

OIL MINI-FRAC ANALYSIS

WELL NAME: **COPRC Loon Creek**
 WELL LOCATION:
 Bottomhole Location: **300/O-06 65-10 127-00**
 Surface Location: 300/O-06 65-10 127-00
 Well License #: **470**

ZONE: **“BASAL” LOWER CANOL**

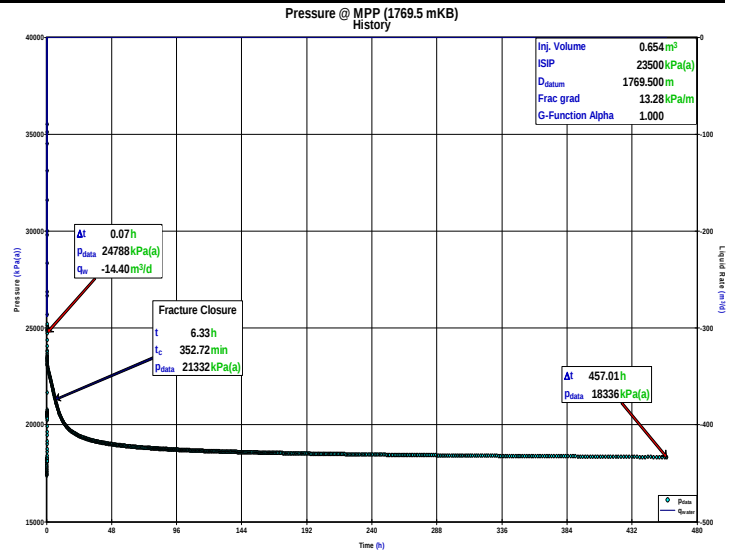
COST CENTRE: **10345055**

TEST DATE: **Mar 2 – 21, 2013**

STAGE OF WELL TEST: **Post-Perf Inj-Falloff**

ORIENTATION: **Vertical**

TYPE/SIZE OF STIMULATION: **N/A**



Reservoir Properties

Injection Interval: 1769 – 1770 mKB		
Frac Height (h): 5 m (Estimate)	Porosity (ϕ): 15 %	Water Saturation (S_w): 13 %
Oil Gravity: 50 °API (Estimate)	H ₂ S Content: 0 %	BHT: 79.2 °C

Injection Data

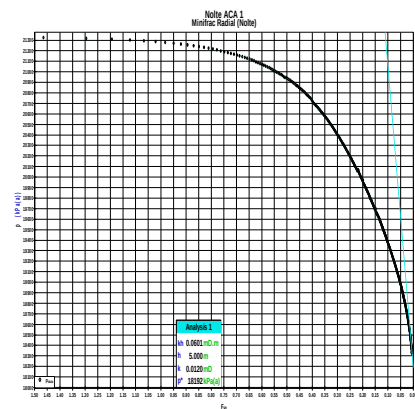
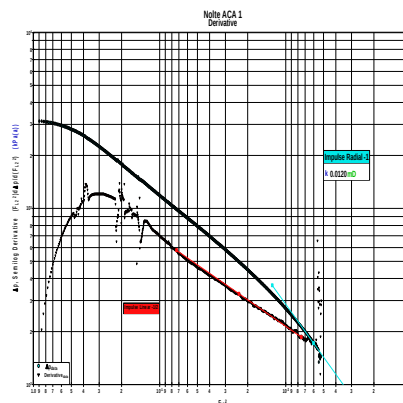
Test	Time	Final Rates				Final Pressures		
		Gas	New Oil	New H ₂ O	Load	Tubing	Casing	BHP
	Hours	e ³ m ³ /d	m ³ /d	m ³ /d	m ³ /d	kPag	kPag	kPaa
Injection	0.1	---	---	---	14.4	N/A	0	24788
Shut-In	457.0	---	---	---	0	N/A	0	18336

Injection Summary

New Fluid (m ³)				Load Fluid (m ³)		Remaining Load (m ³)	
Gas (E ³ M ³)	Gas (MSCF)	Cond (m ³)	Water (m ³)	Oil (m ³)	Water (m ³)	Oil (m ³)	Water (m ³)
---	---	---	---	0	0.65	0	0.65

Pressure Transient Analysis Results Summary

Analysis Results	
P*	18192 kPaa
(kh/ μ) _o	0.21 mD·m/mPa·s
(kh) _o	0.06 mD·m
k _o	0.01 mD



Discussion

Test Procedure:

The “Basal” LOWER CANOL interval was perforated on Mar 1st, 2013. The following day, a retrievable bridge plug, with tandem electronic recorders hung below, was run in hole (center element at 1767 mKB). Water injection was initiated to achieve formation breakdown. Injection continued for several more minutes after breakdown, including for a brief period after the bridge plug setting mechanism was activated (dynamic shut-in). The final water injection rate prior to shut-in was reported to be 14.4 m³/d (0.01 m³/min). The subsequent falloff was monitored for almost 19 days (~457 hrs). Another bridge plug was run in hole shortly thereafter. Completion and test operations were then carried out on the “Middle” and “Upper” intervals of the Lower Canol formation while the “Basal” interval falloff was in progress. After recovering the respective bridge plugs & recorders for each of the upper intervals, the bridge plugs immediately above the “Basal” interval were unset and recovered (including the recorders) on Mar 21st. The primary objectives of the mini-frac test were to obtain frac design and reservoir flow parameters. The analyses / results for the “Middle” and “Upper” intervals have been provided in separate reports.

The test data (injection & falloff) from the subject test was corrected to the mid-point of the perforations (MPP=1769.5 mKB) using an estimated water gradient of 9.8 kP/m.

Analysis:

The mini-frac test data was analyzed using traditional techniques. Diagnostic plots, such as the G-Function & Sqrt (t) plots, were utilized first to confirm the occurrence of fracture closure. For the subject zone, the diagnostic plots indicated closure after almost 6 hrs (or ~353 minutes) of shut-in. However, there wasn't any evidence of pseudo-radial flow on the derivative plot prior to the end of the test. Regardless, after-closure analysis, via Nolte & Soliman / Craig techniques, was then conducted in an attempt to obtain estimates for reservoir parameters. It is also noted that the terminal portion of the data indicated the presence of non-reservoir effects, most likely as a result of uphole operations. Therefore, this portion of the falloff data was not used in the analysis. The corresponding results / plots have been presented in this report.

Conclusions / Recommendations:

The test was only partially successful in satisfying the primary objectives set forth at the onset of the test program. Although closure was achieved, pseudo-radial flow was not reached prior to the end of the test. Therefore, the reported reservoir flow parameters ($k_o = 0.01$ mD, $P^* = 18.2$ MPaa) are considered maximum estimates and should be used with **caution**. Consequently, the overall confidence of the test results is considered to be poor. It is also noted that the oil permeability was calculated based on estimated values for frac height (5 m) & oil viscosity (50 °API oil with a viscosity of 0.28 mPa·s).

Analyzed by: Al Kassam

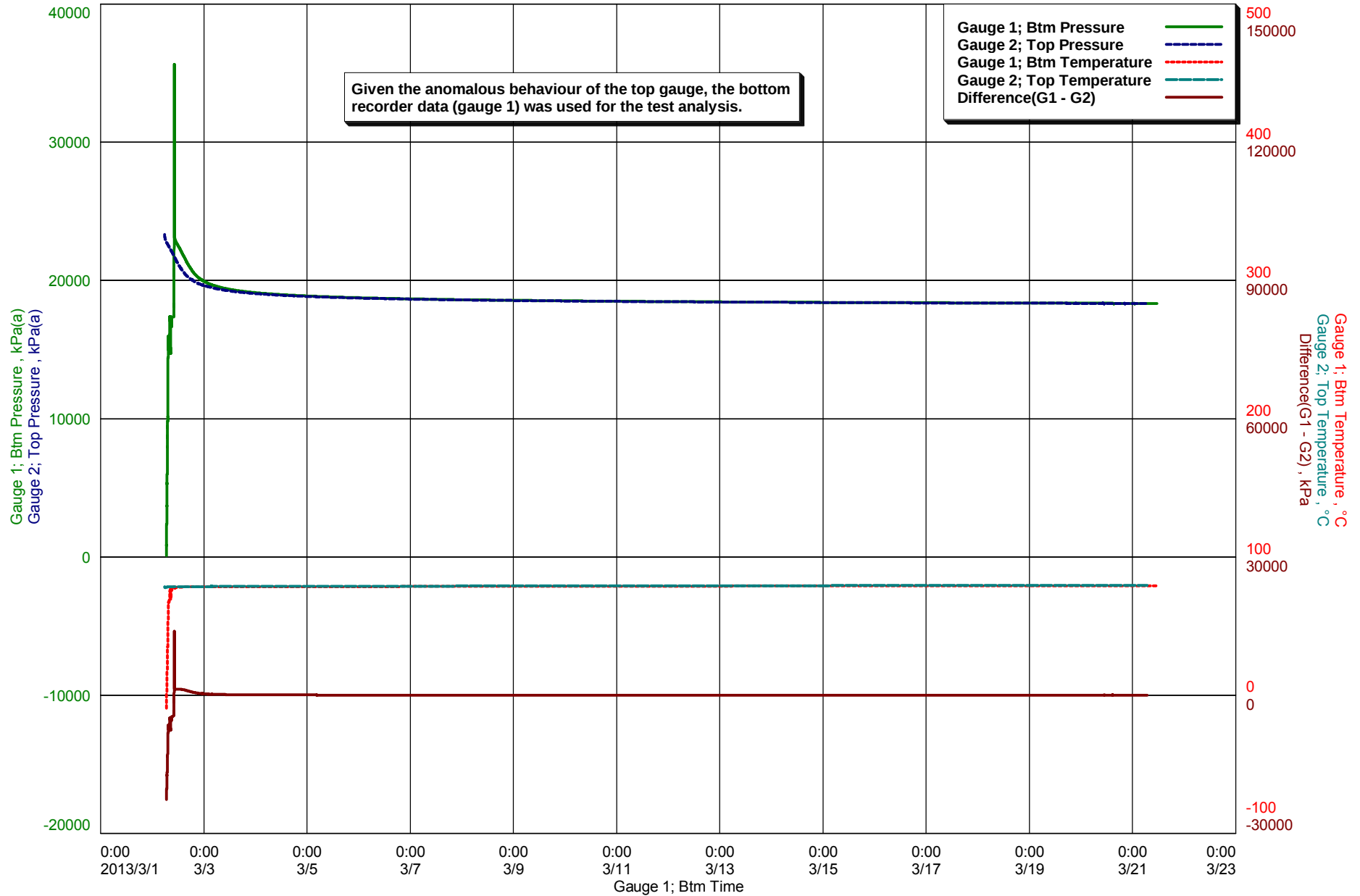
Report Date: May 3rd, 2013

Copy: Kim Clarke Alex Novgorodova Well File

O-06 65-10 127-00

Recorder Validation Plot

Formation: "Basal" Lower Canol



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COPRC Loon Creek
300/O-06- 65-10 127-00

Pressure @ MPP (1769.5 mKB) History

Basal Lower Canol (1769 - 1770 mKB)
DFIT (Mar 2 - 21, 2013)

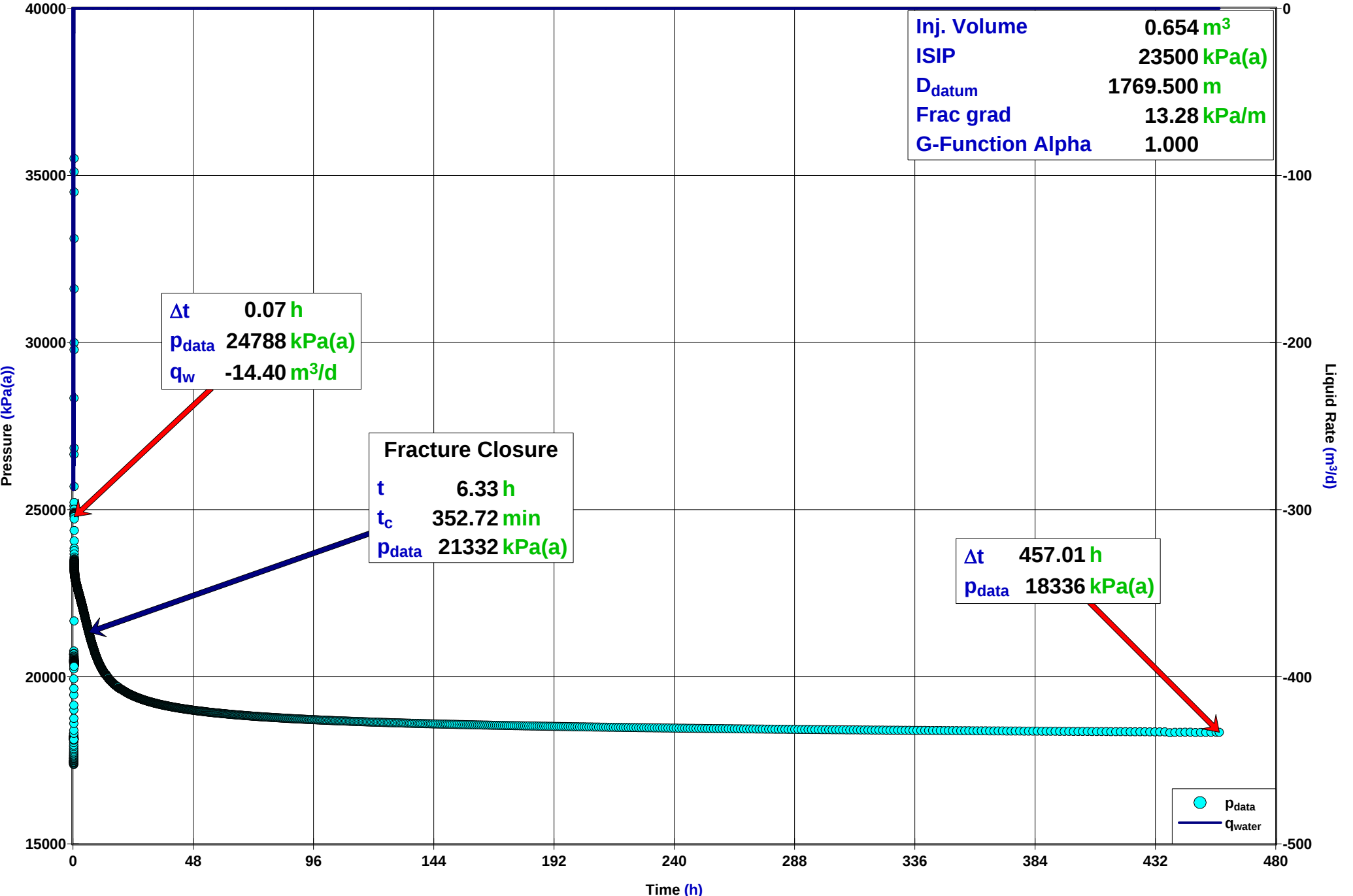
Inj. Volume	0.654 m ³
ISIP	23500 kPa(a)
D _{datum}	1769.500 m
Frac grad	13.28 kPa/m
G-Function Alpha	1.000

Δt 0.07 h
 p_{data} 24788 kPa(a)
 q_w -14.40 m³/d

Fracture Closure
 t 6.33 h
 t_c 352.72 min
 p_{data} 21332 kPa(a)

Δt 457.01 h
 p_{data} 18336 kPa(a)

p_{data}
 q_{water}



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COPRC Loon Creek
300/O-06- 65-10 127-00

Pressure @ MPP (1769.5 mKB)
History

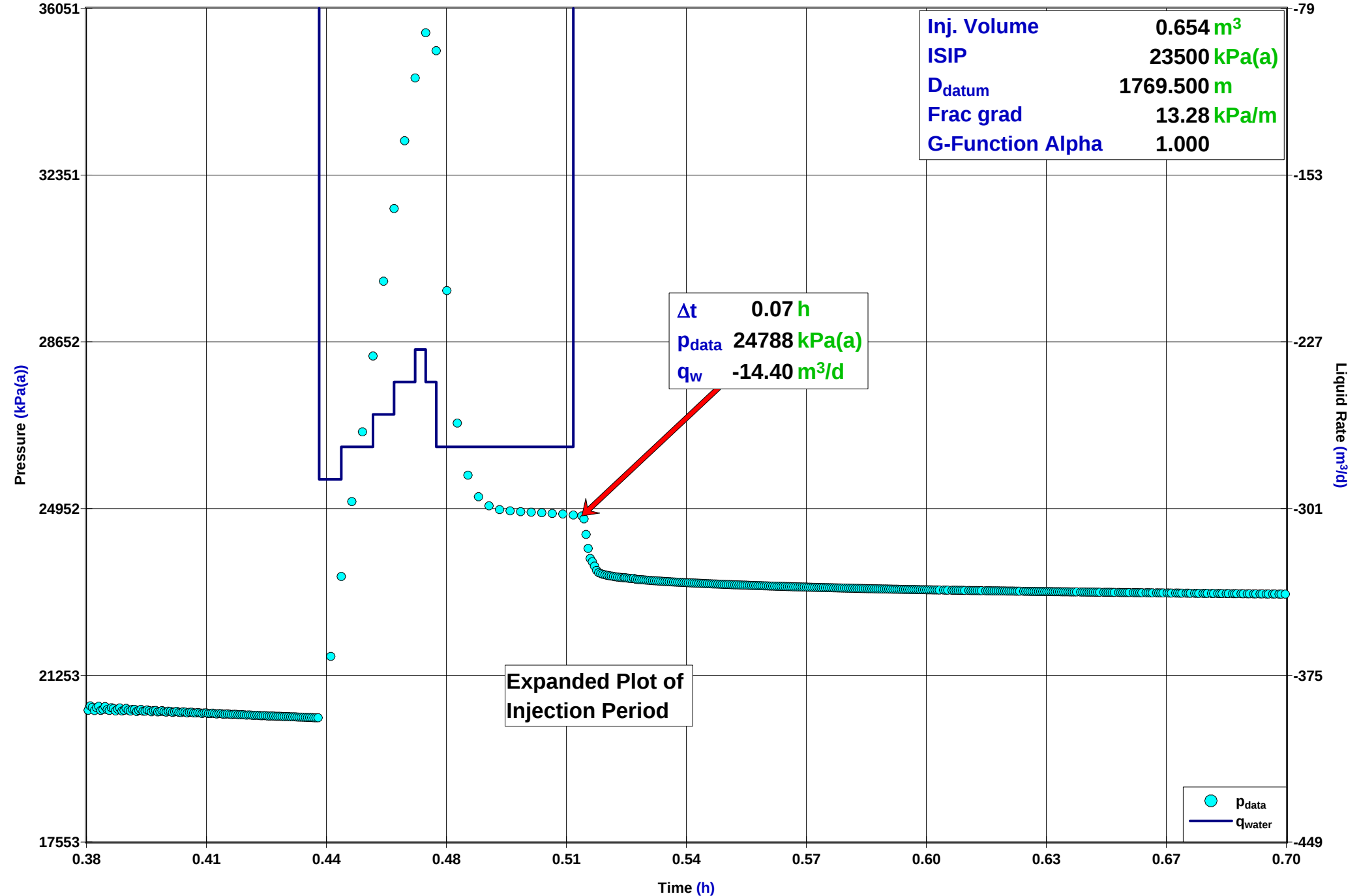
Basal Lower Canol (1769 - 1770 mKB)
DFIT (Mar 2 - 21, 2013)

Inj. Volume	0.654 m ³
ISIP	23500 kPa(a)
D _{datum}	1769.500 m
Frac grad	13.28 kPa/m
G-Function Alpha	1.000

Δt	0.07 h
p _{data}	24788 kPa(a)
q _w	-14.40 m ³ /d

Expanded Plot of
Injection Period

● p_{data}
— q_{water}

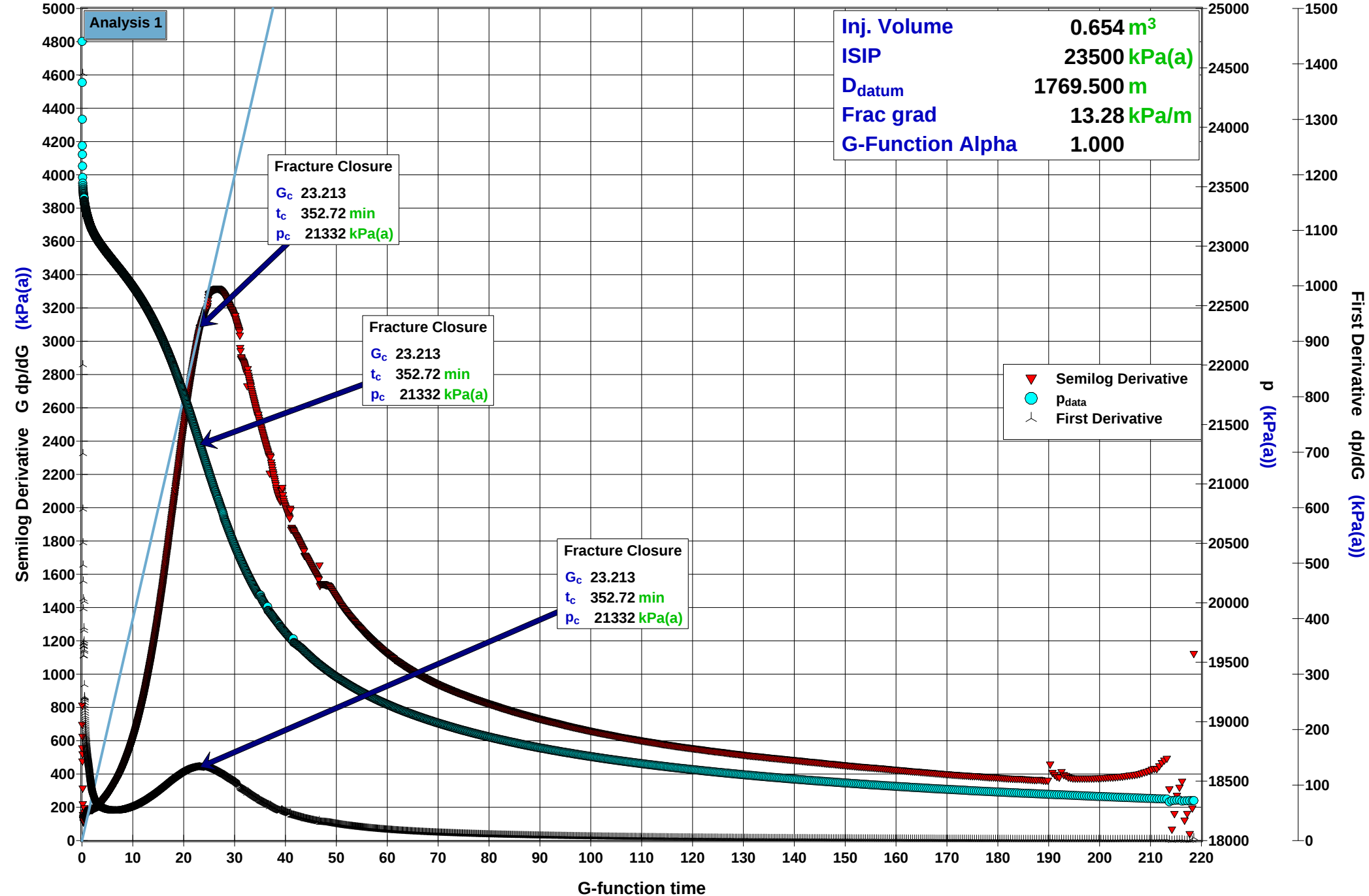


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300/O-06- 65-10 127-00

PCA Diagnostic 1 G-Function

Basal Lower Canol (1769 - 1770 mKB)
DFIT (Mar 2 - 21, 2013)



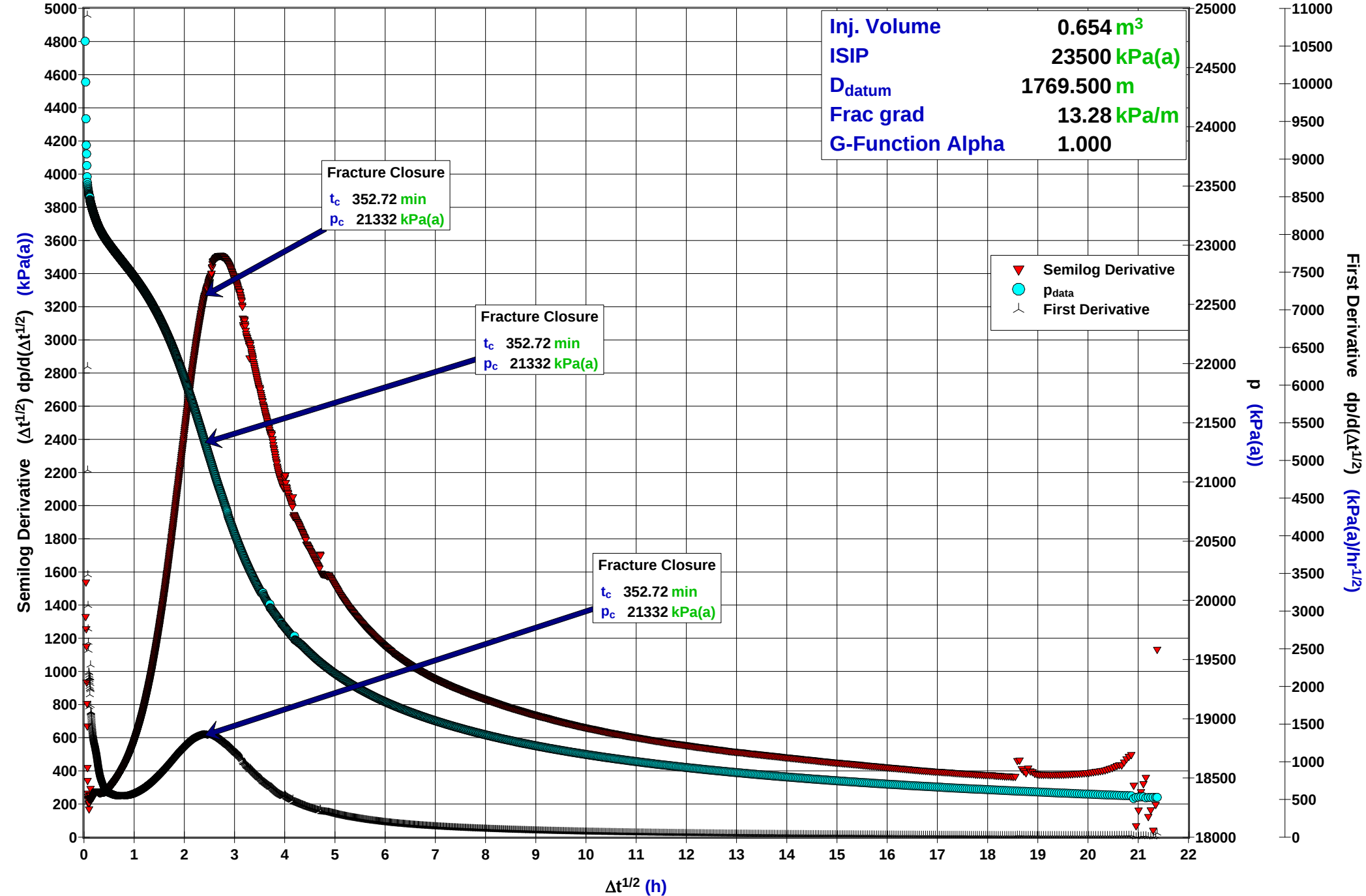
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300/O-06- 65-10 127-00

PCA Diagnostic 1
MiniFrac Sqrt(t)

Basal Lower Canol (1769 - 1770 mKB)
DFIT (Mar 2 - 21, 2013)

Inj. Volume	0.654 m ³
ISIP	23500 kPa(a)
D _{datum}	1769.500 m
Frac grad	13.28 kPa/m
G-Function Alpha	1.000

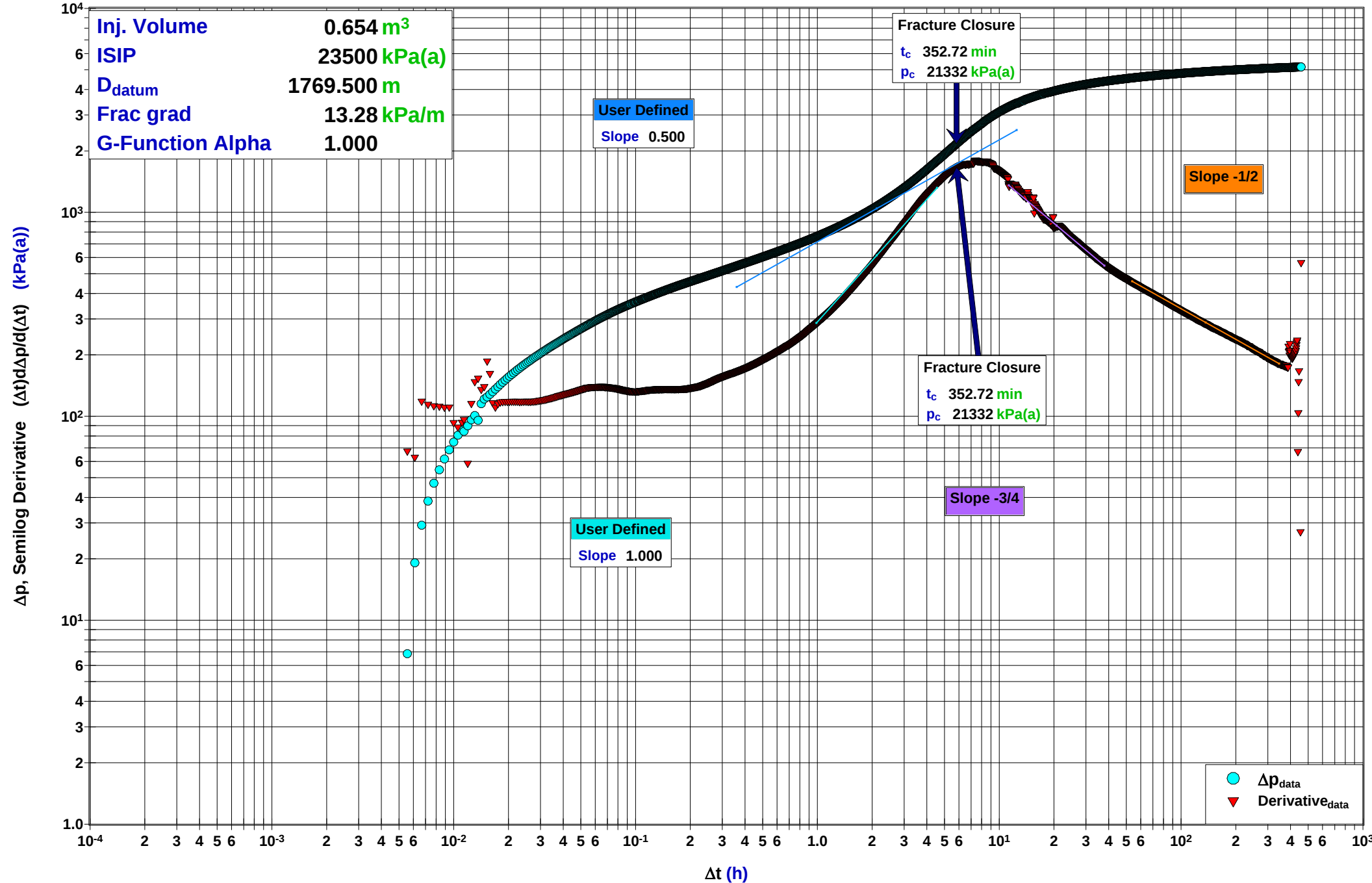


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PCA Diagnostic 1
Derivative

COPRC Loon Creek
300/O-06- 65-10 127-00

Basal Lower Canol (1769 - 1770 mKB)
DFIT (Mar 2 - 21, 2013)



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PCA Diagnostic 1

Input Data

Injected Volume 0.654 m³
Datum Depth 1769.500 m

Results

ISIP 23500 kPa(a)
Fracture Gradient 13.28 kPa/m

Closure Marker 1

Closure time (t_c) 5.8786 h
Closure pressure (p_c) 21332 kPa(a)
Net Frac Press (Δp_{net}) 2168 kPa
G-Function at Closure (G_c) 23.213
Fluid Efficiency (η) 92.07 %

Closure Marker 2

Closure time (t_c) 5.8786 h
Closure pressure (p_c) 21332 kPa(a)
Net Frac Press (Δp_{net}) 2168 kPa
G-Function at Closure (G_c) 23.213
Fluid Efficiency (η) 92.07 %

Fluid Properties

Oil Gravity (γ_o) 50.0 °API
Bubble Point Pressure (p_{bp}) 17488 kPa(a)
Oil Formation Volume Factor (B_o) 1.498
Oil Viscosity (μ_o) 0.2839 mPa.s
Oil Compressibility (c_o) 3.2157e-06 1/kPa
Solution Gas Ratio (R_s) 148.61 m³/m³

Reservoir Properties

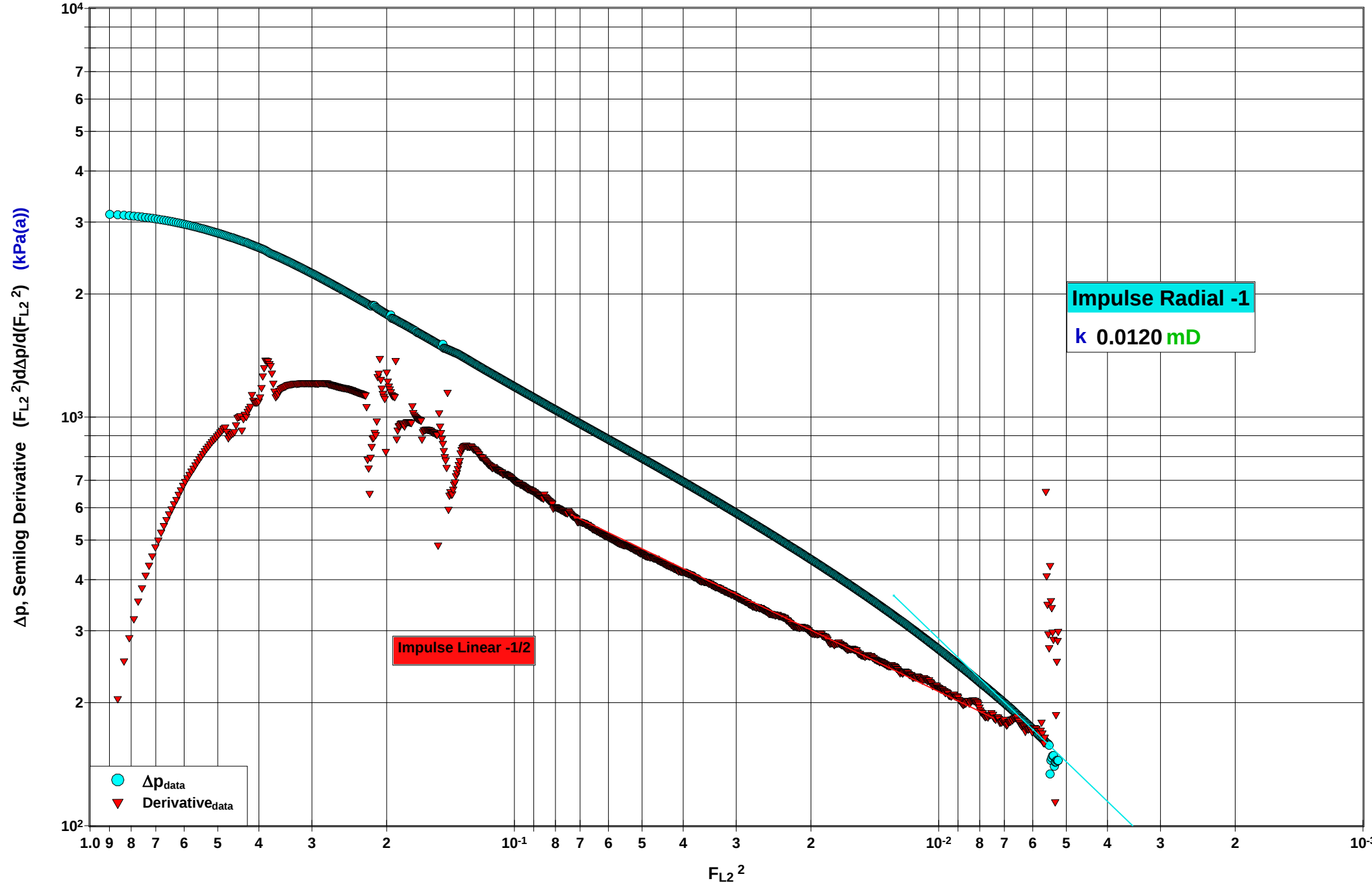
Reservoir Temperature (T_{resv}) 79.2 °C
Reservoir Pressure (p_{resv}) 17495 kPa(a)

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Nolte ACA 1
Derivative

Basal Lower Canol (1769 - 1770 mKB)
DFIT (Mar 2 - 21, 2013)

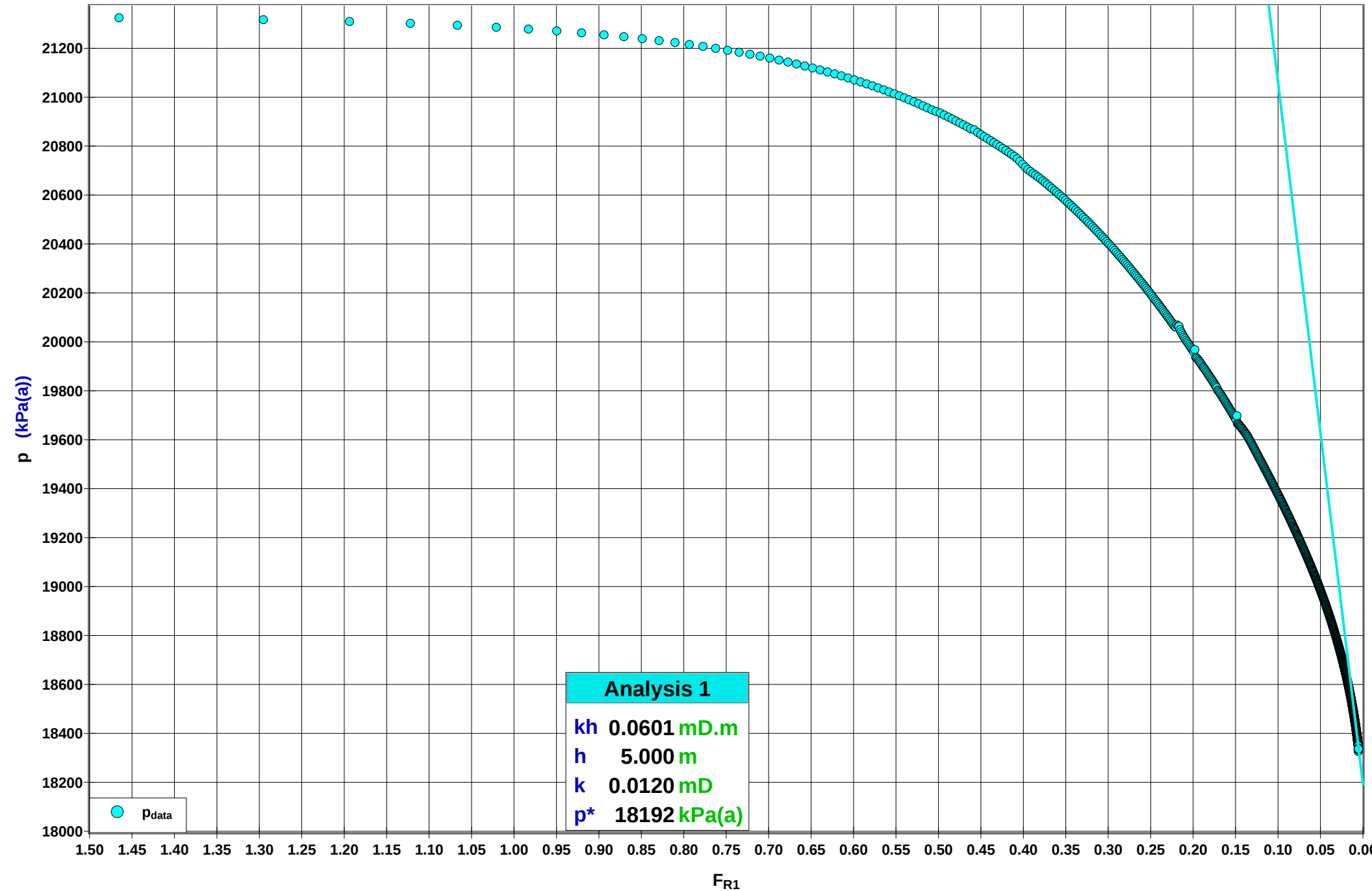


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300/O-06- 65-10 127-00

Nolte ACA 1
Minifrac Radial (Nolte)

Basal Lower Canol (1769 - 1770 mKB)
DFIT (Mar 2 - 21, 2013)

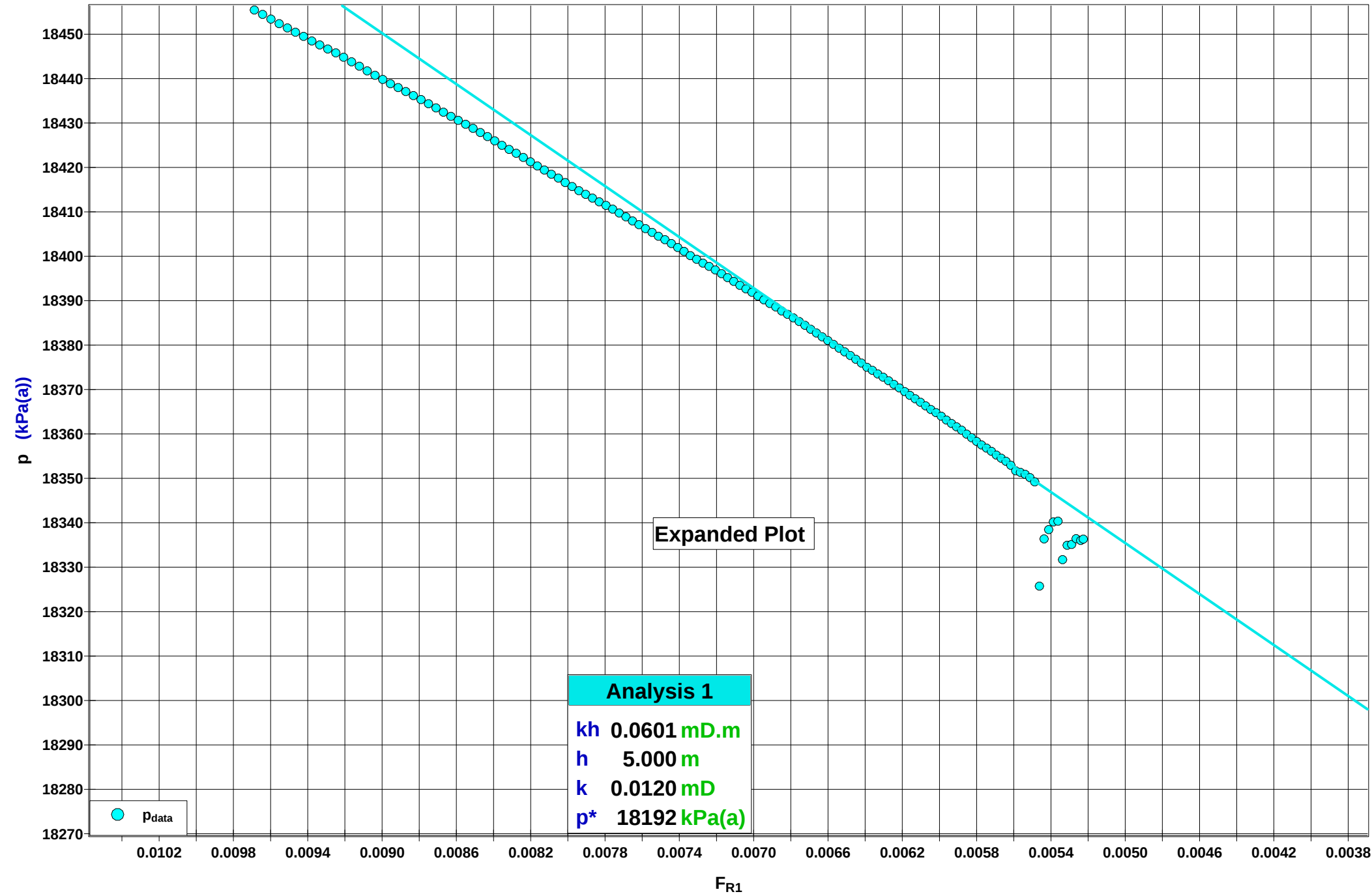


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COPRC Loon Creek
300/O-06- 65-10 127-00

Nolte ACA 1
Minifrac Radial (Nolte)

Basal Lower Canol (1769 - 1770 mKB)
DFIT (Mar 2 - 21, 2013)



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Nolte ACA 1

Linear Analysis (FL)

Flow Capacity (kh)	mD.m
Effective Permeability (k)	mD
Extrapolated Pressure (p*)	18036 kPa(a)
Closure Pressure (pc)	kPa(a)
Reservoir Leakoff Coefficient (CR)	m/min ^{1/2}
Total Leakoff Coefficient (CT)	m/min ^{1/2}

Radial Analysis (FR)

Flow Capacity (kh)	0.06008 mD.m
Effective Permeability (k)	0.0120 mD
Extrapolated Pressure (p*)	18192 kPa(a)

Input Parameters

Estimated Initial Pressure (p _i)	18192 kPa(a)
Closure time (t _c)	352.72 min

Fluid Properties

Oil Gravity (γ _o)	50.0 °API
Bubble Point Pressure (p _{bp})	17488 kPa(a)
Oil Formation Volume Factor (B _o)	1.498
Oil Viscosity (μ _o)	0.2839 mPa.s
Oil Compressibility (c _o)	3.2157e-06 1/kPa
Solution Gas Ratio (R _s)	148.61 m ³ /m ³

Reservoir Properties

Reservoir Temperature (T _{resv})	79.2 °C
Reservoir Pressure (p _{resv})	17495 kPa(a)
Net Pay (h)	5.000 m
Total Porosity (φ _t)	15.00 %
Gas Saturation (S _g)	0.00 %
Oil Saturation (S _o)	87.00 %
Water Saturation (S _w)	13.00 %
Formation Compressibility (c _f)	5.9600e-07 1/kPa
Total Compressibility (c _t)	3.4506e-06 1/kPa

OIL MINI-FRAC ANALYSIS

WELL NAME: **COPRC Loon Creek**
 WELL LOCATION:
 Bottomhole Location: **300/O-06 65-10 127-00**
 Surface Location: 300/O-06 65-10 127-00
 Well License #: **470**

ZONE: **"MIDDLE" LOWER CANOL**

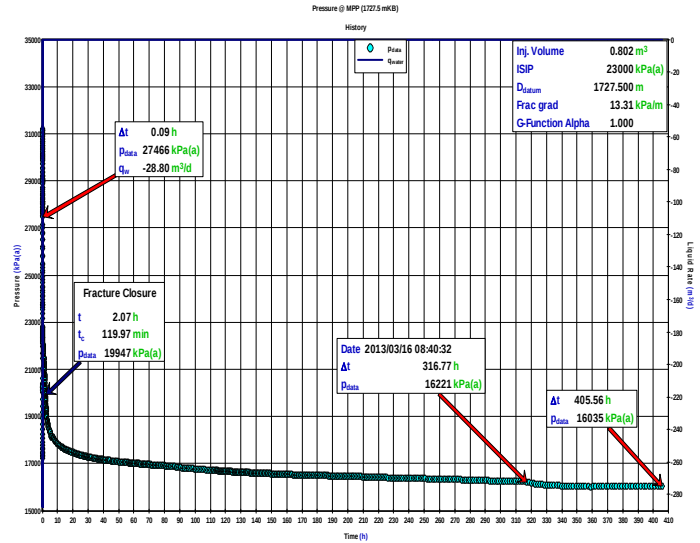
COST CENTRE: **10345055**

TEST DATE: **Mar 3 – 20, 2013**

STAGE OF WELL TEST: **Post-Perf Inj-Falloff**

ORIENTATION: **Vertical**

TYPE/SIZE OF STIMULATION: **N/A**



Reservoir Properties

Injection Interval: 1727 – 1728 mKB		
Frac Height (h): 5 m (Estimate)	Porosity (ϕ): 11 %	Water Saturation (S_w): 22 %
Oil Gravity: 50 °API (Estimate)	H ₂ S Content: 0 %	BHT: 77.3 °C

Injection Data

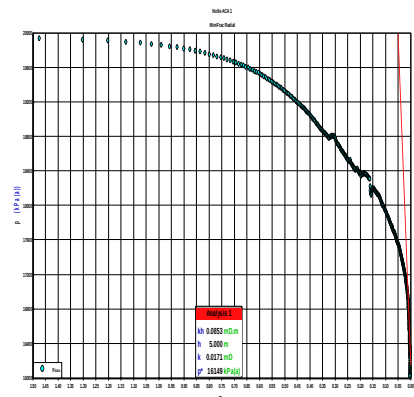
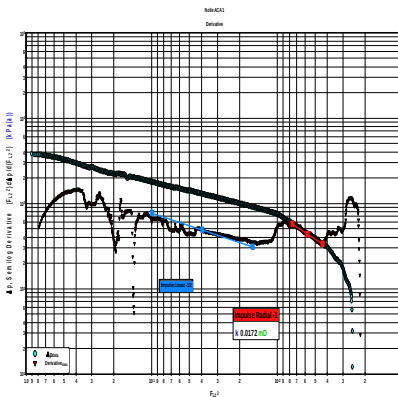
Test	Time	Final Rates				Final Pressures		
		Gas	New Oil	New H ₂ O	Load	Tubing	Casing	BHP
	Hours	e ³ m ³ /d	m ³ /d	m ³ /d	m ³ /d	kPag	kPag	kPaa
Injection	0.1	---	---	---	28.8	N/A	0	27466
Shut-In	405.6	---	---	---	0	N/A	0	16035

Injection Summary

New Fluid (m ³)				Load Fluid (m ³)		Remaining Load (m ³)	
Gas (E ³ M ³)	Gas (MSCF)	Cond (m ³)	Water (m ³)	Oil (m ³)	Water (m ³)	Oil (m ³)	Water (m ³)
---	---	---	---	0	0.8	0	0.8

Pressure Transient Analysis Results Summary

Analysis Results	
P*	16149 kPaa
(kh/ μ) _o	0.28 mD·m/mPa·s
(kh) _o	0.09 mD·m
k _o	0.02 mD



Discussion

Test Procedure:

A segregated post-perf mini-frac test was conducted on the “Basal” Lower Canol interval. This interval was subsequently isolated below bridge plugs. On Mar 3rd, 2013, the “Middle” LOWER CANOL interval was perforated. A retrievable bridge plug, with tandem electronic recorders hung below, was run in hole (center element at 1723 mKB). Water injection was initiated to achieve formation breakdown. Injection continued for several more minutes after breakdown, including for a brief period after the bridge plug setting mechanism was activated (dynamic shut-in). The final water injection rate prior to shut-in was reported to be 28.8 m³/d (0.02 m³/min). The subsequent falloff was monitored for almost 17 days (~406 hrs). On Mar 20th, the bridge plug (including the recorders) was unset and recovered. The primary objectives of the mini-frac test were to obtain frac design and reservoir flow parameters. It is noted that upon isolating this interval, operations were conducted to carry out a mini-frac test on the “Upper” Lower Canol. The analyses / results for each of the zones have been provided in separate reports.

The test data (injection & falloff) from the subject test was corrected to the mid-point of the perforations (MPP=1727.5 mKB) using an estimated water gradient of 9.8 kP/m.

Analysis:

The mini-frac test data was analyzed using traditional techniques. Diagnostic plots, such as the G-Function & Sqrt (t) plots, were utilized first to confirm the occurrence of fracture closure. For the subject zone, the diagnostic plots indicated closure after about 120 minutes of shut-in. After-closure analysis, via Nolte & Soliman / Craig techniques, was then conducted to obtain estimates for reservoir parameters. It is noted that although the derivative data was relatively noisy, the late-time data suggested evidence of pseudo-radial flow. However, the final almost 4 days of the falloff data was deemed unusable as a result of non-reservoir effects (uphole operations). It is also noted that one of the plugs (Basal interval top plug) was tagged at a depth lower (~4m) than it was set at. Therefore, it is speculated that this movement may have caused and / or contributed to the pressure anomaly observed starting on Mar 16th @ ~9AM. Consequently, the terminal portion of the falloff data was not analyzed. The corresponding results / plots have been presented in this report.

Conclusions / Recommendations:

The test was successful in satisfying the primary objectives set forth at the onset of the test program. The test results suggested an effective permeability to oil of 0.02 mD. However, it is noted that this oil permeability was calculated based on estimated values for frac height (5 m) & oil viscosity (50 °API oil with a viscosity of 0.30 mPa·s).

The corresponding extrapolated reservoir pressure was determined to be about 16.1 MPaa.

The overall confidence of the test results is considered to be fair.

Analyzed by: Al Kassam

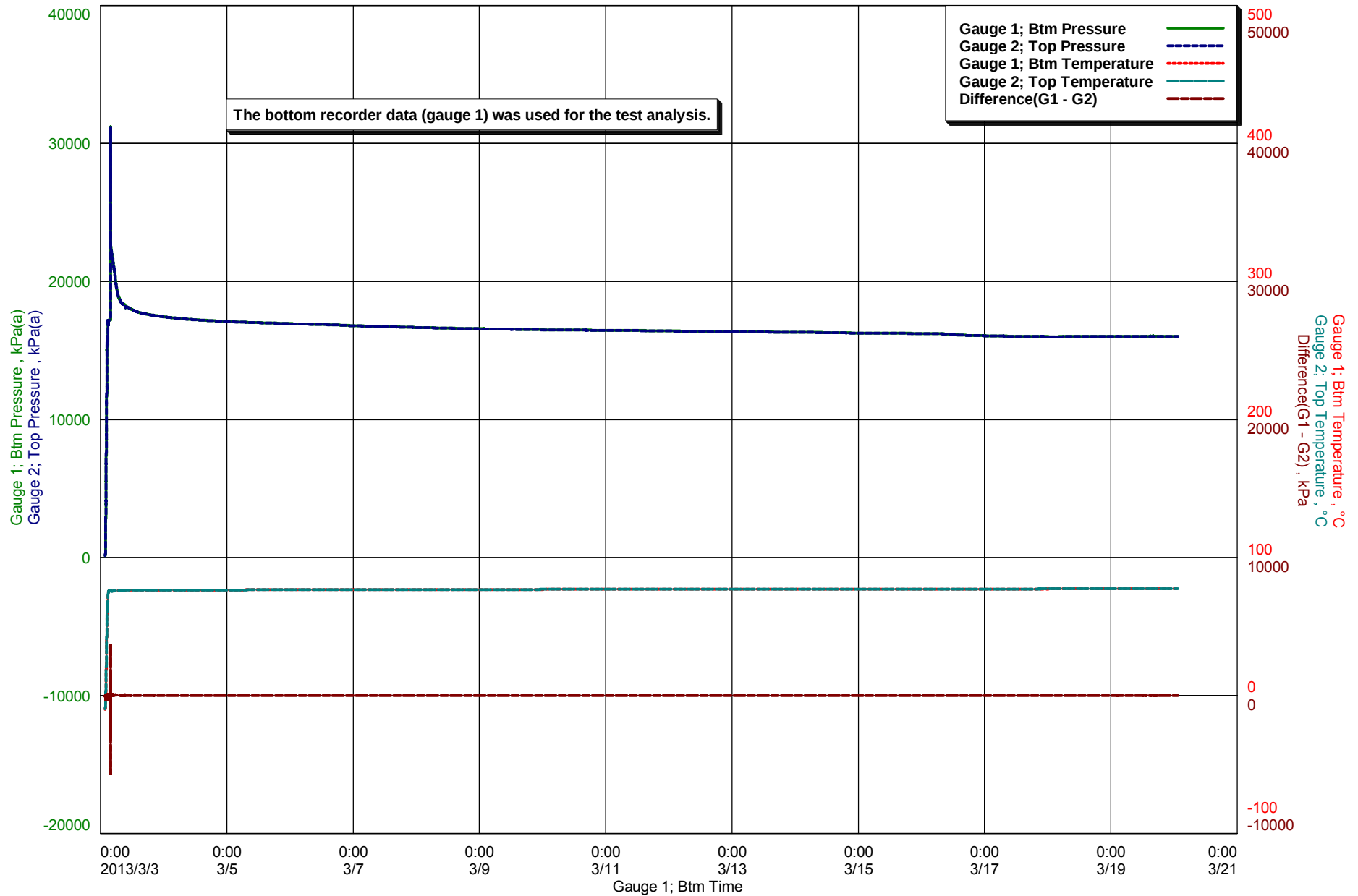
Report Date: May 3rd, 2013

Copy: Kim Clarke Alex Novgorodova Well File

O-06 65-10 127-00

Recorder Validation Plot

Formation: "Middle" Lower Canol

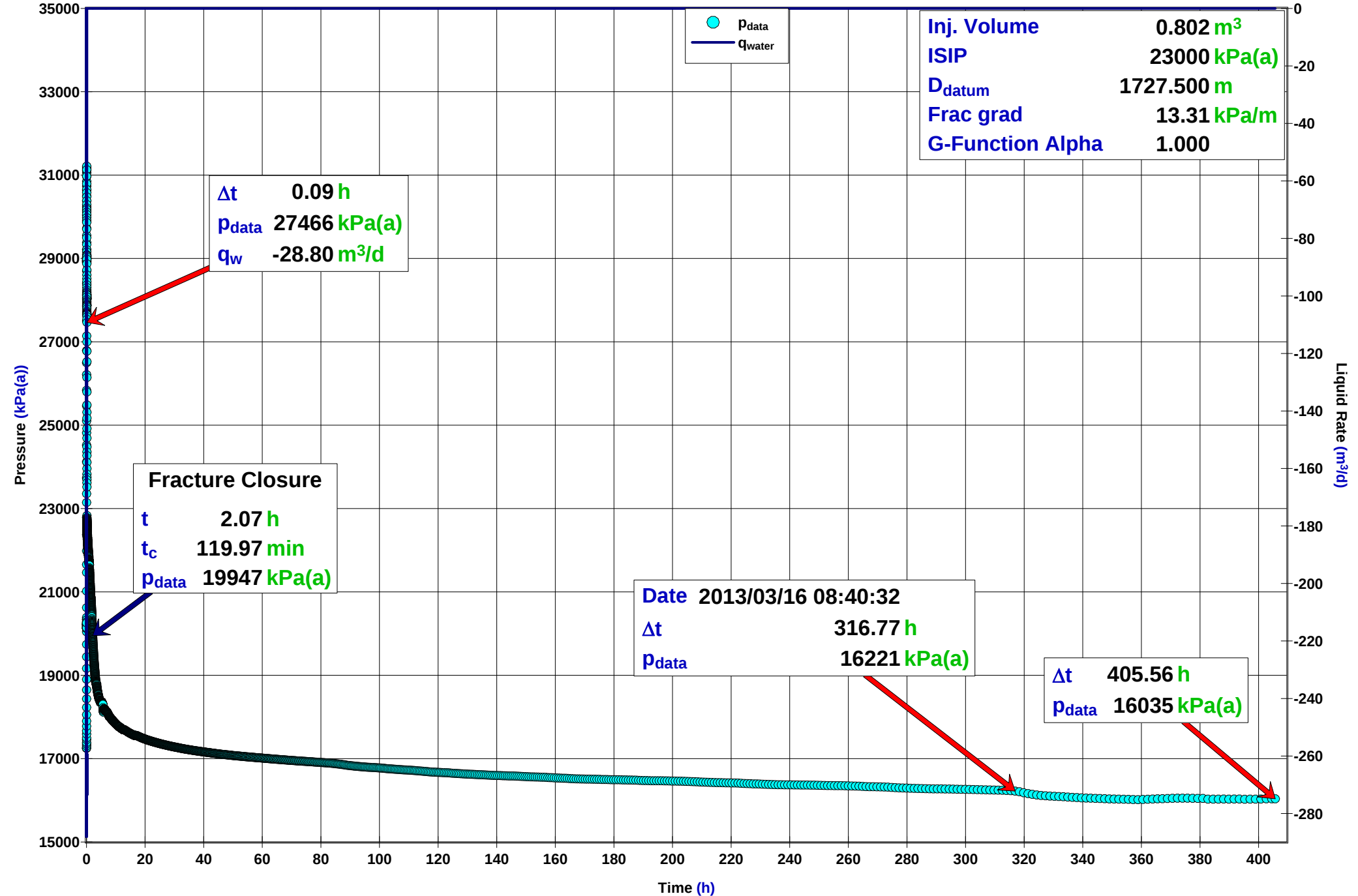


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COPRC Loon Creek
300/O-06 65-10 127-00

Pressure @ MPP (1727.5 mKB) History

Middle Lower Canol (1727 - 1728 mKB)
DFIT (Mar 3 - 20, 2013)

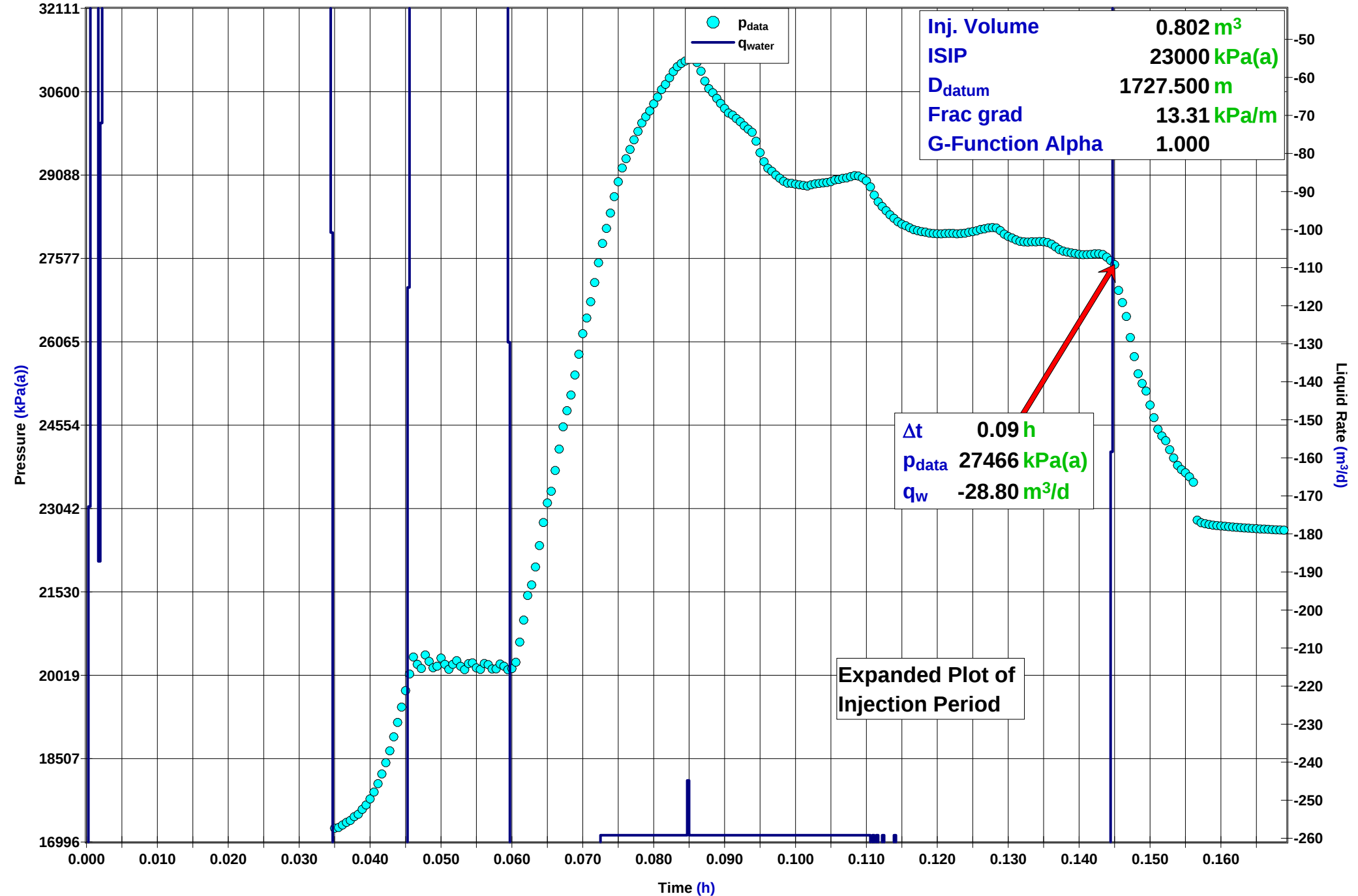


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COPRC Loon Creek
300/O-06 65-10 127-00

Pressure @ MPP (1727.5 mKB)
History

Middle Lower Canol (1727 - 1728 mKB)
DFIT (Mar 3 - 20, 2013)

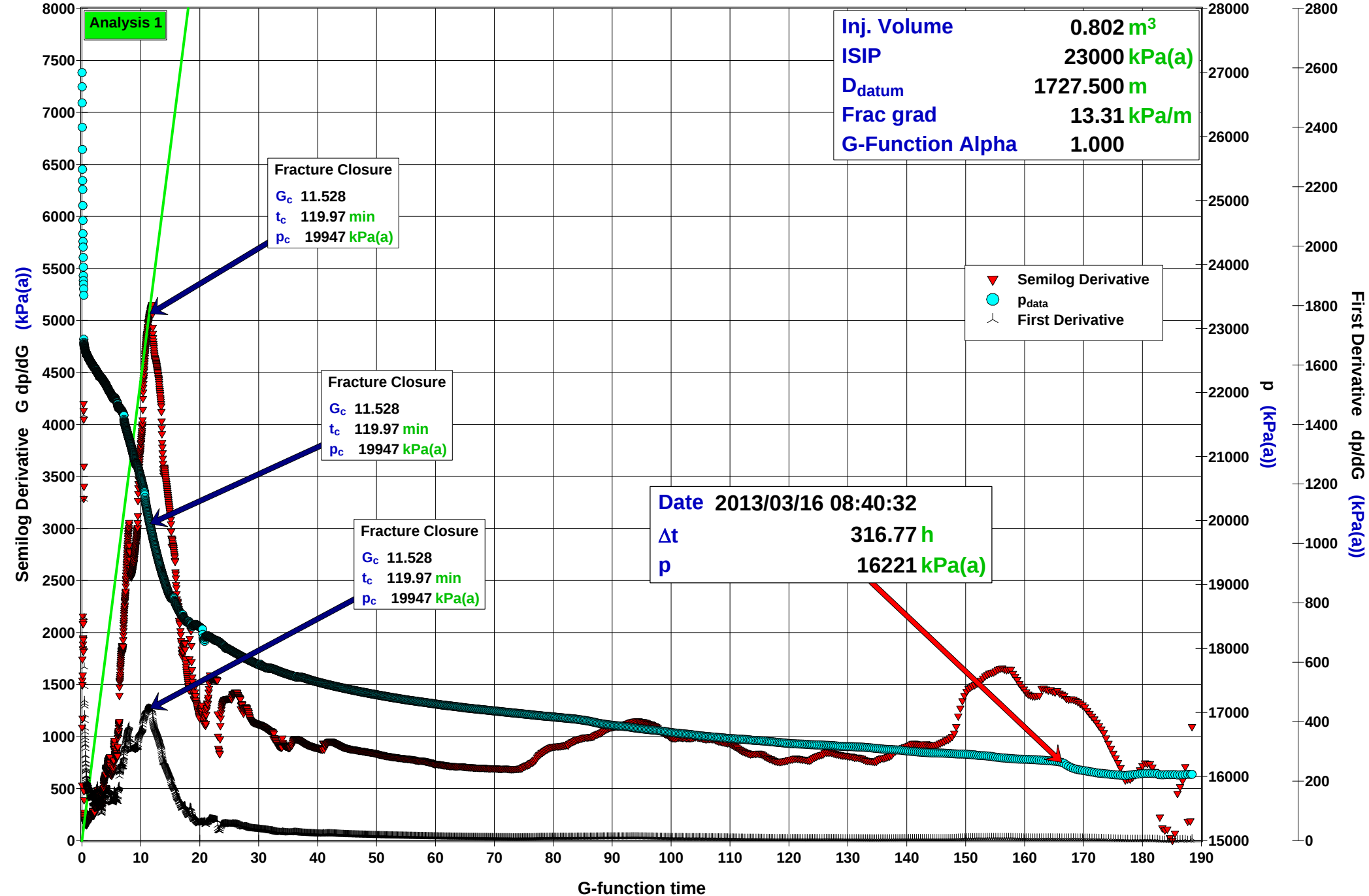


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PCA Diagnostic 1
G-Function

COPRC Loon Creek
300/O-06 65-10 127-00

Middle Lower Canol (1727 - 1728 mKB)
DFIT (Mar 3 - 20, 2013)

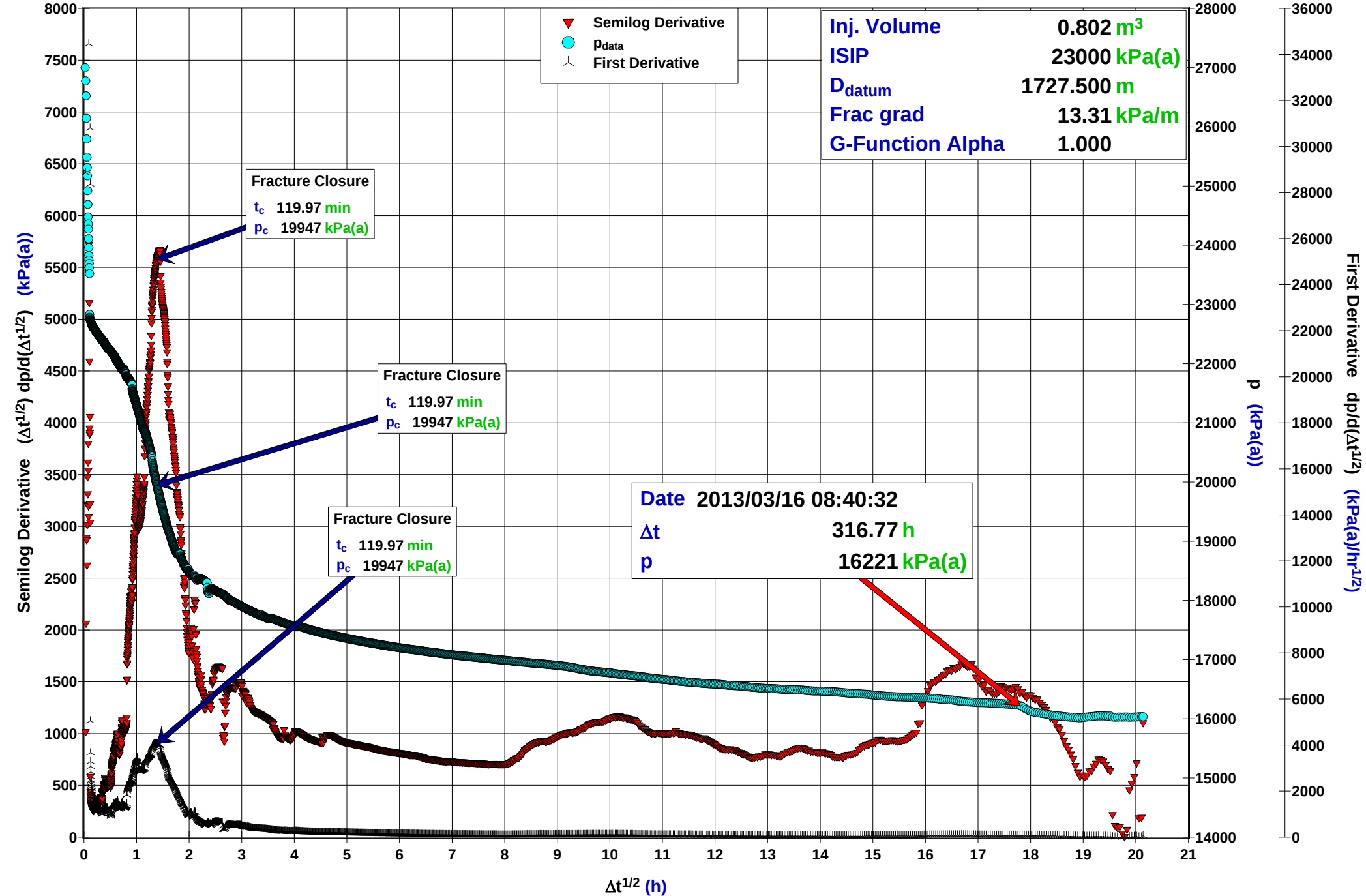


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COPRC Loon Creek
300/O-06 65-10 127-00

PCA Diagnostic 1
MiniFrac Sqrt(t)

Middle Lower Canol (1727 - 1728 mKB)
DFIT (Mar 3 - 20, 2013)

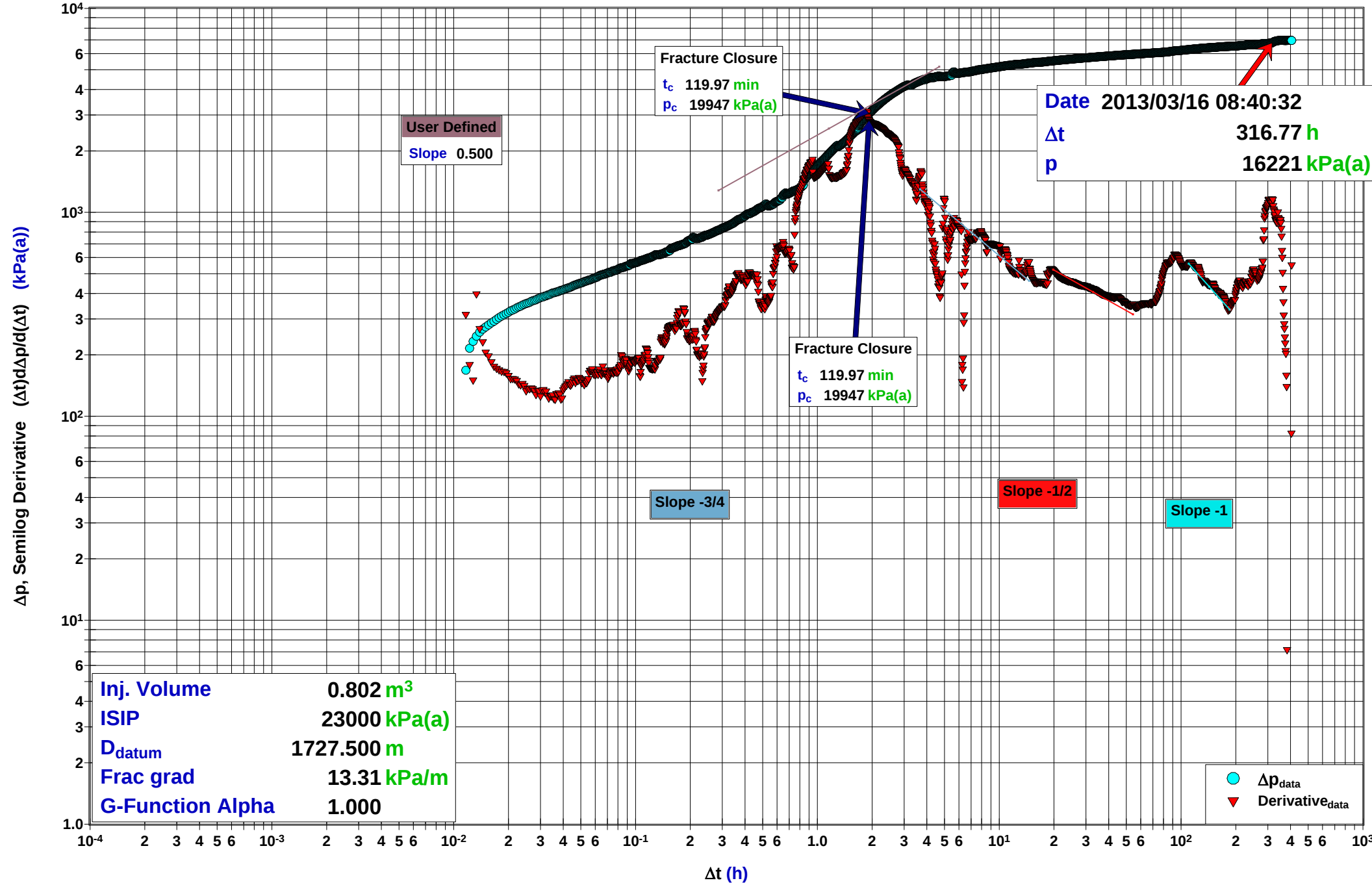


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COPRC Loon Creek
300/O-06 65-10 127-00

PCA Diagnostic 1 Derivative

Middle Lower Canol (1727 - 1728 mKB)
DFIT (Mar 3 - 20, 2013)



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PCA Diagnostic 1

Input Data

Injected Volume 0.802 m³
Datum Depth 1727.500 m

Results

ISIP 23000 kPa(a)
Fracture Gradient 13.31 kPa/m

Closure Marker 1

Closure time (t_c) 1.9994 h
Closure pressure (p_c) 19947 kPa(a)
Net Frac Press (Δp_{net}) 3053 kPa
G-Function at Closure (G_c) 11.528
Fluid Efficiency (η) 85.22 %

Closure Marker 2

Closure time (t_c) 1.9994 h
Closure pressure (p_c) 19947 kPa(a)
Net Frac Press (Δp_{net}) 3053 kPa
G-Function at Closure (G_c) 11.528
Fluid Efficiency (η) 85.22 %

Fluid Properties

Oil Gravity (γ_o) 50.0 °API
Bubble Point Pressure (p_{bp}) 16028 kPa(a)
Oil Formation Volume Factor (B_o) 1.460
Oil Viscosity (μ_o) 0.3004 mPa.s
Oil Compressibility (c_o) 3.2390e-06 1/kPa
Solution Gas Ratio (R_s) 135.38 m³/m³

Reservoir Properties

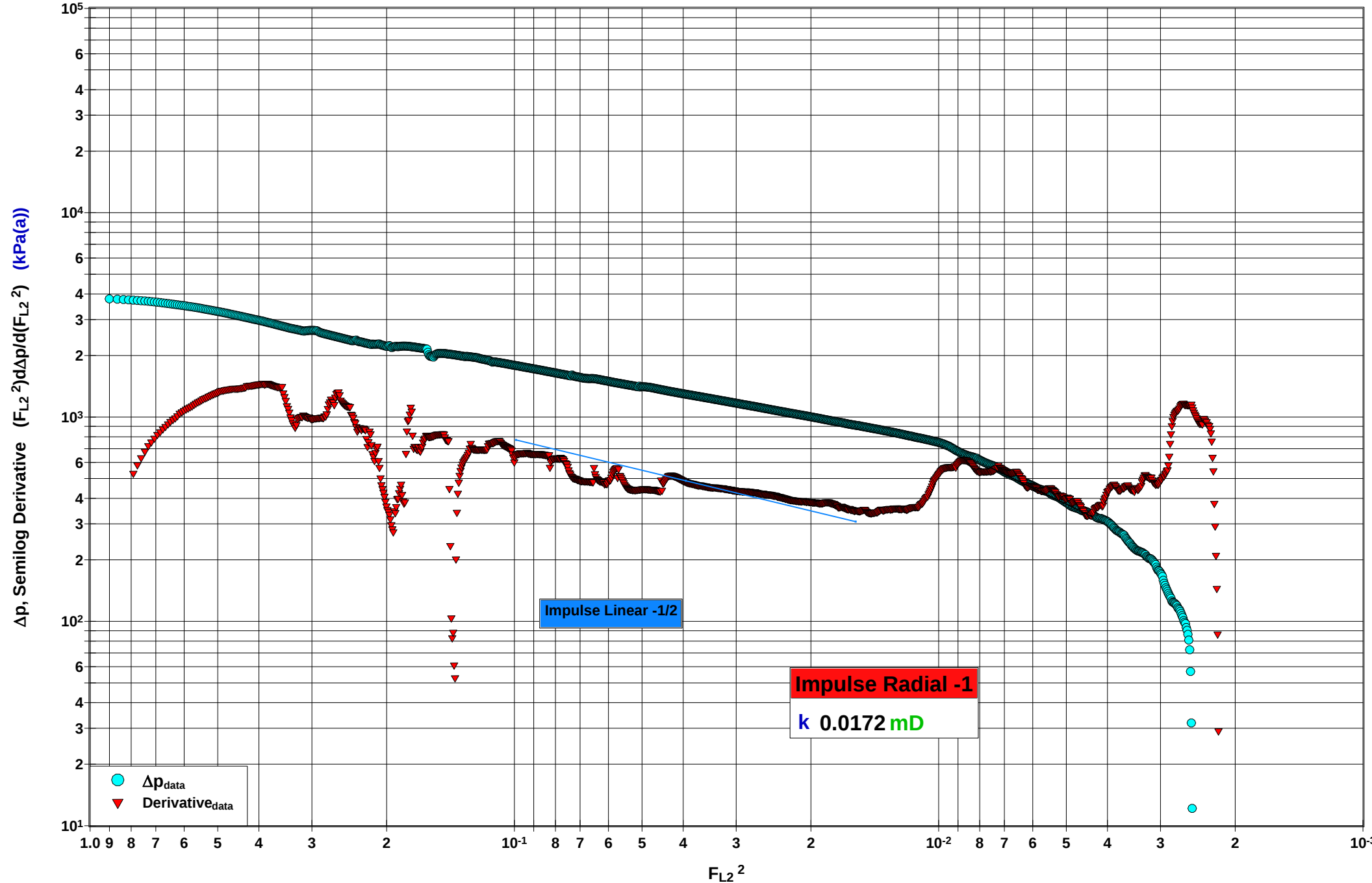
Reservoir Temperature (T_{resv}) 77.3 °C
Reservoir Pressure (p_{resv}) 16035 kPa(a)

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COPRC Loon Creek
300/O-06 65-10 127-00

Nolte ACA 1
Derivative

Middle Lower Canol (1727 - 1728 mKB)
DFIT (Mar 3 - 20, 2013)

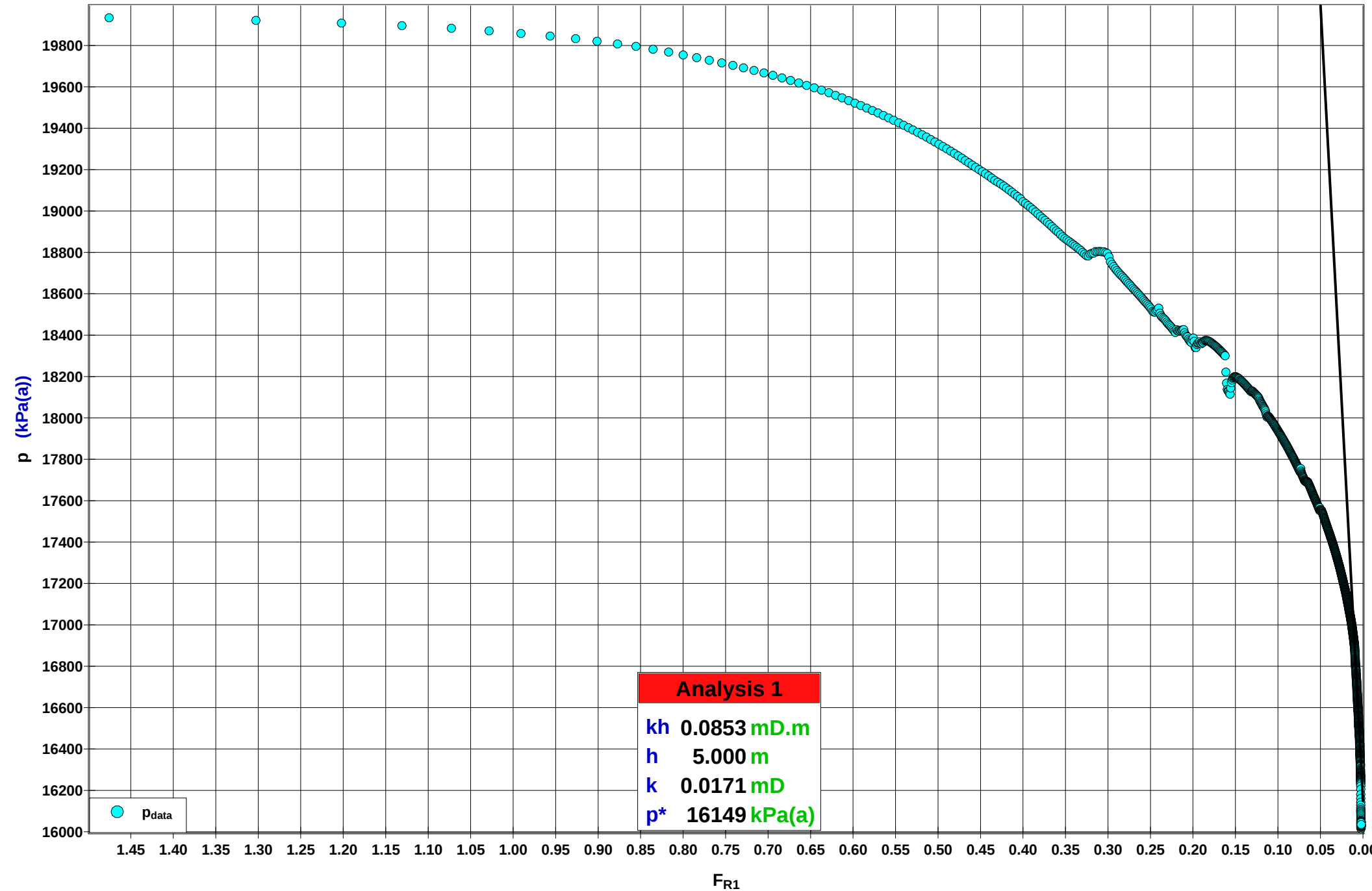


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COPRC Loon Creek
300/O-06 65-10 127-00

Nolte ACA 1
MiniFrac Radial

Middle Lower Canol (1727 - 1728 mKB)
DFIT (Mar 3 - 20, 2013)

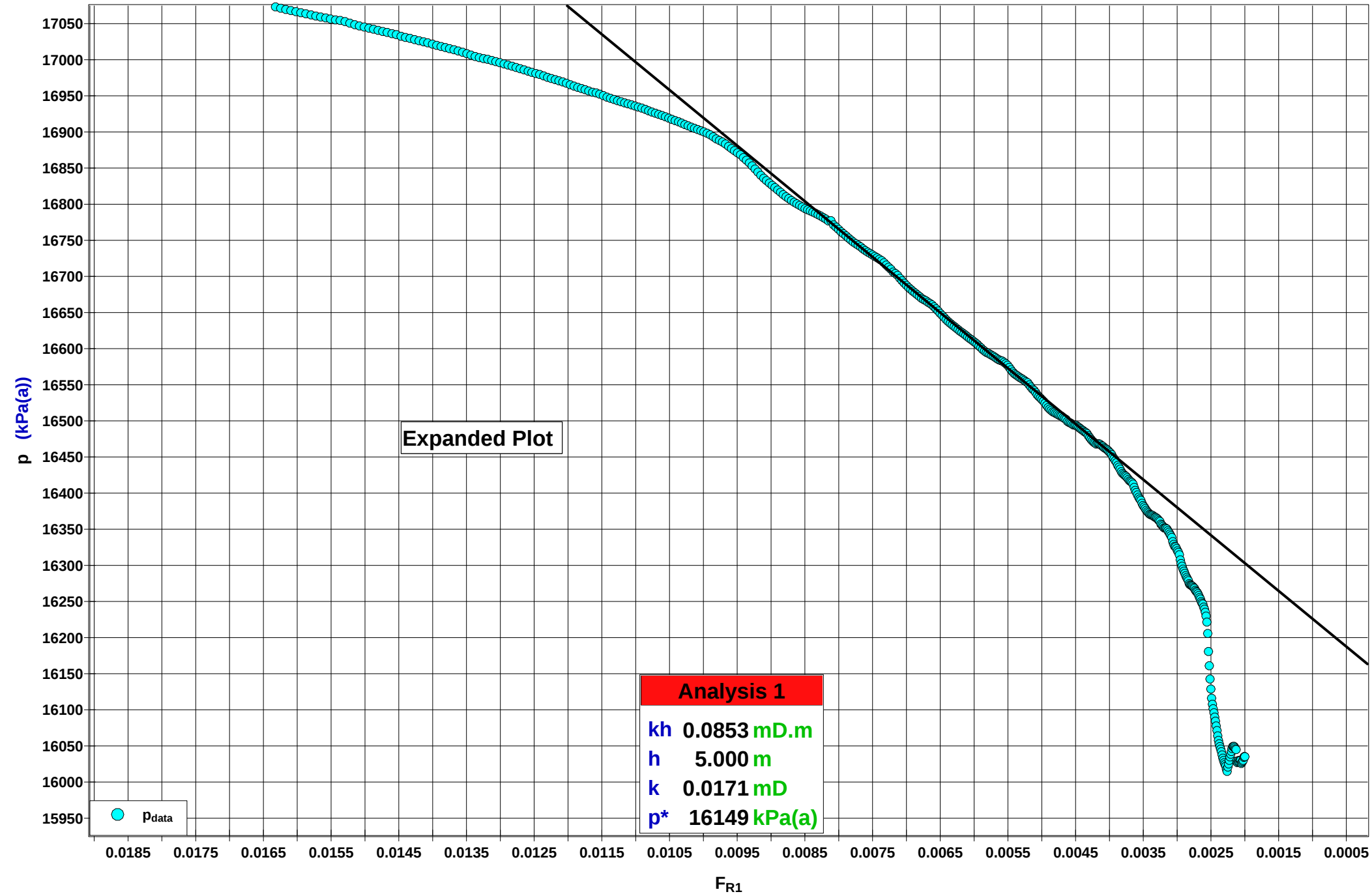


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COPRC Loon Creek
300/O-06 65-10 127-00

Nolte ACA 1
MiniFrac Radial

Middle Lower Canol (1727 - 1728 mKB)
DFIT (Mar 3 - 20, 2013)



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Nolte ACA 1

Linear Analysis (FL)

Flow Capacity (kh)	mD.m
Effective Permeability (k)	mD
Extrapolated Pressure (p*)	16460 kPa(a)
Closure Pressure (pc)	kPa(a)
Reservoir Leakoff Coefficient (CR)	m/min ^{1/2}
Total Leakoff Coefficient (CT)	m/min ^{1/2}

Radial Analysis (FR)

Flow Capacity (kh)	0.08529 mD.m
Effective Permeability (k)	0.0171 mD
Extrapolated Pressure (p*)	16149 kPa(a)

Input Parameters

Estimated Initial Pressure (p _i)	16149 kPa(a)
Closure time (t _c)	119.97 min

Fluid Properties

Oil Gravity (γ _o)	50.0 °API
Bubble Point Pressure (p _{bp})	16028 kPa(a)
Oil Formation Volume Factor (B _o)	1.460
Oil Viscosity (μ _o)	0.3004 mPa.s
Oil Compressibility (c _o)	3.2390e-06 1/kPa
Solution Gas Ratio (R _s)	135.38 m ³ /m ³

Reservoir Properties

Reservoir Temperature (T _{resv})	77.3 °C
Reservoir Pressure (p _{resv})	16035 kPa(a)
Net Pay (h)	5.000 m
Total Porosity (φ _t)	11.00 %
Gas Saturation (S _g)	0.00 %
Oil Saturation (S _o)	78.00 %
Water Saturation (S _w)	22.00 %
Formation Compressibility (c _f)	6.7787e-07 1/kPa
Total Compressibility (c _t)	3.3008e-06 1/kPa

OIL MINI-FRAC ANALYSIS

WELL NAME: **COPRC Loon Creek**
 WELL LOCATION:
 Bottomhole Location: **300/O-06 65-10 127-00**
 Surface Location: 300/O-06 65-10 127-00
 Well License #: **470**

ZONE: **"UPPER" LOWER CANOL**

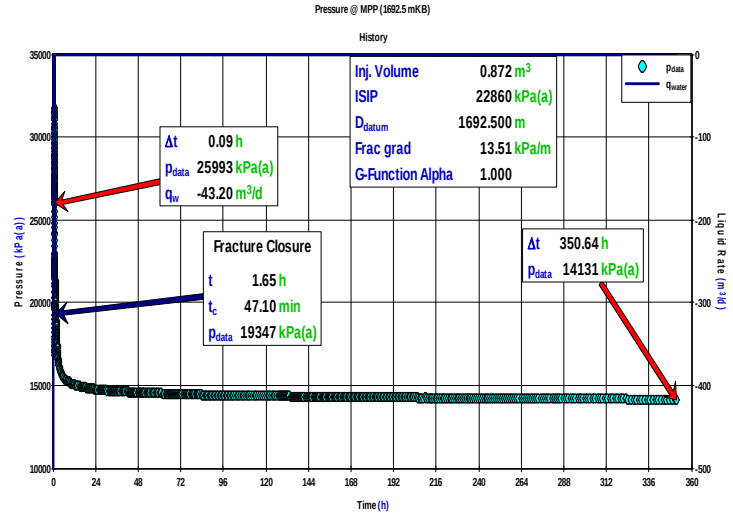
COST CENTRE: **10345055**

TEST DATE: **Mar 3 – 18, 2013**

STAGE OF WELL TEST: **Post-Perf Inj-Falloff**

ORIENTATION: **Vertical**

TYPE/SIZE OF STIMULATION: **N/A**



Reservoir Properties

Injection Interval: 1692 – 1693 mKB		
Frac Height (h): 5 m (Estimate)	Porosity (ϕ): 13 %	Water Saturation (S_w): 13 %
Oil Gravity: 50 °API (Estimate)	H ₂ S Content: 0 %	BHT: 76.1 °C

Injection Data

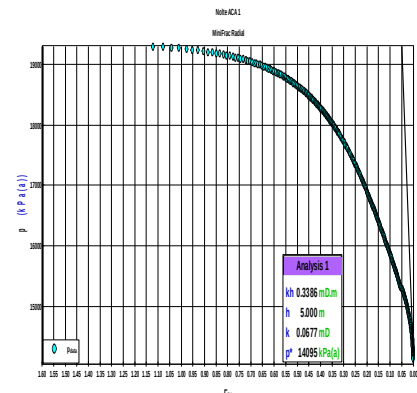
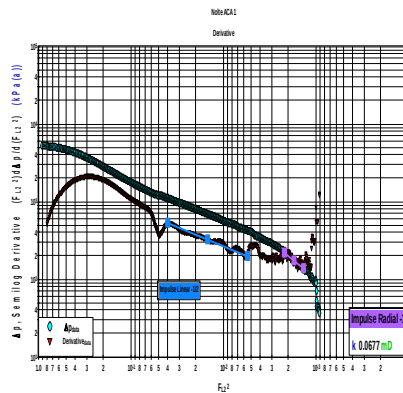
Test	Time	Final Rates				Final Pressures		
		Gas	New Oil	New H ₂ O	Load	Tubing	Casing	BHP
	Hours	e ³ m ³ /d	m ³ /d	m ³ /d	m ³ /d	kPag	kPag	kPaa
Injection	0.1	---	---	---	43.2	N/A	0	25993
Shut-In	350.6	---	---	---	0	N/A	0	14131

Injection Summary

New Fluid (m ³)				Load Fluid (m ³)		Remaining Load (m ³)	
Gas (E ³ M ³)	Gas (MSCF)	Cond (m ³)	Water (m ³)	Oil (m ³)	Water (m ³)	Oil (m ³)	Water (m ³)
---	---	---	---	0	0.9	0	0.9

Pressure Transient Analysis Results Summary

Analysis Results	
P*	14095 kPaa
(kh/ μ) _o	0.59 mD·m/mPa·s
(kh) _o	0.19 mD·m
k _o	0.04 mD



Discussion**Test Procedure:**

Segregated post-perf mini-frac tests were conducted on the “Basal” and “Middle” LOWER CANOL intervals. The mini-frac tests were conducted concurrently and as such, each interval was isolated below bridge plugs. On Mar 3rd, 2013, the “Upper” LOWER CANOL interval was perforated. A retrievable bridge plug, with tandem electronic recorders hung below, was run in hole (center element at 1689 mKB). Water injection was initiated to achieve formation breakdown. Injection continued for several more minutes after breakdown, including for a brief period after the bridge plug setting mechanism was activated (dynamic shut-in). The final water injection rate prior to shut-in was reported to be 43.2 m³/d (0.03 m³/min). The subsequent falloff was monitored for almost 15 days (~351 hrs). On Mar 18th, the bridge plug (including the recorders) was unset and recovered. The primary objectives of the mini-frac test were to obtain frac design and reservoir flow parameters.

The test data (injection & falloff) was corrected to the mid-point of the perforations (MPP=1692.5 mKB) using an estimated water gradient of 9.8 kP/m.

Analysis:

The mini-frac test data was analyzed using traditional techniques. Diagnostic plots, such as the G-Function & Sqrt (t) plots, were utilized first to confirm the occurrence of fracture closure. For the subject zone, the diagnostic plots indicated closure after about 47 minutes of shut-in. After-closure analysis, via Nolte & Soliman / Craig techniques, was then conducted to obtain estimates for reservoir parameters. Although the derivative data was relatively noisy, the late-time data suggested evidence of pseudo-radial flow. The terminal portion of the falloff data was not analyzed since it was most likely being affected by uphole operations in preparation for unsetting & pulling the bridge plug (well was also bled off prior to unsetting the plug). The corresponding results / plots have been presented in this report.

Conclusions / Recommendations:

The test was successful in satisfying the primary objectives set forth at the onset of the test program. The test results suggested an effective permeability to oil of 0.04 mD. However, it is noted that this oil permeability was calculated based on estimated values for frac height (5 m) & oil viscosity (50 °API oil with a viscosity of 0.32 mPa·s).

The corresponding extrapolated reservoir pressure was determined to be about 14.1 MPaa.

The overall confidence of the test results is considered to be fair.

Analyzed by: Al Kassam

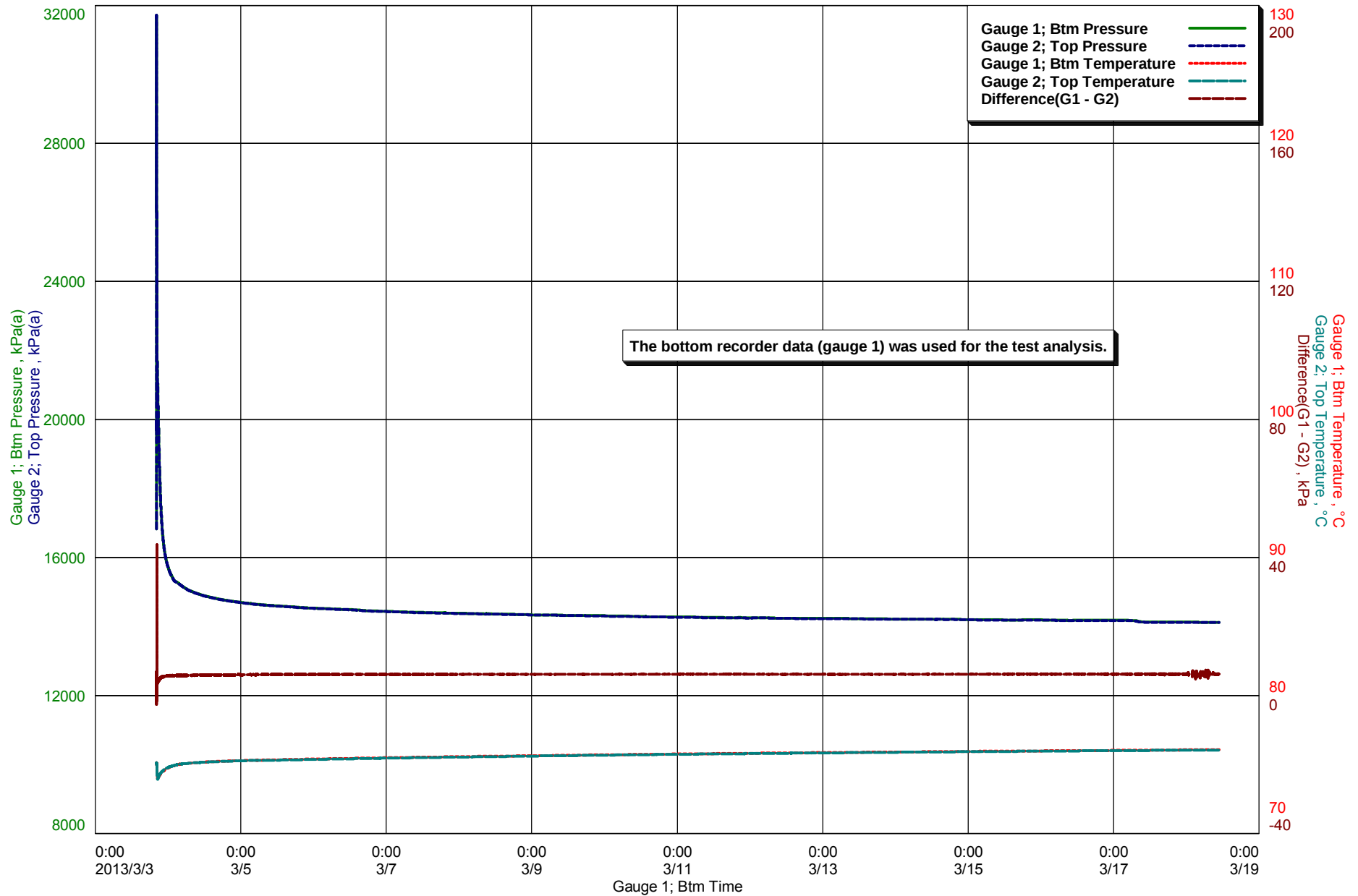
Report Date: May 3rd, 2013

Copy: Kim Clarke Alex Novgorodova Well File

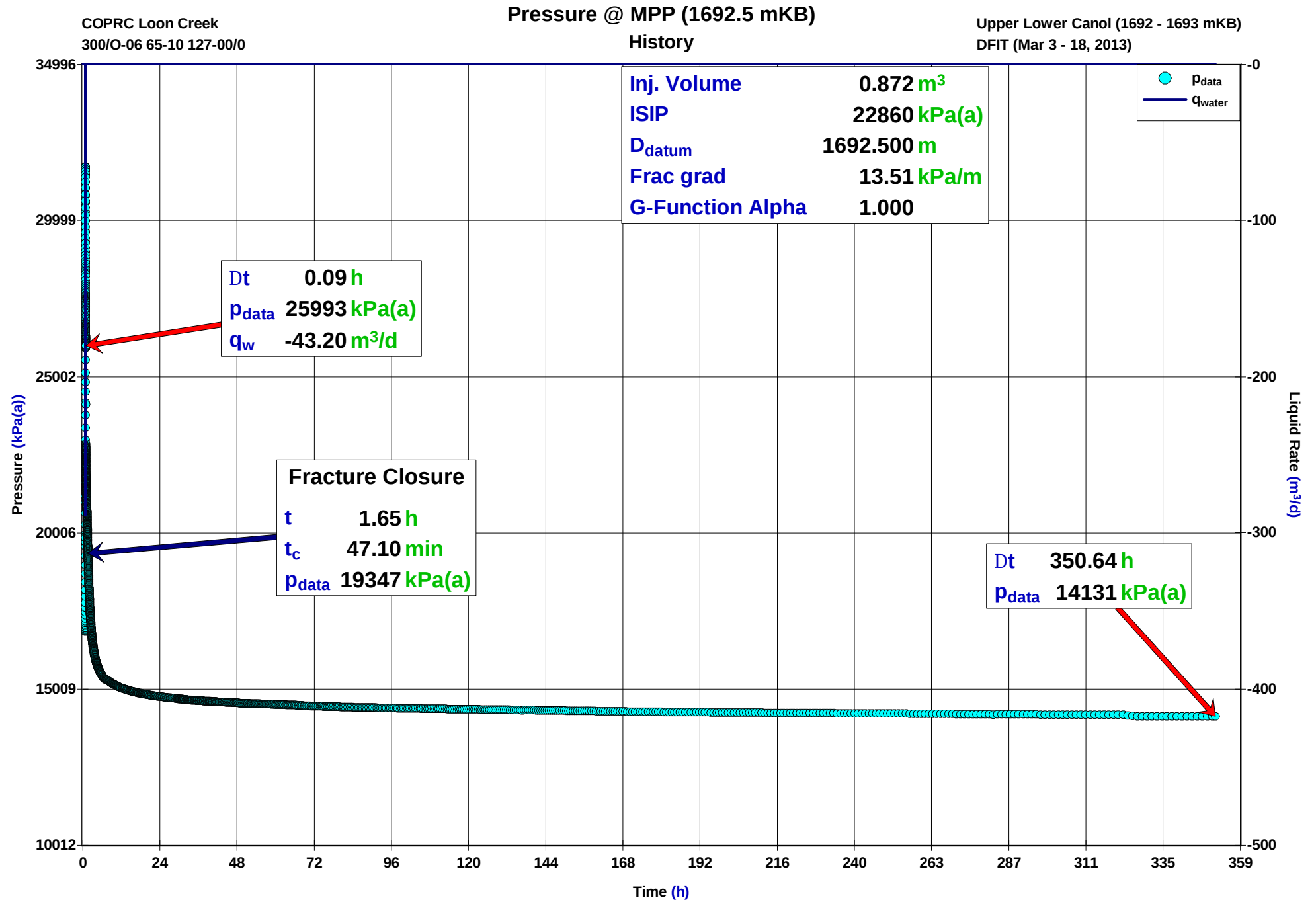
O-06 65-10 127-00

Recorder Validation Plot

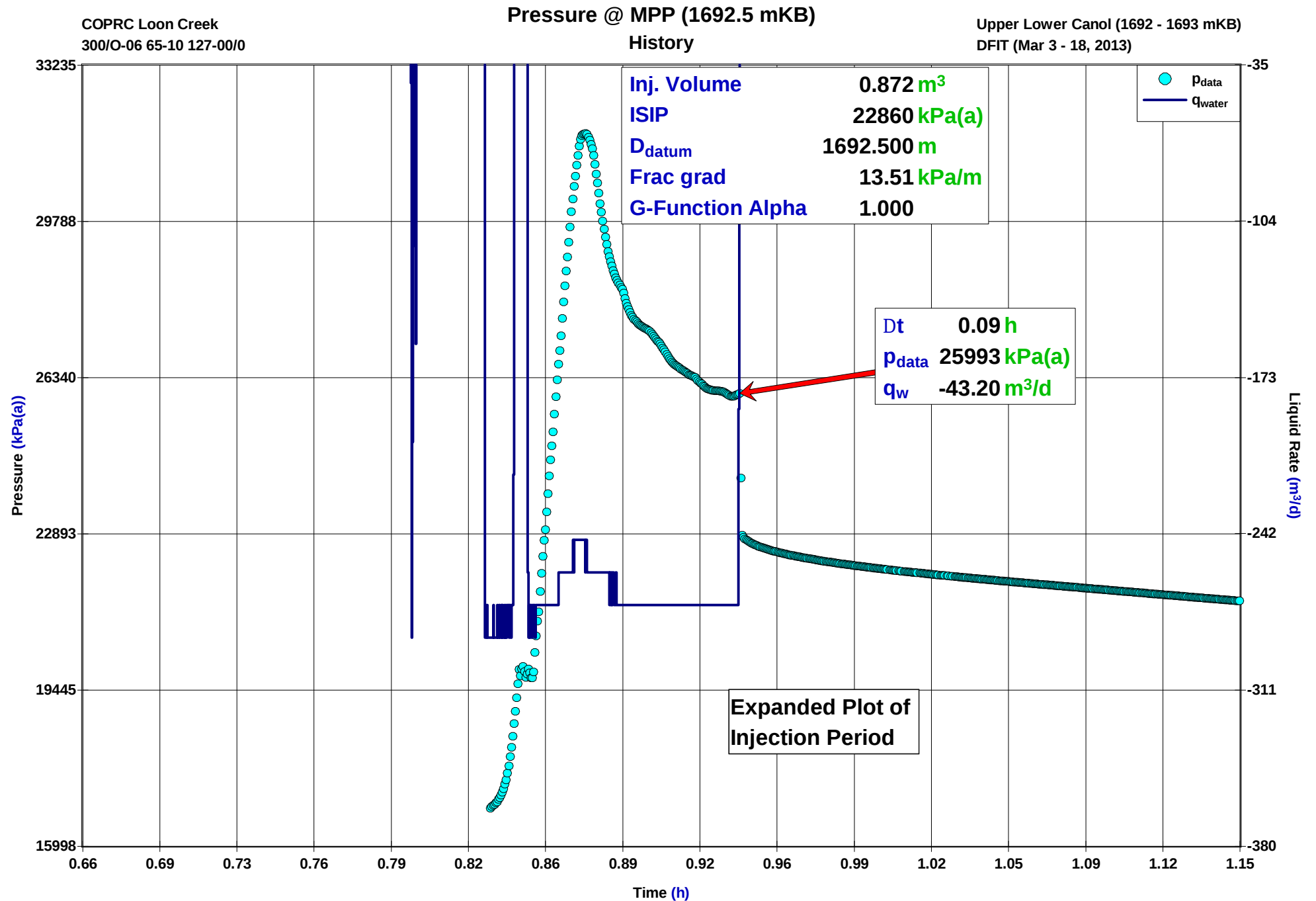
Formation: "Upper" Lower Canol



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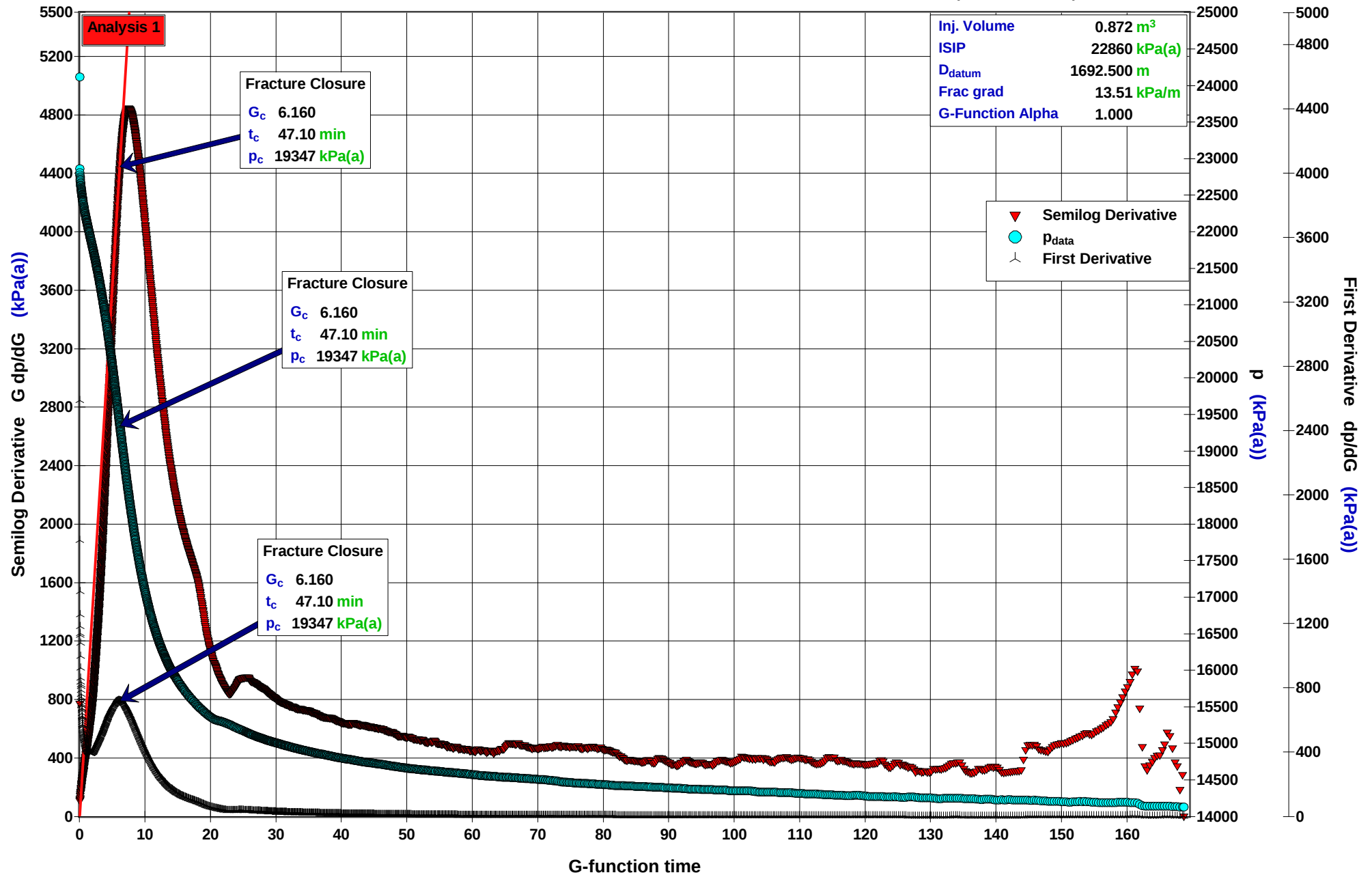


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PCA Diagnostic 1 G-Function

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300/O-06 65-10 127-00/0

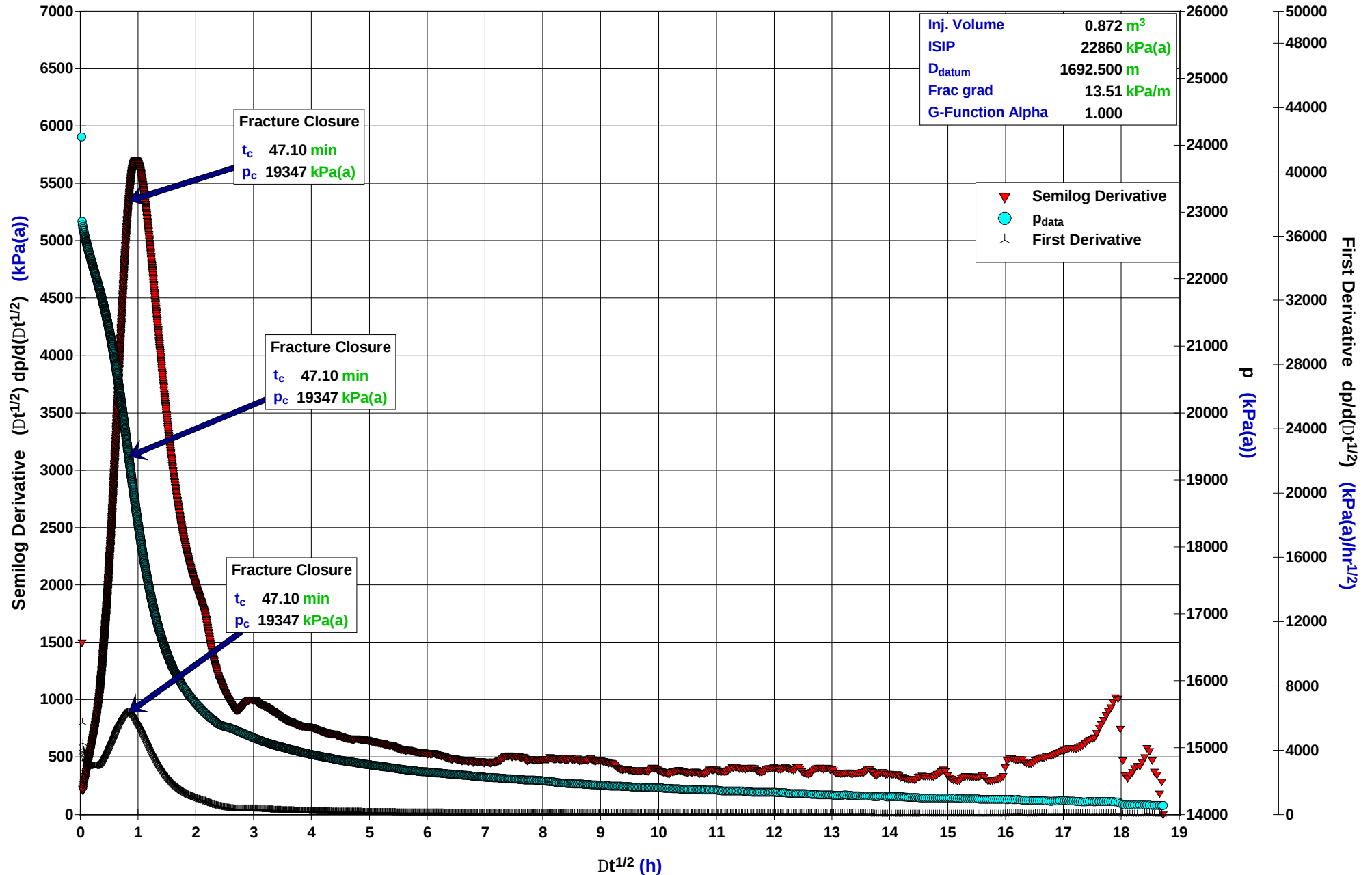
Upper Lower Canol (1692 - 1693 mKB)
DFIT (Mar 3 - 18, 2013)



COPRC Loon Creek
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PCA Diagnostic 1 MiniFrac Sqrt(t)

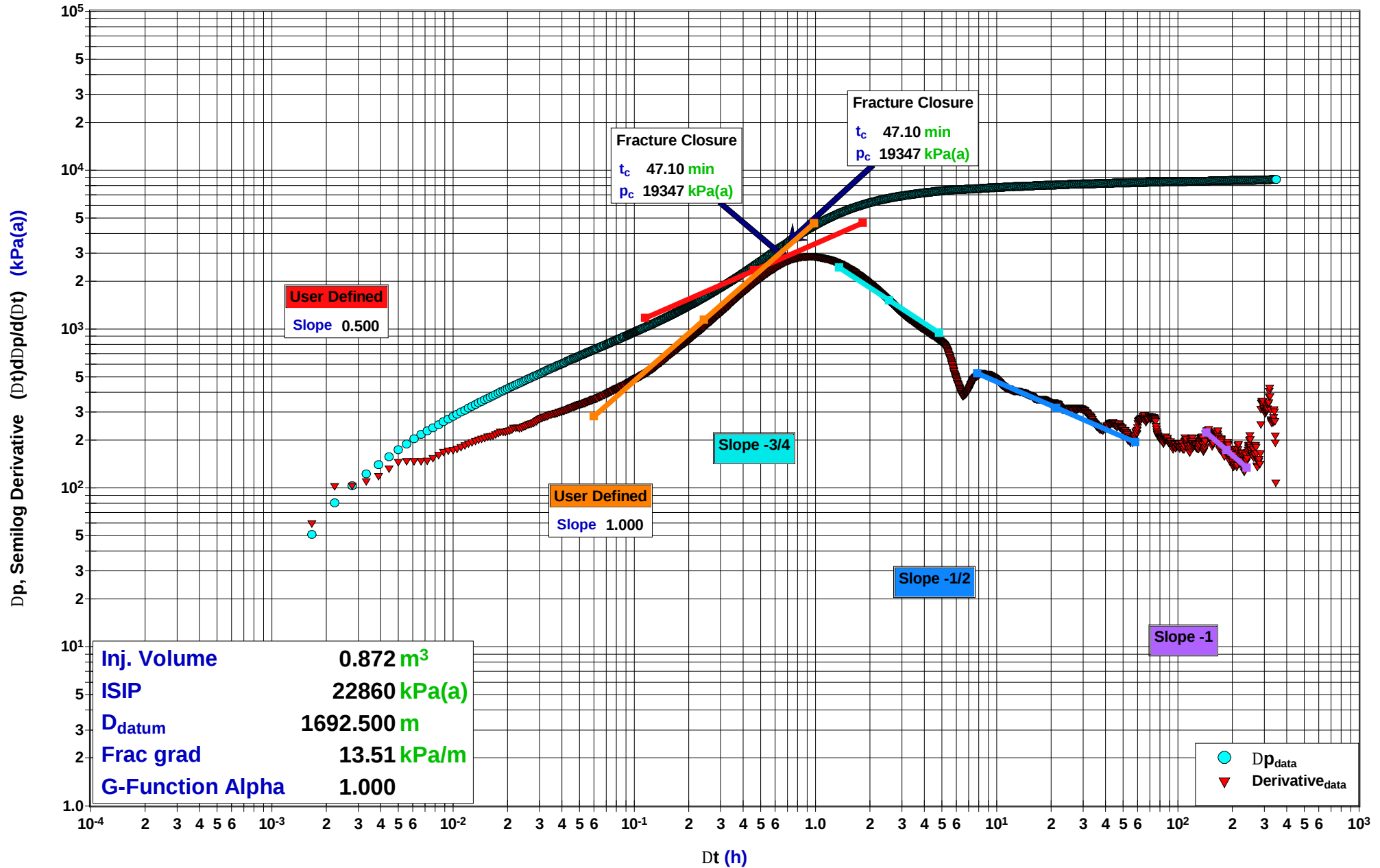
Upper Lower Canol (1692 - 1693 mKB)
DFIT (Mar 3 - 18, 2013)



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PCA Diagnostic 1 Derivative

Upper Lower Canol (1692 - 1693 mKB)
DFIT (Mar 3 - 18, 2013)



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PCA Diagnostic 1

Input Data

Injected Volume 0.872 m³
Datum Depth 1692.500 m

Results

ISIP 22860 kPa(a)
Fracture Gradient 13.51 kPa/m

Closure Marker 1

Closure time (t_c) 0.7850 h
Closure pressure (p_c) 19347 kPa(a)
Net Frac Press (Δp_{net}) 3513 kPa
G-Function at Closure (G_c) 6.160
Fluid Efficiency (η) 75.49 %

Closure Marker 2

Closure time (t_c) 0.7850 h
Closure pressure (p_c) 19347 kPa(a)
Net Frac Press (Δp_{net}) 3513 kPa
G-Function at Closure (G_c) 6.160
Fluid Efficiency (η) 75.49 %

Fluid Properties

Oil Gravity (γ_o) 50.0 °API
Bubble Point Pressure (p_{bp}) 14124 kPa(a)
Oil Formation Volume Factor (B_o) 1.409
Oil Viscosity (μ_o) 0.3229 mPa.s
Oil Compressibility (c_o) 3.2876e-06 1/kPa
Solution Gas Ratio (R_s) 117.27 m³/m³

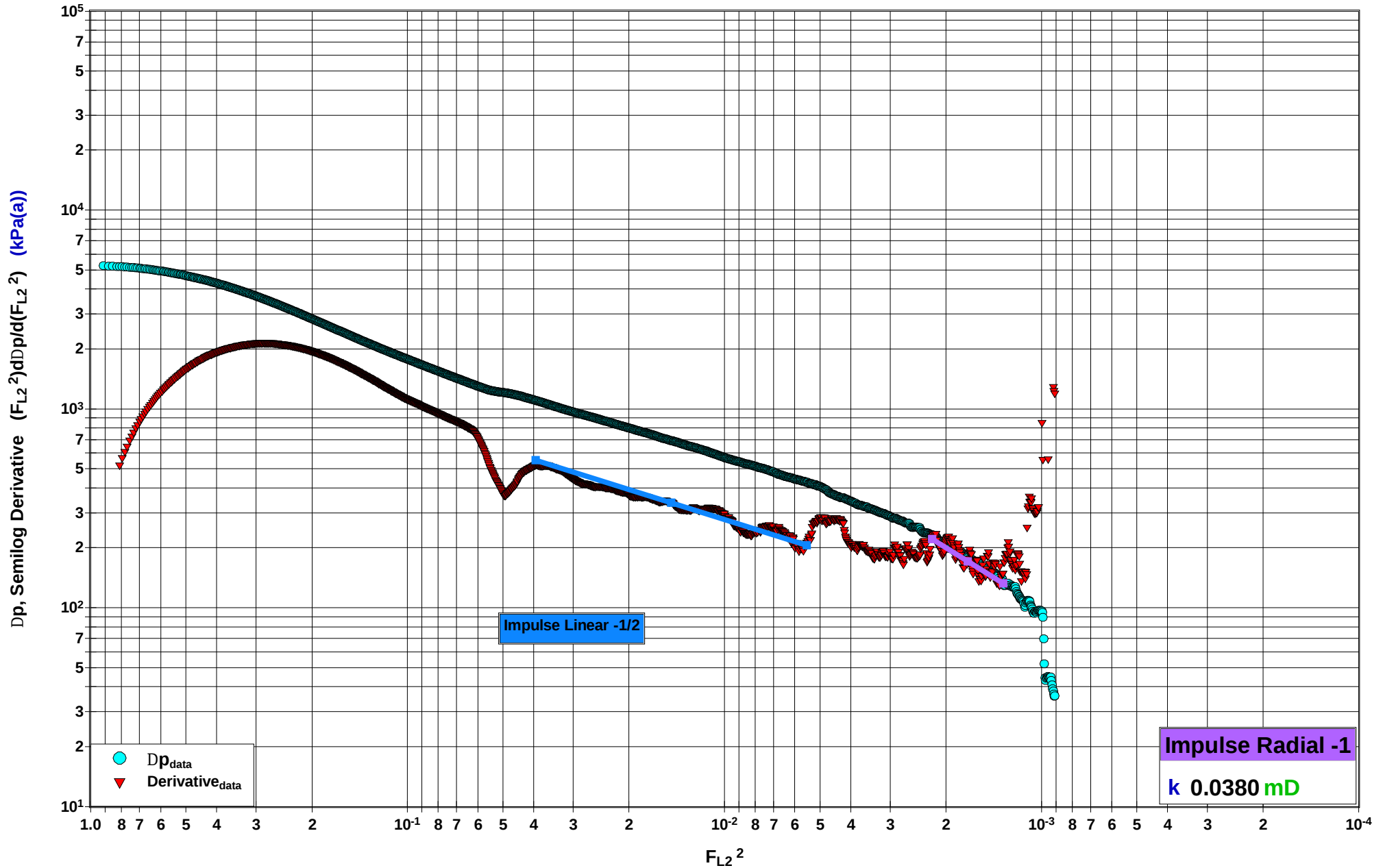
Reservoir Properties

Reservoir Temperature (T_{resv}) 76.1 °C
Reservoir Pressure (p_{resv}) 14131 kPa(a)

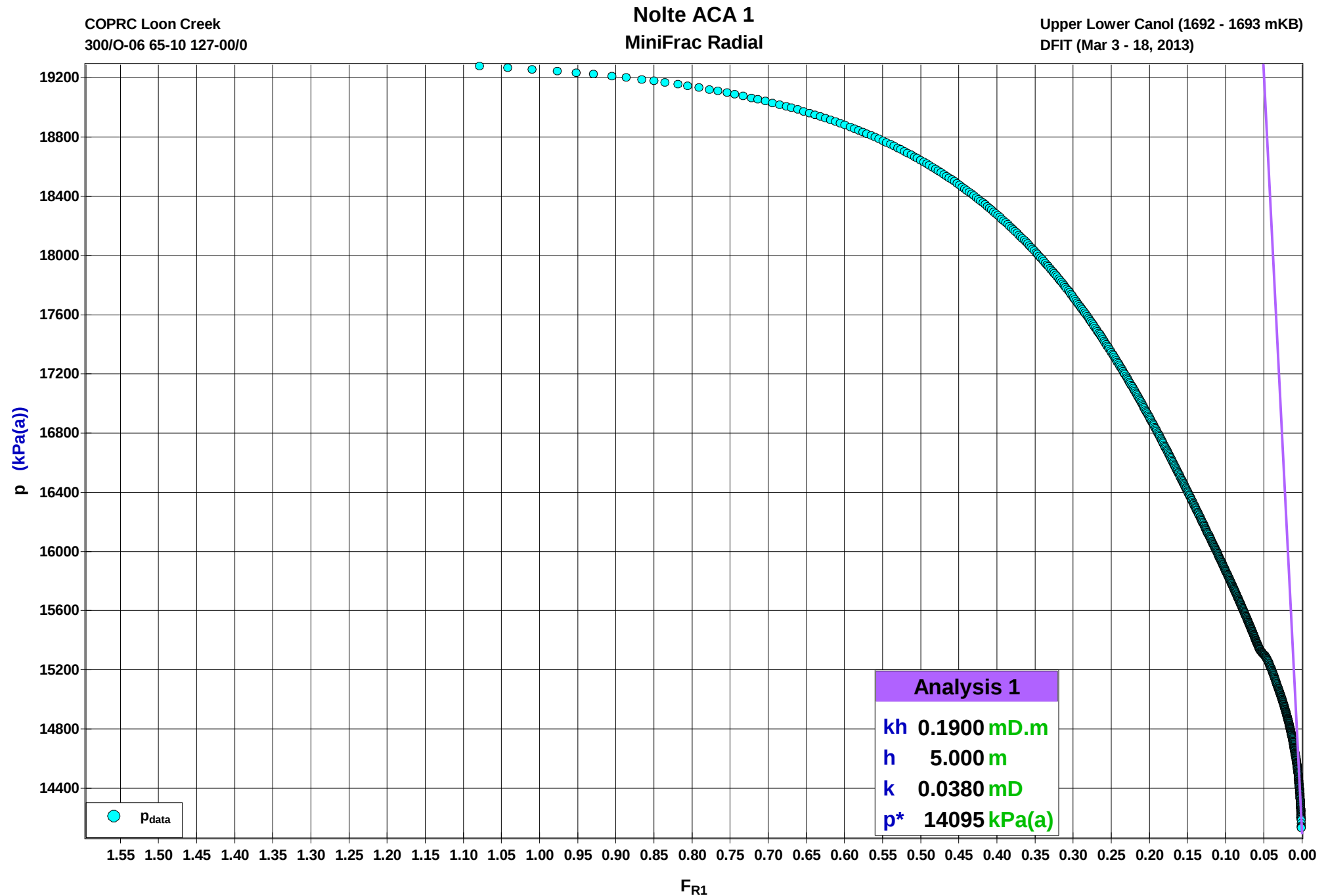
COPRC Loon Creek
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Nolte ACA 1
Derivative

Upper Lower Canol (1692 - 1693 mKB)
DFIT (Mar 3 - 18, 2013)



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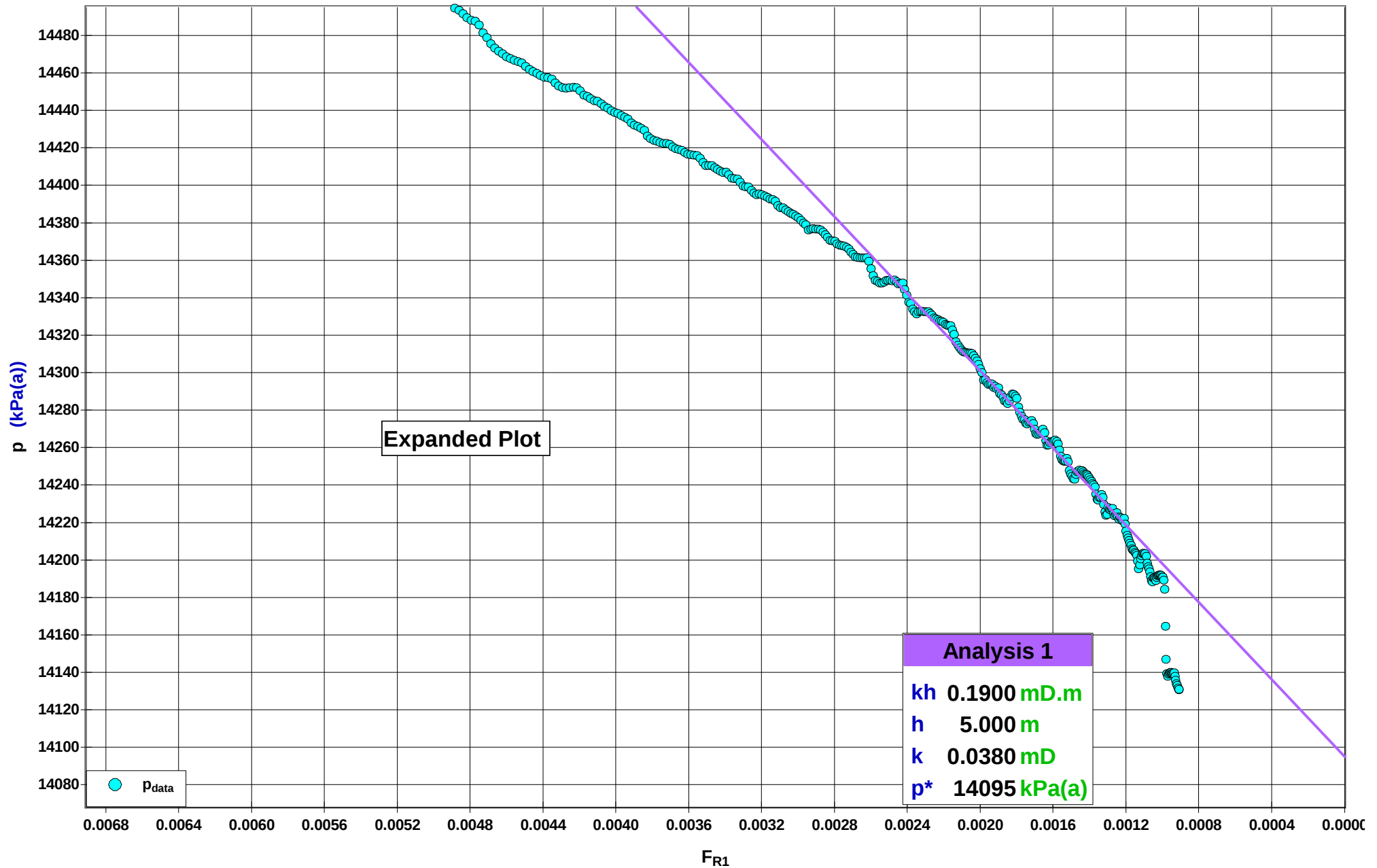


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300/O-06 65-10 127-00/0

Nolte ACA 1
MiniFrac Radial

Upper Lower Canol (1692 - 1693 mKB)
DFIT (Mar 3 - 18, 2013)



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Nolte ACA 1

Linear Analysis (FL)

Flow Capacity (kh)	mD.m
Effective Permeability (k)	mD
Extrapolated Pressure (p*)	14152 kPa(a)
Closure Pressure (pc)	kPa(a)
Reservoir Leakoff Coefficient (CR)	m/min ^{1/2}
Total Leakoff Coefficient (CT)	m/min ^{1/2}

Radial Analysis (FR)

Flow Capacity (kh)	0.19 mD.m
Effective Permeability (k)	0.0380 mD
Extrapolated Pressure (p*)	14095 kPa(a)

Input Parameters

Estimated Initial Pressure (p _i)	14152 kPa(a)
Closure time (t _c)	47.10 min

Fluid Properties

Oil Gravity (γ _o)	50.0 °API
Bubble Point Pressure (p _{bp})	14124 kPa(a)
Oil Formation Volume Factor (B _o)	1.409
Oil Viscosity (μ _o)	0.3229 mPa.s
Oil Compressibility (c _o)	3.2876e-06 1/kPa
Solution Gas Ratio (R _s)	117.27 m ³ /m ³

Reservoir Properties

Reservoir Temperature (T _{resv})	76.1 °C
Reservoir Pressure (p _{resv})	14131 kPa(a)
Net Pay (h)	5.000 m
Total Porosity (φ _t)	13.00 %
Gas Saturation (S _g)	0.00 %
Oil Saturation (S _o)	87.00 %
Water Saturation (S _w)	13.00 %
Formation Compressibility (c _f)	6.3246e-07 1/kPa
Total Compressibility (c _t)	3.5500e-06 1/kPa