



Fred H Poettmann

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1919-1995

By Lloyd E. Elkins, Sr.

A true scientist-engineer, Fred H. Poettmann was elected to the National Academy of Engineering in 1978. He also had the qualifications to be considered for membership in the National Academy of Sciences.

Fred's main attribute throughout his career was the ability to bring to engineering systems the appropriate mix of scientific facts. He knew how to match engineering systems to the rigid requirements of plant design or to the highly complex porosity systems forming underground oil and gas reservoirs.

Fred realized early in his career that one must ask the right questions or pay the penalty for making choices leading down blind alleys.

The first two phases of his career were in research with major companies—Phillips Petroleum (1946 to 1955) and Marathon Oil Company (1955 to 1983)—his leadership and research on oil and gas recovery highlight the technology profile now becoming available to the world at large on the Internet.

The last phase of Fred's career was teaching and challenging graduate students at the Colorado School of Mines in oil and gas recovery and in refining operations (1983 to 1995). Upon his death he left a legacy of technology and, through his students, a legacy of talent to a variety of oil and gas resource systems needing special consideration as we move into the next century.

Born on December 20, 1919, in Moers, Germany, Fred came to the United States with his parents at an early age. He was left with a walking disability after a childhood bout with polio. But rather than let this handicap hold him back, he used his "recreation time," while his friends took part in athletics, to advance his interest in scientific and engineering matters. His academic education began at the Case Institute of Technology, where in 1942 he earned his B.S. degree in chemical engineering. He then went on to the University of Michigan, where he received a master of science degree in 1944 and a doctor of science degree in 1946, both in chemical engineering.

While earning his doctorate, he was exposed to the many phase-relation problems prevailing in petroleum processes. His professor at the University of Michigan advised the Phillips Petroleum Company of Fred's great potential. So upon graduation in 1946 he joined the Phillips Research Department as a manager of hydrocarbon phase research in oil and gas production. During his nine years at Phillips, Fred demonstrated to both Phillips and the industry at large the need to incorporate the fundamentals of phase relations in most oil and gas operations.

In the early 1950s Marathon took steps to join the ranks of a dozen other major oil and gas companies and create a strong program in exploration and production research. The company built a large research center in Littleton, Colorado, and wisely chose to build personnel from the top down, selecting Fred to fill a key spot in the production research effort. This was the beginning of a highly productive program in which he played a major role for twenty-eight years (1955 to 1983).

It was during this period that the major oil and gas companies began developing and improving technology for maximizing oil recovery over that achieved by primary and conventional gas injection and water flooding. Their primary motivation was to perfect performance parameters and transfer the technology to their own company operations. For example, they sought unique chemical combinations that would make a process more effective. Many of the patents filed were defensive in nature. Under Fred's stimulating leadership,

Marathon mastered most of the enhanced oil recovery (EOR) methods offered through the industry's technology-transfer programs. Marathon obtained a patent on a microemulsion Micellar-Polymer-Flooding System, which was then trademarked as Maraflood and available under license.

At the same time, a group of EOR systems was being designed and pilot tested. The basic technology and field test results were documented in the appropriate technical literature. There were four broad types of systems, all of them involving phase shifting, interfacial forces modification, or viscosity adjustments: (1) thermal—steam front sweep; and in situ combustion sweep, (2) improved water flood sweep and displacement efficiency; (3) injection of hydrocarbon fluids miscible with reservoir oil; and (4) carbon dioxide injection to swell oil and reduce viscosity and significantly improve water flood displacement and sweep efficiency. In all these systems the reservoir, after oil recovery, is left full of fluid—essentially water, residual oil, and perhaps some trapped gases.

Fred was involved in several national studies pointing up the potential of EOR techniques for significantly adding to U.S. oil reserves. However, two major hurdles had to be cleared first; the well-defined technologies had to be selected and adjusted to match individual reservoir systems, and the price of crude oil had to be adequate for profitability.

While some massive EOR projects are getting by at prices controlled by the Organization of Petroleum Exporting Countries (e.g., Prudhoe Bay miscible gas injections), many smaller scale projects are lingering on the shelf waiting for a sustained world price increase of 10 to 20 percent. Whether or not Fred sensed that the aggressive type of research that he had been directing had accomplished its major objectives, he only knows.

In the early 1980s, the Colorado School of Mines (CSM) apparently sensed the need to strengthen its petroleum engineering teaching staff. Fred was a natural candidate because of his vast knowledge and the fact that he lived only a short drive from the campus. Taking early retirement from Marathon, he joined the CSM staff as a professor in the Petroleum Engineering Department in 1983.

From early in 1984 until late 1994, Fred coauthored with graduate students twenty-six technical papers. Every one of the students who had the privilege of working with this brilliant man, whether they realized it or not, learned one great truth: keep asking the right questions, and with perseverance a defensible answer can be developed. After formally retiring from CSM in 1990, Fred became an adjunct professor and remained as a part-time teacher and director of graduate research.

The most straightforward way to reflect on Fred Poettmann's total commitment to his profession and on his life of service is through the many honors and awards he received. In the following list, awards granted in recognition of outstanding overall achievement are indicated with an asterisk.

1983

participated in Department of Energy (DOE) Peer Review on "EOR using
1986

Carbon Dioxide" and "EOR Heavy Oil Program", respectively

1987

chairman, Panel on "Reservoir Management" Conference on Research Needs for Hydrocarbon Fuels, sponsored by DOE

Publications: sixty-four publications forty-six plus U.S. and foreign patents
coauthor or coeditor of ten books

Professional Societies:

Society of Petroleum Engineers (SPE) of the American Institute of Mining, Metallurgical and Petroleum Engineers, 1946-1995

director, Denver Section, 1958 to 1962

chairman, Denver Section, 1961

national SPE director, 1966 to 1969

AIME board of directors, 1970 to 1973

vice-president, AIME, 1973

distinguished member SPE, 1983

honorary member AIME, 1985

chairman or member of twenty plus AIME or national SPE committees over the period 1962 to present

National Academy of Engineering

Chemical/Petroleum Peer Committee, 1980 to 1983 member, National Research Council's Commission on Engineering and Technical Systems Committee on Innovative Concepts for Energy Conservation, 1984 to 1985

American Institute of Chemical Engineers, 1943-1995

Denver Section secretary and treasurer, 1957 board member, Denver Section, 1962 chairman of joint symposium committee member of AIChE-SPE, 1961 chairman, National Program Committee, 1962 fellow, AIChE-1974 member, executive committee, Toledo Section, 1976 to 1977

American Chemical Society, 1942 to present

member, Petroleum Research Fund Advisory Board, 1963 to 1966

American Petroleum Institute, 1955 to 1983

member of Research Committee, 1947 to 1965 Oil Recovery Domain Committee, 1947 to 1965 Project 37 "Fundamentals of Hydrocarbon Behavior", late 1940s

Interstate Oil Compact Commission, 1967-1995

appointed by Governor Love to the Research Committee, 1967 to present appointed by Governor Lamm to the Enhanced Oil Recovery Committee, 1980 to present chairman, Research Committee, 1988 to 1991

Honors and Awards:

Lester C. Uren Award of SPE, 1966

* University of Michigan Sesquicentennial Award of College of Engineering as Outstanding Alumnus, 1967

John Franklin Carl Award of SPE, 1971

* fellow, AIChE, 1974

* elected to the National Academy of Engineering, 1978 distinguished member, SPE, 1983

EOR pioneer, SPE/DOE, 1984

* honorary member, AIME, 1985

Herbert C. Thober Award for Chemical Engineering, Toledo Section, AIChE, 1975

Henry Mattson Technical Service Award, Denver SPE, 1983

honorary member, SPE, 1985

Halliburton Professional Award in Teaching, 1986

DeGolyer Distinguished Service Medal of SPE, 1990

* Charles F. Rand Memorial Award of AIME, 1992

honorary doctorate from the Mining University of Leoben, Austria, June 1992

* Katz Medal of the Gas Processors Association, March 1993

Civic Activities:

South Suburban Metropolitan Recreation and Park

District (elected office-Littleton, Colorado), chairman, 1966 to 1971

Littleton Press Council, chairman, 1967 to 1971

board member, Hancock Recreation Center (Findlay, Ohio), 1973 to 1977
chairman, South Suburban Foundation (Littleton, Colorado), 1980 to 1983

president, Columbine Villas Townhouse Association, 1981 to 1982

member and president of board, Columbine Villas

Townhouse Association, 1989 to 1992

By all standards, Fred has left to all a legacy of technology that can lead to maximizing oil and gas recovery worldwide. This should be of special significance to interests in North America, where premature abandonment of marginal wells can make reentry into reservoirs for enhanced oil recovery a little too costly.

When any engineer accesses the various on-line sources of information on oil and gas recovery technology, Fred's name will be a frequent discovery. In fact, a printout of all of his papers on any specific oil or gas recovery technology would lead to most of the EOR technology available today.

Fred is survived by his wife, Anna Bell, who was his constant traveling companion on his innumerable trips to worldwide symposia, conferences, and society meetings. In her special way, she assisted and supported Fred. She is therefore behind the legacy that Fred has left to all of the technologists in transition into the next century. He is also survived by a son, Phil, who graduated from Colorado School of Mines, and a daughter, Trudy, and their families.