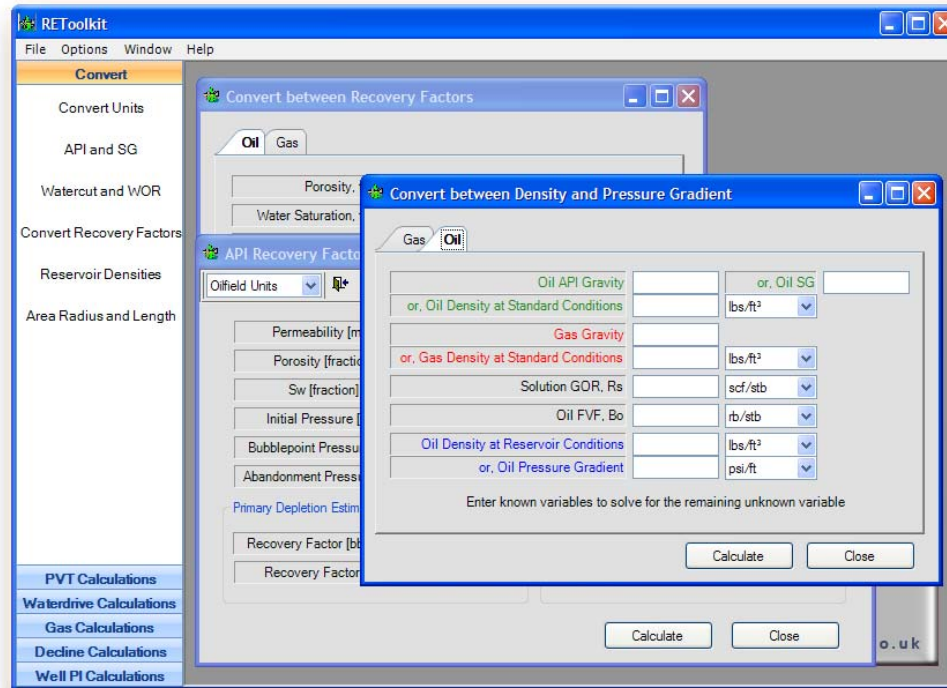


Introducing *REToolkit*



***REToolkit* is Reservoir Engineering Toolkit containing numerous small analytical routines**

□ Conversion Utilities

- Units conversion, API to SG and bbl/tonne, Watercut and WOR, Recovery factors, Densities and Pressure Gradients, Equivalent Area, Radius and Length

□ PVT Calculations

- PVT calculations and correlations for gas, oil and water. Minimum miscibility pressure and dewpoint pressure prediction

□ Waterdrive Calculations

- Mobility ratio, Areal sweep efficiency, Waterdrive and depletion recovery factor estimates

□ Gas Calculations

- Gas BHP calculation from THP

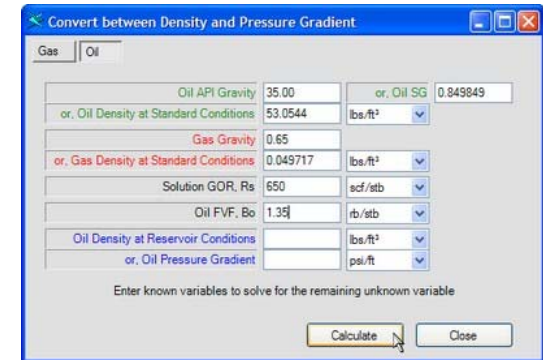
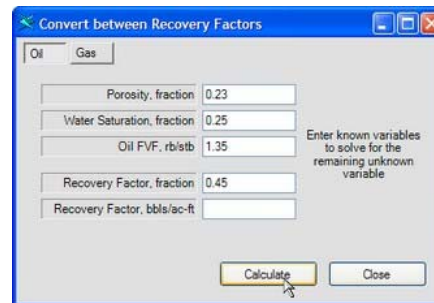
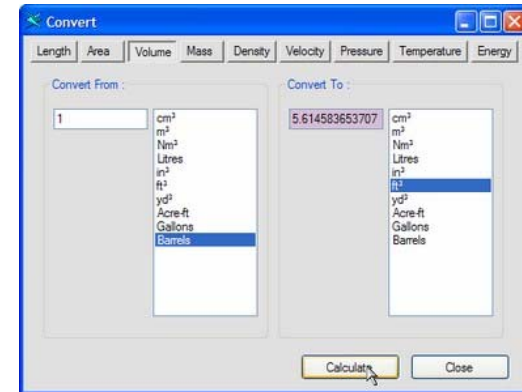
□ Decline curve exponent calculation

□ Vertical and horizontal oil well PI calculation



Conversion Utilities

- ❑ Units conversion
- ❑ API to SG and bbl/tonne
- ❑ Watercut and WOR
- ❑ Recovery factors
- ❑ Densities and Pressure Gradients
- ❑ Equivalent Area, Radius and Length



PVT Calculations

- ❑ PVT calculations and correlations for gas, oil and water
- ❑ Minimum miscibility pressure, and
- ❑ Dewpoint pressure prediction

PVT Calculations

From Composition | From Gas Gravity

Composition (Mole Percent)

Methane	C1	65
Ethane	C2	25
Propane	C3	5
Butane	C4	5
Iso Butane	iC4	
Pentane	C5	
Iso Pentane	iC5	
Hexane	C6	
Heptanes +	C7+	
Nitrogen	N2	
Carbon Dioxide	CO2	
Hydrogen Sulphide	H2S	

Total Mole Percent: 100
Remainder: 0

Input Pressure and Temperature

Pressure: 3500 psi
Temperature: 155 deg. F

Calculations

Pseudo Reduced P	5.228797
Pseudo Reduced T	1.423723
Z Factor	0.788086
Expansion Factor [scf/rcf]	255.45
Gas FVF [rcf/scf]	0.003901
Gas Gravity	0.795806
Gas Viscosity [cP]	0.028855
Gas Compressibility [1/psi]	2.359E-04
Gas gradient [psi/ft]	0.107716
Calorific Value [BTU/scf]	1387.82
Wobbe Index	1555.7132

Net Dry

Calculate

Close

PVT Calculations

Solution GOR | Bubblepoint | Formation Volume Factor | Viscosity | Compressibility

API Gravity: 35
Gas Gravity: 0.65

Res T: 175 deg. F
GOR at Pb: 650 scf/stb

<input checked="" type="checkbox"/>	Standing	California	1947	2931.05
<input checked="" type="checkbox"/>	Lasater	Mid USA/Canada	1958	3353.98
<input checked="" type="checkbox"/>	Vasquez-Beggs	Databank	1980	3301.64
<input checked="" type="checkbox"/>	Glaso	North Sea	1980	3394.35
<input checked="" type="checkbox"/>	Al-Marhoun	Middle East	1988	3886.73
<input checked="" type="checkbox"/>	McCain	Databank	1991	2938.13
<input checked="" type="checkbox"/>	Dokla-Osman	UAE	1992	2955.49
<input checked="" type="checkbox"/>	Farshad	Colombia	1992	3389.97
<input checked="" type="checkbox"/>	DeGhetto	Databank	1994	2882.29
<input checked="" type="checkbox"/>	Almehaideb	UAE	1997	3401.83
<input checked="" type="checkbox"/>	Hanafy-Macary	Egypt	1997	2875.17
<input checked="" type="checkbox"/>	Petrosky	Gulf of Mexico	1998	3674.41
<input checked="" type="checkbox"/>	Al-Shamasi	Databank	1999	2643.48
<input checked="" type="checkbox"/>	Dindoruk-Christman	Gulf of Mexico	2001	3687.01

Average: 3236.82 psi
Standard Deviation: 370.07

Calculate

Close

Minimum Miscibility Pressure

Reservoir Fluid	Composition (Mole Percent)
Ethane	C2 6.05
Propane	C3 2.93
Butane	C4 0.99
Iso Butane	iC4 0.61
Pentane	C5 0.42
Iso Pentane	iC5 0.58
Hexane	C6 0.92
C7+ Molecular Weight, gm/mol	196
C7+ Specific Gravity	0.883

Injection Gas Methane Content, %: 68

Reservoir Temperature: 130 deg. F

Select System: CO2 Injection Gas

Minimum Miscibility Pressure: 3772.7 psi

Calculate

Close



Waterdrive Calculations

- Mobility ratio
- Areal sweep efficiency
- Waterdrive and depletion recovery factor estimates

The screenshot shows a dialog box titled "Mobility Ratio". It contains four input fields: "Oil viscosity, cP" with a value of 3, "Water viscosity, cP" with a value of 0.34, "Endpoint kro, fraction" with a value of 1, and "Endpoint krw, fraction" with a value of 0.4. Below these fields, the "Mobility Ratio" is calculated and displayed as 3.529412. There are "Calculate" and "Close" buttons at the bottom.

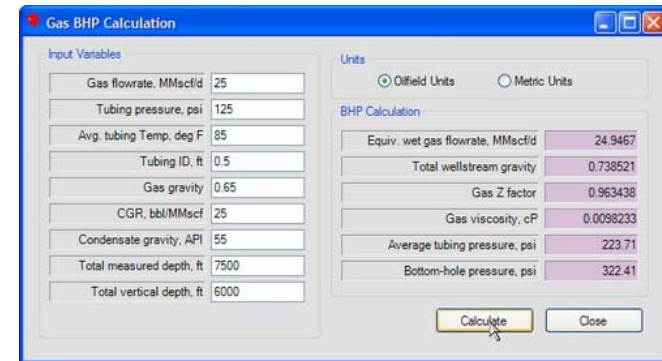
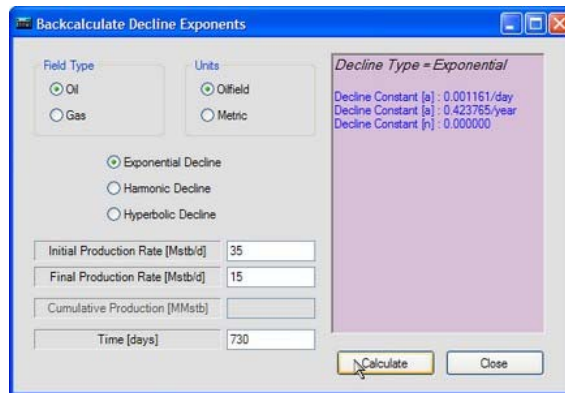
The screenshot shows a dialog box titled "Areal Sweep Efficiency". It contains a "Mobility Ratio" section with the same input fields as the previous dialog, and an "or, Input Mobility Ratio" field with the value 3.529412. To the right, there are fields for "Watercut, fraction" (0.9) and "Method" (Direct Line Drive). Below these, the "Ea, fraction" is calculated and displayed as 0.859313. There are "Calculate" and "Close" buttons at the bottom.

The screenshot shows a dialog box titled "API Recovery Factor Estimates". It has a dropdown menu for "Oilfield Units" set to "Oilfield Units". The dialog is divided into two main sections: "Primary Depletion Estimate" and "Waterdrive Estimate". Each section has two input fields for "Recovery Factor [bbl/ac-ft]" and "Recovery Factor [%]". There are "Calculate" and "Close" buttons at the bottom.



Gas Calculations & Decline curve exponent calculation

- Gas BHP calculation from THP
- Decline curve exponent calculation



Oil Well PI Calculation

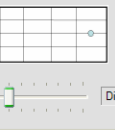
Oil Well PI Calculations

Offfield Units

Vertical Oil Well Horizontal Oil Well

Permeability, mD	350	Thickness, ft	90
Oil FVF Bo, rb/stb	1.375	Area	50 Acres
Oil Viscosity, cP	0.75	Skin factor	0
		Well Radius, ft	0.345

Dietz Shape Factor



Dietz Shape Factor 0.5813

PI, stb/d/psi 3.3363

Calculate

Close

Oil Well PI Calculations

Units: Oilfield Metric

Vertical Oil Well Horizontal Oil Well

Method: Pseudo Steady State [1996] - Economides

lx, mD	350	Well Radius, ft	0.345
ly, mD	350	Well X Midpoint [xo], ft	
kz, mD	35	Well Y Midpoint [yo], ft	
Oil FVF Bo, rb/stb	1.375	Well Length [L], ft	750
Oil Viscosity, cP	0.75	Well Height above Base [zw], ft	60
Major Length [xe], ft	2500	Well Inclination, degrees	75
Minor Length [ye], ft	2500		
Thickness, ft	90		

Show Well Schematic

Skin Factor

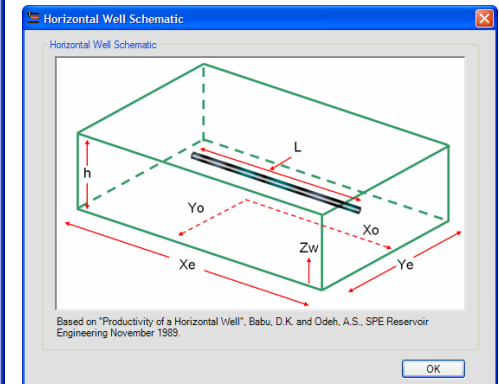
Calculate Skin Input Skin

k (skin), mD	
Skin factor	5.0000

PI, stb/d/psi 65.2293

Calculate

Close



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