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## William J. Bailey

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### Personal Statement

I am a Petroleum Engineer with experience mainly in Reservoir Engineering plus a few Production-related projects. I also have a genuine interest in Risk Analysis, Optimization (reservoir, production and full-field) and Economics.

Here is part of an actual corporate message from a well-known software company that I found in a UK magazine:

*"We continually exist to synergistically supply value-added deliverables such that we may continue to proactively maintain enterprise-wide data to stay empowered and competitive in tomorrow's world."*

Language like this is, sadly, far too prevalent nowadays and is simply unnecessary.

I try to avoid such nonsensical gobbledegook whenever possible and attempt to say what I mean in plain English (sometimes successfully, sometimes not).

### Current Projects and Areas of Interest

**JobTitle** : Principal Scientist (Optimization & Simulation)

As part of the **Uncertainty, Risk & Optimization [URO]** group at SDR I am primarily involved in:

- **Optimization:** Optimization under conditions of uncertainty - a primary focus of my work and involves:
  - **AURUM:** Primary participant in developing the prototype of this Reservoir Optimization Tool. The tool optimizes *ECLIPSE*, *FrontSim* and *E300* against a number of user-specified objective function (including NPV and production). We are currently in release version 2.0 of this near-commercial quality prototype ( [check here for details](#))
  - **Flow Control Valve (FCV):** Looking into processes and workflows for optimal design and operation of FCV's in the presence of uncertainty. Valuation is also an important (and challenging) aspect of this work.
  - **Fracture Design Optimization:** Leading developing of a prototype to provide optimal fracture design specification based on the NPV of the final fracture
  - **Full-Field Optimization:** A primary activity for me and involves developing tools and methodologies to enable fully coupled system optimization (reservoir-tubing-facilities). The work has many facets and currently involves coupling *Eclipse* with *PipeSim* (for example) and optimizing over a specified objective function (usually NPV or some production based quantity). This work will ultimately extend into the domain of fully coupled **full-field systems** (*Eclipse-PipeSim-Hysis*) - hence optimizing a full **IAM-Avocet** model. This is currently a major focus of my work and one in which may have a genuinely beneficial impact on our business
- **Valuation Under Uncertainty & Flexibility (aka Real Options):** Developing tools and processes for valuation of our service offerings under conditions of uncertain market and technical data
- **Risk Analysis:** Developing applications & processes to enable new valuation schemes (value-pricing, Market-Based Valuation [MBV], Real Options etc.). Also web master for the **Schlumberger OFS Risk Analysis Web Site:** [www.risk.oilfield.slb.com](http://www.risk.oilfield.slb.com)

I have been actively involved in Risk Analysis and have supported numerous projects in ECA. I have developed several Risk Analysis tools for field applications which can be accessed via the [Oilfield Risk Analysis](#) web site.

#### Technical & engineering areas of interest include:

- i. [Survival Analysis](#): Investigating statistical time-to-failure techniques to benefit ESP performance analysis
- ii. Multiphase Flow and non-Newtonian flow in conduits (academic specialization)
- iii. Near wellbore modelling and analysis
- iv. Reservoir Management & Reservoir Simulation
- v. Business planning, economic and option pricing (both Real and Financial).
- vi. PVT
- vii. Water Solutions
- viii. Coding (experience with ANSI C, C++ and VBA [Visual Basic for Applications])

#### Eureka Membership Information

**SETC Level** Principal

**Communities** Value and Risk

Reservoir Engineering

Production and Completion Engineering

**SIGs**

Reservoir Management & Simulation

Production Engineering and Management

**Interests**

Artificial Lift

Downhole Fluid Analysis

Enhanced Oil Recovery

Enterprise Management Solutions

Flow Assurance

Fluid Mechanics

Formation Testing/Sampling & Hydrocarbon Fluid Properties

Pricing and Commercial Terms

Reservoir Fluids Chemistry

Rheology

Stimulation Applications

Water Control

#### Registrations

**PTE Domain** *Primary* Reservoir Engineering  
*Secondary* Production and Completion Engineering

#### Expertise

**Other (from LDAP)** Multiphase Flow in Conduits  
Water Control/Water Management  
NWB Performance (modelling and analysis)  
Survival Analysis (equipment performance)  
Rheology (Drilling & Cementing Hydraulics)  
Reservoir Engineering  
Reservoir Optimization  
Full Field Optimization: Reservoir->Network->Facilities->Fiscal Meter  
Fracture Design Optimization  
Quantitative Risk Analysis (Monte Carlo Decision Trees etc)  
Valuation Under Uncertainty (incl. Real Options & Derivatives Pricing)

#### Assignment History/Experience

##### Experience Summary (Quick Listing)

When	With	What	Where
June 2007 to now	Schlumberger-Doll Research (SDR)	Principal Scientist (Optimization & Simulation)	Cambridge (MA), USA

2001 to 2007	Schlumberger-Doll Research (SDR)	Senior Reservoir & Research Engineer	Ridgefield, CT (to 12/2006) and Cambridge, MA (12/2006 onwards)
1999 to 2001	Schlumberger H-RT	Senior Reservoir Engineer	Aberdeen, UK
1997 to 1999	Schlumberger IPM	Petroleum Engineer/Project Manager	Aberdeen, UK
1996 to 1997	Horizontal Well Technology Unit (HWTU), Heriot-Watt University	Project Manager	Edinburgh, UK
1992 to 1996	Imperial College, U. London & NTNU - U. Trondheim	PhD Student & Independent Consultant	London, UK & Trondheim, Norway
1990 to 1992	Nordic Offshore Systems AS	Field Engineer & Development Engineer	Oslo & Bergen, Norway
1989 to 1990	Arthur D. Little (Energy) Ltd	Associate (Management) Consultant	Cambridge, UK
1981 to 1984	Thos. R. Miller Energy Insurance Services	Energy Insurance Broker	London, UK

### Projects I am currently working on at SDR in the Uncertainty, Risk & Optimization group

Title	Description
<b>AURUM Optimization Under Uncertainty</b>	I have a primary role in a team developing a <i>true</i> optimization tool. We are currently on <b>Aurum ver.2.0</b> of a near-commercial quality prototype (check here for details) and has been successfully applied to real reservoirs. We can employ <b>Aurum</b> to optimize for any (operational) variable defined in the SCHEDULE section of an <b>Eclipse, E300</b> or <b>FrontSim</b> model. Significantly we can optimize in the presence of reservoir uncertainty (e.g. fault transmissibility, permeability, porosity, aquifer strength etc.). <b>Aurum</b> can optimize for production, NPV or other objective functions.
<b>AURUM Full Field Optimization</b>	Play a principal role in developing prototype tools and methodologies to furnish coupled system reservoir-tubing-facilities optimization. Work involves truly coupling systems, for example <b>Eclipse</b> with <b>PipeSim</b> (other software packages will be included) and optimizing over a given objective function (NPV, production etc.). The goal is to extend the work into fully coupled <b>full-field systems</b> (i.e. optimizing a complete <b>IAM/Avocet</b> model - reservoir-to-fiscal meter). This is currently a major focus of my work and presents a genuine challenge as many issues remain to be resolved (stability, robustness and, ultimately, making it practical for engineers in the field).
<b>Fracture Design Optimization</b>	Building prototype optimization engine to help Well Services engineers formulate practically realizable pump schedules for optimum fracture performance (using NPV over a given time period as the measure of service quality). Physical uncertainty can also be considered in this framework thus allowing the construction of an efficient frontier that furnishes the degree of confidence (percentile) associated with any particular optimum fracture design.
<b>Survival Analysis</b>	Principal investigator in utilizing <b>Survival Analysis to better understand time-to-event data</b> . So far have undertaken extensive analysis of ESP performance data (from various sources and clients). The results of this statistical technique can be used to assist in novel pricing and contracting schemes (to gain larger profits) as well as furnishing a much better understanding of the performance of our (and competitor) products.
<b>Valuation Under Uncertainty and Flexibility</b> (otherwise known as <b>Real Options</b> )	Investigating how Real Options can help us in better pricing schemes. Real Options have are relatively new to our industry and, working with experts in the field, we are developing an understanding of the potential of this financial engineering technology. While Real Options has (deservedly) received some bad press recently this is not because they are inherently not valuable, rather they have - in much of the literature - been incorrectly handled resulting in effectively meaningless results. However, we feel we have made some genuine progress in this venture with meaningful and properly formulated results.

### Complete Chronological Activity Breakdown to Present ...

When	With	What
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<p><b>June 2007 to present</b></p>	<p>Schlumberger-Doll Research</p>	<p><b>Principal Scientist (Simulation &amp; Optimization).</b> Based in Cambridge (MA), USA - <b>see above for details of current activities and research interests</b></p>
<p><b>Aug 2001 to May 2007</b></p>	<p>Schlumberger-Doll Research</p>	<p><b>Senior Research Engineer, Risk Analysis and Optimization group.</b> Based in Ridgefield (CT), USA - <b>see above for details of the different research activities I was (and still am) involved in</b></p>
<p><b>July 99 to August 01</b></p>	<p>Schlumberger H-RT</p>	<p><b>Senior Reservoir Engineer.</b> Numerous responsibilities and activities in the areas of Reservoir Engineering, Production Enhancement and Water Solutions projects plus general <i>ad hoc</i> Risk Analysis work. Work in this period was as follows:</p> <ul style="list-style-type: none"> <li>o <u>Water Solutions study: <i>Beatrice</i> field, Talisman Energy (UK).</u> Incorporated OFM database analysis to furnish a field-wide, zonal, layer- and completion-specific diagnosis of this mature North Sea field.</li> <li>o <u>Simulation Study: <i>Bruce</i> field, BP.</u> Involved in an Eclipse and multi-segmented wellbore (MSW) study of a long horizontal well to determine the impact of possible damage during drilling.</li> <li>o <u>Material Balance: <i>Banff</i> field, Conoco.</u> Defined a material balance/NODAL analysis study of this field to establish likely location for re-perforation, production enhancement and impact of injection. Time prevented full-field simulation so a simple <b>Material Balance</b> approach was taken - which proved judicious, cost-effective and accurate (as it later turned out).</li> <li>o <u>Water Solutions study: <i>Snorre</i> field, Norsk Hydro.</u> Helped define candidates and production enhancement opportunities for a basket of wells in this field. Study also used a novel Brownian motion oil-price generation tool to provide 'stochastic' financial forecasts and decision trees for the Risk Analysis component of the project.</li> <li>o <u>Full-field simulation study: <i>Wytch Farm</i>, BP.</u> Construction of a new curvi-linear grid (<b>FloGrid</b>), full-field history match (in <b>Eclipse</b>) and <b>OFM</b> analysis: All of which fed into a <b>FrontSim</b> streamline simulation model of the field.</li> <li>o <u>Field study: <i>Scott</i> field, Amerada-Hess.</u> Assisted team in Risk Analysis, PVT-studies (solids deposition) and PhaseTester multiphase flow meter review</li> <li>o <u>Water Solutions (project manager &amp; primary engineer), <i>Northern Business Unit</i> (NBU), Shell (UK).</u> Reviewed all NBU fields to select suitable candidates for water shut-off using a consistent and focussed candidate identification selection procedure incorporating geology, PLT's, OFM, client data and <b>WaterCASE</b>.</li> <li>o <u>Perforation and cross-flow study (lead engineer): N.A.M. (Holland).</u> Novel application of the new multi-lateral/cross-flow package in the <b>Prosper</b> NODAL package. Study involved establishing optimum perforation requirements to prevent cross-flow between different reservoir units in a complex well.</li> <li>o <u>Reservoir engineering: <i>Galley</i>, ChevronTexaco.</u> Study used <b>Eclipse</b> and <b>SimOPT</b> to history match welltest data in order to establish economic viability of a subsea well tie-in potential (resulted in substantial savings).</li> <li>o <u>FloWatcher Interpretation.</u> Performed FloWatcher data interpretation &amp; analysis for UK &amp; Norway.</li> </ul>
<p><b>Jan 1999 to July 1999</b></p>	<p>Schlumberger IPM</p>	<p><b>Project Manager,</b> (Aberdeen). Managed for the Saga "Kristin" field project. Looked at the field development and risk management (both qualitative and quantitative) of an HPHT field development in the Norwegian sector of the North Sea. Project success resulted in extension of contract to development phase.</p>
<p><b>Aug 1997 to Jan 1999</b></p>	<p>Schlumberger IPM</p>	<p><b>Petroleum Engineer,</b> (Aberdeen). Providing various production &amp; reservoir engineering support and input to numerous projects in the North Sea Region. Technical emphasis on horizontal and inclined well inflow performance, multiphase flow simulation, production chemistry and non-Newtonian flow. Helped in designing the IPM/OFS UK web site. Conducted risk analysis and economic viability studies for client's mature assets and constructed various software tools to provide Schlumberger project staff with state-of-the-art models to improve general modelling capabilities.</p>

<b>June 1996 to Aug 1997</b>	Heriot-Watt University	<b>Petroleum Engineer/Project Manager, Horizontal Well Technology Unit</b> , (Edinburgh). Manager of the <i>HoSim</i> project (full budget and staff responsibility). Steered product into the commercial domain through suitable tendering and worked extensively with Norwegian operating companies and project sponsor's. Defined revised code architecture and responsible for project personnel recruitment.
<b>Aug 1992 to May 1996</b>	Imperial College (UK) & NTNU (Trondheim, Norway)	<b>PhD Student and Independent Consultant</b> , (UK and Norway). Completed Ph.D studies at Imperial College after starting them at NTH (now known as NTNU). Core area of research was in non-Newtonian flow during drilling operations and multiphase flow. Three peer-reviewed publications generated from the work. Studies also included some lecturing, tutorial work and college-sanctioned consultancy work with Norwegian operating companies (achieved an 'outstanding' grade for the taught component of the Ph.D. studies). Conducted independent consultancy work in the USA in the field of non-Newtonian flow and software development. Coincidentally carried-out part-time MBA studies (final part of MBA completed on a full-time basis, Summer 1995).
<b>Sept 1990 to July 1992</b>	Nordic Offshore Systems AS	<b>Field Engineer &amp; Senior Development Engineer</b> , (Norway). Senior Development Engineer (May 1991 to July 1992). Single-handedly defined, designed, coded, tested and promoted the companies drilling hydraulics simulation package. Was responsible for running the program on-site resulting in defining pump rates and hydraulic optimization for 4 major North Sea platforms. Field Engineer (June 1990 to May 1991). Worked both on-and-off shore recording, modelling and evaluating real-time drilling data for four platforms. Essence of work was in the early detection of kicks.
<b>May 1989 to Sept 1990</b>	Arthur D. Little (Energy) Ltd	<b>Associate (Management) Consultant</b> High-level management consultancy experience with a number of clients in the Middle East, Belgium, Italy and UK - all at senior management (officer) level. Worked for several months on Das Island, Abu Dhabi, evaluating the commercial viability of a proposed process expansion project. Also worked on LNG storage and loading capability studied, and hazard & risk analysis. My work mainly focussed on the strategic and economic business drivers.
<b>1985 to 1989</b>	Imperial College	M.Eng in Petroleum Engineering with work experience at Texas Eastern (London) and Occidental Petroleum (Aberdeen) where I did my Masters thesis.
<b>1982 to 1985</b>	Thos. R. Miller Energy Insurance Services & Aitken Hume	<b>Energy Insurance Broker</b> , Lloyds Insurance Market and Independent London Underwriting (ILU) market, The City of London. Placed oil & gas related risks to the London market with Thos. R. Miller - Energy Insurance Brokers. Also worked as a <b>Unit Trust Dealer</b> for a (now discredited) merchant bank (Aitken Hume - partly owned by Jonathan Aitken and a few Saudi Princes). Specialized in Technology Stocks on the London Stock Exchange.

## Education

- 1998** **Doctorate**, Petroleum Engineering  
Norwegian University of Science and Technology (*Norway*)  
Thesis: Non-Newtonian flow and modelling and rheological characterization of drilling fluids
- 1996** **MBA**,  
University of Warwick (*United Kingdom*)  
Thesis: Internet Business and Strategic
- 1989** **Masters**, Petroleum Engineering  
Imperial College of Science Technology and Medicine University of London (*United Kingdom*)  
Thesis: Multiphase Flow Modelling of the Scapa Field

**Doctorate:** Research was conducted at both NTNU (Norway) and Imperial College, London under two European Union scholarships

**MBA:** Warwick Business School, University of Warwick, UK (Always one of the top three business schools in the UK and one of the top 10 in Europe). Thesis involved analysis of Internet Commerce strategies for a leading UK manufacture of laboratory equipment. Of note I took the internationally renowned "Derivatives modelling and analysis".

**M.Eng. (Hons.) Petroleum Engineering:** This degree required two dissertations:

The first (stated above) was an industry-orientated study involving multiphase flow simulation of the Scapa field for Occidental Petroleum (UK).

The second thesis - and more academic in focus - concerned the numerical solution of a complex set of simultaneous non-linear functions describing a mechanistic model for vertical slug-flow.

A paper from the Scapa simulation work was presented at the Europec '91 Conference & Exhibition of SPE student paper contest and won first prize for its section.

I am also an [Associate of the Royal School of Mines](#) [ARSM]

## Professional Qualifications and Affiliations

**Societies**   INFORMS   Member   1  
                   SPE           Member   23

## Other

**Technical Editor for the SPE (since 1999) for the following journals:**

- *SPE Reservoir Engineering & Evaluation Journal* (SPE REE J.)
- *SPE Production & Operations Journal* (SPE P&O J.)
- *SPE Journal* (SPE J.) -- occasional

**Review Chairman of the SPE Editorial Review Committee (2004 to 2006 - standard 2 year duration) for *SPE Production & Operations J.*:** Responsible for all operations, multiphase flow and lift-related article submissions and managed a group of 35 volunteer Technical Editors (SPE P&O was formally known as SPE Production & Facilities until late 2005).

**EUREKA community leader:** Value & Risk (V&R) community [2001 to 2003]

**Society of Petroleum Engineers:** Member since 1985

**SPE Chairman & Treasurer:** New York & New England Petroleum Section, SPE since 2003 up to today

## Personal Interests

I am British, although I was born in The British Protectorate of Aden, South Yemen (as it was then called, [click here](#) for info) but we then moved to the East End of London (UK) when I was three and grew-up there - which sort-of makes me a *Cockney*\* (find out more about London's East End [here](#), the home of the notorious [Kray Twins](#), [The Elephant Man](#) and, of course, [Jack The Ripper](#)). [\* note: to be a true Cockney one needs to be born within the sound of Bow Bells, East London - as I wasn't I'm deemed to be "adopted"].

**My interests (when time allows) include:**

- **Music (listening):** I'm mainly into electronic music (techno, experimental and sequential) although I am also a devoted and passionate [Hawkwind](#) fan. I have a penchant for obscure novelty (or just plain "bad") records ([click here](#) for a web site I made on this).
- **Music (playing):** I used to play live quite a lot in a number of somewhat dubious bands ([here's one](#) from a long time ago and [here's a recent one](#) from 2004). Been featured on national radio and *nearly* got a record deal (the usual story). Time prevents me from playing much nowadays.
- **Music (recording):** I am the proud owner of a small collection of vintage analogue synthesizers (including a treasured Moog). I once part-owned a small recording studio but most of the equipment got stolen one night and we never really recovered from that.
- **Music (releasing):** Over the years - purely as a hobby - I ran a small independent record label releasing a variety of awkward music including Acid-Techno, Drone/Dark Ambient, Industrial, Electro and some Punk. This little venture focuses mainly on limited vinyl-only releases (yes, there **is** a devoted and steadfast market for vinyl): visit the [label web site here](#). Of historical interest only, in the mid 1980's, while still at university, I released (and played on) Britain's first ever "Go-Go" record titled "*Bring On The Beat*" by [Snowboy](#) - who now happens to be a major recording artist and internationally recognised DJ in his own right. This record has now become a collectors item and a large part of a chapter in a recent book on the history of Go-Go music was dedicated to this oddity (a small footnote in musical history).
- **Sport:** Cricket, candlepin bowling ([details here](#)), boxing (a long time ago).
- **Cats:** A long-term supporter of [The Cat's Protection League, UK](#).
- **Cats:** I provided a foster home for stray cats seeking permanent adoption (I have adopted 2 myself - Ralpie & Onyx - [see pictures here](#)). Check out the main shelter site: [Second Chance Shelter for Cats, Boston, MA](#) (they are always seeking donations and support).

## External Contacts

**Dr Jim Peden:** [jimpeden@aol.com](mailto:jimpeden@aol.com)

**Dr Iain S. Weir:** Senior lecturer in Statistics. University of West of England E-mail: [Iain.Weir@uwe.ac.uk](mailto:Iain.Weir@uwe.ac.uk)

## Professional Achievements

- **2008:** Performed By Schlumberger - Silver. This was for the StatoilHydro-SLB Snorre B project titled "Alliance Delivers Production Optimization"
- **2008:** Performed By Schlumberger - President's Award (for the above PBS Silver-award project).
- **2008:** Outstanding Technical Editor Award from the SPE Editorial Review Committee (for contributions to *SPE Reservoir & Evaluation Journal*)
- **2007:** Recipient of the inaugural SPE "A Peer Apart" award (22nd October 2007) "in recognition of outstanding contributions in reviewing papers" by achieving the landmark of peer-reviewing over 100 papers for various SPE journals
- **2006:** Schlumberger Well Services R&D Input Award recipient for Fracture Design Optimization
- **2005:** Award of Appreciation from the SPE Editorial Review Committee "in recognition of exceptional effort in ensuring the technical excellence of the Society's permanent literature"
- **2002:** Outstanding Technical Editor Award from the SPE Editorial Review Committee
- **2001:** Outstanding Technical Editor Award from the SPE Editorial Review Committee
- **1999:** Founding member of a cross-industry panel for Risk Analysis in Aberdeen, UK
- **1993:** Recipient of EU COMETT scholarship
- **1993:** Awarded an EU PROFIT scholarship
- **1990:** Winner of the undergraduate section of the Europec 1990 SPE Student Paper contest, The Hague, The Netherlands

## Publications and Presentations

### Publications (peer-reviewed)

1. Prange, M., **Bailey, W.J.**, Couët, B., Dijkpessse, H., Armstrong, M., Galli, A. and Wilkinson, D.: "Valuing Future Information Under Uncertainty Using Polynomial Chaos," *Decision Analysis*\*, **5**, No. 3, September 2008, pp. 140-156, (ISSN 1545-8490). [Click here to view published article](#).  
\**Decision Analysis* is the journal of the *INFORMS* Decision Analysis Society, part of The **IN**stitute **F**or **O**perations **R**esearch and the **M**anagement **S**ciences (*INFORMS*).
2. **Bailey, W.J.**, Weir, I.S., Hogan, J. and Couët, B.: "Survival Analysis: The Statistically Rigorous Method for Analyzing Electrical Submersible Pump System Performance," paper SPE 96722-PA, *SPE Production & Operations J.*, **21**, No. 4, November 2006, pp. 492-504. [Click here to view published article](#).  
This paper was also presented (in a somewhat revised form) as paper SPE 96722, at the SPE Annual Technical Conference and Exhibition, Dallas, TX, 9-12 October 2005 ([Click here to view this version of the paper](#)).
3. Armstrong, M., **Bailey, W.J.** and Couët, B.: "The Option Value of Acquiring Information in an Oilfield Production Enhancement Project", *Journal of Applied Corporate Finance*, Published by Morgan Stanley, **17**, No. 2, Spring 2005, pp.56-61. [Click here to view article](#).
4. Armstrong, M., Galli, A., **Bailey, W.J.** and Couët, B.: "Incorporating Technical Uncertainty in Real Option Valuation of Oil Projects," *Journal of Petroleum Science & Engineering*, No. 44, 31 October 2004, pp. 67-82. [Click here to view article](#) or view the complete issue of the journal from the [Elsevier web site](#).
5. **Bailey, W.J.**: "Survival of the Smartest," *Middle East & Asia Reservoir Review*, No. 5, December 2004, pp. 6-17. [Click here to view article](#).
6. **Bailey, W.J.**, Couët, B., and Wilkinson, D.: "Framework for Field Optimization to Maximize Asset Value", paper SPE 87026-PA, *SPE Reservoir Engineering J.*, **8**, No.1, February 2005, pp. 7-21. [Click here to view complete article](#).
7. **Bailey, W.J.**, Couët, B., Bhandari, A., Faiz, S., Srinivasan, S and Weeds, H.: "Unlocking the Value of Real Options", *Oilfield Review*, **15**, No. 4, Winter 2003/2004, pp. 4-19. [Click here to view](#).
8. Raghuraman, B., Couët, B., Savundararaj, P., **Bailey, W.J.** and Wilkinson, D.: "Valuation of Technology and Information for Reservoir Risk Management," paper SPE 86568, *SPE Reservoir Engineering*, **6**, No. 5, October 2003, pp. 307-316. [Click here to view the published paper](#). Note that the original version of this paper was presented at the SPE ATCE, San Antonio, Texas in September 2002 as paper SPE 77424 and credited to Raghuraman, B., Couët, B., Savundararaj, P.: [and can be viewed here](#).

9. Contribution to book *Real Options Analysis* by J. Mun., published by Wiley Finance - a division of John Wiley & Sons, Inc., NJ, USA, June 2002 (ISBN 0-471-25696-X). Contribution titled "Real Options in Oil and Gas," by **W.J. Bailey**, pp. 36-41. See details at the [Wiley web-site here](#).
10. **Bailey, W.J.**: "Value Quantification - The Key to Understanding Uncertainty," published by Schlumberger UKI in *Advanced* (a public magazine published by WCP) UK Summer 2002 pp. 13-16. [Click here to view](#).
11. Saldungaray, P.M., Troncoso, J.C., Sofyan, M., Santoso, B.T., Parlar, M., Price-Smith, C., Hurst, G. and **Bailey, W.J.**: "Frac-Packing Open-hole Completions: An Industry Milestone," paper SPE 73757, presented at SPE International Symposium and Exhibition on Formation Damage Control, Lafayette, Louisiana, USA, 20-21 February 2002.  
An abridged version of this article was published in *J. Petroleum Technology*: September 2002, pp. 80-81. [Click here to view](#).
12. **Bailey, W.J.**, Couët, B., Lamb, F., Simpson, G. & Rose, P.: "Taking a Calculated Risk," *Oilfield Review*, **12**, No.3, Autumn 2000, pp. 20-35. [Click here to view](#).
13. **Bailey, W.J.**, Crabtree, M., Tyrie, J., Elphick, J.E., Kuchuk, F., Romano, C. & Roodhart, L.: "Water Control," *Oilfield Review*, **12**, No.1, Spring 2000, pp. 30-51. [Click here to view](#).
14. **Bailey, W.J.** and Peden, J.M.: "Generalized and Consistent Pressure Drop and Flow Regime Transition Model for Drilling Hydraulics," paper SPE 62167, *SPE Drilling and Completion*, **15**, No. 1, March 2000, pp. 44-56.  
Paper significantly revised from SPE 39281 (see below). [Click here to view](#).
15. **Bailey, W.J.** and Weir, I.S. "Investigation of Methods for Direct Rheological Model Parameter Estimation," *Journal of Petroleum Science & Engineering*, **21**, No. 1/2, September 1998, pp. 1-13. [Click here to view](#).
16. Wier, I.S. and **Bailey, W.J.**: "A Statistical Study of Rheological Models for Drilling Fluids," paper SPE 36359, *SPE Journal*, **1**, No. 4, December 1996, pp. 473-486. [Click here to view](#).
17. **Bailey, W.J.**: An Evaluation of Calculation Procedures Affecting the Constituent Factors of Equivalent Circulating Density for Drilling Hydraulics, Ph.D. Thesis. Published by U. Trondheim, Norway, Report 1996:5. Published in book-form: ISBN 82-7119-988-9, December 1996.

### Conferences & Presentations (not peer-reviewed)

1. Coffin, G., **Bailey, W.J.** and Couët, B.: "Uncertainty & Optimization for IWC," presented at the Eureka Workshop on Uncertainty & Intelligent well Control. Oxford, 2-4 September 2008. [Click here to view presentation \(in PDF\)](#).
2. Djikpesse, H., Couët, B., Prange, M., **Bailey, W.J.** and Wilkinson, D.: "Practical Methods for Constrained Oilfield Optimization," presented at the SIAM Conference on Optimization (OP08), session CP9: Applications - Part I of III, held in Boston, MA, 10-13 May 2008.
3. Mamonov, A., Couët, B., **Bailey, W.J.**, Prange, M., Djikpesse, H. and Druskin, V.: "Optimal Grid Coarsening: A Fast Proxy for Large Reservoir Optimization," paper SPE 111378, presented at the 2007 SPE/EAGE Reservoir Characterization and Simulation Conference, Abu Dhabi, U.A.E., 28-31 October 2007. [Click here to view paper](#) .
4. Prange, M., Armstrong, M., **Bailey, W.J.**, Couët, B., Djikpesse, H., Wilkinson, D. and Galli, A.: "Better Valuation Of Future Information Under Uncertainty," paper SPE 103028, presented at the 2006 SPE Annual Technical Conference and Exhibition, San Antonio, TX, 24-27 September 2006. [Click here to view paper](#) .
5. Wilkinson, D., **Bailey, W.J.** and Couët, B.: "Alternative Approaches to Real Option Valuation: A Critical Appraisal", paper SPE 97065, presented at the SPE Annual Technical Conference and Exhibition, Dallas, TX, 9-12 October 2005. [Click here to view article](#). A variation of this paper was also presented at the Workshop on Uncertainty Propagation in Modeling Workflows, held in Oxford, UK, 3-6 April 2006.
6. **Bailey, W.J.**, Couët, B., and Wilkinson, D.: "Field Optimization Tool for Maximizing Asset Value", paper SPE 87026, presented at SPE Asia Pacific Conference on Integrated Modelling for Asset Management, Kuala Lumpur, Malaysia, 29-30 March 2004. [Click here to view](#).
7. Armstrong, M., **Bailey, W.J.** and Couët, B.: "Archimedean Copula-based Bayesian Updating to Help Formulate Real Options for Oilfield Production Enhancement", presented at the 7th Annual International Conference on Real Options Washington, D.C., July 9-12, 2003. [Click here to view the paper](#) and the PowerPoint presentation used to accompany the paper [can be viewed by clicking here](#).

8. **Bailey, W.J.**, Mun, J. and Couët, B.: "A Stepwise Example of Real Options Analysis of a Production Enhancement Project," paper SPE 78329, presented at EUROPEC 2002, Aberdeen, UK (29-31 October, 2002). [Click here to view](#).
9. **Bailey, W.J.**: "Quantitative Risk Analysis for Value-Adding Projects: Methods & Applications," *DiaLog*, Summer 2001, published by the London Petrophysical Society (LPS). Paper can be viewed by [clicking here](#).
10. **Bailey, W.J.** and Peden, J.M.: "A Generalised and Consistent Pressure Drop and Flow Regime Transition Model for Drilling Hydraulics Suitable for Slimhole, Underbalanced and Horizontal Wells", paper SPE/IADC 39281, presented at SPE/IADC Middle East Drilling Technology Conference and Exhibition, Manama, Bahrain, (23-25 November, 1997), pp. 273-289. [Click here to view](#).
11. **Bailey, W.J.**, Weir, I.S., Skjetne, E. and Daltaban, T.S.: "Hyperbolic Rheological Model for Drilling Fluids," paper SPE 36025 (January 1996). Due to an unresolved dispute with two of the authors the paper remains unpublished.
12. **Bailey, W.J.**: "Two-Dimensional Multiphase Flow Simulation of Scapa," Prize-winning student paper presented at Europec '91 Conference & Exhibition of SPE, The Hague, The Netherlands (August 1991). Paper won the undergraduate section of the Student paper Competition held at this conference.

## Internal Reports & Research Notes

### Research Notes (including Departmental Notes)

To access reports login via LDAP alias and password required.

1. **OFSR-rn-2009-040-MM-C**: "A Modelling Framework for Fracture Design Optimization," by William Bailey and Benoît Couët (5th March 2009). [Click here to view](#).
2. **OFSR-dn-2008-141-MM-P**: "Utility Comparison of Survival Analysis and Hierarchical Bayesian Approach for ESP Performance Analysis," by William Bailey, Benoît Couët and Shashi Kant\* (December 2008). [Click here to view](#). \*
3. **OFSR-rn-2008-116-MM-C**: "Methodology for Valuing a Single-Period Decision Problem with Imperfect Information," by Michael Elliott, Michael Prange and William Bailey (September 2008). [Click here to view](#).
4. **OFSR-rn-2008-055-MM-C**: "Quantifying the Value of a Future Well Test with Reservoir and Measurement Uncertainty," by Michael Prange and William Bailey (May 2008). [Click here to view](#).
5. **OFSR-rn-2008-052-MM-C**: "Coupled Simulation Optimization," by Kashif Rashid, William Bailey and Benoît Couët (April 2008). [Click here to view](#).
6. **OFSR-rn-2008-044-MM-C**: "Fracture Design Optimization - Single Variable Sensitivity Analysis," by William Bailey and Benoît Couët (March 2008). [Click here to view](#).
7. **OFSR-nr-2007-110-MM-U**: "Optimal Grid Coarsening: A Fast Proxy for Large Reservoir Optimization," by Alexander V. Mamonov, Benoît Couët, William Bailey, Michael Prange, Hugues Djikpesse and Vladimir Druskin (October 2007). [Click here to view](#).
8. **OFSR-nr-2006-089-MM-C**: "Optimal Grid Coarsening For Reservoir Simulation," by Michael Prange, William Bailey, Benoît Couët and Hugues Djikpesse (September 2006). [Click here to view](#).
9. **OFSR-pr-2006-031-MM-U**: "Better Valuation Of Future Information Under Uncertainty," by Michael Prange, Margaret Armstrong, William Bailey, Benoît Couët, Hugues Djikpesse, David Wilkinson and Alain Galli (August 2006). [Click here to view](#).
10. **OFSR-rn-2006-077-MM-C**: "Transformation of Survival Curves to Hazard Function" by William Bailey (August 2006). [Click here to view](#).
11. **OFSR-rn-2005-147-MM-C**: "Application Of Survival Analysis for Time-To-Event Analysis Of Oilfield Equipment Systems" by William Bailey, Benoît Couët, Iain Weir and James Hogan (December 2005). [Click here to view](#).
12. **OFSR-rn-2005-155-MM-C**: "Survival Analysis for Oilfield Equipment Components Performance" by William Bailey, Benoît Couët, Iain Weir and James Hogan (December 2005). [Click here to view](#).
13. **OFSR-pr-2005-046-MM-U**: "Survival Analysis: The Statistically Rigorous Method for Analyzing Electrical Submersible Pump System" by William Bailey, Iain Weir, Benoît Couët and James Hogan (July 2005). [Click here to view](#).
14. **OFSR-pr-2005-047-MM-U**: "Alternative Approaches to Real Option Valuation: A Critical Appraisal" by David Wilkinson, William Bailey and Benoît Couët (July 2005). [Click here to view](#).
15. **OFSR-rn-2005-087-MM-P**: "Framework for Constrained Nonlinear Optimization With/Without Uncertainty Under Petrel: Classes Design & Library Usage" by Hugues Djikpesse, David Wilkinson, Wenyu Kong, William Bailey and Benoît Couët (May 2005). [Click here to view](#).
16. **OFSR-rn-2005-084-MM-P**: "Forecast Reservoir Optimization With/Without Uncertainty: Petrel Workflow Overview" by William Bailey and Hugues Djikpesse (May 2005). [Click here to view](#).
17. **OFSR-rn-2004-163-MM-C**: "Use of an Optimal Grid to Define a Proxy and a Better Up-Scaling of a Reservoir

Simulator" by Anshul Agarwal, William Bailey, Benoît Couët, Hugues Djikpesse, Vladimir Druskin and Wenyu Kong (December 2004). [Click here to view](#).

18. **OFSR-pr-2003-025-MM-U**: "Incorporating Technical Uncertainty in Real Option Valuation of Oil Projects" by Margaret Armstrong, Alain Galli, William Bailey and Benoît Couët (Summer 2003). [Click here to view](#).
19. **OFSR-pr-2003-026-MM-U**: "The Option Value of Acquiring Information in an Oilfield Production Enhancement Project" by Margaret Armstrong, William Bailey and Benoît Couët (Summer 2003). [Click here to view](#).

### TSIN: Technical Support Information Notes.

These were informal notes written mainly by IPM staff in Aberdeen (Scotland, UK) in response to a specific problem or client-driven request. These notes are deliberately short and meant to point interested readers to a solution rather than providing it directly. Nevertheless they provided a useful technology & information platform. They ceased being written in 1999.

1. **TSIN 001**. Bailey, W.J. and Halford, F.: "Condensate Humping During Pressure Build-Up Testing: Theoretical Perspective" (1998). [Click here to view](#).
2. **TSIN 003**. Bailey, W.J.: "Waxes, Hydrates and Asphaltenes: Summary of Conference (Aberdeen, 17th to 18th June 1998)" (1998). [Click here to view](#).
3. **TSIN 004**. Bailey, W.J.: "Immiscible Oil Separation" (1998). [Click here to view](#).
4. **TSIN 005**. Bailey, W.J.: "Calculation of the Critical Flowrate and Cuttings Concentration for Maximising ROP" (1998). [Click here to view](#).
5. **TSIN 007**. Bailey, W.J.: "Economic Viability and Job Duration Estimation for Well Interventions" (1998). [Click here to view](#).
6. **TSIN 008**. Bailey, W.J.: "Analysis to Establish Possible Choking in Pre-Holed Liners" (1998). [Click here to view](#).
7. **TSIN 014**. Bailey, W.J.: "Modelling Complex Multiphase Systems: Overview and an Enhancement of Service Capabilities" (1999). [Click here to view](#).
8. **TSIN 019**. Bailey, W.J., Simonian, S. and Gaskell, J.: "Flow Assurance: Methods for Predicting and Preventing Arterial Blockage and Fouling" (1999). [Click here to view](#).

## Conference & Meeting Presentations

*Coupling Qualitative and Quantitative Components of Risk*: presentation to the SPE/JAPT/JNOC Applied Technology Workshop on "Application of Probabilistic Methods to Reserves and Project Evaluations," 24-27 February 2002, Chiba (Tokyo) Japan.

*Water Control*: keynote presentation to SPE Holland regional meeting, The Hague, October 2000. (Presentation based upon material provided by Jon Elphick, Schlumberger Water Solutions Specialist)

*Risk Analysis for Value-Adding Projects: Methods & Applications*: presented to The London Petrophysical Society - 1-day conference on Risk Analysis titled "Better Evaluations from Better Statistics & GeoStatistics" held at The Geological Society, Piccadilly, London 7th March 2001.

Have given numerous presentations on Risk Analysis at various Schlumberger forums, workshops and meetings.

## Courses Given

MSc-level course in basics Multiphase Flow in Pipes (NTNU, Trondheim, Norway)

Quantitative Risk Analysis (Decision Trees, Monte Carlo simulation) as part of SLB-OFS Petroleum Economics course (Aberdeen)

## Patents and Patent Applications

### Patents

#### i. System, Method, And Apparatus For Fracture Design Optimization

*Authors*: William Bailey, Joseph Ayoub, Benoît Couët, Vincent Dury, Wenyu Kong and David Wilkinson.

U.S. Patent No. US 2008/0209997 A1, awarded 4th September 2008 (provisional application No. 60/890,244, filed 16th February 2007). [Click here to view this patent](#)

## Patent Applications, Memos & Pending

### 1. Automated Field Development Planning

- Authors:* Peter Tilke, Vijaya Halabe, Raj Banerjee, Tarek Habashy, Michael Thambynayagam, Jeff Spath, Andrew Carnegie, Bill Bailey, Benoit Couet and Michael Prange.  
Docket No. 112.0008, filed with the U.S. Patent Office on 20th January 2009.
2. **Valuing Future Information Under Uncertainty**  
*Authors:* Michael Prange, William Bailey, Benoît Couët, Hugues Djikpesse and Michael Elliot.  
Case No. 94.0181-NP, U.S. Patent Application No. 12/182,890, filed 30th July 2008.
  3. **Method For Selecting Well Measurements**  
*Authors:* Andrew Carnegie, Benoît Couët, Michael Prange, William Bailey, Pamir Bursin and Steven Flew.  
Case No. 122.0035, Application Serial No. 12/127,436, filed 27th May 2008.
  4. **Automated Field Development Planning of Well And Drainage Locations**  
*Authors:* Peter Tilke, William Bailey, Benoît Couët, Michael Prange and Martin Crick.  
Case No. 60.1700, filed July 2006.
  5. **Application of Survival Analysis for Time-to-Event Analysis of Oilfield Equipment Systems**  
*Authors:* William Bailey and Benoît Couët.  
Case No. 60.1668, filed December 2005.
  6. **Survival Analysis Tool for Oilfield Equipment Components Performance**  
*Authors:* William Bailey and Benoît Couët.  
Case No. 60.1667, filed December 2005.
  7. **Use of an Optimal Grid to Define a Proxy And A Better Up-Scaling of a Reservoir Simulator**  
*Authors:* Benoît Couët, Vladimir Druskin, William Bailey and Hugues Djikpesse.  
Case No. 94.0126, filed September, 2004.

Updated March 5, 2009