

**CHARLES R. GREENE, Ph.D.**  
**Chemical Engineer**

**SPECIALIZED PROFESSIONAL COMPETENCE**

Over 50 years of professional experience focused on an understanding and knowledge of petroleum refining, petrochemicals and synthetic fuels. The experience is based on a 28 year career with Shell Oil Company and Shell Development Company where he served as Manager, Manufacturing for Shell Chemical Company as well as Manager, Chemical Engineering Department for Shell Development Company and Manager, Process Study Team where he supervised a team of chemical engineers who conducted a technical and economic analysis of all the refining process in five Shell refineries in the United States. This technical and economic analysis included such processes as alkylation, catalytic cracking, hydrotreating, hydrocracking and isomerization. Following retirement from Shell, he served as Director, Energy Industry Programs at SRI International (formerly Stanford Research Institute) for 6 years. Dr. Greene worked as private consultant for 8 years and has been associated with Aptech Engineering Services for 8 years

Dr. Greene is experienced in process development, process design, plant start-up, and operation of refinery and chemical plant processes including alkylation, polymerization, oxidation, epoxidation, chlorination, and hydroformylation and hydrocracking. Dr. Greene has evaluated refinery processes for upgrading heavy crudes and pitch and special processes such as the dehydrocyclodimerization of the products of natural gas processing to make gasoline for a group of private clients. Provided testimony as an expert witness in a gasoline dealer-refiner pricing dispute.

Detailed knowledge of refinery processes, economics, and mathematical models for refinery economic evaluation. Detailed knowledge of equation-of-state models. Performed technical and economic evaluations for the upgrading of petroleum residuum. Directed management seminars and business planning sessions for Pertamina (state-owned Indonesian oil company) and the Ministry of Petroleum in Saudi Arabia. Evaluated a refinery expansion program for Sinopec, the petrochemical and refining ministry in the People's Republic of China. Analyzed the acquisition of a \$900 million (U.S.) petroleum refinery and refined product marketing network. Evaluated a \$750 million (U.S.) venture to construct a 2,500 mile pipeline. Completed economic and environmental evaluations of fuel substitution options for electric utility companies.

**EDUCATION AND PROFESSIONAL AFFILIATIONS**

- ! B.S. (Biochemistry), University of Chicago (1949)
- ! M.S. (Organic Chemistry), University of Chicago (1950)
- ! Ph.D. (Physical Chemistry), University of Chicago (1952)
- ! M.B.A. (Manufacturing Management), University of California (Berkeley) (1957)
- ! Member, American Institute of Chemical Engineers
- ! Member, American Chemical Society
- ! Fellow, American Institute of Chemists

## EXPERIENCE SUMMARY

- ! Manager, Chemical Engineering Department, Shell Development Company
- ! Manager, Manufacturing, Shell Chemical Company
- ! Manager, Unconventional Raw Materials (Synthetic Fuels), Shell Oil Company
- ! Manager, Shell-Conoco-U.S. Department of Energy Coal Hydrocracking Project
- ! Director, Energy Industry Studies, SRI International
- ! Director, Fossil Energy Technology, Science Applications International

## SELECTED REPORTS, PUBLICATIONS, AND INVITED LECTURES

Selected Recent Reports:

- ! *Petroleum Refining Profit Margins and the Price of Crude Oil: The Role of the Futures Market*
- ! *Analysis of Petroleum Imports into Western Europe*
- ! *The Market for Octane-Enhancing Compounds*
- ! *Changing U.S. Demand for Motor Gasoline*
- ! *The Market for Rare Earths in Catalytic Cracking Catalysts*
- ! *A Techno-economic Analysis of Petroleum Residuum Upgrading Processes*

*The Future of Tar Sands Development in Utah*, Invited Lecture, University of Utah, Engineering Experiment Station (September 1988).

*Economic Analysis of Synthetic Fuel Processes*, Hydrocarbon Processing (April 1984).

*Hydrocracking of Coal to Gasoline Using Molten Zinc Chloride*, Fuel, 63 (with C. Zielke, M. Pell, and R.T. Struck) (1980).

## ADDITIONAL INFORMATION

For more information regarding APTECH's personnel and services, please contact our Corporate Headquarters in Sunnyvale, California (USA) at (408) 745-7000 or visit our website (<http://www.aptecheng.com>).