internal reports. Several patent applications submitted on fracturing of deep oil/gas wells, and stimulation of carbonate reservoirs. Schlumberger patent awarded on the use of viscoelastic surfactant (VES) fluids for application in fracturing and matrix treatments.

1/99 –6/99

Matrix Engineering Specialist - Schlumberger Dowell

Responsible for worldwide Matrix Treatment technology with emphasis on development of improved chemistry and services. Position located at Dowell's Engineering Center in Sugar Land, Texas. Duties focused on development of an engineered methodology for stimulation of carbonate reservoirs including matrix, acid fracturing, and propped fracturing treatments. Responsible for internal and client training on Matrix Stimulation Engineering, and new technology transfer. A key task was supervision of Development Engineers within Dowell Research/Engineering who are working on Matrix related projects. SPE paper on a new matrix diversion system for carbonates published for the 1999 SPE National meeting. Two patents pending on VES as a fracturing fluid/matrix diversion system, and a sandstone acidizing system for sensitive formations.

1/96 - 1/99

StimCADE Product Manager – Schlumberger Dowell

Responsible for worldwide technology transfer of StimCADE Matrix Stimulation software in cooperation with ARCO, and other User Club Members (Statoil, BP, Shell, etc.). Duties included daily consultation with StimCADE programmers, development/execution of marketing plans, and field-testing of StimCADE. Conducted 3 and 5 day Matrix Stimulation Engineering schools for more than 400 Schlumberger and client engineers. StimCADE was winner of the 1997 Meritorious Award for Engineering Innovation sponsored by Petroleum Engineer International. Published numerous SPE papers on horizontal well acidizing, and field validation of StimCADE models including an article in SPE Production & Facilities on coiled tubing acidizing of horizontal wells. Performed the duties of editor for the Matrix chapters in the 3rd Edition of the Reservoir Stimulation book by Nolte et al. and wrote Chapter 13 ("Introduction to Matrix Treatments").

4/93 - 1/96

Far East Production Services Manager – Dowell Schlumberger

Responsible for technology transfer of acidizing, fracturing, and water control. Position located in Jakarta with coverage of Vietnam, India, Pakistan, China, Japan, Indonesia, Australasia, and numerous other countries. Duties included internal/client training, development/ execution of marketing plans, and field-testing of new stimulation technology. Instrumental in development of hydraulic fracturing of deep high temperature oil wells in Vietnam, geothermal well matrix/fracture stimulation in the Philippines, improved water control treatments, and Enhanced Production Forums. Performed duties as a Design and Evaluation (DESC) Engineer for Vietsovetro in Vung Tau, Vietnam with emphasis on propped fracturing using bauxite. Member of the SPE Southeast Asia Conference and IPA Meeting Technical committees. Awarded the "Best Paper" for Engineering at the 22nd annual IPA meeting. Presented SPE papers on coiled tubing acidizing and propped fracturing in Vietnam.

8/90 - 4/93

Matrix Stimulation Business Line Manager - Dowell Schlumberger

Responsible for worldwide Matrix Treatment business line. Position located at DS Headquarters, Paris, France. Duties focused on internal training (Advanced Service Modules) and management of engineering projects. Additionally, duties included supervision of field-testing and development/execution of marketing plans for new and repositioned Matrix products/services. Published SPE and IPA papers on foam diversion and fines migration. Issued patent on Hydraulic Fracturing. Member of the SPE Acidizing Reprint Committee.

11/87 to 8/90

Senior Staff Engineer - Dowell Schlumberger

Responsible for technical sales/service and development for DS Stimulation products/services in North America with emphasis on acid and propped fracturing of HTHP gas wells (Wilcox, Cotton Valley Sandstone, Edwards Limestone, Cotton Valley Limestone). Duties included performance and development of stimulation technical seminars for DS personnel and clients. Authored the Matrix Stimulation Advanced Service Module, an internal one-week school. Managed development projects in R&D, and short- and long-term technology transfer projects to the field/clients with emphasis

on fracturing (Borate vs. Titanate). Published three SPE papers on fracturing, and stimulation of horizontal wells. Co-authored a chapter "Stimulation of Carbonate Reservoirs" in *Oil and Gas Production from Carbonate Rocks* by Chilingar (ed.). Member of the SPE Formation Damage Reprint Committee.

9/86 to 11/87

Senior Development Scientist - Dowell Schlumberger

Responsible for worldwide Fracturing and Sand Control Technical Service in Tulsa R&D. Duties included performance of technical seminars for clients and DS personnel, technical writing and editing, laboratory chemical and mechanical testing, and other tasks to support Marketing and Operations as required. Editor of *Fluid Selection Guide for Matrix Acidizing*, Dowell Schlumberger, 1986. Submitted numerous patent disclosures related to fracturing fluids and fracturing of horizontal wells.

5/86 to 9/86

Senior Development Scientist - Dowell Schlumberger

Assigned to the DS Equipment Task Force as the Task Force Leader. Responsible for development of the DS Equipment Strategy designed to address the problems associated with future pumping equipment architecture and requirements.

12/85 to 5/86

Regional Marketing Manager - Dowell Schlumberger

Responsible for coordinating all marketing and sales efforts within the Central Region (Texas Panhandle to Pennsylvania). Responsible for all revenue forecast, market share calculations, technical training plans for DS and clients, coordinated the introduction of experimental/commercial products and services. Also responsible for R&D project proposal plans, weekly and monthly marketing reports, advertising, trade show participation, liaison with State Oil and Gas Associations, pricing strategy, client contact strategy and several client contacts.

9/84 to 12/85

Stimulation Marketing Specialist - Dowell Schlumberger

Responsible for marketing of all stimulation products and services in the Southern Region (Texas and Louisiana) with emphasis on fracturing of deep gas wells (Wilcox, Cotton Valley Lime etc.). Responsible for field development of all experimental products/services, technical training of DS personnel and clients, and regional laboratory stimulation development projects. Also responsible for liaison with client laboratory personnel, and technical assistance to the sales staff.

3/83 to 9/84

Regional Account Manager - Dowell Division of Dow Chemical USA and Dowell Schlumberger

Responsible for acid/propped fracturing stimulation and cementing sales to 20 operating companies in Houston. Emphasis was on fracturing of deep gas wells for Mitchell Energy completed in the Wilcox and Cotton Valley Limestone reservoirs. Sales revenue generated averaged \$400K/month.

4/81 to 3/83

Chemical Technology Manager - Dowell Division of Dow Chemical USA

Responsible for managing five Southern Regional Laboratories, The Regional Quality Assurance Program, technical seminars for DS personnel and clients, development of experimental products and services, and technical contact with clients in research and production. Published one SPE paper on fracturing quality assurance/monitoring.

1/80 to 4/81

Regional Engineer - Dowell Division of Dow Chemical USA

Responsible for quality assurance technical sales/training and other engineering related duties in four district locations in the Southern Region. Instrumental in publishing a Regional Fracturing Policy. Responsible for critical well fracturing design throughout the Southern Region, i.e. deep HTHP gas reservoirs to 400°F. Fracturing treatments performed in the Wilcox, Cotton Valley Sandstone, Edwards Limestone, Cotton Valley Limestone, and Austin Chalk reservoirs.

6/78 to 1/80

Senior Research Chemist - Dowell Division of Dow Chemical USA

Supervisor of the Fracturing Fluid Research Group in Tulsa. Developed YF400 (High-Temperature Fracturing Fluid), and J353 (High-Temperature Stabilizer). Note J353 is the standard stabilizer used today by all service companies. Published one SPE paper and submitted two patent disclosures.

10/75 to 6/78

Research Chemist - Dowell Division of Dow Chemical USA

Performed research on Matrix Acidizing techniques and systems. Developed Clay Acid, a multimillion-dollar product. Received three United States and several foreign patents. Published several SPE papers.

1974 to 1975

Research Associate for Dr. Philip W. West at Louisiana State University.

1972 to 1974

Graduate Teaching Assistant at Louisiana State University.

1968 to 1972

Served in the United States Army including a tour in Vietnam and Cambodia. Obtained the rank of Captain. Awards include the Bronze Star, Air Medal, Valorous Unit Award and the Vietnamese Cross of Gallantry.

PUBLICATIONS

Thomas, R.L., and Nasr-El-Din, H.A.: "Field Validation of a Carbonate Matrix Acidizing Model: A Case Study of Seawater Injection Wells in Saudi Arabia," paper SPE 82271 to be presented at the 2003 SPE European Formation Damage Conference held in The Hague, 13-14 May, 2003.

Thomas, R.L., Nasr-El-Din, H.A., Lynn, J.D., Meththa, S., Zaidi, S., and Muhareb, M.: "Matrix Acidizing of the HT/HP Jauf Sandstone Reservoir: A Laboratory Study," *The Saudi Aramco Journal of Technology*, Summer 2002.

Thomas, R.L., Nasr-El-Din, Meththa, S., Hilab, V., and Lynn, J.D.: "The Impact of HCl to HF Ratio on Hydrated Silica Formation During the Acidizing of a High Temperature Sandstone Gas Reservoir in Saudi Arabia," paper SPE 77370 for the 2002 SPE Annual Technical Conference and Exhibition, San Antonio, Texas, 29 September – 2 October 2002.

Thomas, R.L., Nasr-El-Din, H.A., Lynn, J.D., Meththa, S., Muhareb, M., and Ginest, N.: "Channel vs. Matrix Sandstone Acidizing of a HT/HP Reservoir in Saudi Arabia," paper SPE 73702 presented at the 2002 SPE International Symposium on Formation Damage Control held in Lafayette, Louisiana, 20–21 February 2002.

Thomas, R.L., Nasr-El-Din, H.A., Lynn, J.D., Meththa, S., and Zaidi, S.R.: "Precipitation During the Acidizing of a HT/HP Illitic Sandstone Reservoir in Eastern Saudi Arabia: A Laboratory Study," paper SPE 71690 presented at the 2001 SPE Annual Technical Conference and Exhibition, New Orleans, Louisiana, September 30 - October 3, 2001.

Chang, F.F., Love, T.G., Affeld, C.J., Blevins III, J.B., Thomas, R.L., and Fu, D.K. 2000. New Material and Technique for Matrix Stimulation in High-Water-Cut Oil Wells. *SPE Drilling & Completion* **15** (2): 126–131.

Kotlar, H.K., Thomas, R.L., Ziauddin, M., Brydon, H. and Karlstad, S.: "Gravel-pack Damage Removal in Horizontal and Vertical Wells," paper 54724 presented at the 1999 SPE European Formation Damage Conference, The Hague, The Netherlands, 31 May – 1 June 1999.

Chang, F.F., Thomas, R.L., and Fu, D.K.: "A New Material and Novel Technique for Matrix Stimulation of High-Water-Cut Oil Wells," paper SPE 39592 presented at the 1998 International Symposium on Formation Damage Control held in Lafayette, 18-19 February 1998.

Eckerfield, L.D., Zhu, D., Hill, A.D., Thomas, R.L., Robert, J.A. and Bartko, K.: "Fluid Placement Model for Stimulation of Horizontal or Variable Inclined Wells," paper 49103 presented at the 73rd Annual Technical Conference and Exhibition of the SPE, New Orleans, September 28-30 1998.

Thomas, R.L., Saxon, A. and Milne, A.: "The Use of Coiled Tubing During Matrix Acidizing of Carbonate Reservoirs Completed in Horizontal, Deviated and Vertical Wells," SPE Production and Facilities (August, 1998).

Thomas, R.L., Ali, S.A., Acock, A.M., and Robert, J.A.: "Field Validation of a Foam Diversion Model: A Matrix Stimulation Case Study," paper 39422 presented at the 1998 International Symposium on Formation Damage Control held in Lafayette, 18-19 February 1998.

Ezeukwu, T., Thomas, R.L. and Gunneroed, T.: "Fines Migration Control in High-Water-Cut Nigerian Oil Wells: Problems and Solutions," paper 39482 presented at the 1998 International Symposium on Formation Damage Control held in Lafayette, 18-19 February 1998.

Bartko, K.M., Acock, A.M, Robert, J.A and Thomas, R.L.: "A Field Validated Matrix Acidizing Simulator for Production Enhancement in Sandstones and Carbonates," paper SPE 38170 presented at the 1997 SPE European Formation Damage Conference held in The Hague, 2-3 June 1997.

Hung L.V., San, N.T., Shelomentsev, A.G., Tronov J.A., Lam, D.D., Thomas, R.L., Fox, T. and C. Bisdikian: "Near-Tip-Screenout Hydraulic Fracturing of Oil Wells in the Bach Ho Field, Offshore Vietnam," paper SPE 29284 presented at the SPE Asia Pacific Oil & Gas Conference held in Kuala Lumpur, Malaysia, 20-22 March 1995 and the 1st Annual SPE - PetroVIETNAM Technical Conference in Ho Chi Minh City, S.R. Vietnam, 1-2 March 1995.

Thomas, R.L. and Milne, A.: "The Use of Coiled Tubing during Matrix Acidizing of Carbonate Reservoirs". paper SPE 29266 presented at the SPE Asia Pacific Oil & Gas Conference held in Kuala Lumpur, Malaysia, 20-22 March 1995.

Zerhboub, M., Ben-Naceur, K., Touboul, E., and Thomas, R.L. 1994. Matrix Acidizing: A Novel Approach to Foam Diversion. *SPE Production & Facilities* (5): 121-126.

Thomas, R. and Fannin, V.: "A Sandstone Matrix Acidizing Simulator for Engineered Treatment Designs: A Field study, " paper IPA 93-23.122 presented at the 22nd Annual Convention, October 1993.

Thomas, R and Milne, A.: "The Use of Coiled Tubing During Matrix Acidizing of Carbonate Reservoirs" presented at the World Oil Coiled Tubing Forum, March 1993.

Crowe, C. W., Masmonteil, J., Touboul, E. and Thomas, R.: "Trends in Matrix Acidizing" *Oilfield Review* (October 1992): 22-40

Ayorinde, A., Granger, C. and Thomas, R.L.: "The Application of Fluoboric Acid in Sandstone Matrix Acidizing: A Case Study," paper IPA 92-23.23 presented at the 21st Annual Convention, October 1992.

Zerhboub, M., Touboul, E., Ben-Naceur, K. and Thomas, R.L.: "Matrix Acidizing: A Novel Approach to Foam Diversion," paper SPE 22854 presented at the 66th Annual Technical Conference and Exhibition of the SPE, Dallas, October 6-9, 1991.

Brown, E., Thomas, R. and Milne, A.: "The Challenges of Completing and Stimulating Horizontal Wells" *Oilfield Review* (July 1990): 53-63.

Weaton, W.E., Lipari, S.A., Morris, M.D., Boney, C.L. and Thomas, R.L.: "A Case Study of High-Temperature Wells Fractured Using Multiple Fluids to Improve Conductivity and Well Performance," paper SPE 21033 presented at the SPE International Symposium on Oilfield Chemistry, Anaheim, California, February 20-21, 1990.

- Hendrickson, A.R., Thomas, R.L. and Economides, M.J.: "Stimulation of Carbonate Reservoirs," in *Oil and Gas Production From Carbonate Rocks*, G. Chilingar (ed.), American Elsevier, in press 1989.
- Economides, M.J. and Thomas, R.L.: "Well Analysis Before and After Fracture Stimulation," paper SPE 89018 presented at the Joint SPE/New Mexico Tech Centennial Meeting, Socorro, New Mexico, October 16-19, 1989.
- Thomas, R.L. and Brown, J.E.: "The Impact of Fracturing Fluids on Conductivity and Performance in Low-Temperature Wells," paper SPE 18862 presented at the Production Operations Symposium, Oklahoma City, March 13-14, 1988.
- Wine, J.D., DeBonis, M.P. and Thomas, R.L.: "The Effect of Guar and HPG Crosslinked Fracturing Fluids on Well Performance: A Case Study," presented at the Low Permeability Reservoirs Symposium/Rocky Mountain Regional Meeting, Denver, March 6-8, 1988.
- Thomas, R.L., Smith, C.F. and Grant, W.D.: "Quality Assurance -- No Margin For Error," paper SPE 10912 presented at the 1982 SPE Cotton Valley Symposium, Tyler, May 20, 1982.
- Thomas, R.L. and Crowe, C.W.: "Matrix Treatment Employs New Acid System For Stimulation and Control of Fines Migration in Sandstone Formations," *JPT* (August 1981) 1491-1500.
- Elbel, J.L. and Thomas, R.L.: "The Use of Viscosity Stabilizers in High-Temperature Fracturing," paper SPE 9036 presented at the SPE Rocky Mountain Regional Meeting, Casper, May 14-16, 1980.
- McBride, J.R., Rathbone, M.J. and Thomas, R.L.: "Evaluation of Fluoboric Acid Treatments in the Grand Isle Offshore Area Using Multiple Rate Flow Test," paper SPE 8399 presented at the 54th Annual Technical Conference and Exhibition of the SPE, Las Vegas, September 23-26, 1979.
- Thomas, R.L. and Elbel, J.L.: "The Use of Viscosity Stabilizers in High-Temperature Fracturing," paper SPE 8344 presented at the 54th Annual Technical Conference and Exhibition of the SPE, Las Vegas, September 23-26, 1979.
- Thomas, R.L. and Crowe, C.W.: "Matrix Treatment Employs New Acid System for Stimulation and Control of Formations Fines Migration in Sandstone Formations," paper SPE 7566 presented at the 53rd Annual Technical Conference and Exhibition of the SPE, Houston, October 1-3, 1978.
- Thomas, R.L., Crowe, C.W. and Chmilowski, W.: "Single Stage Chemical Treatment Provides Stimulation and Clay Control in Sandstone Formations," paper presented at the 29th Annual Technical Meeting of the Petroleum Society of the CIM, Calgary, June 13-16, 1978.
- Thomas, R.L. and Crowe, C.W.: "Single Stage Chemical Treatment Provides Stimulation and Clay Control in Sandstone Formations," paper presented at the SPE California Regional Meeting, San Francisco, April 12-14, 1978.
- Thomas, R.L., Crowe, C.W. and Simpson, B.E.: "Effect of Chemical Treatment Upon Formation Clays is Revealed by Improved SEM Technique," paper presented at the 51st Annual Technical Conference of the SPE, New Orleans, October 3-6, 1976.
- Thomas, R.L., Dharmarajan, V., Lindquist, G.L. and West, P.W.: "Measurement of Sulfuric Acid Aerosol, Sulfur Trioxide and the Total Sulfate Content of the Ambient Air," *Anal. Chem.* (April 1976) 48, 638-46.
- Maddalone, R.F., Thomas, R.L. and West, P.W.: "The Measurement of Sulfuric Acid Aerosol and the Total Sulfate Content of the Ambient Air," *Environ. Sci. Technol.* (February 1976) 10, 162-67.
- Dharmarajan, V., Thomas, R.L., Maddalone, R.F. and West, P.W.: "Sulfuric Acid Aerosol -- A Review," *Sci. of the Total Environ.* (April 1975) 4, 279-89.

Thomas, R.L., Dharmarajan, V. and West, P.W.: "Convenient Method for Generation of Sulfuric Acid Aerosol," *Environ. Sci. Technol.* (October 1974) 8, 930-38.

PATENTS

Ortiz; Isaias, and Thomas; Ronnie L.: "Method of Treating Subterranean Formations to Enhance Hydrocarbon Production Using Proppants," United States Patent 7,392,843, July 1, 2008.

Chang, F., Thomas, R.L., Grant, W.D., and Frenier, W.: "Composition and Method for Treating a Subterranean Formation," United States Patent 6,924,255, August 2, 2005.

Samuel; M., Lee, J., Chang; F., Card; R., and Thomas; R.L.: "Compositions Containing Aqueous Viscosifying Surfactants and Methods for Applying Such Compositions in Subterranean Formations," United States Patent No. 6,637,517, October 28, 2003.

Qu, Q., Nelson; E., Willberg; D., Samuel; M., Lee, J., Chang; F., Card; R., Vinod, P., Brown, E., and Thomas; R.L.: "Compositions Containing Aqueous Viscosifying Surfactants and Methods for Applying Such Compositions in Subterranean Formations," United States Patent No. 6,435,277, August 20, 2002.

Thomas, R.L and Boney, C.L.: "Fracturing With Multiple Fluids to Improve Fracture Conductivity," United States Patent No. 5,036,919, August 6, 1991

Thomas, R.L.: "Method For Acidizing a Subterranean Formation," United States Patent No. 4,151,878, May 1, 1979.

Thomas, R.L.: "Method For Acidizing a Subterranean Formation," United States Patent No. 4,151,879, May 1, 1979.

Thomas, R.L. and Suhy, F.A.: "Method of Treating a Well Using Fluoboric Acid to Clean a Propped Fracture," United States Patent No. 4,160,483, January 1979.