

Name: Dr. Henry B. Crichlow Ph.D, P.E
Address: 330 W. Gray St, Suite 504, Norman, OK. 73069, USA
Profession: Registered Professional Engineer

Summary:

Dr. Henry Crichlow is a recognized expert in Petroleum and Energy Engineering. Dr. Crichlow has been employed by major oil companies, MOBIL and TEXACO as an engineer and also performed consultant engineering analyses for major oil conglomerates and institutions including, MOBIL, TEXACO, KERR McGEE, UNION, the WORLD BANK and the FDIC (USA). He has advised some of the largest international oil companies like PEMEX, KUWAIT OIL, YPFB, and PETROPERU in multibillion-dollar projects.

He is a Registered Professional Engineer with a Ph.D., from STANFORD UNIVERSITY; he also has M.Sc degrees from the UNIVERSITY OF OKLAHOMA and B.Sc degree from COLORADO SCHOOL OF MINES, all in engineering. Dr. Crichlow was a Distinguished Professor of Engineering and Head of the Departments of Petroleum, Natural Gas and Geological Engineering at the University of Oklahoma, one of the premier Petroleum Universities in the world. He holds several patents and publications in engineering and the Internet. He is CEO of EnergyPower Inc. an Energy Services Corporation, UNIGAS a gas storage utility company and President of HBC Registered Engineers, a consulting company that operates in USA, South America, Eastern Europe and Africa.

Recent Major Energy Projects:

- Developer of the patented SWAP™ technology for oil recovery from oil sands and heavy oil recovery. 9 patents pending in USA and Canada.
- World Bank: Gas Reserves Quantification in 8 major reservoir systems in Bolivia, with 2,000 BCF gas reserves to justify \$400Million Major pipelines to Brazil and Argentina for World Bank.
- Kuwait Oil Company – Development and Implementation of Contingency and Recovery Plan for 700+ major oilwell fires and rehabilitation program after and during the Gulf War.
- Multiple gas storage developments in depleted gas fields using optimally designed horizontal wells.
- Federal Deposit Insurance Corporation (FDIC) – Evaluation of 29,000 oil and gas wells.

- **PEMEX - \$3 Billion Offshore Gas Development and Reinjection Project with up to 1,060 Million CFD gas re-injected into the reservoirs.**
- **MOBIL – Gas Injection projects in Oklahoma Panhandle.**
- **Several Major Multi-million dollar Litigations including: TEXACO, UNION PACIFIC, KERR-McGEE, DOME PETROLEUM, LCEC, ONG and other companies.**
- **Waste Tire Gasification to provide electric power from shredded waste tires. National Award by Popular Mechanics magazine Outstanding R&D award for 2001.**
- **Three patents published and pending on safe economic underground nuclear waste disposal.**
- **SMART GRID technology developer for the electric utility industries worldwide.**
- **More than 15 patents published and pending on, tar sands recovery, oil shale recovery internet applications in electric power distribution and optimization, Compressed Natural Gas.**

Detail:

Dr. Henry B. Crichlow is a Registered Professional Engineer with a Ph.D., from STANFORD UNIVERSITY; a M.Sc. from the UNIVERSITY OF OKLAHOMA; a B.Sc., (Silver Diploma) from COLORADO SCHOOL OF MINES, all in Petroleum Engineering.

Dr. Crichlow has 40 years continuous experience in oil, gas, computers, engineering, energy, optimization and nuclear waste technology and has worked in engineering & management capacities with TEXACO, MOBIL, SSI Corp and UNIGAS Corp. He is involved in the development, implementation and utilization of profitable patent-worthy high technology in the energy and associated industries worldwide. He has been an oil and gas consultant to several domestic majors, as well as independents and smaller companies, the FDIC and WORLD BANK. He is a consultant to ITGI Corporation, a company developing solutions to waste tire recycling around the world by converting waste tire to electric energy. He is CEO of EnergyPower Inc. an energy services company, and CEO and Major Shareholder of Unigas Inc.. Also, as owner of HBC Registered Engineers, he is an international consultant and expert witness in all aspects of oil and gas with primary emphasis on petroleum engineering, natural gas, reserves evaluation, optimization, modeling, gas storage, secondary and enhanced recovery.

Dr. Crichlow has 10 years academic experience as Associate Professor, Earle P. Halliburton Distinguished Professor of Engineering, and Director/Chairman of the School of Petroleum Engineering, Geological Engineering and Natural Gas Engineering at the University of Oklahoma. He also initiated, developed and directed the USGS Certified Oil Well Blowout Control Systems School at the University of Oklahoma to provide real time oilwell blowout control techniques for drillers and engineers and to certify these personnel worldwide for safe drilling operations. Dr. Crichlow developed the contingency plans and recovery plans for Kuwait Oil Company after the fires began in 1991.

His expertise has been focused on energy technology, natural gas engineering, natural gas marketing, natural gas storage, power generation, water-flood, simulation techniques, EOR with steam injection, nuclear waste disposal and innovative engineering methods in energy optimization of power generation systems and related areas. He has published (Prentice Hall – Publisher) an outstanding text for engineers - MODERN RESERVOIR ENGINEERING: A Simulation Approach, along with several books, monographs, and technical papers in petroleum engineering and geothermal operations. In the drilling area, he has worked on the downhole vortex generator and polycrystalline compax drill bits for drilling improvements.

In recent years, Dr. Crichlow has been involved in several Cogeneration projects using natural gas throughout the U.S and in Eastern Europe. Ongoing projects include, Coal Bed methane, Oil sands recovery, Heavy oil recovery, Tire Derived Fuels (TDF) in power generation, Fuel Emissions Control additives and use of waste natural gas in Cogeneration. Dr. Crichlow is involved in the development of natural gas storage projects utilizing patented state of the art horizontal drilling techniques with several major corporations and utilities and also in applications of these techniques to maximizing mature oil field development and advanced patented methods for nuclear waste disposal. He has also developed, patented and is implementing a safe, economical and readily deployable method to mitigate the problems of Nuclear Waste Disposal which will allow the Nuclear Power Industry to resolve the problems of energy sufficiency in the US and abroad. Recently some innovative research by Dr. Crichlow has led to the development of internet-based energy technologies that provide utility companies with massive savings in energy distribution costs and operations. He has currently 12 patents in progress at the USPTO.

Dr. Crichlow has evaluated all the Gas Reserves of Bolivia in its major gas fields prior to development of the international pipelines to transmit gas to Brazil and Argentina. Dr. Crichlow aided the Kuwaiti nation by designing, developing, planning, writing and implementing their CONTINGENCY PLAN and their RECOVERY PLAN to rehabilitate the destroyed Kuwaiti oilfields after the 1991 oil-well fires. Dr. Crichlow was in Kuwait one month after the fighting stopped in 1991. In 1996-1997, Dr. Crichlow made a feasibility study and reserves evaluation for the PEMEX multi-billion dollar offshore (1,000,000 Barrel/Day) Cantarell Field Development and the associated Gas Injection program. Technical recommendations and results were presented to PEMEX in Mexico for this \$3 Billion project. He has developed major compressed natural gas (CNG) utilization programs in vehicles for use in China.

Dr. Crichlow is a member of the Society of Petroleum Engineers of AIME, and former member of the American Management Association and the Research Society of America. Dr. Crichlow has been an expert witness on several successful multi-million dollar litigation cases in oil and gas with major energy companies, TEXACO, DOME, UNION-PACIFIC, and WARBURG-PINCUS etc. He also holds engineering patents, in Nuclear Waste Disposal (5,850,614 and 6,238,138), patents pending on Wild Oil-well Fire Extinguishing, Compressed Natural Gas for Vehicles, 16 patents pending for Innovative Internet Systems using Intelligent software robots for Electric Power Utility and Energy Services also several more patent pending technologies on enhanced recovery of heavy oil. He is an instrument rated pilot, soccer coach and player. His foreign languages include Spanish (capable) and French (capable).

Dr. Henry Crichlow has been quoted as an energy expert by the following publications: 1) New York Times, New York. 2) Oil & Gas Journal, Houston 3) Daily Oklahoman, Oklahoma City 4) Dallas Morning News, Dallas. 5) Fort Worth Star Tribune, Fort Worth. 6) Chicago Tribune, Chicago. 7) Houston Chronicle, Houston

Some references for Dr. Crichlow are:

- Mr. Ken DeGhetto, Former Chairman FOSTER-WHEELER CORP.(USA).**
- Dr. Edward Perkins, Former US Ambassador to South Africa, Head of US Foreign Service..**
- Mr. Khalid Al-Fulaij, Vice Chairman, KUWAIT OIL COMPANY. Kuwait City.**
- Judge Vickie Miles LaGrange, FEDERAL JUDGE, OKLAHOMA.**

- Dr. Shetima Monguno, Former President OPEC. (Organization of Petroleum Exporting Countries)
- Dr. Charles Mankin, OU Professor and Director of OK Geological Survey.
- Former Congressman J.C Watts, US Congress Washington DC.
- Sr. Raul Soria Galvarro, YPF, BOLIVIA.
- Atty: David Dunham, AKIN, GUMP, Austin, and TX. (one of the Largest Law Firms in USA)
- Dr. Fernando Rodriguez de la Garza, Chief E&P, PEMEX, Mexico City, MEXICO.

Current Projects: Engineering & Management Services

- Major Oklahoma Gas Exploration Management.
- UNIGAS – \$210,000,000. Gas Storage System in Oklahoma using horizontal gas wells.
- Bulgarian Coal Bed Gas Development – 440 sq. km. and 196 Billion Cubic Meters gas.
- Gas Fired Generation in Eastern Europe – using proprietary technology to optimize operations.
- EPI, Power STAR™ technology for utility companies in the US and worldwide.
- Gas Fired Power Projects in Latin America and Caribbean.
- Oil Sands Recovery with Patent pending Reactor
- Underground Oil Sands Recovery with Uniwell™.
- Heavy Oil Recovery with patent pending SWAP technology and Upgrading.
- Energy Software Development.
- Paraffin Removal.
- EOR and Gas Storage systems in production areas.
- Safe disposal of nuclear waste – CANADA, USA

Recent Technical Work:

A Rapid Combustion Cell for rapidly extracting oil from oil shale and tar sands by vaporizing the oil in situ.

Optimizing offshore development in 1,000,000 BOPD Cantarell Oil field for \$3 Billion PEMEX project by injection of inert high pressure gas.

Smart Storage System for optimizing underground gas storage using horizontal drilling and Linear Programming algorithms.

Nuclear Waste disposal using optimally designed horizontal wells in selected underground formations. 2 Patents.

Refueling systems for CNG systems using demountable fuel tank.

Development and Implementation of 80,000 CNG vehicles system for China.

PowerStar – an automatic meter reading device using RISC computers and the Internet.

System to minimize energy costs using day ahead power costs and optimizing algorithms in real time.

PowerBOT – an internet robot system for gathering meter data automatically and autonomously.

Methods to establish internet websites for electric power meters.

Nu-Meter, a system to rapidly and safely attach devices to power meters.

System and methodology to generate, display, present and pay utility billing systems on the Internet in real time

Power-Forward server system to identify meter systems continuously over the Internet.

Uniwell – improved horizontal system for recovering heavy crude using continuous steam injection.

Power Brain - Neural Network models to forecast power use in electric utility systems.

Non-condensing gas drive system to augment steam displacement in heavy oil recovery in the uniwell system.

Coal Bed Methane Recovery Analysis in Oklahoma and in Eastern Europe..

INDUSTRIAL EXPERIENCE DETAIL

CONSULTING EXPERIENCE WITH THE FOLLOWING COMPANIES:

**PEMEX
Kuwait Oil Co
Phillips Petroleum
Union Oil Co
IBM,
CiGNA Ins. Energy Co.,
Energy Ministry (Trinidad),
Charter Financial Co
Highland Insurance
Vector Co
UNIGAS Corp
Trimax Corp
Trinity Gas
Eason Oil Co
Petro Peru (Lima,Peru),
WORLD BANK
FDIC,
Tenneco Oil Co
Mobil Oil Co.,
Extractol Oil
Minor Trans Corn,
YPFB (Bolivia)
GAGE Inc.
Aminoil Co
NOWSCO,
Wilson Downhole Co
USDoE,
Holden Energy
Recycled Energy Corn
KERR-McGEE
Vector Drilling.
LCEC Utility
Golden Spread Utility
EurEnergy Inc.**

Plus several others smaller companies, organizations and groups.

EDUCATION: Dr. Crichlow

**STANFORD University: 1972 Ph.D Petroleum Engineering
Dissertation: "Laboratory investigation of Steam Drive Processes"**

**University of Oklahoma: 1969 M. Sc Petroleum Engineering
"Effects of Partial Penetration on Gas Well Deliverability"**

**Colorado School of Mines: 1967
Degree: B.Sc (Engineer Degree)
Major: Petroleum Engineering**

ACADEMIC EXPERIENCE:

**Chairman & Director of School of Petroleum, Natural Gas Engineering
and Geological Engineering, University of Oklahoma
1974- 1978**

**Erle P. Halliburton Distinguished Professor of Engineering, University
of Oklahoma
1974 - 1978.**

**Associate Professor of Engineering, Dept. of Petroleum Geological
and Natural Gas Engineering, University of Oklahoma, 1974-1978.**

**Assistant Professor, Dept of Petroleum Geological and Natural Gas
Engineering University of Oklahoma,
1971 - 1974.**

**Director and Founder, Oil Well Blowout Prevention Systems School,
University of Oklahoma,
1974-1978.**

**ACADEMIC ACCOMPLISHMENTS AT UNIVERSITY OF OKLAHOMA:
PETROLEUM & GEOLOGICAL ENGINEERING DEPT:**

Energy Center Development:

**Revision and expansion of the Energy Center concept first initiated by
PGE Dept to include other university groups and development of
funding procedures from State and
Federal Sources.**

Oil Well Blowout School:

Initiated, developed, staffed, directed and certified, through USGS, the Oil Well Blowout Systems School at OU for training all field drilling personnel worldwide.

Computer Services Upgrade at OU:

Introduction of faster compilers for student and research work on campus, job throughput increased from 2,500 jobs/day to 11,000 jobs/day. Use of RJE's to speed turnaround and use of terminals as a necessary adjunct to student teaching. Introduction of commercial RJE terminals (Alpha Co., DC) to Engineering College to ease backlog of graduate research computing until OU developed its computer capacity.

Publications:

Publication of PGE Departmental Magazine for alumni and supporters of Petroleum Department Fund raising. The magazine increased funds, enrollment and faculty positions with the industry.

ACADEMIC RESEARCH SUPERVISED:

"Determination of Optimum Acceleration Parameters in the ADIP Solution of Partial Differential Equations" by Nouri Berruin

"Pressure Buildup Analysis"., by P. Chao,

"Vertical Multiphase flow in Pipes"., by A Krishnamoorthy.

"Effects of Coning"., by F. Akindele, "Multiphase Flow in Inclined Pipes", by M. Faramanara

"Optimal Design of Well Patterns in Waterflood design" by R. Bose.

"Tracer Prediction and Streamline flow in Arbitrary Reservoir

Systems"., by P. Schnewerk "Sparse Matrix Techniques in Reservoir

Simulation", by J. Palatka

"Correlation Functions for Reservoir Recovery Mechanisms and Ultimate Recovery"., by N. Gonzalez

"Economic Analysis of Compression Costs in Natural Gas Pipeline Systems.", by H. Panahinmand.

"Optimizing Oil and Gas Production Systems.", by F. Farshad.

“Response of Natural Gas Resources to Drilling Activity.”, by M. Diba

“Analysis of Multiple Sealing Fault Systems in a Closed Rectangular Reservoir by Type Curve Matching.”, by D. Tiab.

“Compositional Flow in Porous Media”., by F. Craig

“Optimal Procedures in Reservoir Simulation Techniques” by M. Al-Marhoun

“Simulation of Geothermal fluid flow”., by M. Cheng.

“Application of Computers to Lithostratigraphic Correlation and Three Dimensional Correlation’s”, by M. Bawab.

INDUSTRY EXPERIENCE:

1. UNIGAS Corp/HBC ENGINEERS:

President and CEO of an engineering and consulting group with major emphasis on technical and innovative engineering problem solving in the oil and natural gas industry, gas storage, cogeneration, horizontal drilling, reservoir engineering and evaluations, legal expert work. UNIGAS is a gas storage utility developing high deliverability gas storage systems using innovative horizontal well technologies. 1985 - Today.

www.unigascorp.com

2. ENERGYPOWER INC.

Founder, CEO and developer of the power Star technology for SMART Grids. EnergyPower, Inc. is an innovative service corporation poised to transform the energy, power and associated industries for the 21st Century by the deployment of competent “smart technology”, the likes of which have not been seen since the development of the “Information Highway”. 1999 to today.

www.energypower.com

3. UNIGAS NUCLEAR

Owner, developer and patentee of THREE novel technologies for safe economic disposal of nuclear waste from nuclear power plants worldwide. Our ability to use the existing sophisticated down-hole technology in the oil and gas industry to locate and drill horizontal wellbores several miles laterally to safely reach these very deep underground formations and emplace these nuclear packets for 10,000 year storage. 1995 - Today

www.safenuclearwaste.com

4. PTTS Company.

President and Chief Engineer of a Training and Research Engineering Company with offices in Oklahoma, Texas, Latin America and Africa. Provided technical training in all aspects of the oil and gas industry worldwide from a faculty of 30 lecturers. Provided research and engineering services to major international oil companies, governmental and international agencies on Reservoir Simulation, fluid flow, Enhanced Oil Recovery and Production Engineering with a staff of 30 oil and gas professionals. 1980-1985.

3. PETROLEUM CONSULTANT: Petroleum Consultant while at STANFORD University. Well test analysis. Computer Simulation. EOR work 1969-1971.

4. MOBIL OIL Corporation: Staff Engineer, North American Producing Division, responsible for Reservoir Simulation in Company Division, Performed engineering design work on several complex multi-reservoir, multi-well systems with attendant optimization techniques to maximize production economics. Development of remote production computer controlled field projects in TX and OK lectured to fellow engineers on Computer Simulation and Computer methods. Written appraisal as the "Best Engineer in the Mobil North American Division". by Division Manager, Charles Tucker - (1969). 1967 - 1969

5. SCIENTIFIC SOFTWARE CORPORATION: Denver Cob. System Analyst - Reservoir Simulation of oil and gas systems. Programming, Documentation and Utilization. 1970.

6. TEXACO INC.: Engineering Assistant. Reservoir Engineering, Economic analysis of marginal wells. 1965 - 1966.

INDUSTRY RESPONSIBILITIES:

As President/Owner/Founder of these companies responsibilities included:

Budgeting and cost accounting

Supervision of Engineers

Research Proposal Preparation / Project Initiation

Financial Planning

Contract Negotiation

Personnel Merit Review / Professional Recruiting

Professional Engineering Work Certification

INDUSTRY RESEARCH:

Geothermal Wells: Analysis of salt precipitation and plugging using physical chemistry and flow models.- USDoE with VETTER Research.

Elution profile Analysis: Online measurement of elution concentration profiles to determine rock and fluid properties of porous media.

Maximizing Steam Recovery in Light Oil Systems. Experimental flow models to analyze the steam displacement process and develop mathematical models to predict the behavior. - USDoE.

Downhole steam Generator: Design, Experimental and Filed testing in Permian sands of an electrically powered down hole steam generator.

Tar Sands research: Documentation and Analysis of Wyoming Tar sands- USDoE Laramie Energy Tech Center.

Combustion Cell for Oil Shale and Tar Sands research: Design and construction of a rapid combustion cell for oil recovery from oil shale and tar sands.

Downhole Vortex Generator. Analysis of Drilling Tool for maximizing drilling by using vortex dynamics at the drill bit/formation interface.

In-Situ Paraffin Eliminator: Development and testing of downhole tool for insitu removal of paraffin by electrical power.

PDC Bit Optimization: Use of bit erosion models to maximize bit performance and penetration rates.

Horizontal Drilling: Decision Analysis models for maximum economic benefits.

Kuwait Well Fires: Analysis of Kuwait oil Fires and formulation of contingency and recovery plan for 700 well fires in Kuwait.

Technical

Reservoir Modeling and Simulation Compositional Reservoir Simulation of Rio Grande Reservoir System - Bolivia- World Bank

- multiple zone condensate system with water influx and gas cycling
- several hundred wells, gas and gas condensate
- performance matching and optimization of gas cycling
- in excess of 1 TCF and 100 MM BBI reserves

Reservoir Modeling of Colpa Reservoir - Bolivia - World Bank

- light oil system, water influx and water coning
- performance matching and maximization of recovery
- 500 Billion CF and 32,000,000 STB Reserves

Reservoir Modeling of Caranda Reservoir System - Bolivia - World Bank

- light oil system
- maximize for recovery
- 86 Billion CF, 2,900,000 Barrels

Reservoir Modeling of THREE major reservoir for MOBIL Oil Co.

- (1) Postle Hough Reservoir System, Oklahoma
- (2) Hough Morrow ~A' system, Oklahoma
- (3) Postle Morrow Water Flood System, Oklahoma

- Mobil Oil Corporation
- 21,300 acre project with 99 wells and daily production of 17,900 BPD
- performance matching and forecasting
- optimization of sweep efficiency
- minimization of lease line drainage
- economic optimization over life history
- payout analysis
- infield development and expansion

Reservoir Modeling of Condensate Putnam Oswego System

- Mobil Oil Corporation
- 130 well system

- History performance matching and forecasting
- reservoir optimization under gas cycling
- sweep efficiency and recovery maximization

EOR - Enhanced Oil Recovery

Steam Project Design Loco Reservoir

- design and evaluation of 263 wells project for steam injection after waterflood in Shallow

Permian and Loco Sands

- Selection of reservoirs suitable for injection
- 10,000 BWPD steam injection in controlled 5-Spot
- estimated reserves 2,756,000 SIB

Maximizing Steam drive Recovery in Light Oil Systems

- USDOE Research
- Quantify the rate dependence of light oil recovery by steam

Steam Drive Modeling Using Streamtube Concepts

- USDOE Research
- design, development and implementation of computer model to predict steam with streamtube models

Alkaline Flooding of Lower Main Zone - Huntington Beach Field - Aminoil

- determination of and distribution of oil in place
- improve flooding efficiency of alkaline flood
- simulated alkaline flooding process by streamtube modeling
- determined conforming pore volume using tracers

Steam Pilot Design - Loco Reservoir System

- selection of optimal design parameters for steam injection in Loco Sand, Stephens County, Oklahoma

South Loco Steam Injection

- design and testing of downhole steam generator
- injection into 300' Permian Sand
- heavy oil recovery - 12 deg. API

Reserves Evaluation

Evaluation and Engineering Review for US FDIC BANK of all Penn Square energy loans

- reserves evaluation of 22,000 oil and gas leases.
- production forecasts high pressure, high temperature deep gas systems

- waterfloods
- shallow oil and gas
- disposal wells
- fair market value and reserves

Plus several hundred other wells and properties too numerous and insignificant to list for independents in Oklahoma, Texas, Colorado, etc.

Gas Engineering

Regional Gas Reserves and Deliverability

- use of sophisticated superposition deliverability and drilling rates model to match performance of several thousand wells in a region and to forecast regional gas deliverabilities with parameter variation over long term planning horizon
- for major financial houses/banks in New York, Florida, Texas, Europe

Schulter Gas Pipeline

- analysis and design of gas pipeline
- Okmulgee County, Oklahoma
- 5 MMCFD

Schulter Gas Field

- reserve estimation of gas field
- Okmulgee County, Oklahoma
- 4 MMCFD

Creek System Gas Pipeline

- analysis of gas deliverability on pipeline system
- 16 MMCFD K-2 Gas Pipeline System
- analysis of gas deliverability of pipeline system
- 8 MMCFD

Waterflood Design

Analysis and Design of Senora Waterflood, Okfuskee County, Oklahoma

- 66 wells, 765,000 STB waterflood reserves
- Dykstra- Parsons approach
- streamtube modeling

Primary Recovery and Secondary Waterfloods of Copan Lease

- Bartlesville and Wayside Sands

- 17 wells
- 73,000 STB reserves
- maximize primary by shutting in of selected producing wells
- maximize secondary by pattern selection

Waterflood Study Loco Reservoir System

- re-evaluation and reserves determination and redesign of existing 263 well
to minimize operating costs, maximize sweep efficiency and increase flood effectiveness.

- reserves 900,000 STB.
 - Apex Waterflood - Christian County, Kentucky
 - design and implementation of secondary waterflood using modeling techniques
 - -70 well program
- 422 M STB reserve

Nelson Waterflood - Rogers County, Oklahoma

- design and implementation of Bartlesville Sand waterflood
- peripheral pattern

Plus several other minor waterfloods.

Other Technical Accomplishments

Methane Extraction from Coal with TRW Energy Systems

- production CH₄ from coal beds
- evaluation of potential in Pennsylvania

Cogeneration Development Potential with Pride Oil Well Services

- development of co generated electric power from gas wells in eastern Oklahoma

Cogeneration Development in Stephens County, Oklahoma with GKJ Inc.

- development of co generated electric with a Garrett Jet engine and use of steam for recovery in Shallow Sands

Downhole Steam Generator with Marr industries

- patented
- developed and testing of electrically driven downhole steam generator

In-Situ Paraffin Eliminator with Extractol Inc.

- patented

- development, fabrication and testing of in-Situ paraffin elimination system using electric power

Rapid Combustion Cell for Tar Sand Processing

- design, development and testing of a combustion cell for extraction of oil from Tar Sands

Determination of Rock Properties by using Tracer Elution Profiles

- PTTS Research

- design, fabrication and testing of equipment on core samples

Development of the Energy Center concept at the University of Oklahoma

Founder and Developer of the Oil Well Blow Out Training School at the University of Oklahoma

TECHNICAL ACCOMPLISHMENTS:

Petroleum Reservoir Systems/Reservoir Modeling:

1. Design and Development of 20 BCF Gas Storage Facility with multiple zone storage for Major Pipeline Company. Complete engineering design and reservoir definition. Reservoir simulation and scheduling of gas deliveries. Economic analysis.

2. Compositional Reservoir Simulation of Rio Grande Reservoirs - Bolivia. Multiple zone condensate systems with gas cycling optimization. Several hundred wells. Reserves in excess of 1.0 TCF gas reserves and 100 Million Barrels oil.

3. Reservoir Modeling of Colpa and Caranda Reservoir Systems - Bolivia Light oil, with water coning and water influx. 500 Billion CF gas reserves and 32,000,000 Barrels oil.

**4. Reservoir Simulation and Production Optimization of Oklahoma and Texas systems:
Waterflood operations, Gas cycling and economic optimization of 21,300 acre project with 17,900 BOPD production.**

Enhanced Oil Recovery:

Steam Project Design for 263 well project in Permian sands with 2.7 million STB reserves. -CIGNA insurance Energy Co.

Maximizing Steam Drive in Light Oil systems. Quantify the rate dependence of project parameters. - USDoE.

**Stream Drive Modeling using Streamtube concepts. - USDoE.
Alkaline Flooding Process. - AMTNOIL.**

Downhole Steam Generator. Design and testing of downhole steam generator. - EXTRACTOL

Oil and Gas Reservoir Engineering:

Evaluation and Engineering Review of several thousand wells for US Government agency. - FDIC

Reserves Evaluation of several hundred wells for various operators and companies throughout the US and overseas.

Regional Gas Deliverability using sophisticated superposition flow models coupled with drilling rate analysis

Pipeline Gas Deliverability and Analysis.

Waterflood Design and Analysis.

Natural Gas Storage Design, Optimization and Implementation

Publications:

"Numerical Study of the Effect of Completion Technique on Gas Well Deliverability.", SPE' Symposium on Numerical Simulation, Dallas, TX 1970.

"Practical Gas Reservoir Simulation"., Society of Petroleum Engineers Regional Paper Contest winner, Berkeley, California, 1970.

"The Use of an r-z Model to study the Effects of Completion Techniques on Gas Well Deliverability.", with P.J. Root, SPEJ, October 1973.

“Computer Aided instruction with interactive Graphic Display.”, with John Harbaugh, JQprp4LQf 1973.

“Mathematical Models for the Design of Thermal Methods in Heavy Oil Recovery.”, Proceedings the Symposium on Heavy Oil Recovery Maracaibo, Venezuela, 1974.

“Data Acquisition and Telemetry in a Natural Gas Measurements Laboratory,”, with J.H. Christensen, AIChE, 67th Annual Meeting, Washington, D.C. 1974.

“Pressure Analysis of Multiple Sealing Fault Systems in Bounded Reservoirs by Type Curve Matching,” with D. Tiab, SPE of AIChE 52nd Annual Meeting, Denver, CO., 1977.

“Thermodynamic Analysis of Gas Reservoirs,”, with D. Tiab, P. Sarathi, ASME 80Pfl-34. New Orleans Meeting, 1980.

“Preliminary Experimental Results of High Pressure Nitrogen injection for EOR Systems.” SPE 10273 with A.Ahmed, and D. Menzie, San Antonio, Oct.1981.

“Development and implementation of an Alkaline Waterflood Model”, - AMINOLL Co., California, 1980.

“Simulation of Geothermal Reservoir Systems”, with M. Cheng., AIChE. 1980. “Technical Review of Enhanced Oil Recovery”, USDoE, April 1980.

“A Definitive Study of the Problems and Possible Solutions to Geothermal Engineering”, with O. Vetter, Los Angeles 1979.

“Grid Type Simulation for Gas reservoir Systems”., Soc of Computer Simulation Journal

Numerical Simulation of Heterogeneous Fractured Gas Reservoir Systems with Turbulence and Closure Stress Effects.”, with A. Allam, M. Solemn, SPE 10119

“Retrievable Underground Nuclear Storage” – Methods for safe nuclear waste storage., Regina Canada, 2009.

BOOKS:

Modern Reservoir Engineering - A Simulation Approach, Prentice Hall,

Englewood Cliffs, New Jersey, 1976. Reprinted 4 times. Industry Standard.

Proceedings of the Geothermal Reservoir Well Stimulation Symposium Editor, San Francisco 1980.

Proceedings of The Massive Hydraulic Fracturing Symposium. Editor, Norman, OK 1977.

Introduction to the Oil and Gas Industry. PTTS, Norman, OK, 1981.

Advanced Reservoir Engineering Manual. PTTS, Norman, OK 1981.

PROFESSIONAL AFFILIATIONS. (PAST)

**Society of Petroleum Engineers of AIME,
Scientific Research Society of America
American Management Association
American Association of University Professors.
National Society of Professional Engineers
Registered Professional Engineers - OKLAHOMA #9920., #2249
Registered Engineer - BOLIVIA SOUTH AMERICA**

COURSES TAUGHT AT UNIVERSITY LEVEL:

**Introduction to Engineering ENGR 1112
Computer Analysis ENGR 2722
Numerical Methods in Engineering ENGR 3723
Heat Transfer and Fluid Mechanics ENGR 3233
Petroleum Reservoir Engineering PE 4453
Petroleum Reservoir Mechanics PE 4461
Natural Gas Lab PE 4601
Mathematical Simulation Models PE 5613
Computer Analysis for Digital Simulation ENGR 5723
Masters Level Graduate Research Supervision
Ph.D Level Graduate Research Supervision**

INDUSTRY COURSES TAUGHT:

**Introduction to the Oil & Gas industry
Oil and Gas Reserves Evaluation and Economics**

**Reservoir Engineering
Advanced Reservoir Engineering
Waterflood Analysis
Natural Gas Engineering
Reservoir Simulation
Pressure Transient Analysis**

LANGUAGE Proficiency:

**Spanish: read, write, and speak
French: read.**

MISCELLANEOUS:

Private Pilot License: Instrument Rated, Soccer Coach.

ACADEMIC AND INDUSTRIAL COMMITTEES:

**22 Different University Committee Positions, including President's
Advisory Committee, University Computer Committee, Engineering
College Computer Committee, etc.**

**Several Industry committees, including SPE Review, SPE Engineer
Certification Committee. IADC Drilling Committees**

Computer Software and Application Developed and Supervised:

(1) Gas Well Testing:

- **Multipoint gas Well Testing**
- **Absolute Open Flow Determination**
- **Gas Well Deliverability**
- **Back Pressure Equation - Determine validity of Well Test Data**

(2) Optimization of Gas Plant Liquids Recovery To Maximize Profit

- **Optimize Income Based on GPM Recovered and Selling Prices of Liquids and Gases**
- **Determination of Income for various Throughput Rates**
- **Develop Performance Curve for Gas Plant**
- **Operate Gas Plant to obtain maximum benefit**
- **Determine quantity and quality gas to purchase**

(3) Gas Plant Economics

- **Effects of Prices, Throughput Rates**
- **Cash Flow Projections**
- **investigate Sales Price Effects on Income Stream**
- **Minimize Cost of Operations**
- **Global Sensitivity Analysis**

(4) Large Scale Gas Reserves Evaluation regional)

- **Uses Historical Drilling Rates, Superposition of Production**
- **Normalized Declines and Dynamic Resource Allocation Model (DRAM)**
- **New Well Potentials**
- **Determine if Regional Deliverability Exists for Pipeline**
- **Perform Sensitivity Analysis on all parameters**
- **Verify Past Production**
- **Predict Future Drilling Needs to meet Gas Contract Rates**
- **Predict Makeup Gas Purchases**

(5) Performance Prediction Using Decline Rate Analysis

- **Exponential Decline**
- **Optimized Hyperbolic Decline**
- **Workover Options**
- **Determine Reserves**
- **Rate(Time Analysis**
- **Rate/Cumulative Analysis**

(6) Optimal Design of Gas Production System

- Analyze Effects of Wellbore Variables on Production
- Develop Comprehensive Plan for Gas Well Development
- Develop [PR Performance Type Curves
- Analyze Reservoir Behavior
- NODAL Type Analysis

(7) Pressure Transient Analysis

- Determines the following:
 - Avg. Reservoir Pressure
 - Rock Permeability
 - Capacity Md.-ft
 - Radius of Invasion
 - Skin Effect
 - Effective Wellbore Radius
 - Delta skin
 - Flow Efficiency
 - Well bore Storage Time Factor

(8) Volumetric Gas Reserves (Single Well or Reservoir)

- Calculates G1P from Reservoir Data - "Short Form"
- Calculates GIP from Contour data - "Long Form"
- Pore Volume vs. Area, Reserves vs. Area
- Gas Reserves vs. Volume, Thickness vs. Volume

(9) Material Balance P/Z Analysis

- Computes Reserves
- Determines Original Gas in Place
- Forecasts Production Rate
- Optimize Number of Producing Wells
- Minimize New Investments
- Validate Pressure Production Data
- Investigate Water Influx
- Rate-Time Conversion

(10) Gas Reserves Availability (Single Well)

- Schedule Gas Purchases
- Determine Makeup Gas Needed
- Monitor Deliverability
- Computes Sales Volumes for New Wells Being Tied into Pipeline System
- Uses One-Point Well Test Data

(11) Production Forecasting: Reservoir Pressure To Make Contract Rate

- Determine SIP at which well will no longer produce into pipeline
- Calculate excess well capacities - Predicts well performance at future SIPs
- Determines Reserves
- Determines Rate/Time and Rate/Cumulative

(12) Production Forecasting: Constant Backpressure Well Performance

- Determines well performance against a constant Backpressure

Industrial Experience - Dr. Crichlow / Unigas

- Determines Rate/Time and Rate/Cumulative Behavior
- Determines Remaining Reserves

(13) Production Forecasting: Production Limited to Fraction of AOF

- Determine well performance under AOF constraints
- determine reserves
- Determine Rate/Time and Rate/Cumulative
- Calculates Incremental Production

(14) Production Forecasting: Tubing Sizing for Liquids Removal

- Sizes tubing string for continuous liquid removal
- Both condensate and water
- Determines Minimum flow rates to maintain removal
- Calculates Flow Velocities

(15) Metering: Calibration of Orifice Flow Meter

- Determines calibration curve
- * Calculates Flow vs. inches of Water

(16) Metering: Calibration of Orifice Flow Prover

- Determines Calibration Curve
- Calculates Flow vs. Inches of Water

(17) Natural Gas Properties

- Density
- Compressibility
- Viscosity
- Formation Volume Factor
- Z Factor
- Real Gas Potential
- Develop data for all your gas computations

(18) Bottom Hole Pressures: Flowing & Static

- Determine Flowing BHP
- Determine Static BHP
- Analyze Well Performance

(19) Gas Pipeline Transmission

- Analysis of Gas Pipeline Transmission Variables
- Weymouth Equations
- Panhandle Equations
- * Flow Rates & Throughputs
- * Pressures, Upstream & Downstream
- * Line Lengths, Sizes

- Input line parameters and the program automatically determines the other variables which have

(20) Multistage Gas Compression

- Analysis of Adiabatic Horsepower Requirements
- For Multistage Compression
- Up to 4 possible stages
- Horsepower requirements of each stage

(21) Pipeline Looping Analysis

- Maximize Pipeline Efficiencies
- Restore Throughput
- Calculate Flow Rates
- Calculate Flow Lengths
- Calculate Flow Line Diameters
- Determine Flow Capacities

OIL AND GAS

(1) Economics

- computes the standard cash flow parameters and economic parameters for a project

(2) Decline Curve Analysis

- determines the projected decline rate given certain input parameters

(3) Gas Deliverability

- calculates the absolute open flow of a producing gas well

(4) Pressure Build Up Analysis

- Analyzes the pressure transient data for a oil well using three basic techniques: Homer, MDH, Muskat. A plot is prepared of the results

(5) Material Balance

- determines the material balance behavior of a petroleum reservoir
- develops pressure cumulative response data

(6) Primary Reserves

- determines in place reserves under volumetric reservoir behavior

(7) Waterflood

- performs a Dykstra-Parsons waterflood calculation on a given reservoir

(8) Volumetric Equation OIP

- calculates oil in place by volumetric methods

(9) Material Balance Oil In Place

(10) Gas Reservoir System

* calculates the performance of a gas reservoir system from the reservoir to the sales point

(11) Monte Carlo Simulation

- using random numbers to calculate the Monte Carlo response of a reservoir using various input distributions

(12) Logging

- performs well logging interpretation and formation evaluation

(13) Bottom Hole Pressure

- calculates the bottom hole pressure of gas wells giving gas properties and surface pressures

(14) Streamline

- calculates streamline and streamtube location in a waterflood project An areal plot is made of streamlines and streamtubes

(15) Huff and Puff

- calculates the single well performance of a well undergoing intermittent steam injection and production cycles (CSMP)

(16) Combustion

- calculates the performance of a combustion drive system

(17) Water Influx

- calculates the unsteady state water influx behavior of a reservoir system using the Van Everdingen and Hurst approach

(18) Reservoir Simulation

- Gas reservoir simulation
- Oil reservoir simulation
- Compositional simulation

(19) Muskat Material Balance

- calculates material balance response of reservoir using Muskat equation (CSMP)

(20) Steam Injection

- calculates the movement of steam in a vertical wellbore

(21) Geothermal Wellbore

- calculates the pressure and quality of a geothermal fluids flow in the wellbore

(22) Tracer Modeling

(23) Statistical Data Processing

- provides all regular data analysis for engineering work

(24) Geothermal Reservoir Simulation

- simulates behavior and operation of a geothermal reservoir under production and injection.

(25) Fracture Stimulation Design

- provides analysis to design a stimulation program

(26) Alkaline Flood Model

- models the recovery of oil during a caustic flood

(27) Optimization of Waterflood Well Spacing

- provides the optimal spacing for waterflood projects

(28) Multiphase Flow in Pipes

- provides flowing pressure gradients in multiphase flow up wellbore

(29) Water coning

- predicts formation of water cone in production wells

(30) Gas Gathering and Deliverability Systems

- predicts interaction of the reservoir, wellbore, compressors and delivery line

(31) Well Control Training Module

- trains the student in well control requirements

(32) Well Control Mathematics

- trains the student in well control calculations

(33) Gasdel

- performs multipoint deliverability testing of gas well to regulatory requirements

(34)GIP

- gas reserves and original gas in place using the EXXON regression approach
- production forecasting

(35) Gasop

- optimal reserves evaluation of gas reservoirs with and without water influx

(36) Frac Gas

- production forecasting of a gas-fractured reservoir

(37) Gasproc calculations

- bottom hole flowing and bottom static pressure from gas well test data on sweet or sour gas systems

(38) Bhold

- bottom hole flowing pressure from a gas well on sweet or sour gas systems

(39) Watfes

- a waterflood evaluation system utilizing conventional techniques to estimate waterflood behavior

(40) Tops

- total optimization of production systems using a rapid Systems analysis approach
- all components from reservoir to delivery point are included

LEGAL EXPERT WORK: Dr. Henry B. Crichlow, PhD

CONTRACT BREACH: Patented oilfield horizontal drilling tools. Contract breach between parties. \$8,000,000 cause of action. Dr. Crichlow was retained to testify and demonstrate the value and applicability of device in the oil and gas market. (Successfully settled) (WARBURG GROUP-LONDON! SIDEWINDER COMPANY-USA)

*** Attorney References:**

O'QUINN, KERENSKY, McANINCH P.C

John M. Quinn, Mike O' Brien: 713-223-1000 - Houston, TX

AND Roberts, Marrs & Carson:

Richard Marrs 800-492-0066, Tulsa. OK

CONTRACT BREACH: Value of Oil field patented devices. Dr. Crichlow was retained to testify and demonstrate that significant value was associated inventor's devices for down hole pumping of oil wells with gas lock problem. Litigation was based on \$50,000,000 market value. (Successful: Multi-million dollar award) (vs. ECO HOLDINGS and their Insurance Company)

*** Attorney References: AKIN, GUMP**

- o **David Dunham 512-499-6200 Austin, TX. (Possibly largest Texas Law Firm)**

OIL & FLUID MIGRATION: across lease lines. Dr. Crichlow was retained to quantify the extent of fluid migration across lease boundaries between producing well locations. (Successfully settled) (MAJOR INDEPENDENT) Dr. Crichlow was expert advisor to LONG & ATTERBERRY (Consultants)

ENHANCED OIL RECOVERY: GAS INJECTION: Dr. Crichlow was retained to testify and demonstrate that significant oil reserves were being produced by EOR gas scavenging during the injection of natural gas into an oil reservoir in Oklahoma during a gas injection project. Cause \$12,000,000. (Successful monetary settlement) (ONG/ONEOK and GAGE Pipeline Company).

*** Attorney Reference:**

McAFEE & TAFT (OK City)

Philip Hart 405-235-9621

(One of the largest OK Law Firms)

GAS PROCESSING vs. GAS PIPELINE:, breach of contract against two international multi-billion dollar conglomerates. Dr. Crichlow was retained to testify and demonstrate that conglomerates were “short-changing” pipeline companies, that gas and liquids production was not in keeping with actual production information and contract requirements. Successful litigation. Cause \$100,000,000 to \$200,000,000. (Extremely successful monetary award) (TEXACO-DOME vs. GAGE Pipeline System).

* Attorney Reference:

Stan Ward, 405-360-9700 Norman

WATERFLOOD CONTAMINATION, of arable land. Loss of productivity. Cause less than \$100,000. (Settled), (CONOCO - major oil company)

LOSS OF ULTRADEEP WELL:, Dr. Crichlow was retained by the Insurance Company to testify and demonstrate that improper engineering and operations by first party led to loss of well and reserves. Cause \$30,000,000 to \$50,000,000. (\$4,000,000 settlement) (HIGHLAND INSURANCE CO.)

* Attorney Reference:

Abowitz & Welch
Cheek & Cheek OKC
plus Major Houston Law Firm.

IMPROPER WELL PLUGGING: Determination of fieldwide reserves prior to plugging. Cause less than \$1,000,000. (Successful settlement), (MAJOR OIL Co.)

CONTAMINATION OF PRODUCING ZONE DUE TO WATER FLOOD:. Dr. Crichlow demonstrated and testified that water did not come from waterflood zone as indicated by other party. Dr. Crichlow used a technique involving ‘water fingerprinting” to rule out the alleged source of water. Less Than \$1,000,000. (TENNECO - major Oil Company)

CIVIL ACTION: G 97-525 S/2. IN THE CHANCERY COURT 01 THE FIRST JUDICIAL DISTRICT OF HINDS COUNTY, MISS. J.G GROUP INC. vs. JETTA PRODUCTION COMPANY. Action on behalf of the defendants in an Underground Natural Gas Storage Litigation in which Dr. Crichlow as expert witness was required to validate the reservoir as a viable storage system in today’s market and to put a monetary value on the system when in operation. (October 1997), Atty. Michael HARTUNG, 120 North Congress St, Suite 1100, Jackson, MI. 39201., Phone 601—948—0550 Fax: 601—948—7780

CASE 14098: LAMB COUNTY ELECTRIC vs. SOUTH WESTERN PUBLIC SERVICE COMPANY. Texas Railroad Commission PUC Division. Dr. Crichlow provided expert witness testimony on engineering analysis for the electric power company to determine electric power use in oilfield production practices. (June 1997), Atty. Gary McClaren, Lubbock, TX.

WARD & ASSOCIATES - Norman Oklahoma: Drilling Litigation Eagle vs. GLB. Drilling Operations technology.

HALL, ESTILL, HARDWICK, GABLE – Oklahoma City, UNIGAS Gas Storage at OK Corporation Commission, Horizontal well drilling in gas storage.

HALL, BLACK& SPROULL – San Antonio, TX. At TRRC. TEXACO and UNION PACIFIC vs. KERR MCGEE, Gas Development Drilling Technology Applications.

GIBBS, ARMSTRONG BOROCHOFF, MULLICAN & NART. PC – Tulsa, OK. Barnett Shale Drilling Operations Litigation. Aruba vs. Eagle Drilling, Wise Co, TX. Cause:05-02-149

SAFETIRE Corp, Shredded Tire Chips Litigation, District Court, Beaumont, TX. Technical Analysis of shredded tire operations.


MADDEN SEWELL LLP, Dallas, TX, Carlton Energy vs. Phillips Oil Interests, LLC. Coal Bed Methane Drilling Operations in Bulgaria, Harris Co., TX.

PROPANE TANK EXPLOSION: CJ-2004-2188, Oklahoma City, Albert vs. Bultman, Redwine & Cubberley, Ward & Associates.

WARD & ASSOCIATES, Thornton vs. Quicksilver Resources Inc., Barnett Shale Drilling Operations.

Dr. Henry Crichlow – Patents, published, applied for and pending:

1 US20020018545 [Method and apparatus for reading a meter and providing customer service via the internet](#)


A method and system for monitoring usage of a utility at a remote location by a central station and incorporates a real time method for optimizing energy costs operationally by combining... 1000 

2 6238138 [Method for temporary or permanent disposal of nuclear waste using multilateral and horizontal boreholes in deep isolated geologic basins](#)

A method of disposing nuclear waste in underground rock formations (18). The method includes the steps of selecting an land area having a rock formation (18) positioned there below of a depth able... 1000




3 6900738 [Method and apparatus for reading a meter and providing customer service via the internet](#)

A method and system for monitoring usage of a utility at a remote location by a central station and incorporates a real time method for optimizing energy costs operationally by combining... 1000 


4 6965319 [Method and system for energy management using intelligent agents over the internet](#)

A system for managing utility meters via internet. The system includes a central station able to communicate over the internet, and a plurality of meters. The central station includes an... 1000 

5 US20090025307 [Severe storm shelter](#)

This invention is related to the development of and installation of a shelter structure suitable for severe storm safety. The shelter is a composite structure constructed of precast and post... 895 

6 US20060036675 [Method and system for energy management and optimization.](#)

A method and a system for utilizing expensive energy management software systems via the internet by a plurality of remote client users without having the major software systems resident on the... 895 



7 US20070284107 [Heavy Oil Recovery and Apparatus](#)

A thermal in-situ method and apparatus are provided for recovering

hydrocarbons from subterranean hydrocarbon-containing formations such as oil sands, oil shale and other heavy oil systems.... 895  

8 US20040243524 [SYSTEM AND METHOD FOR REAL TIME GENERATING, PRESENTING, DISPLAYING AND PAYING UTILITY BILLS ONLINE](#)

A system for continuously providing information on the internet of the usage of a utility commodity at a meter includes an internet site at which the usage of the utility commodity at the meter can... 895 



9 US20060175061 [Method for Recovering Hydrocarbons from Subterranean Formations](#)

Recovery of viscous hydrocarbon from subterranean formations is assisted by using a plurality of novel U-tube type wells, each with dual wellheads, a moveable wellbore packer, a lateral section... 895

10 US20070209972 [Oil Recovery from Hydrocarbonaceous Solids](#)

A thermal method and apparatus are provided for recovering hydrocarbons from hydrocarbon-containing solids such as oil shale, tar sands and other hydrocarbonaceous solids. The method includes...

895  

11 US20040246143 [SYSTEM WITH REPLACEMENT METER COVER](#)

A system can be used with an existing meter that has a removable cover and a base and measures the usage of a utility commodity, such as electricity. The system replaces the removable cover with a...

895  



12 US20070187103 [Hydrocarbon Recovery from Subterranean Formations](#)

Recovery of viscous hydrocarbon by hot fluid injection into subterranean formations is assisted by using a specially designed and under-reamed vertical wellbore with multiple injection perforations...

895  

13 US20060036967 [Remote meter reading using transmitted visual graphics.](#)

A technique for remote meter reading (RMR) of a plurality of meters uses visual image devices coupled to pattern recognition technologies to allow unattended meters, gages, registers, screens,

and... 895  

14 US20050240427 [Energy management method and process using analytic metrics.](#)

A method and process provides an approach to optimizing energy costs or any similar fungible, consumable commodity in real time use by defining and utilizing a novel analytic metric based on the... 895



15 US20070175638 [Petroleum Extraction from Hydrocarbon Formations](#)

Recovery of viscous hydrocarbon by hot fluid injection from subterranean formations is assisted by using a specially designed and under-reamed vertical well to form a central production cavity;... 895



16 US20050041790 [METHOD AND SYSTEM FOR COMMUNICATING FROM AN AUTOMATIC METER READER](#)

In a system where an automatic meter reader device communicates with a host at a remote location using a communication line that is shared with at least one other user, conflicts between the use of...

895



17 7167102 [System with replacement meter cover](#)

A system can be used with an existing meter that has a removable cover and a base and measures the usage of a utility commodity, such as electricity. The system replaces the removable cover with a...

895



18 5850614 [Method of disposing of nuclear waste in underground rock formations](#)

A method of disposing nuclear waste in underground rock formations (18). The method includes the steps of selecting an area of land having a rock formation (18) positioned therebelow, the rock...



19 7098783 [System and method for real time generating, presenting, displaying and paying utility bills online](#)

A system for continuously providing information on the internet of the usage of a utility commodity at a meter includes an internet site at which the usage of the utility commodity at the meter can... 895 



20 7422063 [Hydrocarbon recovery from subterranean formations](#)

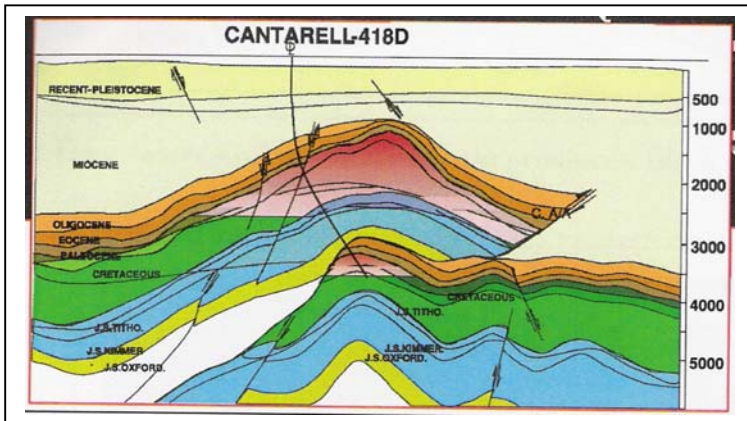
Recovery of viscous hydrocarbon by hot fluid injection into subterranean formations is assisted by using a specially designed and under-reamed vertical wellbore with multiple injection perforations...

895  

21 6999567 [Method and system for communicating from an automatic meter reader](#)

In a system where an automatic meter reader device communicates with a host at a remote location using a communication line that is shared with at least one other user, conflicts between the use of...

895

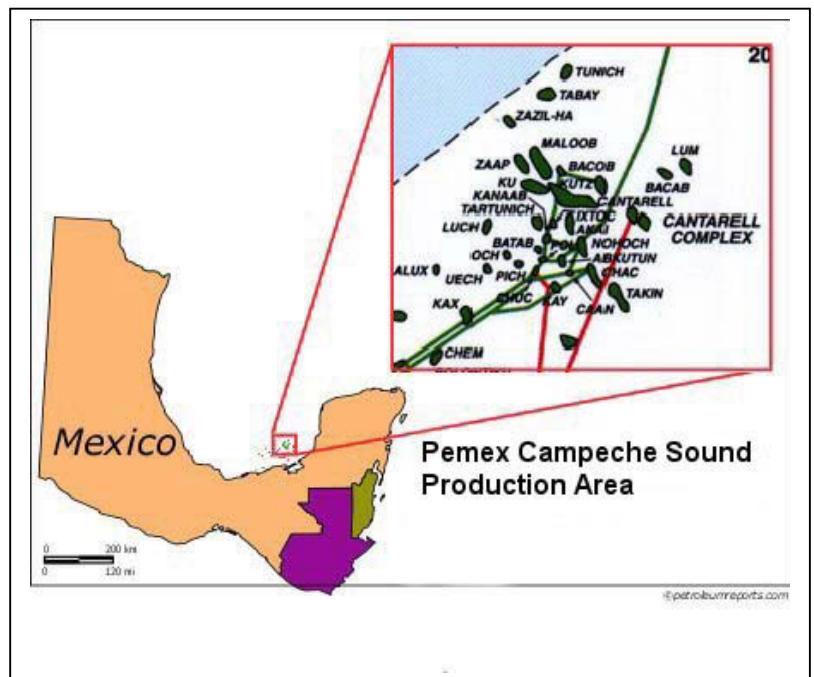


\$3 BILLION PEMEX OFFSHORE PROJECT

Optimizing offshore development in 1,000,000 BOPD Cantarell Oil field for **\$3 Billion** PEMEX project by designing and selecting the best available technology for reservoir pressurization injection.

Dr. Crichlow recommended:
High Pressure Nitrogen Injection
instead of:

1. Flue Gas
2. Carbon Dioxide
3. Natural Gas



Maximizing Oil recovery by
gas Injection in Offshore
Oil Fields



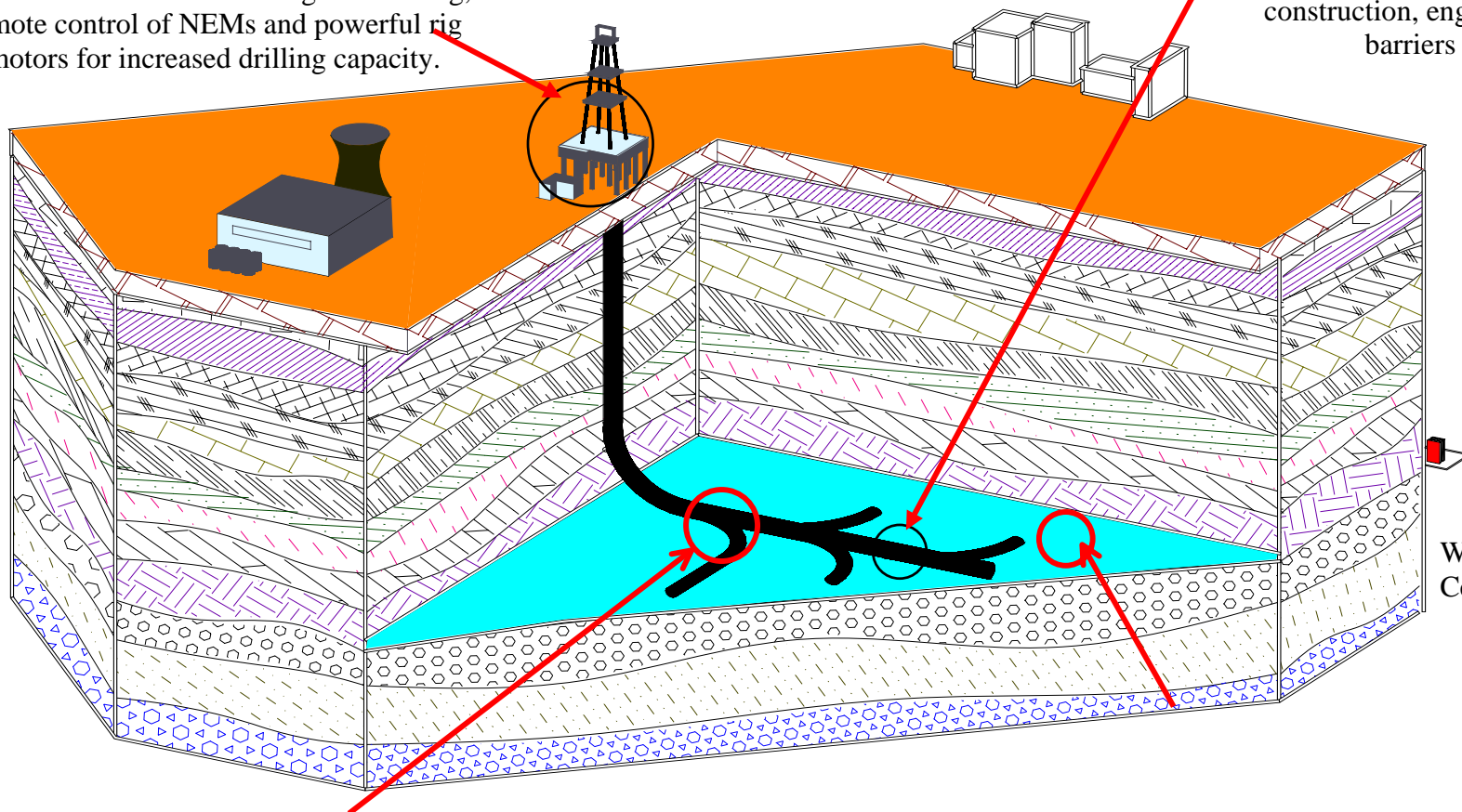
**Unigas
Nuclear
Corporation**
People Protecting the PlanetSM

**SAFE NUCLEAR WASTE DISPOSAL
TECHNOLOGY**

NUCLEARSAFE™
Patents No. 5,850,614
6,238,138

NEM: Nuclear Encapsulation Module - Nuclear Waste is stored in specialized modules placed inside the primary and secondary laterals of the NuclearSAFE™ system. Modules utilize innovative metallurgy, fail-safe construction, engineered barriers

NDR: Nuclear Drilling Rig - a specially modified deep drilling oil rig to provide radioactive materials handling & shielding, remote control of NEMs and powerful rig motors for increased drilling capacity.



World Trade Center to Scale

RTS: Reentry Tieback System - unique system designed to allow multiple successful entries into the lateral zones where the waste modules (NEMs) are stored in the nuclear repository. This allows temporary or permanent nuclear waste storage.

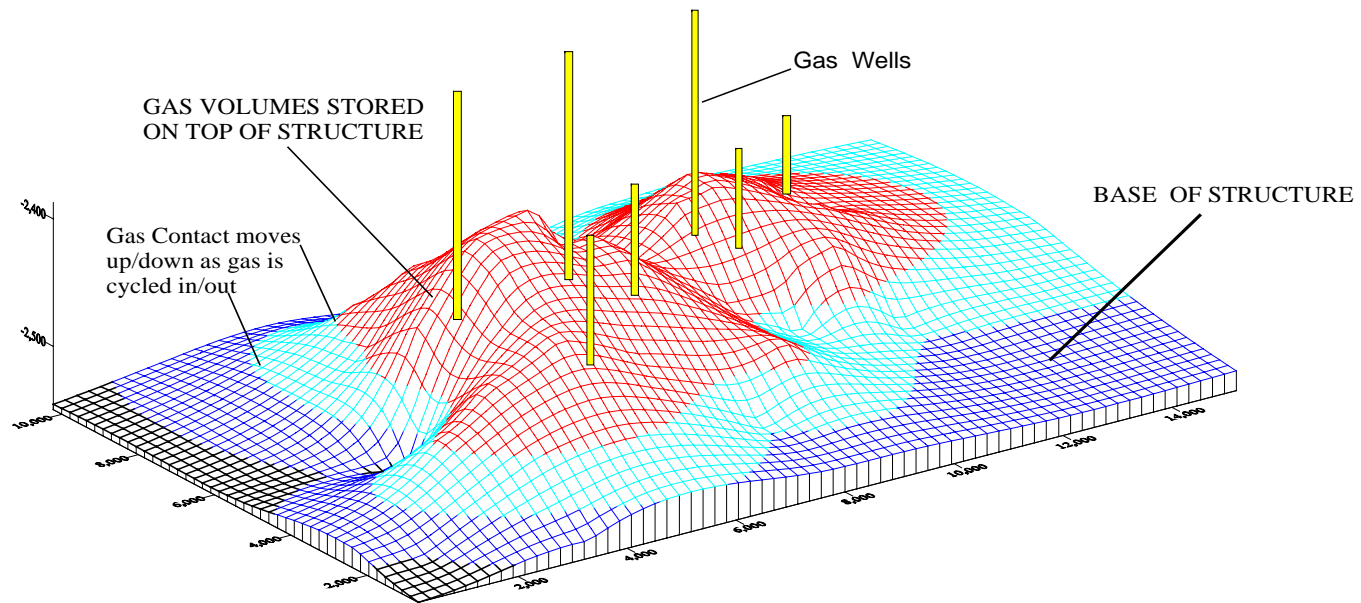
Dr. Henry B. Crichlow

www.safenuclearwaste.com

NRZ: Nuclear Repository Zone - Seismically defined, Deep Repository Zone at 15 - 20,000+ feet. Geologically Isolated. Structurally & Hydrodynamically closed, No chance of Material Loss to the Environment over geologic time.

\$210,000,000 Gas Storage System for 30 BCF Gas

UNIGAS GAS STORAGE SYSTEM GEOLOGICAL STRUCTURE OF TARGET ZONE CROMWELL SANDSTONE AT 3200 FT DEEP

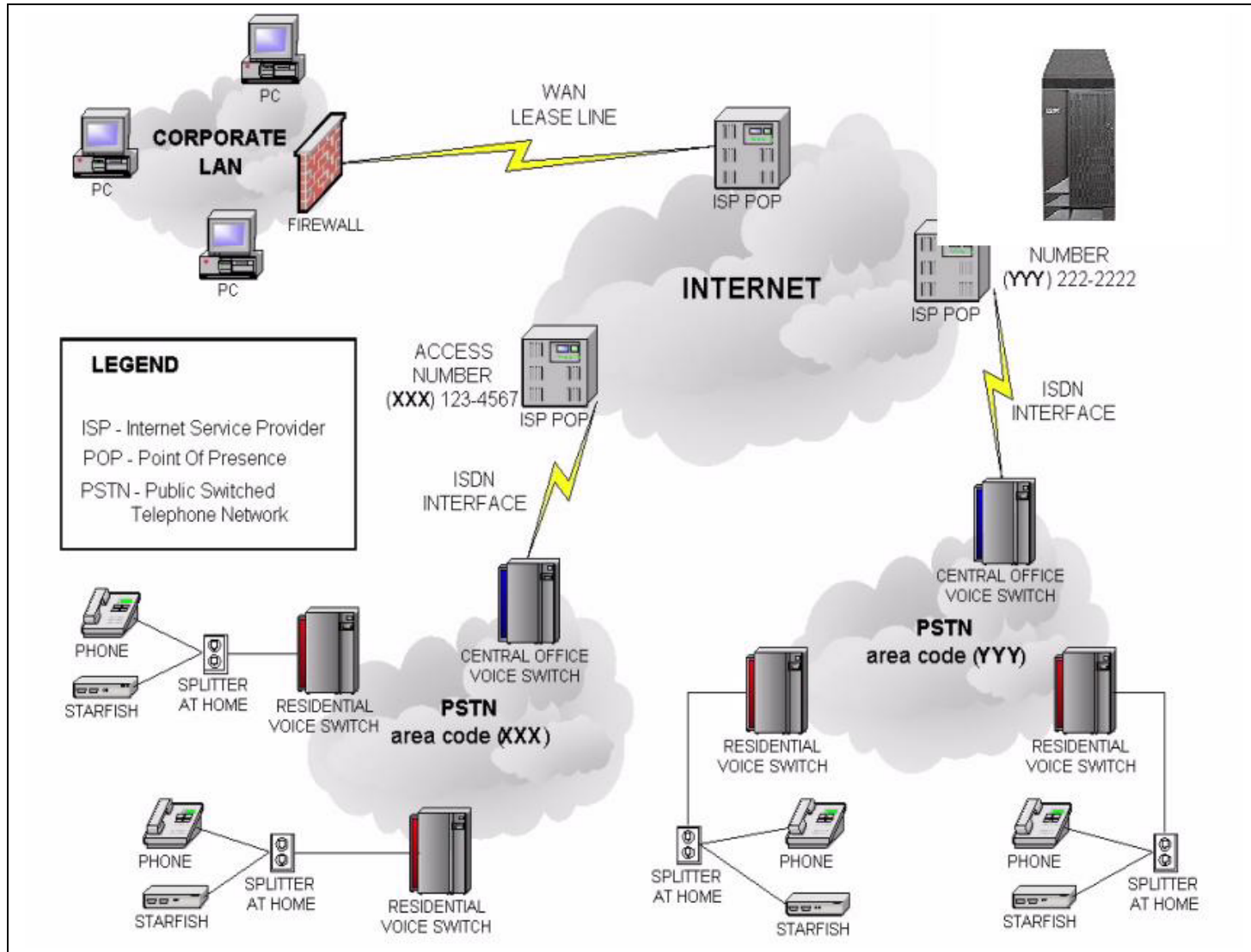


Gas for Power Plant is stored on top of Domed structure and produced as needed for power generation.

Gas_2000

www.unigascorp.com

SMART GRID TECHNOLOGIES – Patented By Dr. Crichlow



www.energypower.com

END OF RESUME