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SUMMARY OF EXPERIENCE

A Reservoir Engineer with over 23 years of practical experience in reservoir engineering, simulation and implementation of miscible flood and thermal projects. The experience includes waterflood and miscible flood simulations, reservoir characterization of naturally fractured reservoirs, reservoir simulation for EOR predictions, economics, cost estimations and performance analysis of waterflood and EOR projects.

Consultant Experience

Dominion Canada

- Regional Aquifer Study

Ongoing

Conoco Phillips

- Regional CO₂ Feasibility Study

April 2006

Air Liquide

- EOR Presentation

January 2006

Arc Trust

- CO₂ Feasibility Study / Acquisition

Ongoing

Petrobank

- Analysis of Columbian Pool with gas cap and water drive

Ongoing

Synenco

- CO₂ Screening / Thermal Evaluation

May 2006

Harvest Energy

- Regional CO₂ Evaluation

April 2006

EnCana

- Regional CO₂ Evaluation

June 2006

High Artic

- Fractured Gas Reservoir

January – June 2006

Landmark Oil & Gas	March – April 2006
<ul style="list-style-type: none"> • SAGD 	
Apache Canada	January – May 2006
<ul style="list-style-type: none"> • Hatton Gas Field 	
Devon	April – June 2006
<ul style="list-style-type: none"> • Ferrier Waterflood Optimization 	
Devon	November 2005 – June 2006
<ul style="list-style-type: none"> • Swan Hills Waterflood/Miscible Flood Evaluation 	
PTAC	June 2004- 2006
<ul style="list-style-type: none"> • Case Study Oil and Gas Potential (examined ~32,000 and 12,000 oil pools in WCSB) 	
Husky	June 2004
<ul style="list-style-type: none"> • Reservoir Analysis of the Whiterose field (offshore, Waterflood) 	
Sherritt	April – May 2004
<ul style="list-style-type: none"> • Thermal Evaluation 	
Petrobank	Nov 2003
<ul style="list-style-type: none"> • Reservoir Analysis, Development planning, Simulation review of several fields 	
Apache / Alberta Gov't. Presentation	Dec - 2003
<ul style="list-style-type: none"> • Horizontal Well Analysis • Present case for new royalty structure regarding horizontals 	
Flowing Energy	Feb 2003
<ul style="list-style-type: none"> • Reservoir Simulation Optimization, Wildmere Pools 	
Apache Canada	Oct 02 – May 03
<ul style="list-style-type: none"> • Assessment of CO₂ potential for 1000 well field (Midale) • Tight gas assessment for infill drilling to 40 acre spacing at Hatton 	
Columbus	Mar 03
<ul style="list-style-type: none"> • Waterflood optimization of Sparky Wainwright Pool 	
Barrington Resources	Nov 02
<ul style="list-style-type: none"> • Eyehill Sparky Waterflood evaluation and application 	
Northrock Energy	Feb 02 – Dec 02
<ul style="list-style-type: none"> • Kisbey waterflood evaluation for unitization 	
Samson Cree Nation	Oct 00 – present
<ul style="list-style-type: none"> • Evaluation of fluid flow and volumes in place for the Bonnie Glen Reservoir 	

Gulf Canada Resources	June 00 – Sept 00
<ul style="list-style-type: none"> • Evaluation of Westrose North Future Potential 	
Tappit Resources	June 00 – Oct 00
<ul style="list-style-type: none"> • Evaluation of Tatgawa Waterflood Potential 	
Renaissance Energy	Nov. 99 – June 00
<ul style="list-style-type: none"> • Evaluation of Warner Waterflood Potential • Evaluation of Eagle Creek Waterflood Potential 	
Edge Energy	Jan. 00 – June 00
<ul style="list-style-type: none"> • Evaluation of Strathmore Lower Mannville 	
Zueitina Oil Company, Libya	July 99 –Dec. 00
<ul style="list-style-type: none"> • Evaluation of Aswad Field Waterflood Potential 	
Consultant, Reservoir Simulation/EOR Implementation Pioneer Natural Resources (USA) Inc New Mexico Petroleum Recovery Research Center/Parker and Parsley	Oct. 93 – Jan 2003
<ul style="list-style-type: none"> • Reservoir characterization/simulation of naturally fractured reservoir (10 billion bbl OOIP) • Pilot design/economic evaluation of commercial project • Tracer/pressure transient design (vertical pulse test, build up test, interference test) 	
Chevron Canada	Oct. 99 – June 00
<ul style="list-style-type: none"> • Evaluation of waterflood and miscible flood 	
Arc Financial	Sept-1999- Jan 2000
<ul style="list-style-type: none"> • Evaluation of the Frobisher-Midale Unit 	
Sherritt	Aug 97 - Aug 00
<ul style="list-style-type: none"> • Evaluation of fracture heavy oil pool (Central America) 	
AEC East	Sept 99- Dec 99
<ul style="list-style-type: none"> • Wabiskaw Litigation 	
Canadian Natural Resources Limited	Sept-99 – Jan00
<ul style="list-style-type: none"> • Determination of reserves and Gas-oil ratio behavior for North Brintnell Field • Presentation to the AUB 	
Iran	Feb 99 – Jan 01
<ul style="list-style-type: none"> • Evaluation, production optimization and simulation of large naturally fractured reservoir (6.5 Bbbl – OOIP) • Recommendation of EOR 	
Pacalta Resources (Syria)	Jan 99 – Mar 99
<ul style="list-style-type: none"> • Recommendation of heavy oil EOR scheme (Syria) • Simulation study of heavy oil reservoir (Ecuador) 	

- Panther Petroleum Ltd (Calgary)** **Aug 98 – Dec 98**
- Expert witness; waterflood
- Gulf Canada (Red Deer)** **July 98 – Dec 98**
- Recommend acid gas injection scheme for Westrose Pool
- Woodside Petroleum (Australia)** **Nov 97 –May 98**
- Goodwyn Black Oil, Gas/Gas, Condensate/ Gas Injection Scheme (MoRes)
 - ~ 8-10 Tcf reservoir
 - evaluate compression, waterhandling and sweep efficiency aspects
 - Generated multiple geological realizations and converted to these to history matched reservoir models, then did risk and uncertainty analysis on reserves
- Shell Canada (Calgary)** **1994 – Dec 98**
- Midale/Weyburn (combined OOIP >1.6 billion bbl) - evaluated Midale CO₂ miscible flood pilot and demonstration project, and evaluated Weyburn waterflood operations (including recommendations to optimize performance with improved surveillance and horizontal well infill development) as well as the proposed CO₂ miscible flood project
 - House Mountain - evaluated and made recommendations on horizontal well locations based on simulation results
 - Virginia Hills - proposed horizontal injectors for miscible flood optimization based on simulation and analytical work
 - Belloy - performed waterflood/gas cap blowdown simulation and analytical work to support regulatory application for scheme implementation
 - Harmattan East
 - 1 Tscf gas condensate pool: recommended re-sizing of compressor based on flow simulation and a coupled surface network
 - Associated oil pool: performed waterflood optimization, wellbore calculations, and infill evaluation
 - Waterton (2 Tscf gas condensate/naturally fractured reservoir (Shell Canada's largest gas field) - evaluated gas condensate recovery with compositional/dual porosity model, and did coning study
- Calcrude Oils Ltd. (Calgary)** **Nov 95 - Sept 96**
- Cherhill - waterflood evaluation (for naturally fractured reservoir)
- Canadian Natural Resources Ltd. (Calgary)** **Nov 95 – Nov 96**
- Buick Creek - horizontal well evaluation, primary production
- Chauvco Resources Ltd. (Calgary)** **Sept 95 - Feb 96**
- Middle East reservoir - water drive, EOR evaluation using dual porosity model, material balance calculations
 - Middle East reservoir - black oil simulation
- Crestar Energy (Calgary)** **Sept 94 - Oct 96**
- Water injection scheme - Hayes 'A'
 - Gas injection scheme analysis - Cardium Ricinus

- Horizontal well, water coning study - Jenner
- Evaluation of heavy oil properties (economics and literature review)

Canadian Hunter Resources (Calgary)

May 94 - Feb 95

- Gas field simulation - Cadomin formation
- Geostatistical/reservoir characterization
- Liquid loading/wellbore hydraulics

Computer Modelling Group (Calgary)

Aug 93 – Feb 95

- Teaching reservoir engineering and simulation (Black oil, EOS, and compositional)
- Simulation of reservoirs in Russia, Indonesia, Algeria, Libya, Canada, Ecuador and the United States
- Simulation of naturally fractured reservoirs of Iran (Asmari - >5 billion bbl OOIP)
- Gas condensate/volatile oil fluid characterization

PanCanadian Petroleum Limited (Calgary)

Nov 91 - July 93

- Simulation of horizontal well development (length and orientation) that led to the drilling of 45 wells (incremental oil rate ~ 8000 bbl/day)
- Chief simulation engineer for the evaluation of a \$1 Billion CO₂ miscible flood project in Weyburn, PanCanadian's largest oil field (>1 billion bbl OOIP)
- Waterflood and miscible flood simulations including reservoir characterization of naturally fractured reservoirs for field scale and CO₂ pilot
- Development of initial facilities for CO₂/NGL gathering, processing and injection systems
- PVT analysis and miscibility criteria of solvents

Shell Canada (Calgary) Senior Reservoir Engineer

May 88 – Oct 91

- Senior Reservoir Engineer for Virginia Hills miscible flood project (Shell Canada's most productive oil field ~ 380 million bbl OOIP)
- Compositional simulation for miscible flood: slug sizing, WAG ratio, profile control
- Waterflood black oil simulation
- Technical advisor to junior engineers for solution gas drive systems, horizontal wells, PTA, waterflood optimization, reservoir characterization, decline analysis, DST evaluation
- Chief engineering contact and liaison with field office during start-up and for two years after implementation of miscible flood (facility, instrumentation, surveillance engineering)
- Assisted in coordinating budget proposals, infill drilling profile control, phasing of project capital, workovers
- Coordinated a performance review of eight Canadian miscible flood projects (1 man year effort; supervised summer students' work)
- Proposed horizontal well project in a mature waterflood field
- Designed, implemented and analyzed solvent and water tracer program
- Coordinated produced and injected fluids compositional analysis for hydrocarbon miscible flood

Husky Oil Operations (Calgary) Reservoir Engineer

Apr 85 - May 88

- Simulation engineer (black oil waterflooding in naturally fractured reservoirs)

- Developed analytical computer models for GOR prediction, steam drive and material balance calculations
- PTA (build-up and fall-off tests, interference testing)
- EOR evaluation, steamflooding, polymer/surfactant/waterflood reservoir screening
- Senior Reservoir Engineer on Husky's most productive oil field (300 million bbl OOIP)
- Economics, cost estimation and performance analysis on waterflood and thermal projects
- Designed waterflood inter-well tracer test program.
- Reserve evaluation on 20 oil and gas fields

EDUCATION

University of Calgary

- Masters in Petroleum Engineering - 1994
 - Thesis: Reservoir Simulation/Characterization

University of Alberta, Edmonton

- Bachelor of Science in Mechanical Engineering - 1985
- Co-operative Education 24 months (work experience)

University of Alberta, Edmonton

- Bachelor of Science (Major - Chemistry, Minor - Physics) - 1980
- First class general standing

PUBLICATIONS (author or co-author) AND PRESENTATIONS (presenter or co-presenter)

1. Baker, R.O., Chugh, S., McBurney, C., and McKishnie, R.A. - Epic Consulting Services Ltd., “*History Matching Standards; Quality Control and Risk Analysis for Simulation*”, CIM paper 2006-129, presented at the Petroleum Society’s Canadian International Petroleum Conference 2006, Calgary, Alberta, Canada, June 13 – 15, 2006.
2. Baker, R.O., Fong, C., Jong, E., and McKishnie, R.A. - Epic Consulting Services Ltd., “*Developing Rule of Thumb and Assessing Risk for Waterflood Forecasts*”, CIM paper 2006-119, presented at the Petroleum Society’s Canadian International Petroleum Conference 2006, Calgary, Alberta, Canada, June 13 – 15, 2006.
3. Baker, R.O. – Epic Consulting Services Ltd., Delauretis, E.F. – NAL Resources Ltd., Yarranton, H.W. – University of Calgary, “*Application of Material Balance and Volumetrics to Determine Reservoir Fluid Saturations and Fluid Contact Levels*”, CIM paper 2006-024, presented at the Petroleum Society’s Canadian International Petroleum Conference 2006, Calgary, Alberta, Canada, June 13 – 15, 2006.
4. Baker, R.O, “The Importance of Comprehensive Gas Field Surveillance”, DAS paper, JCPT, Volume 44, No. 10, October 2005.
5. Baker, R.O., Jong, E.S.W., Virués, C., “*Understanding the Enigma of Reserves Growth: The Whys*”, CIM paper 2004-272, presented at the Petroleum Society’s Canadian International Petroleum Conference 2004, Calgary, Alberta, Canada, June 8 – 10, 2004.
6. McGilp, L. - Northrock Resources Ltd, Christensen, R. - Cuesta Energy Ltd, Baker, R.O. and Mahmoud, Y. - Epic Consulting Services Ltd.: “*Reservoir Characterization and Simulation of the Kisbey Frobisher-Alida Pool in Southeast Saskatchewan*”, CIM paper 2004-224, presented at the Petroleum Society’s Canadian International Petroleum Conference 2004, Calgary, Alberta, Canada, June 8 – 10, 2004.
7. McBurney, C., Chugh, S., Baker, R.O.: “*Tight Gas Diagnostics: To Drill or Not to Drill?*”, CIM paper 2004-212, presented at the Petroleum Society’s Canadian International Petroleum Conference 2004, Calgary, Alberta, Canada, June 8 – 10, 2004.

8. Beliveau, D. and Baker, R.: "*Reserves Growth: Enigma, Expectation or Fact*", SPE paper 84144, presented at the SPE Annual Technical Conference and Exhibition held in Denver, Colorado, U.S.A., 5 – 8 October 2003.
9. Baker, R.O., Regier, C., Sinclair, R.O.: "PVT Error Analysis for Material Balance Calculations," paper 2003-203 prepared for presentation at the 54th Annual Technical Meeting of the Petroleum Society of CIM, CIPC 2003, Calgary, AB, June 10 – 12, 2003
10. Baker, R.O, Anderson, T. and Sandhu, K.: "Using Decline Curves to Forecast Waterfloods: Part II—Modeling Results," paper 2003-163 prepared for presentation at the 54th Annual Technical Meeting of the Petroleum Society of CIM, CIPC 2003, Calgary, AB, June 10 – 12, 2003.
11. Baker, R.O, Anderson, T. and Sandhu, K.: "Using Decline Curves to Forecast Waterfloods: Part I—Fundamentals and Field Cases," paper 2003-181 prepared for presentation at the 54th Annual Technical Meeting of the Petroleum Society of CIM, CIPC 2003, Calgary, AB, June 10 – 12, 2003.
12. Schechter, D.S., Pultra, E., Baker, R.O., Knight, W.H., McDonald W.P., Leonard, P. and Rounding C.: "Co2 Pilot Design and Water Injection Performance in the Naturally Fractured Spraberry Trend Area, West Texas, SPE paper 71605, October 2001.
13. Baker, R.O., Kuppe, F., Chugh, S., Bora, R., Stojanovic, S., R. Batycky: "Full-Field Modeling Using Streamline-Based Simulation: 4 Case Studies", SPE 77172 for publication in the SPE Reservoir Evaluation & Engineering, April 2002.
14. Baker, R.O., Rupam Bora, Epic Consulting Ltd., D.S. Schechter, Texas A & M University, P. McDonald, William H. Knight, Paul Leonard and Carl Rounding, Pioneer Natural Resources (USA) Inc., "Development of a Fracture Model for Spraberry Field, Texas USA", SPE paper 716351, This paper was prepared for presentation at the 2001 SPE Annual Technical Conference and Exhibition held in New Orleans, Louisiana, 30 September–3 October 2001
15. Baker, R.O., Bialowas, S.: "Production Behavior of Heavy Oil Pools With Gas Caps," presented at the CIPC 2001, Calgary Alberta, June 12-14, 2001, paper 2001-147.
16. Baker, R.O., Telesford, A., Wong, S.: "An Integrated Fracture Characterization of A Heavy Oil Naturally Fractured Carbonate Reservoir," presented at the CIPC 2001, Calgary Alberta, June 12-14, 2001, paper 2001-13.
17. Baker, R.O.: "Streamline Technology: Reservoir History Matching and Forecasting = Its Success, Limitations and Future", *JCPT*, Distinguished Author Series, March 2001.
18. Baker, R.O., Kuppe, F., Chugh, S., Bora, R., Stojanovic, S., R. Batycky: "Full-Field Modeling Using Streamline-Based Simulation: 4 Case Studies", SPE paper 66045, prepared for presentation at the SPE Reservoir Simulation Symposium held in Houston Texas, 11-14 February 2001
19. Baker, R.O., Kuppe, F.: "Reservoir Characterization for Naturally Fractured Reservoirs," SPE 63286, prepared for presentation at the Annual Technical Conference and Exhibition, Dallas, Texas, 1-4 October 2000.
20. Baker, R.O., Contreras, R.A., Sztukowski, D.: "Characterization of the Dynamic Fracture Transport Properties in a Naturally Fractured Reservoir," SPE 59690, presented at the 2000 SPE Permian Basin Oil and Gas Recovery Conference held in Midland, Texas 21-23-March 2000.
21. SPE Applied Technology Workshop: "History Matching: Advanced Techniques," London, UK, 28 February – 3 March 2000, "History Matching Naturally Fractured Reservoirs; Key Parameters and Uncertainties."
22. 50th Annual Technical Meeting of the Petroleum Society of CIM, Calgary, Alberta, Canada, June 1999, "Waterflood and Water Drive Optimization".

23. 49th Annual Technical Meeting of the Petroleum Society of CIM, Calgary, Alberta, Canada, June 8 –10, 1998, “Modeling Cold Production for Heavy Oil Reservoirs”.
24. SPE # 39623, April 19 – 22 1998, “Using an Analytical Decline Model to Characterize Naturally Fractured Reservoirs”.
25. Baker R.O., “ Reservoir Management for Waterfloods – Part II ”, JCPT, v37, pg 12-17, January 1998.
26. 48th Annual Technical Meeting of the Petroleum Society of CIM, Calgary, Alberta, Canada, June 9-11, 1997, “Mainstream Options for Heavy Oil: Part I - Cold Production”
27. 48th Annual Technical Meeting of the Petroleum Society of CIM, Calgary, Alberta, Canada, June 9-11, 1997, “Simulation of Horizontal Wells to Mitigate Miscible Solvent Gravity Override in the Virginia Hills Margin”
28. Journal of Canadian Petroleum Technology *Distinguished Authors Series*, April 1997, “Reservoir Management for Waterfloods”
29. SPE #35469, October 1996, “Reservoir Characterization and CO₂ Pilot Design in the Naturally Fractured Spraberry Trend Area”
30. SPE Applied Technology Workshop Series: Applied Reservoir Characterization, Calgary, Alberta, Canada, October 24 - 25, 1996, “Reservoir Simulation and Performance Prediction”
31. SPE Applied Technology Workshop Series: Applied Reservoir Characterization, Calgary, Alberta, Canada, October 24 - 25, 1996, “Fracture Reservoir Characterization”
32. 47th Annual Technical Meeting of the Petroleum Society of CIM, Calgary, Alberta, Canada, June 10-12, 1996, “Estimation of Volumetric Sweep Efficiency of a Miscible Flood”
33. Improved Oil Recovery Symposium, Tulsa, Oklahoma, April 21, 1996, “Effect of Reservoir Heterogeneities on Flow Simulation Requirements”
34. Gas Technology Conference, Calgary, Alberta, Canada, April 28 - May 1, 1996, “Three Dimensional Simulation of a Fractured Rich Gas Condensate Reservoir: A Study of Waterton Sheet III”
35. Gas Technology Conference, Calgary, Alberta, Canada, April 28 - May 1, 1996, “A New Interpretation of Fracture Distribution of Waterton Sheet III: An Integrated Reservoir Characterization Study”
36. Tulsa Geophysical Conference, May 1994, “Problems in Characterization in Naturally Fractured Reservoir”
37. Canadian SPE/CIM/CANMET International Conference on Recent Advances in Horizontal Well Applications, March 1994, “Development of the Weyburn Unit, S.E. Saskatchewan with Multiple Horizontal Wells - A Simulation Study”
38. Stanford University, 1993, “Fracture Characterization”
39. Canadian Institute of Mining Seminar, May 1993, “Effect of Reservoir Heterogeneity on Flow Simulation Requirements”
40. SPE Rocky Mountain Regional/Low Permeability Reservoirs Symposium, April 1993, “A Multidisciplinary Reservoir Characterization and Simulator Study of the Weyburn Unit, Saskatchewan, Canada” (also printed in Journal of Petroleum Technology)
41. SPE/DOE Eighth Symposium on Enhanced Oil Recovery, April 1992, “Profile Control in Virginia Hills EOR Injectors”
42. Joint Miscible Flood Operator Meeting, July 1991, “Miscible Flood Simulation and Reservoir Characterization”
43. Joint Miscible Flood Operator Meeting, April 1991, “Reservoir Surveillance and Data Requirements”
44. Joint Miscible Flood Operator Meeting, January 1990, “Reservoir Management”
45. SPE (Forum Series), August 1990, “Reservoir Surveillance and Monitoring”

46. 39th Annual Technical Meeting of the Petroleum Society of CIM, Calgary, Alberta, Canada, June 1988, "Fracture Characterization of the Wainwright Pool"