

Reservoir Solutions add-ins grow to 12

Ryder Scott has posted two new Reservoir Solutions Excel add-ins to the webpage at www.ryderscott.com/software/reservoir-solutions/. They are the Lognormal Probability Tool and the Exponential Calculator.

More than 20 years ago, Ryder Scott released its first Reservoir Solutions freeware program and by 2006, the number of petroleum engineering and geoscience applications had grown to 10. Today, the Excel add-ins are used by thousands in the industry the world over.

Bob Royce, petroleum engineer, said, "Right now, I am using the Log Wizard software to do a Simandoux shaley sand analysis. It works well and gives me the answers I need very quickly. I have also used the volumetrics and P/Z add-ins."

To request a password to enable the Reservoir Solutions downloads, please go to www.ryderscott.com/software/reservoir-solutions/rs-freeware-password-request-form/.

The latest version of the software family is compatible with the following versions of Excel: 2007, 2010, 2013, 2016 and 2019. In addition, Ryder Scott developed a fix for Office 365 users, who earlier this year reported that the engineering menu did not load or appear on the add-ins tab of the Excel ribbon after installation.

Please go to www.ryderscott.com/software/reservoir-solutions/ for further information on how to solve the loading problem.

Starting with the two new programs, the following summaries describe the capabilities and functions of each add-in.



developing assessments in resource plays

Ryder Scott designed the **Lognormal Probability Tool** to assist the experienced petroleum professional in developing assessments of undeveloped reserves

and resources quantities in resource plays. The tool is based on the methodology outlined in Monograph 3, "Guidelines for the Practical Evaluation of Undeveloped Reserves in Resource Plays (2010)," published by the Society of Petroleum Evaluation Engineers. The template displays a probit plot with up to three lognormal distributions, each containing as many as 4,000 data points. The **Lognormal Probability Tool** features utilities for sorting data series. It also offers options to select the data interval over which the linear regression will be conducted. The logarithmic scale has a range of adjustments. With the preparation of the probit plot itself, the program will also determine and display the results of the analysis to include P10, P50 and

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Data Analytics

Ryder Scott has posted Well Collator -- a fully automated, web-based application that takes surface and bottom-hole coordinates for a group of wells in a CSV file. Then the tool makes use of a pad-branch-stem hierarchy that enables the user to estimate spacing in a cluster (pad) of wells. The free application is at www.ryderscott.com/software/well-collator/.

Adam Cagle, data science coordinator, said Ryder Scott plans to introduce a spacing-vs.-time calculation. "The enhancement will show how the well's spacing has changed over time and return this information as a time-series variable," he said.

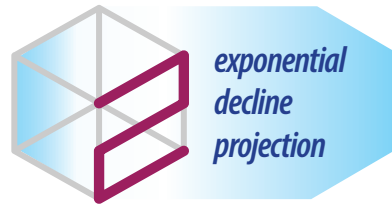


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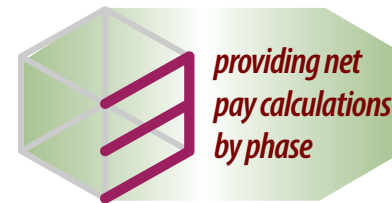
P90 distributions; lognormal series mean; arithmetic mean; and Swanson's mean. Also provided are Monograph 3 metrics P10/P90 and \hat{p} . Finally, the tabulation will display the count of data points included in the linear regression and indicate the conformance of the analysis to the criterion presented in Monograph 3, namely, whether the analyzed sample size meets the minimum recommended size.



exponential decline projection

Using **Exponential Calculator**, evaluators can enter any three valid exponential decline projection variables into the template and click

“Calculate.” The simple-to-use utility then calculates and displays the remaining two variables. For example, if the user enters initial and final rates for an exponential decline as well as an annual decline rate, **Exponential Calculator** will display remaining reserves and life of the projection. Of critical importance, the evaluator must enter parameters from a valid projection. Entering variables that are not physically or mathematically possible will generate invalid results.

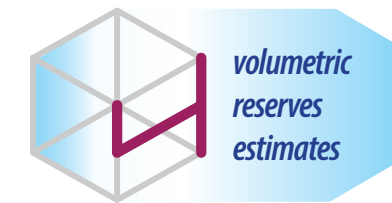


providing net pay calculations by phase

TruVert 2-D provides a sophisticated calculation procedure to determine true vertical thickness (TVT) and net pay in deviated wellbores that

penetrate dipping reservoirs. While the computation procedures are relatively simple, manual TVT calculations can be time consuming and often confusing. With **TruVert 2-D**, the user enters measured-depth log data, either measured or subsea contact depths and standard directional survey data for rapid, accurate calculation results.

TruVert 2-D enables the advanced user to emulate heterogeneous reservoir stratigraphy, providing net pay calculations by phase. As a bonus, **TruVert 2-D** incorporates Excel's versatile graphics-handling capabilities to provide the energy professional with printer-friendly, hard-copy output of individual reservoir geometry.



volumetric reserves estimates

RyVOL facilitates the preparation of volumetric reserves estimates for oil and gas wells and reservoirs. The menu-driven program provides tem-

plates for either oil or gas reservoirs and allows the user to determine such fluid and reservoir properties as gas deviation factors, pseudocritical temperatures and pressures, oil- and gas-formation volume factors and calculated solution gas-oil ratios.

Volumetric in-place and recoverable reserves are based on user input for reservoir volumes and recovery factors. Secondary product recovery is calculated either as a percentage of product in-place or as a ratio relative to primary product. **RyVOL** works with the **Reservoir Solutions Modules 1.0**.



calculation of oil and fluid properties

Reservoir Solutions Modules 1.0 gives reservoir engineers the capabilities to solve common problems requiring the calculation of oil and fluid properties, such as pseudocritical properties, compressibilities and formation-volume factors. Included in the program are functions for calculating Tc (pseudocritical temperature), Pc (pseudocritical pressure), Z factor (real gas deviation), shut-in bottomhole pressure, Cg (gas isothermal compressibility), Cw (water isothermal compressibility), Co (oil isothermal compressibility), Bo (oil formation volume factor) and Bg (gas formation volume factor).



computation of gas properties

Reservoir Gas Analysis Software (ResGAS) computes critical pressures and temperatures and specific gravities and heating values of a gas stream. The application works with the **Reservoir Solutions Modules** program. The computation of gas properties includes corrections for contaminants and adjustments for condensate content. **ResGAS** also calculates wet gas in place and recoverable wet-dry- and sales-gas volumes as well as recoverable condensate volumes.

ResGAS computes the estimated recovery of propane, butane and sulfur and approximates the BTU content of separator and gas sales. A user must enter separator-gas component percentages derived from laboratory analysis and other data input, including well and reservoir parameters and recovery factors.

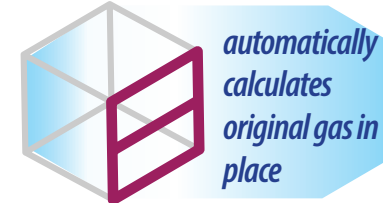


economics evaluation software

QuickLook economics evaluation software gives the user a simple, fast tool to compute screening economics for prospects, evaluate workovers and recompletions and run preliminary lending economics. The user can run complete reserves and cash flow projections for individual wells or properties.

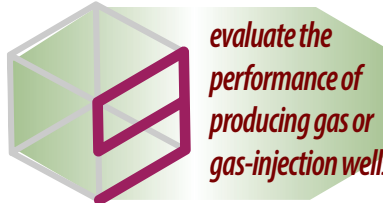
QuickLook computes up to four distinct product streams, two oil and two gas, and secondary product streams based on gas-oil ratios or condensate yields. The program provides options for exponential, hyperbolic, harmonic and manual product projections. A user can also subtract or add together streams.

QuickLook also has multiple expense, tax and investment-parameter options as well as a provision for abandonment costs.



automatically calculates original gas in place

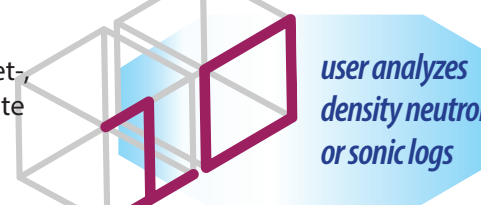
The **Material Balance application** automatically calculates original gas in place (OGIP), estimated ultimate recovery (EUR), BHP/Z vs. cumulative gas production and Tc and Pc properties from gas gravity while adjusting for contaminants. Using the popular Cullender-Smith (1956) method as modified by Ryder Scott, the utility software also predicts shut-in bottomhole pressures from tubing pressures in gas wells.



evaluate the performance of producing gas or gas-injection wells

With the **Flowing Pressure Analysis** program, a user can evaluate the performance of producing gas or gas-injection wells. The program enables the user to calculate flowing bottomhole pressures (FBHP) for gas wells. The application also automatically computes associated backpressure equation parameters and displays a traditional log-log backpressure curve at the user's option.

For producing wells, absolute open flow (AOF) potential is also calculated. Static bottomhole pressure (SIBHP) can be determined from shut-in tubing pressure (SITP). The application integrates techniques derived from Cullender-Smith and Turner, Hubbard and Dukler (1969). Ryder Scott modified those algorithms for today's high-speed computers.



user analyzes density neutron or sonic logs

selected methods:

- Shale content—Applicable to consolidated and unconsolidated formations
- Total porosity—Uses arithmetic-average or sum-of-squares method
- Effective porosity—Uses arithmetic-average or sum-of-squares method
- Formation water saturation—Solves using Archie or modified Simandoux algorithms

For sonic logs, the program template uses interval transit time to calculate uncorrected sonic and effective porosities. For water-saturation and shale-content computations, **LogWizard** includes visual basic functions that can be exported or linked to other Excel applications.

Based on user-selected criteria, **LogWizard** calculates gross reservoir sand thickness and net pay thickness as well as average porosities and water saturations for pay sections. The program incorporates an Rw calculator to assist users in computing formation water resistivity from log data. The template also contains areas for entering core data or notes.



Excel-based tool for material balance calculations

RamBal is an easy-to-use, Excel-based tool for material balance calculations to help predict future performance of abnormally pressured, unconventional gas fields. The algorithm compensates for reservoir rock and water compressibility in determining both OGIP and recoverable reserves and accounts for finite downdip free water expansion. The program requires only commonly available reservoir pressures, temperature data and gas properties and includes “calculators” and tips to help experienced petroleum professionals assess appropriate compressibility coefficients as well as the conversion of separator gas components to reservoir (wet gas) conditions.



versatile coalbed methane volumetrics analysis tools

The **rscCBM** program provides the user with versatile coalbed methane volumetrics analysis tools. The program incorporates standard Langmuir parameters obtained from laboratory analysis of coalbed core samples and has a feature-rich set of calculation procedures to provide useful, reliable results.

The volumetrics program presents a graphical representation of results for each zone, seam or well, which can be printed. Data validation and enhanced navigation are used extensively. In each case where calculated results are anticipated in the program, the user may optionally override such calculations. Those changes will be evident to the user by a change in background color. That is especially important when no lab data is available and calculations are entered manually rather than basing them on Langmuir parameters.

The templates in **rscCBM** are large by design and use “frozen panes” to facilitate data entry and visualization of graphical results. That could create difficulties for users with low-resolution graphics displays. To compensate, the program automatically detects the user's display settings to set or eliminate frozen panes.

[Reservoir Solutions user manuals are included in the Excel files accessible from the engineering menu. All posted freeware programs produce presentation-quality, on-screen views and printer-friendly, hard-copy output.](#)

Ryder Scott also distributes USB drives with the freeware from its booth at the SPE-ATCE and NAPE events.

Editor's Note: Ryder Scott does not guarantee or warrant the accuracy or reliability of the Reservoir Solutions software and disclaims its fitness for any particular purpose.