

WELL TEST ANALYSIS REPORT

**Para et al Fort Liard N-01
N - 01
Build up Test
FANTASQ: 1455.6 – 1469.0 mKB**

June – July, 2003

PARAMOUNT RESOURCES LTD

November 2004

CONCLUSIONS

1. The **average reservoir pressure** following the test is approximately **12265.10 kPaa MPP**.
2. The analysis showed **radial homogeneous reservoir** with radial flow.
3. The match was obtained by using **permeability to gas of 54.5 mD** and **radial skin of + 37** (possible due to turbulence).

DISCUSSION

PRESSURE SUMMARY				
Extrapolated Reservoir Pressure	(P _R)	12502.49	kPaa	1813.36 psia
Flowing Sandface Pressure	(P _{wf})	6580.41	kPaa	954.42 psia

RESERVOIR CHARACTERISTICS				
Flow Capacity to Gas	(kh)	311	mD.m	
Permeability to Gas	(K _g)	54.5	mD	
Net Pay	(h)	6.0	m	19.7 ft
Skin Factor	(s)	+ 37		

Objectives

Pressure transient analysis was performed on flow and build up test to determine deliverability, average reservoir pressure, and fluid flow characteristics of the reservoir.

**Para et al Fort Liard
N – 201**

**FANTASQ: 1455.6-1469.0 mKB
June - July, 2003**

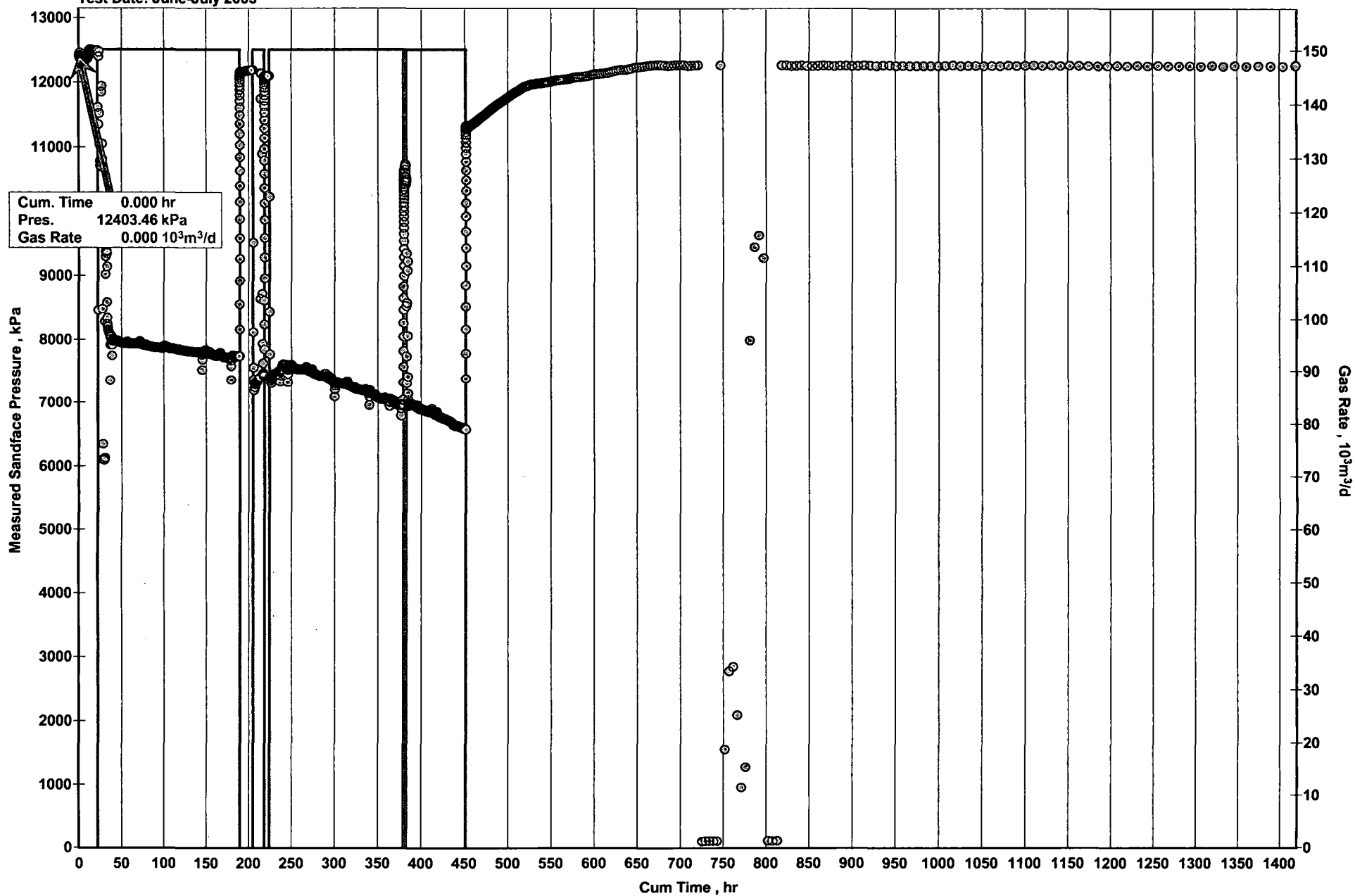
The pressure transient analysis as presented in this report indicated a radial homogeneous reservoir with radial flow. The test showed permeability to gas of 54.5 md and a radial skin of + 37.

The match is shown as a simulated overlay on the surface pressure data for the overview, Cartesian, semi-log and log-log match plots. The Strip Chart shows the measured surface pressure data converted to bottomhole pressure data and flow rate and build up test. The Derivative Analysis Log-Log Plot shows the various flow models tested for this well. The semi-steady state (SSS) derivative (also known as the primary pressure derivative) is monotonically decreasing, which indicates that the data set is analysable. The extrapolated pressure P^* of 12502.49 kPaa was chosen to best represent the average reservoir pressure.

All pressure transient analysis was conducted using pseudo-pressures.

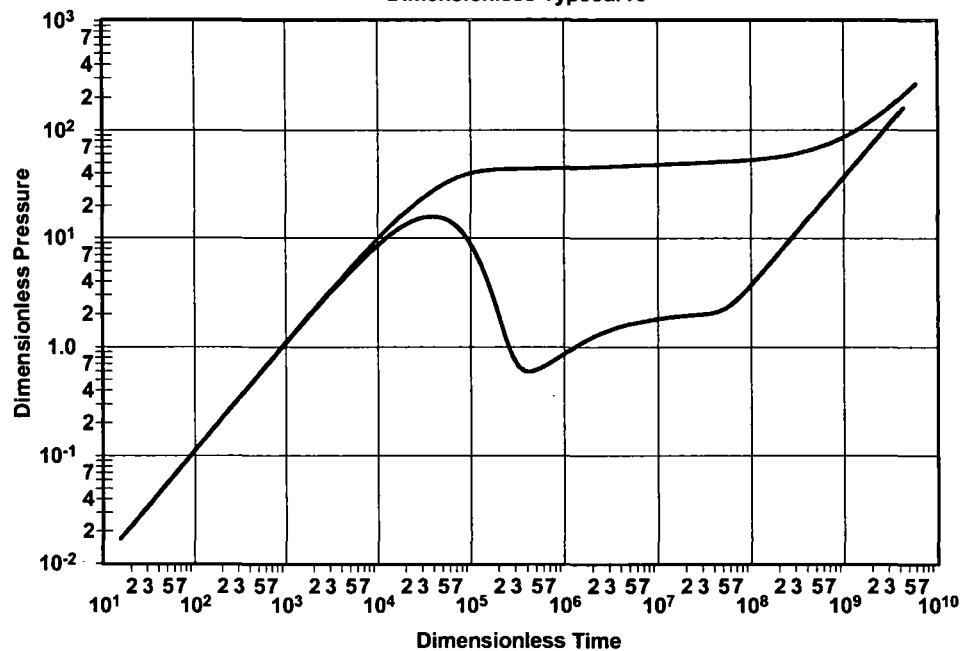
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PARA ET AL FORT LIARD N-01
Field: LIARD; Formation: FANTASQ
Test Date: June-July 2003

Data Chart



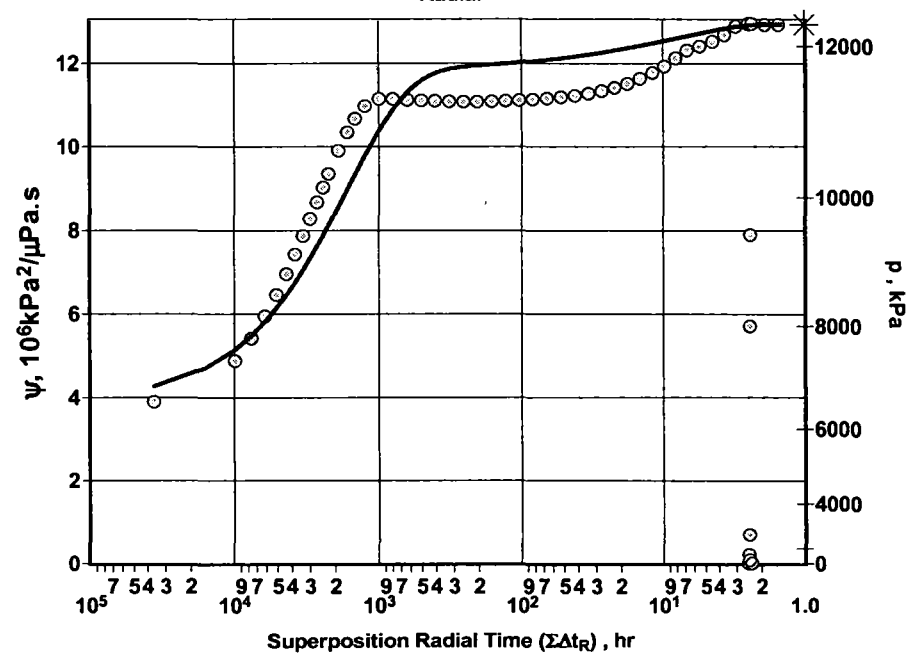
Vertical Model #1

Dimensionless Typecurve



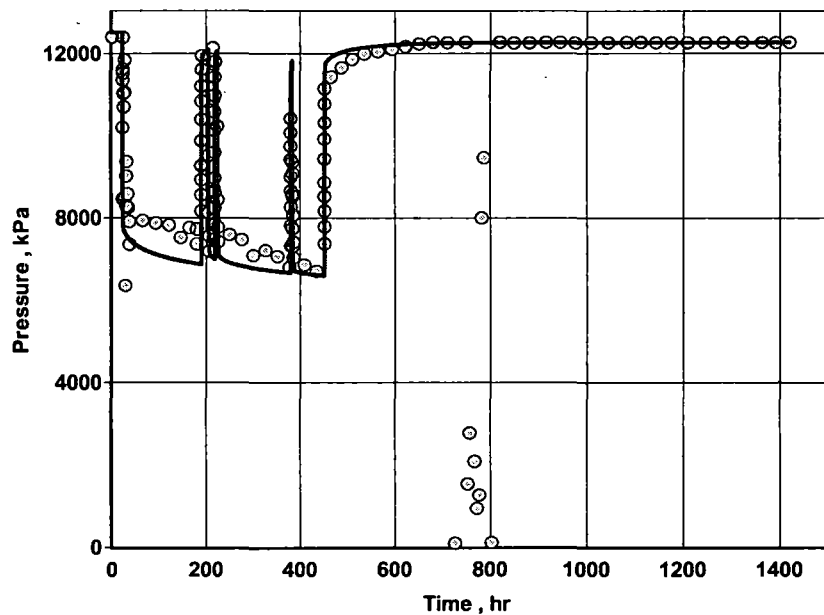
Vertical Model #1

Radial



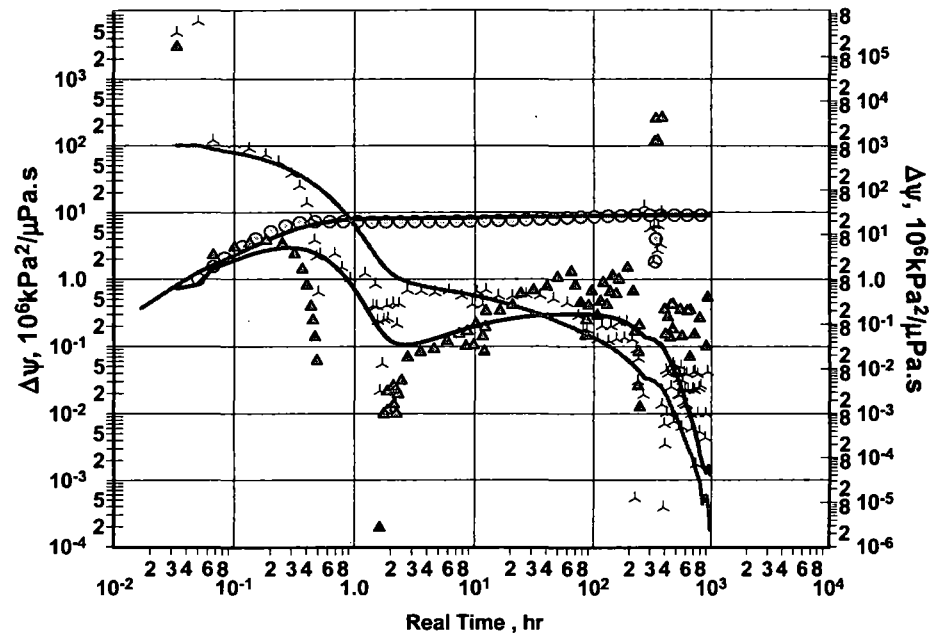
Vertical Model #1

Total Test



Vertical Model #1

Typecurve



Vertical Gas Well Model

Case Name : Vertical Model #1

Paramount Resources LTD

PARA ET AL FORT LIARD N-01

Field: LIARD; Formation: FANTASQ

Test Date: June-July 2003

Model Parameters

Permeability (k)	54.500 mD	Reservoir Length (X_e)	1200.00 m
Apparent Wellbore Storage Dim. (C_{aD})	0.00	Reservoir Width (Y_e)	1200.00 m
Wellbore Storage Constant Dim. (C_D)	900.00	Active Well At (X_w)	100.00 m
Storage Pressure Param Dim. (C_{pD})	0.000	Active Well At (Y_w)	100.00 m
Skin (s)	37.000		
Turbulence Factor (D)	0.00 ($10^3 \text{ m}^3/\text{d}$) ⁻¹		

Formation Parameters

Net Pay (h)	6.00 m
Total Porosity (ϕ_t)	11.00 %
Gas Saturation (S_g)	90.00 %
Water Saturation (S_w)	10.00 %
Oil Saturation (S_o)	0.00 %
Wellbore Radius (r_w)	0.091 m
Formation Temperature (T)	37.0 °C
Formation Compressibility (c_f)	6.779e-7 kPa ⁻¹
Total Compressibility (c_t)	7.938e-5 kPa ⁻¹

Production and Pressure

Final Gas Rate	150.001 $10^3 \text{ m}^3/\text{d}$
Cumulative Gas Production	2530.684 10^3 m^3
Final Measured Pressure	12279.89 kPa

Synthesis Results

Average Error	%
Synthetic Initial Pressure (p_i)	12502.49 kPa
Average Reservoir Pressure	12265.10 kPa
Pressure Drop Due To Skin (Δp_s)	4518.73 kPa
Flow Efficiency (FE)	0.205
Damage Ratio (DR)	4.876

Fluid Properties

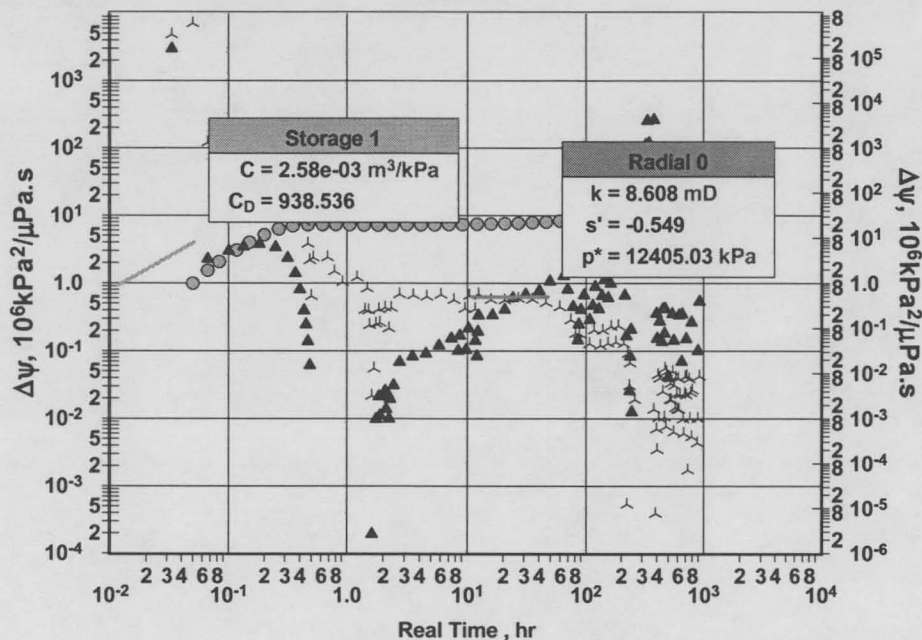
Gas Gravity (G)	0.620
N ₂	2.10 %
H ₂ S	0.00 %
CO ₂	0.90 %
Critical Pressure (P_c)	4634.63 kPa
Critical Temperature (T_c)	199.27 K
PVT Reference Pressure (p_{pVT})	12510.12 kPa
Gas Compressibility (c_g)	8.74016e-5 kPa ⁻¹
Gas Compressibility Factor (z)	0.817
Gas Viscosity (μ_g)	15.395 $\mu\text{Pa.s}$
Gas Formation Volume Factor (B_g)	0.007126 m^3/m^3

Forecasts

Forecast Flowing Pressure (P_{flow})	6580.41 kPa
3 - Month Constant Rate Forecast @ Curr. Skin	116.455 $10^3 \text{ m}^3/\text{d}$
6 - Month Constant Rate Forecast @ Curr. Skin	95.318 $10^3 \text{ m}^3/\text{d}$
Forecast Flow Duration (t_{flow})	12.00 month
Constant Rate Forecast @ Curr. Skin	70.009 $10^3 \text{ m}^3/\text{d}$
Constant Rate Forecast @ Skin=0	108.150 $10^3 \text{ m}^3/\text{d}$
Constant Rate Forecast @ Skin=-4	114.983 $10^3 \text{ m}^3/\text{d}$

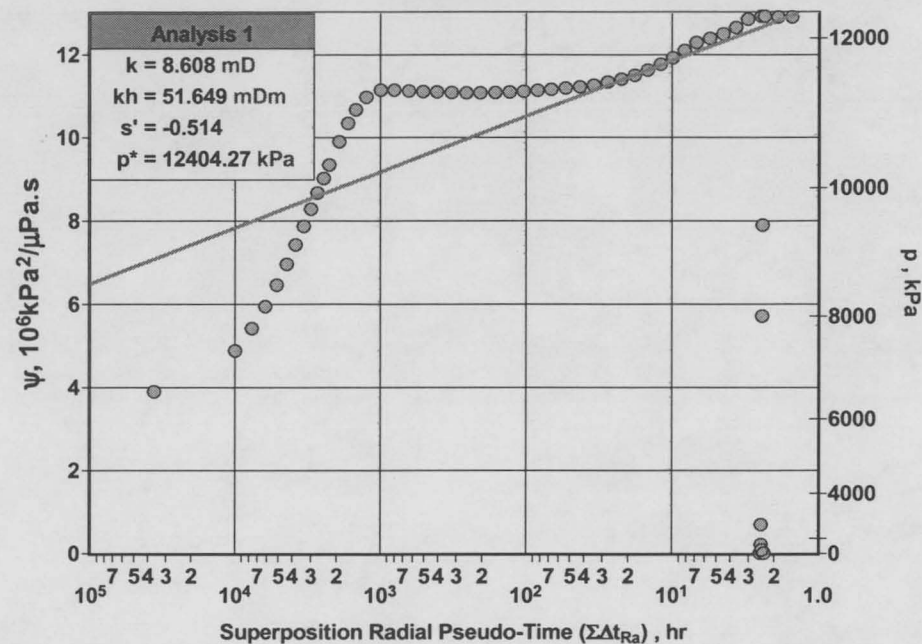
Deriv.BU 1

Typecurve



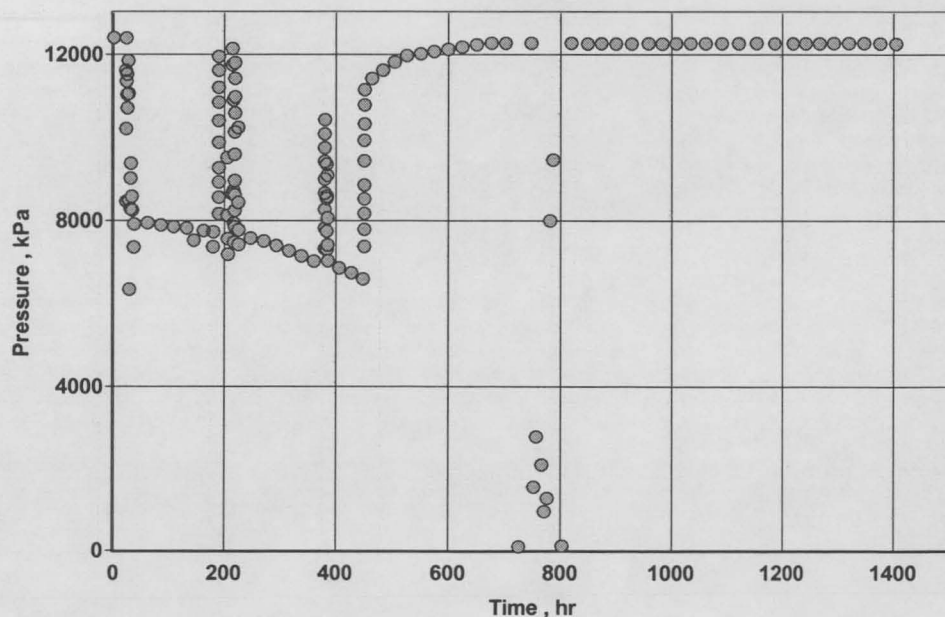
Deriv.BU 1

Radial



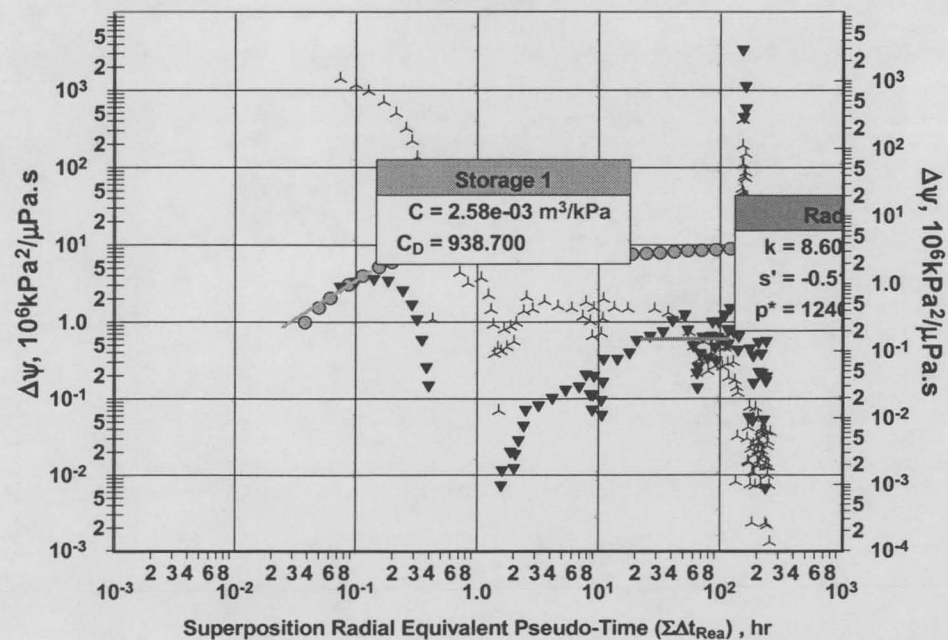
Deriv.BU 1

Total Test



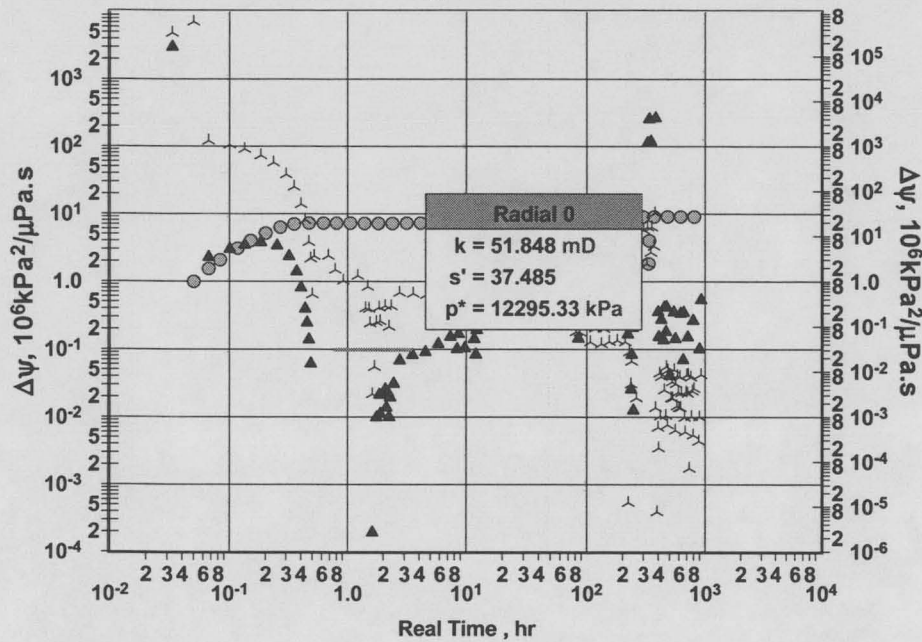
Deriv.BU 1

Typecurve



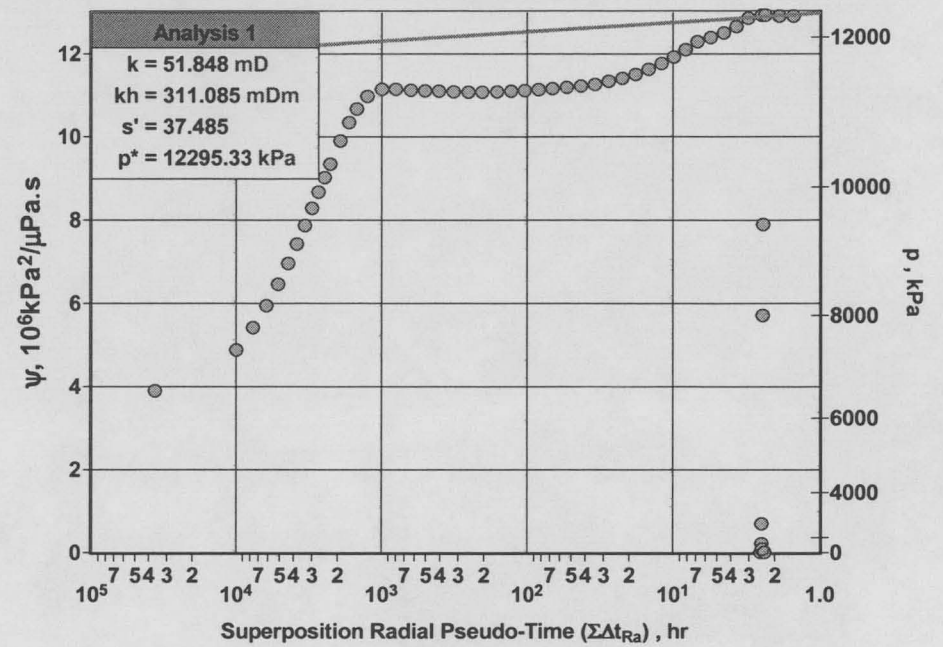
RadialBU 1

Typecurve



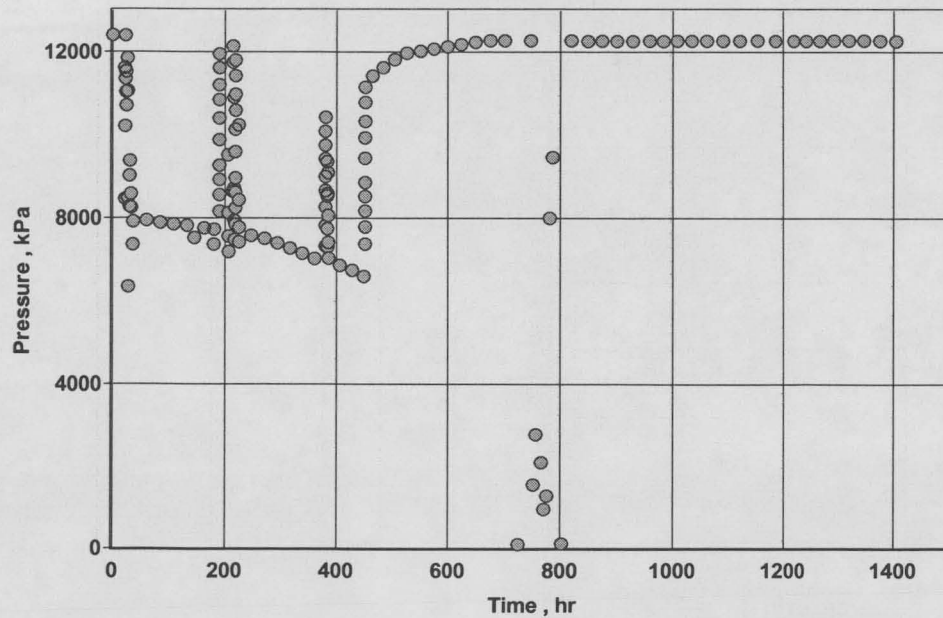
RadialBU 1

Radial



RadialBU 1

Total Test



RadialBU 1

Typecurve

