



**STEPHEN J. MCGOVERN, PHD
SENIOR INDUSTRY CONSULTANT**

CAREER PROFILE

Over 30 years of experience in many aspects of refining process technology and management, especially Hydroprocessing, Catalytic Cracking, Clean Fuels and Refinery Economics. Outstanding record of process/project development and implementation as well as refining technical service and technical training.

PROFESSIONAL EXPERIENCE

FIT Consulting – Industry Consulting Practice 2006 - Present

Energy Consulting Practice 2000-Present
Principal of Consulting firm specializing in Petroleum Refining Technology

Mobil Corporation 1973-2000
Senior Technical Expert in Refining Process Technology with special emphasis on Catalytic Cracking and Hydroprocessing. Past Manager of Corporate Hydroprocessing Research and Technical Service group. Provided world-wide technical service and troubleshooting, technical input into laboratory experimental programs and the process design of new commercial units.

RECENT ACCOMPLISHMENTS

- Prepared a detailed assessment of the US refining industries capabilities to produce both on-road and off-road ULSD.
- Prepared a detailed technical and economic assessment of Solid Acid Alkylation Technologies
- Evaluated technical and economic merits of processes for producing 30ppm sulfur gasoline.
- Diagnosed performance problems of commercial HDP and FCC units.
- Improved system-wide average FCC power recovery turbine reliability from 2.5 to 5+ years.
- Provided detailed designs for several Hydrocracking units.

- Initiated the development of Mobil's Cyclofine FCC third stage separator technology.
- Initiated the development of Mobil's improved FCC stripper technology.
- Designed and coordinated an extensive FCC pilot unit program to better understand the effects of feed quality on FCC yields and product properties.
- Provided guidance to the refineries regarding Air Emissions Compliance and Testing.
- Managed the rapid commercialization of Mobil's Octgain process.
- Currently teach RPS "Production of low sulfur gasoline and distillate" course

OTHER ACCOMPLISHMENTS

Process Consultant, FCC and Clean Fuels Technology – Senior technical expert in refining process technology.

- Provided technical and economic guidance for several major FCC revamps.
- Provided on-site FCC turnaround and troubleshooting support.
- Provided "cold eyes" and Value Engineering reviews of other major projects.
- Participated in several refinery yield improvement surveys.
- Evaluated adsorption technology for removing sulfur from gasoline.
- Responsible for overseeing Mobil's FCC modeling effort.
- Improved the FCC and HDP representations in refinery planning and operational LP's.

Project Leader Responsible for the Process Design and Start-up of a new Hydrocracker at Mobil's Singapore Refinery. Coordinated the pilot plant work that set the process design, specified the reactor design including the control scheme for the highly exothermic reactions, and provided pre-startup training for the operations staff. The unit was streamed in 1990 and met or exceeded all expectations and generated profits sufficient to recover the \$100MM investment in 13 months. Also, coordinated an effort to improve the profitability of Mobil's four existing hydrocrackers through the application of improved catalysts, better quench hardware and control technology and enhanced reliability.

Project Leader Responsible for the Process Design of Mobil's First Cat Cracker Feed Hydrotreater. Designed and coordinated a \$5MM laboratory program to optimize the process design conditions for this \$300MM project which was streamed in 1988. In addition to setting the process design, this program identified corrosion and fouling problems that

would have caused serious operational problems if not identified in this stage of the design. Judicious pre-investment has allowed the unit capacity to be expanded by 50%, while meeting the stringent CARB-II gasoline specifications.

Project Leader Responsible for FCC Commercial Operations. Provided design basis for four new FCC units. Coordinated start-up of one. Chief troubleshooting resource. Demonstrated to US EPA that the unique aspects of FCC flue gas chemistry compromise the validity of particulate emission results obtained with Method 5 or 5B. EPA subsequently issued a new method (5F) for Fluid Catalytic Cracking units.

Process Engineer Responsible for Developing a Process to Stabilize the Synthetic Fuels Produced by the SASOL II Plant in South Africa. Although Mobil was not actively licensing hydroprocessing technology, SASOL solicited a proposal because none of the major technology licensors could meet their requirements. A process that exceeded their requirements was developed and designed in less than one year, and operated smoothly in the commercial plant.

Process Engineer Responsible for the Development of Mobil's Xylene Isomerization Process. The developmental pilot unit work was completed quickly and efficiently, leading to commercialization in less than 18 months. This process as well as other spin-offs, now accounts for most of the world's Xylene Isomerization capacity

EDUCATION

Ph. D. Chemical Engineering, Princeton University, Princeton, New Jersey 1985

M. A. Chemical Engineering, Princeton University, Princeton, New Jersey 1982

M. S. Chemical Engineering, Drexel University, Philadelphia, Pennsylvania, 1976

B. S. Chemical Engineering, Drexel University, Philadelphia, Pennsylvania, 1973

ADDITIONAL INFORMATION

New Jersey Professional Engineer, License No. 24GE26348

PUBLICATIONS

Photoacoustic Spectroscopy Applied to Heterogeneous Catalysis, S.J.McGovern, B.S.H.Royce, J.B.Benziger, 1984 Annual AIChE Meeting, San Francisco, CA, November 1984

Infrared Photoacoustic Spectroscopy of Adsorption on Powders, S.J.McGovern, B.S.H.Royce, J.B.Benziger, Applications of Surface Science, 18 p. 401 (1984)

The Importance of Interstitial Gas Expansion in Infrared Photoacoustic Spectroscopy of Powders, S.J.McGovern, B.S.H.Royce, J.B.Benziger, Journal of Applied Physics, Vol. 57 (5) p. 1710 (1985)

Analytical Photoacoustic Spectroscopy of Catalysts, B.S.H.Royce, S.J.McGovern, J.B.Benziger, American Laboratory, March 1985

IR Photoacoustic Spectroscopy of Silica and Aluminum Oxide, J.B.Benziger, S.J.McGovern, B.S.H.Royce, Catalyst Characterization Science, ACS Symposium Series No. 288, M.L.Deviney and J.L.Gland, Eds. p.449 (1985)

Surface Characterization of Supported Tungsten and Molybdenum Oxides by Infrared Spectroscopy, S.J.McGovern, B.S.H.Royce, J.B.Benziger, 189th ACS National Meeting, Miami Beach, FL, 1985

Cocurrent Downflow of Air and Water in a Two Dimensional Packed Column, G.Christensen, S.J.McGovern, S.Sundaresan, AIChE Journal, Vol. 32 (10) p. 1677 (1986)

Experimental and Kinetic Evaluation of Hydrotreating Catalysts, T.R.Kiliany, C.K.Lee, S.J.McGovern, AIChE Spring National Meeting, Orlando, FL, 1990

Process for Hydrotreating Catalytic Cracking Feedstocks, W.R.Derr,Jr, R.E.Holland, S.J.McGovern, M.P.Nicoletti, AIChE Spring National Meeting, Orlando FL, 1990

Improved Hydrocracker Temperature Control: Mobil Quench Zone Technology, S.J.McGovern, M.S.Sarli, D.W.Lewis, P.W.Snyder, NPRA Annual Meeting, San Antonio, TX, 1993

Ultra Low Sulfur Gasoline: Overview and Comparison of Gasoline Sulfur Reduction Technologies, S.J.McGovern and C.K.Lee, AIChE Spring National Meeting, Houston, Tx, 2001-11-14

“Clean” Diesel: Overview and Comparison of “Clean” Diesel Production Technologies, C.K.Lee and S.J.McGovern, AIChE Spring National Meeting, Houston, Tx, 2001

FCC Cyclone Design Considerations, S.J.McGovern, AIChE Spring Meeting, New Orleans, 2002

The Role of Trickle Bed Reactor Design in Meeting Future Clean Fuels Regulations, W.R.Derr,Jr., S.J.McGovern, C.K.Lee, World Refining, October 2002, Vol. 12, No. 8 page 30

Refinery Long Range Planning: Methodology for Evaluating Competing Technologies, S.J. McGovern, C.K. Lee, AIChE Spring National Meeting, New Orleans, LA, 2003

Diesel Strategy Study: Impacts of Future US Diesel Specifications Changes on Investments, Operating Costs, Hydrogen Requirements and Carbon Dioxide Emissions, S.J. McGovern, C.K. Lee, AIChE Spring National Meeting, New Orleans, LA, 2004

Hydrocracking Chemistry and Economics in a Clean Fuels Environment. S.J. McGovern, C.K. Lee, AIChE Spring National Meeting, New Orleans, LA, 2004

Underperformance of ULSD Units May Create Supply Problems in US, S.J. McGovern, C.K. Lee, J.A. Zagorski, Oils and Gas Journal, August 8, 2005

PATENTS

US 6324895 Process for Determining the amount of erosive material entering a power recovery turbine, Chitnis; Girish K.; Freeman; Brent David; Lemon, Jr.; Edward A.; McGovern; Stephen J.; Mazzocato; Lisa

US 5681450 Reduced Chaos Cyclone Separation, -Chitnis, Girish K., McGovern, Stephen J., Schatz, Klaus W.

US5413696 Gasoline Upgrading Process, - Fletcher, David L., Hilbert, Timothy L., McGovern, Stephen J., Sarli, Michael S., Shih, Stuart S.

US5399258 Hydrocarbon Upgrading Process, - Fletcher, David L., Sarli, Michael S., Shih, Stuart S., McGovern, Stephen J., Diez, Douglas S., Deptford (NJ) US; Harandi, Moshen, N., Hilbert, Timothy L.

US5360532 Gasoline Upgrading Process, - Fletcher, David L., McGovern, Stephen J., Sauer, John E.

US5352354 Gasoline Upgrading Process, - Fletcher, David L., Hilbert, Timothy L., McGovern, Stephen J., Sarli, Michael S., Shih, Stuart S.

US5318690 Gasoline Upgrading Process, - Fletcher, David L., Hilbert, Timothy L., McGovern, Stephen J., Sauer, John E.

US4780193 Process for Hydrotreating Catalytic Cracking Feedstocks, - Derr, W. Rodman, Jr., Holland, Robert E., McGovern, Stephen J., Tracy, William J., III

US464046 Apparatus for Injecting Liquid Hydrocarbon Feed and Steam into a Catalytic Cracking Zone, - Krambeck, Frederick J., McGovern, Stephen J., Sauer, John E.

US4555328 Method and Apparatus for Injecting Liquid Hydrocarbon Feed and Steam into a Catalytic Cracking Zone, - Krambeck, Frederick J., McGovern, Stephen J., Sauer, John E.

US4421636 Inert Gas Enrichment in FCC Unit Regenerators, - Dolan, Michael J., McGovern, Stephen J., Owens, Peter J.

US4395325 Reducing Sulfur Trioxide Concentration in Regeneration Zone Flue Gas, - McGovern, Stephen J., Owens, Peter J., Dolan, Michael J.

US4370222 FCC Regeneration, - McGovern, Stephen J., Yeigh, John H., Jr.

US4176083 Separating Flue Gas from Regenerated Cracking Catalyst - McGovern, Stephen J., Schatz, Klaus W., Zrinscak, Fred S., Sr.

US4126539 Method And Arrangement Of Apparatus For Hydrogenating Hydrocarbons - Derr, Walter R., Jr., Gallagher, Lawrence E., Haddad, James H., McGovern, Stephen J., Schatz, Klaus W., Smith, Fritz A.

US4080397 Method For Upgrading Synthetic Oils Boiling Above Gasoline Boiling Material - Derr, Walter R., McClernon, Joseph R., McGovern, Stephen J., Smith, Fritz A.

US4059648 Method For Upgrading Synthetic Oils Boiling Above Gasoline Boiling Material, - Derr, Walter R., McClernon, Joseph R., McGovern, Stephen J., Smith, Fritz A.