June 18, 1992

Mr. G.C.K. Johnson, P. Eng.
Coordinator, Southern Production
Home Oil Company Limited
1700 Home Oil Tower
324 - 8th Avenue S.W.
Calgary, Alberta
T2P 2Z5

Dear Mr. Johnson:

RE: Annual Pressure Surveys - Pierson Field

The Petroleum Branch has received the results of your 1991 annual pressure survey for the Pierson Lower Amaranth C Pool.

The Branch agrees that RFT pressure results are more accurate than short term build-up tests in tight reservoirs. Therefore your request to use of RFT pressure data as a substitute for pressure build-up tests is approved. However, the remainder of Home's planned 1992 drilling program is restricted to Sections 8, 9 and 10-2-29 (WPM) and additional pressure data is requested from Sections 16, 17 and 19-2-29 (WPM) to ensure reservoir pressure in these areas is not closer to the bubble point than anticipated.

If you have any questions, please contact John N. Fox, Chief Petroleum Engineer at (204) 945-6574.

Yours truly,

Original Signed
L. R. Dubreuil

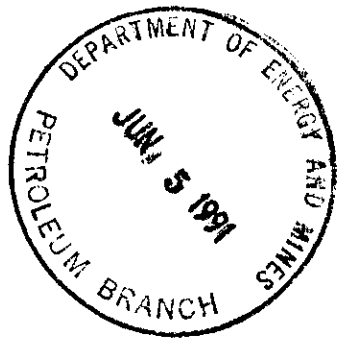
L.R. Dubreuil
Director

Home Oil Company Limited

1600 Home Oil Tower
324 Eighth Avenue S.W.
Calgary, Alberta T2P 2Z5
Telephone (403) 232-7100
Fax (403) 232-7678

30 May 1991

Manitoba Energy and Mines
Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3



Attention: Mr. J.N. Fox
Chief Petroleum Engineer, Petroleum Branch

Dear Sir:

Re: **1991 Pressure Survey**
South Pierson Field, Lower Amaranth Pools

Attached is a list outlining Home Oil Company Limited's candidates for the 1991 pressure survey in the subject field. Included in the attachment is the method of testing, shut-in period, and approximate date of test.

If you have any questions or concerns regarding this matter, please contact Allan Willms at (403) 232-7362.

Yours truly,
HOME OIL COMPANY LIMITED

D.A. Bertram, P.Eng.
Chief Reservoir Engineer
Southern District

cc: A.R. Willms
D.A. Cairns
H.A. Seefeldt
J.S. Murray
D.A. Wilmot - Estevan
S Pierson (MAN) (RES) (TIC)
Day File

1991 PRESSURE SURVEY

SOUTH PIERSON LOWER AMARANTH POOLS

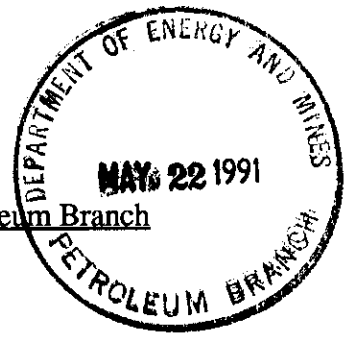
Well	Pool	Current Status	Elevations mKB	Elevations mCF	MPP(mCF)	Test Type	Approx. Survey Date	Shut-in Period
06-11-002-29 W1M	C	Prod. Oil	468.0	463.7	1009.2	AWS	July	21+ days
02-16-002-29 W1M	C	Prod. Oil	477.0	472.6	1015.6	AWS	June	21 days
08-17-002-29 W1M	C	Prod. Oil	479.6	475.2	1023.1	AWS	June	21+ days
16-18-002-29 W1M	?	Prod. Oil	483.3	479.1	1023.8	AWS	July	21+ days

Home Oil Company Limited

1600 Home Oil Tower
324 Eighth Avenue S.W.
Calgary, Alberta T2P 2Z5
Telephone (403) 232-7100
Fax (403) 232-7678

16 May 1991

Manitoba Energy and Mines
Petroleum Branch
555 - 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3



Attention: Mr. J.N. Fox
Chief Petroleum Engineer, Petroleum Branch

Dear Sir:

Re: **1990 Pressure Survey**
South Pierson Field

Attached for your information are the results of the build-ups conducted on five South Pierson wells. These wells were approved for the 1990 South Pierson pressure survey in your letter dated November 28, 1990 and are as follows:

10-01-002-29 W1M
10-10-002-29 W1M
06-16-002-29 W1M
12-19-002-29 W1M
02-30-002-29 W1M.

All tests were conducted using an automatic acoustic wellbore sounder.

If you have any questions or require further information, please contact the undersigned at (403) 232-7362.

Yours truly,
HOME OIL COMPANY LIMITED

A.R. Willms, P.Eng.
Reservoir Engineering

cc: A.R. Willms
D.A. Cairns
H.A. Seefeldt
J.S. Murray
S Pierson (MAN) (RES)
Day File

SOUTH PIERSON
10-01-002-29 W1M

Date Of Test	August 7/90 - April 19/91
Extrapolated Reservoir Pressure	10 659 kPag
Permeability	.016 md
Skin	-4.2

A composite, infinite acting reservoir model was used to match the data. As in every other well in the South Pierson area, this well was hydraulically fractured and therefore analyzed in the same manner using the composite model. In this case the homogeneous model could have been used, but since the composite model has been used to analyze the majority of the wells in this area it was felt this model should be used for this well.

The permeability attained from the model is very low and explains the poor performance of the well. There are currently no producing wells immediately offsetting this well and therefore the extrapolated pressure is as expected near the initial reservoir pressure.

Sci ific Software-Intercomp Interpret/2

WELL TEST ANALYSIS REPORT

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 10-01-002-29 W1M

Date: 02-MAY-91
Test No:
Test Date: AUG 7/90 - APR 19/91
Gauge:
Depth: m

Perforations:	From	To
1	m	m

ANALYSIS SUMMARY

PRESSURE READINGS TAKEN BY AUTOMATIC ACOUSTIC WELLBORE SOUNDER.

Scientific Software-Intercomp — Interpret/2

Results Summary

Company: HOME OIL COMPANY LIMITED

Field:	SOUTH PIERSON	Date:	02-MAY-91
Formation:	SPEARFISH	Test No:	
Zone:		Test Date:	AUG 7/90 - APR 19/91
Well:	10-01-002-29 W1M	Gauge:	
		Depth:	m

Near wellbore effects: Wellbore Storage and Skin
Reservoir behaviour: Composite
Boundary effects: Infinite Lateral Extent

Flow Period:		UNITS
(pav)i	10658.521	kPa
p(Dt=0)	850.290	kPa
kh	5.706E-02	mD.m
k	1.630E-02	mD
C	1.374E-03	m3/kPa
S	-4.20	
r1	14.	m
(pch)1/2	5.025E-02	
(kh/u)1/2	3.035E-02	
ri	27.	m

Scientific Software-Intercomp — Interpret/2

Well & Reservoir Parameters

Company: HOME OIL COMPANY LIMITED

Field:	SOUTH PIERSON	Date:	02-MAY-91
Formation:	SPEARFISH	Test No:	
Zone:		Test Date:	AUG 7/90 - APR 19/91
Well:	10-01-002-29 W1M	Gauge:	
		Depth:	m

WELL AND RESERVOIR DATA (OIL)

Matrix Porosity	.175	fraction
Reservoir Thickness	3.50	m
Wellbore Radius	.100	m
Oil Formation Volume Factor	1.169	Rm3/m3
Oil Viscosity	1.30	cp
Total Compressibility	6.800E-06	1/kPa

Rates

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 10-01-002-29 W1M

Date: 02-MAY-91
Test No:
Test Date: AUG 7/90 - APR 19/91
Gauge:
Depth: m

RATES

Flow Period	Start hrs	End hrs	Duration hrs	Oil Sm3/D	Gas 1E3Sm3/D	Water Sm3/D
1	.0000	360.0000	360.0000	.60	.00	8.20
2	360.0000	1077.0000	717.0000	.30	.00	6.70
3	1077.0000	1202.0000	125.0000	.70	.00	9.50
4	1202.0000	7360.0000	6158.0000	.00	.00	.00

Analysis Parameters

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON

Zone:

Well: 10-01-002-29 W1M

Test Date: AUG 7/90 - APR 19/91

Gauge:

Depth: m

ANALYSIS MODEL, FLOW PERIOD: 4

Near wellbore effects:	Wellbore Storage and Skin
Reservoir behaviour:	Composite
Boundary effects:	Infinite Lateral Extent

ANALYSIS PARAMETERS, FLOW PERIOD: 4

Pressure match, PM	2.874E-05	1/kPa
Time match, TM	7.130E-04	1/hr
Curve Match, Log CDe2S	7.620E-02	
Dimensionless composite discontinuity radius, r1D	3.89	
Composite storativity ratio, (pch)1/2	5.025E-02	
Composite mobility ratio, (kh/u)1/2	3.035E-02	

Scientific Software-Intercomp | Interpret/2

Analysis Results

Company: HOME OIL COMPANY LIMITED

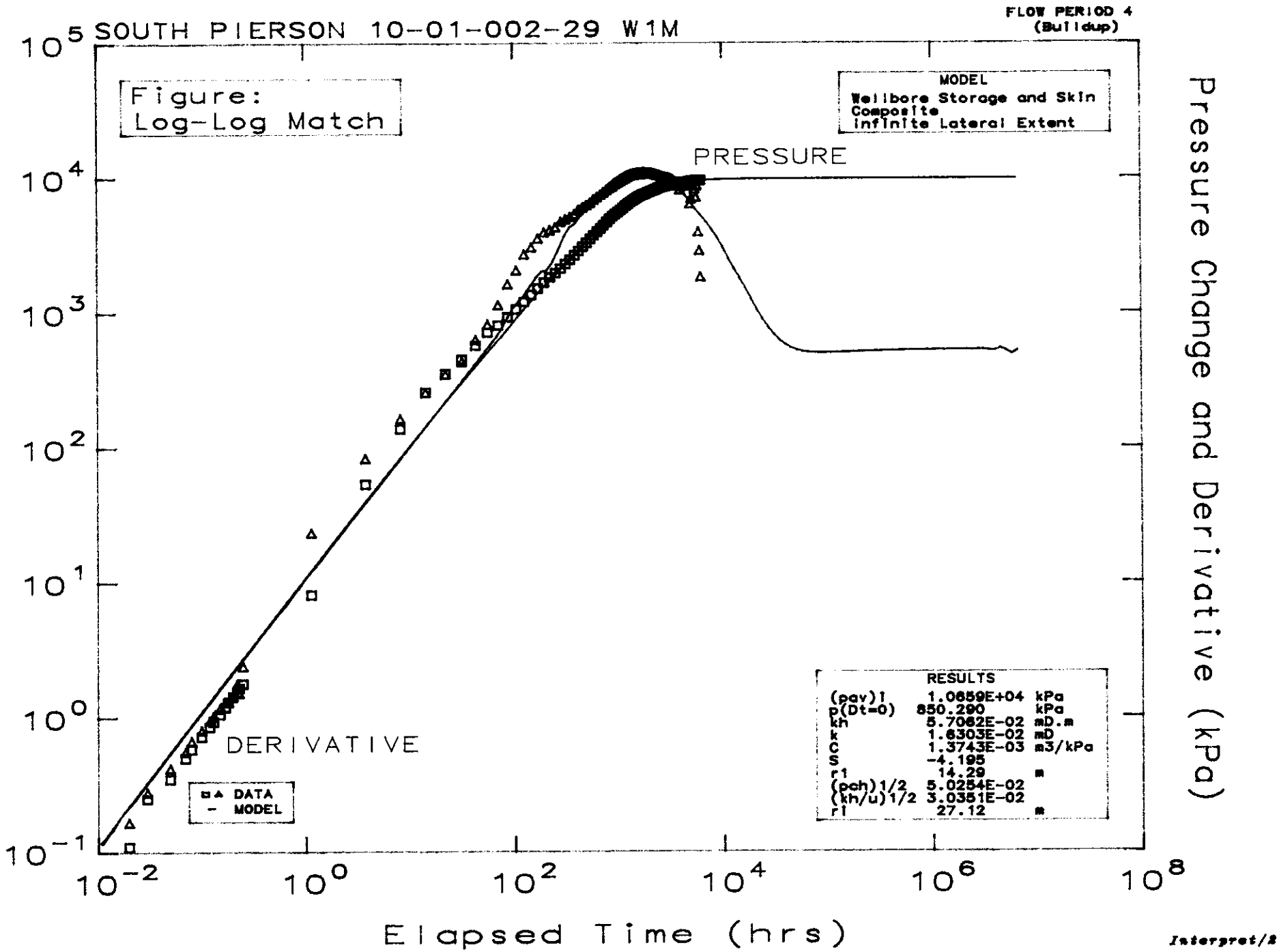
Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 10-01-002-29 W1M

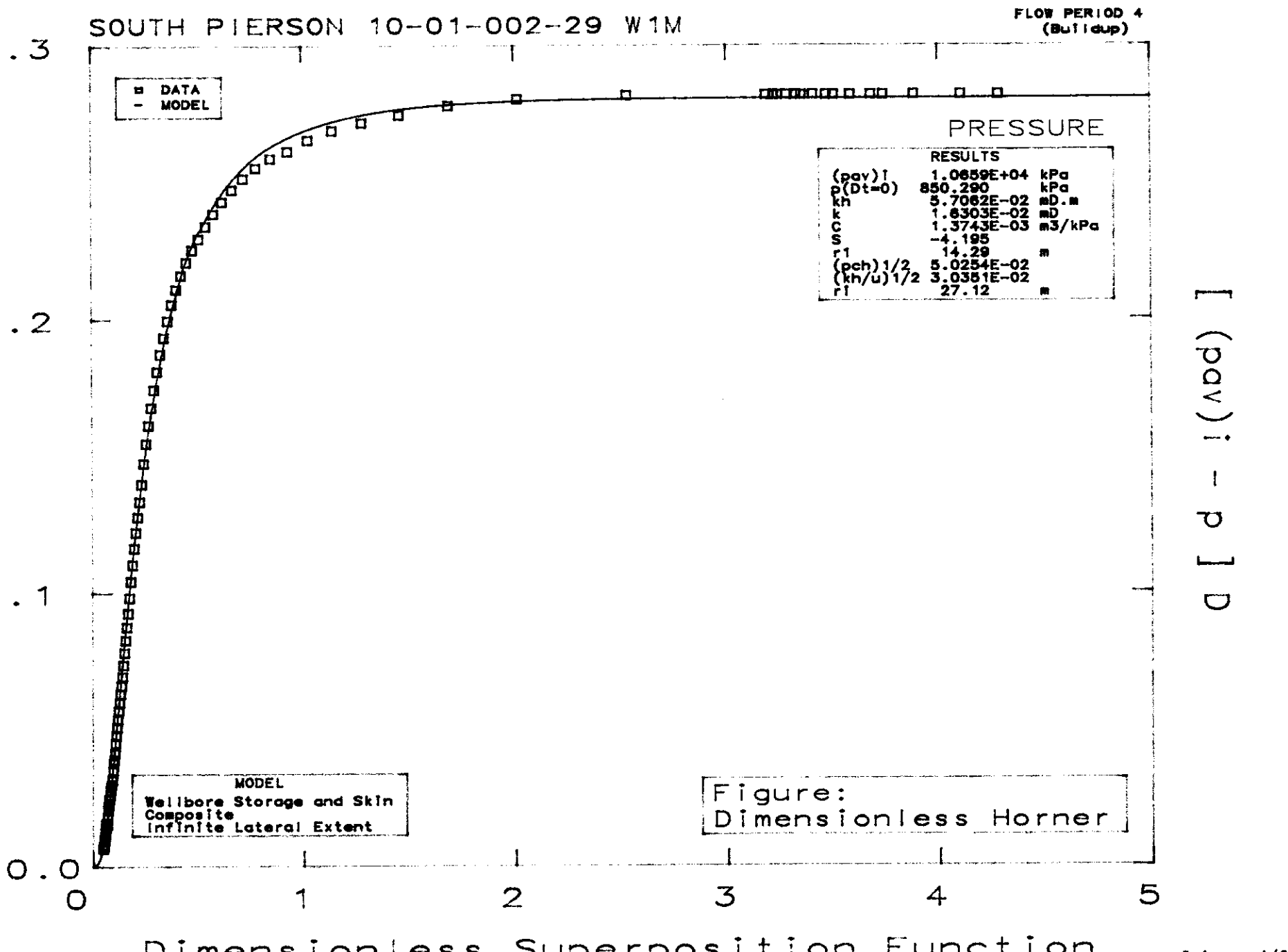
Date: 02-MAY-91
Test No:
Test Date: AUG 7/90 - APR 19/91
Gauge:
Depth: m

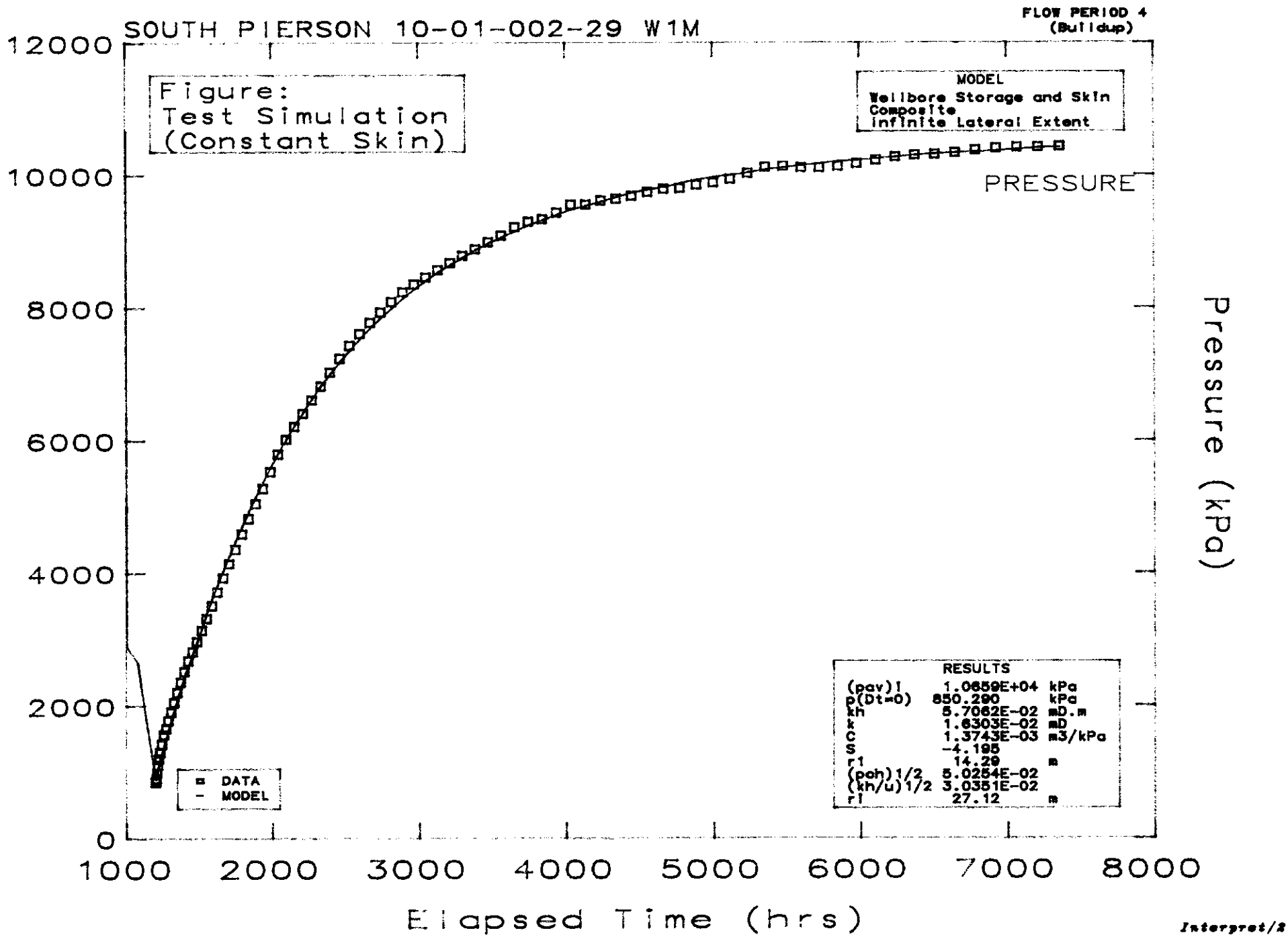
Near Wellbore Effects: Wellbore Storage and Skin
Reservoir behaviour: Composite
Boundary effects: Infinite Lateral Extent

ANALYSIS RESULTS, FLOW PERIOD: 4

Initial average reservoir pressure, (pav)i	10658.521	kPa
P (Delta t = 0), p(Dt=0)	850.290	kPa
Permeability-thickness, kh	5.706E-02	mD.m
Permeability, k	1.630E-02	mD
Wellbore storage coefficient, C	1.374E-03	m3/kPa
Wellbore skin factor, S	-4.20	
Composite discontinuity radius, r1	14.	m
Composite storativity ratio, (pch)1/2	5.025E-02	
Composite mobility ratio, (kh/u)1/2	3.035E-02	
Radius of investigation (approx), ri	27.	m


SOUTH PIERSON 10-01-002-29 W1M
FLOW PERIOD 4
(Buildup)
Figure:
Log-Log Match
MODEL
Wellbore Storage and Skin
Composite
infinite Lateral Extent
PRESSURE
DERIVATIVE
DATA
MODEL
RESULTS
(pav)1 1.0659E+04 kPa
p(Dt=0) 850.290 kPa
kh 5.7062E-02 mD.m
k 1.6303E-02 mD
C 1.3743E-03 m3/kPa
S -4.195
r1 14.29 m
(pch)1/2 5.0254E-02
(kh/u)1/2 3.0351E-02
r1 27.12 m
Pressure Change and Derivative (kPa)
Elapsed Time (hrs)
Interpret/2


SOUTH PIERSON 10-01-002-29 W1M
FLOW PERIOD 4
(Buildup)
DATA
MODEL
PRESSURE
RESULTS
(pav)i 1.0659E+04 kPa
p(Dt=0) 850.290 kPa
kh 5.7062E-02 mD.m
k 1.6303E-02 mD
C 1.3743E-03 m3/kPa
S -4.195
r1 14.29 m
(pch)1/2 5.0254E-02
(kh/u)1/2 3.0351E-02
r1 27.12 m
MODEL
Wellbore Storage and Skin
Composite
Infinite Lateral Extent
Figure:
Dimensionless Horner
[(pav)i - p] D
Dimensionless Superposition Function
0.0
.1
.2
.3
0
1
2
3
4
5
Interpret/8


SOUTH PIERSON 10-01-002-29 W1M
FLOW PERIOD 4
(Buildup)
Figure:
Test Simulation
(Constant Skin)
MODEL
Wellbore Storage and Skin
Composite
Infinite Lateral Extent
PRESSURE
RESULTS
(pav)i 1.0659E+04 kPa
p(Dt=0) 850.290 kPa
kh 5.7062E-02 mD.m
k 1.6303E-02 mD
C 1.3743E-03 m3/kPa
S -4.195
r1 14.29 m
(poh)1/2 5.0254E-02
(kh/u)1/2 3.0351E-02
rI 27.12 m
DATA
MODEL
12000
10000
8000
6000
4000
2000
0
1000
2000
3000
4000
5000
6000
7000
8000
Pressure (kPa)
Elapsed Time (hrs)
Interpret/2

SOUTH PIERSON
10-10-002-29 W1M

Date Of Test	December 14/90 - February 1/91
Extrapolated Reservoir Pressure	8 192 kPag
Permeability	1.01 md
Skin	-6.1

A composite, infinite acting reservoir model was used to match the data. The composite model is a result of the hydraulic fracture treatment during the initial completion. A skin of -6.2 was calculated, which is also due to the induced fracture.

The permeability attained from the model was approximately 1 md. This value closely matches that obtained from the core analysis. The hydraulic fracture treatment size was kept to a minimum to avoid initiating the fracture into the Mississippian formation. This may explain why the well is presently producing below average. Currently the well is producing 9.5 m^3WPD which is greater than expected from the Spearfish formation, implying that some communication has been established with the Mississippian formation.

As in every other build-up, the length of the test was not long enough and therefore the second stabilization was not attained. Some margin of error in the extrapolated reservoir pressure may occur as a result of this.

Sci ific Software-Intercomp Interpret/2

WELL TEST ANALYSIS REPORT

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 10-10-002-29 W1M

Date: 14-MAY-91
Test No:
Test Date: DEC 14/90 - FEB 1/91
Gauge:
Depth: m

Perforations:	From	To
1	m	m

ANALYSIS SUMMARY

PRESSURE READINGS TAKEN USING AUTOMATIC ACOUSTIC WELLBORE SOUNDER.

Scie ific Software-Intercomp Interpret/2

Results Summary

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 10-10-002-29 W1M

Date: 14-MAY-91
Test No:
Test Date: DEC 14/90 - FEB 1/91
Gauge:
Depth: m

Near wellbore effects: Wellbore Storage and Skin
Reservoir behaviour: Composite
Boundary effects: Infinite Lateral Extent

Flow Period:		UNITS
(pav)i	8191.797	kPa
p(Dt=0)	3605.390	kPa
kh	3.25	mD.m
k	1.01	mD
C	1.997E-04	m3/kPa
S	-6.05	
r1	62.	m
(pch)1/2	.583	
(kh/u)1/2	2.91	
xf	84.4	m
ri	109.	m

Scie :fic Software-Intercomp — Interpret/2

Well & Reservoir Parameters

Company: HOME OIL COMPANY LIMITED

Field:	SOUTH PIERSON	Date:	14-MAY-91
Formation:	SPEARFISH	Test No:	
Zone:		Test Date:	DEC 14/90 - FEB 1/91
Well:	10-10-002-29 W1M	Gauge:	
		Depth:	m

WELL AND RESERVOIR DATA (OIL)

Matrix Porosity	.130	fraction
Reservoir Thickness	3.20	m
Wellbore Radius	.100	m
Oil Formation Volume Factor	1.169	Rm3/m3
Oil Viscosity	1.30	cp
Total Compressibility	6.800E-06	1/kPa

Rates

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 10-10-002-29 W1M

Date: 14-MAY-91
Test No:
Test Date: DEC 14/90 - FEB 1/91
Gauge:
Depth: m

RATES

Flow Period	Start hrs	End hrs	Duration hrs	Oil Sm3/D	Gas 1E3Sm3/D	Water Sm3/D
1	.0000	3657.0000	3657.0000	2.50	.00	9.40
2	3657.0000	4835.0000	1178.0000	.00	.00	.00

Scientific Software-Intercomp | Interpret/2

Analysis Parameters

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 10-10-002-29 W1M

Date: 14-MAY-91
Test No:
Test Date: DEC 14/90 - FEB 1/91
Gauge:
Depth: m

ANALYSIS MODEL, FLOW PERIOD: 2

Near wellbore effects: Wellbore Storage and Skin
Reservoir behaviour: Composite
Boundary effects: Infinite Lateral Extent

ANALYSIS PARAMETERS, FLOW PERIOD: 2

Pressure match, PM	4.579E-04	1/kPa
Time match, TM	.279	1/hr
Curve Match, Log CDe2S	-2.20	
Dimensionless composite discontinuity radius, r1D	345.	
Composite storativity ratio, (pch)1/2	.583	
Composite mobility ratio, (kh/u)1/2	2.91	

Scientific Software-Intercomp — Interpret/2

Analysis Results

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 10-10-002-29 W1M

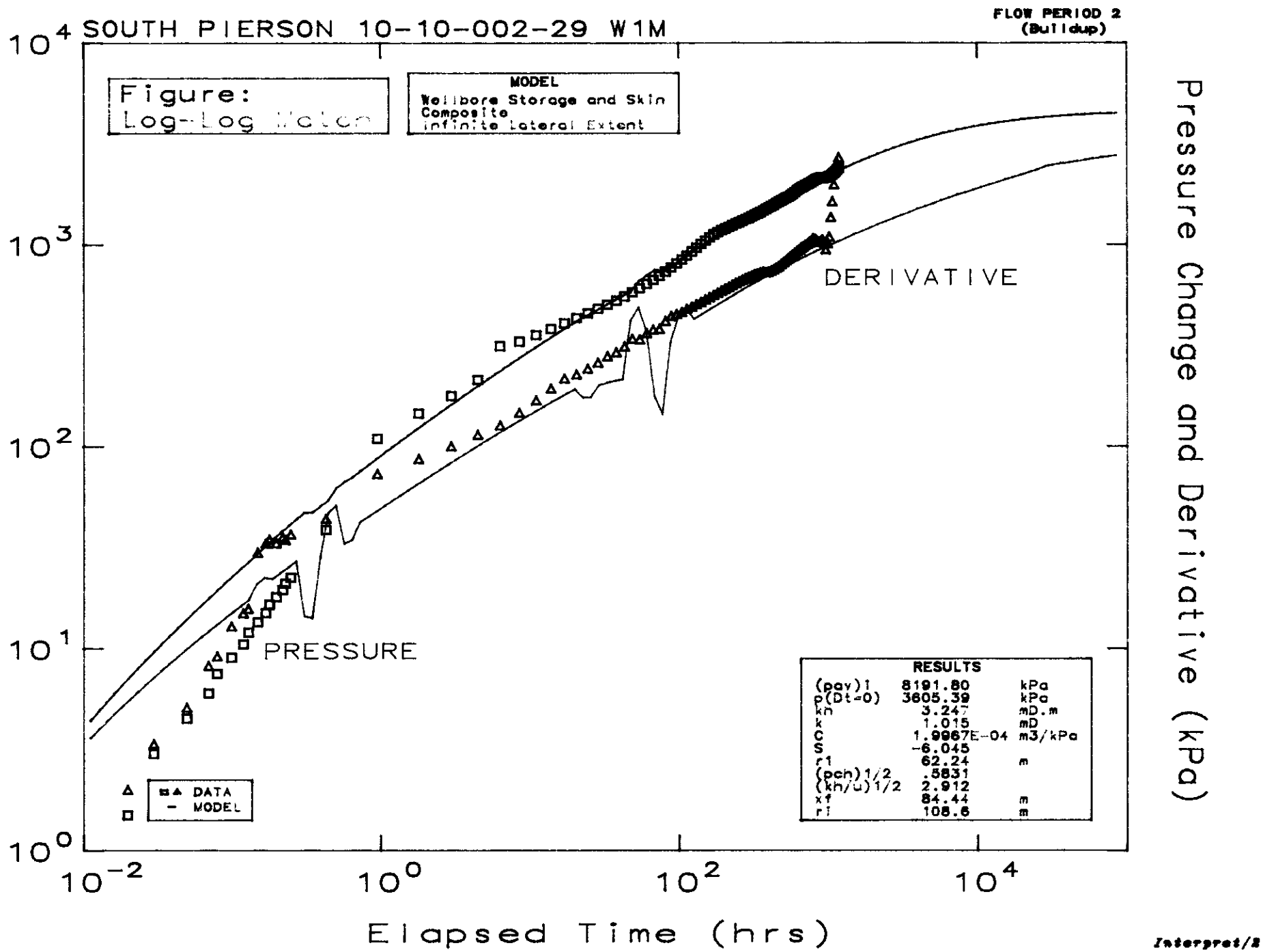
Date: 14-MAY-91
Test No:
Test Date: DEC 14/90 - FEB 1/91
Gauge:
Depth: m

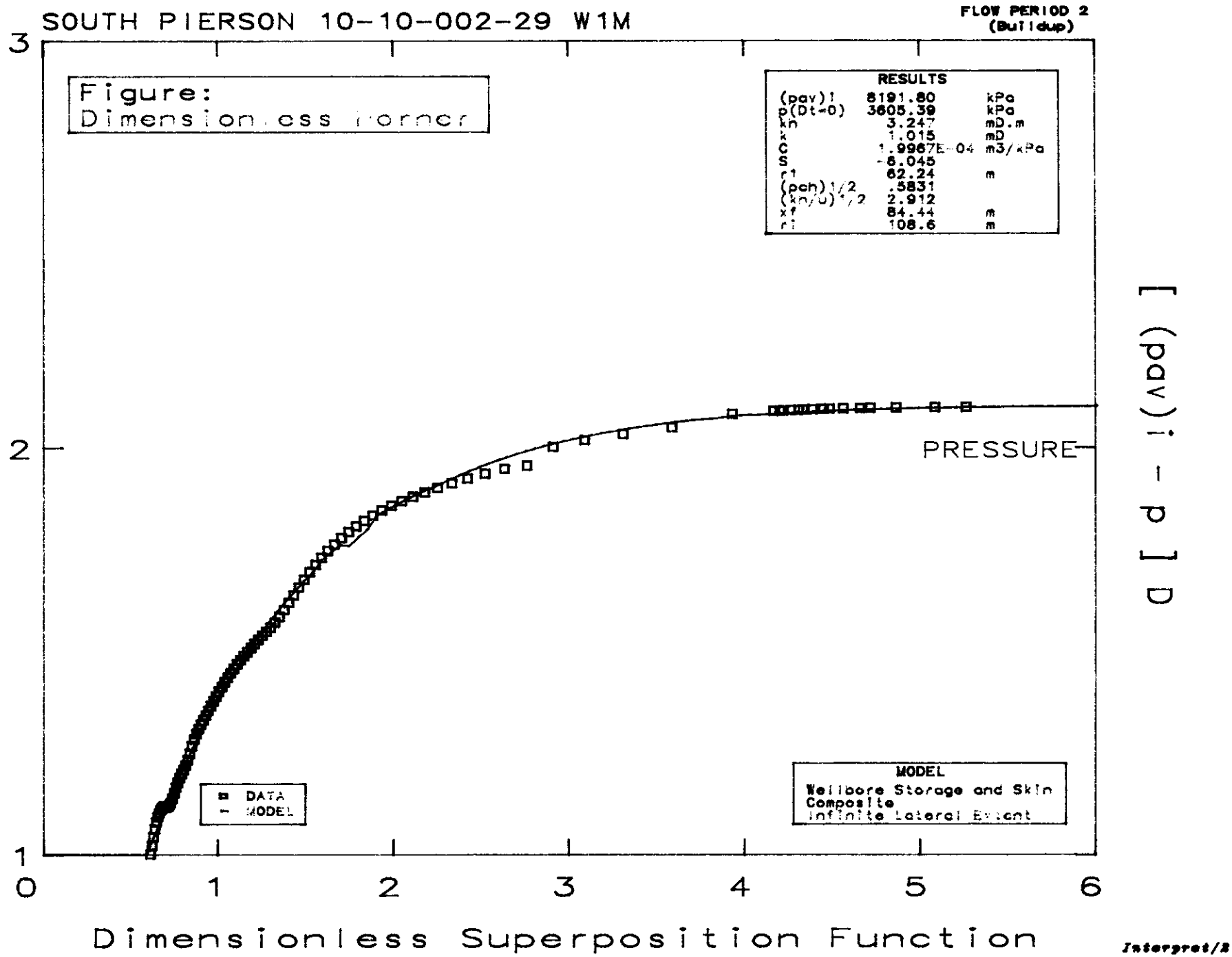
ANALYSIS MODEL, FLOW PERIOD: 2

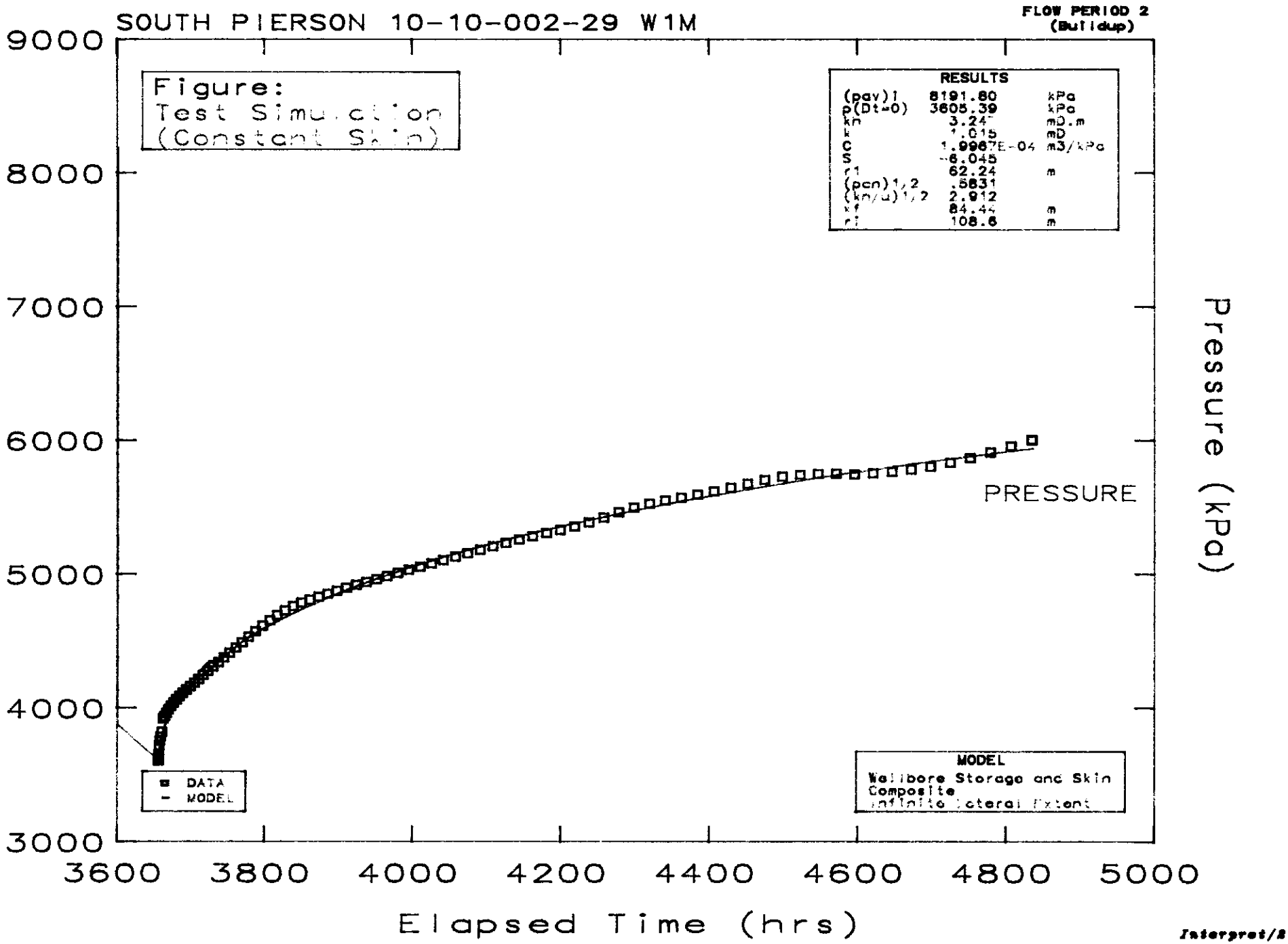
Near wellbore effects: Wellbore Storage and Skin
Reservoir behaviour: Composite
Boundary effects: Infinite Lateral Extent

ANALYSIS RESULTS, FLOW PERIOD: 2

Initial average reservoir pressure, (pav)i	8191.797	kPa
P (Delta t = 0), p(Dt=0)	3605.390	kPa
Permeability-thickness, kh	3.25	mD.m
Permeability, k	1.01	mD
Wellbore storage coefficient, C	1.997E-04	m3/kPa
Wellbore skin factor, S	-6.05	
Composite discontinuity radius, r1	62.	m
Composite storativity ratio, (pch)1/2	.583	
Composite mobility ratio, (kh/u)1/2	2.91	
Half length of fracture, xf	84.4	m
Radius of investigation (approx), ri	109.	m


SOUTH PIERSON 10-10-002-29 W1M
FLOW PERIOD 2
(Buildup)
Figure:
Log-Log Match
MODEL
Wellbore Storage and Skin
Composite
Infinite Lateral Extent
DERIVATIVE
PRESSURE
DATA
MODEL
RESULTS
(pay)1 8191.80 kPa
p(Dt=0) 3605.39 kPa
kh 3.247 mD.m
k 1.015 mD
C 1.9967E-04 m3/kPa
S -6.045
r1 62.24 m
(pch)1/2 .5831
(kh/u)1/2 2.912
xf 84.44 m
ri 108.6 m
Pressure Change and Derivative (kPa)
Elapsed Time (hrs)
Interpret/2


SOUTH PIERSON 10-10-002-29 W1M
FLOW PERIOD 2
(Buildup)
Figure:
Dimensionless Corner
RESULTS
(pav)i 8191.80 kPa
p(Dt=0) 3605.39 kPa
kh 3.247 mD.m
k 1.015 mD
C 1.9967E-04 m3/kPa
S -6.045
r1 62.24 m
(pch)1/2 .5831
(kh/u)1/2 2.912
xf 84.44 m
ri 108.6 m
PRESSURE
DATA
MODEL
MODEL
Wellbore Storage and Skin
Composite
Infinite Lateral Extent
[(pav)i - p] D
Dimensionless Superposition Function
0
1
2
3
4
5
6
1
2
3
Interpret/8


SOUTH PIERSON 10-10-002-29 W1M
FLOW PERIOD 2
(Buildup)
Figure:
Test Simulation
(Constant Skin)
RESULTS
(pav)1 8191.80 kPa
p(Dt=0) 3605.39 kPa
kh 3.24 mD.m
k 1.015 mD
C 1.9967E-04 m3/kPa
S -6.045
r1 62.24 m
(pcn)1/2 .5831
(kh/u)1/2 2.912
rf 84.44 m
ri 108.6 m
PRESSURE
DATA
MODEL
MODEL
Wellbore Storage and Skin
Composite
Infinite Lateral Extent
9000
8000
7000
6000
5000
4000
3000
3600
3800
4000
4200
4400
4600
4800
5000
Pressure (kPa)
Elapsed Time (hrs)
Interpret/8

SOUTH PIERSON
06-16-002-29 W1M

Date Of Test	January 21 - February 19/91
Extrapolated Reservoir Pressure	7 794 kPag
Permeability	12.5 md
Skin	-1.6

The analysis for this well indicated a composite, infinite acting reservoir. The composite behaviour results from the hydraulic fracture treatment conducted during the initial completion, as does the negative skin.

The permeability of 12.5 md derived from the composite model is greater than the core analysis results. This permeability represents that of the inner ring of the model. Fluid movement in this ring is mainly governed by the hydraulically induced fracture. Assuming the net pay and viscosity is constant in the inner and outer rings of the composite model, the permeability in the outer area (or matrix permeability) is 1.3 md which closely matches that of the core analysis. With the low matrix permeability, the build-up was not run long enough and therefore the second stabilization was not reached. This does leave room for some margin of error in the extrapolation of the late time data.

Scientific Software-Intercomp Interpret/2

WELL TEST ANALYSIS REPORT

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 06-16-002-29 W1M

Date: 18-APR-91
Test No:
Test Date: JAN 21 - FEB 19/91
Gauge:
Depth: m

Perforations:	From	To
1	m	m

ANALYSIS SUMMARY

PRESSURE READINGS TAKEN WITH AUTOMATIC ACOUSTIC WELLBORE SOUNDER.

Scientific Software-Intercomp Interpret/2

Results Summary

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 06-16-002-29 W1M

Date: 18-APR-91
Test No:
Test Date: JAN 21 - FEB 19/91
Gauge:
Depth: m

Near wellbore effects: Wellbore Storage and Skin
Reservoir behaviour: Composite
Boundary effects: Infinite Lateral Extent

Flow Period:		UNITS
(pav)i	7793.737	kPa
p(Dt=0)	954.900	kPa
kh	56.3	mD.m
k	12.5	mD
C	6.367E-03	m3/kPa
S	-1.60	
r1	52.	m
(pch)1/2	6.57	
(kh/u)1/2	9.43	
ri	267.	m

Well & Reservoir Parameters

Company: HOME OIL COMPANY LIMITED

Field:	SOUTH PIERSON	Date:	18-APR-91
Formation:	SPEARFISH	Test No:	
Zone:		Test Date:	JAN 21 - FEB 19/91
Well:	06-16-002-29 W1M	Gauge:	
		Depth:	m

WELL AND RESERVOIR DATA (OIL)

Matrix Porosity	.155	fraction
Reservoir Thickness	4.50	m
Wellbore Radius	.100	m
Oil Formation Volume Factor	1.169	Rm3/m3
Oil Viscosity	1.30	cp
Total Compressibility	6.800E-06	1/kPa

Rates

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 06-16-002-29 W1M

Date: 18-APR-91
Test No:
Test Date: JAN 21 - FEB 19/91
Gauge:
Depth: m

RATES

Flow Period	Start hrs	End hrs	Duration hrs	Oil Sm3/D	Gas 1E3Sm3/D	Water Sm3/D
1	.0000	1219.0000	1219.0000	9.90	.00	1.30
2	1219.0000	1955.0000	736.0000	8.20	.00	.40
3	1955.0000	2699.0000	744.0000	6.90	.00	.30
4	2699.0000	4858.0000	2159.0000	5.80	.00	.20
5	4858.0000	6022.0000	1164.0000	4.00	.00	.10
6	6022.0000	6714.0000	692.0000	.00	.00	.00

Analysis Parameters

Company: HOME OIL COMPANY LIMITED

Field:	SOUTH PIERSON	Date:	18-APR-91
Formation:	SPEARFISH	Test No:	
Zone:		Test Date:	JAN 21 - FEB 19/91
Well:	06-16-002-29 W1M	Gauge:	
		Depth:	m

ANALYSIS MODEL, FLOW PERIOD: 6

Near wellbore effects:	Wellbore Storage and Skin
Reservoir behaviour:	Composite
Boundary effects:	Infinite Lateral Extent

ANALYSIS PARAMETERS, FLOW PERIOD: 6

Pressure match, PM	4.854E-03	1/kPa
Time match, TM	.152	1/hr
Curve Match, Log CDe2S	2.94	
Dimensionless composite discontinuity radius, r1D	12.5	
Composite storativity ratio, (pch)1/2	6.57	
Composite mobility ratio, (kh/u)1/2	9.43	

Scie ˌfic Software-Intercomp | Interpret/2

Analysis Results

Company: HOME OIL COMPANY LIMITED

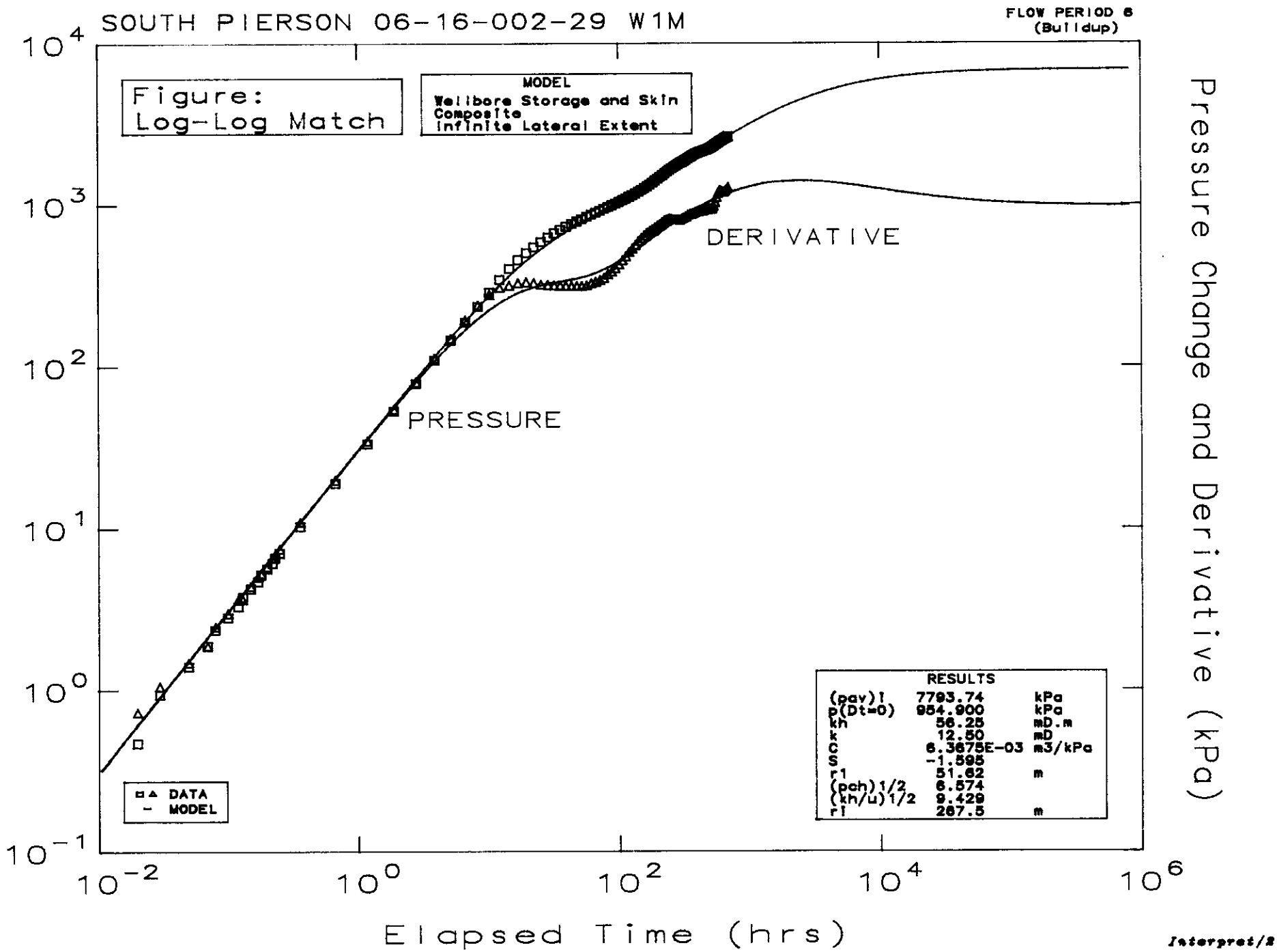
Field:	SOUTH PIERSON	Date:	18-APR-91
Formation:	SPEARFISH	Test No:	
Zone:		Test Date:	JAN 21 - FEB 19/91
Well:	06-16-002-29 W1M	Gauge:	
		Depth:	m

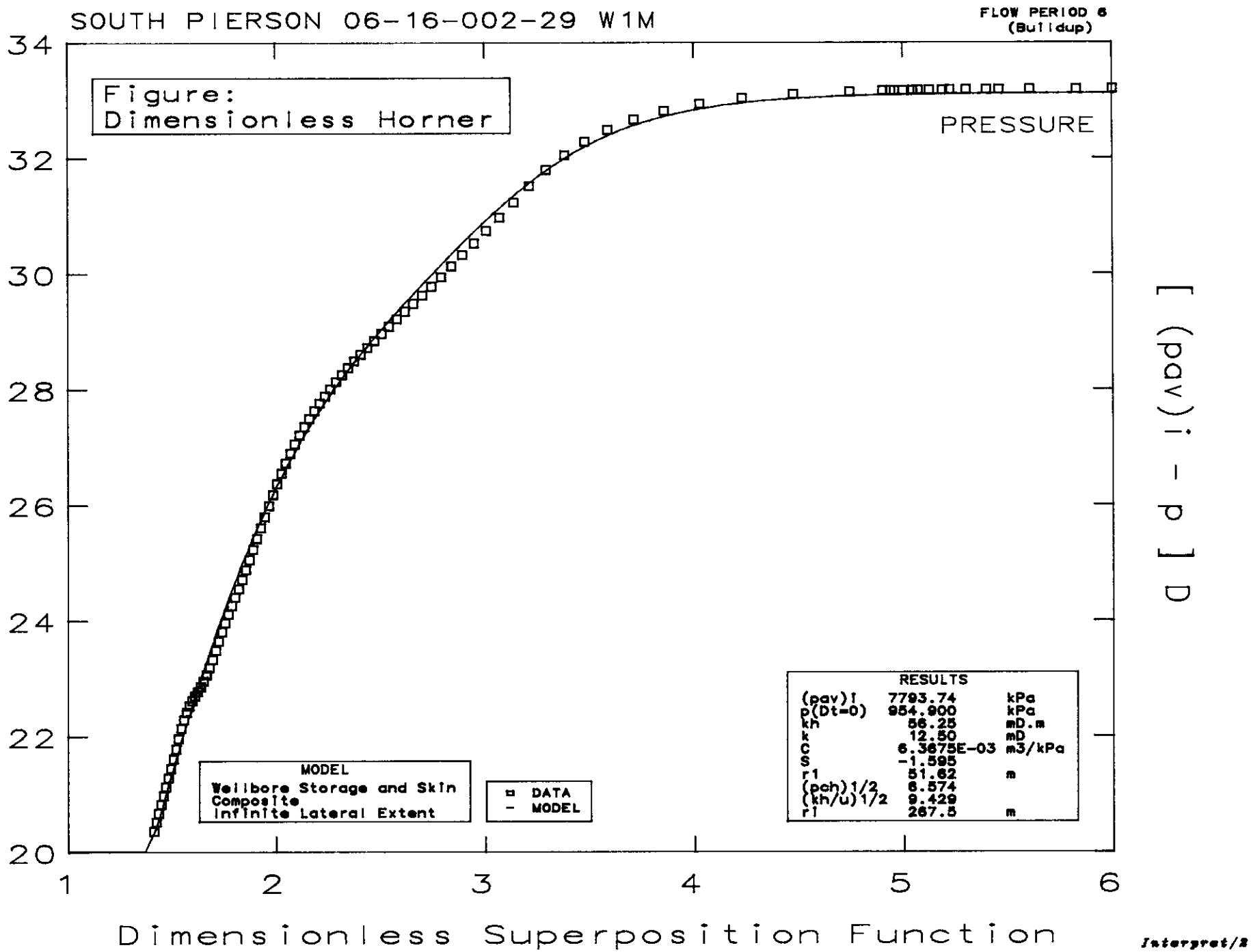
ANALYSIS MODEL, FLOW PERIOD: 6

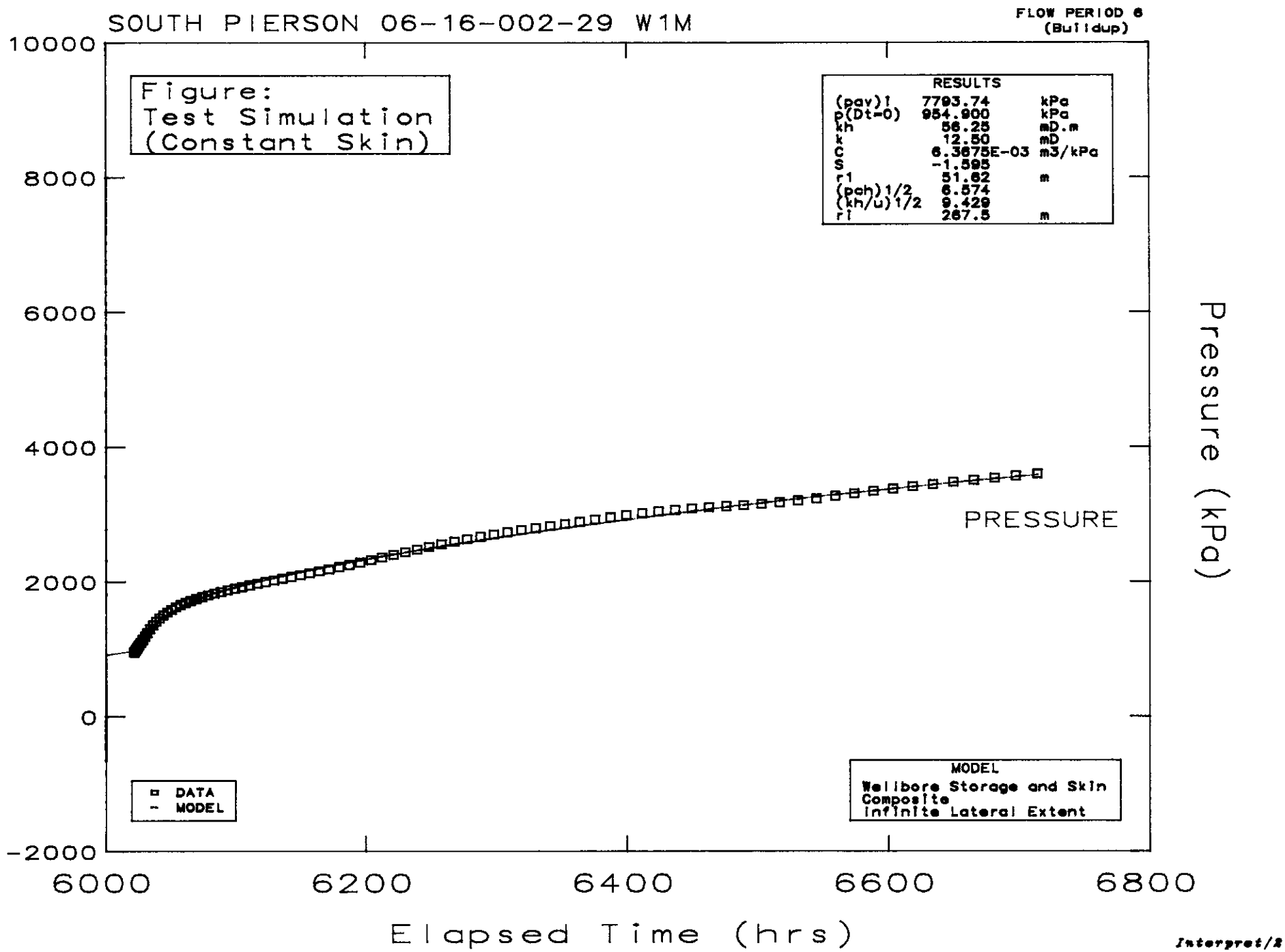
Near wellbore effects:	Wellbore Storage and Skin
Reservoir behaviour:	Composite
Boundary effects:	Infinite Lateral Extent

ANALYSIS RESULTS, FLOW PERIOD: 6

Initial average reservoir pressure, (pav)i	7793.737	kPa
P (Delta t = 0), p(Dt=0)	954.900	kPa
Permeability-thickness, kh	56.3	mD.m
Permeability, k	12.5	mD
Wellbore storage coefficient, C	6.367E-03	m3/kPa
Wellbore skin factor, S	-1.60	
Composite discontinuity radius, r1	52.	m
Composite storativity ratio, (pch)1/2	6.57	
Composite mobility ratio, (kh/u)1/2	9.43	
Radius of investigation (approx), ri	267.	m


SOUTH PIERSON 06-16-002-29 W1M
FLOW PERIOD 6
(Buildup)
Figure:
Log-Log Match
MODEL
Wellbore Storage and Skin
Composite
Infinite Lateral Extent
DERIVATIVE
PRESSURE
RESULTS
(pav)! 7793.74 kPa
p(Dt=0) 954.900 kPa
kh 56.25 mD.m
k 12.50 mD
C 6.3675E-03 m3/kPa
S -1.595
r1 51.62 m
(pch)1/2 6.574
(kh/u)1/2 9.429
r! 267.5 m
DATA
MODEL
Pressure Change and Derivative (kPa)
Elapsed Time (hrs)
Interpret/2


SOUTH PIERSON 06-16-002-29 W1M
FLOW PERIOD 6
(Buildup)
Figure:
Dimensionless Horner
PRESSURE
34
32
30
28
26
24
22
20
1
2
3
4
5
6
[(pav)i - p] D
Dimensionless Superposition Function
MODEL
Wellbore Storage and Skin
Composite
Infinite Lateral Extent
DATA
MODEL
RESULTS
(pav)i 7793.74 kPa
p(Dt=0) 954.900 kPa
kh 56.25 mD.m
k 12.50 mD
C 6.3675E-03 m3/kPa
S -1.595
r1 51.62 m
(pch)1/2 6.574
(kh/u)1/2 9.429
r1 267.5 m
Interpret/2


SOUTH PIERSON 06-16-002-29 W1M
FLOW PERIOD 6
(Buildup)
Figure:
Test Simulation
(Constant Skin)
RESULTS
(pav)! 7793.74 kPa
p(Dt=0) 954.900 kPa
kh 56.25 mD.m
k 12.50 mD
C 6.3675E-03 m3/kPa
S -1.595
r1 51.62 m
(pch)1/2 6.574
(kh/u)1/2 9.429
ri 267.5 m
PRESSURE
DATA
MODEL
MODEL
Wellbore Storage and Skin
Composite
Infinite Lateral Extent
10000
8000
6000
4000
2000
0
-2000
6000
6200
6400
6600
6800
Pressure (kPa)
Elapsed Time (hrs)
Interpret/2

SOUTH PIERSON
12-19-002-29 W1M

Date Of Test	September 19/90 - November 19/90
Extrapolated Reservoir Pressure	10 555 kPag
Permeability	0.008 md
Skin	-2.3

This build-up was conducted before the well was hydraulically fractured. A review of the data indicated that wellbore storage dominated the build-up and therefore the build-up was analyzed using a convolution technique. See attached report.

TRI-ENER-TECH PETROLEUM SERVICES LTD.
PHONE: (403) 264-5530

CONVOLUTION ANALYSIS
REVISED CALCULATIONS
HOME SR. S. PIER 12-19-02-29W1
SPEARFISH FORMATION

PREPARED FOR:
HOME OIL COMPANY LIMITED

PREPARED BY: Tim Gorman
Tim Gorman, P. Eng.

DATE: 1991-04-08

DISCUSSION

The log-log plots show the effects of wellbore storage are dominant throughout the duration of the buildup and conventional techniques could not be used to analyze the buildup response. Sandface rate convolution has been applied to unmask the reservoir response and allow quantitative calculation of the reservoir parameters. The results of the analysis should be viewed as order of magnitude calculations due to the possible error factors associated with the technique. Typically we recommend using this technique to supplement type curve matching, rather than a stand alone tool. Unfortunately, in this case, type curve matching could not be applied due to the extended WBS effects.

Linear regression was applied to the SRC modified Horner buildup data corresponding to shut-in times between 270 and 580 hours to determine a slope and extrapolated pressure. This is a general trend, but it is thought to be most indicative of the formation response. Conventional Horner analysis was them performed using the derive slope (6844 kPa/cycle) and extrapolated pressure (10555 kPa).

In addition to the SRC Modified Horner plot, a Sandface Rate Convolution plot has been created to determine the portion of the buildup which is reflecting formation response. The relatively linear portion after "Σ_e/1-Q_d" (Time Transform) = 6 suggests that the corresponding SRC Modified Horner data can be used for analysis.

Flow Rate

The stated final liquid flow rate of 0.06 m^3/d is lower than the calculated initial sandface liquid afterflow rate of 0.17 m^3/d. Using the SND calculated initial afterflow with cumulative production would result in an effective producing time of 161 days. An effective producing time of 10921 hours based on cumulative oil production (18.2 m^3) divided by final oil rate (0.04) is thought to be unrealistically high.

EFFECTIVE PRODUCING TIME

Reservoir parameter calculations were based on an effective producing time of 720 hours. This value was selected as it produces the most realistic value of extrapolated reservoir pressure. SRC Modified Horner plots have also been generated for producing times of 3864 and 10921 hours to show sensitivity of the slope and extrapolated pressures to variations in the producing time.

Producing Time (hrs)	Slope (kPa/cycle)	Extrapolated Pressure (kPa)
10921	4009	12000
3864	4996	11305
720	6844	10555

HOME SR. S. PIER 12-19-02-29W1
SPEARFISH FORMATION

SUMMARY OF RESULTS

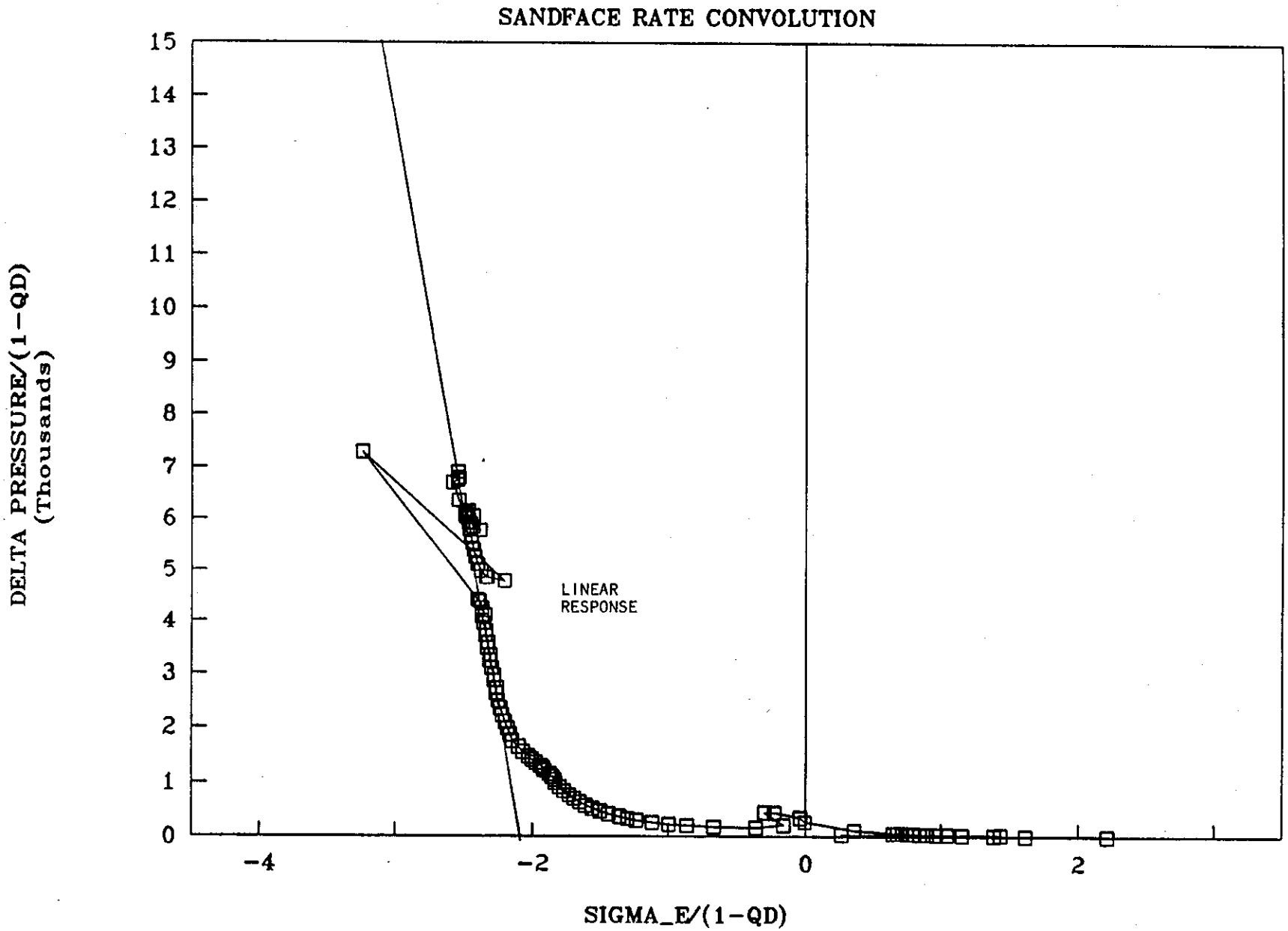
Input Parameters

Extrapolated Pressure	10555 kPa
Slope	6844 kPa/cycle
Final Flowing Pressure	523.8 kPa
Flow Rate (Oil)	0.04 m^3/d
Net Pay	6.0 m
Porosity	14.9%
Viscosity (Oil)	3.84 CP
Compressibility	1.0e-6 kPa^{-1}
Formation Volume Factor	1.01
Well Bore Radius	0.1 m
Effective Producing Time	720 Hrs.

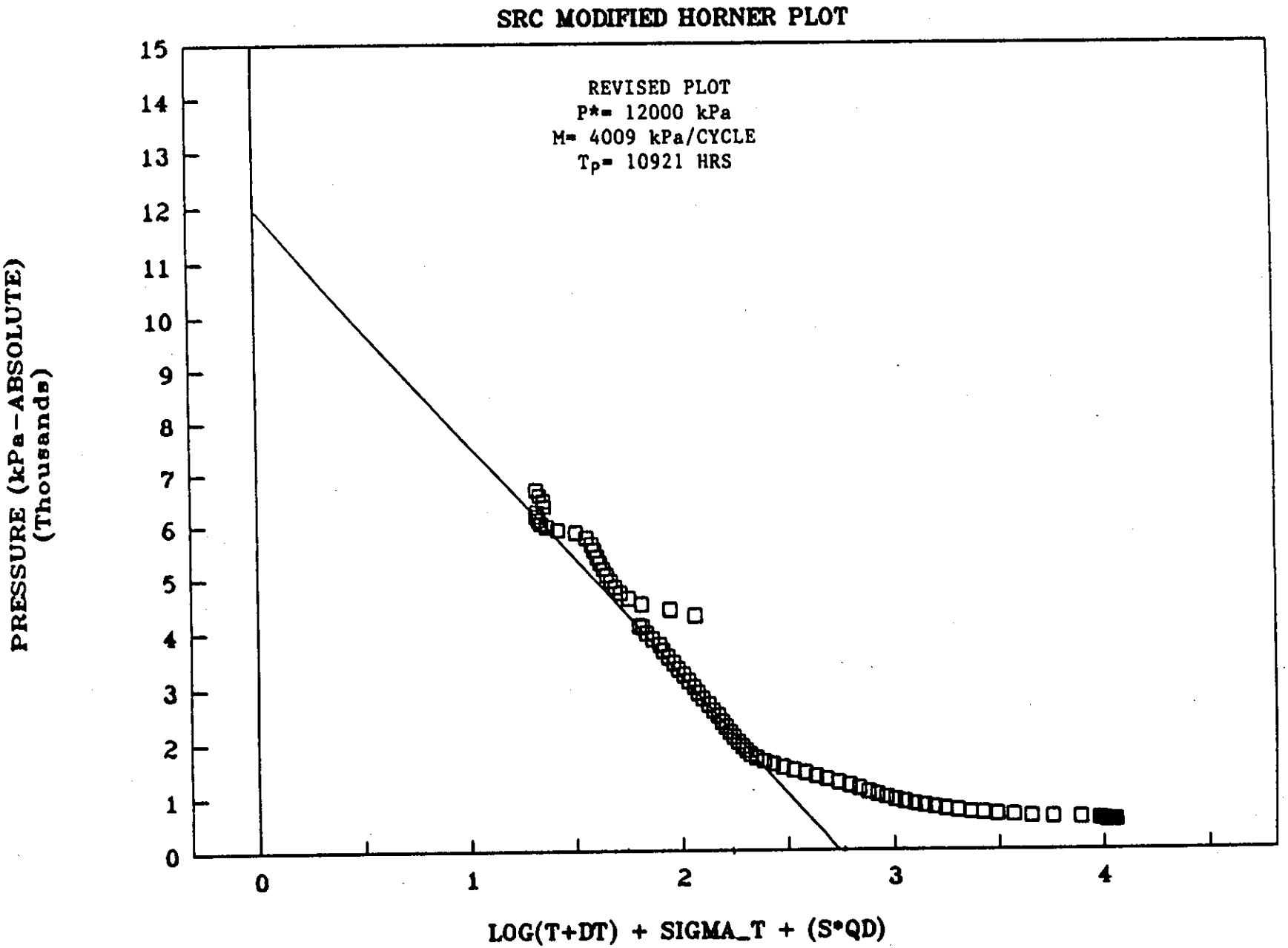
Calculated Parameters

Transmissibility (Oil)	0.012 mD • m/CP
Flow Capacity (Oil)	0.048 mD • m
Permeability (Oil)	0.008 mD
Skin Factor	-2.3
Damage Ratio	0.3
Radius of Investigation	11.1

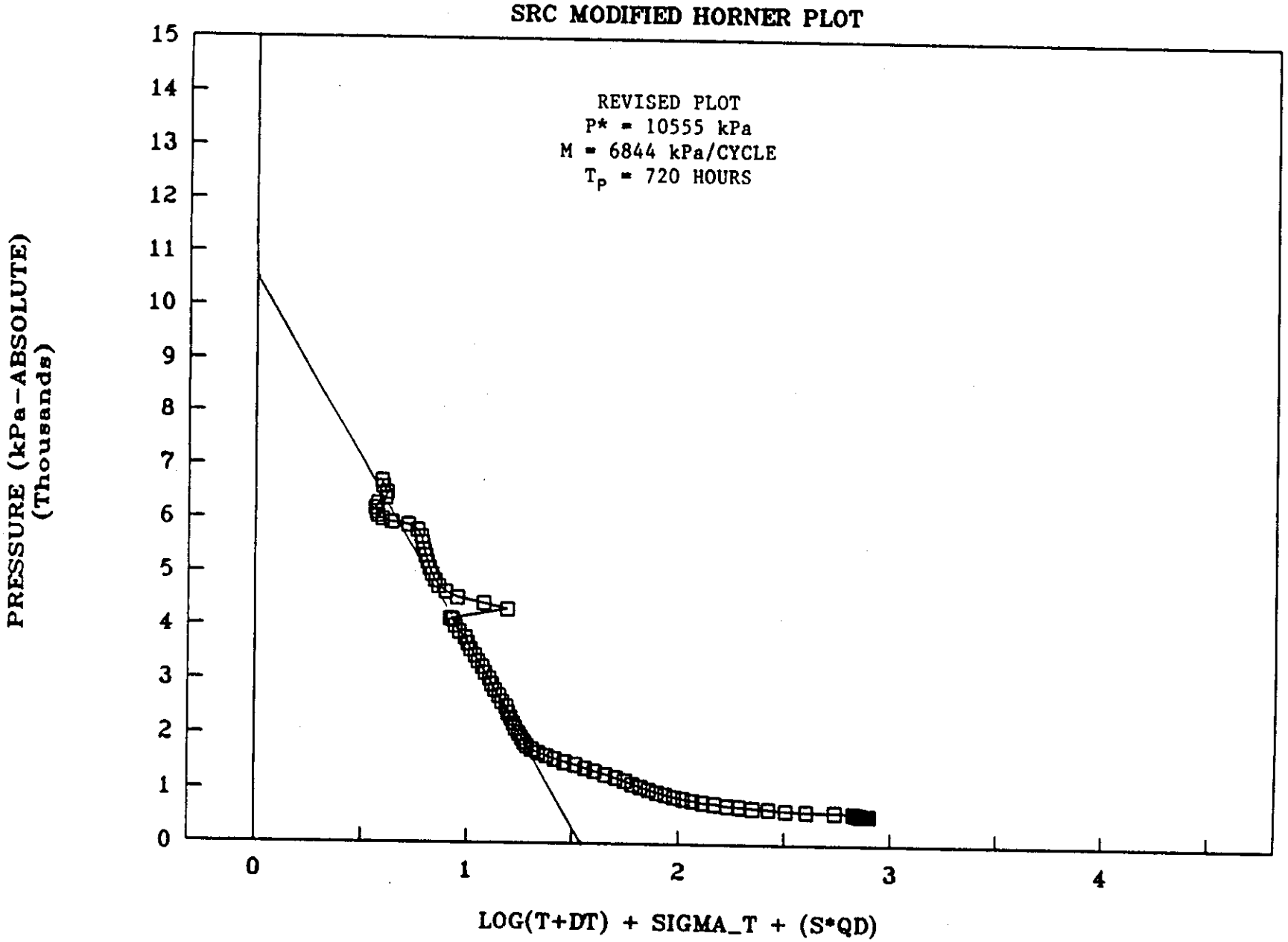
HOME SR.S.PIER 12-19-02-29W1



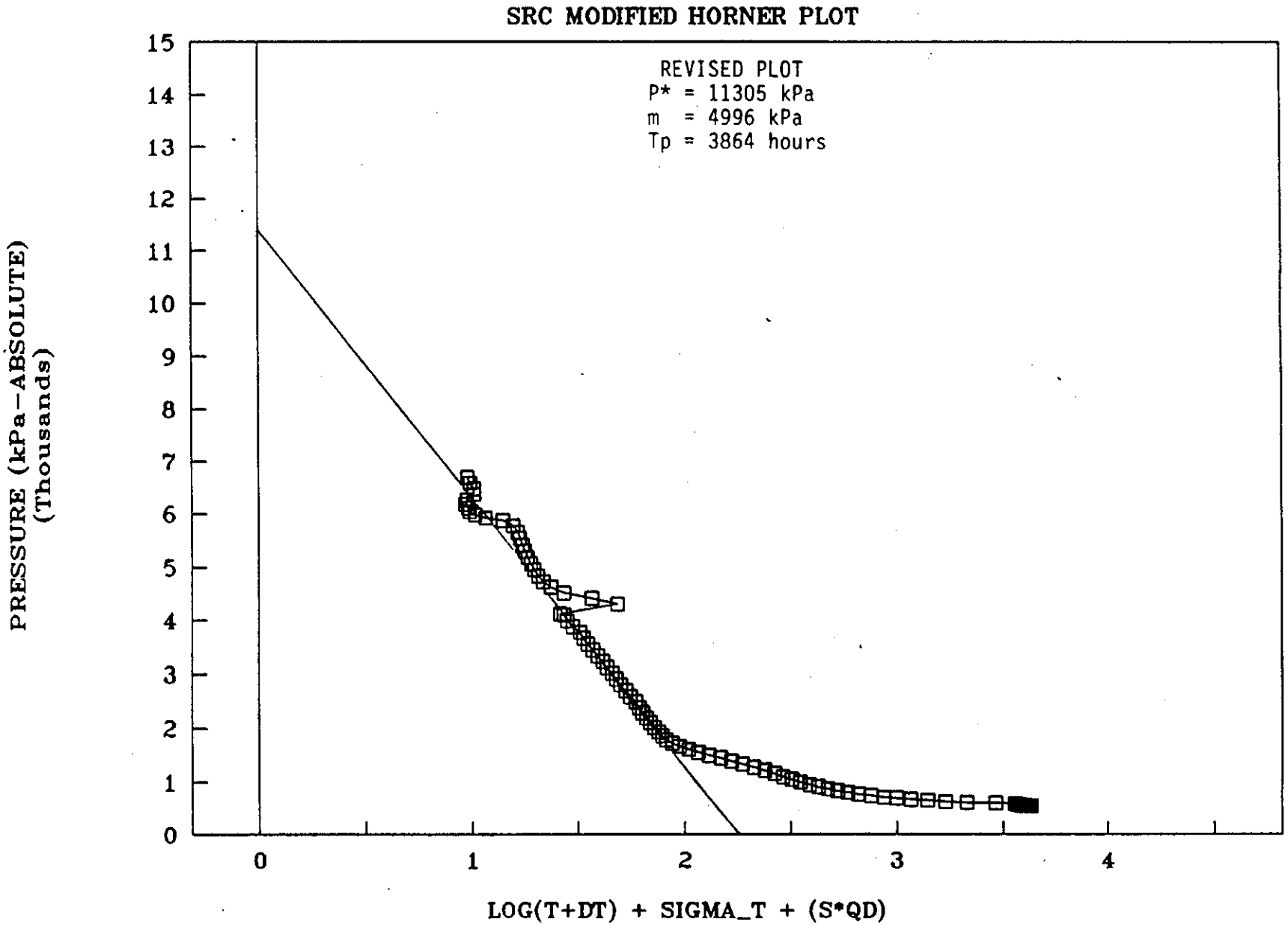
HOME SR.S.PIER 12-19-02-29W1



HOME SR.S.PIER 12-19-02-29W1



HOME SR.S.PIER 12-19-02-29W1



HOME SR. S. PIER 12-19-02-29W1
SPEARFISH FORMATION

Delta Time Hrs.	Pressure kPa	Sandface Rate m3/D	Pressure Function	SRC Time Function	SRC Mod. Hnr. Time
0.017	552.08	0.97	3.9609	2.2118	2.9020
0.033	552.18	0.97	8.9097	1.6120	2.8899
0.050	552.26	0.97	12.8705	1.3845	2.8853
0.067	552.34	0.98	33.6626	0.2630	2.8600
0.083	552.42	0.97	20.7892	1.4298	2.8862
0.100	552.50	0.97	24.7501	1.1547	2.8807
0.117	552.58	0.97	28.7109	1.0425	2.8784
0.133	552.67	0.97	33.1642	0.9621	2.8768
0.150	552.76	0.97	37.6206	0.8969	2.8755
0.167	552.84	0.97	41.5814	0.8416	2.8743
0.183	552.92	0.97	45.5392	0.7935	2.8734
0.200	553.01	0.97	49.9956	0.7505	2.8725
0.217	553.08	0.97	53.4610	0.7116	2.8717
0.233	553.17	0.97	57.9143	0.6764	2.8710
0.250	553.24	0.97	61.3796	0.6438	2.8703
0.473	554.36	0.97	116.8195	0.3556	2.8645
1.109	557.53	0.97	273.7370	-0.0053	2.8572
2.157	562.74	0.96	354.4193	-0.0398	2.8561
3.618	570.02	0.95	445.9950	-0.2304	2.8480
5.492	579.35	0.93	451.2746	-0.3040	2.8389
7.779	590.76	0.81	213.1801	-0.1612	2.8280
10.478	603.76	0.67	160.1325	-0.3653	2.7393
13.590	618.14	0.62	176.9692	-0.6720	2.6062
17.115	634.25	0.59	203.5687	-0.8669	2.5071
21.052	652.13	0.56	230.5319	-0.9966	2.4245
25.402	671.82	0.54	263.6040	-1.1187	2.3488
30.165	693.31	0.53	304.1237	-1.2332	2.2843
35.340	716.62	0.51	339.5287	-1.2995	2.2273
40.928	742.09	0.49	376.3782	-1.3640	2.1685
46.929	770.17	0.48	423.5064	-1.4437	2.1136
53.343	800.97	0.47	474.0005	-1.5071	2.0657
60.169	834.61	0.46	527.8941	-1.5623	2.0209
67.408	871.21	0.45	585.2184	-1.6118	1.9782
75.060	910.88	0.44	645.9840	-1.6566	1.9370
83.124	953.73	0.43	710.2012	-1.6976	1.8971
91.601	999.85	0.42	777.8447	-1.7355	1.8581
100.491	1049.35	0.41	848.9250	-1.7706	1.8200
109.794	1102.31	0.40	923.4016	-1.8032	1.7827
119.509	1158.22	0.39	1000.2630	-1.8338	1.7459
129.637	1214.70	0.37	1058.1820	-1.8417	1.7039
140.177	1271.30	0.35	1112.6670	-1.8583	1.6560
151.131	1327.80	0.33	1163.7000	-1.8770	1.6060
162.497	1384.00	0.32	1229.3730	-1.9157	1.5609
174.276	1439.66	0.30	1273.5990	-1.9265	1.5146
186.467	1494.57	0.28	1314.2880	-1.9432	1.4637
199.071	1548.49	0.27	1370.1740	-1.9789	1.4181
212.088	1602.69	0.26	1424.9080	-2.0067	1.3776

HOME SR. S. PIER 12-19-02-29W1
SPEARFISH FORMATION

Delta Time Hrs.	Pressure kPa	Sandface Rate m3/D	Pressure Function	SRC Time Function	SRC Mod. Hnr. Time
225.518	1660.32	0.25	1482.7520	-2.0311	1.3392
239.360	1721.85	0.25	1565.0700	-2.0718	1.3087
253.615	1787.81	0.25	1653.3130	-2.1032	1.2853
268.282	1858.94	0.26	1772.4250	-2.1496	1.2723
283.363	1936.21	0.26	1877.2160	-2.1661	1.2601
298.856	2019.03	0.26	1989.5340	-2.1854	1.2459
314.762	2106.13	0.26	2107.6560	-2.2041	1.2321
331.080	2197.05	0.26	2230.9580	-2.2217	1.2191
347.811	2291.47	0.26	2359.0070	-2.2385	1.2067
364.955	2389.22	0.26	2491.5720	-2.2541	1.1952
382.512	2489.88	0.26	2628.0840	-2.2688	1.1844
400.481	2592.08	0.25	2729.2960	-2.2627	1.1660
418.863	2695.58	0.25	2867.7620	-2.2841	1.1500
437.658	2800.27	0.24	2967.7160	-2.2798	1.1302
456.865	2906.06	0.24	3107.3590	-2.3010	1.1142
476.485	3012.94	0.24	3248.4410	-2.3165	1.1024
496.518	3120.77	0.23	3346.1610	-2.3108	1.0834
516.964	3228.39	0.23	3486.3500	-2.3305	1.0683
537.822	3336.16	0.22	3579.6340	-2.3255	1.0486
559.093	3444.40	0.22	3718.8000	-2.3456	1.0329
580.777	3553.36	0.21	3809.4180	-2.3411	1.0128
602.873	3663.22	0.21	3948.8560	-2.3605	0.9976
625.382	3774.11	0.21	4089.6010	-2.3741	0.9868
648.304	3879.57	0.19	4117.8680	-2.3494	0.9588
671.638	3987.50	0.19	4251.4310	-2.3748	0.9383
695.385	4097.93	0.19	4388.0880	-2.3902	0.9259
719.545	4112.45	0.19	4406.0570	-2.4025	0.9159
744.118	4305.17	0.48	7285.5650	-3.2420	1.1872
769.103	4412.50	0.19	4777.3690	-2.2059	1.0748
794.501	4520.01	0.18	4849.7900	-2.3336	0.9480
820.312	4621.86	0.16	4854.4110	-2.3447	0.8916
846.535	4726.63	0.16	4979.3780	-2.3828	0.8596
873.171	4836.01	0.16	5109.8430	-2.4050	0.8410
900.220	4948.67	0.16	5244.2210	-2.4216	0.8271
927.682	5064.13	0.16	5381.9380	-2.4352	0.8157
955.556	5180.93	0.16	5521.2540	-2.4471	0.8057
983.843	5298.23	0.16	5661.1660	-2.4572	0.7972
1012.542	5411.93	0.16	5796.7840	-2.4663	0.7896
1041.655	5528.84	0.16	5936.2300	-2.4747	0.7826
1071.180	5650.62	0.16	6081.4870	-2.4818	0.7766
1101.117	5768.67	0.15	6148.2180	-2.4728	0.7592
1131.468	5864.91	0.12	6045.7250	-2.4368	0.7159
1162.231	5918.21	0.07	5774.5080	-2.3889	0.6374
1193.407	5978.85	0.07	5839.7630	-2.4362	0.5934
1224.995	6040.65	0.07	5906.2650	-2.4600	0.5713
1256.997	6104.92	0.08	6041.0890	-2.4926	0.5661
1289.411	6176.25	0.08	6118.6890	-2.4999	0.5594

HOME SR. S. PIER 12-19-02-29W1
SPEARFISH FORMATION

Delta Time Hrs.	Pressure kPa	Sandface Rate m3/D	Pressure Function	SRC Time Function	SRC Mod. Hnr. Time
1322.237	6260.29	0.10	6349.6710	-2.5427	0.5714
1355.477	6369.70	0.13	6697.1200	-2.5885	0.6087
1389.129	6476.90	0.12	6742.1270	-2.5538	0.6130
1423.193	6581.34	0.11	6783.0070	-2.5422	0.5976
1457.671	6686.44	0.11	6901.2450	-2.5500	0.5906

SOUTH PIERSON
02-30-002-29 W1M

Date Of Test	January 10 - February 19/91
Extrapolated Reservoir Pressure	8 603 kPag
Permeability	4.4 md
Skin	-1.5

A composite, infinite acting reservoir model was used in the analysis of the build-up to match the data. The composite behaviour is a result of the induced hydraulic fracture, as is the negative skin.

Once again, the permeability attained from the model is greater than the core analysis results. This permeability represents that of the inner ring of the model. Fluid movement in this ring is mainly governed by the hydraulic fracture. Assuming the net pay and viscosity is constant in the inner and outer rings of the composite model, the permeability in the outer area (or matrix permeability) is 0.62 md. With the low matrix permeability, the build-up was not run long enough and therefore the second stabilization was not reached. This does leave room for some margin of error in the extrapolation of the late time data.

Sci. ific Software-Intercomp Interpret/2

WELL TEST ANALYSIS REPORT

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 02-30-002-30 W1M

Date: 02-MAY-91
Test No:
Test Date: JAN 10 - FEB 19/91
Gauge:
Depth: m

Perforations:	From	To
1	m	m

ANALYSIS SUMMARY

PRESSURE READINGS TAKEN WITH AUTOMATIC ACOUSTIC WELLBORE SOUNDER.

Scie ific Software-Intercomp — Interpret/2

Results Summary

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 02-30-002-30 W1M

Date: 02-MAY-91
Test No:
Test Date: JAN 10 - FEB 19/91
Gauge:
Depth: m

Near wellbore effects: Wellbore Storage and Skin
Reservoir behaviour: Composite
Boundary effects: Infinite Lateral Extent

Flow Period:		UNITS
(pav)i	8603.470	kPa
p(Dt=0)	659.880	kPa
kh	24.6	mD.m
k	4.39	mD
C	2.895E-04	m3/kPa
S	-1.53	
r1	27.	m
(pch)1/2	1.04	
(kh/u)1/2	7.12	
ri	183.	m

Scie ific Software-Intercomp Interpret/2

Well & Reservoir Parameters

Company: HOME OIL COMPANY LIMITED

Field:	SOUTH PIERSON	Date:	02-MAY-91
Formation:	SPEARFISH	Test No:	
Zone:		Test Date:	JAN 10 - FEB 19/91
Well:	02-30-002-30 W1M	Gauge:	
		Depth:	m

WELL AND RESERVOIR DATA (OIL)

Matrix Porosity	.161	fraction
Reservoir Thickness	5.60	m
Wellbore Radius	.100	m
Oil Formation Volume Factor	1.169	Rm3/m3
Oil Viscosity	1.30	cp
Total Compressibility	6.800E-06	1/kPa

Rates

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 02-30-002-30 W1M

Date: 02-MAY-91
Test No:
Test Date: JAN 10 - FEB 19/91
Gauge:
Depth: m

RATES

Flow Period	Start hrs	End hrs	Duration hrs	Oil Sm3/D	Gas 1E3Sm3/D	Water Sm3/D
1	.0000	498.0000	498.0000	8.60	.00	.30
2	498.0000	1219.0000	721.0000	7.10	.00	1.00
3	1219.0000	3373.0000	2154.0000	5.60	.00	.40
4	3373.0000	4333.0000	960.0000	3.80	.00	.20
5	4333.0000	5291.0000	958.0000	.00	.00	.00

Analysis Parameters

Company: HOME OIL COMPANY LIMITED

Field:	SOUTH PIERSON	Date:	02-MAY-91
Formation:	SPEARFISH	Test No:	
Zone:		Test Date:	JAN 10 - FEB 19/91
Well:	02-30-002-30 W1M	Gauge:	
		Depth:	m

ANALYSIS MODEL, FLOW PERIOD: 5

Near wellbore effects:	Wellbore Storage and Skin
Reservoir behaviour:	Composite
Boundary effects:	Infinite Lateral Extent

ANALYSIS PARAMETERS, FLOW PERIOD: 5

Pressure match, PM	2.280E-03	1/kPa
Time match, TM	1.46	1/hr
Curve Match, Log CDe2S	1.55	
Dimensionless composite discontinuity radius, r1D	95.4	
Composite storativity ratio, (pch)1/2	1.04	
Composite mobility ratio, (kh/u)1/2	7.12	

Analysis Results

Company: HOME OIL COMPANY LIMITED

Field: SOUTH PIERSON
Formation: SPEARFISH
Zone:
Well: 02-30-002-30 W1M

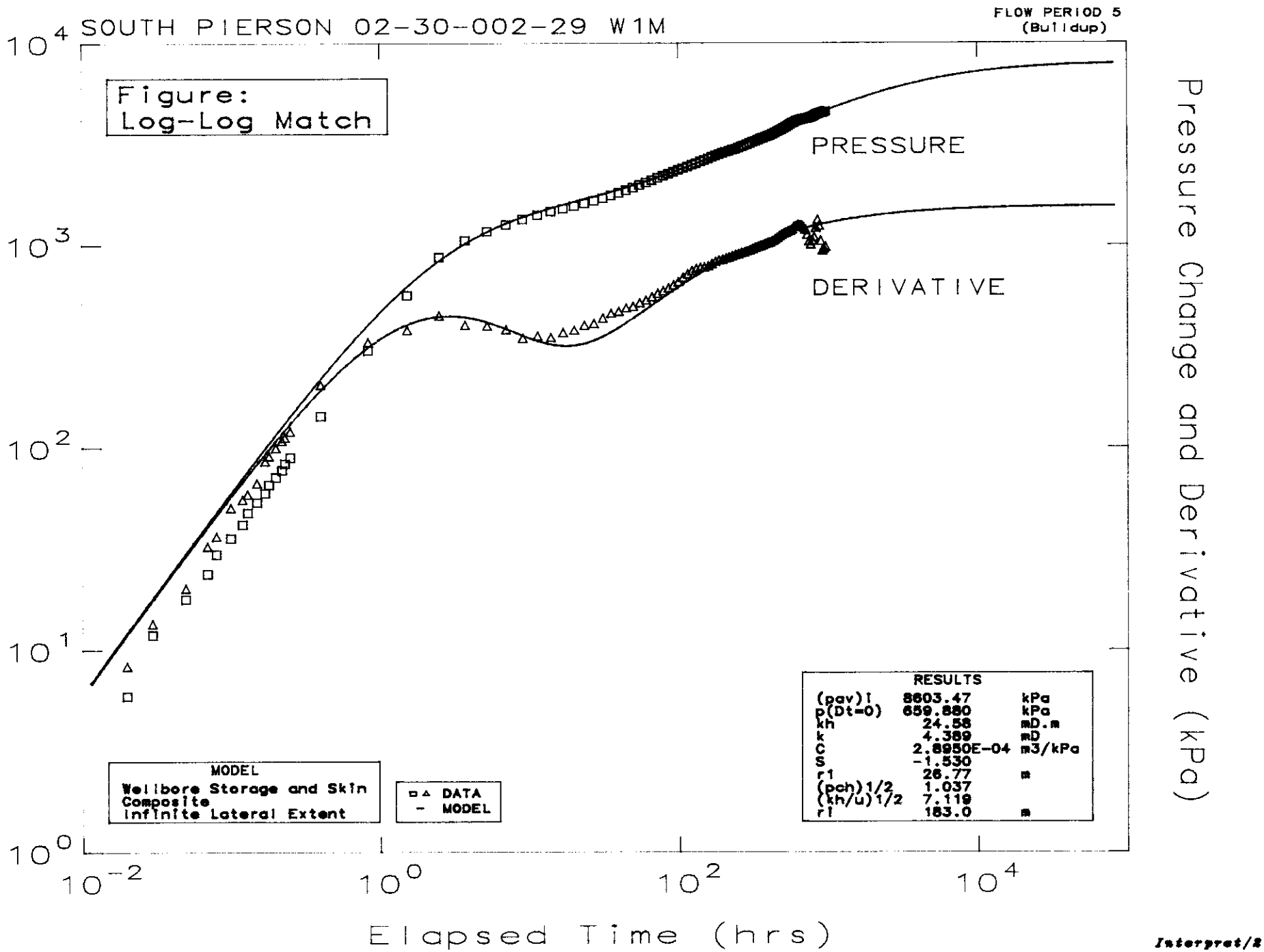
Date: 02-MAY-91
Test No:
Test Date: JAN 10 - FEB 19/91
Gauge:
Depth: m

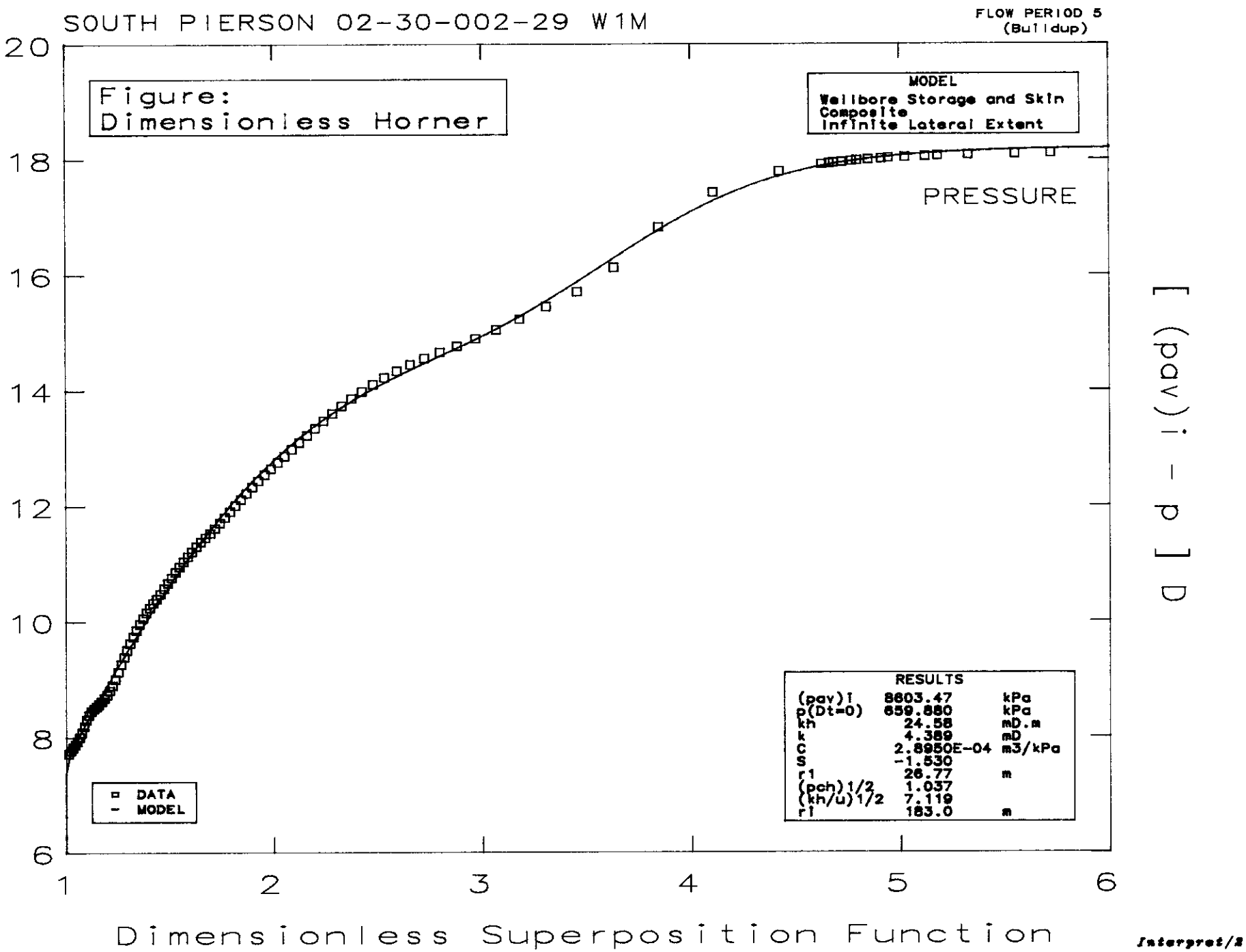
ANALYSIS MODEL, FLOW PERIOD: 5

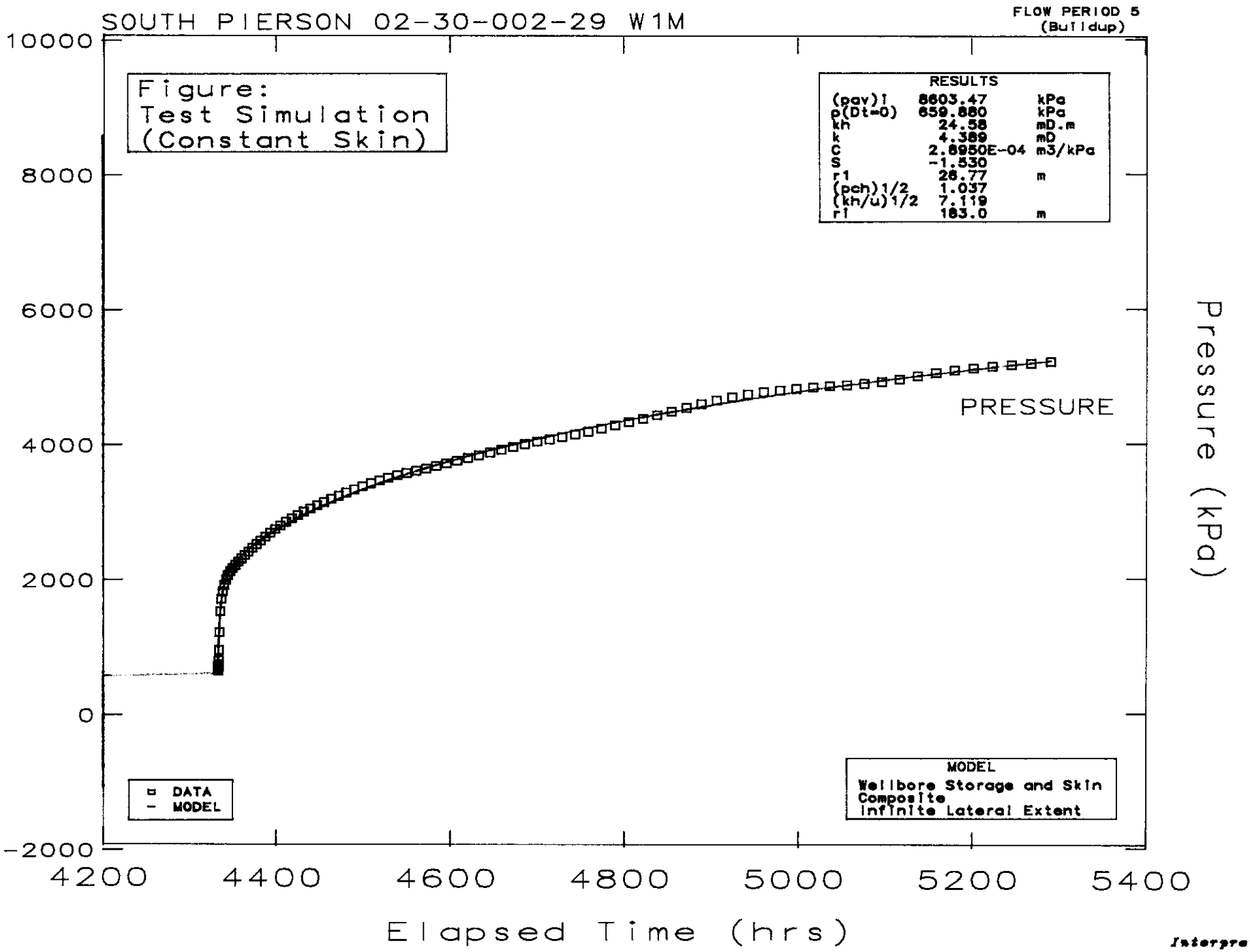
Near wellbore effects: Wellbore Storage and Skin
Reservoir behaviour: Composite
Boundary effects: Infinite Lateral Extent

ANALYSIS RESULTS, FLOW PERIOD: 5

Initial average reservoir pressure, (pav)i	8603.470	kPa
P (Delta t = 0), p(Dt=0)	659.880	kPa
Permeability-thickness, kh	24.6	mD.m
Permeability, k	4.39	mD
Wellbore storage coefficient, C	2.895E-04	m3/kPa
Wellbore skin factor, S	-1.53	
Composite discontinuity radius, r1	27.	m
Composite storativity ratio, (pch)1/2	1.04	
Composite mobility ratio, (kh/u)1/2	7.12	
Radius of investigation (approx), ri	183.	m


SOUTH PIERSON 02-30-002-29 W1M
FLOW PERIOD 5
(Buildup)
Figure:
Log-Log Match
PRESSURE
DERIVATIVE
RESULTS
(pav)i 8603.47 kPa
p(Dt=0) 659.880 kPa
kh 24.58 mD.m
k 4.389 mD
C 2.8950E-04 m3/kPa
S -1.530
r1 26.77 m
(pch)1/2 1.037
(kh/u)1/2 7.119
rI 183.0 m
MODEL
Wellbore Storage and Skin
Composite
Infinite Lateral Extent
DATA
MODEL
Pressure Change and Derivative (kPa)
Elapsed Time (hrs)
Interpret/2


SOUTH PIERSON 02-30-002-29 W1M
FLOW PERIOD 5
(Buildup)
Figure:
Dimensionless Horner
MODEL
Wellbore Storage and Skin
Composite
Infinite Lateral Extent
PRESSURE
RESULTS
(pav)i 8603.47 kPa
p(Dt=0) 659.880 kPa
kh 24.58 mD.m
k 4.389 mD
C 2.8950E-04 m3/kPa
S -1.530
r1 26.77 m
(pch)1/2 1.037
(kh/u)1/2 7.119
ri 183.0 m
DATA
MODEL
20
18
16
14
12
10
8
6
1
2
3
4
5
6
[(pav)i - p] D
Dimensionless Superposition Function
Interpret/2


SOUTH PIERSON 02-30-002-29 W1M
FLOW PERIOD 5
(Buildup)
Figure:
Test Simulation
(Constant Skin)
RESULTS
(pav)i 8603.47 kPa
p(Dt=0) 659.880 kPa
kh 24.58 mD.m
k 4.389 mD
C 2.8950E-04 m3/kPa
S -1.530
r1 26.77 m
(pch)1/2 1.037
(kh/u)1/2 7.119
ri 183.0 m
PRESSURE
DATA
MODEL
MODEL
Wellbore Storage and Skin
Composite
Infinite Lateral Extent
10000
8000
6000
4000
2000
0
-2000
4200
4400
4600
4800
5000
5200
5400
Pressure (kPa)
Elapsed Time (hrs)
Interpret/2