

**Cirriculum Vitae**  
**Mr. M.R. (Mike) Carlson**

**BIO**

Mike Carlson founded Applied Reservoir Engineering & Evaluation, Ltd., a petroleum engineering consulting firm specializing in reservoir engineering, numerical simulation, and economic evaluations. He has more than 32 years of experience in the petroleum industry, working for such corporations as AMOCO Canada, Home Oil, Petro-Canada and Canadian Hunter. He has taught various short courses in the use of production and exploitation simulation software for such companies as Scientific Software-Intercomp and McDaniel & Associates Consultants Ltd. He has authored more than 20 different technical papers and is a member of SPE, APEGGA, the Canadian Well Logging Society, and the Canadian Society of Petroleum Geologists. He has served as technical program committee chairman for the Canadian Institute of Mining, Metallurgy & Petroleum (CIM), director of the National Board of the Petroleum Society of CIM, and was on the Industry Advisory Committee for the University of Regina Petroleum Engineering. He is the author of *Practical Reservoir Simulation*, (2003, PennWell). Currently, he is actively involved in the development of a Steam Assisted Gravity Drainage (SAGD) projects in north-eastern Alberta.

**EDUCATION**

**University of Toronto, Canada**

B. App. Sc. In Geological Engineering – graduated 1979.

Geological engineering is oriented to the design of foundations, earth and rock structures.

The curriculum includes courses in geology, soil mechanics, rock mechanics, and groundwater.

**University of Calgary, Canada**

Graduate Level Courses. Reservoir Simulation I, Applied Reservoir Simulation and Thermal Recovery Methods. (Grade Pt. Avg. 3.53)

**EMPLOYMENT SUMMARY**

**April 2012 – Present**

**President, Applied Reservoir Enterprises Ltd., Calgary**

- Expert witness in patent litigation regarding SAGD process. Prepared expert witness report and provided analysis of rebuttal responses. (Cenovus)
- Expert panel member for cap rock integrity for ERCB hearing (Alberta Oil Sands Inc.)
- Electrical modelling of E-T Energy's pilot project using STARS
- Technical Project Manager for Fateh/Mishrif study of carbonate reservoir in Persian Gulf. Presented results in Istanbul Turkey. (Petro Management Group)

- Reservoir Simulation support for Mexican multi-frac horizontal well (WestRock Energy Consultants Ltd.)
- Training courses in Vienna (HOT Engineering GmbH.)
- Thermal Reservoir Simulation Course (SPE) in Calgary
- Reservoir Management Course in Qatar (HOT Engineering GmbH – run twice)
- Advanced Reservoir Simulation Workshop (Bauerberg-Klein) Course taught in Lima Peru for CAREC.
- Subsidence study of Pembina Cardium multi-frac well depletion

## **Sept 2009 – April 2012**

### **Manager Reservoir Engineering, RPS Energy Group**

Managed group of 10 people. Group activities included reservoir simulation, economic evaluations, corporate reserves, SAGD, peer reviews, expert witness for two projects. The Calgary office had a very high profit margin in the RPS organization.

Nexen:

- Peer Review Pad 14 and 15 at Long Lake
- In house reservoir engineering support
- Geomechanical review JACOS Hangingstone Project
- Geomechanical models for Long Lake Pads 12,13, 14 and 15 (partial)

Investment Fund SAGD Operator Property Review

Peer Reviews

- For bank – operators development plans - for financing
- Marathon Oil – progress to date on SAGD project
- Van Yogan field in Siberia (TNK-BP)

Alberta Oil Sands Inc

- Geomechanical Simulation
- ES-SAGD Simulation

Silverbirch

- Geomechanical Design. of shallow project

Conventional Simulations

- Chinook – Thorsby Glauconite pool performance
- Penngrowth – three different reservoirs
- Questerre – waterflooding with horizontal multfrac wells
- Arawak – Dodsland horizontal multfrac well infills

OptiCanada

- Review and simulation of performance of Long Lake property – Opti has 35 percent working interest

Review for Acquisition

- Reviewed property for possible acquisition

EM-SAGD Development support

- Electromagnetic induction SAGD development assistance for Siemens AG in Erlangen in Germany.

#### Development Plans

- Petro America – heavy oil development in Columbia
- Petro-Minerales – heavy oil development in Columbia
- Reactivation of old heavy oil area in Texas

#### Litigation Support

- Ackroyd LLP – CPDFN and Conklin Metis re MEG Energy Development (settled).
- Ackroyd LLP – Support to CPDFN (settled) and Conklin Metis re Petrobank THAI in situ combustion process (application withdrawn)
- Ackroyd LLP – Support for local interveners re Koch Gemini SAGD project (settled).
- Blakes LLP – support for Saskatchewan heavy oil litigation (Cenovus)

### **March 2008 – August 2009**

#### **Principal Reservoir Engineer – InSitu Oilsands, Petro-Canada**

Hired principally to provide geomechanical advice to prevent caprock failure of MacKay River project, due to offset Joslyn catastrophic steam release (May of 2006). Significant accomplishments – recognition of cap rock leakage into overlying Wabiskaw C sand through Wabiskaw D mudstone. geomechanical modelling of possible failures, identification of condensation induced water hammer as a significant safety risk, modelling of steam induced water hammer and mitigation. Lewis testing program has now been successfully implemented in the field. A second program has been conceptually designed.

Worked as consultant engineer from March 3<sup>rd</sup> to June 27<sup>th</sup>, 2008. Full time from July 7<sup>th</sup>, 2008 until August 2009.

- Provided expert advice on Reservoir Engineering for Oil Sands Depletion Planning for both In Situ and Mining properties. This included analytical assessments, reservoir simulation using both Exotherm and Stars, and geomechanical assessments
- Provide wider reservoir engineering and oil & gas industry perspective to Petro-Canada's oil sands projects.
- Work closely with the oil sands reservoir engineering manager and staff to be fully aware of all of the technical reservoir engineering work in oil sands. This includes meeting with each of the reservoir engineers on a regular/appropriate basis to review their evaluations and provide advice and guidance as needed.
- Hands on oil sands reservoir engineering evaluation work including analysis of data and reservoir simulation. Initial project will be to assist with developing Lewis testing program.
- Identify opportunities for joint work between asset teams, lead/act as coordinator as appropriate including coordinating monthly oil sands reservoir engineering meetings, and training programs. Thermal Reservoir Simulation course for co-op students.
- Development of reservoir engineering skills, tools, and processes, etc., leading and/or coordinator activities as appropriate.

- Peer reviewer for Major Property Reviews for all oil sands properties and other Petro Canada properties as appropriate
- Attends weekly Reservoir Engineering Supervisor meetings.

**01/2006 – 12/2007**

**Vice-President Engineering, Silverwing Energy Inc.**

Responsible for all engineering functions and most production functions. During the past year at Silverwing the company's production has doubled. Gas plants have been built in South Beavertail and at Boundary Lake. A booster compressor and gathering system was started-up in Buick and a gas gathering system plus two sweetening units were installed in South Beavertail. Engineering done for gathering system in Umbach. Other highlights include:

- Corporate Reserves – coordinated annual reports prepared by Gilbert Lausten Jung
- Marketing – transportation, tie-in, gas contracts and processing
- Production Reporting
- Economic Evaluation – Tomahawk farm-in and development
- Joint Venture CO&O for gas plant construction.
- Sale of Boundary Lake Plant to Altagas
- Computerized log analysis
- Pressure transient analysis
- Hiring operator – NE BC
- HSE program implementation
- Critical sour well applications
- Accounting support

Company taken public during this time period (IPO). Assisted with engineering functions on IPO and due diligence.

**10/1999 – 10/2006**

**President, Applied Reservoir Engineering Ltd.**

Principal of consulting petroleum engineering firm specializing in reservoir engineering, numerical simulation and economic evaluations.

Significant courses – see courses taught section.

Berrymoor Jurassic R, N and GGG pools (Shiningbank Energy Inc.)

Effect of gas cap production on oil leg

Thermal Fractured Reservoir (Reservoir Team / Shell International E&P / PDO)

Qarn Alam field in the Sultanate of Oman

Thermal and black oil reservoir modelling of steam pilot and development using STARS and IMEX (CMG)

Two trips for a total of 10 weeks in Oman

Reservoir Model Input (Sheritt International)

Input structural cross-sections for overthrust reservoir in Cuba into geological mapping package

Geomechanical Grid (Taurus RS / Shell International E&P)

U.S. Gulf of Mexico offshore reservoir

background research on stress states offshore Gulf of Mexico

Decision Cycle Compression – ADCO – Giant Onshore Carbonate Field (CMG/Gaffney-Cline)

Simulation support in Houston and Abu Dhabi.

Work was on Middle East giant carbonate reservoir.

DCC is an intensive decision management tool for developing oil and gas fields.

Optimized reservoir simulations (IMEX – CMG) and converted datasets from Eclipse.

Fractured Reservoir Engineering (Sunwing)

two day short course to Chinese geologists on training tour in Canada

SAGD Stratigraphic Drilling Program (Newmont Mining Corporation of Canada Ltd.)

two 18 well drilling programs on oil sands lease in Christina Lake area.

follow-up to successful government hearing.

Organized data for subsequent sale of property.

Property sold to KNOC for \$315 mm Canadian

Gas over Bitumen Alberta Energy and Utilities Board – Bitumen Submission (Newmont Mining Corporation of Canada Ltd.) – This was a major 2 year project.

- Expert witness for main and interim hearing (economics, reservoir simulation, thermal simulation (using Geosim and STARS), and log analysis)
- Submission preparation for 6 person panel (log analysis, geology, hydrogeology, geomechanics, gas reservoir simulation, thermal reservoir simulation, geostatistics, economics)

Aerial Ostracod (Player Petroleum)

Reservoir simulation of mature gas flood. Significant increase in recovery factor.

Stanmore Glauconite Pool (Player Petroleum Ltd.)

Reservoir simulation for waterflood (Eclipse). Government application

Government approval successfully obtained

Brassey HCMF Compositional Reservoir Simulation (Canadian Hunter Exploration)

History match miscible flood (GEM – CMG) and provide blowdown predictions.

Valhalla Doe Creek T and U Pools (Petrorep Resources Ltd.)

Waterflood optimization using simulation. Update of study previously completed.

Technical Support – Kotaneelee Litigation (McDaniel and Associates Consultants Ltd.)

Continuation of previous work on this project.

Kakut Charlie Lake Reservoir Review (Shiningbank Energy Ltd.)

3-day review of reservoir performance and review of previous simulation study.

Project extended to include complete reservoir simulation

Morse River Unit No 1. (Shiningbank Energy Ltd.)  
2-day update of previous reservoir study.  
Caroline Swan Hills Reservoir (Newport Petroleum)  
Technical review of subject reservoir.

**07/1998 – 02/1999**

**Senior Staff Reservoir Engineer, Reserves Advisor, Team Leader, Reserves Management for Gulf Canada Resources Limited**

Originally hired into technical consulting group reporting to Vice President North America (Calgary) as Senior Staff Reservoir Engineer. Initial assignment Red Earth Keg River, waterflood technical support. Assignment changed upon arrival to Team Leader - Reserves Management, reporting to Director (manager) Business Enhancement.

House Mountain Unit No. 2

Waterflood optimizations increased value of property by \$10 mm.

**05/1997 – 06/1998**

**Vice President Technical Services, McDaniel & Associates Consultants Ltd.**

Sold Startup Company to McDaniel & Associates Consultants Ltd. Services marketed under Applied Reservoir Engineering Ltd., A Division of McDaniel & Associates Consultants Ltd. Responsibilities include marketing, bid preparation, staffing, supervision of reservoir studies and technical appraisal of (outside) reservoir simulations for evaluation purposes. Strategic change to highly supported technical staff. Procured expanded computing facilities.

Acquisition Support (Amoco Canada Petroleum Company Ltd.)

Provided technical backup for purchase bid on sour gas condensate reservoir.  
Reservoir was to be developed with horizontal wells.

Litigation Support - Kotaneelee (Duncan, Kelly)

Prepared questions for lawyer to cross-examine expert witness.. Reservoir is structurally complex dolomite sour gas reservoir located in Yukon Territories.

Varadero and Boca de Jaruco Thrust Faulted Chalk Reservoirs - Cuba (Sherritt International Corporation)

- Large numerical simulation (Eclipse) with approximately 150,000 grid blocks, of which 100,000 were active, used for Varadero field. Major change in reservoir characterization made based on history match results. Heavy oil ranged from 9 to 12 degrees API.
- Boca Reserves and drive mechanism assessed by conventional reservoir engineering methods including material balance. Reservoir has moderately strong water drive.

- Reports made for securities reporting to SEC (IPO on NYSE). Also included due diligence.

George Kiskatinaw (Rigel Oil and Gas Inc.)

- Sandstone reservoir in Peace River Arch. Preliminary study resulted in successful infill well. Correctly predicted amount of gas pay drilled. (Eclipse).
- Follow up study requested for AEUB application and to evaluate alternate depletion strategies.

Progress Halfway Pool (Phillips Petroleum Canada Inc.)

Small reservoir study to evaluate communication between possible gas cap well and main body of reservoir. Identified water influx and suggested optimized waterflood.

Boundary Lake Halfway Reservoir (Rigel Oil and Gas Inc.)

Optimized waterflood identified, which should result in substantial upside.

Cecil Charlie Lake (Corexcana and Anderson Exploration Ltd.)

Study identified performance related to fractures. Horizontal well predictions made as well as an assessment of waterfloods. Waterflooding was not thought to be effective based on simulation and offsetting waterflood failure.

Reservoir Simulation Reviews

- Benson Midale Beds
- Midale Ordovician Yeoman
- Loon Lake Slave Point G
- Valhalla Doe Creek T, U and BB Pool  
Material Balance Studies
- Sylvan Lake Pekisko B
- Manyberries Sunburst Q Pool

Pipeline Reserves Study and Gas Storage Candidate Selection (Interprovincial Pipeline Ltd.)

Prepared report on projected gas discoveries and location of known (established) reserves in Northern Alberta.

**02/1990 – 04/1997**

**President, Applied Reservoir Engineering & Evaluation Ltd.**

Principal of consulting petroleum engineering firm specializing in reservoir engineering, numerical simulation, and economic evaluations.

Expert Evaluation for Litigation (Canadian Hunter Exploration Ltd.)

Evaluated material balance study results for litigation.

Montney Waterflood Evaluation - Valhalla (Suncor Energy Inc.)

Performed reservoir simulation on low permeability reservoir with hydraulically fractured wells. Recommended against waterflooding due to relative permeability data and lower performance expected from fractured wells. Detailed modelling of core flood results.

Near Critical Sour Gas Retrograde Condensate - Wabamun Gold Creek (Ulster  
Petroleums)

Evaluated producing trends and pressure transient analyses for the Gold Creek  
Wabamun field. Successfully matched GOR behaviour. (Two previous consulting  
studies failed). Detailed description of fractured reservoir provided.

Sour Gas Field PVT Sampling Program - Horizontal Well (Suncor Inc., Resources Group)

Design of sour gas PVT sampling program for very sour reservoir in northern Alberta.

Gas Field Deliverability Study (Computer Modelling Group)

Reservoir simulation of large gas field in northeast B.C. Objective of work was to  
develop a long-term deliverability plan for the field. Core asset for the operating  
company.

Horizontal Well Evaluation (Barrington Petroleum Ltd.)

Pekisko reservoir in the Twining area.

Pembina Nisku Near Critical Volatile Oil Reservoir Model (Home Oil Company Limited)

- Preparation of compositional simulation to predict optimal method of reservoir  
development.
- Extremely difficult fluid to characterize. Some samples indicated dew point  
system with very high CVD dropouts (over 40 percent) to extremely volatile  
bubble point systems (Bo over 4).
- Extensive monitoring of laboratory work was required. Problems documented in  
"Obtaining PVT Data For Very Sour Retrograde Condensate Gas and Volatile Oil  
Reservoirs: A Multi-disciplinary Approach", presented at the SPE Gas Technology  
Conference held in Calgary, April 28th - May 1st, 1996.

Single Well Gas Condensate Reservoir Simulation (Suncor Inc, Resources Group)

Effects of retrograde condensation on single well productivity were investigated.

Modelled hydraulic fracture directly with compositional simulator. Less productivity  
impairment was identified than previously indicated in literature. Presented results at  
SPE Low Permeability Reservoirs and Rocky Mountain Regional Symposium in late  
March 1995.

Blueberry Debolt Reservoir Optimization Study (Suncor Inc., Resources Group)

The North and South Pool were both modelled to determine optimal continued  
development. This field is trapped by the updip termination of the Debolt on a thrust  
fault. Difficult boundary conditions, extensive production history (36 years),  
considerable geological extrapolation required.

Foothills Development Study (Suncor Inc, Resources Group)

Stolberg, Red Hat, Mountain Park and offsets

Reservoir Simulator Demonstration (Computer Modelling Group)

Data set from reservoir input into simulator model to demonstrate model capabilities,  
in particular, the use of horizontal well option. Old and limited data extrapolated using  
correlations.

Reservoir Simulation / Production Prediction (Stampeder Exploration)

Kerobert Area

Well Test Interpretation (Suncor Inc., Resources Group)



Umbach area gas well

Technical Support - Simonette Leduc Reservoir (Suncor Inc., Resources Group)

Supported staff and provided equipment for major reservoir study

Waterflood Study - Waskada Field (Omega Hydrocarbons Ltd.)

Waskada and Mississippian

Waterflood Simulation Study (Page Petroleum Ltd. / Royal Bank of Canada)

The effects of layering were investigated on a mature waterflood in the Dodsland area of Saskatchewan. Study recommendations have been implemented.

Gas Oil Ratio / Drainage Study (Omega Hydrocarbons Ltd.)

- Performed numerical simulation to quantitatively determine gas saturations over time.
- Appeared as expert witness in Court of Queens Bench (Province of Alberta).
- Recently (Sept '95) reviewed waterflood performance and recommended combined peripheral and pattern drive.

Multi-well Computerized Log Analysis (Scientific Software - Intercomp)

Large gas reservoir in Bangladesh with a difficult analysis, due to presence of heavy and radioactive minerals.

Log Analysis Presentation, Dhaka Bangladesh (Scientific Software - Intercomp)

The techniques to analyze logs in Bangladesh were presented to the staff of the Bangladesh Oil Gas and Mineral Corporation (BOGMC).

Economic Evaluations

- Major property evaluation - foothills sandstone gas reservoir. Independent audit for internal reserves booking. Evaluated reserves database software for future acquisition. (Amerada Hess Canada)
- Major property evaluation - foothills carbonate gas reservoir. Independent engineering report for dispute resolution (potential litigation) and sale of property.
- Property swap - northeastern B.C. and northern Alberta. Evaluations used as basis of exchange of properties (Petro-Canada and Phillips Petroleum Canada Inc.)

Reservoir Engineering Review Keg River Reef (Amerada Hess Canada)

Material Balance Study (Amerada Hess Canada)

Sturgeon Lake field

Horizontal Well Evaluations (Omega Hydrocarbons)

Entwistle area Pekisko and Wilmar Frobisher-Alida.

Waterflood Feasibility Study (Orbit Oil and Gas Ltd.)

Tindastoll Belly River B pool.

Vacation Relief (Orbit Oil and Gas Ltd.)

Work consisted of general shallow gas reservoir engineering. Did evaluation of properties for acquisitions. Reviewed horizontal well potential in Twining Pekisko.

**01/1988 – 01/1990**

**Consultant (employee) Scientific Software-Intercomp (Intercomp Resource Development and Engineering Ltd.)**

SSI is an international consulting firm specializing in exploration and production services. Responsible for conducting reservoir simulation studies, computerized log analysis, economic evaluations, and audits of evaluations, within budgets. Also, instruction of industry courses in reservoir simulation.

#### Southwestern Saskatchewan Waterflood Study

- Best presentation at 1989 SSI internal technical symposium (\$5,000 U.S. prize).
- Presented Saskatchewan CIM Conference in Sept. '89.
- Published in January 1992 issue of JCPT.

#### Major Waterflood Study

- Alberta carbonate reservoir, 75+ wells, multi-layer, Beaverhill Lake
- Presented at CIM/SPE technical conference in June 1990
- Published in May 1992 issue of JCPT.

#### Log Analysis and Petrophysics

- Six reservoir study in Bangladesh (CIDA sponsored project). Results presented in Dhaka Bangladesh.
- Cashirari and San Martin Fields in Peru (PCIAC project)
- Glauconite channel for simulation study

#### Economic Evaluations

Rhodes Energy

Sunlite Oil Canada

Canadian Futurity Oil and Gas

#### Glauconite Reservoir Simulation

Study successfully obtained GOR penalty relief.

### **09/1981 – 01/1988**

#### **Group Leader Reserves, Home Oil Company Limited**

Responsibilities included the supervision of senior technologists (4) and a junior engineer, booking and reporting of all exploration and development reserves, reporting of corporate reserves, preparation of ceilings tests and net asset values.

- Specific recommendations made for resolving inter-department conflicts. Technical projects were identified for the future.
- Successfully reduced variance between Home and the external reserves auditor - McDaniel and Associates
- Responsible for securities reporting of Home's international reserves in Australia, Indonesia (Malacca Straits) and U.S.
- Involved in defence of Hiram Walker Resources. Interface for White Knights.
- Acquisitor (Gulf) sold company to Interprovincial Pipeline Limited (IPL) based on internal reserves evaluation. Based on improved calculations, an uplift of over \$100 million dollars was recognized. This transaction exceeded one billion

dollars. An IPO was raised on TSE and NYSE. Responsible for “due diligence” proceedings and interface with external evaluators.

- Used and enhanced a large computer database.
- Tertiary economics prepared for Swan Hills Unit No. 1 and Mitsue Gilwood Unit No. 1.

### **Group Leader Northern Alberta Reservoir**

Responsibilities include reservoir engineering and exploitation in Northern Alberta. Existing properties optimized and new areas developed. Supervised one technician and one technologist.

### **Operations Engineer (Southern District)**

Responsible for monitoring and optimizing production, completions, facilities, workovers, budgeting and government liaison.

**06/1979 – 07/1981**

### **Drilling Engineer, Amoco Canada Petroleum Company Ltd.**

Responsible for assisting drilling engineers and design of completion and kill procedure for Steep Creek blowout.

### **New Well Completions Engineer**

Responsible for most new well completions in Pembina (Drayton Valley) District office. Scheduled rig moves and prepared well completion programs. Keeping up was a major accomplishment with between 7 and 11 service rigs operating during the peak of the boom.

### **Lease Engineer**

Pembina Cardium D and F leases, Rat Creek B and C leases. Potential polymer flood analyzed – well testing and obtaining samples.

## **TRAINING COURSES**

(Teaching Summary)

### **Advanced Reservoir Simulation (Bauerberg-Klein / CAREC)**

Course on compositional modelling for gas condensates, miscible floods and volatile oil simulations. Workshop included training in tuning, history matching and 6 problem sets. Taught in Lima Peru.

### **Reservoir Simulation In Practice (Scientific Software - Intercomp)**

Presented 2 days of a 5-day industry simulation course. Topics covered were:

- single well studies
- coning problem set
- cross sectional studies
- pseudo relative permeability
- PVT input
- well representation

Course presented 3 times.

### **Reserves Course**

Instructor for half day of in-house reservoir engineering school relating to reserves. Technology Transfer. (Home Oil Company Limited).

Responsible for in-office technology transfer program with foreign (Bangladesh) engineers on CIDA project. (Scientific Software-Intercomp).

### **Practical Reservoir Simulation, Using, Developing and Assessing Results**

Five day course on reservoir simulation. Course included formal instruction; example problem sets on computers with simulator and anecdotes of previous problems. The course was run twice. (Petroleum Society of CIM)

Course twice in Ploesti, Romania – Module 2 (HOT Engineering GmbH / Petrom)

3 day version of course for PIECE in Houston Texas in 2011. Scheduled to be taught as 5 day course in 2013.

### **Numerical Simulation of Petroleum Reservoirs**

Taught 10 day industry simulation course for CUPET, Majagua Cuba

Taught 5 day industry simulation course at UNACAR (Mexican University) to PEMEX engineers

### **Thermal Reservoir Simulation**

3 day introductory course for co-op students and recent graduates (Petro-Canada) – taught 3 times.

5 day course for Nexen Inc. in June 2010 (RPS Energy Canada Limited)

5 day course for SPE in 2012 (ARE), 2011, and 2010 (RPS).

### **Applied Reservoir Management**

5 day industry course for HLS India, New Delhi, India. (Halliburton)

5 day course in Campina, Romania (HOT) February 2006.

5 day course in Vienna Austria (HOT), July 2007  
5 day course Dhamman, Saudi Arabia May 2008 (HOT)  
5 day course in-house course for RAG April 2008 (HOT)  
5 day course Dubai October 2008 (HOT)  
5 day course Abu Dhabi November 2008 (HOT)  
5 day course Wien June 2010  
5 day course Wien July 2011  
Two 5 day courses in Qatar for HOT engineering May 2012  
5 day course in Vienna for HOT Engineering July 2012

**Introduction To Reservoir Engineering Basics** (Encana / PanCanadian Petroleum Ltd.)

Two-day basic reservoir engineering course for reservoir engineering training program (course taught four times).

**Natural Gas Reservoir Engineering**

Taught two 5 day courses on natural gas reservoir engineering. (National Engineering University of Peru UNI). First week taught in Lima with second week in field location (Talara – Northern Peru)

**Fractured Reservoir Engineering**

Taught 5 day industry simulation course at UNACAR (Mexican University) to PEMEX engineers

Two day short course to Chinese geologists on training tour in Canada (Sunwing).

**Fractured Reservoir Simulation**

Taught 5 day industry simulation course at UNACAR (Mexican University) to PEMEX engineers

**Volatile Oil and Condensate Reservoirs**

Taught 5 day industry course at UNACAR (Mexican University) to PEMEX engineers

**PETROM Module 3 – Predicting Performance via Material Balance and Simulation**

10 day course on use of material balance, simulation history matching tuning and predictions, Ploesti, Romania (HOT Engineering GmbH).

**Reservoir Management of Coning Prone, Heterogeneous and Tight Reservoirs**

Taught 6 day course in Dehra Dun India (ONGC Management Engineers)

**Advanced Reservoir Engineering**

Taught 12 day industry course at NAFTAGAS (Sonatrach) Hassi-Masoud, Algeria.

**EOR Simulation**

Taught 10 day course on EOR and reservoir simulation. Also water and gas coning. (Majagua Cuba, CUPET)

**Economics for the Petroleum Industry ECO-310** (Southern Alberta Institute of Technology))

Taught introductory course at SAIT covering basic engineering economic concepts, input data for economics and the use of PEEP.

**PUBLICATIONS, PRESENTATIONS AND AWARDS**

1. Awarded \$5,000 U.S. for best presentation at SSI's 1988 internal technical conference.

2. "A Dodsland - Hoosier Waterflood Study", presented at the 3rd CIM Saskatchewan Petroleum Conference. Published in the Journal of Canadian Petroleum Technology in January of 1992. Co-author R.J. Andrews.
3. "The East Swan Hills Unit Waterflood Optimization Study: A Multi-Disciplinary Approach". Presented at the Joint CIM/SPE International Technical Conference held in Calgary during June of 1990. Published in May 1992 edition of JCPT. Co-authors P. MacLean, H. Hornford, and G. Czyzewski.
4. "Choosing & Obtaining Software for the Small or Independent Consultant", invited presentation made to the Computer Oriented Geological Society during February of 1993.
5. "The Effects of Reservoir Heterogeneity on Predicted Waterflood Performance in The Dodsland Field", presented at the Fifth Petroleum Conference of the South Saskatchewan Section of the Petroleum Society of CIM, October 18th-20th 1993. Published in December 1995 edition of JCPT 1995.
6. "The Effects of Retrograde Liquid Condensation On Single Well Productivity Determined Via Direct (Compositional) Modelling Of A Hydraulic Fracture In A Low Permeability Reservoir", presented at the SPE Rocky Mountain Regional and Low Permeability Reservoirs Symposium, in March of 1995. Also re-presented, by invitation, at 1995 CMG (Computer Modelling Group) annual Technical Advisory Committee (TAC) meeting, June 1995. Published in JCPT Special Edition Vol. 38, No. 13.
7. "Tips, Tricks and Traps for Oil Material Balance Calculations", presented at the 46th ATM of the Petroleum Society of CIM, May 1995, published JCPT December 1997.
8. Panelist and speaker, "Forging Our Future: The Emergence of Entrepreneurial Consulting", Theme Session for the 46th ATM of the Petroleum Society of CIM, May 1995.
9. "Ownership of Solution and Evolved Gas: Technical and Legal Perspectives"; presented at the 46th ATM of the Petroleum Society of CIM, May 1995. Co-author Mr. Glenn Friesen, Partner of McCarthy Tetrault (then largest law firm in Canada). Published in JCPT.
10. "Reservoir Engineering Implications of Hydrogeology", presented at CSPG annual conference (Canadian Society of Petroleum Geologists) in May 1995.
11. "The Future Of The Oil and Gas Industry Until 2015", presented to the Native Indian Trade Association's Aboriginal Canada Construction Expo '95, on behalf of the Petroleum Society of CIM, November 27th, 1995 (conference televised nationally on CPAC).
12. "Obtaining PVT Data For Very Sour Retrograde Condensate Gas and Volatile Oil Reservoirs: A Multi-disciplinary Approach". Co-author W.B. Cawston, Anderson Exploration Ltd (Home Oil).
13. Petroleum Society of CIM, Technical Luncheon "What You Should Know About Assessing Simulation Results For Economic Evaluations", presented September 23rd, 1996.
14. Two Part Distinguished Author Series, JCPT, "What You Should Know About Assessing Simulation Results for Economic Evaluations", Part I and Part II, May and August 1997.
15. "Optimization Of The Blueberry Debolt Oil Pools: Significant Production Increases For A Mature Pool", Presented at the 48th Annual Technical Meeting of the Petroleum Society of CIM, June 1997, Calgary, Alberta. Co-authors, S.Chugh, R. Bora, P. Loczy, and M. Byl. Published JCPT 50th Anniversary Special Edition.

16. "Reservoir Characterization Of Fractured Reservoirs In Western Canada", presented at the 48th Annual Technical Meeting of the Petroleum Society of CIM, June 1997, Calgary, Alberta. Published JCPT 50th Anniversary Special Edition.
17. "Simulation of Gas Condensate Systems", invited presentation, Geoquest (Schlumberger) Canadian Technical Forum and Users Meeting, April 26th to 28th, 1998, Canmore, Alberta, Canada.
18. "Fractured Reservoir Characterization", presentation in SPE Forum, Fractured Reservoirs, St. Maxime, France, September, 2000.
19. "Geomechanical and Thermal Reservoir Simulation Demonstrates SAGD Enhancement Due to Shear Dilation", P.M. Collins, M.R. Carlson, D.A. Walters, A. Settari, Presented at OilRock 2002, Austin Texas, October 2002.
20. Practical Reservoir Simulation; textbook, 529 pages, published October 2003, PennWell Publishing
21. JCPT Distinguished Author Series, "SAGD and Geomechanics", June 2003. Reply and Discussion in September issue of JCPT.
22. "SAGD and Geomechanics Poster Session", SPE Advanced Technology Workshop "Field Development Planning in Challenging Conditions: The Geomechanics Dimensions", November 3<sup>rd</sup> to 7<sup>th</sup>, 2003, Stresa, Italy.
23. "A Brief History of Gas Condensate Reservoir Engineering", Advanced Technology Workshop, Gas Condensate Reservoir Development and Management, May 19th to 20th, 2004, League City, Texas.
24. "Mitigating Condensate Impairment by Fracching", Advanced Technology Workshop, Gas Condensate Reservoir Development and Management, May 19th to 20th, 2004, League City, Texas.
25. Invited Presentation Thermal Operations and Production – Tunisia, May of 2009.
26. CSUG/SPE 147300; Pseudo-Component, "Thermal, Reservoir Simulation Study of A Proposed, Low Pressure, Steam-Assisted Gravity Drainage Pilot Project In Northeast Alberta", M.M.E. Uwiera-Gartner, M. R. Carlson, and C.T.S. Palmgren, Unconventional Resources Conference held in Calgary, Alberta, Canada, 15–17 November 2011.
27. SPE 147302 "Evaluation of the Clearwater Formation caprock for a proposed, low pressure, steam-assisted gravity-drainage pilot project in Northeast Alberta", M.M.E. Uwiera-Gartner, M. R. Carlson, and C.T.S. Palmgren, SPE Annual Technical Conference and Exhibition held in Denver, Colorado, USA, 30 October–2 November, 2011.
28. NURETH14-600; "And now for something completely different: condensation induced water hammer and steam assisted gravity drainage in the Athabasca oil sands, M. R. (Mike) Carlson", The 14th International Topical Meeting on Nuclear Reactor Thermalhydraulics, NURETH-14 Toronto, Ontario, Canada, September 25-30, 2011. Published in Kerntechnik 77 (2012) 2, Carl Hanser Verlag, Munchen.
29. WHOC11-520; Reservoir design of a shallow LP-SAGD project for in situ extraction of Athabasca Bitumen, C. Palmgren, I. Walker; M. Carlson, M. Uwiera; M. Torlak, Proceedings for the 2011 World Heavy Oil Congress [WHOC11].

30. “What every SAGD engineer should know about condensation induced water hammer”; May 5th, 2010. Presentation at the SPE Technical Luncheon, Calgary Section. Website: [http://speca.ca/PDF/SPE\\_WhatSAGDknow.pdf](http://speca.ca/PDF/SPE_WhatSAGDknow.pdf).
31. Carlson, M.R., “What every SAGD operator and engineer should know about potential failure by condensation-induced water hammer”, Journal of Canadian Heavy Oil Association, September 2010.
32. Recent Perspectives in SAGD; October 13th, 2010, Calgary Section of the Society of Petroleum Engineers, Technical Luncheon.
33. Analyzing How To Utilize Technical Testing Methodologies To Ensure Caprock Integrity; In Situ Oil Sands Summit 2011, May 24-25, 2011 Calgary, Canada.
34. Issues for evaluating Caprock Integrity on SAGD projects, December 6th, 2011, Canadian Heavy Oil Association, Calgary, Alberta. Presentation available on CHOA website.
35. “A discussion about condensation induced water hammer and caprock integrity”; Society of Petroleum Engineers, Edmonton Section, Dinner presentation at U of Alberta Faculty Club, January 10th, 2012.
36. Detailed Consideration of the Proposed Joslyn Failure Mechanism, CETI, February 2012. M.R. (Mike) Carlson;
37. SPE 156962 An Analysis of the Caprock Failure at Joslyn, SPE Heavy Oil Conference Canada held in Calgary, Alberta, Canada, 12–14 June 2012.
38. “The caprock failure at Joslyn. An analysis”, Journal of the Canadian Heavy Oil Association, January 2013.

## **AFFILIATIONS**

Society of Petroleum Engineers (SPE)

- Handled advertising for SPE Publicity Committee, SPE Canadian Section Newsletter.
- Chairman SPE ATW Gas Condensate Reservoir Development and Management, League City, Texas, May 19<sup>th</sup> to 20<sup>th</sup>, 2004.

Canadian Well Logging Society (CWLS)

Association of Professional Engineers, Geologists and Geophysicists (APEGGA)

Canadian Well Logging Society

Auditor, financial statements

Canadian Society of Petroleum Geologists

Canadian Institute of Mining, Metallurgy & Petroleum (CIM)

- Technical Program Committee Chairman, 45th Annual Technical Meeting
- Director, National Board of the Petroleum Society of CIM (3 years).
- General Interest Meeting Chairman for 1997-1998 and 1998-1999 seasons (Sept. to June).
- Director, National Board (2nd term, one year)
- Session Chairman, 49th Annual Technical Meeting
- Conference Co-Chair, 51st Annual Technical Meeting Of the Petroleum Society of CIM.

Editorial Review Board – JCPT, Topic Coordinator (2002 - 2005)

## **LANGUAGES**

English          Fluent written and spoken



French  
Spanish

Some spoken (Grades 3 to 4 – Montreal, Grades 6-10 – Toronto, travel)  
Functional (order food and travel) spoken. Most reservoir terms (extensive travel: Spain, Venezuela, Mexico, Bolivia, Peru; plus 2 weeks immersion course in Mexico).