JOHN W. WRIGHT

FEBRUARY 1999

John Wright Company
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EDUCATION and PROFESSIONAL AFFILIATIONS

B.Sc. Mechanical Engineering And Metallurgy, Texas A&M University, Registered Engineer, Texas,

SPE & API

WORK HISTORY

JOHN WRIGHT COMPANY: President, *"Blowout Engineering Advisor"*, (1989 - Present). Mr. Wright formed John Wright Company in August 1989 to provide blowout control engineering design, specialist personnel and related special services general contracting specifically for relief wells and underground blowouts, to the oil and gas industry. During this time Mr. Wright has designed and supervised dozens of relief well and borehole intersection projects around the world. Additionally he was instrumental in pioneering blowout control contingency plans, developing procedures for special services and response organizations, and introducing a comprehensive "Well Control Management System". Mr. Wright co-founded *WELL FLOW DYNAMICS* in December 1991 to provide hydraulic two-phase transient kill simulations with OLGA-WELL-KILL for blowouts as well as other drilling and production operations. He managed the field operations of Vector Magnetics Inc., a casing detection firm in 1991 and 1992. In 1994 and 1995 he combined forces with Boots & Coots Inc., an oil well firefighting firm, forming Wright Boots & Coots Engineering. As of January 1996 the John Wright Company is again operating independent of all firefighting companies.

EASTMAN CHRISTENSEN: "Manager, Relief Well Operations", 1986 - 1989. Responsible for the technical design and operations of Eastman Christensen's Relief Well Team in execution of seven relief well projects during this time period. Pioneered methodologies using electro-magnetic ranging technology.

"Manager, Technical Services", 1985 - 1986. Supervised surveying, drilling tools, computers, and technical procedures for worldwide operations.

"Surveying Product Manager", 1983 - 1985. World wide survey market. New tool development, survey accuracy quantification, training, and quality assurance. "Presidents Award" for field introduction of Seeker Gyro in 1983.

"Technical Services Application Engineer", 1981 to 1983. Introduction of the first commercial rate gyro surveying system.

SCHLUMBERGER OFFSHORE SERVICES: Offshore *Field Logging Engineer*, 1979-1981.

PUBLICATIONS

- Rose, V.C., Wright, J.W., Hartman, R.: "Makarem-1 Relief Well Planning and Drilling" Presented at the SPE Annual Conference, New Orleans, 1998.
- Flak, L. H., Wright, J. W., & Ely, J. W.: "Part 1 Blowout control: Response, intervention and management–Strategy and planning", World Oil (November 1993), p.p. 71-78.
- Flak, L. H., Wright, J. W., & Tuppen, J. A: "Part 2 Blowout control: Response, intervention and management–Logistics", World Oil (December 1993), p.p. 55-61.
- Wright, J. W., Woodruff, J. W., & Thompson, D.: "Part 4 Blowout control: Response, intervention and management–Contingency Plans", World Oil (March 1994), p.p. 53-56.
- Rygg, O. B., Smestad P., & Wright J. W.: "Part 5 Blowout control: Response, intervention and management–Hydraulic Simulations", World Oil (April 1994).
- Flak, L. H. & Wright, J. W.: "Part 11 Blowout control: Response, intervention and management – Relief Wells", World Oil (December 1994), p.p. 59-64.
- Flak, L. H. & Wright, J. W.: "Part 12 Blowout control: Response, intervention and management – Incident Management", World Oil (April 1995), p.p. 105 - 112.
- Wright, J. W.: "Relief Well Technology Can Solve Ordinary Problems", O&GJ, (January 18, 1993), p.p. 30-33.
- Rygg, O.B., Smestad, P. & Wright J.: "Dynamic Two-Phase Flow Simulator: A Powerful Tool for Blowout and Relief Well Kill Analysis", SPE 24578, 1992.
- Wright, J. W.: "Blowout Intervention Preparedness Through Relief Well Contingency Planning", presented at IADC European Well Control Conference, (June 1991).
- Wright, J. W., Thompson, B. G., Zachary, M. B., Leraand, Frode: "Relief-Well Planning and Drilling for a North Sea Underground Blowout", J. Pet. Tech., (March, 1992), p.p. 266-273.
- Voisin, J., Quiroz, G. A., Wright, J. W., Pounds, R., Bierman, K.: "Relief Well Planning and Drilling for SLB-5-4X Blowout, paper SPE 16677 presented at the 1987 SPE Annual Technical Conference and Exhibition, Dallas, Sept. 27-30.
- Wright, J. W.: "Directional Drilling Azimuth Reference Systems", SPE17212, (February 1988).
- Wright, J. W.: "Rate Gyro Surveying of Wellbores in the Rocky Mountains", SPE 11841, (May 1983).
- Wright, J. W.: "New Generation Survey System Using Gyrocompassing Techniques", SPE 11169, (September 1982).

JAMES F. (JIM) WOODRUFF, P.E.

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EDUCATION AND PROFESSIONAL AFFILIATIONS

B.Sc. Mining Engineering and B.Sc. Civil Engineering, Virginia Polytechnic Institute and State University, Registered Engineer in State of Texas, Member SPE.

WORK HISTORY

JOHN WRIGHT COMPANY: *"Blowout Advisor"*, 1991 - Present. Employed as relief well field operations engineer specializing in relief well planning and rig site coordination for blowout control. Planned, engineered and/or coordinated relief wells on a wide range of well types, including onshore and offshore, surface and underground blowouts, single and multiple well intersections and oil/gas/H_2S well blowouts. Also provides emergency preparedness and contingency planning documents for both domestic and international operators. To date more than twenty-five development projects have been investigated and emergency planning documents submitted.

EASTMAN CHRISTENSEN: *"Senior Operations Engineer"*, 1991. Supervised five drilling engineers to support daily directional and horizontal drilling operations. Further supported daily operations with troubleshooting for difficult directional and horizontal wells on domestic and international locations, including first horizontal well in Ecuador.

"Senior Operations Coordinator", 1990-1991. Coordinated daily directional and horizontal drilling operations which included up to 35 rig site projects and 90 directional drillers. Responsible for the daily logistics and supervision of well planning, personnel, tools and equipment during the highly active Austin Chalk horizontal drilling period. Designed and implemented equipment and methods to increase average daily footage by approximately 20% within district operations. Prepared and instructed a horizontal drilling school for 100 directional drillers, engineers and support staff.

"Directional Drilling Engineer", 1988-1990. Performed rig site supervision of directional and horizontal drilling, including the first horizontal well in Venezuela. Designated as the Relief Well Team Drilling Engineer and assisted in the planning and execution of three relief wells with three successful intersections. This included a large geothermal blowout and a shallow dual intersection utilizing a 13 3/8" whipstock and build rates of up to 15°/100 feet.

"Staff Drilling Engineer I", 1987-1988. Provided support to worldwide locations from company headquarters with optimization of steerable systems, project proposals, torque and drag and troubleshooting of difficult directional and drilling optimization projects. Authored the company manual on the rig site operation of steerable systems.

"Directional Drilling Engineer", 1986-1987. Assigned to introduce and promote steerable systems at the rig site in the offshore North Sea drilling arena. Established many new local drilling records by designing, selecting and implementing a new and innovative directional drilling assembly, the NORTRAK Steerable System. Major accomplishments included the World's Longest Continuous 8 1/2" PDC Bit Run of 8315' in 96.5 hours on a 65° inclination casing whipstock sidetracked directional well offshore Norway. Became troubleshooter and trainer for steerable systems in the region.

DOWELL SCHLUMBERGER: "Directional Drilling Engineer", 1982-1985. Based in various international locations and provided rig site supervision of directional drilling services. Drilling environments included offshore, land, platform, and MODU's in Europe, Asia and Africa. Two years as the senior rig site supervisor of the directional drilling services for a forty well dual-derrick North Sea platform.

PUBLICATIONS

- Wright, J. W., Woodruff, J. F., & Thompson, D.: "Part 4 Blowout control: Response, intervention and management–Contingency Plans", World Oil (March 1994), pp. 53-56.
- Woodruff, J.F., Texas District Horizontal Drilling, 1991, Eastman Christensen.
- Woodruff, J.F., Navigation Drilling System Operator's Manual, 1988, Eastman Christensen.
- Pruitt, G.L., Ross, K.C., & Woodruff, J.F., " Drilling With Steerable Systems In Large Diameter Holes", SPE 17190, 1988.

MAJOR RELIEF WELL INTERVENTION EXPERIENCE

Marathon Oil (Alaska 1988), Ormat Energy (Nevada 1989), Saga 2/4-14 (North Sea 1989), CNG (PA 1991), Shell Western (Texas 1991), ARCO (Texas 1991), Sunrise (Kansas 1992), Phillips (Louisiana 1992), CNG ST-76 (GOM 1993), CNG 248-6 (GOM 1993), Phillips (Texas 1993), Elf (Nigeria 1993), Mexpetrol (Argentina 1993), Banoco (Bahrain 1994), Shell (Syria 1995), Banoco (Bahrain 1995-96), OGDC (Pakistan 1996), ELF Aquitane (France 1996 & 1997), PDO-Shell Oman (Oman 1997).

OLE BIRGER RYGG

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EDUCATIONAL BACKGROUND

M. Sc., Fluid Mechanics, University of Oslo, 1985
Ph.D., Fluid Mechanics, University of Oslo, 1988

WORK HISTORY

WELL FLOW DYNAMICS AS: "*Managing director*", 1991 to Present. Co-owner
Co-founded Well Flow Dynamics in 1991 and was responsible for the contract with IFE/Sintef for use of OLGA-WELL-KILL on a license basis. Responsible for the maintenance and further developments of the OLGA-WELL-KILL simulator, as well as, application of the model in actual blowouts and contingency planning.

INSTITUTE OF ENERGY TECHNOLOGY: *"Senior research scientist"*, 1988-1992. Project leader of several research projects in multi-phase flow simulation with application to North Sea pipeline transportation and design. In charge of IFE's successful application of the OLGA two-phase flow model in the kill planning of a major underground blowout in the North Sea in 1989. In charge of the development of the OLGA-WELL-KILL dynamic multi-phase flow simulator for blowout kill planning. Responsible for use of OLGA-WELL-KILL on a series of contingency plans and actual blowouts.

UNIVERSITY OF OSLO: *"Scientist"*, 1987. Lecturer in geophysics.
"Scientist", 1984-1987. Research in Physical Oceanography, Fundamentals of wave propagation and wave forces applied to offshore operations in the North Sea.

PUBLICATIONS

- Rygg, O.B., Smestad, P. & Wright J.: "Dynamic Two-Phase Flow Simulator: A Powerful Tool for Blowout and Relief Well Kill Analysis", SPE 24578, 1992.
- Rygg, O.B. & Gilhuus, T.: "Use of a Dynamic Two-Phase Pipe Flow Simulator in Blowout Kill Planning", SPE 20433, 1990.
- Rygg, O.B. & Ellul, I.: "The Engineering of Offshore pipelines: A Dynamic Simulation Approach", 16th ETCE, ASME, 1993.
- Rygg, O.B. & Ellul, I.: "The Dynamic Two-Phase Modeling of Offshore Live Crude lines Under Rupture conditions", OTC 6747, 1991.
- Rygg, O.B. & Flaten G.: "Dispersive Shallow Water Waves Over a Porous Sea Bed", Coastal Eng., 15, 1991.
- Rygg, O.B.: Nonlinear Refraction-Diffraction of Surface Waves in Intermediate and Shallow Water", Coastal Eng., 12, 1988.
- Rygg, O.B. et al: "Long Period Swell Wave Events on the Norwegian Shelf", J. of Physics Ocean. 18, 1988.
- Rygg, O.B.: "Refraction/Diffraction of Surface Gravity Waves", doctoral thesis Univ. of Oslo, 1988.

Morten Haug Emilsen

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Education and Professional Affiliations

M. Sc., Multiphase Flow Engineering, Norwegian Institute of Technology, Trondheim (NTH), 1994.
SPE, board member of the SPE OSLO Section

Work History

Well Flow Dynamics AS: Petroleum engineer, 1997 - Present. Well and flowline simulations in production optimisation. Blowout contingency planning. Software development.Engineering consultant for SAGA Petroleum ASA, Haltenbanken South Field Development. Engineering consultant for STATOIL, Åsgard Field Development.

Aker Engineering AS: Process engineer 1995-1997. Multiphase flow simulations and optimisation during the Åsgard field development project for Statoil. Start-up and shutdown philosophy, normal operation, equipment sizing. In charge of hydrate control for the Midgard flowlines and wells

JOHN W. ELY

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EDUCATION and PROFESSIONAL AFFILIATIONS

B.Sc. Chemistry, Oklahoma State University, SPE, ACS, AICH, ASQC

WORK HISTORY

JOHN WRIGHT COMPANY: Consultant for Kill Equipment and Speciality Polymer 1993 - present. Mr. Ely specializes in blowout hydraulics, particularly kill pumping equipment, fracture mechanics, well completion, cementing, fluids, and serves a unique role in the industry as a developer of patented polymer technology for control of blowouts in dynamic kill operations. His extensive publications, research and 25 years experience brings clients a level headed expert in equipment and fluids design, optimization techniques and site supervision.

Mr. Ely's background in blowout intervention pumping operations began with history-making kill operations in the Middle East and Indonesia, where he also developed methodology to aid optimization of relief well procedures once the well bore intercept is achieved. A Blowout Advisor with a unique knowledge of cementing, rheology, hydraulics, equipment, directional issues, polymers and mud with personnel management experience from kill operations around the world. Mr. Ely is President of his own company, Ely & Associates, specializing in hydraulic fracture treatments.

ELY & ASSOCIATES "President" , 1991 - present. Started in 1991 to provide a blend of practical and technical expertise on well completion, stimulation fluids, equipment, and reservoir analysis. Services respective to stimulation , formation evaluation, well performance analysis, multi-phase multi-dimensional reservoir analysis, completion's and workovers consulting including deep gas wells and coalbed methane, and several short-courses in hydraulic fracture treatment.

S.A. HOLDITCH & ASSOCIATES: "Vice-President of Stimulation Technology", 1985-1991. Assisted in well kill operations, including West Cameron; develop in-situ polymers for optimization of well kill operations, develop special tools (downhole jetting tool for special penetration). Provided technical expertise on fracturing and acidizing fluids. Supervised hundreds of stimulation treatments domestic and abroad and involved in research on fracturing fluids under the auspices of the Gas Research Institute.

NOWSCO "Engineering Manager", 1980-1985 Responsible for all phases of engineering , research and development and formulation of a chemical product line. Involvement in several kill operations including consulting for Red Adair on chemicals for fire extinguishment. One of several incidents where John's extensive knowledge of chemistry utilized for fire control, including several coal mine fires where cross-linked foam was used to seal off shafts and special plastics were used to seal the surface.

HALLLIBURTON SERVICES "Technical Advisor, International Operations", 1977-1980. Coordinate all phases of research with international field operations. Pumping operations supervisor at the Arun Field 1978 and 1980 during first documented use of dynamic kill procedures presented by Mobil Oil. Specialty polymers and loss circulation additives utilized. 1979 and 1980 spent 130 days on Ixtoc offshore well kill operation. John Ely designed the cement slurry, a 9 ppg high compression strength, light weight, thixotropic cement for use in final kill of the Ixtoc One. "*Technical Advisor, Eastern Hemisphere*", 1973-1977. Responsible for operations in 11 Middle Eastern countries. Involved in Conoco offshore blowout near Dubai. Salt cavities in proximity of the flowing well and crater with giant gas bubble significantly complicated application. Conventional well kill pumping operations failed. John developed controlled viscosity polymers to direct the flow of fluids to the blowing well and cross-linked polymers to fill huge salt cavities. Resulted in U.S. Patent #4,133,383. Involved in 8 relief well programs for high pressure gas well blowouts near Agahjari in Iran. Additionally, helped in high pressure water flow in Gachsaran where special polymers were utilized to control several wells with flow of as much as 300,000 bbls/day.

"Senior Chemist, "1965-1973. Involved in three separate kill operations in Southern Oklahoma where specialty chemicals required to kill wild wells. Chemicals provided viable alternative to top kill applications.

PUBLICATIONS

- Flak, L. H., Wright, J. W., & Ely, J. W.: "Part 1 Blowout control: Response, intervention and management–Strategy and planning", World Oil (November 1993), p.p. 71-78.
- Ely, J.W., Stimulation Treatment Handbook: An Engineer's Guide to Quality Control, 1985, Pennwell Publishing Company.

Numerous other publications

Stephen J. Grindrod

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Education and Professional Affiliations
1978 - 1981 University of Lancaster - Ph.D Engineering
1977 - 1978 University of Cambridge - Advanced Course in Production Methods and Management
1974 - 1977 University of Lancaster - BSc Engineering (2.1 with Honours)

Professional Societies: Institute of Electrical Engineers, Institution of Mechanical Engineers, Society of Petroleum Engineers

Work History
Copsegrove Developments Ltd. Mar. 1991 to present - Consultant Drilling Engineer. Steve set up his own consulting company in 1991 and is currently working for major North Sea Operators on (1) directional survey analysis which has entailed developing specialist directional survey analysis software and (2) writing procedure and technical manuals. Steve has worked as a consultant to the John Wright Company since 1991.

Koninklijke/Shell Exploratie en Produktie Laboratorium, Rijswijk, The Netherlands. Dec. 1980 - Research Engineer in Drilling Section and Investigation leader for Borehole Surveying Project

Shell International Petroleum Maatschappij B.V. The Hague, The Netherlands. Sept. 1986 - Operations Engineer

Shell UK Exploration and Production, Aberdeen Scotland. July 1987 - Drilling and Equipment Engineer

Shell UK Exploration and Production, Lowestoft, England. Nov. 1988 - Drilling Engineer

After completing his PhD, Steve joined Shell at the Research labs. in the Netherlands. Here he worked in the Drilling Research Section. The main work was on Borehole Surveying and became the Shell expert on the subject. The object was to improve surveying in Shell's operations world wide and one result was the Shell Borehole Surveying Manual. An extension of the work was the application of surveying, homing-in and directional drilling techniques in relief well drilling for blow outs. He has been involved in the planning of a number of relief wells, often when Shell provided assistance to outside companies, and have been to the Far East, South America and Wyoming to provide on-site assistance for relief well drilling.

Besides the surveying and relief well speciality, he received Shell training for wellsite operations petroleum engineering. In Aberdeen, his work as a Drilling Equipment Engineer gave a broader experience of drilling equipment, techniques and operations with special responsibility for land rigs and offshore mobile rigs.

The work in Lowestoft was initially in obtaining drilling equipment for the start of the Sole Pit gas field. This involved defining, specifying, developing and procuring mudline suspension, template, wellheads, risers and other drilling equipment. It included the interfaces of the jacket and decks with pre-drilled wells on the template. I have been acting as Duty Operations Engineer and taking responsibility for drilling equipment for the Shell Lowestoft. I was also involved with the Sole Pit 'Clone' well which involved using relief well drilling techniques to drill a production well from the Clipper platform into an abandoned highly productive exploration well.

Publications
- IADC/SPE 11382. "Calculation of NMDC Length Required for Various Latitudes Developed from Field Measurements of Drill String Magnetisation" By S J Grindrod and C J M Wolff, presented at the IADC/SPE 1983 Drilling Conference held in New Orleans.
- "The Influence and Measurement of Harmonics on an Industrial System", By Dr. D A Bradley and Dr S J Grindrod, presented at the Third International Conference on Sources and Effects of Power System Disturbances in May 1982.