ALAN MOURGUES, MSc, MIEAust, CPEng, NPER, RPEQ, SPE

CV

Reservoir Engineer

PROFESSIONAL SUMMARY

Petroleum Reservoir Engineer with twenty plus years of international Oil & Gas industry experience.

Held employee positions in small and large organizations, as well as consulting both as independent and as part of a major global advisory Group.

Exposure to a wide range of projects of varying degrees of technical complexity and commercial maturity, onshore and offshore, and across the project life span from early exploration through to appraisal and development stages.

Primary focus on reserves and resources evaluations, production forecasting, field development planning, recovery and production optimization, uncertainty analysis & risk assessments, and economic modelling.

Currently based in Australia, through my consulting business moREc I provide reservoir engineering and subsurface technical expertise to Australian and international companies operating in the conventional Oil & Gas and CSG Industries.

My service offering includes desktop studies, peer reviews, due diligence, data rooms, reserves evaluations, independent expert reviews, and competent person's reports.

Guest Lecturer at University of Queensland for the Masters in Petroleum Engineering Program.

Sound technical foundation, business acumen and exceptional communication skills are key elements of my value proposition.

KEY SKILLS

- Reservoir Modelling (Petrel/GeoDesigner)
- Black oil numerical simulation (E100, TNAV, IMEX)
- Compositional simulation (E300, GEM)
- Uncertainty analysis & experimental design (AHM, MEPO)
- Analytical reservoir modelling (MBAL, IHS Fekete)
- Pressure/rate transient analysis (PTA Saphir/RTA Topaze)
- Integrated production modelling (IPM)
- Field development planning
- Reserves Estimation (SPE-PRMS)
- Economic/financial modelling

QUALIFICATIONS

- **MSc** Petroleum Engineering, Imperial College, University of London, UK, 2005-2006
- IFP, Institute Français du Pétrole. Integrated Certificate Programme (2002)
- **MEng** Hydraulics and Environmental Sciences, University of Chile,1998-2000
- **BSc** Civil Engineering, University of Chile, 1995-1997

CREDENTIALS

- **CPEng**, Chartered Petroleum Engineer (Engineers Australia)
- **NER**, National Engineering Register Australia
- **RPEQ**, Registered Professional Engineer of Queensland
- **APEC**, Asia Pacific Economic Cooperation

AFFILIATIONS

- Professional Engineer member of Engineers Australia (**MIEAust**)
- Member of the Society of Petroleum Engineers (**SPE**), Queensland Section

CAREER HISTORY

MOREC **AUSTRALIA, JUL 2018 TO DATE**

Consulting Reservoir Engineer

Client: Origin Energy – Beetaloo/Canning Basins, Australia (ongoing, from Jun 2021). Financial modelling for multi-scenario development concept evaluations across the company's growth asset the Beetaloo and Canning basin plays. Role included bridging technical and commercial teams and construction of novel interactive dashboard tool for comprehensive input/output interrogation/QC and for detailed scenario comparison.

Client: Comet Ridge Limited - Bowen Basin, Australia (ongoing, from Sep 2018). Reservoir Engineering support in various Company's CSG assets, including Field Development Planning and Type Curve Development for the Mahalo Project Area, Denison Trough, Bowen Basin's Walloons assets and Interests in the Galilee Basin.

Client: Leigh Creek Energy (LCK) – Cooper Basin, Australia (Oct 2021). Independent review on the reasonableness of Bridgeport Energy's production forecasts, as part of the due diligence process by LCK ahead of potential interest acquisition. The scope specifically entailed checking Bridgeport's decline curve analyses (DCA) conducted on the well/units/fields (largely end of life) across the various assets that comprised Bridgeport's net reserves as at 31 Mat 2021.

Client: Central Petroleum Limited – Surat Basin, Australia (Dec 2020 – Feb 2020). Project Range, Dynamic Modelling; peer review of existing model, update and completion of base case model, low/high cases, sensitivity analyses, field development scenario and reporting

Client: Galilee Energy Limited – Galilee Basin, Australia (Oct 2020). Review and QC of Glenaras Field Reservoir Model, base case history match and prediction scenarios to determine near-term pilot drilling requirements and potential assessment of full field development.

Client: Central Petroleum Limited - Amadeus Basin, Australia (Oct 2019 – Mar 2020). Dynamic modelling of the Mereenie oil/gas field. Deliverables included history matched reference base case model, no-further-development (NFD) and 'new wells' forecasts, and low and high side history matches and forecasts. This model would form the basis of future field development planning and Reserves booking workflows.

Client: [Confidential] – Taranaki Basin, New Zealand (Jun 2019). Pressure Transient Analyses of various gas/condensate wells, with the objective of updating reservoir permeability maps and well performance for input update into field simulation model.

Client: [Confidential] – Gipsland Basin, Australia (Jul 2019). Due Diligence; technical evaluation of a certain gas field as part of an opportunity assessment to acquire the assets and produce it in a blowdown phase, followed up by a long-term gas storage phase.

Client: [Confidential] – Taranaki Basin, New Zealand (Aug 2019). Single well sector modelling of various multi-stage fractured horizontal oil wells using Rubis simulator, aimed at better modelling of near-wellbore phenomena and higher reliability of early production performance.

Client: New Zealand Oil & Gas (NZOG) – Bonaparte Basin, Timor Sea Offshore Western Australia (Jan 2019). Buffalo Oil Field farm-in opportunity assessment. Technical review of Buffalo Oil Field dynamic model, whose objective was to evaluate the robustness of the history match produced by the operator, and run sensitivities on

forecasting under various assumptions for the field re-development, with specific emphasis in protecting for the downside on the structural attic oil volume.

Client: New Zealand Oil & Gas (NZOG) – Otway Basin, Victoria, Australia (Jul 2018). Beach Otway divestment opportunity assessment: technical review of G2/G3, G4 and HBWS dynamic models. The review aimed at assessing the degree of confidence on the models handed over by the operator, which underpin the production profiles and recoverable volumes presented in their economic modelling.

BEACH ENERGY — AUSTRALIA, JAN 2018 TO JUN 2018

Principal Reservoir Engineer

(Beach Energy acquired Lattice Energy, an Origin Energy spin-off, with transaction completed in Jan 2018)

MAIN PROJECTS

Charo-Snatcher oilfield, onshore Cooper Basin, Australia. Hydrocarbon recovery potential assessment via engineered waterflood, with production analysis, material balance, analytical modelling for fluid displacement and recovery calculations. Reservoir modelling and numerical simulation fully scoped out for next study phase.

ORIGIN ENERGY — AUSTRALIA, SEP 2013 TO JAN 2018

Principal Reservoir Engineer

ROLE

Accountable for maximizing the value of Origin's conventional operated assets. The role comprises reservoir engineering and geomodelling capability, in addition to production engineering and development geology expertise. Responsible for developing sound reservoir management plans and managing producing risks and uncertainties over field life.

MAIN PROJECTS

Thylacine gas field, Otway, offshore Victoria, Australia: reservoir modelling and history matching after comprehensive well intervention and data acquisition program triggered by water breakthrough in key well. Model will underpin Reserves booking [update], as well as support reservoir management plan and proposal of two appraisal wells.

Kupe gas/condensate Field, offshore NZ: detailed subsurface assessment, including reservoir modelling, numerical simulation, PTA, IPM, uncertainty analysis and experimental design, to support the optimum Phase 2 Development recommendation, which included onshore compression and drilling of an extra well. The study resulted in a material reserves increase of 30%, which realized an added value for the business of ~AUD$130M.

Low-permeability Walloons: reservoir/well performance evaluation in stress-sensitive, pressure-dependent permeability reservoirs via pressure transient analysis (PTA), material balance, and numerical simulation studies, integrated with production technology and reservoir geomechanics. Project aims at unlocking >3 TCF of gas trapped in low permeability acreage.

RPS ENERGY
Principal Petroleum Engineer **AUSTRALIA, JUN 2011 TO AUG 2013**

ROLE
Reservoir/Petroleum Engineering consulting: Integrated Field Studies, Field Development, Due Diligence, Peer reviews, Competent Person's Reporting, Resources/Reserves Evaluation.

MAIN PROJECTS
Client: Origin Energy Resources Ltd. – Bowen Basin, Australia (Feb-Jun 2013). Full-field reservoir modelling and numerical simulation of CSG assets in the Bowen Basin. The main objective of the study was to history match Origin's base case geological realization, based on which the model; (i) feeds-back the Assisted History Matching approach adopted by Origin, and (ii) provides a forecast basis to support Field Development planning.

Client: Cairn India Limited – Rajasthan Basin, India (Feb 2013). Well testing support to Cairn India's Rajasthan Exploration team. Scope of work included the design of open hole and cased DSTs on multiple targets, as well as production tests to be carried out on selective and commingled completions throughout the exploration/appraisal campaign over the current year.

Client: [Confidential] – Surat Basin, Australia (Jan 2013). Transient IPR-based Type Curve analysis for well deliverability estimates in some tight gas sands assets. The study also included well test analysis and Prosper scenario analysis on conventional reservoirs within the entitlement.

Client: [Confidential] – Berkine Basin, Algeria (Dec 2012). Due Diligence on some oil and gas assets in the Berkine Basin, Algeria for a take-over evaluation. The scope of the study included peer review of Field Development Plan and Reserves assessment.

Client: [Confidential] – San Joaquin Valley Basin, Southern California, US (Aug/Sep 2012). Independent Resources Report on some shale-oil assets in the San Joaquin Valley, US. The study focused on the Antelope shale member of the Monterey formation, and included the certification of Contingent Resources, conformed to the SPE-PRMS.

Client: [Confidential] – Taranaki Basin, New Zealand (Jul 2012). Technical due diligence of some CSG assets in the on-shore Taranaki basin. The review included a screening study related to the Contingent and Prospective Resources Certification conducted by a third party.

Client: Origin Energy Resources Ltd. – Taranaki Basin, New Zealand (May-Jun 2012). Reservoir numerical simulation study of the naturally fractured Tikorangi limestone in the Waihapa/Ngaere anticline structure. Scope of work included review of Petrel static model and E-100 numerical simulation to estimate incremental oil production and assess gas injection/production cycles into/from the depleted oil reservoir.

Client: Arrow Energy Ltd. – Bowen Basin, Queensland, Australia (Mar-Apr 2012). Integrated Production Modelling (IPM) of the CSG Moranbah Gas Project. Model objective was to support the Field Development Plan.

Client: [Confidential] – Gippsland Basin, Victoria, Australia (Feb 2012). Technical due diligence of CSG assets in the on-shore Gippsland basin. The review included a screening study related to the Contingent and Prospective Resources Certification conducted by a third party.

Client: Central Petroleum Ltd. – Amadeus Basin, NT, Australia (Jan 2012). Review of well test pressure measurements in the horizontal Surprise 1 Re-entry H-ST1oil well. Scope of work included QC data, pressure transient analysis (PTA) on the final pressure build-up, and recommendations on further testing.

Client: Rialto Energy Ltd. – Ivorian Basin, Cote d'Ivoire (Jul 2011). Resource assessment of Block CI-202, off-shore Cote d'Ivoire. The work, conducted as part of a Competent Person's Report that RPS prepared for Rialto, included the analysis of pressure surveys and production tests to assess reservoir connectivity in the structurally complex, highly faulted, multi-layer reservoir Gazelle field (oil and gas).

Client: [Confidential] – Browse Basin, WA, Australia (Jul 2011). Due diligence study of a major gas field in the Browse Basin. Scope of work included review of reservoir static and dynamic models, leading to the Field Development Plan (FDP) and reserves estimates.

MOREC LTD **NEW ZEALAND, MAY 2011 TO DEC 2011**
Reservoir Engineer Consultant

MAIN PROJECTS
Client: Origin Energy Resources Ltd. – Taranaki Basin, New Zealand (Sep-Oct 2011). Technical feasibility study for gas storage into the depleted, naturally fractured Tikorangi limestone, on-shore Waihapa/Ngaere oil field. The study included PBU and Interference test analyses, material balance, well performance, nodal analysis, and numerical simulation modelling.

Client: [Confidential] – San Joaquin Valley Basin, Southern California, US (May/Aug 2011). Independent Expert Reports on the hydrocarbon potential of two heavy-oil fields in the McDonald Anticline structure, where 15 wells produce 13 to 20° API oil from the source Antelope shale and various Eocene-aged sands, under a mechanical pumping artificial lift system. These reports were to be used by commissioning brokers to pitch to investors for funds in order to sanction field development, which would include workover/recompletion of existing wells, drilling new wells and implementation of a steam injection IOR scheme.

GREYMOUTH PETROLEUM **NEW ZEALAND, 2010 - 2011**
Senior Reservoir Engineer

MAIN PROJECTS
Kowhai Field: analytical study to assess well/reservoir performance; flowing material balance; volumetric checks; production decline analysis and production forecasts; reserve estimates/updates; design/planning of PLT's and well tests; analysis of well deliverability issues (condensate dropout, non-Darcy effects, fracture deterioration, scaling, liquid loading).

Turangi Field: geostatistical inversion-based reservoir modelling (Petrel) and Eclipse numerical simulation model of Mangahewa Zone 3 reservoir. The model was history matched to PLT and MDT pressure data during the period of time before any commingled production occurred, primarily by tuning the sand/layer vertical transmissibility. Individual well performance of the hydraulically fractured wells was honoured by incorporating a productivity index "decline factor" to account for fracture deterioration and condensate banking of the retrograde gas. The study backed up the proposal of the Turangi-4 well.

Ngatoro Field: numerical simulation of N1-16/0 oil pool. Multi-scenario reservoir modelling was performed to assess the short to mid-term impact on production of the injection gas rates. 2 MMstb of incremental oil were quantified and unswept areas were identified for infill drilling. Additional volumes were to be accessed by implementing an optimized waterflood, which would form the scope of work of the next modelling phase.

Kaimiro Field: multi-scenario reservoir modelling of the McKee gas pool in Kaimiro area. Sensitivities on the aquifer strength and on the vertical communication across the shaly layer in between the sandy layers were run to analyse various completion options. Gas reinjection was observed to play a major role in pushing the aquifer away from the producer well. Breakthrough of injected gas was estimated to occur in circa 4 years. This project was worth app. 10 Bscf of sales gas with initial condensate yields of some 50 bbl/MMscf.

ENAP – SIPETROL SA **CHILE, 2001 - 2009**
Reservoir Engineer

ROLE
Responsible for reserve estimates and production forecasts; analysis of production data and well and reservoir performance; well test interpretation; reservoir characterization and reservoir modelling; preliminary economic assessments.

MAIN PROJECTS
Dorado-Riquelme block (Joint Venture with Methanex), Austral Basin, Chile: design, execution, interpretation and analysis of every well test conducted on the first 10 wells drilled in the area. Pressure transient analysis-derived reservoir properties were combined with 3D seismic and geological data to build the reservoir model. Integrated system modelling through the Petex IPM approach resulted in the selection of optimum design of surface network layout. The model was used to optimize the development phasing and resulted in economically viable gas reserves of 65 Bscf and increased the project profitability by more than US$20 million.

Pampa del Castillo field, San Jorge Basin, Argentina: pilot project on tertiary recovery. Eclipse-100 numerical simulation to assess reservoir/well performance under the injection of polymers and surfactants. The study supported the implementation of the project.

Calafate and Cullen Fields, Tierra del Fuego, Chile. Numerical simulation to identify unswept areas and remaining potential. Both are mature oil fields, gas cap-driven, over a hundred wells each, on production since the 1950's. The model quantified significant loss of reinjected gas, which triggered the decision to run 3D-seismic in the area.

BP **UK, JUN – AUG 2006**
Reservoir Engineer

Clair Phase 1 Subsurface Team
MSc Thesis Project – summer internship: I developed from scratch an integrated asset model (IPM) of the Clair field (North Sea) to understand reservoir connectivity and the impact of facilities constraints. My work provided BP's Clair Phase 1 Subsurface Team with a high-quality tool, not developed up until then, which informed the field depletion plan and the reservoir management strategy, adding significant business value. A direct outcome of this piece of work was the identification of a production increase potential of nearly 30% by solely re-allocating gas lift rates, with minimal expenditure and operational risk.

OTHER INFORMATION

COMPUTING SKILLS

Oil & Gas: Reservoir modelling (**Petrel**), numerical simulation (**ECLIPSE E100, E300**, **CMG Imex, Gem, t-Navigator Suite**), uncertainty analysis and experimental design (**MEPO, t-Nav AHM**), production database (**OFM**), pressure transient analysis (**Saphir**, **PanSystem**), Petroleum Experts **IPM** suite (**MBAL**–material balance, **Prosper**–well performance, **GAP**–gathering network, **OpenServer**–automation), PVT and fluid characterization (**PVTP, PVTi**), **IHS (Fekete)** suite, risk analysis and reserves evaluation (**Crystal Ball, @RISK, REP**), Kappa suite (**Saphir**, **Rubis**), development planning & financial modelling **ValNav**, **PetroVR**

Programming: Visual Basic, PowerQuery, Python

TEACHING

- Guest lecturer and Tutor at University of Queensland for the Reservoir Engineering Course - MSc Petroleum Engineering (Heriot Watt University), from 2014
- Courses:
  - ✓ *Fundamentals of Reservoir Engineer*, offered internally while an employee at Origin to bring awareness Company-wide of the importance of subsurface understanding
  - ✓ *Reservoir Engineering and SubSurface 101,* offered at Origin to a Commercial Team

PERSONAL DETAILS

- Date of birth: 22/May/1977 (45 years old)
- Nationality: Australian (born in Chile)
- Marital status: Married, 2 children aged 7 and 9
- ✉ 5 Pylara Crescent, Ferny Hills, QLD 4055 (Brisbane), Australia
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REFERENCES

Name:	Plan Production and Allocate Capital Process Implementation Manager
Organization:	Origin Energy, Australia
Telephone:	+61 4 7770 9508
E-mail:	petrina.weatherstone@originenergy.com.au
Connection:	Ms. Weatherstone was my Manager at Origin for 4 years in the Operated Assets Team, Exploration and Development Division, and before that, the hiring Manager when I was an Independent Consultant doing contract work for Origin.

Name:	Mike Adams, Consultant Reservoir Engineer
Organization:	MA Reservoir Engineering, NZ
Telephone:	+64(21) 844 638
E-mail:	mike@mareservoir.com
Connection:	Mr. Adams was representing the Crown interest during my time in NZ and he and I worked together with US-based clients during my time as Independent Consultant.

Name:	David Guise, Regional Manager
Organization:	Ederline Investments Pty Ltd, Australia
Telephone:	+61 4 0787 1861
E-mail:	david_guise@iprimus.com.au
Connection:	Mr. Guise was Managing Director of RPS Australia Asia Pacific during my time as RPS' consultant.