

**MIKE SMITH**  
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**PRESENT STATUS:** Active Physics / Mathematics Private Consultant

### **SUMMARY**

Over thirty-nine years experience in design and improvement of systems for oil/gas and mineral exploration in both wireline and logging while drilling (LWD) environments. Proven creativity and tenacity. Recognized expertise on neutron porosity measurements in earth formations with numerous patents, awards, and publications, including Schlumberger's own magazine, *The Technical Review*. Three neutron porosity measurement systems are ISO 9000 certified; two others are pending. Extensive experience includes theoretical and practical knowledge of nuclear sensors, computerized logging equipment, digital signal processing, vertical resolution enhancement, neural net technology, Monte-Carlo modeling, and pattern recognition methods. Particularly strong programming skills with EXCEL+VBA and VISUAL BASIC for realtime applications. Innovative products in pulsed neutron logging technology, including calibration, physical modeling, and non-linear least squares fitting of multichannel time spectra. International expert on the propagation of neutrons and gamma rays in vuggy, laminated, fractal porous media. A pioneer in thermal neutron diffusion coefficient logging.

### **PROFESSIONAL EXPERIENCE**

HALLIBURTON ENERGY SERVICES - Houston, Texas 1996 - 1999

(Subsidiary of Halliburton Company that merged with Dresser Industries in 1998)

Private Consultant (1996-1998)

Senior Scientific Advisor (1998-1999)

Improved accuracy of hostile neutron and LWD neutron tools to increase competitive/commercial status as premium logging tools. Developed new generation neutron porosity measurement systems for both open and cased boreholes.

- Redesigned hostile neutron tool's calibration, ratio-to-porosity transform, and environmental correction algorithms and realtime software, resulting in significant improvement in porosity measurement accuracy.
- Developed enhanced vertical resolution processing algorithms / software for this neutron tool and integrated with gamma ray, density, and dual induction tool enhancements, thereby upgrading the commercial position of the entire hostile tool string.
- Optimized designs for new generation neutron logging tools for open and cased boreholes. ISO 9000 certifications pending. Achieved higher logging speeds, better accuracy, and lower costs.
- Revised calibration procedures for 6 ¾" LWD neutron tool and its sandstone response, improving measurement accuracy and satisfying clients' concerns.
- Researched pattern recognition method to extract features from 2D images and demonstrated feasibility for automatic scanning of borehole acoustic images for fractures, cavities, and laminated sections.

WRT ENERGY SERVICES – HARC - The Woodlands, Texas

1993 - 1996

Private Consultant

Provided scientific, hardware, and interpretative software for two novel gamma ray spectroscopy logging tools, both for through-tubing wireline applications.

- Applied classical dual-water model for analyses of oil, water, sand and clay volume fractions from capture gamma ray tool's spectral data. Trained a neural net to provide the same analyses automatically. This was an industry first for slim through-tubing logging tools and neural net technology.
- Utilized both singular value decomposition and neural net methods for determining quantitative K, U and Th concentrations from natural gamma ray tool's spectra data that worked in casing or in casing plus tubing. This was also an industry first.
- Demonstrated that BGO is superior to NaI(Tl) for carbon / oxygen inelastic gamma ray measurements with pulsed neutron generators.

## MIKE SMITH

HALLIBURTON ENERGY SERVICES - Houston, Texas 1983 - 1993

### Senior Research Physicist (1987-1993)

Designed and optimized neutron logging tools for wireline and LWD applications; digital signal processing algorithms and software to enhance vertical resolution for neutron and density logging tools. Created unique model for dual-spaced neutron logging tools.

- Invented realtime digital signal processing method to improve the vertical resolution of density and neutron wireline logs via deconvolution. This industry-first provided competitive advantages for 350 field units.
- Optimized LWD neutron module and its calibration procedures, realtime logging software, and environmental corrections. Unique 3-D routine corrects porosity for borehole size and standoff.
- Designed premium neutron wireline logging tool featuring the best sensitivity and repeatability in the industry. 175 field units manufactured from 1985-1990 remain calibrated and operational in 1999. Created algorithms for all environmental corrections and implemented realtime software.
- Developed pulsed neutron tool model for quantitative flood monitoring in cased boreholes - first to feature a true 3-phase analysis for oil, water and specific flood agent volume fractions.
- Created model for dual-spaced neutron porosity tools, making them ISO 9000 compliant. One of only two such models in the world. First accounting of neutron absorption by impurities in earth formations.

NL McCULLOUGH - Houston, Texas

1978 - 1983

### Manager, Computerized Logging Systems (1980-1983)

#### Senior Research Physicist (1978-1980)

Provided scientific, software, and hardware design and development of realtime computer systems for logging trucks. Created interpretative software for a variety wireline applications.

- Managed staff of 24 during manufacture, installation, and maintenance of 15 computerized field units. Repackaged applications software for 11 wireline logging tools including gamma, neutron, density, cement bond, sonic delta-t, sonic wave form, and temperature.
- Designed, as Principal Architect, computerized logging system, including hardware configuration, system software, and application software written in unique language (Log11). Featured the first application of color graphics at the well site, with a unit cost of only \$85,000.
- Developed a novel cement evaluation technique with a major oil company that reduced wellsite times from 10 to 2 hours. Completed 5 jobs in 6 months with revenues in excess of \$300,000.
- Created dual-water model software package for chlorine and pulsed neutron logging tools. Performed 72 commercial cased borehole jobs in first year.

SCHLUMBERGER WELL SERVICES - Houston, Texas

1977 - 1978

### Senior Software Engineer (1977 - 1978)

Designed software for sonic, electromagnetic and nuclear logging tools that featured control and feedback with the surface computer. Utilized DEC PDP-11 assembly language in prima facie realtime environment.

- Designed realtime software for new digital resistivity tool featuring 8 downhole measurements, each with a separate 3-point autocalibration procedure integrated with the logging application.
- Improved support for a pulsed neutron logging tool that featured 3 control / feedback loops with the surface computer. Installed true double-buffering scheme for cased borehole telemetry.
- Implemented software for an acoustic logging tool featuring 4 control / feedback loops.
- Debugged and improved system software support for the sonic waveform digitizer module.

TEXACO, INC. - BELLAIRE RESEARCH LABORATORY - Bellaire, Texas

1968 - 1977

### Senior Physicist (1974 - 1977)

- Supported calibrated measurements for sulfur, calcium and aluminum logging tool that featured Cf252.
- Investigated a variety of thermal and epithermal neutron porosity measurement systems with different neutron sources including, Cf252, AmBe, PuBe, PoBe, AcBe, AmB, and 14-Mev generator.
- Provided realtime software for the very first dielectric / resistivity log outputs from input phase / amplitude.

- Established paradigm shift in carbon/oxygen logging with NaI(Tl) and pulsed neutron generators by increasing frequency from 1 kHz to 20 kHz utilizing a high-resolution Ge(Li) gamma detector.

**MIKE SMITH**

**EDUCATION**

MS, Physics - The Johns Hopkins University, Baltimore, Maryland - 1968  
 AB, Physics & Mathematics - Rockhurst College, Kansas City, Missouri – 1963

**PROFESSIONAL AFFILIATIONS**

Society of Professional Well Log Analysts

**BOY SCOUTS OF AMERICA**

Ad Alteri Dei, Eagle Scout

**TECHNICAL SKILLS**

Windows 3.1 thru XP, UNIX, LINUX; FORTRAN, PDP-11 assembly language; PETCOM; MATLAB; EXCEL + VBA, and VISUAL BASIC, especially for realtime applications

**PUBLICATIONS**

Dual Water Model Interpretation for a New Through-Tubing Neutron Capture Spectroscopy Logging Tool: unpublished technical paper

Enhancing Vertical Resolution of Density Logs While Maintaining Calibration and Borehole Compensation; October 1994; WTGS Symposium

Enhanced Vertical Resolution Processing of Dual-Spaced Neutron and Density Tools Using Standard Shop Calibration and Borehole Compensation Procedures; June 1990; SPWLA Symposium

Laminated Reservoir Evaluation Using Logs with Different Vertical Resolution; July 1991; London Geological Society Meeting

Temperature Effects on Dual-Spaced Thermal Neutron Logging Tools; June 1989; SPWLA Symposium

Quantitative Flood Monitoring Utilizing a New Pulsed Neutron Tool Modeling Concept; September 1987; SPE Technical Conference

Neutron Absorption Effects on Dual-Spaced Thermal Neutron Logging Tools, June 1987; London SPWLA

Calibration, Checking and Physical Corrections for a New Dual-Spaced Neutron Porosity Tool; June 1986; SPWLA Symposium

The Aluminum Activation Log; May 1973; SPWLA Symposium

The Plasma-Resonance Probe; 1967; NASA Report

**PATENTS**

3,774,033	Dual-Spaced Epithermal Porosity Logging
3,818,225	Thermal Neutron Diffusion Coefficient Logging
3,906,224	Dual-Spaced Epithermal Neutron Porosity Logging
3,974,300	3 Frequency Modulated Lifetime and Porosity
4,092,536	Cement Voids and Borehole Washout Detection
4,122,339	Porosity via Pulsed Neutron Source and Epithermal Neutron and Inelastic Gamma Detectors

4,122,340	Porosity via Pulsed Neutron Source and Neutron Spectra
4,134,011	Porosity via Fast Neutron Spectra
4,152,590	Simultaneous Thermal Neutron Decay Time and Porosity Logging
4,746,801	Differentiating Low Porosity Limes from High Porosity Gas Sands
4,990,774	High Resolution Capture Cross Sections from Pulsed Neutron Logs
5,619,411	Enhanced Vertical Resolution Processing of Dual-Spaced Density Tools

**MIKE SMITH**

**REFERENCES**

Harry D. Smith, Jr.  
Grand Harbor, Lake Conroe

Ward E. Schultz  
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