

**EVALUATION OF WELL
WESTERN ADVENTURE # 1,
NORTH BROOK FORMATION,
DEER LAKE BASIN, NEWFOUNDLAND
VOLUME 1 OF 2**

**Prepared for:
DEER LAKE OIL AND GAS LIMITED**

**By: Roberto Aguilera, Ph.D.
Maria S. Aguilera, B.Sc.**

May 28, 2001



SERVIPETROL LTD.
International Petroleum Consultants





SERVIPETROL LTD.

*International Petroleum Consultants
Independent Oil and Gas Producers*



736 - 6th Ave. S.W., Suite 1640
Calgary, AB, Canada T2P 3T7

<http://www.agt.net/public/aguilera/servipetrol.htm>
email: aguilera@agt.net

Ph: (403) 266-2535
Fax: (403) 264-8297

Roberto Aguilera, Ph.D., PEng.
President

May 28, 2001

Deer Lake Oil and Gas
205 Water Street (2nd Floor)
St. John's, Newfoundland A1C 1B4

ATTENTION: Mr. Cabot Martin

Gentlemen:

**SUBJECT: EVALUATION OF DEER LAKE
WESTERN ADVENTURE # 1
NEWFOUNDLAND, CANADA**

This report presents an evaluation of the North Brook formation, well Western Adventure # 1, Deer Lake Basin, Newfoundland. The study focuses on quantitative evaluation of the formation. Following a detailed review of geologic and reservoir data the well logs of Western Adventure # 1 were evaluated using Servipetrol's Fracture Completion Log (FCL). The analysis indicated a negligible amount of net pay. This conclusion is supported by 3 DSTs that failed to yield commercial gas rates.

Results of the study show large values of water saturation typically bigger than 60%. Small gas rates ranging between 823 and 2,936 m³/d measured during DST# 4 are associated with the presence of natural microfractures. A gas analysis conducted by Core Laboratories indicated a very large percentage of nitrogen (80.63%) and a very small volume of methane (15.98%). Comparing the initial (13,950 kPaa) and final (13,720 kPaa) extrapolated pressures (p^*) recorded during DST# 4 indicates that there is a 1.65% reservoir depletion. The skin is negative ($s \approx -2$) and consequently it is highly unlikely that a stimulation job would lead to larger production rates.

The host rock ("matrix system") is tight and as a result fluid flow to the wellbore cannot be obtained unless natural fractures are intersected by the well. The "fracture" system is composed mainly by low permeability microfractures of tectonic origin. Effective permeability to gas is in the order of 0.015 md.

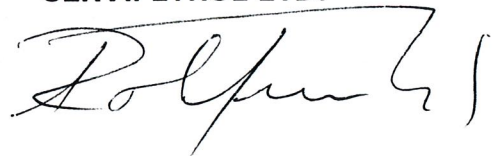
Given the very low value of fracture permeability, the volume of gas-in-place investigated during DST# 4 is negligible. The volume of gas-in-place from the FCL log interpretation is also very small. Assuming a reasonable water saturation cutoff of 55% indicates that there is negligible pay in Western Adventure # 1. Assuming a water saturation cutoff of 75% leads to a net pay of 10 meters and a gas-in-place of $437.6 \times 10^3 \text{ m}^3/\text{hectare}$. This equates to $113.3 \times 10^6 \text{ m}^3/\text{section}$ (1 section = 259 hectares = 640 acres).

Assuming that there is no water influx the gas recovery is estimated at 75 % of the OGIP or $85 \times 10^6 \text{ m}^3$ of gas per section. This includes the very large percentage of nitrogen mentioned above.

It is recommended to study the possibility of drilling a well up structure to continue with the exploration of the Deer Lake basin. It is also recommended to validate the gas analysis from the North Brook formation.

The studies that substantiate these conclusions are presented in detail in this report. This opportunity to be of service to Deer Lake Oil and Gas is sincerely appreciated. If you have any questions or if I can be of further assistance, please do not hesitate to contact me at your convenience.

Yours truly,
SERVIPETROL LTD.



Roberto Aguilera, Ph. D., P. Eng.
President

RA:mep



SUMMARY

This report presents an evaluation of well Western Adventure # 1, North Brook formation, Deer Lake basin, Newfoundland. The evaluation was conducted through detailed quantitative analyses of logs and cores using Servipetrol's Fracture Completion Log (FCL). DSTs # 1 and 3 carried out on August 2001 and DST # 4 performed on December 2001 were evaluated using Servipetrol's WELLTEST-NFR, a software package with capabilities for evaluation of naturally fractured reservoirs.

The North Brook is a low porosity (usually less than 10%), low effective permeability ($k_g < 0.1$ md) Carboniferous formation, composed predominantly by sandstone, siltstone, shales and conglomerates.

The FCL log interpretation of well Western Adventure # 1 indicates the presence of natural microfractures of tectonic origin. The North Brook reservoir can be classified as being of Type A, i.e., is a reservoir where most of the storage is within the matrix and a smaller storage is within the fractures (Aguilera¹). The fracture porosity from the log interpretation averages 1.48%. Although this porosity is large, it is composed by microfractures of very low effective permeability to gas.

The natural microfractures contribute the necessary permeability required to achieve the small gas production observed during DST# 4. Gas reservoir capacity was calculated to be in the order of 0.032 md-m. Effective permeability to gas was calculated to be 0.015 md.

The skin factor is negative (≈ -2.2) indicating improved conditions around the wellbore. Under this circumstance it is highly unlikely that the gas production rates observed during DST# 4 could be increased with a stimulation job. Based on experience, the negative skin is reflecting the presence of fractures.



Comparing the initial (13,950 kPaa) and final (13,720 kPaa) extrapolated pressures (p^*) recorded during DST# 4 indicates that there is a 1.65% reservoir depletion.

The radius of investigation from DST# 4 was only in the order of 3.7 meters due to the very low microfracture permeability and the short flow period. This radius of investigation led to a negligible volume of gas investigated. The FCL log interpretation also indicates a negligible volume of gas-in-place using a water saturation cutoff of 55%. If this cutoff is increased to 75% the gas-in-place amounts to $437.6 \times 10^3 \text{ m}^3$ per hectare. A water saturation cutoff of 75%, however, is very high based on our experience with naturally fractured reservoirs.

A gas analysis conducted by Core Laboratories on December 11, 2000 indicated a very large percentage of nitrogen (80.63%). A second analysis carried out by the same company on December 29, 2000 yielded 72.78% of nitrogen and 7.67% of methane. Probably these results are reflecting the method of collection. Deer Lake Oil and Gas indicates that the sample was collected from an "outlet line bubbling gas up through water in a small inverted plastic bag giving a mixture of gas, air and water at a time when the gas/ratio coming out of the line was 10% of gas and 90% of air".

Gas recovery has been estimated at 75% assuming that there is no water influx (Aguilera¹). If the reservoir is connected with an aquifer, gas recoveries could be anticipated to be lower.

It is recommended to study the possibility of drilling a well up structure to continue with the exploration of the Deer Lake basin. Study the possibility of deviating the new well towards the north-west or the south-east without incurring in additional significant expenses. In principle, this could improve the probabilities of success as very limited in-situ stress information suggests that fractures oriented from the south-west to the north-east could possibly be open.



CONCLUSIONS

Conclusions presented in this report are based on a review of geological and reservoir data, FCL (Fracture Completion log) interpretation and well test analysis of well Western Adventure # 1, North brook formation, Deer Lake basin, Newfoundland:

- 1) The North Brook is a naturally fractured reservoir of **Type A**, i.e., a reservoir where most of the storage is within the matrix system and a smaller storage is within the fractures¹. Only microfractures were intersected by well Western Adventure # 1. The natural micro fractures provide the necessary permeability to achieve the small gas rates observed during DST# 4 (823 to 2,936 m³/d). An analysis conducted by Core Laboratories in a sample collected during DST# 3 shows that the mol percent of N₂ is very high (80.63%). The percentage of CH₄ is only 15.98%. This is probably the result of the sampling method.
- 2) The North Brook natural fractures are of tectonic origin and are probably fault and fold-related. Tectonic fractures are very pervasive from a macro-scale all the way to the grain scale. Most likely the fold-related natural fractures are mainly of Type I and II (Stearns classification¹). Due to the pervasive nature of tectonic fractures it is likely that future wells could intersect macrofractures in which case the gas rates would be much more significant than those recorded during DST# 4.
- 3) Average North Brook properties calculated from the FCL log interpretation of well Western Adventure #1 are as follows:

ZONE	DEPTH (mKB)	ϕ_t (%)	ϕ_2 (%)	ϕ_m (%)	S _{wt} (%)	Pay (m)	Refer to Table
Upper	284-674	9.63	1.33	8.30	67.49	3.0	D-1
Middle	674-844	12.10	1.85	10.25	67.96	3.5	D-2
Lower	844-1569	6.33	1.24	5.09	64.66	3.4	D-3
Average	284-1569	9.37	1.48	7.89	66.70	9.9	



4) The above results are based on a water saturation cutoff of 75%, which is very high based on our experience. Using a more reasonable water saturation cutoff of 55% results in a total negligible net pay (≈ 0.5 m). Average properties in the above table apply only to the net pay. Depth corresponds to the interval analysed. ϕ stands for porosity, and the subscripts t, 2 and m stand for total, fracture and matrix systems, respectively. S_{wt} is the average water saturation of the composite system in the pay interval. Tables mentioned above in the last column are found at the end of the **DISCUSSION** section of this report. The fracture porosity presented above is a composite of microfractures that have a very low effective permeability. In this case there is no correlation between fracture porosity and fracture permeability.

5) The following values of original gas-in-place (OGIP) were calculated from the FCL log interpretation based on a 75% water saturation cutoff:

ZONE	DEPTH (m)	OGIP _t Million 10 ³ m ³ /ha	OGIP ₂ Million 10 ³ m ³ /ha	OGIP _m Million 10 ³ m ³ /ha	% OGIP in Fractures	Part Coeff (%)
Upper	284-674	134.9	18.4	116.5	13.64	13.81
Middle	674-844	194.9	29.7	165.2	15.24	15.29
Lower	844-1569	107.8	19.9	87.9	18.46	19.59
Total	284-1569	437.6	68.0	369.6	15.54	15.8

6) The above values of original gas-in-place (OGIP) are presented in standard m³/hectare and apply only to the net pay. Subscripts t, 2 and m stand for total, fracture and matrix systems, respectively. Values of OGIP were calculated volumetrically as the product of net pay times porosity times gas saturation divided by the gas formation volume factor. A gas formation volume factor of

0.00696 m³/m³ was used for the above calculations. Assuming a reservoir area of 1 section (259 hectares) leads to a gas-in-place equal to 113.3 x 10⁶ standard m³. Using a more reasonable water saturation cutoff of 55% results in a negligible volume of gas-in-place (17,253 m³/ha).

- 7) The partitioning coefficient (last column in the above table) is defined as the fraction of total porosity that is made out of fractures, i.e., it is calculated as the ratio of fracture porosity to total porosity. Given the fact that the partitioning coefficient is relatively small and that most of the hydrocarbons are stored in the matrix system the reservoir is classified as being of **Type A**.
- 8) DST# 4 covering interval 1425-1522 m was conducted on December 1, 2000. Analysis of this DST led to the following results:

ISI pressure (p*), kPaa	13,950 @ 1430 mKB
FSI pressure (p*), kPaa	13,720 @ 1430 mKB
Percent depletion	1.65
Transmissibility, md-m/cp	2.40
Permeability to gas, md	0.15
Skin factor	-2.23
Radius of investigation, m	3.74
Omega (ω), %	N.A.
Lambda (λ)	N.A.
Fracture spacing, m	N.A.

The data was not amenable to analysis using type curves for determination of the storativity ratio (ω), the interporosity flow coefficient, lambda (λ), and fracture spacing.

RECOMMENDATIONS

Recommendations presented in this report are based on a review of geological and reservoir data, FCL (Fracture Completion log) interpretation and well test analysis of well Western Adventure # 1, North brook formation, Deer Lake basin, Newfoundland. Recommendations are as follows:

- 1) Continue with the exploration program. Search for a suitable location up structure of Western Adventure # 1. Study the possibility of deviating the new well towards the north-west or the south-east without incurring in additional significant expenses. In principle, this could improve the probabilities of success as very limited in-situ stress information suggests that fractures oriented from the south-west to the north-east could possibly be open.
- 2) Corroborate the fluid analysis conducted by Core Laboratories on December 2000. The analysis carried out on a sample collected during DST# 3 leads to a very large percentage of nitrogen (80.63%) and a very small percentage of CH₂ (15.98%). A second sample led to 72.78% of nitrogen and 7.67% of methane. These results are probably the result of the sampling method.
- 3) Evaluate future wells with the same techniques presented in this study. These techniques have been developed specifically for the evaluation of naturally fractured reservoirs. Cut an oriented core in the next well. Have a geologist experienced with fracture cores at the well site. Design a core analysis program thinking in terms of natural fractures. Run the same suite of logs of Western Adventure # 1 plus an image log.



DISCUSSION

LOG INTERPRETATION

This section presents some of the key theoretical principles behind the FCL log interpretation. For more details the reader is referred to the book "Naturally Fractured Reservoirs" by Dr. Roberto Aguilera, PennWell Publishing Company, Tulsa, Oklahoma (2nd edition, 1995), p. 231.

BASIC APPROACH

In the FCL process¹ the basic formation evaluation equations:

$$I = R_t / (FR_w) \quad (1)$$

and

$$F = a\phi^m \quad (2)$$

are combined as proposed by Pickett,^{2,3}

$$R_t = \phi^m a R_w I \quad (3)$$

to obtain:

$$\log R_t = -m \log \phi + \log (a R_w) + \log I \quad (4)$$

or in the case of shaly formations:⁴

$$\log (R_t / A_{sh}) = -m \log \phi + \log (a R_w) + \log I \quad (5)$$

In the above equations \emptyset stands for total porosity (fraction), m is the porosity exponent of the composite system of matrix and fractures, I is the resistivity index, R_t is the true resistivity, A is a function of shaliness,⁴ F is the formation factor, R_w is water resistivity at reservoir temperature, and " a " is a constant.

Analysis of equations 4 and 5 indicates that (1) a crossplot of porosity or the response of a porosity log vs. R_t or (2) a crossplot of porosity vs. R_t/A_{sh} on log-log coordinate paper should result in a straight line with a slope of $-m$ for zones with constant aR_w and constant I (Figures D1-A and D1-B in this section). This type of crossplot is usually known as a "Pickett Plot."

For reservoirs with natural fractures, the value of m is smaller than the cementation exponent m_b , determined from a matrix plug in the laboratory at simulated reservoir overburden conditions. This is reasonable because open unhealed fractures produce a reduction in tortuosity and cementation.

The value of m is determined by calculating the slope of the line drawn through points of constant water saturation in the Pickett plot. With the value of m determined from the crossplot and m_b determined in the laboratory it is possible to complete the evaluation with respect to porosities. In the present study, laboratory values of m_b are not available. As a result we have assumed m_b values ranging between 1.8 and 2.0 based on previous experience with similar types of clastic formations.

POROSITY

The relationship between the matrix and fracture porosity systems is evaluated with the use of a dual-porosity model, which considers the interaction between matrix and fractures with the use of the equations:¹



$$\emptyset^{-m} = 1/[v\emptyset + (1-v)/\emptyset_b^{-mb}] \quad (6)$$

and

$$v = \frac{\emptyset - \emptyset_b}{(1 - \emptyset_b)} = \frac{\emptyset - \emptyset_m}{\emptyset} \quad (7)$$

where,

v = partitioning coefficient, fraction

\emptyset_b = matrix block porosity attached to matrix bulk properties, fraction

\emptyset_m = matrix porosity attached to total bulk properties, fraction

m_b = matrix cementation exponent

m = dual-porosity exponent

WATER SATURATION

Water saturation is calculated using a statistical parameter, $P^{1/2}$, originally introduced by Porter, Pickett and Whitman⁵ for conventional reservoirs and Aguilera¹ for naturally fractured reservoirs.

Empirically, it has been found that $P^{1/2}$ has a normal distribution for intervals, which are 100 percent saturated with water. Intervals with some hydrocarbon saturation deviate from the normal distribution. When working with sonic logs $P^{1/2}$ can be expressed as:

$$P^{1/2} = [R_t (\Delta t - \Delta t_m)^m]^{1/2} \quad (8)$$

where R_t is true resistivity, m is the porosity exponent, Δt is the response of the sonic log in $\mu\text{sec/m}$ and subscript m stands for "matrix". If density logs are used $P^{1/2}$ can be written as:



$$P^{1/2} = [R_t (\rho_s - \rho_b)^m]^{1/2} \quad (9)$$

Where ρ stands for density, and the subscripts s and b stand for "grain" and "bulk" properties, respectively. When porosity (\emptyset) is used in mixed lithologies $P^{1/2}$ is written as:

$$P^{1/2} = (R_t \emptyset^m)^{1/2} \quad (10)$$

In shaly formations R_t is divided by A_{sh} , a function of clay volume.

Since P has a square root normal distribution for zones with 100% water saturation, a plot of $P^{1/2}$ vs. cumulative frequency (which includes total number of samples for values of $P^{1/2}$ within a particular range) on probability paper should result in an approximately straight line¹. Hydrocarbon zones should deviate from this approximately straight line.

Figure D-2 shows schematics associated with the $P^{1/2}$ statistical analysis. The familiar bell shape typical of intervals with 100% water saturation is presented in the upper part of the Figure. Notice that hydrocarbon-bearing intervals fall to the right of the bell shape. The lower part of **Figure D-2** shows the probability crossplot where the bell-shape normal distribution becomes a straight line. Dots representing hydrocarbon-bearing intervals deviate from the straight line.

Once the hydrocarbon zones have been recognised, values of water saturation can be calculated as follows:

1. Consider the 100% water saturation zones as a single distribution. This should result in a straight line on probability paper.
2. Determine the average value of $P^{1/2}$ at a cumulative frequency of 50%.
3. Calculate the resistivity index I from the relationship:

$$I = (P_h^{1/2} / P_{100}^{1/2})^2 \quad (11)$$

where $P_h^{1/2}$ is the value of $P^{1/2}$ for a hydrocarbon-bearing zone and $P_{100}^{1/2}$ is the average value of $P^{1/2}$ determined in Step 2.

4. Calculate water saturation of the double-porosity system from the equation:

$$S_{wt} = I^{-1/n} \quad (12)$$

For a complete evaluation, it is desirable to have estimates of water saturations in both the matrix blocks (S_{wb}) and the fracture (S_{wf}) system. The fracture water saturation can be calculated from the equation:¹

$$S_{wf} = \frac{\mu_w WGR}{B_g \mu_g + \mu_g WGR} \quad (13)$$

The matrix water saturation (S_{wb}) can be calculated from the equation:

$$S_{wb} = \frac{S_w - VS_{wf}}{1 - v} \quad (14)$$

Where μ_w is water viscosity in cp, WGR is water-gas ratio in standard cf^3/cf^3 , B_g is gas formation volume factor in cf^3/cf^3 , and μ_g is gas viscosity in cp. For the present study, the WGR was assumed to be equal to zero, leading to $S_{wf} = 0$. In the case of oil reservoirs, g (gas) is replaced by o (oil) in the above equations.⁶

This log evaluation process requires the reading, plotting and crossplotting or large volumes of data, and requires a large number of calculations. This makes it an ideal computer application. **Figure D-3** shows a schematic representation of the steps followed in the FCL analysis.

RESULTS

The FCL log interpretation presented in this study evaluates well Western Adventure # 1, Deer Lake basin, North Brook interval 284 to 1569 m. The Carboniferous North Brook formation is a low porosity (typically less than 10%), low permeability ($k_g \approx 0.015$ md), fractured formation composed mainly by sandstone, siltstone, shale and conglomerates.

Average results of the FCL log interpretation are presented in this section in **Tables D-1 to D-3**. The tables include cut-offs used in the evaluation ($S_w < 75\%$, Shale volume $< 50\%$, porosity > 0) and the gas formation volume factor (0.00696 m³/m³). There is also an interval summary showing the following data:

Top and bottom of interval

Gross and net meters

Total, fracture, and matrix porosity

Total, fracture and matrix water saturation

Gas-in-place in m³ per hectare in the total, fracture and matrix systems

Results from DST# 4 (1425-1522 mKB) indicate that the North Brook formation is gas bearing. However, a fluid analysis conducted by Core Laboratories on December 2000 on a sample collected during DST# 3 (685-872 m) shows a very large percentage of nitrogen (80.63%) and a very small percentage of methane (15.98%). A second analysis carried out by the same company on December 29, 2000 yielded 72.78% of nitrogen and 7.67% of methane. Probably these results are reflecting the method of collection. Deer lake Oil and Gas indicates that the sample was collected from an "outlet line bubbling gas up through water in a small inverted plastic bag giving a mixture of gas, air and water at a time when the gas/ratio coming out of the line was 10% of gas and 90% of air". These data is presented in the section dealing



with **FLUID ANALYSIS**. It is important to corroborate the results of these analyses.

The following is a synopsis of the FCL interpretation results on the Upper, Middle and Lower North Brook formations:

ZONE	DEPTH (mKB)	ϕ_t (%)	ϕ_2 (%)	ϕ_m (%)	S_{wt} (%)	Pay (m)	Refer to Table
Upper	284-674	9.63	1.33	8.30	67.49	3.0	D-1
Middle	674-844	12.10	1.85	10.25	67.96	3.5	D-2
Lower	844-1569	6.33	1.24	5.09	64.66	3.4	D-3
Average	284-1569	9.37	1.48	7.89	66.70	9.9	

The above results are based on a water saturation cutoff of 75%, which is very high based on our experience. Using a more reasonable water saturation cutoff of 55% results in a negligible net pay (≈ 0.5 m). Depth in the above table corresponds to the interval analysed. Average properties correspond to the net pay only. ϕ stands for porosity, and the subscripts t, 2 and m stand for total, fracture and matrix systems, respectively. S_{wt} is the average water saturation of the composite system in the pay interval. Summary Tables mentioned above in the last column are found at the end of this section. Those summaries include the word "hydrocarbon". Given the large percentage of nitrogen reported by Core Laboratories it is more advisable to think in terms of "gas" rather than "hydrocarbons" until additional fluid analysis data become available.

The fracture porosity presented above corresponds to several microfractures of tectonic origin. Although the porosity is high it is accompanied by a very low effective permeability to gas (0.015 md) that precludes any significant gas production in well Western Adventure # 1.

Tectonic fractures are very pervasive from a macro-scale all the way to the grain scale. Based on this observation it is likely that a future well could intersect macro-fractures that in turn would lead to larger rates. Limited in-situ stress data (**Figure D-4**) suggests that the maximum principal horizontal stress in the area has a south-west north-east direction. Consequently, the probability of intersecting open fractures can be increased by drilling directional holes preferentially towards the north-west or the south-east. Most of the naturally fractures appear to be fault and fold-related. The fold-related fractures are likely of Stearns type 1 and 2 (Aguilera¹).

Shale volumes were calculated from the equation:

$$V_{sh} = (GR - GR_{min}) / (GR_{max} - GR_{min}) \quad (15)$$

Where GR = gamma ray value of interval being analysed

GR_{min} = gamma ray for clean intervals

GR_{max} = gamma ray for shale intervals

Care was exercised to make sure that radioactive materials did not affect the solution.

The following values of original gas-in-place (OGIP) were calculated from the FCL log interpretation based on a 75% water saturation cutoff:

ZONE	DEPTH (m)	OGIP _t Million 10 ³ m ³ /ha	OGIP ₂ Million 10 ³ m ³ /ha	OGIP _m Million 10 ³ m ³ /ha	% OGIP in Fractures	Part Coeffic (%)
Upper	284-674	134.9	18.4	116.5	13.64	13.81
Middle	674-844	194.9	29.7	165.2	15.24	15.29
Lower	844-1569	107.8	19.9	87.9	18.46	19.59
Total	284-1569	437.6	68.0	369.6	15.54	15.8

The above values of original gas-in-place (OGIP) are presented in standard $\text{m}^3/\text{hectare}$ and apply only to the net pay. The subscripts t, 2 and m stand for total, fracture and matrix systems, respectively. Values of OGIP were calculated volumetrically as the product of net pay times porosity times gas saturation divided by the gas formation volume factor. A gas formation volume factor of $0.00696 \text{ m}^3/\text{m}^3$ was used for the above calculations. Assuming a reservoir area of 1 section (259 hectares) leads to a gas-in-place equal to 113.3×10^6 standard m^3 . Using a more reasonable water saturation cutoff of 55% results in a negligible volume of gas-in-place ($17,253 \text{ m}^3/\text{ha}$).

The partitioning coefficient (last column in the above table) is defined as the fraction of total porosity that is made out of fractures, i.e., it is calculated as the ratio of fracture porosity to total porosity. Given the fact that the partitioning coefficient is relatively small and that most of the gas is stored in the matrix system the reservoir is classified as being of **Type A**. **Figure D-5** shows a schematic representation of Type A, B and C reservoirs. In reservoirs of Type B approximately half the storage is in the matrix and half is in the fractures. In reservoirs of Type C most of the storage is in the fractures. For additional details on this classification the reader is referred to Aguilera's ¹ book.

Detailed results of the dual-porosity Fracture Completion Log (FCL) interpretation are presented in the **Appendix**.

The Appendix includes Pickett and $P^{1/2}$ crossplots used in the analysis. In addition each appendix includes detailed listings containing depth, $P^{1/2}$ values, total fracture and matrix porosity, partitioning coefficient, total and matrix water saturation, cumulative porosity meters ($\varnothing \times h$), and cumulative gas meters ($S_{\text{gas}} \times \varnothing \times h$) for the total, fracture and matrix systems.



Cutoffs used in the interpretation and interval summaries for each formation are also included in each Appendix. The summaries include the word "hydrocarbon". Given the very large value of nitrogen reported by Core Laboratories (80.63%) it is better at this stage to replace it by the word "gas" until additional fluid analysis data become available.

The calculated logs included in the plastic pockets at the end of this report shown in the first track the partitioning coefficient, a fracture pay flag, the gamma ray curve, the PE curve and the SP log. The next 2 tracks show total, matrix and fracture porosity, and the total and matrix water saturation. The next track shows porosity and resistivity logs used in this evaluation. The last track shows the estimated lithological components.

WELL TEST ANALYSIS

DST data collected by Alpine is presented in the **SUBSURFACE PRESSURES** section of this report. DSTs# 1, 2 and 4 carried out in well Western Adventure # 1 were evaluated using Servipetrol's WELLTEST-NFR, a software package with capabilities for evaluation of naturally fractured reservoirs. The theoretical principles behind WELLTEST-NFR have been published in the literature.^{7,8} The data was not amenable to evaluation using type curves. As a result only superposition plots were utilized in the analysis.

Key objectives of the well test analysis were to estimate the reservoir capacity, the effective permeability to gas, skin, the radius of investigation and to evaluate if there was any possible reservoir depletion. An atmospheric pressure of 101 kPa was used in this study.

DST# 1.- This was a conventional bottom hole test covering Lower North Brook interval 840-872 mKB. The test was conducted on August 5, 2000. It was



mechanically successful and indicated very low permeability within the tested zone. The preflow indicated a fair airflow throughout. The final flow resulted in a fair air blow decreasing to dead in 30 minutes. It remained dead throughout the rest of the flow period. **Figures D-6 and D-7** show superposition plots for this test. The initial and final shutin extrapolated pressures (p^*) were 8954 and 8699 kPaa at 871.6 mKB. Comparison of the extrapolated pressures indicates that there was 2.8% reservoir depletion during the test. Total fluid recovery was minimum amounting to 108 meters of condensate flecked drilling fluid. There was no gas flow to surface. The DST data is presented in the **SUBSURFACE PRESSURES** section of this report. The interpretation is shown in the section dealing with **TRANSIENT ANALYSIS**.

DST# 3.- This was also a conventional bottom hole test covering Middle and Lower North brook interval 685-872 mKB. The test was conducted on August 6, 2000. There was no preflow as the packer seat was lost upon tool opening. The final flow indicated a very weak air blow decreasing to dead in 10 minutes. It remained dead throughout the rest of the flow period. **Figures D-8** shows the superposition plot for this test. The extrapolated pressure (p^*) was 9626 kPaa at 870.9 mKB. Total fluid recovery was minimum amounting to 60 meters of drilling fluid with some hydrocarbon flecking. There was no gas flow to surface. The DST data is shown in the **SUBSURFACE PRESSURES** section. The interpretation is displayed in the section dealing with **TRANSIENT ANALYSIS**.

DST# 4.- This was a conventional bottom hole test covering Lower North Brook interval 1425-1522 mKB. The test was conducted on December 1, 2000. It was mechanically successful and indicated qualitatively low permeability within the tested zone. The preflow indicated a strong airflow throughout. Gas reached the surface by the end of the preflow yielding a lazy 1.5 m flame. The final flow resulted in gas to surface immediately. **Figures D-9 and D-10** show superposition plots for this test. The initial and final shutin extrapolated pressures (p^*) were 13,950 and 13,720 kPaa at 1,430.19 mKB. Comparison of the extrapolated pressures indicates that there was



a 1.65% reservoir depletion during the test. Total fluid recovery was 234 meters of gasified muddy water. Surface gas rates were recorded and varied between 823 and 2936 m³/day. Complete analysis of DST# 4 is presented in the **TRANSIENT ANALYSIS** section of this report. The following is a summary of results:

ISI pressure (p*), kPaa	13,950 @ 1430 mKB
FSI pressure (p*), kPaa	13,720 @ 1430 mKB
Percent depletion	1.65
Transmissibility, md-m/cp	2.40
Permeability to gas, md	0.15
Skin factor	-2.23
Radius of investigation, m	3.74
Omega (ω), %	N.A.
Lambda (λ)	N.A.
Fracture spacing, m	N.A.

The effective permeability to gas is very small indicating that only microfractures (not macrofractures) were intersected by the wellbore.

Our interpretation suggests that fractures in the North Brook formation are of tectonic origin (related to faulting and folding). Since tectonic fractures are very pervasive from a large to a small scale it is reasonable to postulate that larger fractures (macrofractures) must be present in the North Brook formation. Key objective of future wells would be to try to intersect those macrofractures.

Very limited information (**Figure D-4**) suggests that the maximum principle horizontal stress in the general area of interest has a SW-NE preferential orientation. If this is true for the North Brook formation, NW-SE directional holes will have reasonable probabilities of intersecting open fractures (and probably open macrofractures). It is



Fracture Analysis Results

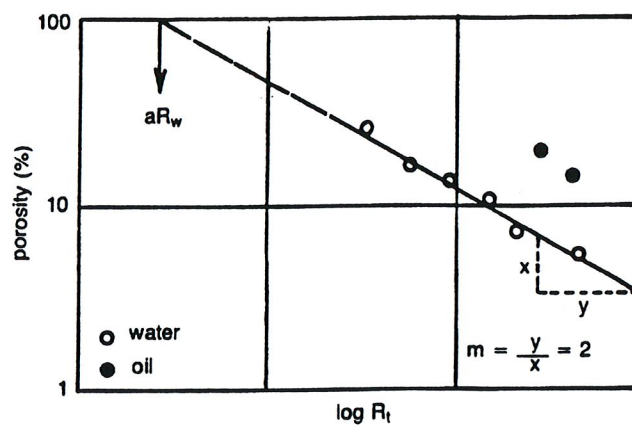
FILE: DEE567SC

DATE: 05-26-2001
page: 2

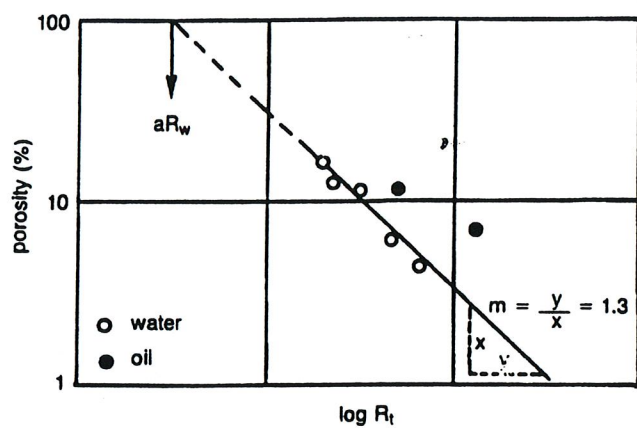
recovery factor	0.700
surface loss	0.050
reservoir area	259.000
Initial Recoverable Gas-E3m3/ha	75.479
Initial Sales Gas-E3m3/ha	71.705

Reserves classification	RESOURCES
Initial Gas in Place -E3m3	27927.090
Initial Recoverable Gas -E3m3	19548.963
Initial Sales Gas -E3m3	18571.514

Initial Recoverable Gas -E3m3	19548.963
cum'l produced, 01/2001-E3m3	0.000
remaining raw gas, 01/2001-E3m3	19548.963
remaining sales gas, 01/2001-E3m3	18571.514



(a)



(b)

Crossplots for a) homogeneous and b) fractured formations (after Aguilera, 1974)

Figure D-1



SERVIPETROL LTD.
International Petroleum Consultants



GENERALIZED FCL FLOW CHART

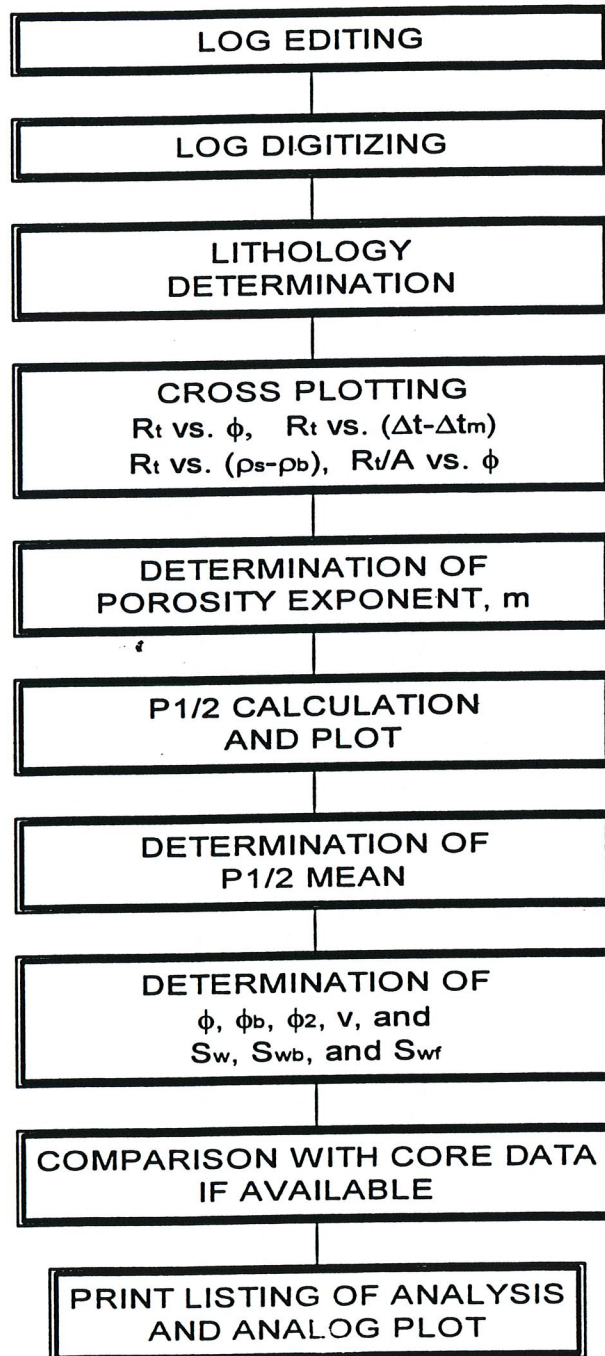
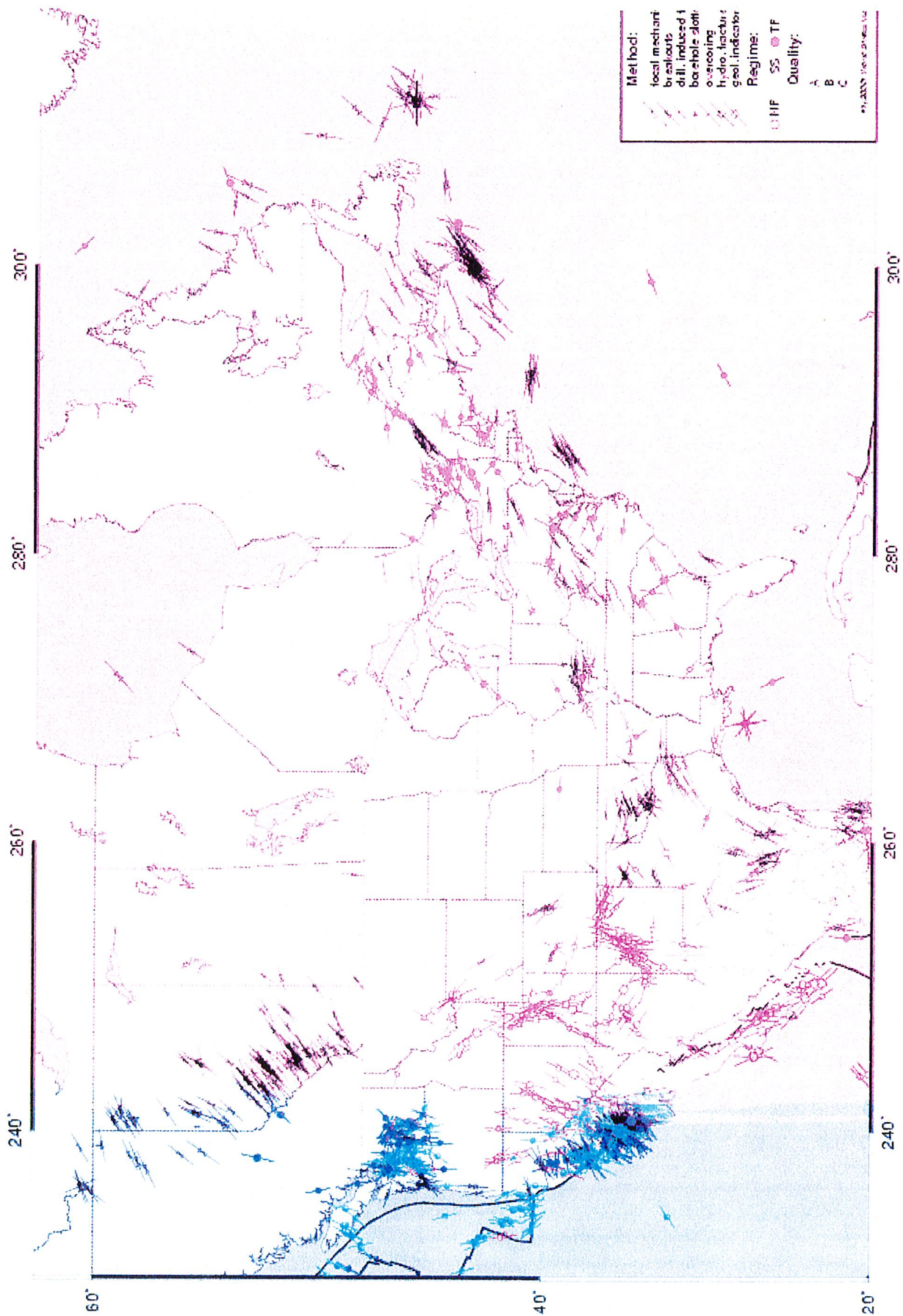


Figure D-3



SERVIPETROL LTD.
International Petroleum Consultants



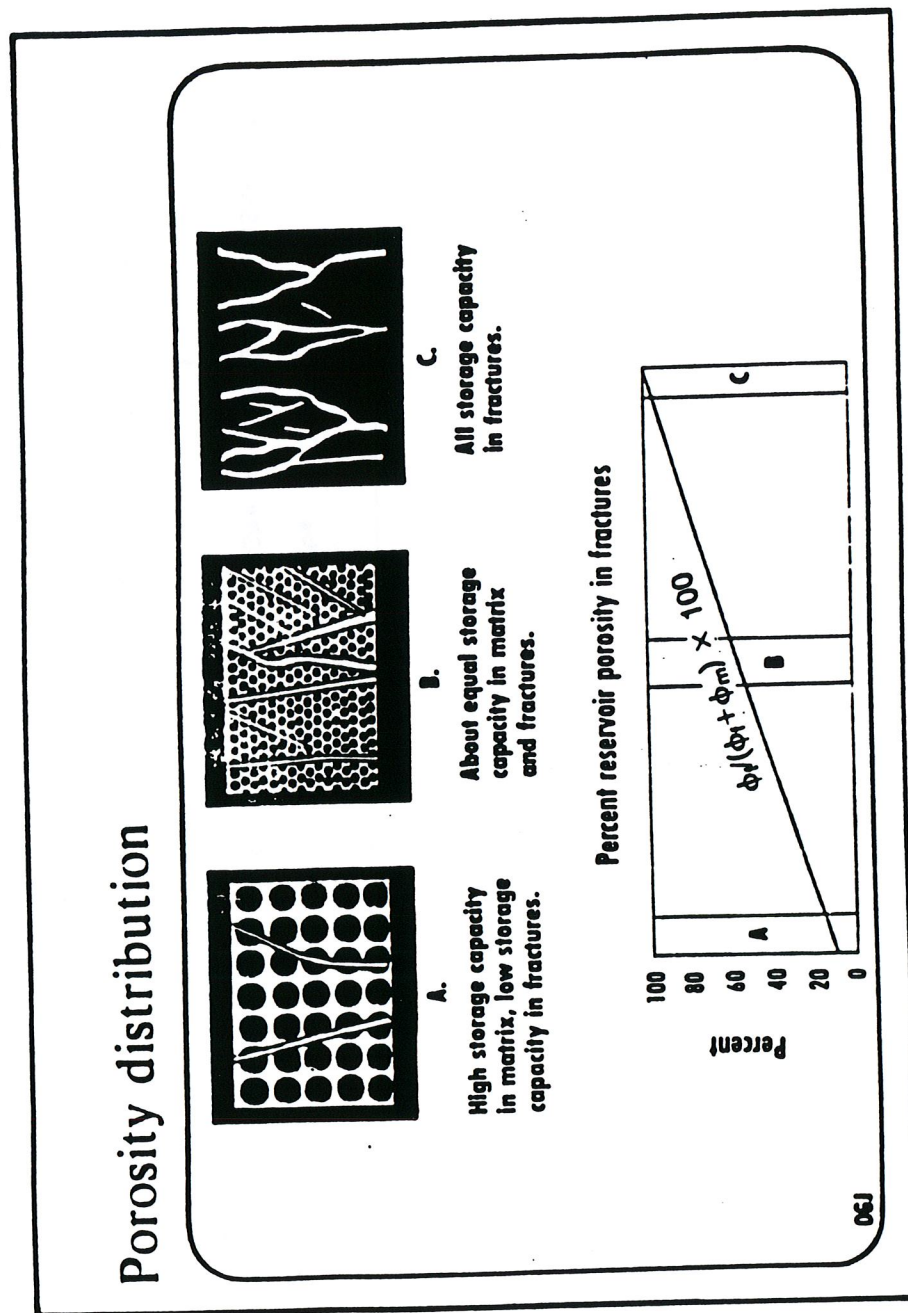


World Stress Map Rel. 2000-1

Projection: UTM

Figure D-4

Geologic Aspects



Schematic sketches showing porosity distribution in fractured reservoir rocks. (After McNaughton & Garb)

DEER LAKE OIL AND GAS, WELL: DEER LAKE ET AL WA-1, BU2

GAUGE @ 871.69 m, DST #1 (840.0 m - 872.0 m)

Superposition Plot (Buildup)

8.0E+03

6.0E+03

4.0E+03

2.0E+03

Delta m(p), GPa²/mPa.s

Superposition Function

servipetrol

0.4

0.8

1.2

1.6 Figure D-7

m = -1.018E+04

Tf = 3.997E+00 mD-m/cp

s = -2.293E+00

Dp* = 5.911E+03 GPa²/mPa.s

p* = 8.699E+03 kPa

DEER LAKE OIL & GAS, WELL: DEER LAKE ET AL WA-1

GAUGE @ 870.9 m, DST #3 (685.0 m - 872.0 m)

Superposition Plot (Buildup)

$m = -3.300E+03$
 $Tf = 1.061E+01 \text{ mD-m/cp}$
 $s = -2.149E+00$
 $Dp^* = 3.875E+03 \text{ GPa}^2/\text{mPa.s}$
 $p^* = 9.626E+03 \text{ kPa}$

Delta m(p), $\text{GPa}^2/\text{mPa.s}$

3500

3000

2500

2000

Superposition Function

servipetrol

0.4

0.8

1.2

1.6 Figure D-8

DEER LAKE OIL AND GAS, WELL: DEER LAKE ET AL WA-1, BUI

GAUGE @ 1430.19 m, DST #4 (1425.09 m - 1522.90 m)

Superposition Plot (Buildup)

m	=	-6.453E+04
Tf	=	5.472E-01 mD-m/cp
s	=	-8.292E-01
Dp*	=	1.410E+04 GPa ² /mPa.s
p*	=	1.395E+04 kPa

1.6E+04

Delta m(p), GPa²/mPa.s

1.2E+04

8.0E+03

4.0E+03

Superposition Function

servipetrol

0.2

0.4

0.6

0.8

Figure D-9

DEER LAKE OIL AND GAS, WELL: DEER LAKE ET AL WA-1, BU2

GAUGE @ 1430.19 m, DST #4 (1425.09 m - 1522.90 m)

Superposition Plot (Buildup)

1.6E+04

1.2E+04

8.0E+03

4.0E+03

Delta m(p), GPa²/mPa.s

m = -1.344E+04
Tf = 2.404E+00 mD-m/cp
s = -2.232E+00
Dp* = 1.336E+04 GPa²/mPa.s
p* = 1.372E+04 kPa

Superposition Function

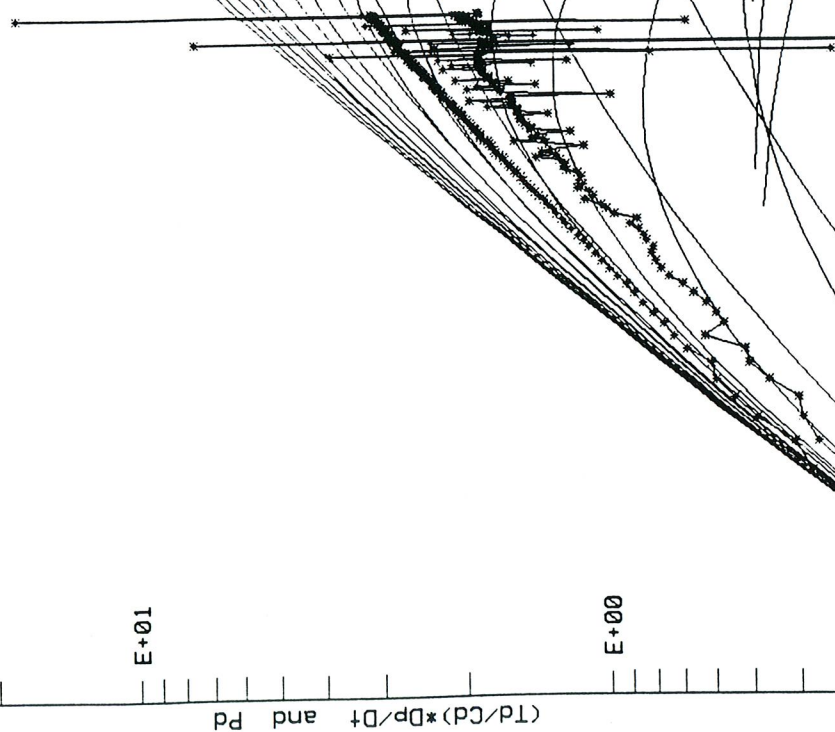
servipetrol

DEER LAKE OIL AND GAS, WELL: DEER LAKE ET AL WA-1, BU2

GAUGE @ 1430.19 m, DST #4 (1425.09 m - 1522.90 m)

TEST DATE: 12/01/2000

Dual Porosity (pseudo steady)



Dimensionless Time Group

servipetrol

DATA VALIDATION

SUBSURFACE PRESSURE DATA

Subsurface pressures of DSTs# 1, 3 and 4 was provided by Alpine in PC diskettes containing data collected between August and December 2000.

The quality of the pressure data is good. The data are presented in the **SUBSURFACE PRESSURES** section of this report.

Pressure data was prepared for analysis using WELLTEST-NFR, a software package designed for evaluation of naturally fractured reservoirs. A surface pressure of 101 kPa was used in the evaluation.

GAS ANALYSIS

Fractional analysis of gas was conducted by Core Laboratories on December 11, 2000 with a view to determine mol percent of each component, critical properties ($p_{Pc} = 3649.3$ kPaa, $p_{Tc} = 143.3$ °K) and specific gravity ($SG = 0.917$). Significant in the laboratory study was the very large mol percent of nitrogen ($N_2 = 80.63\%$) and the very low value of methane ($CH_4 = 15.98\%$). A second test yielded 72.78% of nitrogen and 7.67% of methane. The data is probably faulty and it is recommended to validate it. These results are reflecting the method of sample collection. Deer lake Oil and Gas indicates that the sample was collected from an "outlet line bubbling gas up through water in a small inverted plastic bag giving a mixture of gas, air and water at a time when the gas/ratio coming out of the line was 10% of gas and 90% of air". These data was used for calculating gas deviation factors and gas formation volume factors for the North Brook reservoir. Gas analysis data are presented in the **FLUID ANALYSIS** section.



WELL LOG DATA

Schlumberger provided digitized well logs of well Western Adventure # 1 in LAS format. The quality of the log data is considered to be good. The well logs were evaluated using a dual-porosity model and the $P^{1/2}$ statistical analysis incorporated in Servipetrol's Fracture Completion Log (FCL) service. Results of the FCL evaluation are considered reasonable.

CORE DATA

Core porosities are presented at the end of this section. These porosities were used for calibrating the well log interpretation. Porosities are in general low and typically smaller than 10%. Some of the fractured samples between 360.3 and 868.8 m were evaluated to determine k_{\max} , k_{90} and k_{vertical} . These permeabilities are un-stressed. The maximum permeabilities range between 0.09 and 25.1 md as shown in the last page of this section. It is not unusual to see that core permeabilities decrease significantly (sometimes more than ten or one hundred-fold) when they are subjected to simulated in-situ stresses. These reduced permeabilities are the reason for the very weak air blows observed during DSTs # 1 and 3 and for the low gas rates measured during DST # 4.



Well : DEER LAKE OIL & GAS INC.
 Location : DEER LAKE ET AL WESTERN ADVENTURE #1
 Field :
 Formation :

SAMPLE NUMBER	DEPTH	POROSITY (HELIUM)	BULK DENSITY	GRAIN DENSITY	
		fraction	kg/m3	kg/m3	
134	183.2	0.179	2260	2760	17.9
135	184.0	0.238	2080	2730	23.8
136	185.2	0.164	2290	2740	16.4
137	189.5	0.223	2120	2730	22.3
138	192.0	0.194	2200	2730	19.4
139	197.0	0.136	2330	2700	13.6
140	284.5	0.107	2390	2670	10.7
141	327.5	0.077	2500	2710	7.7
142	341.3	0.070	2490	2680	7
143	416.8	0.077	2450	2660	7.7
144	428.6	0.081	2470	2690	8.1
145	452.0	0.108	2420	2710	10.8
146	465.2	0.058	2590	2740	5.8
147	479.8	0.048	2590	2720	4.8
148	491.0	0.056	2600	2750	5.6
149	524.0	0.069	2570	2760	6.9
150	533.0	0.100	2420	2690	10
151	548.3	0.118	2430	2760	11.8
152	560.4	0.061	2590	2760	6.1
153	573.5	0.140	2330	2710	14
154	607.2	0.112	2420	2730	11.2
155	612.0	0.069	2510	2700	6.9
156	641.5	0.087	2470	2700	8.7
157	708.5	0.078	2470	2680	7.8
158	743.8	0.079	2490	2700	7.9
159	755.0	0.064	2520	2690	6.4
160	766.8	0.059	2530	2690	5.9
161	779.4	0.078	2520	2730	7.8
162	791.2	0.105	2440	2730	10.5
163	842.0	0.094	2470	2730	9.4
164	853.9	0.089	2440	2680	8.9
165	862.3	0.096	2420	2680	9.6
48	883.0	0.101	2440	2710	10.1
166	886.3	0.044	2630	2750	4.4
49	887.0	0.106	2450	2730	10.6
50	896.0	0.045	2550	2670	4.5
51	901.0	0.052	2530	2660	5.2
52	903.3	0.061	2570	2740	6.1

53	911.5	0.080	2450	2660	8
54	926.2	0.031	2620	2700	3.1
55	948.5	0.115	2420	2740	11.5
56	961.0	0.046	2540	2660	4.6
57	966.5	0.043	2630	2750	4.3
58	968.1	0.073	2490	2690	7.3
59	971.1	0.046	2610	2730	4.6
60	980.3	0.081	2450	2670	8.1
61	983.5	0.030	2600	2680	3
62	992.7	0.105	2400	2680	10.5
63	1000.0	0.065	2490	2660	6.5
64	1004.0	0.019	2660	2710	1.9
65	1005.8	0.005	2620	2630	0.5
66	1008.7	0.009	2650	2670	0.9
67	1010.7	0.088	2420	2650	8.8
68	1017.8	0.014	2630	2670	1.4
69	1024.0	0.006	2660	2670	0.6
70	1028.7	0.075	2440	2640	7.5
71	1035.2	0.080	2450	2660	8
72	1043.9	0.021	2600	2660	2.1
73	1045.3	0.013	2630	2670	1.3
74	1050.8	0.049	2510	2640	4.9
75	1053.6	0.010	2650	2680	1
76	1060.1	0.026	2570	2640	2.6
77	1069.2	0.038	2550	2650	3.8
78	1079.0	0.022	2610	2670	2.2
79	1085.5	0.024	2620	2680	2.4
80	1093.0	0.034	2570	2660	3.4
81	1096.0	0.017	2610	2660	1.7
82	1105.8	0.030	2590	2670	3
83	1108.0	0.068	2490	2670	6.8
86	1112.0	0.059	2500	2650	5.9
84	1113.0	0.011	2640	2670	1.1
85	1115.3	0.026	2580	2650	2.6
87	1132.0	0.064	2470	2640	6.4
88	1139.6	0.036	2550	2640	3.6
89	1144.8	0.005	2680	2690	0.5
90	1147.5	0.054	2490	2630	5.4
91	1151.7	0.037	2540	2640	3.7
92	1154.6	0.005	2670	2680	0.5
93	1160.0	0.035	2570	2660	3.5
94	1168.0	0.015	2600	2640	1.5
95	1173.0	0.039	2530	2640	3.9
96	1180.0	0.010	2620	2650	1
97	1192.1	0.034	2560	2650	3.4
98	1195.3	0.011	2640	2670	1.1
99	1200.5	0.033	2560	2650	3.3
100	1204.0	0.034	2530	2620	3.4
101	1212.8	0.032	2530	2620	3.2
101	1216.1	0.024	2640	2700	2.4
103	1222.0	0.025	2610	2680	2.5

104	1226.0	0.010	2660	2680	1
105	1234.1	0.023	2610	2670	2.3
106	1243.0	0.011	2660	2690	1.1
107	1249.2	0.032	2590	2680	3.2
108	1258.0	0.026	2610	2680	2.6
109	1269.0	0.046	2550	2670	4.6
110	1274.0	0.038	2590	2690	3.8
111	1286.5	0.027	2630	2700	2.7
112	1291.5	0.037	2590	2690	3.7
113	1297.4	0.007	2690	2710	0.7
114	1303.4	0.061	2520	2690	6.1
115	1312.0	0.021	2610	2670	2.1
116	1313.0	0.007	2670	2690	0.7
117	1318.0	0.027	2590	2660	2.7
118	1326.0	0.029	2620	2700	2.9
119	1330.5	0.042	2550	2660	4.2
120	1339.0	0.035	2580	2670	3.5
121	1351.1	0.030	2630	2710	3
122	1360.2	0.010	2710	2730	1
123	1368.4	0.043	2570	2690	4.3
124	1372.0	0.006	2680	2700	0.6
125	1384.0	0.005	2700	2700	0.5
126	1395.0	0.006	2670	2680	0.6
1	1403.5	0.013	2600	2640	1.3
2	1408.0	0.038	2640	2740	3.8
3	1419.5	0.054	2630	2780	5.4
4	1422.7	0.064	2600	2780	6.4
38	1426.8	0.019	2680	2740	1.9
5	1430.4	0.014	2650	2690	1.4
39	1435.0	0.008	2670	2690	0.8
6	1439.3	0.028	2650	2730	2.8
7	1440.0	0.062	2580	2740	6.2
8	1440.5	0.020	2640	2690	2
9	1443.5	0.011	2680	2710	1.1
10	1444.0	0.017	2600	2650	1.7
11	1446.0	0.011	2640	2670	1.1
40	1451.5	0.009	2670	2700	0.9
12	1455.9	0.037	2660	2760	3.7
13	1460.0	0.025	2680	2740	2.5
14	1463.0	0.054	2600	2750	5.4
15	1464.0	0.042	2610	2720	4.2
16	1467.2	0.013	2670	2710	1.3
17	1471.5	0.025	2650	2720	2.5
18	1473.0	0.029	2580	2660	2.9
41	1475.3	0.020	2650	2700	2
19	1481.5	0.024	2690	2760	2.4
42	1488.7	0.020	2650	2710	2
20	1490.5	0.014	2670	2710	1.4
21	1493.8	0.034	2600	2690	3.4
22	1495.0	0.027	2630	2700	2.7
23	1499.4	0.009	2680	2700	0.9

43	1505.0	0.026	2640	2710	2.6
24	1510.0	0.008	2660	2680	0.8
47	1513.2	0.015	2670	2710	1.5
25	1516.0	0.009	2700	2730	0.9
44	1516.3	0.005	2670	2680	0.5
26	1522.0	0.025	2630	2700	2.5
27	1525.0	0.033	2620	2710	3.3
28	1527.9	0.050	2560	2690	5
29	1529.7	0.031	2670	2760	3.1
30	1533.0	0.011	2680	2710	1.1
31	1538.4	0.005	2730	2730	0.5
45	1543.1	0.005	2710	2710	0.5
32	1547.0	0.014	2710	2750	1.4
46	1553.0	0.005	2700	2700	0.5
33	1557.7	0.005	2730	2740	0.5
34	1562.9	0.013	2680	2720	1.3
35	1564.8	0.027	2620	2700	2.7
36	1565.5	0.025	2640	2710	2.5
37	1568.1	0.025	2660	2730	2.5
127	1604.4	0.005	2740	2740	0.5
128	1611.8	0.005	2720	2720	0.5
129	1625.5	0.005	2710	2710	0.5
130	1630.0	0.005	2740	2740	0.5
131	1699.3	0.005	2790	2790	0.5
133	1763.0	0.005	2810	2810	0.5
132	1766.5	0.005	2790	2790	0.5

CORE LABORATORIES

Company : DEER LAKE OIL & GAS
Well : WA-1
Location :
Province : NEWFOUNDLAND

Field :
Formation : NOT SPECIFIED
Coring Equip.:
Coring Fluid :

File No.: 52131-00-0323
Date : 2000-08-14
Analysts: DJB
Core Dia: 60 mm

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH m	PERMEABILITY			POROSITY (HELIUM) fraction	BULK DENSITY kg/m ³	GRAIN DENSITY kg/m ³	DESCRIPTION
		(MAXIMUM) K _{air} mD	(90 DEG) K _{air} mD	(VERTICAL) K _{air} mD				
FD 8	360.30	0.88	0.88	0.46	0.084	2430.	2650.	ss vf f m c lam
FD 9	509.80							
FD 10	535.30	0.19	0.13	0.11	0.047	2520.	2650.	ss vf f m c lam
FD 11	596.50							
FD 12	673.70	0.12	0.11	0.07	0.030	2570.	2650.	cgl sdy
FD 13	674.20							
FD 14	675.20	6.00	5.47	2.84	0.105	2370.	2640.	ss vf f m c pbls
FD 15	675.50	9.86	9.31	5.81	0.129	2300.	2640.	ss vf f m c
FD 1	676.70	25.1	23.9	5.73	0.089	2420.	2650.	cgl sdy
FD 16	677.00	0.55	0.34	0.44	0.055	2470.	2620.	cgl sdy cht
FD 17	677.80							
FD 18	678.20	2.73	2.67	1.87	0.087	2400.	2630.	ss vf f m c vc
FD 19	678.80	1.02	0.91	0.74	0.090	2410.	2650.	ss vf f m c
FD 20	679.90	0.09	0.07	0.05	0.055	2540.	2690.	ss vf f m c vc calc
FD 2	735.50	0.95	0.81	0.72	0.102	2390.	2660.	ss vf f m c vc
FD 3	855.10	3.57	2.72	0.64	0.080	2440.	2650.	cgl sdy
FD 4	856.00	1.44	1.40	0.41	0.072	2450.	2640.	cgl sdy
FD 5	858.50	3.52	2.97	1.23	0.084	2430.	2650.	cgl sdy
FD 6	859.30	3.53	3.26	1.50	0.065	2470.	2650.	ss vf f m c vc pbls
FD 7	868.80	1.11	1.04	0.55	0.092	2420.	2660.	ss vf f m c vc pbls

GAS DELIVERABILITY

Sandface Analysis

The deliverability study was conducted using data from DST# 4. From a simplified analysis using the backpressure equation, the following parameters were determined:

- Inverse slope $n = 1.0$ (assumed)
- Performance coefficient $C = 5.62 \text{ E-}09$
- Absolute Open Flow Potential (AOF) $= 1.06 \times 10^3 \text{ m}^3/\text{day}$

Tabular and graphical results of the simplified analysis are presented in this section in subsequent pages.




```

+ + + + + + + + + + + + + + + + +
+
+          SERVIPETROL LTD.
+ International Petroleum Consultants
+
+          Gas Deliverability Test
+
+ + + + + + + + + + + + + + + + +

```

DEER LAKE OIL AND GAS, WESTERN ADVENTURE #1, LOWER NORTH BROOK
GAUGE AT 1430.19 mKB, INTERVAL 1425.09-1522.9 mKB
TEST DATE: DECEMBER 1, 2000
PREPARED BY ROBERTO AGUILERA, PhD AND MARIA S. AGUILERA, BSc

Input Data

```

Temperature..... = 3.490E+01  C
Specific Gravity of Gas (Air=1)... = 9.170E-01
Pseudo Critical Pressure..... = 3.649E+03  kPa
Pseudo Critical Temperature..... = 1.433E+02  K

```

Output

Simplified Analysis Sandface Deliverability

	duration	sandface	calc	meas	p ²	dp ²	flow rate
	h	kPa			MPa ²	MPa ²	k(m ³ /d)
ext. flow	3.18	3214.0		x	10.33	177.91	1.0
F-shut-in	3.13	13720.0		x	188.24		

RESULT

$$q = C \cdot (Pr^2 - Pwf^2)^n$$

```

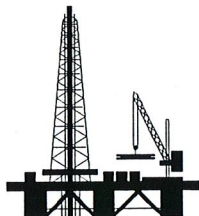
inverse slope n..... = 1.00000E+00
Pr..... = 1.37200E+04  kPa
C = q/(Pr^2 - Pwf^2)^n = 5.62086E-09
AOF..... = 1.05806E+00  k(m^3/d)

```



DST # 4

**WELL WESTERN ADVENTURE # 1
NORTH BROOK FORMATION
DEER LAKE BASIN, NEWFOUNDLAND**



SERVIPETROL LTD.
International Petroleum Consultants



DEER LAKE OIL AND GAS, WELL: DEER LAKE ET AL WA-1, BUI

GAUGE @ 1430.19 m, DST #4 (1425.09 m - 1522.90 m)

Superposition Plot (Buildup)

1.6E+04

Delta m(P), GPa²/mPa.s

1.2E+04

8.0E+03

4.0E+03

$m = -6.453E+04$
 $Tf = 5.472E-01 \text{ mD-m/cp}$
 $s = -8.292E-01$
 $Dp^* = 1.410E+04 \text{ GPa}^2/\text{mPa.s}$
 $p^* = 1.395E+04 \text{ kPa}$

Superposition Function

servipetrot

0.8

0.6

0.4

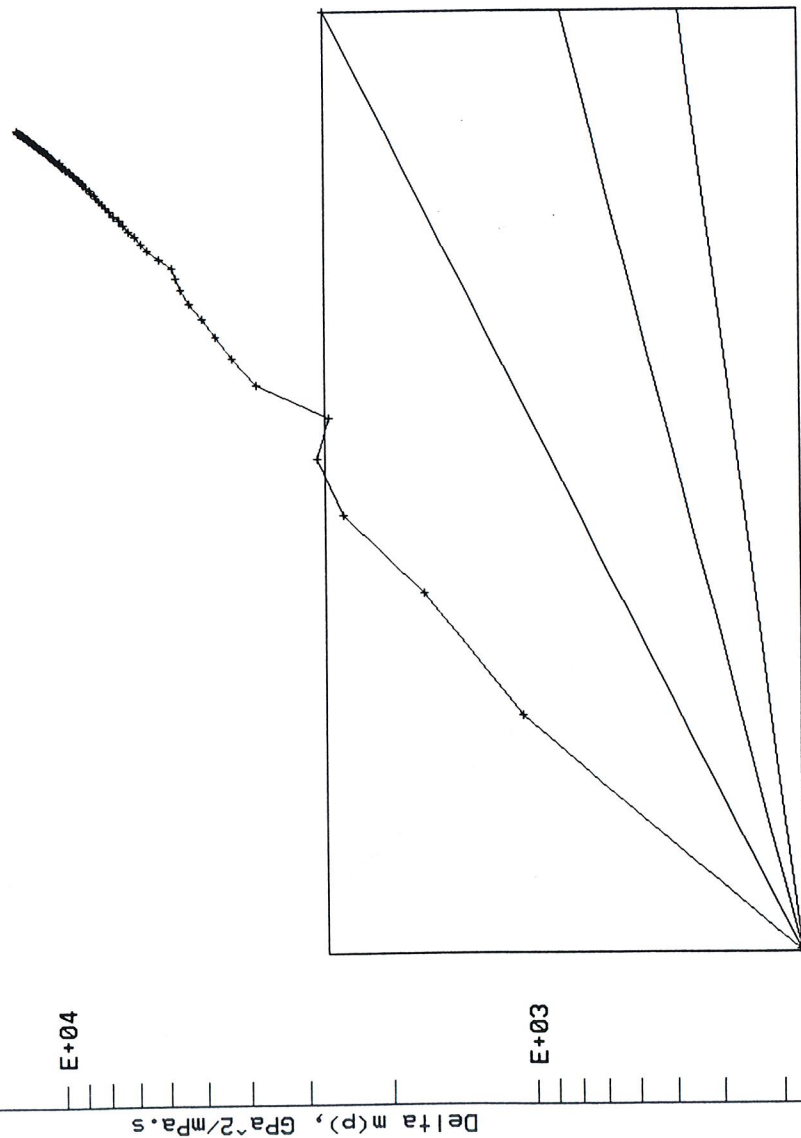
0.2

DEER LAKE OIL AND GAS, WELL: DEER LAKE ET AL WA-1, BUI

GAUGE @ 1430.19 m, DST #4 (1425.09 m - 1522.90 m)

TEST DATE: 12/01/2000

Log-Log Diagnostic Plot

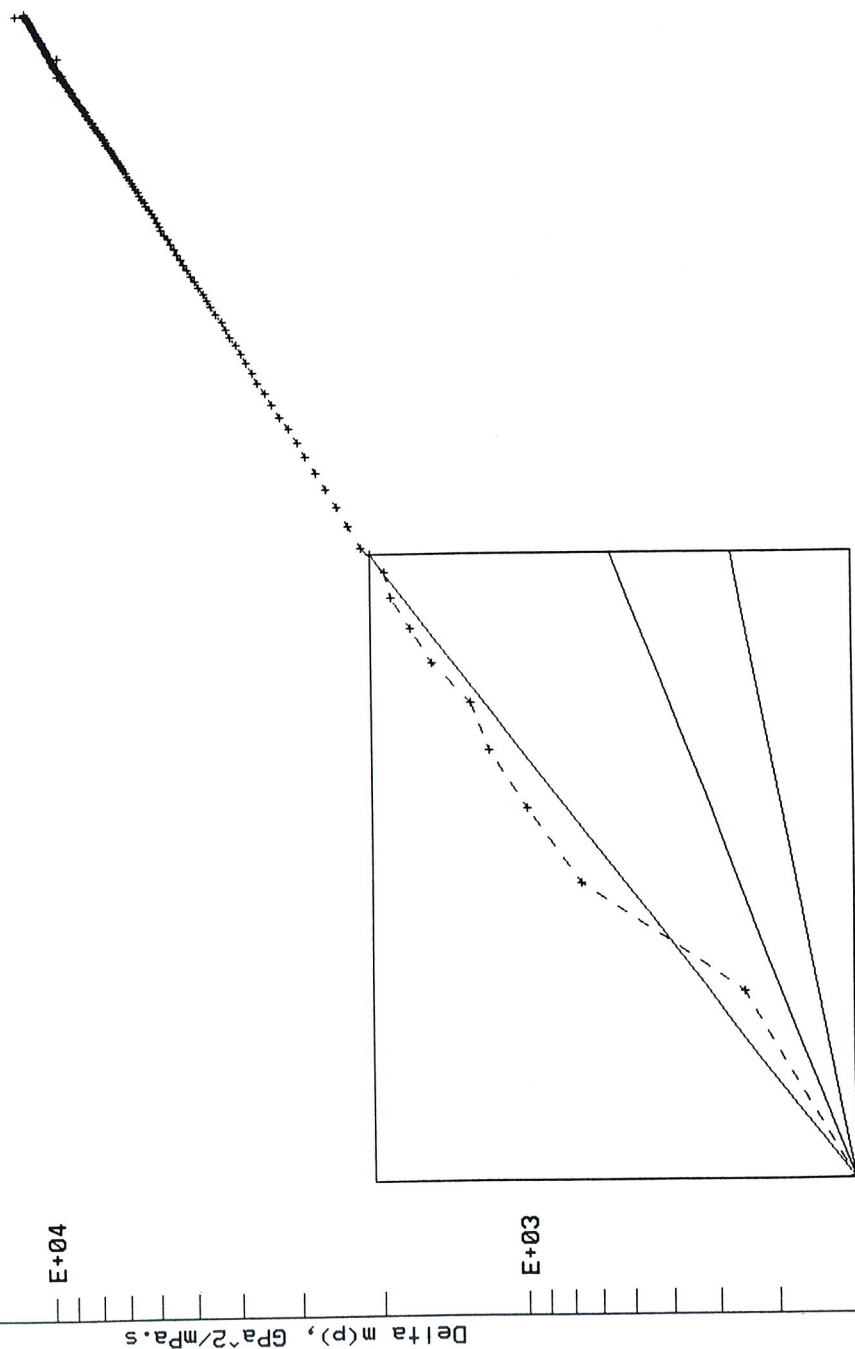


DEER LAKE OIL AND GAS, WELL: DEER LAKE ET AL WA-1, BU2

GAUGE @ 1430.19 m, DST #4 (1425.09 m - 1522.90 m)

TEST DATE: 12/01/2000

Log-Log Diagnostic Plot



105	1.750E+00	1.003E+00	1.052E+04	9.196E+03	8.212E+03
106	1.767E+00	1.009E+00	1.054E+04	9.227E+03	8.244E+03
107	1.783E+00	1.014E+00	1.056E+04	9.259E+03	8.275E+03
108	1.800E+00	1.020E+00	1.058E+04	9.289E+03	8.305E+03
109	1.817E+00	1.025E+00	1.060E+04	9.320E+03	8.337E+03
110	1.833E+00	1.030E+00	1.062E+04	9.351E+03	8.367E+03
111	1.850E+00	1.035E+00	1.064E+04	9.380E+03	8.397E+03
112	1.867E+00	1.041E+00	1.066E+04	9.410E+03	8.426E+03
113	1.883E+00	1.046E+00	1.076E+04	9.563E+03	8.580E+03
114	1.900E+00	1.051E+00	1.066E+04	9.405E+03	8.422E+03
115	1.917E+00	1.056E+00	1.072E+04	9.495E+03	8.511E+03
116	1.933E+00	1.061E+00	1.074E+04	9.523E+03	8.540E+03
117	1.950E+00	1.066E+00	1.077E+04	9.579E+03	8.596E+03
118	1.967E+00	1.071E+00	1.077E+04	9.575E+03	8.592E+03
119	1.983E+00	1.076E+00	1.081E+04	9.632E+03	8.649E+03
120	2.000E+00	1.081E+00	1.082E+04	9.658E+03	8.674E+03
121	2.017E+00	1.086E+00	1.084E+04	9.683E+03	8.700E+03
122	2.033E+00	1.090E+00	1.085E+04	9.707E+03	8.724E+03
123	2.050E+00	1.095E+00	1.087E+04	9.731E+03	8.747E+03
124	2.067E+00	1.100E+00	1.086E+04	9.724E+03	8.741E+03
125	2.083E+00	1.105E+00	1.090E+04	9.776E+03	8.792E+03
126	2.100E+00	1.109E+00	1.092E+04	9.803E+03	8.820E+03
127	2.117E+00	1.114E+00	1.093E+04	9.827E+03	8.843E+03
128	2.133E+00	1.119E+00	1.094E+04	9.849E+03	8.866E+03
129	2.150E+00	1.123E+00	1.077E+04	9.575E+03	8.592E+03
130	2.167E+00	1.128E+00	1.097E+04	9.893E+03	8.910E+03
131	2.183E+00	1.132E+00	1.099E+04	9.915E+03	8.932E+03
132	2.200E+00	1.137E+00	1.100E+04	9.937E+03	8.953E+03
133	2.217E+00	1.141E+00	1.101E+04	9.958E+03	8.974E+03
134	2.233E+00	1.145E+00	1.103E+04	9.979E+03	8.995E+03
135	2.250E+00	1.150E+00	1.104E+04	1.000E+04	9.016E+03
136	2.267E+00	1.154E+00	1.105E+04	1.002E+04	9.036E+03
137	2.283E+00	1.158E+00	1.107E+04	1.004E+04	9.056E+03
138	2.300E+00	1.163E+00	1.107E+04	1.005E+04	9.071E+03
139	2.317E+00	1.167E+00	1.108E+04	1.007E+04	9.083E+03
140	2.333E+00	1.171E+00	1.110E+04	1.010E+04	9.118E+03
141	2.350E+00	1.175E+00	1.112E+04	1.012E+04	9.136E+03
142	2.367E+00	1.180E+00	1.113E+04	1.014E+04	9.158E+03
143	2.383E+00	1.184E+00	1.114E+04	1.016E+04	9.177E+03
144	2.400E+00	1.188E+00	1.115E+04	1.018E+04	9.196E+03
145	2.417E+00	1.192E+00	1.117E+04	1.020E+04	9.217E+03
146	2.433E+00	1.196E+00	1.118E+04	1.022E+04	9.236E+03
147	2.450E+00	1.200E+00	1.117E+04	1.021E+04	9.223E+03
148	2.467E+00	1.204E+00	1.120E+04	1.026E+04	9.274E+03
149	2.483E+00	1.208E+00	1.121E+04	1.028E+04	9.292E+03
150	2.500E+00	1.212E+00	1.123E+04	1.029E+04	9.310E+03
151	2.517E+00	1.216E+00	1.124E+04	1.032E+04	9.332E+03
152	2.533E+00	1.220E+00	1.125E+04	1.033E+04	9.347E+03
153	2.550E+00	1.223E+00	1.126E+04	1.035E+04	9.367E+03
154	2.567E+00	1.227E+00	1.127E+04	1.037E+04	9.384E+03
155	2.583E+00	1.231E+00	1.128E+04	1.039E+04	9.402E+03
156	2.600E+00	1.235E+00	1.130E+04	1.040E+04	9.422E+03
157	2.617E+00	1.239E+00	1.131E+04	1.042E+04	9.439E+03
158	2.633E+00	1.242E+00	1.132E+04	1.044E+04	9.455E+03
159	2.650E+00	1.246E+00	1.133E+04	1.046E+04	9.474E+03
160	2.667E+00	1.250E+00	1.134E+04	1.047E+04	9.488E+03

Superposition Analysis

=====

No.	Elapsed time hr	T-Function Dimensionless	P-Function GPa ² /mPa.s
1	1.667E-02	2.225E+00	2.145E+02
2	3.333E-02	1.929E+00	3.573E+02
3	5.000E-02	1.757E+00	7.729E+02
4	6.667E-02	1.636E+00	9.950E+02
5	8.333E-02	1.543E+00	1.192E+03
6	1.000E-01	1.466E+00	1.293E+03
7	1.167E-01	1.402E+00	1.552E+03
8	1.333E-01	1.347E+00	1.714E+03
9	1.500E-01	1.298E+00	1.872E+03
10	1.667E-01	1.255E+00	1.925E+03
11	1.833E-01	1.216E+00	2.162E+03
12	2.000E-01	1.180E+00	2.297E+03
13	2.167E-01	1.147E+00	2.423E+03
14	2.333E-01	1.117E+00	2.547E+03
15	2.500E-01	1.089E+00	2.671E+03
16	2.667E-01	1.063E+00	2.784E+03
17	2.833E-01	1.038E+00	2.898E+03
18	3.000E-01	1.015E+00	3.017E+03
19	3.167E-01	9.936E-01	3.133E+03
20	3.333E-01	9.731E-01	3.248E+03
21	3.500E-01	9.536E-01	3.352E+03
22	3.667E-01	9.351E-01	3.459E+03
23	3.833E-01	9.175E-01	3.558E+03
24	4.000E-01	9.007E-01	3.650E+03
25	4.167E-01	8.847E-01	3.744E+03
26	4.333E-01	8.693E-01	3.837E+03
27	4.500E-01	8.546E-01	3.928E+03
28	4.667E-01	8.404E-01	4.019E+03
29	4.833E-01	8.268E-01	4.085E+03
30	5.000E-01	8.138E-01	4.200E+03
31	5.167E-01	8.012E-01	4.289E+03
32	5.333E-01	7.891E-01	4.376E+03
33	5.500E-01	7.773E-01	4.461E+03
34	5.667E-01	7.660E-01	4.545E+03
35	5.833E-01	7.551E-01	4.627E+03
36	6.000E-01	7.445E-01	4.720E+03
37	6.167E-01	7.343E-01	4.786E+03
38	6.333E-01	7.243E-01	4.867E+03
39	6.500E-01	7.147E-01	4.933E+03
40	6.667E-01	7.054E-01	5.020E+03
41	6.833E-01	6.963E-01	5.093E+03
42	7.000E-01	6.875E-01	5.169E+03
43	7.167E-01	6.789E-01	5.226E+03
44	7.333E-01	6.706E-01	5.310E+03
45	7.500E-01	6.625E-01	5.407E+03
46	7.667E-01	6.546E-01	5.448E+03
47	7.833E-01	6.469E-01	5.517E+03
48	8.000E-01	6.395E-01	5.581E+03
49	8.167E-01	6.322E-01	5.633E+03

106	1.767E+00	3.891E-01	8.244E+03
107	1.783E+00	3.865E-01	8.275E+03
108	1.800E+00	3.840E-01	8.305E+03
109	1.817E+00	3.815E-01	8.337E+03
110	1.833E+00	3.791E-01	8.367E+03
111	1.850E+00	3.767E-01	8.397E+03
112	1.867E+00	3.743E-01	8.426E+03
113	1.883E+00	3.719E-01	8.580E+03
114	1.900E+00	3.696E-01	8.422E+03
115	1.917E+00	3.673E-01	8.511E+03
116	1.933E+00	3.650E-01	8.540E+03
117	1.950E+00	3.628E-01	8.596E+03
118	1.967E+00	3.606E-01	8.592E+03
119	1.983E+00	3.584E-01	8.649E+03
120	2.000E+00	3.563E-01	8.674E+03
121	2.017E+00	3.541E-01	8.700E+03
122	2.033E+00	3.520E-01	8.724E+03
123	2.050E+00	3.500E-01	8.747E+03
124	2.067E+00	3.479E-01	8.741E+03
125	2.083E+00	3.459E-01	8.792E+03
126	2.100E+00	3.439E-01	8.820E+03
127	2.117E+00	3.419E-01	8.843E+03
128	2.133E+00	3.400E-01	8.866E+03
129	2.150E+00	3.380E-01	8.592E+03
130	2.167E+00	3.361E-01	8.910E+03
131	2.183E+00	3.342E-01	8.932E+03
132	2.200E+00	3.324E-01	8.953E+03
133	2.217E+00	3.305E-01	8.974E+03
134	2.233E+00	3.287E-01	8.995E+03
135	2.250E+00	3.269E-01	9.016E+03
136	2.267E+00	3.251E-01	9.036E+03
137	2.283E+00	3.233E-01	9.056E+03
138	2.300E+00	3.216E-01	9.071E+03
139	2.317E+00	3.199E-01	9.083E+03
140	2.333E+00	3.182E-01	9.118E+03
141	2.350E+00	3.165E-01	9.136E+03
142	2.367E+00	3.148E-01	9.158E+03
143	2.383E+00	3.132E-01	9.177E+03
144	2.400E+00	3.115E-01	9.196E+03
145	2.417E+00	3.099E-01	9.217E+03
146	2.433E+00	3.083E-01	9.236E+03
147	2.450E+00	3.067E-01	9.223E+03
148	2.467E+00	3.052E-01	9.274E+03
149	2.483E+00	3.036E-01	9.292E+03
150	2.500E+00	3.021E-01	9.310E+03
151	2.517E+00	3.006E-01	9.332E+03
152	2.533E+00	2.991E-01	9.347E+03
153	2.550E+00	2.976E-01	9.367E+03
154	2.567E+00	2.961E-01	9.384E+03
155	2.583E+00	2.947E-01	9.402E+03
156	2.600E+00	2.932E-01	9.422E+03
157	2.617E+00	2.918E-01	9.439E+03
158	2.633E+00	2.904E-01	9.455E+03
159	2.650E+00	2.890E-01	9.474E+03
160	2.667E+00	2.876E-01	9.488E+03
161	2.683E+00	2.862E-01	9.508E+03

162	2.700E+00	2.849E-01	9.573E+03
163	2.717E+00	2.835E-01	9.544E+03
164	2.733E+00	2.822E-01	9.561E+03
165	2.750E+00	2.809E-01	9.578E+03
166	2.767E+00	2.796E-01	9.596E+03
167	2.783E+00	2.783E-01	9.613E+03
168	2.800E+00	2.770E-01	9.627E+03
169	2.817E+00	2.757E-01	9.645E+03
170	2.833E+00	2.744E-01	9.662E+03
171	2.850E+00	2.732E-01	9.679E+03
172	2.867E+00	2.720E-01	9.694E+03
173	2.883E+00	2.707E-01	9.711E+03
174	2.900E+00	2.695E-01	9.727E+03
175	2.917E+00	2.683E-01	9.744E+03
176	2.933E+00	2.671E-01	9.760E+03
177	2.950E+00	2.659E-01	9.776E+03
178	2.967E+00	2.648E-01	9.792E+03
179	2.983E+00	2.636E-01	9.806E+03
180	3.000E+00	2.625E-01	9.823E+03
181	3.017E+00	2.613E-01	9.840E+03
182	3.033E+00	2.602E-01	9.855E+03
183	3.050E+00	2.591E-01	9.871E+03
184	3.067E+00	2.580E-01	9.886E+03
185	3.083E+00	2.569E-01	1.037E+04
186	3.100E+00	2.558E-01	9.917E+03
187	3.117E+00	2.547E-01	9.931E+03
188	3.133E+00	2.536E-01	9.946E+03

Input Data

```

-----
Pressure Run Depth..... = 1.439E+03 m
Fluid Analyzed..... = Gas
Production Time..... = 2.352E+00 hr
Total Flow Rate..... = 1.108E+01 Res m^3/D
Oil Flow Rate..... = 0.000E-01 m^3/D
Gas Flow Rate(Free Gas)..... = 9.220E+02 m^3/D
Water Flow Rate..... = 0.000E-01 m^3/D
Bottomhole Flowing Pressure..... = 3.214E+03 kPa
Specific Gravity of Gas..... = 9.170E-01
Gas Deviation Factor..... = 9.594E-01
Oil Formation Volume Factor..... = 1.000E+00 Res m^3/m^3
Gas Formation Volume Factor..... = 1.201E-02 Res m^3/m^3
Water Formation Volume Factor..... = 1.000E+00 Res m^3/m^3
Solution Gas-Oil Ratio..... = 0.000E-01 m^3/m^3
Solution Gas-Water Ratio..... = 0.000E-01 m^3/m^3
Oil Viscosity..... = 1.000E+00 cp
Gas Viscosity..... = 1.325E-02 cp
Water Viscosity..... = 1.000E+00 cp
Reservoir Temperature..... = 3.490E+01 Degree C
Pay Thickness..... = 2.130E+00 m
Porosity..... = 9.040E-02
Oil Saturation..... = 0.000E-01
Gas Saturation..... = 2.406E-01
Water Saturation..... = 7.594E-01
Total Compressibility..... = 2.975E-05 1/kPa
Wellbore Radius..... = 1.000E-01 m
Pseudocritical pressure..... = 3.649E+03 kPa
Pseudocritical temperature..... = 1.433E+02 K
Nitrogen,mole fraction..... = 8.063E-01
Carbon dioxide,mole fraction..... = 9.200E-03
Hydrogen sulphide,mole fraction... = 0.000E-01

```

Output

```

-----
Slope..... = 1.344E+04
Intercept..... = 1.336E+04 GPa^2/mPa.s
Dp or Dm(p) at 1 hour..... = 5.800E+03 GPa^2/mPa.s
Extended Pressure..... = 1.372E+04 kPa
Total Transmissibility..... = 2.404E+00 mD-m/cp
Oil Transmissibility..... = 0.000E-01 mD-m/cp
Gas Transmissibility..... = 2.404E+00 mD-m/cp
Water Transmissibility..... = 0.000E-01 mD-m/cp
Oil Reservoir Capacity..... = 0.000E-01 mD-m
Gas Reservoir Capacity..... = 3.185E-02 mD-m
Water Reservoir Capacity..... = 0.000E-01 mD-m
Total Mobility..... = 1.129E+00 mD/cp
Oil Mobility..... = 0.000E-01 mD/cp
Gas Mobility..... = 1.129E+00 mD/cp
Water Mobility..... = 0.000E-01 mD/cp
Effective Permeability to Oil..... = 0.000E-01 mD
Effective Permeability to Gas..... = 1.495E-02 mD
Effective Permeability to Water... = 0.000E-01 mD
Skin Factor..... = -2.232E+00
Pressure Drop due to skin..... = -1.537E+04 kPa
Total Ideal Productivity Index... = 4.281E-04 Res m^3/D/kPa
Total Actual Productivity Index... = 1.054E-03 Res m^3/D/kPa
Total Flow Efficiency..... = 2.463E+00
Oil Ideal Productivity Index..... = 0.000E-01 m^3/D/kPa
Oil Actual Productivity Index..... = 0.000E-01 m^3/D/kPa
Oil Flow Efficiency..... = 0.000E-01
Gas Ideal Productivity Index..... = 3.564E-02 m^3/D /kPa
Gas Actual Productivity Index..... = 8.777E-02 m^3/D /kPa
Gas Flow Efficiency..... = 2.463E+00
Radius of Investigation..... = 3.737E+00 m
Hydrocarbons-in-Place based on Radius of investigation
(Meaningful only during the transient flow period)
Oil-in-Place (OOIP)..... = 0.000E-01 m^3
Gas-in-Place (OGIP). .... = 1.692E+02 m^3

```




DST # 3

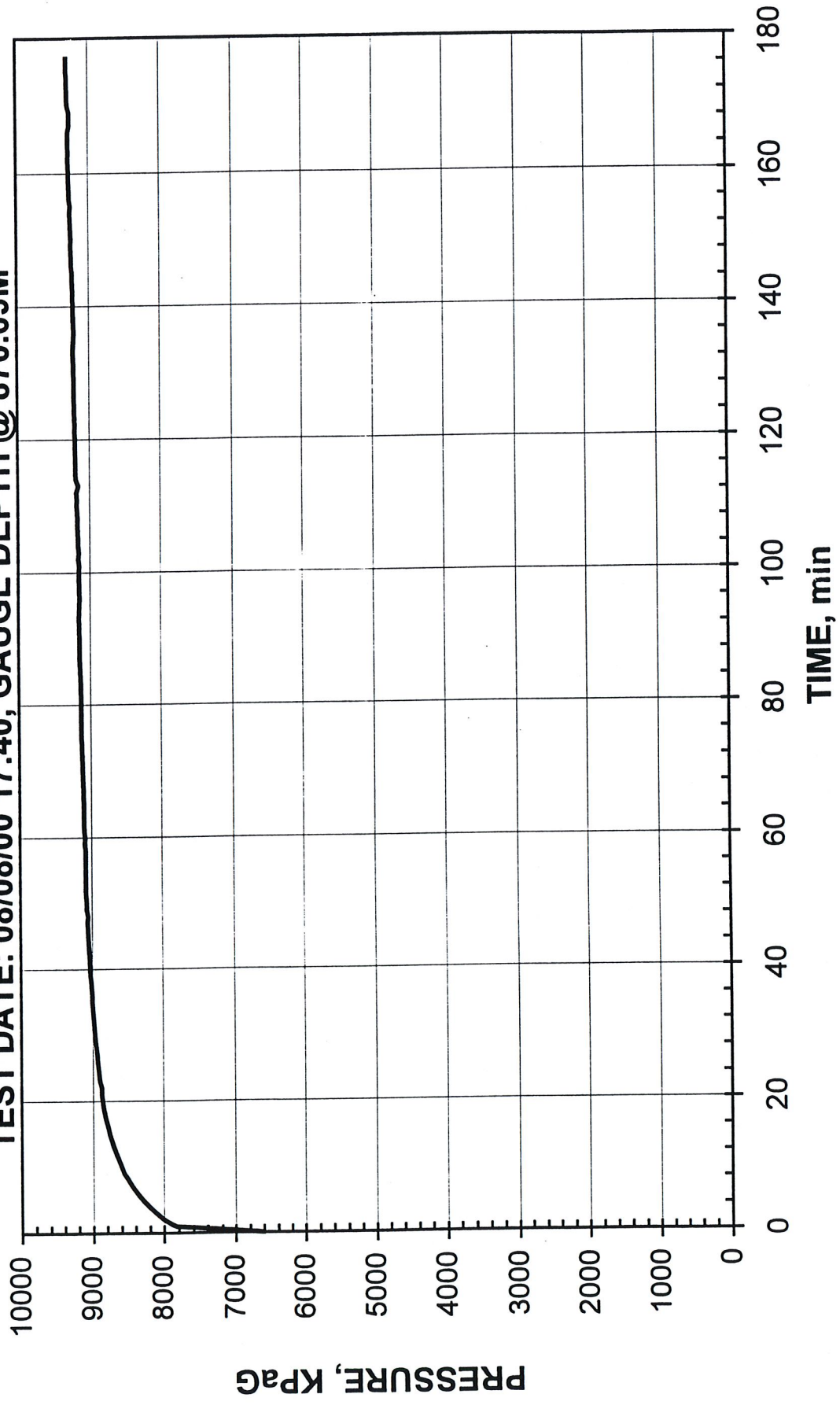
**WELL WESTERN ADVENTURE # 1
NORTH BROOK FORMATION
DEER LAKE BASIN, NEWFOUNDLAND**



SERVIPETROL LTD.
International Petroleum Consultants



DEER LAKE OIL AND GAS, WELL: DEER LAKE ET AL WA-1, DST#3,
TEST DATE: 08/08/00 17:40, GAUGE DEPTH @ 870.69M



DEER LAKE OIL & GAS, WELL: DEER LAKE ET AL WA-1

GAUGE @ 870.9 m, DST #3 (685.0 m - 872.0 m)

Superposition Plot (Buildup)

$m = -3.300E+03$
 $Tf = 1.061E+01 \text{ mD-m/cp}$
 $s = -2.149E+00$
 $Dp^* = 3.875E+03 \text{ GPa}^2/\text{mPa.s}$
 $p^* = 9.626E+03 \text{ kPa}$

Delta m(p), $\text{GPa}^2/\text{mPa.s}$

Superposition Function

servipetrol

1.6

1.2

0.8

0.4

3500

3000

2500

2000

DEER LAKE OIL & GAS, WELL: DEER LAKE ET AL WA-1

GAUGE @ 870.9 m, DST #3 (685.0 m - 872.0 m)

TEST DATE: 08/08/2000 17:40

Dual Porosity (pseudo steady)

E+01

E+00

E-01

E+00

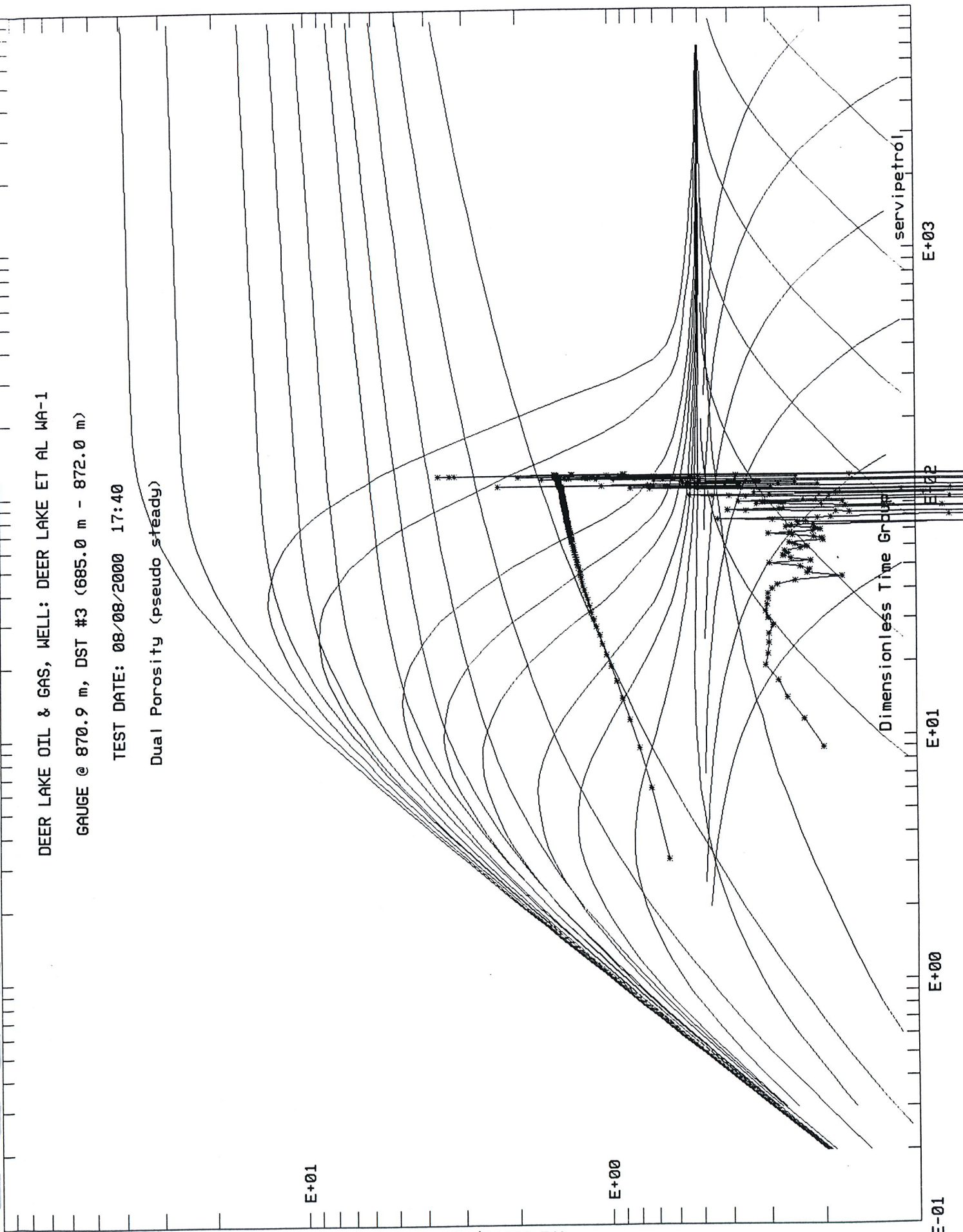
E+01

E+03

(Td/Cd)*Dp/Dt and Pd

Dimensionless Time Group

servipetrol



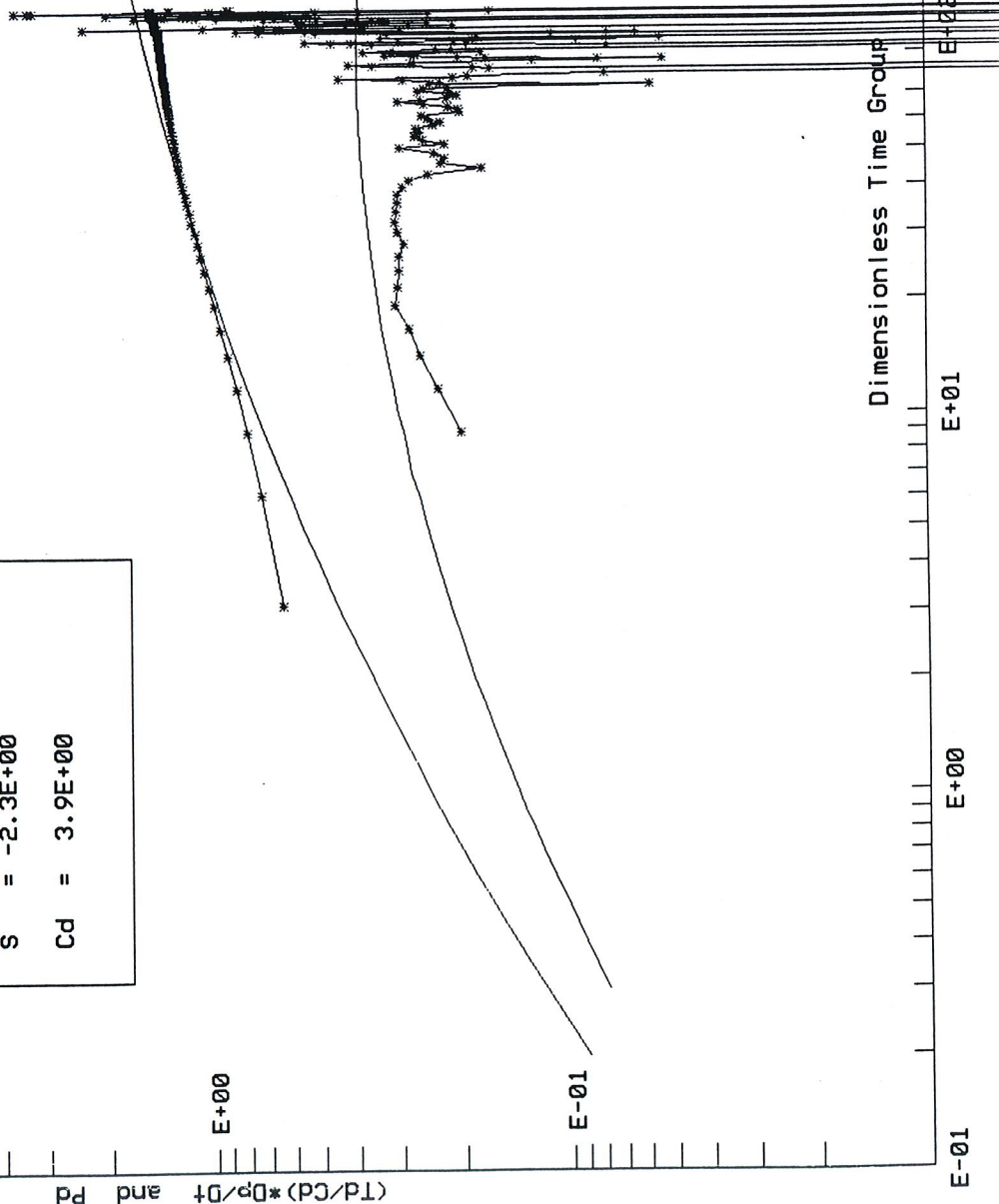
DEER LAKE OIL & GAS, WELL: DEER LAKE ET AL WA-1

GAUGE @ 870.9 m, DST #3 (685.0 m - 872.0 m)

TEST DATE: 08/08/2000 17:40

Dual Porosity (pseudo steady)

Tf = 1.3E+01
W = 3.9E-01
Lm = 1.3E-04
S = -2.3E+00
Cd = 3.9E+00



servipetrol

E+03

E+02

E+01

E+00

E-01

(Td/Cd)*(Dp/Dt) and Pd

E+01

E+00

E-01

Buildup Data

=====

No.	Shutin time hr	Effective Time hr	Pressure kPa	m[p] GPa ² /mPa.s	Delta m[p] GPa ² /mPa.s
1	1.667E-02	1.633E-02	7.936E+03	5.717E+03	1.507E+03
2	3.333E-02	3.200E-02	8.092E+03	5.923E+03	1.714E+03
3	5.000E-02	4.706E-02	8.211E+03	6.083E+03	1.873E+03
4	6.667E-02	6.154E-02	8.314E+03	6.222E+03	2.012E+03
5	8.333E-02	7.547E-02	8.401E+03	6.340E+03	2.131E+03
6	1.000E-01	8.889E-02	8.477E+03	6.443E+03	2.234E+03
7	1.167E-01	1.018E-01	8.546E+03	6.538E+03	2.329E+03
8	1.333E-01	1.143E-01	8.604E+03	6.618E+03	2.409E+03
9	1.500E-01	1.263E-01	8.665E+03	6.703E+03	2.494E+03
10	1.667E-01	1.379E-01	8.701E+03	6.753E+03	2.544E+03
11	1.833E-01	1.492E-01	8.740E+03	6.809E+03	2.599E+03
12	2.000E-01	1.600E-01	8.774E+03	6.855E+03	2.646E+03
13	2.167E-01	1.705E-01	8.809E+03	6.904E+03	2.695E+03
14	2.333E-01	1.806E-01	8.837E+03	6.944E+03	2.735E+03
15	2.500E-01	1.905E-01	8.865E+03	6.984E+03	2.775E+03
16	2.667E-01	2.000E-01	8.887E+03	7.015E+03	2.806E+03
17	2.833E-01	2.092E-01	8.911E+03	7.049E+03	2.840E+03
18	3.000E-01	2.182E-01	8.931E+03	7.078E+03	2.869E+03
19	3.167E-01	2.269E-01	8.950E+03	7.104E+03	2.895E+03
20	3.333E-01	2.353E-01	8.964E+03	7.124E+03	2.915E+03
21	3.500E-01	2.435E-01	8.974E+03	7.138E+03	2.929E+03
22	3.667E-01	2.514E-01	8.974E+03	7.138E+03	2.929E+03
23	3.833E-01	2.592E-01	8.998E+03	7.173E+03	2.964E+03
24	4.000E-01	2.667E-01	9.008E+03	7.187E+03	2.978E+03
25	4.167E-01	2.740E-01	9.019E+03	7.203E+03	2.994E+03
26	4.333E-01	2.811E-01	9.030E+03	7.218E+03	3.009E+03
27	4.500E-01	2.880E-01	9.037E+03	7.228E+03	3.019E+03
28	4.667E-01	2.947E-01	9.049E+03	7.246E+03	3.037E+03
29	4.833E-01	3.013E-01	9.061E+03	7.262E+03	3.053E+03
30	5.000E-01	3.077E-01	9.068E+03	7.272E+03	3.063E+03
31	5.167E-01	3.139E-01	9.075E+03	7.282E+03	3.073E+03
32	5.333E-01	3.200E-01	9.082E+03	7.292E+03	3.083E+03
33	5.500E-01	3.259E-01	9.090E+03	7.304E+03	3.095E+03
34	5.667E-01	3.317E-01	9.098E+03	7.315E+03	3.106E+03
35	5.833E-01	3.373E-01	9.105E+03	7.326E+03	3.116E+03
36	6.000E-01	3.429E-01	9.105E+03	7.326E+03	3.116E+03
37	6.167E-01	3.482E-01	9.112E+03	7.335E+03	3.126E+03
38	6.333E-01	3.535E-01	9.120E+03	7.347E+03	3.138E+03
39	6.500E-01	3.586E-01	9.129E+03	7.360E+03	3.151E+03
40	6.667E-01	3.636E-01	9.134E+03	7.367E+03	3.158E+03
41	6.833E-01	3.685E-01	9.136E+03	7.370E+03	3.161E+03
42	7.000E-01	3.733E-01	9.140E+03	7.375E+03	3.166E+03
43	7.167E-01	3.780E-01	9.147E+03	7.385E+03	3.176E+03
44	7.333E-01	3.826E-01	9.151E+03	7.392E+03	3.183E+03
45	7.500E-01	3.871E-01	9.157E+03	7.400E+03	3.191E+03
46	7.667E-01	3.915E-01	9.159E+03	7.404E+03	3.195E+03
47	7.833E-01	3.958E-01	9.163E+03	7.409E+03	3.200E+03
48	8.000E-01	4.000E-01	9.156E+03	7.399E+03	3.190E+03

49	8.167E-01	4.041E-01	9.173E+03	7.424E+03	3.215E+03
50	8.333E-01	4.082E-01	9.174E+03	7.425E+03	3.216E+03
51	8.500E-01	4.121E-01	9.181E+03	7.436E+03	3.226E+03
52	8.667E-01	4.160E-01	9.185E+03	7.441E+03	3.232E+03
53	8.833E-01	4.198E-01	9.186E+03	7.442E+03	3.233E+03
54	9.000E-01	4.235E-01	9.186E+03	7.442E+03	3.233E+03
55	9.167E-01	4.272E-01	9.186E+03	7.442E+03	3.233E+03
56	9.333E-01	4.308E-01	9.184E+03	7.439E+03	3.230E+03
57	9.500E-01	4.343E-01	9.184E+03	7.439E+03	3.230E+03
58	9.667E-01	4.377E-01	9.186E+03	7.442E+03	3.233E+03
59	9.833E-01	4.411E-01	9.194E+03	7.454E+03	3.245E+03
60	1.000E+00	4.444E-01	9.193E+03	7.452E+03	3.243E+03
61	1.017E+00	4.477E-01	9.201E+03	7.464E+03	3.255E+03
62	1.033E+00	4.509E-01	9.206E+03	7.471E+03	3.262E+03
63	1.050E+00	4.541E-01	9.207E+03	7.472E+03	3.263E+03
64	1.067E+00	4.571E-01	9.206E+03	7.471E+03	3.262E+03
65	1.083E+00	4.602E-01	9.207E+03	7.472E+03	3.263E+03
66	1.100E+00	4.632E-01	9.208E+03	7.474E+03	3.265E+03
67	1.117E+00	4.661E-01	9.210E+03	7.477E+03	3.268E+03
68	1.133E+00	4.690E-01	9.212E+03	7.481E+03	3.271E+03
69	1.150E+00	4.718E-01	9.215E+03	7.484E+03	3.275E+03
70	1.167E+00	4.746E-01	9.221E+03	7.492E+03	3.283E+03
71	1.183E+00	4.773E-01	9.221E+03	7.492E+03	3.283E+03
72	1.200E+00	4.800E-01	9.223E+03	7.496E+03	3.287E+03
73	1.217E+00	4.826E-01	9.226E+03	7.501E+03	3.292E+03
74	1.233E+00	4.852E-01	9.227E+03	7.501E+03	3.292E+03
75	1.250E+00	4.878E-01	9.234E+03	7.511E+03	3.302E+03
76	1.267E+00	4.903E-01	9.234E+03	7.511E+03	3.302E+03
77	1.283E+00	4.928E-01	9.234E+03	7.511E+03	3.302E+03
78	1.300E+00	4.952E-01	9.235E+03	7.513E+03	3.304E+03
79	1.317E+00	4.976E-01	9.232E+03	7.509E+03	3.300E+03
80	1.333E+00	5.000E-01	9.232E+03	7.509E+03	3.300E+03
81	1.350E+00	5.023E-01	9.234E+03	7.511E+03	3.302E+03
82	1.367E+00	5.046E-01	9.237E+03	7.516E+03	3.307E+03
83	1.383E+00	5.069E-01	9.238E+03	7.517E+03	3.308E+03
84	1.400E+00	5.091E-01	9.243E+03	7.524E+03	3.315E+03
85	1.417E+00	5.113E-01	9.245E+03	7.528E+03	3.319E+03
86	1.433E+00	5.134E-01	9.250E+03	7.534E+03	3.325E+03
87	1.450E+00	5.156E-01	9.253E+03	7.539E+03	3.330E+03
88	1.467E+00	5.176E-01	9.251E+03	7.536E+03	3.327E+03
89	1.483E+00	5.197E-01	9.251E+03	7.536E+03	3.327E+03
90	1.500E+00	5.217E-01	9.252E+03	7.538E+03	3.329E+03
91	1.517E+00	5.237E-01	9.254E+03	7.541E+03	3.332E+03
92	1.533E+00	5.257E-01	9.255E+03	7.543E+03	3.333E+03
93	1.550E+00	5.277E-01	9.259E+03	7.548E+03	3.339E+03
94	1.567E+00	5.296E-01	9.256E+03	7.544E+03	3.335E+03
95	1.583E+00	5.315E-01	9.252E+03	7.538E+03	3.329E+03
96	1.600E+00	5.333E-01	9.250E+03	7.534E+03	3.325E+03
97	1.617E+00	5.352E-01	9.251E+03	7.536E+03	3.327E+03
98	1.633E+00	5.370E-01	9.253E+03	7.539E+03	3.330E+03
99	1.650E+00	5.388E-01	9.254E+03	7.541E+03	3.332E+03
100	1.667E+00	5.405E-01	9.256E+03	7.544E+03	3.335E+03
101	1.683E+00	5.423E-01	9.252E+03	7.538E+03	3.329E+03
102	1.700E+00	5.440E-01	9.263E+03	7.554E+03	3.345E+03
103	1.717E+00	5.457E-01	9.256E+03	7.544E+03	3.334E+03
104	1.733E+00	5.474E-01	9.267E+03	7.560E+03	3.351E+03

105	1.750E+00	5.490E-01	9.267E+03	7.560E+03	3.351E+03
106	1.767E+00	5.506E-01	9.270E+03	7.564E+03	3.355E+03
107	1.783E+00	5.523E-01	9.273E+03	7.568E+03	3.359E+03
108	1.800E+00	5.538E-01	9.273E+03	7.568E+03	3.359E+03
109	1.817E+00	5.554E-01	9.276E+03	7.573E+03	3.364E+03
110	1.833E+00	5.570E-01	9.282E+03	7.581E+03	3.372E+03
111	1.850E+00	5.585E-01	9.280E+03	7.578E+03	3.369E+03
112	1.867E+00	5.600E-01	9.285E+03	7.586E+03	3.377E+03
113	1.883E+00	5.615E-01	9.259E+03	7.548E+03	3.339E+03
114	1.900E+00	5.630E-01	9.292E+03	7.596E+03	3.387E+03
115	1.917E+00	5.644E-01	9.297E+03	7.603E+03	3.394E+03
116	1.933E+00	5.659E-01	9.297E+03	7.603E+03	3.394E+03
117	1.950E+00	5.673E-01	9.298E+03	7.605E+03	3.396E+03
118	1.967E+00	5.687E-01	9.299E+03	7.606E+03	3.397E+03
119	1.983E+00	5.701E-01	9.300E+03	7.608E+03	3.399E+03
120	2.000E+00	5.714E-01	9.302E+03	7.610E+03	3.401E+03
121	2.017E+00	5.728E-01	9.306E+03	7.617E+03	3.408E+03
122	2.033E+00	5.741E-01	9.305E+03	7.615E+03	3.406E+03
123	2.050E+00	5.754E-01	9.309E+03	7.620E+03	3.411E+03
124	2.067E+00	5.767E-01	9.310E+03	7.622E+03	3.413E+03
125	2.083E+00	5.780E-01	9.310E+03	7.622E+03	3.413E+03
126	2.100E+00	5.793E-01	9.313E+03	7.627E+03	3.418E+03
127	2.117E+00	5.806E-01	9.315E+03	7.629E+03	3.420E+03
128	2.133E+00	5.818E-01	9.315E+03	7.629E+03	3.420E+03
129	2.150E+00	5.831E-01	9.316E+03	7.630E+03	3.421E+03
130	2.167E+00	5.843E-01	9.318E+03	7.633E+03	3.424E+03
131	2.183E+00	5.855E-01	9.319E+03	7.635E+03	3.426E+03
132	2.200E+00	5.867E-01	9.321E+03	7.638E+03	3.429E+03
133	2.217E+00	5.878E-01	9.325E+03	7.644E+03	3.434E+03
134	2.233E+00	5.890E-01	9.323E+03	7.640E+03	3.431E+03
135	2.250E+00	5.902E-01	9.314E+03	7.628E+03	3.419E+03
136	2.267E+00	5.913E-01	9.312E+03	7.625E+03	3.416E+03
137	2.283E+00	5.924E-01	9.313E+03	7.627E+03	3.418E+03
138	2.300E+00	5.935E-01	9.319E+03	7.635E+03	3.426E+03
139	2.317E+00	5.947E-01	9.321E+03	7.638E+03	3.429E+03
140	2.333E+00	5.957E-01	9.320E+03	7.637E+03	3.428E+03
141	2.350E+00	5.968E-01	9.325E+03	7.644E+03	3.434E+03
142	2.367E+00	5.979E-01	9.324E+03	7.642E+03	3.433E+03
143	2.383E+00	5.990E-01	9.328E+03	7.649E+03	3.440E+03
144	2.400E+00	6.000E-01	9.333E+03	7.655E+03	3.446E+03
145	2.417E+00	6.010E-01	9.334E+03	7.657E+03	3.448E+03
146	2.433E+00	6.021E-01	9.342E+03	7.669E+03	3.460E+03
147	2.450E+00	6.031E-01	9.343E+03	7.671E+03	3.461E+03
148	2.467E+00	6.041E-01	9.346E+03	7.674E+03	3.465E+03
149	2.483E+00	6.051E-01	9.349E+03	7.679E+03	3.470E+03
150	2.500E+00	6.061E-01	9.348E+03	7.677E+03	3.468E+03
151	2.517E+00	6.070E-01	9.351E+03	7.682E+03	3.473E+03
152	2.533E+00	6.080E-01	9.355E+03	7.687E+03	3.478E+03
153	2.550E+00	6.090E-01	9.358E+03	7.693E+03	3.483E+03
154	2.567E+00	6.099E-01	9.360E+03	7.694E+03	3.485E+03
155	2.583E+00	6.108E-01	9.354E+03	7.686E+03	3.477E+03
156	2.600E+00	6.118E-01	9.367E+03	7.705E+03	3.495E+03
157	2.617E+00	6.127E-01	9.369E+03	7.708E+03	3.499E+03
158	2.633E+00	6.136E-01	9.371E+03	7.711E+03	3.502E+03
159	2.650E+00	6.145E-01	9.373E+03	7.714E+03	3.505E+03
160	2.667E+00	6.154E-01	9.373E+03	7.714E+03	3.505E+03

161	2.683E+00	6.163E-01	9.377E+03	7.720E+03	3.511E+03
162	2.700E+00	6.171E-01	9.380E+03	7.725E+03	3.515E+03
163	2.717E+00	6.180E-01	9.377E+03	7.720E+03	3.511E+03
164	2.733E+00	6.189E-01	9.382E+03	7.727E+03	3.518E+03
165	2.750E+00	6.197E-01	9.382E+03	7.727E+03	3.518E+03
166	2.767E+00	6.206E-01	9.382E+03	7.727E+03	3.518E+03
167	2.783E+00	6.214E-01	9.363E+03	7.699E+03	3.490E+03
168	2.800E+00	6.222E-01	9.364E+03	7.700E+03	3.491E+03
169	2.817E+00	6.230E-01	9.365E+03	7.702E+03	3.493E+03
170	2.833E+00	6.239E-01	9.389E+03	7.738E+03	3.529E+03
171	2.850E+00	6.247E-01	9.391E+03	7.740E+03	3.531E+03
172	2.867E+00	6.255E-01	9.391E+03	7.740E+03	3.531E+03
173	2.883E+00	6.262E-01	9.395E+03	7.747E+03	3.538E+03
174	2.900E+00	6.270E-01	9.396E+03	7.748E+03	3.539E+03
175	2.917E+00	6.278E-01	9.401E+03	7.755E+03	3.546E+03
176	2.933E+00	6.286E-01	9.401E+03	7.755E+03	3.546E+03
177	2.950E+00	6.293E-01	9.402E+03	7.757E+03	3.548E+03

Superposition Analysis

=====

No.	Elapsed time hr	T-Function Dimensionless	P-Function GPa ² /mPa.s
1	1.667E-02	1.690E+00	1.507E+03
2	3.333E-02	1.398E+00	1.714E+03
3	5.000E-02	1.230E+00	1.873E+03
4	6.667E-02	1.114E+00	2.012E+03
5	8.333E-02	1.025E+00	2.131E+03
6	1.000E-01	9.542E-01	2.234E+03
7	1.167E-01	8.953E-01	2.329E+03
8	1.333E-01	8.451E-01	2.409E+03
9	1.500E-01	8.016E-01	2.494E+03
10	1.667E-01	7.634E-01	2.544E+03
11	1.833E-01	7.295E-01	2.599E+03
12	2.000E-01	6.990E-01	2.646E+03
13	2.167E-01	6.714E-01	2.695E+03
14	2.333E-01	6.463E-01	2.735E+03
15	2.500E-01	6.232E-01	2.775E+03
16	2.667E-01	6.021E-01	2.806E+03
17	2.833E-01	5.825E-01	2.840E+03
18	3.000E-01	5.643E-01	2.869E+03
19	3.167E-01	5.473E-01	2.895E+03
20	3.333E-01	5.315E-01	2.915E+03
21	3.500E-01	5.166E-01	2.929E+03
22	3.667E-01	5.027E-01	2.929E+03
23	3.833E-01	4.895E-01	2.964E+03
24	4.000E-01	4.771E-01	2.978E+03
25	4.167E-01	4.654E-01	2.994E+03
26	4.333E-01	4.543E-01	3.009E+03
27	4.500E-01	4.437E-01	3.019E+03
28	4.667E-01	4.337E-01	3.037E+03
29	4.833E-01	4.241E-01	3.053E+03
30	5.000E-01	4.150E-01	3.063E+03
31	5.167E-01	4.063E-01	3.073E+03
32	5.333E-01	3.979E-01	3.083E+03
33	5.500E-01	3.900E-01	3.095E+03
34	5.667E-01	3.823E-01	3.106E+03
35	5.833E-01	3.750E-01	3.116E+03
36	6.000E-01	3.680E-01	3.116E+03
37	6.167E-01	3.612E-01	3.126E+03
38	6.333E-01	3.547E-01	3.138E+03
39	6.500E-01	3.485E-01	3.151E+03
40	6.667E-01	3.424E-01	3.158E+03
41	6.833E-01	3.366E-01	3.161E+03
42	7.000E-01	3.310E-01	3.166E+03
43	7.167E-01	3.256E-01	3.176E+03
44	7.333E-01	3.203E-01	3.183E+03
45	7.500E-01	3.153E-01	3.191E+03
46	7.667E-01	3.104E-01	3.195E+03
47	7.833E-01	3.056E-01	3.200E+03
48	8.000E-01	3.010E-01	3.190E+03
49	8.167E-01	2.966E-01	3.215E+03

50	8.333E-01	2.923E-01	3.216E+03
51	8.500E-01	2.881E-01	3.226E+03
52	8.667E-01	2.840E-01	3.232E+03
53	8.833E-01	2.800E-01	3.233E+03
54	9.000E-01	2.762E-01	3.233E+03
55	9.167E-01	2.725E-01	3.233E+03
56	9.333E-01	2.688E-01	3.230E+03
57	9.500E-01	2.653E-01	3.230E+03
58	9.667E-01	2.619E-01	3.233E+03
59	9.833E-01	2.585E-01	3.245E+03
60	1.000E+00	2.553E-01	3.243E+03
61	1.017E+00	2.521E-01	3.255E+03
62	1.033E+00	2.490E-01	3.262E+03
63	1.050E+00	2.460E-01	3.263E+03
64	1.067E+00	2.430E-01	3.262E+03
65	1.083E+00	2.402E-01	3.263E+03
66	1.100E+00	2.374E-01	3.265E+03
67	1.117E+00	2.346E-01	3.268E+03
68	1.133E+00	2.319E-01	3.271E+03
69	1.150E+00	2.293E-01	3.275E+03
70	1.167E+00	2.268E-01	3.283E+03
71	1.183E+00	2.243E-01	3.283E+03
72	1.200E+00	2.218E-01	3.287E+03
73	1.217E+00	2.195E-01	3.292E+03
74	1.233E+00	2.171E-01	3.292E+03
75	1.250E+00	2.148E-01	3.302E+03
76	1.267E+00	2.126E-01	3.302E+03
77	1.283E+00	2.104E-01	3.302E+03
78	1.300E+00	2.083E-01	3.304E+03
79	1.317E+00	2.062E-01	3.300E+03
80	1.333E+00	2.041E-01	3.300E+03
81	1.350E+00	2.021E-01	3.302E+03
82	1.367E+00	2.001E-01	3.307E+03
83	1.383E+00	1.982E-01	3.308E+03
84	1.400E+00	1.963E-01	3.315E+03
85	1.417E+00	1.944E-01	3.319E+03
86	1.433E+00	1.926E-01	3.325E+03
87	1.450E+00	1.908E-01	3.330E+03
88	1.467E+00	1.891E-01	3.327E+03
89	1.483E+00	1.873E-01	3.327E+03
90	1.500E+00	1.856E-01	3.329E+03
91	1.517E+00	1.840E-01	3.332E+03
92	1.533E+00	1.823E-01	3.333E+03
93	1.550E+00	1.807E-01	3.339E+03
94	1.567E+00	1.792E-01	3.335E+03
95	1.583E+00	1.776E-01	3.329E+03
96	1.600E+00	1.761E-01	3.325E+03
97	1.617E+00	1.746E-01	3.327E+03
98	1.633E+00	1.731E-01	3.330E+03
99	1.650E+00	1.717E-01	3.332E+03
100	1.667E+00	1.703E-01	3.335E+03
101	1.683E+00	1.689E-01	3.329E+03
102	1.700E+00	1.675E-01	3.345E+03
103	1.717E+00	1.661E-01	3.334E+03
104	1.733E+00	1.648E-01	3.351E+03
105	1.750E+00	1.635E-01	3.351E+03

106	1.767E+00	1.622E-01	3.355E+03
107	1.783E+00	1.609E-01	3.359E+03
108	1.800E+00	1.597E-01	3.359E+03
109	1.817E+00	1.585E-01	3.364E+03
110	1.833E+00	1.573E-01	3.372E+03
111	1.850E+00	1.561E-01	3.369E+03
112	1.867E+00	1.549E-01	3.377E+03
113	1.883E+00	1.537E-01	3.339E+03
114	1.900E+00	1.526E-01	3.387E+03
115	1.917E+00	1.515E-01	3.394E+03
116	1.933E+00	1.504E-01	3.394E+03
117	1.950E+00	1.493E-01	3.396E+03
118	1.967E+00	1.482E-01	3.397E+03
119	1.983E+00	1.472E-01	3.399E+03
120	2.000E+00	1.461E-01	3.401E+03
121	2.017E+00	1.451E-01	3.408E+03
122	2.033E+00	1.441E-01	3.406E+03
123	2.050E+00	1.431E-01	3.411E+03
124	2.067E+00	1.421E-01	3.413E+03
125	2.083E+00	1.411E-01	3.413E+03
126	2.100E+00	1.402E-01	3.418E+03
127	2.117E+00	1.392E-01	3.420E+03
128	2.133E+00	1.383E-01	3.420E+03
129	2.150E+00	1.374E-01	3.421E+03
130	2.167E+00	1.365E-01	3.424E+03
131	2.183E+00	1.356E-01	3.426E+03
132	2.200E+00	1.347E-01	3.429E+03
133	2.217E+00	1.338E-01	3.434E+03
134	2.233E+00	1.330E-01	3.431E+03
135	2.250E+00	1.321E-01	3.419E+03
136	2.267E+00	1.313E-01	3.416E+03
137	2.283E+00	1.305E-01	3.418E+03
138	2.300E+00	1.296E-01	3.426E+03
139	2.317E+00	1.288E-01	3.429E+03
140	2.333E+00	1.280E-01	3.428E+03
141	2.350E+00	1.272E-01	3.434E+03
142	2.367E+00	1.265E-01	3.433E+03
143	2.383E+00	1.257E-01	3.440E+03
144	2.400E+00	1.249E-01	3.446E+03
145	2.417E+00	1.242E-01	3.448E+03
146	2.433E+00	1.234E-01	3.460E+03
147	2.450E+00	1.227E-01	3.461E+03
148	2.467E+00	1.220E-01	3.465E+03
149	2.483E+00	1.213E-01	3.470E+03
150	2.500E+00	1.206E-01	3.468E+03
151	2.517E+00	1.199E-01	3.473E+03
152	2.533E+00	1.192E-01	3.478E+03
153	2.550E+00	1.185E-01	3.483E+03
154	2.567E+00	1.178E-01	3.485E+03
155	2.583E+00	1.172E-01	3.477E+03
156	2.600E+00	1.165E-01	3.495E+03
157	2.617E+00	1.159E-01	3.499E+03
158	2.633E+00	1.152E-01	3.502E+03
159	2.650E+00	1.146E-01	3.505E+03
160	2.667E+00	1.139E-01	3.505E+03
161	2.683E+00	1.133E-01	3.511E+03

Input Data-superposition

Pressure Run Depth.....	=	8.707E+02	m
Fluid Analyzed.....	=	Gas	
Production Time.....	=	8.000E-01	hr
Total Flow Rate.....	=	1.233E+01	Res m ³ /D
Oil Flow Rate.....	=	0.000E-01	m ³ /D
Gas Flow Rate(Free Gas).....	=	1.000E+03	m ³ /D
Water Flow Rate.....	=	0.000E-01	m ³ /D
Bottomhole Flowing Pressure.....	=	6.722E+03	kPa
Specific Gravity of Gas.....	=	9.170E-01	
Gas Deviation Factor.....	=	9.511E-01	
Oil Formation Volume Factor.....	=	1.000E+00	Res m ³ /m ³
Gas Formation Volume Factor.....	=	1.233E-02	Res m ³ /m ³
Water Formation Volume Factor.....	=	1.000E+00	Res m ³ /m ³
Solution Gas-Oil Ratio.....	=	0.000E-01	m ³ /m ³
Solution Gas-Water Ratio.....	=	0.000E-01	m ³ /m ³
Oil Viscosity.....	=	1.000E+00	cp
Gas Viscosity.....	=	1.274E-02	cp
Water Viscosity.....	=	1.000E+00	cp
Reservoir Temperature.....	=	2.280E+01	Degree C
Pay Thickness.....	=	2.130E+00	m
Porosity.....	=	9.040E-02	
Oil Saturation.....	=	0.000E-01	
Gas Saturation.....	=	2.406E-01	
Water Saturation.....	=	7.594E-01	
Total Compressibility.....	=	3.197E-05	1/kPa
Wellbore Radius.....	=	1.000E-01	m
Pseudocritical pressure.....	=	3.649E+03	kPa
Pseudocritical temperature.....	=	1.433E+02	K
Nitrogen,mole fraction.....	=	8.063E-01	
Carbon dioxide,mole fraction.....	=	9.200E-03	
Hydrogen sulphide,mole fraction...	=	0.000E-01	

49	8.167E-01	3.202E-02	4.498E+03	1.965E+03	1.811E+03
50	8.333E-01	3.205E-02	4.557E+03	2.014E+03	1.860E+03
51	8.500E-01	3.207E-02	4.606E+03	2.056E+03	1.903E+03
52	8.667E-01	3.210E-02	4.646E+03	2.091E+03	1.937E+03
53	8.833E-01	3.212E-02	4.674E+03	2.115E+03	1.961E+03
54	9.000E-01	3.214E-02	4.615E+03	2.064E+03	1.910E+03
55	9.167E-01	3.216E-02	4.640E+03	2.086E+03	1.932E+03
56	9.333E-01	3.218E-02	4.997E+03	2.404E+03	2.250E+03
57	9.500E-01	3.220E-02	4.836E+03	2.258E+03	2.104E+03
58	9.667E-01	3.222E-02	4.921E+03	2.334E+03	2.180E+03
59	9.833E-01	3.224E-02	4.942E+03	2.353E+03	2.199E+03
60	1.000E+00	3.225E-02	4.969E+03	2.379E+03	2.225E+03
61	1.017E+00	3.227E-02	5.005E+03	2.411E+03	2.258E+03
62	1.033E+00	3.229E-02	5.047E+03	2.450E+03	2.296E+03
63	1.050E+00	3.230E-02	5.092E+03	2.492E+03	2.338E+03
64	1.067E+00	3.232E-02	5.124E+03	2.522E+03	2.368E+03
65	1.083E+00	3.234E-02	5.146E+03	2.543E+03	2.389E+03
66	1.100E+00	3.235E-02	5.199E+03	2.592E+03	2.438E+03
67	1.117E+00	3.236E-02	5.230E+03	2.622E+03	2.468E+03
68	1.133E+00	3.238E-02	5.252E+03	2.643E+03	2.489E+03
69	1.150E+00	3.239E-02	5.277E+03	2.668E+03	2.514E+03
70	1.167E+00	3.240E-02	5.298E+03	2.688E+03	2.534E+03
71	1.183E+00	3.242E-02	5.330E+03	2.719E+03	2.565E+03
72	1.200E+00	3.243E-02	5.356E+03	2.744E+03	2.590E+03
73	1.217E+00	3.244E-02	5.368E+03	2.756E+03	2.602E+03
74	1.233E+00	3.245E-02	5.416E+03	2.803E+03	2.649E+03
75	1.250E+00	3.246E-02	5.435E+03	2.821E+03	2.667E+03
76	1.267E+00	3.248E-02	5.467E+03	2.852E+03	2.699E+03
77	1.283E+00	3.249E-02	5.486E+03	2.871E+03	2.717E+03
78	1.300E+00	3.250E-02	5.511E+03	2.897E+03	2.743E+03
79	1.317E+00	3.251E-02	5.549E+03	2.935E+03	2.781E+03
80	1.333E+00	3.252E-02	5.540E+03	2.925E+03	2.772E+03
81	1.350E+00	3.253E-02	5.641E+03	3.027E+03	2.873E+03
82	1.367E+00	3.254E-02	5.688E+03	3.076E+03	2.922E+03
83	1.383E+00	3.255E-02	5.744E+03	3.133E+03	2.979E+03
84	1.400E+00	3.255E-02	5.778E+03	3.168E+03	3.015E+03
85	1.417E+00	3.256E-02	5.811E+03	3.202E+03	3.048E+03
86	1.433E+00	3.257E-02	5.851E+03	3.244E+03	3.090E+03
87	1.450E+00	3.258E-02	5.881E+03	3.276E+03	3.122E+03
88	1.467E+00	3.259E-02	5.417E+03	2.804E+03	2.650E+03
89	1.483E+00	3.260E-02	5.953E+03	3.352E+03	3.198E+03
90	1.500E+00	3.261E-02	5.988E+03	3.389E+03	3.235E+03
91	1.517E+00	3.261E-02	6.034E+03	3.438E+03	3.284E+03
92	1.533E+00	3.262E-02	6.061E+03	3.467E+03	3.313E+03

Input Data

```

-----
Pressure Run Depth..... = 8.717E+02  m
Fluid Analyzed..... = Gas
Production Time..... = 3.333E-02  hr
Total Flow Rate..... = 2.709E+01  Res m^3/D
Oil Flow Rate..... = 0.000E-01  m^3/D
Gas Flow Rate(Free Gas)..... = 1.000E+03  m^3/D
Water Flow Rate..... = 0.000E-01  m^3/D
Bottomhole Flowing Pressure..... = 1.244E+03  kPa
Specific Gravity of Gas..... = 9.170E-01
Gas Deviation Factor..... = 9.706E-01
Oil Formation Volume Factor..... = 1.000E+00  Res m^3/m^3
Gas Formation Volume Factor..... = 2.709E-02  Res m^3/m^3
Water Formation Volume Factor..... = 1.000E+00  Res m^3/m^3
Solution Gas-Oil Ratio..... = 0.000E-01  m^3/m^3
Solution Gas-Water Ratio..... = 0.000E-01  m^3/m^3
Oil Viscosity..... = 1.000E+00  cp
Gas Viscosity..... = 1.079E-02  cp
Water Viscosity..... = 1.000E+00  cp
Reservoir Temperature..... = 2.290E+01  Degree C
Pay Thickness..... = 2.130E+00  m
Porosity..... = 9.040E-02
Oil Saturation..... = 0.000E-01
Gas Saturation..... = 2.406E-01
Water Saturation..... = 7.594E-01
Total Compressibility..... = 6.786E-05  1/kPa
Wellbore Radius..... = 1.000E-01  m
Pseudocritical pressure..... = 3.649E+03  kPa
Pseudocritical temperature..... = 1.433E+02  K
Nitrogen,mole fraction..... = 8.063E-01
Carbon dioxide,mole fraction..... = 9.200E-03
Hydrogen sulphide,mole fraction... = 0.000E-01

```


Superposition Analysis

=====

No.	Elapsed time hr	T-Function Dimensionless	P-Function GPa ² /mPa.s

1	1.667E-02	4.771E-01	2.062E+01
2	3.333E-02	3.010E-01	4.834E+01
3	5.000E-02	2.218E-01	7.119E+01
4	6.667E-02	1.761E-01	9.521E+01
5	8.333E-02	1.461E-01	1.163E+02
6	1.000E-01	1.249E-01	1.012E+02
7	1.167E-01	1.091E-01	1.544E+02
8	1.333E-01	9.690E-02	2.124E+02
9	1.500E-01	8.714E-02	2.704E+02
10	1.667E-01	7.917E-02	3.252E+02
11	1.833E-01	7.254E-02	3.433E+02
12	2.000E-01	6.694E-02	3.654E+02
13	2.167E-01	6.214E-02	3.964E+02
14	2.333E-01	5.799E-02	4.180E+02
15	2.500E-01	5.435E-02	4.645E+02
16	2.667E-01	5.115E-02	4.936E+02
17	2.833E-01	4.830E-02	5.412E+02
18	3.000E-01	4.575E-02	6.297E+02
19	3.167E-01	4.346E-02	6.844E+02
20	3.333E-01	4.139E-02	7.423E+02
21	3.500E-01	3.950E-02	8.362E+02
22	3.667E-01	3.778E-02	8.752E+02
23	3.833E-01	3.621E-02	9.130E+02
24	4.000E-01	3.476E-02	9.597E+02
25	4.167E-01	3.342E-02	1.001E+03
26	4.333E-01	3.218E-02	1.028E+03
27	4.500E-01	3.103E-02	1.065E+03
28	4.667E-01	2.996E-02	1.118E+03
29	4.833E-01	2.896E-02	1.159E+03
30	5.000E-01	2.803E-02	1.187E+03
31	5.167E-01	2.715E-02	1.216E+03
32	5.333E-01	2.633E-02	1.244E+03
33	5.500E-01	2.555E-02	1.274E+03
34	5.667E-01	2.482E-02	1.295E+03
35	5.833E-01	2.413E-02	1.316E+03
36	6.000E-01	2.348E-02	1.341E+03
37	6.167E-01	2.286E-02	1.368E+03
38	6.333E-01	2.227E-02	1.407E+03
39	6.500E-01	2.172E-02	1.367E+03
40	6.667E-01	2.119E-02	1.463E+03
41	6.833E-01	2.068E-02	1.496E+03
42	7.000E-01	2.020E-02	1.535E+03
43	7.167E-01	1.974E-02	1.576E+03
44	7.333E-01	1.930E-02	1.630E+03
45	7.500E-01	1.888E-02	1.661E+03
46	7.667E-01	1.848E-02	1.691E+03
47	7.833E-01	1.810E-02	1.722E+03
48	8.000E-01	1.773E-02	1.769E+03
49	8.167E-01	1.737E-02	1.811E+03

50	8.333E-01	1.703E-02	1.860E+03
51	8.500E-01	1.670E-02	1.903E+03
52	8.667E-01	1.639E-02	1.937E+03
53	8.833E-01	1.609E-02	1.961E+03
54	9.000E-01	1.579E-02	1.910E+03
55	9.167E-01	1.551E-02	1.932E+03
56	9.333E-01	1.524E-02	2.250E+03
57	9.500E-01	1.498E-02	2.104E+03
58	9.667E-01	1.472E-02	2.180E+03
59	9.833E-01	1.448E-02	2.199E+03
60	1.000E+00	1.424E-02	2.225E+03
61	1.017E+00	1.401E-02	2.258E+03
62	1.033E+00	1.379E-02	2.296E+03
63	1.050E+00	1.357E-02	2.338E+03
64	1.067E+00	1.336E-02	2.368E+03
65	1.083E+00	1.316E-02	2.389E+03
66	1.100E+00	1.296E-02	2.438E+03
67	1.117E+00	1.277E-02	2.468E+03
68	1.133E+00	1.259E-02	2.489E+03
69	1.150E+00	1.241E-02	2.514E+03
70	1.167E+00	1.223E-02	2.534E+03
71	1.183E+00	1.206E-02	2.565E+03
72	1.200E+00	1.190E-02	2.590E+03
73	1.217E+00	1.174E-02	2.602E+03
74	1.233E+00	1.158E-02	2.649E+03
75	1.250E+00	1.143E-02	2.667E+03
76	1.267E+00	1.128E-02	2.699E+03
77	1.283E+00	1.114E-02	2.717E+03
78	1.300E+00	1.099E-02	2.743E+03
79	1.317E+00	1.086E-02	2.781E+03
80	1.333E+00	1.072E-02	2.772E+03
81	1.350E+00	1.059E-02	2.873E+03
82	1.367E+00	1.046E-02	2.922E+03
83	1.383E+00	1.034E-02	2.979E+03
84	1.400E+00	1.022E-02	3.015E+03
85	1.417E+00	1.010E-02	3.048E+03
86	1.433E+00	9.983E-03	3.090E+03
87	1.450E+00	9.870E-03	3.122E+03
88	1.467E+00	9.759E-03	2.650E+03
89	1.483E+00	9.650E-03	3.198E+03
90	1.500E+00	9.544E-03	3.235E+03
91	1.517E+00	9.441E-03	3.284E+03
92	1.533E+00	9.339E-03	3.313E+03

Input Data-superposition

```

-----
Pressure Run Depth..... = 8.717E+02 m
Fluid Analyzed..... = Gas
Production Time..... = 3.333E-02 hr
Total Flow Rate..... = 2.709E+01 Res m^3/D
Oil Flow Rate..... = 0.000E-01 m^3/D
Gas Flow Rate(Free Gas)..... = 1.000E+03 m^3/D
Water Flow Rate..... = 0.000E-01 m^3/D
Bottomhole Flowing Pressure..... = 1.244E+03 kPa
Specific Gravity of Gas..... = 9.170E-01
Gas Deviation Factor..... = 9.706E-01
Oil Formation Volume Factor..... = 1.000E+00 Res m^3/m^3
Gas Formation Volume Factor..... = 2.709E-02 Res m^3/m^3
Water Formation Volume Factor..... = 1.000E+00 Res m^3/m^3
Solution Gas-Oil Ratio..... = 0.000E-01 m^3/m^3
Solution Gas-Water Ratio..... = 0.000E-01 m^3/m^3
Oil Viscosity..... = 1.000E+00 cp
Gas Viscosity..... = 1.079E-02 cp
Water Viscosity..... = 1.000E+00 cp
Reservoir Temperature..... = 2.290E+01 Degree C
Pay Thickness..... = 2.130E+00 m
Porosity..... = 9.040E-02
Oil Saturation..... = 0.000E-01
Gas Saturation..... = 2.406E-01
Water Saturation..... = 7.594E-01
Total Compressibility..... = 6.786E-05 1/kPa
Wellbore Radius..... = 1.000E-01 m
Pseudocritical pressure..... = 3.649E+03 kPa
Pseudocritical temperature..... = 1.433E+02 K
Nitrogen,mole fraction..... = 8.063E-01
Carbon dioxide,mole fraction..... = 9.200E-03
Hydrogen sulphide,mole fraction... = 0.000E-01

```


Output-superposition

```

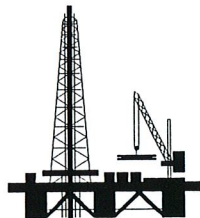
-----
Slope..... = 3.346E+05
Intercept..... = 6.421E+03 GPa^2/mPa.s
Dp or Dm(p) at 1 hour..... = 1.657E+03 GPa^2/mPa.s
Extended Pressure..... = 8.954E+03 kPa
Total Transmissibility..... = 1.236E-01 mD-m/cp
Oil Transmissibility..... = 0.000E-01 mD-m/cp
Gas Transmissibility..... = 1.236E-01 mD-m/cp
Water Transmissibility..... = 0.000E-01 mD-m/cp
Oil Reservoir Capacity..... = 0.000E-01 mD-m
Gas Reservoir Capacity..... = 1.333E-03 mD-m
Water Reservoir Capacity..... = 0.000E-01 mD-m
Total Mobility..... = 5.804E-02 mD/cp
Oil Mobility..... = 0.000E-01 mD/cp
Gas Mobility..... = 5.804E-02 mD/cp
Water Mobility..... = 0.000E-01 mD/cp
Effective Permeability to Oil..... = 0.000E-01 mD
Effective Permeability to Gas..... = 6.261E-04 mD
Effective Permeability to Water... = 0.000E-01 mD
Skin Factor..... = 7.117E-01
Pressure Drop due to skin..... = 4.545E+04 kPa
Total Ideal Productivity Index... = -7.179E-04 Res m^3/D/kPa
Total Actual Productivity Index... = 3.514E-03 Res m^3/D/kPa
Total Flow Efficiency..... = -4.894E+00
Oil Ideal Productivity Index..... = 0.000E-01 m^3/D/kPa
Oil Actual Productivity Index..... = 0.000E-01 m^3/D/kPa
Oil Flow Efficiency..... = 0.000E-01
Gas Ideal Productivity Index..... = -2.650E-02 m^3/D /kPa
Gas Actual Productivity Index..... = 1.297E-01 m^3/D /kPa
Gas Flow Efficiency..... = -4.894E+00
Radius of Investigation..... = 6.680E-02 m
Hydrocarbons-in-Place based on Radius of investigation
(Meaningful only during the transient flow period)
Oil-in-Place (OOIP)..... = 0.000E-01 m^3
Gas-in-Place (OGIP). .... = 2.398E-02 m^3

```



DST # 1

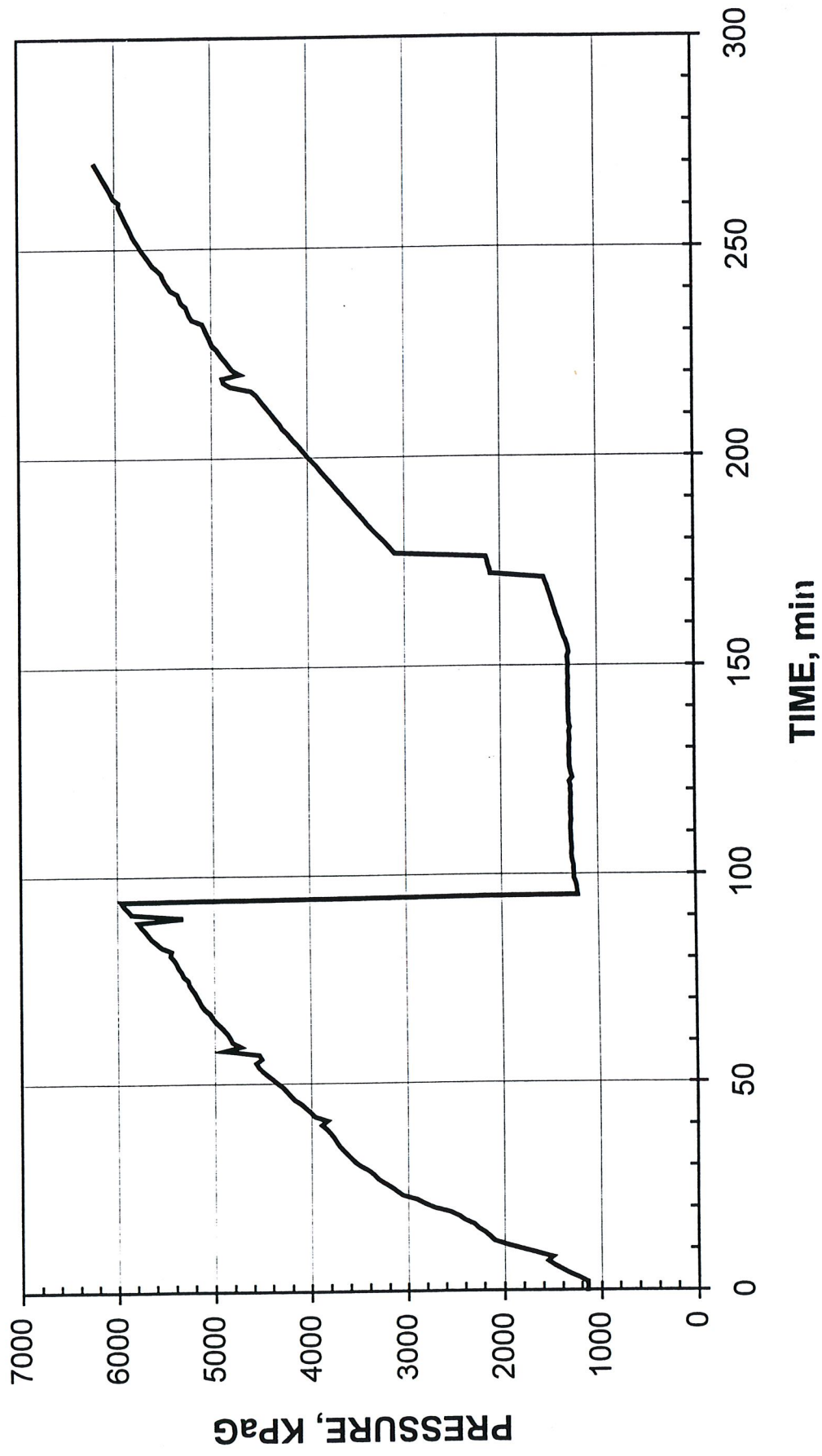
**WELL WESTERN ADVENTURE # 1
NORTH BROOK FORMATION
DEER LAKE BASIN, NEWFOUNDLAND**



SERVIPETROL LTD.
International Petroleum Consultants



DEER LAKE OIL & GAS, WELL: DEER LAKE ET AL WA-1
DST#1, TEST DATE: 08/06/00 17:00, GAUGE DEPTH @ 871.69M



DEER LAKE OIL AND GAS, WELL: DEER LAKE ET AL WA-1, BU2

GAUGE @ 871.69 m, DST #1 (840.0 m - 872.0 m)

Superposition Plot (Buildup)

8.0E+03

6.0E+03

4.0E+03

2.0E+03

Delta m(P), GPa²/mPa.s

m = -1.018E+04
Tf = 3.997E+00 mD-m/cp
s = -2.293E+00
Dp* = 5.911E+03 GPa²/mPa.s
p* = 8.699E+03 kPa

Superposition Function

servipetrol

0.4

0.8

1.2

1.6

DEER LAKE OIL AND GAS, WELL: DEER LAKE ET AL WA-1, BU2

GAUGE @ 871.69 m, DST #1 (840.0 m - 872.0 m)

TEST DATE: 08/06/2000

Log-Log Diagnostic Plot

Delta m(p), GPa²/mPa.s

Delta Time, hr

servipetro!

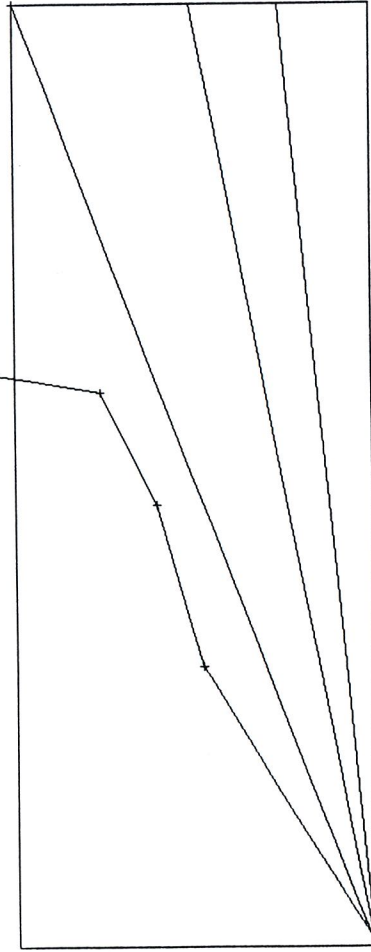
E+03

E+02

E+01

E-02

E-01



DEER LAKE OIL AND GAS, WELL: DEER LAKE ET AL WA-1, BU2

GAUGE @ 871.69 m, DST #1 (840.0 m - 872.0 m)

TEST DATE: 08/06/2000

Dual Porosity (pseudo steady)

E+01

E+00

(Td/Cd)*Dp/Dt and Pd

Dimensionless Time Group

servipetrol

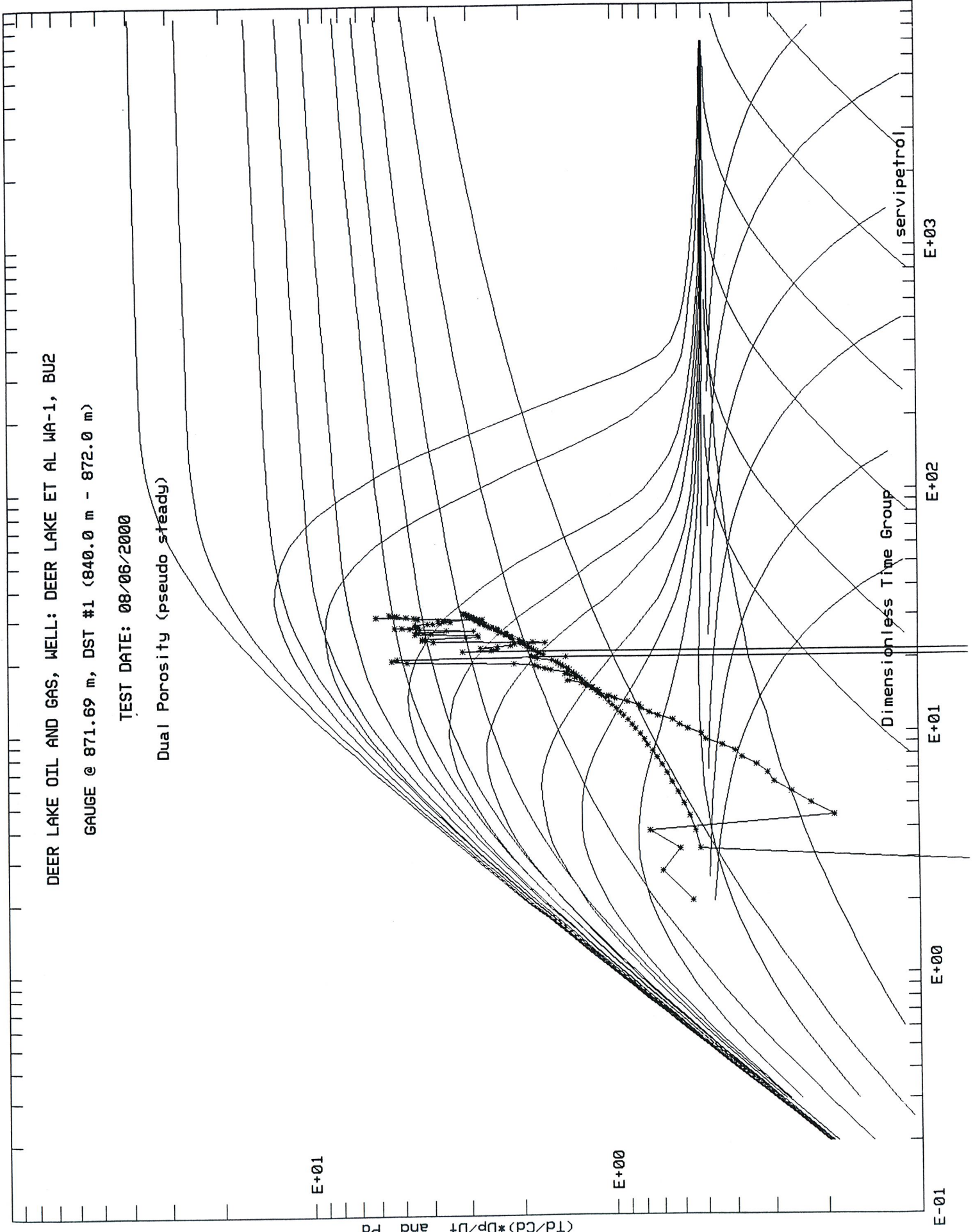
E-01

E+00

E+01

E+02

E+03




```

+ + + + + + + + + + + + + + + + + + + + + + +
+
+          SERVIPETROL LTD.          +
+      International Petroleum Consultants      +
+
+          WELLTEST-NFR  V1.21        +
+
+ + + + + + + + + + + + + + + + + + + + + + +

```

DEER LAKE OIL AND GAS, WELL: DEER LAKE ET AL WA-1, BU2
 GAUGE @ 871.69 m, DST #1 (840.0 m - 872.0 m)
 TEST DATE: 08/06/2000
 PREPARED BY ROBERTO AGUILERA, PhD AND MARIA S. AGUILERA, BSc

Flowrate Data
 =====

No.	Elapsed time hr	Total Res m ³ /D	Oil m ³ /D	Gas m ³ /D	Water m ³ /D
1	3.333E-02	2.395E+01	0.000E-01	1.000E+03	0.000E-01
2	1.533E+00	0.000E-01	0.000E-01	0.000E-01	0.000E-01
3	2.867E+00	2.395E+01	0.000E-01	1.000E+03	0.000E-01

Buildup Data

=====

No.	Shutin time hr	Effective Time hr	Pressure kPa	m[p] GPa ² /mPa.s	Delta m[p] GPa ² /mPa.s
1	1.667E-02	1.647E-02	2.203E+03	4.795E+02	3.486E+00
2	3.333E-02	3.254E-02	2.219E+03	4.865E+02	1.050E+01
3	5.000E-02	4.824E-02	2.227E+03	4.901E+02	1.402E+01
4	6.667E-02	6.357E-02	2.241E+03	4.961E+02	2.010E+01
5	8.333E-02	7.854E-02	3.205E+03	1.018E+03	5.421E+02
6	1.000E-01	9.318E-02	3.241E+03	1.041E+03	5.645E+02
7	1.167E-01	1.075E-01	3.278E+03	1.064E+03	5.878E+02
8	1.333E-01	1.215E-01	3.318E+03	1.089E+03	6.129E+02
9	1.500E-01	1.352E-01	3.364E+03	1.119E+03	6.427E+02
10	1.667E-01	1.486E-01	3.405E+03	1.145E+03	6.692E+02
11	1.833E-01	1.616E-01	3.445E+03	1.172E+03	6.959E+02
12	2.000E-01	1.745E-01	3.486E+03	1.199E+03	7.229E+02
13	2.167E-01	1.870E-01	3.521E+03	1.223E+03	7.470E+02
14	2.333E-01	1.993E-01	3.557E+03	1.247E+03	7.714E+02
15	2.500E-01	2.113E-01	3.599E+03	1.276E+03	8.000E+02
16	2.667E-01	2.231E-01	3.633E+03	1.299E+03	8.232E+02
17	2.833E-01	2.347E-01	3.671E+03	1.326E+03	8.499E+02
18	3.000E-01	2.460E-01	3.713E+03	1.355E+03	8.794E+02
19	3.167E-01	2.571E-01	3.747E+03	1.380E+03	9.041E+02
20	3.333E-01	2.680E-01	3.785E+03	1.408E+03	9.315E+02
21	3.500E-01	2.786E-01	3.822E+03	1.434E+03	9.584E+02
22	3.667E-01	2.891E-01	3.861E+03	1.462E+03	9.863E+02
23	3.833E-01	2.994E-01	3.901E+03	1.492E+03	1.016E+03
24	4.000E-01	3.094E-01	3.939E+03	1.521E+03	1.045E+03
25	4.167E-01	3.193E-01	3.976E+03	1.549E+03	1.072E+03
26	4.333E-01	3.290E-01	4.009E+03	1.573E+03	1.097E+03
27	4.500E-01	3.385E-01	4.053E+03	1.607E+03	1.131E+03
28	4.667E-01	3.479E-01	4.096E+03	1.640E+03	1.164E+03
29	4.833E-01	3.571E-01	4.131E+03	1.668E+03	1.191E+03
30	5.000E-01	3.661E-01	4.168E+03	1.697E+03	1.221E+03
31	5.167E-01	3.749E-01	4.205E+03	1.726E+03	1.250E+03
32	5.333E-01	3.836E-01	4.246E+03	1.758E+03	1.282E+03
33	5.500E-01	3.922E-01	4.282E+03	1.787E+03	1.311E+03
34	5.667E-01	4.006E-01	4.318E+03	1.816E+03	1.340E+03
35	5.833E-01	4.088E-01	4.363E+03	1.852E+03	1.376E+03
36	6.000E-01	4.169E-01	4.387E+03	1.873E+03	1.396E+03
37	6.167E-01	4.249E-01	4.424E+03	1.903E+03	1.427E+03
38	6.333E-01	4.328E-01	4.459E+03	1.932E+03	1.456E+03
39	6.500E-01	4.405E-01	4.494E+03	1.961E+03	1.485E+03
40	6.667E-01	4.481E-01	4.531E+03	1.992E+03	1.516E+03
41	6.833E-01	4.556E-01	4.568E+03	2.024E+03	1.548E+03
42	7.000E-01	4.629E-01	4.604E+03	2.054E+03	1.578E+03
43	7.167E-01	4.701E-01	4.637E+03	2.083E+03	1.607E+03
44	7.333E-01	4.772E-01	4.691E+03	2.130E+03	1.654E+03
45	7.500E-01	4.843E-01	4.905E+03	2.320E+03	1.844E+03
46	7.667E-01	4.911E-01	4.975E+03	2.384E+03	1.908E+03
47	7.833E-01	4.979E-01	4.990E+03	2.397E+03	1.921E+03
48	8.000E-01	5.046E-01	4.808E+03	2.233E+03	1.757E+03

49	8.167E-01	5.112E-01	4.884E+03	2.301E+03	1.825E+03
50	8.333E-01	5.177E-01	4.921E+03	2.334E+03	1.858E+03
51	8.500E-01	5.241E-01	4.953E+03	2.364E+03	1.888E+03
52	8.667E-01	5.303E-01	4.989E+03	2.397E+03	1.921E+03
53	8.833E-01	5.365E-01	5.023E+03	2.428E+03	1.951E+03
54	9.000E-01	5.426E-01	5.049E+03	2.452E+03	1.976E+03
55	9.167E-01	5.487E-01	5.093E+03	2.493E+03	2.017E+03
56	9.333E-01	5.546E-01	5.109E+03	2.508E+03	2.032E+03
57	9.500E-01	5.604E-01	5.129E+03	2.527E+03	2.051E+03
58	9.667E-01	5.662E-01	5.150E+03	2.546E+03	2.070E+03
59	9.833E-01	5.719E-01	5.170E+03	2.565E+03	2.089E+03
60	1.000E+00	5.775E-01	5.190E+03	2.585E+03	2.109E+03
61	1.017E+00	5.830E-01	5.295E+03	2.684E+03	2.208E+03
62	1.033E+00	5.884E-01	5.326E+03	2.714E+03	2.238E+03
63	1.050E+00	5.938E-01	5.344E+03	2.732E+03	2.256E+03
64	1.067E+00	5.991E-01	5.361E+03	2.748E+03	2.272E+03
65	1.083E+00	6.043E-01	5.411E+03	2.798E+03	2.322E+03
66	1.100E+00	6.095E-01	5.429E+03	2.815E+03	2.339E+03
67	1.117E+00	6.145E-01	5.446E+03	2.832E+03	2.356E+03
68	1.133E+00	6.196E-01	5.520E+03	2.906E+03	2.430E+03
69	1.150E+00	6.245E-01	5.548E+03	2.934E+03	2.458E+03
70	1.167E+00	6.294E-01	5.577E+03	2.963E+03	2.487E+03
71	1.183E+00	6.342E-01	5.597E+03	2.983E+03	2.506E+03
72	1.200E+00	6.390E-01	5.613E+03	2.999E+03	2.523E+03
73	1.217E+00	6.437E-01	5.658E+03	3.045E+03	2.569E+03
74	1.233E+00	6.483E-01	5.707E+03	3.094E+03	2.618E+03
75	1.250E+00	6.529E-01	5.736E+03	3.124E+03	2.648E+03
76	1.267E+00	6.574E-01	5.767E+03	3.157E+03	2.680E+03
77	1.283E+00	6.618E-01	5.799E+03	3.190E+03	2.714E+03
78	1.300E+00	6.663E-01	5.830E+03	3.222E+03	2.746E+03
79	1.317E+00	6.706E-01	5.855E+03	3.248E+03	2.772E+03
80	1.333E+00	6.749E-01	5.886E+03	3.281E+03	2.805E+03
81	1.350E+00	6.791E-01	5.915E+03	3.311E+03	2.835E+03
82	1.367E+00	6.833E-01	5.933E+03	3.331E+03	2.855E+03
83	1.383E+00	6.875E-01	5.952E+03	3.351E+03	2.875E+03
84	1.400E+00	6.916E-01	5.976E+03	3.376E+03	2.900E+03
85	1.417E+00	6.956E-01	5.996E+03	3.397E+03	2.921E+03
86	1.433E+00	6.996E-01	6.017E+03	3.420E+03	2.944E+03
87	1.450E+00	7.036E-01	6.038E+03	3.442E+03	2.966E+03
88	1.467E+00	7.075E-01	6.060E+03	3.466E+03	2.989E+03
89	1.483E+00	7.113E-01	6.055E+03	3.461E+03	2.985E+03
90	1.500E+00	7.151E-01	6.109E+03	3.519E+03	3.043E+03
91	1.517E+00	7.189E-01	6.130E+03	3.542E+03	3.066E+03
92	1.533E+00	7.226E-01	6.152E+03	3.566E+03	3.090E+03
93	1.550E+00	7.263E-01	6.178E+03	3.594E+03	3.118E+03
94	1.567E+00	7.299E-01	6.204E+03	3.623E+03	3.147E+03
95	1.583E+00	7.335E-01	6.230E+03	3.651E+03	3.175E+03
96	1.600E+00	7.371E-01	6.252E+03	3.675E+03	3.199E+03
97	1.617E+00	7.406E-01	6.278E+03	3.704E+03	3.228E+03
98	1.633E+00	7.441E-01	6.304E+03	3.733E+03	3.257E+03

Superposition Analysis

=====

No.	Elapsed time hr	T-Function Dimensionless	P-Function GPa ² /mPa.s

1	1.667E-02	1.914E+00	3.486E+00
2	3.333E-02	1.618E+00	1.050E+01
3	5.000E-02	1.447E+00	1.402E+01
4	6.667E-02	1.327E+00	2.010E+01
5	8.333E-02	1.235E+00	5.421E+02
6	1.000E-01	1.161E+00	5.645E+02
7	1.167E-01	1.099E+00	5.878E+02
8	1.333E-01	1.046E+00	6.129E+02
9	1.500E-01	1.000E+00	6.427E+02
10	1.667E-01	9.590E-01	6.692E+02
11	1.833E-01	9.224E-01	6.959E+02
12	2.000E-01	8.894E-01	7.229E+02
13	2.167E-01	8.593E-01	7.470E+02
14	2.333E-01	8.317E-01	7.714E+02
15	2.500E-01	8.063E-01	8.000E+02
16	2.667E-01	7.828E-01	8.232E+02
17	2.833E-01	7.609E-01	8.499E+02
18	3.000E-01	7.406E-01	8.794E+02
19	3.167E-01	7.215E-01	9.041E+02
20	3.333E-01	7.035E-01	9.315E+02
21	3.500E-01	6.866E-01	9.584E+02
22	3.667E-01	6.707E-01	9.863E+02
23	3.833E-01	6.556E-01	1.016E+03
24	4.000E-01	6.413E-01	1.045E+03
25	4.167E-01	6.277E-01	1.072E+03
26	4.333E-01	6.147E-01	1.097E+03
27	4.500E-01	6.024E-01	1.131E+03
28	4.667E-01	5.906E-01	1.164E+03
29	4.833E-01	5.794E-01	1.191E+03
30	5.000E-01	5.686E-01	1.221E+03
31	5.167E-01	5.583E-01	1.250E+03
32	5.333E-01	5.483E-01	1.282E+03
33	5.500E-01	5.388E-01	1.311E+03
34	5.667E-01	5.297E-01	1.340E+03
35	5.833E-01	5.208E-01	1.376E+03
36	6.000E-01	5.124E-01	1.396E+03
37	6.167E-01	5.042E-01	1.427E+03
38	6.333E-01	4.963E-01	1.456E+03
39	6.500E-01	4.886E-01	1.485E+03
40	6.667E-01	4.812E-01	1.516E+03
41	6.833E-01	4.741E-01	1.548E+03
42	7.000E-01	4.672E-01	1.578E+03
43	7.167E-01	4.605E-01	1.607E+03
44	7.333E-01	4.540E-01	1.654E+03
45	7.500E-01	4.477E-01	1.844E+03
46	7.667E-01	4.416E-01	1.908E+03
47	7.833E-01	4.357E-01	1.921E+03
48	8.000E-01	4.299E-01	1.757E+03
49	8.167E-01	4.243E-01	1.825E+03

50	8.333E-01	4.189E-01	1.858E+03
51	8.500E-01	4.136E-01	1.888E+03
52	8.667E-01	4.085E-01	1.921E+03
53	8.833E-01	4.035E-01	1.951E+03
54	9.000E-01	3.986E-01	1.976E+03
55	9.167E-01	3.938E-01	2.017E+03
56	9.333E-01	3.892E-01	2.032E+03
57	9.500E-01	3.847E-01	2.051E+03
58	9.667E-01	3.802E-01	2.070E+03
59	9.833E-01	3.759E-01	2.089E+03
60	1.000E+00	3.717E-01	2.109E+03
61	1.017E+00	3.676E-01	2.208E+03
62	1.033E+00	3.636E-01	2.238E+03
63	1.050E+00	3.597E-01	2.256E+03
64	1.067E+00	3.559E-01	2.272E+03
65	1.083E+00	3.521E-01	2.322E+03
66	1.100E+00	3.485E-01	2.339E+03
67	1.117E+00	3.449E-01	2.356E+03
68	1.133E+00	3.414E-01	2.430E+03
69	1.150E+00	3.380E-01	2.458E+03
70	1.167E+00	3.346E-01	2.487E+03
71	1.183E+00	3.313E-01	2.506E+03
72	1.200E+00	3.281E-01	2.523E+03
73	1.217E+00	3.249E-01	2.569E+03
74	1.233E+00	3.218E-01	2.618E+03
75	1.250E+00	3.188E-01	2.648E+03
76	1.267E+00	3.158E-01	2.680E+03
77	1.283E+00	3.129E-01	2.714E+03
78	1.300E+00	3.101E-01	2.746E+03
79	1.317E+00	3.072E-01	2.772E+03
80	1.333E+00	3.045E-01	2.805E+03
81	1.350E+00	3.018E-01	2.835E+03
82	1.367E+00	2.991E-01	2.855E+03
83	1.383E+00	2.965E-01	2.875E+03
84	1.400E+00	2.940E-01	2.900E+03
85	1.417E+00	2.915E-01	2.921E+03
86	1.433E+00	2.890E-01	2.944E+03
87	1.450E+00	2.866E-01	2.966E+03
88	1.467E+00	2.842E-01	2.989E+03
89	1.483E+00	2.818E-01	2.985E+03
90	1.500E+00	2.795E-01	3.043E+03
91	1.517E+00	2.773E-01	3.066E+03
92	1.533E+00	2.750E-01	3.090E+03
93	1.550E+00	2.729E-01	3.118E+03
94	1.567E+00	2.707E-01	3.147E+03
95	1.583E+00	2.686E-01	3.175E+03
96	1.600E+00	2.665E-01	3.199E+03
97	1.617E+00	2.644E-01	3.228E+03
98	1.633E+00	2.624E-01	3.257E+03

Input Data-superposition

```

-----

Pressure Run Depth..... = 8.717E+02 m
Fluid Analyzed..... = Gas
Production Time..... = 1.367E+00 hr
Total Flow Rate..... = 2.395E+01 Res m^3/D
Oil Flow Rate..... = 0.000E-01 m^3/D
Gas Flow Rate(Free Gas)..... = 1.000E+03 m^3/D
Water Flow Rate..... = 0.000E-01 m^3/D
Bottomhole Flowing Pressure..... = 2.195E+03 kPa
Specific Gravity of Gas..... = 9.170E-01
Gas Deviation Factor..... = 9.677E-01
Oil Formation Volume Factor..... = 1.000E+00 Res m^3/m^3
Gas Formation Volume Factor..... = 2.395E-02 Res m^3/m^3
Water Formation Volume Factor..... = 1.000E+00 Res m^3/m^3
Solution Gas-Oil Ratio..... = 0.000E-01 m^3/m^3
Solution Gas-Water Ratio..... = 0.000E-01 m^3/m^3
Oil Viscosity..... = 1.000E+00 cp
Gas Viscosity..... = 1.096E-02 cp
Water Viscosity..... = 1.000E+00 cp
Reservoir Temperature..... = 2.290E+01 Degree C
Pay Thickness..... = 2.130E+00 m
Porosity..... = 9.040E-02
Oil Saturation..... = 0.000E-01
Gas Saturation..... = 2.406E-01
Water Saturation..... = 7.594E-01
Total Compressibility..... = 6.025E-05 1/kPa
Wellbore Radius..... = 1.000E-01 m
Pseudocritical pressure..... = 3.649E+03 kPa
Pseudocritical temperature..... = 1.433E+02 K
Nitrogen,mole fraction..... = 8.063E-01
Carbon dioxide,mole fraction..... = 9.200E-03
Hydrogen sulphide,mole fraction... = 0.000E-01

```


Output-superposition

```

-----
Slope..... = 1.018E+04
Intercept..... = 5.911E+03 GPa^2/mPa.s
Dp or Dm(p) at 1 hour..... = 2.125E+03 GPa^2/mPa.s
Extended Pressure..... = 8.699E+03 kPa
Total Transmissibility..... = 3.997E+00 mD-m/cp
Oil Transmissibility..... = 0.000E-01 mD-m/cp
Gas Transmissibility..... = 3.997E+00 mD-m/cp
Water Transmissibility..... = 0.000E-01 mD-m/cp
Oil Reservoir Capacity..... = 0.000E-01 mD-m
Gas Reservoir Capacity..... = 4.382E-02 mD-m
Water Reservoir Capacity..... = 0.000E-01 mD-m
Total Mobility..... = 1.876E+00 mD/cp
Oil Mobility..... = 0.000E-01 mD/cp
Gas Mobility..... = 1.876E+00 mD/cp
Water Mobility..... = 0.000E-01 mD/cp
Effective Permeability to Oil..... = 0.000E-01 mD
Effective Permeability to Gas..... = 2.057E-02 mD
Effective Permeability to Water... = 0.000E-01 mD
Skin Factor..... = -2.293E+00
Pressure Drop due to skin..... = -1.273E+04 kPa
Total Ideal Productivity Index... = 1.245E-03 Res m^3/D/kPa
Total Actual Productivity Index... = 3.682E-03 Res m^3/D/kPa
Total Flow Efficiency..... = 2.958E+00
Oil Ideal Productivity Index..... = 0.000E-01 m^3/D/kPa
Oil Actual Productivity Index..... = 0.000E-01 m^3/D/kPa
Oil Flow Efficiency..... = 0.000E-01
Gas Ideal Productivity Index..... = 5.198E-02 m^3/D /kPa
Gas Actual Productivity Index..... = 1.537E-01 m^3/D /kPa
Gas Flow Efficiency..... = 2.958E+00
Radius of Investigation..... = 2.581E+00 m
Hydrocarbons-in-Place based on Radius of investigation
(Meaningful only during the transient flow period)
Oil-in-Place (OOIP)..... = 0.000E-01 m^3
Gas-in-Place (OGIP). .... = 4.049E+01 m^3

```

PERFORMANCE FORECAST

The forecast presented in this study is based on simplified analysis techniques. The forecast is presented in the next page as a crossplot of pressures vs. gas rates.

The forecast was performed based on the following parameters:

- Inverse slope $n = 1.0$ (assumed)
- Performance coefficient $C = 5.62 \text{ E-}09$
- Absolute Open Flow Potential (AOF) $= 1.06 \times 10^3 \text{ m}^3/\text{day}$



DEC. 12. 2000 11:17AM



GAS ANALYSIS

0001 - 1

CONTAINER IDENTITY

METER NUMBER

WELL LICENSE NUMBER

52134-2000-7583

LABORATORY NUMBER

Deer Lake Oil and Gas Inc.

PAGE

OPERATOR

Deer Lake et al Western Adventure 1

LOCATION

WELL OR SAMPLE LOCATION

KB ELEV (m)

OR ELEV (m)

Western Adventure

FIELD OR AREA

POOL OR ZONE

SAMPLER

DST 3

TEST TYPE AND NO.

TEST RECOVERY

Easting

POINT OF SAMPLE

SAMPLE POINT ID

PUMPING

FLOWING

GAS LIFT

SWAB

WATER

m/d

OIL

m/d

GAS

m/d

TEST INTERVAL (mins)

100

°C

°C

SEPARATOR

RESERVOIR

CONTAINER
WHEN SAMPLEDCONTAINER
WHEN RECEIVED

SEPARATOR

Temperatures, °C

Pressures, kPa (gauge)

DATE SAMPLED (Y/M/D)

2000 12 11

DATE RECEIVED (Y/M/D)

2000 12 11

DATE ANALYZED (Y/M/D)

KM

ANALYST

AMT. AND TYPE CUSHION

MUD RESISTIVITY

COMPONENT	MOLE FRACTION AIR FREE AS RECEIVED	MOLE FRACTION AIR FREE ACID GAS FREE	mLW AIR FREE AS RECEIVED
H ₂	0.0003	0.0003	
He	0.0006	0.0006	
N ₂	0.8063	0.8138	
CO ₂	0.0092	0.0000	
H ₂ S	0.0000	0.0000	
C ₁	0.1598	0.1613	
C ₂	0.0167	0.0169	55.3
C ₃	0.0028	0.0028	10.3
iC ₄	0.0004	0.0004	1.7
C ₄	0.0007	0.0007	2.9
iC ₅	0.0004	0.0004	2.0
C ₅	0.0002	0.0002	1.0
C ₆	0.0006	0.0006	3.3
C ₇₊	0.0020	0.0020	13.7
Total	1.0000	1.0000	94.2

CALCULATED GROSS HEATING VALUE

MJ/kg @ 15°C & 101.325 kPa (abs.)

8.19

MOISTURE FREE

8.25

MOISTURE & ACID GAS FREE

CALCULATED VAPOR PRESSURE

kPa (abs.) @ 60.0°C

35.7

PENTANES PLUS

CALCULATED TOTAL SAMPLE PROPERTIES (AIR=1) @ 15°C & 101.325 kPa
MOISTURE FREE AS SAMPLED1.124 kg/m³

DENSITY

0.917

RELATIVE DENSITY

26.6

RELATIVE MOLECULAR MASS

CALCULATED PSEUDOCRITICAL PROPERTIES

AS SAMPLED

ACID GAS FREE

3649.9 kPa (abs.)

pPc

143.3 K

pTc

kPa (abs.)

pPc

K

pTc

REMARKS: Sample contained air contamination. Nitrogen may be affected by air contamination.

Sample opening pressure : 0 kPa(g).

NOTE: THE GROSS HEATING VALUE HAS BEEN CALCULATED IN ACCORDANCE TO AGA REPORT 86 AND ALL PROPERTIES HAVE BEEN CALCULATED UTILIZING GPA 2145 - 00 PHYSICAL CONSTANTS.



Core Laboratories Canada Ltd.
2810 10 Street N.E.
Calgary, Alberta, Canada T2E 7T7
Tel: 403-250-4000
Fax: 403-250-5120
www.corelab.com

Core Laboratories Reservoir Fluids Report - Calgary
Gas Composition to C6+
for
Deer Lake Oil and Gas
Western Adventure No.1

Number Of Pages (including cover page): 2

File Number: 52137-2000-7873

Date: December 29, 2000

Report Distribution: Cabot Martin, Deer Lake (St. John's) - 2 copies

APPROVED BY:

A handwritten signature in black ink, appearing to read "Sean Stewart", is written over a horizontal line.

Sean Stewart, Ph.D.
Technical Specialist, Technical Services Group
Phone # 250-4046
Email sean_stewart@corelabcal.com

Please contact the above person should there be any questions concerning the contents of this report. Atmospheric samples will be kept a maximum of 30 days.

The analysis, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgement of Core Laboratories. Core Laboratories assumes no responsibility and makes no warranty or representations, expressed or implied, as to the productivity, proper operations, or profitability however of any oil, gas, coal or other mineral, proper well or sand in connection with which such report is used or relied upon for any reason whatsoever.



COMPANY Deer Lake Oil and Gas
SAMPLE ID Western Adventure No. 1
PROJECT Gas Analysis

PAGE 1 of 1
FILE 52137-00-7873
DATE 12/29/00

Scope of Work

Identify the composition of a gas in gas - water mixture to C_6+ , plus nitrogen, oxygen and carbon dioxide.

Samples Received and Description

Sample #1: Deer Lake Oil and Gas
Description: Gas - Water mixture (~ 10% gas)
Location: not given

Date Sampled: not given
Date Received: 00-12-21
Date Analyzed: 00-12-28

Results

Table 1. Results of Gas Composition Analysis to C_6+

Component	Mole %
Nitrogen	72.78
Oxygen	18.70
Carbon Dioxide	0.01
Methane	7.67
Ethane	0.71
Propane	0.09
Isobutane	0.01
n-Butane	0.02
Isopentane	0.01
n-Pentane	trace
Hexanes +	trace

**Drill Stem Testing - Gas Recovery Measurements**

Company: DEER LAKE OIL & GAS
C/O 225 Seabrook Ave. S.W.
CALGARY, AB

Job Ticket #: D2-08837

DST#: 4

Test Date: 12/01/2000 300hrs

Well Name: DEER LAKE ET AL WA-1

Location: WA-1

Contact: STAN PODULSKY

Gas Measurements for Flow # 2

BJ2

Gas Recovery Measured With:

Critical Flow

Time (min.)	Orifice (mm)	Pressure (kPa)	Rate (m ³ /d)
20	12.70	80	2935.00
25	12.70	40	2335.00
30	6.35	65	823.00
35	6.35	80	922.00
40	6.35	100	1061.00
45	6.35	115	1158.00
50	6.35	120	1188.00
55	6.35	120	1188.00
60	6.35	110	1128.00
65	6.35	105	1054.00
70	6.35	100	1061.00
75	6.35	90	995.00
80	6.35	80	922.00

DEER LAKE ET AL WA-1



Drill Stem Test Report

Prepared for: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

Well Name: DEER LAKE ET AL WA-1
Location: WA-1

Test Date: 08/06/2000

Job Ticket #: D2-09851 DST#: 1

WA-1

DST #1



Drill Stem Testing Report

Company: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

Contact: STAN PODULSKY

Job Ticket #: D2-09851 DST#: 1
Test Date: 08/06/2000 1700hrs

Well Name: DEER LAKE ET AL WA-1
Location: WA-1

General Information:

Test Type: CONV. BOTTOM HOLE
Interval: 840.00m - 872.00m
Formation: NORTH BROOK
KB Elevation: 92.50m
Ground Elevation: 90.00m
Total Depth: 872.00m
Test Mode: Fluid

Tester: C. PETERSON
Truck No.: 0Y0
Contractor: LOGAN DRILLING
Rig No.: 50 LI
Hole Diameter: 96mm
Hole Condition: GOOD
Bottom Hole Temperature: 22.90 C

Electronic Recorder Information:

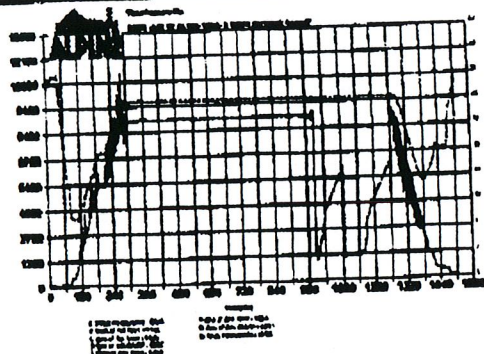
OUTSIDE	FLUID
Recorder #: 497	Recorder #: 490
Range: 70000 kPag	Range: 35000 kPag
Depth: 871.69 m	Depth: 834.63 m
Flag Points:	Time: Pressure:
A Initial Hydrostatic	0.00 8922.0
B Start of 1st Flow	0.00 1142.4
C End of 1st Flow	2.00 1142.4
D End of 1st Shutin	92.00 6859.6
E Start of 2nd Flow	0.00 1211.3
F End of 2nd Flow	76.00 1552.1
G End of 2nd Shutin	100.00 6202.6
H Final Hydrostatic	0.00 8765.9

Test Run Information:

Start Time: 1700hrs
Reached Test Depth: 752hrs
Pull Out Time: 1232hrs
Tool Out Of Hole: 1530hrs

Weight set on Packers: 2.00daN
Weight to free Packers: 10.00daN
Initial String Weight: 9.00daN
Unseated String Weight: 9.00daN

Tool Chased Dist: 0.00m Water Loss: 20.00cm³
Mud Type: POLYMER Mud Drop: NO
Mud Weight: 1044.00kg/m³ VIB: 36.00Hz
Amount of fill: 0.00m Filter Cake: 1.00mm
Amt of cushion: 0.00 Pump Time: 28min
Type of cushion: Reversed Out: NO



Recovery Description:

Total fluid recovery was 108 meters condensate flecked drilling fluid.

No gas to surface.

General Remarks:

Mechanically successful. *Test results suggest low permeability within the zone tested.

PREFLOW: Fair air blow throughout.

FINAL FLOW: Fair air blow decreasing to dead in 30 minutes. Remaining dead throughout remainder of flow.

Gas Bomb: 0 Sampler: 0
Fluid Sample: 3 Sent to: CORE LAB



Drill Stem Testing - Tool Diagram / Description

Company: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

Job Ticket #: D2-00851

DST#: 1

Test Date: 08/06/2000 1700hrs

Well Name: DEER LAKE ET AL WA-1

Contact: STAN PODULSKY

Location: WA-1

Conventional Bottomhole

Drill Collar Stands: 0
Drill Collar Singles: 0
Drill Pipe Stands: 93
Drill Pipe Singles: 1
Heavy Wt. Pipe Stands: 0
Heavy Wt. Pipe Singles: 0
Total Drill Collars/Pipe and Tools: 847.75m
Total Drill Pipe Above K.B.: 7.75m
Total Depth: 872m

7.11m

Tool / Drill Stem Information:

Tool Weight: 0.50 daN
Drill Collar Inside Diameter: 0.00 mm
Drill Collar Total Length: 0.00 m
Drill Pipe Inside Diameter: 78.00 mm
Drill Pipe Total Length: 840.64 m
Heavy Weight Pipe Diameter: 0.00 mm
Heavy Weight Pipe Length: 0.00 m
Bottom Choke Diameter: 9.59 mm
Number of Packers: 2 Dia.: 82.55 mm

Depth:
840.00m

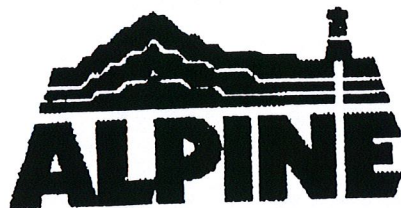
Tool Remarks:

31.89m

Total Depth: 872.00m

Item	Length
P.O.S.	0.39
XO	0.16
REC 4490	1.39
SHUT IN TOOL	1.34
REC 4441	1.39
PACKER	1.27
PACKER UP	0.82
PACKER DOWN	0.66
PERF	3.00
REC 4498	1.39
XO	0.16
D.C.	27.00
XO/REC 4497	0.16
BULLNOSE	0.20

39.00



Drill Stem Testing - Time / Pressure Listing

Company: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

Job Ticket #: D2-09851
Test Date: 08/08/2000 1700hrs

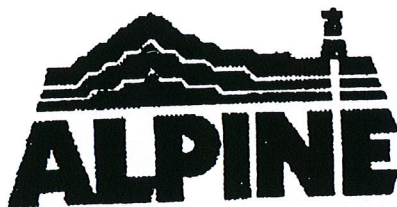
DST#: 1

Well Name: DEER LAKE ET AL WA-1

Contact: STAN PODULSKY

Location: WA-1

Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abscissa (T+d)/dt	Temp. (°C)	Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abscissa (T+d)/dt	Temp. (°C)
A	Initial Hydrostatic	0.00	0.00	8922.60		22.9			34.00	2598.40	3740.80	1.0585	22.8
B	Start of 1st Flow	0.00	0.00	1142.40		22.7			35.00	2825.20	3768.80	1.0571	22.8
		1.00	-3.50	1138.90		22.7			36.00	2860.90	3803.30	1.0556	22.8
C	End of 1st Flow	2.00	0.00	1142.40		22.7			37.00	2896.80	3839.20	1.0541	22.8
		1.00	81.00	1223.40	3.0000	22.7			38.00	2748.80	3891.20	1.0526	22.8
		2.00	182.60	1325.20	2.0000	22.7			39.00	2795.10	3937.50	1.0513	22.8
		3.00	261.60	1404.00	1.6667	22.7			40.00	2822.90	3965.30	1.0500	22.8
		4.00	340.30	1482.70	1.5000	22.7			41.00	2884.60	4007.00	1.0488	22.8
		5.00	406.20	1548.80	1.4000	22.7			42.00	2915.50	4057.80	1.0476	22.8
		6.00	459.50	1601.90	1.3333	22.7			43.00	2966.40	4108.60	1.0465	22.8
		7.00	519.70	1662.10	1.2657	22.6			44.00	3034.70	4177.10	1.0455	22.8
		8.00	579.40	1821.80	1.2500	22.7			45.00	3072.90	4215.30	1.0444	22.8
		9.00	827.50	1989.90	1.2222	22.7			46.00	3110.00	4252.40	1.0435	22.8
		10.00	958.30	2100.70	1.2000	22.7			47.00	3148.20	4290.60	1.0426	22.8
		11.00	1000.00	2142.40	1.1818	22.7			48.00	3204.80	4347.30	1.0417	22.8
		12.00	1049.80	2192.20	1.1667	22.7			49.00	3254.80	4397.00	1.0408	22.8
		13.00	1118.00	2290.40	1.1538	22.7			50.00	3322.90	4465.30	1.0400	22.8
		14.00	1184.30	2306.70	1.1429	22.7			51.00	3382.30	4504.70	1.0392	22.8
		15.00	1261.60	2404.00	1.1333	22.7			52.00	3402.80	4545.20	1.0385	22.8
		16.00	1320.60	2463.00	1.1250	22.7			53.00	3430.80	4573.00	1.0377	22.8
		17.00	1414.30	2556.70	1.1176	22.7			54.00	3471.10	4613.50	1.0370	22.8
		18.00	1581.00	2723.40	1.1111	22.7			55.00	3496.50	4638.90	1.0364	22.8
		19.00	1679.40	2821.80	1.1053	22.7			56.00	3553.30	4695.70	1.0357	22.8
		20.00	1759.30	2901.70	1.1000	22.8			57.00	3582.60	4735.00	1.0351	22.8
		21.00	1914.30	3056.70	1.0952	22.8			58.00	3677.10	4819.50	1.0346	22.8
		22.00	1979.20	3121.80	1.0909	22.8			59.00	3697.90	4840.30	1.0339	22.8
		23.00	2039.40	3181.80	1.0870	22.8			60.00	3725.70	4866.10	1.0333	22.8
		24.00	2112.30	3254.70	1.0833	22.8			61.00	3761.80	4904.00	1.0328	22.8
		25.00	2174.60	3317.20	1.0800	22.8			62.00	3804.40	4946.80	1.0323	22.8
		26.00	2226.90	3369.30	1.0769	22.8			63.00	3848.40	4990.80	1.0317	22.8
		27.00	2272.00	3414.40	1.0741	22.8			64.00	3880.80	5023.20	1.0313	22.8
		28.00	2346.50	3491.90	1.0714	22.8			65.00	3902.80	5045.20	1.0308	22.8
		29.00	2408.60	3551.00	1.0690	22.8			66.00	3954.80	5097.30	1.0303	22.8
		30.00	2447.90	3590.30	1.0667	22.8			67.00	3986.10	5128.50	1.0299	22.8
		31.00	2489.60	3632.00	1.0645	22.8			68.00	4008.10	5150.50	1.0294	22.8
		32.00	2527.80	3670.20	1.0625	22.8			69.00	4033.60	5176.00	1.0290	22.8
		33.00	2569.40	3711.80	1.0608	22.8			70.00	4054.40	5196.80	1.0286	22.9



Drill Stem Testing - Time / Pressure Listing

Company: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

Job Ticket #: D2-09851 DST# 1
Test Date: 08/08/2000 1700hrs

Well Name: DEER LAKE ET AL WA-1
Location: WA-1

Contact: STAN PODULSKY

Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abcissa (T+dt)/dt	Temp. (°C)	Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abcissa (T+dt)/dt	Temp. (°C)
		71.00	4084.50	5226.90	1.0262	22.9			15.00	66.00	1277.80		22.8
		72.00	4112.30	5254.70	1.0276	22.8			16.00	69.50	1281.30		22.8
		73.00	4143.50	5286.90	1.0274	22.8			17.00	67.20	1279.00		22.8
		74.00	4172.50	5314.90	1.0270	22.9			18.00	62.50	1274.30		22.7
		75.00	4191.00	5333.40	1.0267	22.9			19.00	67.00	1278.80		22.8
		76.00	4223.40	5365.80	1.0263	22.9			20.00	67.00	1278.80		22.8
		77.00	4241.90	5384.30	1.0260	22.9			21.00	67.00	1278.80		22.8
		78.00	4267.40	5409.80	1.0258	22.8			22.00	65.90	1277.70		22.8
		79.00	4305.60	5448.00	1.0253	22.8			23.00	65.90	1277.70		22.8
		80.00	4345.10	5488.50	1.0250	22.8			24.00	63.70	1275.50		22.8
		81.00	4387.00	5539.40	1.0247	22.8			25.00	69.50	1281.30		22.8
		82.00	4444.60	5588.90	1.0244	22.8			26.00	66.00	1277.80		22.8
		83.00	4500.00	5642.40	1.0241	22.8			27.00	78.70	1290.50		22.8
		84.00	4534.70	5677.10	1.0238	22.8			28.00	48.60	1260.40		22.8
		85.00	4567.20	5709.60	1.0235	22.8			29.00	81.40	1273.20		22.8
		86.00	4604.20	5748.60	1.0233	22.8			30.00	71.80	1283.80		22.8
		87.00	4637.80	5780.20	1.0230	22.8			31.00	77.60	1289.40		22.8
		88.00	4673.60	5816.00	1.0227	22.8			32.00	77.60	1289.40		22.8
		89.00	4708.50	5851.90	1.0225	22.8			33.00	81.00	1292.80		22.8
		90.00	4744.20	5886.60	1.0222	22.8			34.00	78.60	1290.40		22.8
		91.00	4790.50	5932.90	1.0220	22.8			35.00	78.60	1290.40		22.8
D	End of 1st Shutin	92.00	4817.20	5959.60	1.0217	22.8			36.00	79.70	1291.50		22.8
E	Start of 2nd Flow	0.00	0.00	1211.80		22.8			37.00	74.10	1285.90		22.8
		1.00	5.80	1217.60		22.8			38.00	77.80	1289.40		22.8
		2.00	8.10	1219.80		22.8			39.00	82.20	1294.00		22.8
		3.00	15.10	1228.90		22.7			40.00	79.90	1291.70		22.8
		4.00	36.10	1249.90		22.8			41.00	82.20	1294.00		22.8
		5.00	36.10	1249.90		22.8			42.00	82.20	1294.00		22.8
		6.00	39.20	1251.00		22.8			43.00	84.50	1296.30		22.8
		7.00	48.60	1260.40		22.8			44.00	87.80	1299.80		22.8
		8.00	49.80	1261.80		22.7			45.00	87.80	1299.80		22.8
		9.00	59.00	1270.80		22.8			46.00	87.80	1299.80		22.8
		10.00	61.40	1273.20		22.7			47.00	86.70	1298.50		22.8
		11.00	56.70	1268.50		22.7			48.00	86.70	1298.50		22.8
		12.00	59.00	1270.80		22.7			49.00	86.70	1298.50		22.8
		13.00	63.70	1275.80		22.8			50.00	90.30	1302.10		22.8
		14.00	63.70	1275.50		22.8			51.00	91.50	1303.30		22.8



Drill Stem Testing - Time / Pressure Listing

Company: DEER LAKE OIL & GAS
C/O 225 Boarboro Ave. S.W.
CALGARY, AB

Job Ticket #: D2-09851
Test Date: 08/08/2000 1700hrs

DST# 1

Well Name: DEER LAKE ET AL WA-1

Contact: STAN PODULSKY

Location: WA-1

Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abcissa (T+dt)/dt	Temp. (°C)	Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abcissa (T+dt)/dt	Temp. (°C)
		52.00	88.00	1299.80		22.8			13.00	1832.20	3384.30	7.0000	22.9
		53.00	90.20	1302.00		22.8			14.00	1868.10	3420.20	8.5714	22.9
		54.00	90.20	1302.00		22.8			15.00	1904.00	3456.10	6.2000	22.9
		55.00	89.00	1300.80		22.8			16.00	1945.80	3497.70	5.6750	22.9
		56.00	91.50	1303.30		22.8			17.00	1979.20	3531.30	5.5882	22.9
		57.00	97.20	1309.00		22.8			18.00	2017.40	3569.50	5.3333	22.9
		58.00	78.70	1290.50		22.8			19.00	2059.10	3611.20	5.1053	22.9
		59.00	89.10	1300.90		22.8			20.00	2093.80	3645.90	4.9000	22.9
		60.00	99.80	1311.40		22.8			21.00	2132.00	3684.10	4.7143	22.9
		61.00	115.80	1327.80		22.8			22.00	2169.00	3721.10	4.5455	22.9
		62.00	134.30	1348.10		22.8			23.00	2207.20	3759.30	4.3813	22.9
		63.00	146.90	1357.70		22.8			24.00	2247.70	3799.80	4.2500	22.9
		64.00	163.20	1375.00		22.8			25.00	2285.90	3838.00	4.1200	22.9
		65.00	177.10	1388.90		22.8			26.00	2322.90	3875.00	4.0000	22.9
		66.00	191.00	1402.80		22.8			27.00	2355.40	3907.50	3.8889	22.9
		67.00	204.90	1416.70		22.8			28.00	2399.30	3951.40	3.7857	22.9
		68.00	218.80	1430.60		22.8			29.00	2442.20	3994.30	3.6897	22.9
		69.00	232.70	1444.50		22.8			30.00	2478.00	4030.10	3.6000	22.9
		70.00	246.60	1458.40		22.8			31.00	2515.10	4067.20	3.5181	22.9
		71.00	259.30	1471.10		22.8			32.00	2552.10	4104.20	3.4375	22.9
		72.00	273.20	1485.00		22.8			33.00	2592.60	4144.70	3.3636	22.8
		73.00	289.40	1501.20		22.8			34.00	2629.70	4181.80	3.2941	22.8
		74.00	302.10	1513.90		22.8			35.00	2684.40	4218.50	3.2286	22.9
		75.00	321.80	1533.60		22.8			36.00	2699.10	4261.20	3.1867	22.9
F	End of 2nd Flow	76.00	340.30	1552.10		22.8			37.00	2733.80	4285.90	3.1081	22.9
		1.00	541.70	2093.80	79.0000	22.8			38.00	2770.90	4323.00	3.0526	22.8
		2.00	549.80	2101.90	40.0000	22.8			39.00	2805.60	4357.70	3.0000	22.8
		3.00	568.00	2118.10	27.0000	22.9			40.00	2840.30	4392.40	2.9600	22.8
		4.00	574.10	2126.20	20.5000	22.9			41.00	2877.40	4429.50	2.9024	22.8
		5.00	588.00	2140.10	16.6000	22.9			42.00	2914.40	4466.50	2.8571	22.8
		6.00	1552.10	3104.20	14.0000	22.9			43.00	2950.30	4502.40	2.8140	22.8
		7.00	1586.00	3140.10	12.1429	22.9			44.00	2983.80	4535.90	2.7727	22.8
		8.00	1625.00	3177.10	10.7600	22.9			45.00	3017.40	4569.50	2.7333	22.8
		9.00	1664.40	3216.50	9.6667	22.9			46.00	3051.00	4603.10	2.6957	22.8
		10.00	1710.70	3282.80	8.8000	22.9			47.00	3089.20	4641.30	2.6596	22.8
		11.00	1751.20	3303.30	8.0909	22.8			48.00	3121.80	4673.70	2.6250	22.8
		12.00	1791.70	3343.80	7.6000	22.9			49.00	3136.80	4688.70	2.5918	22.8



Drill Stem Testing - Time / Pressure Listing

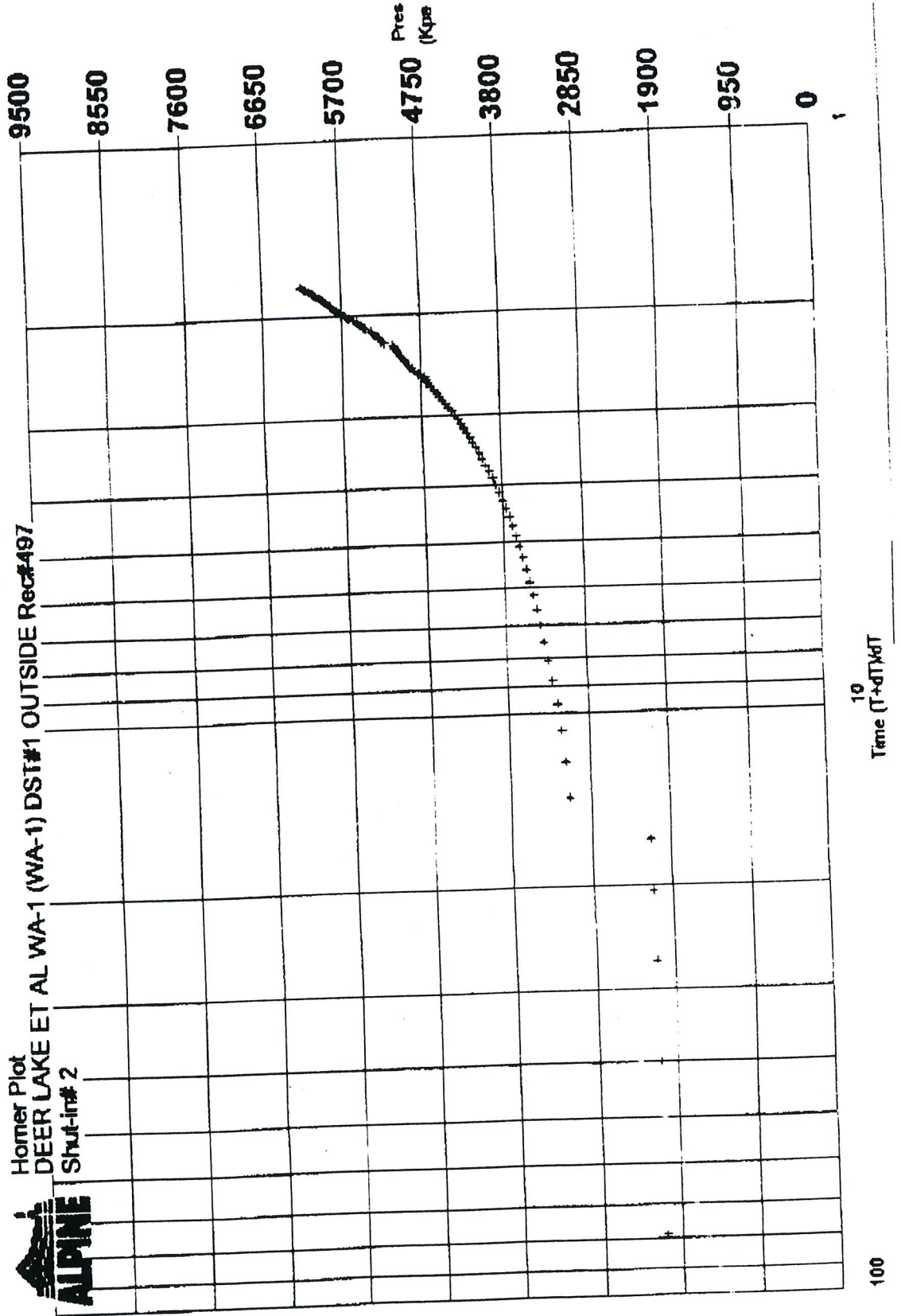
Company: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

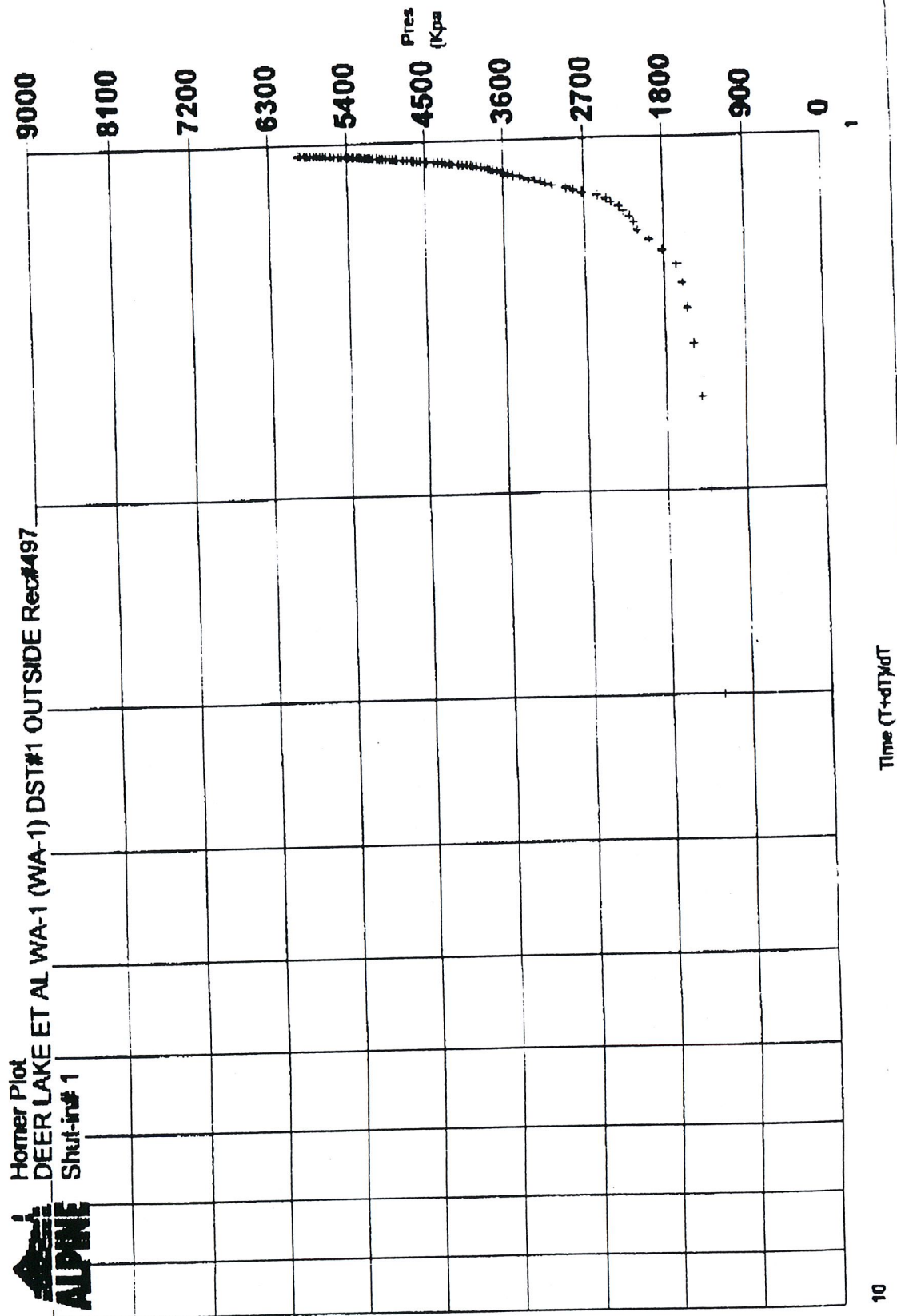
Job Ticket #: D2-09851 DST#: 1
Test Date: 08/08/2000 1700hrs

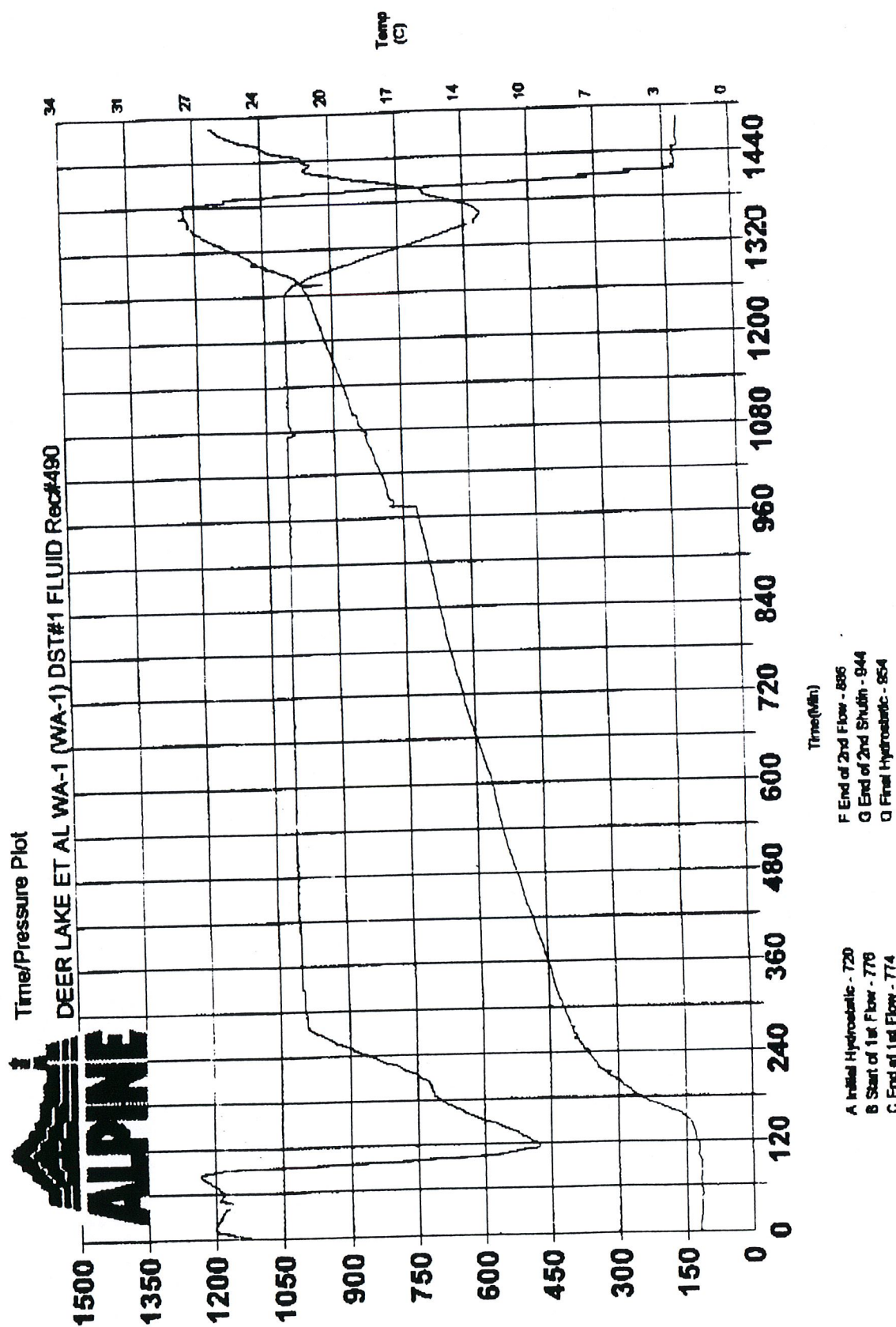
Well Name: DEER LAKE ET AL WA-1
Location: WA-1

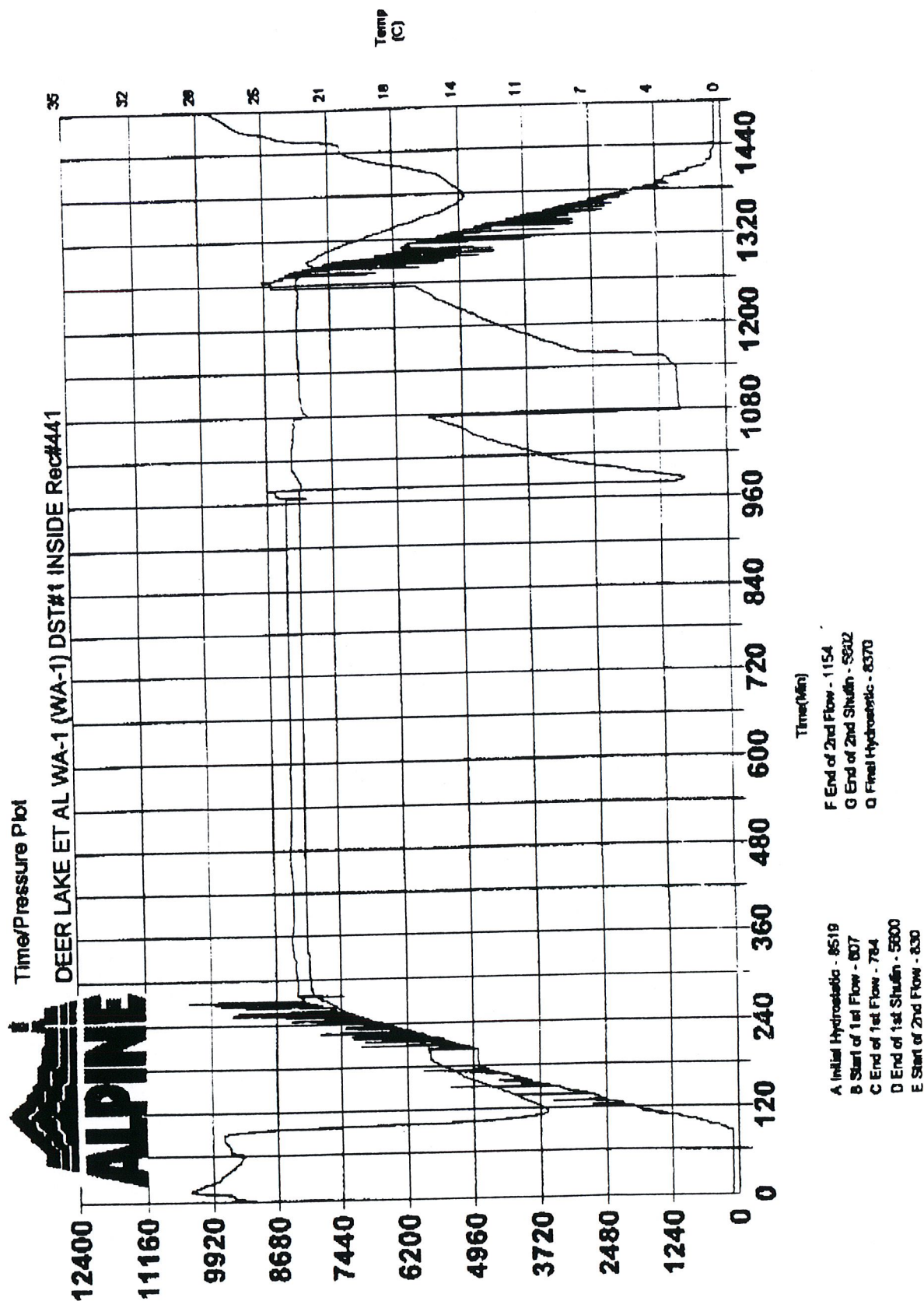
Contact: STAN PODULSKY

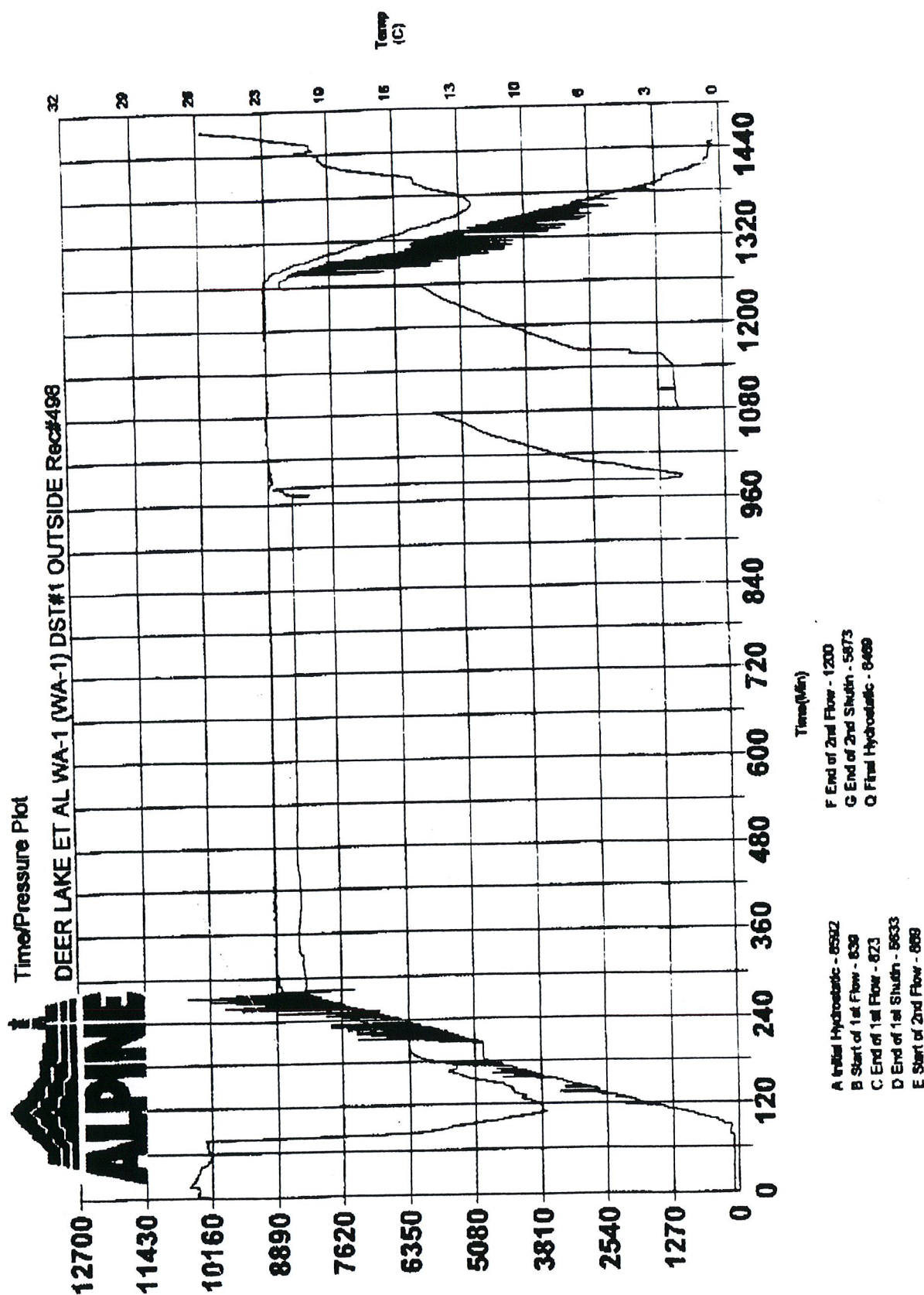
Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abscissa (T+dt)/dt	Temp. (°C)	Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abscissa (T+dt)/dt	Temp. (°C)
		50.00	3158.30	4708.40	2.5500	22.8			87.00	4342.80	5894.70	1.8086	22.8
		51.00	3230.40	4782.50	2.5294	22.8			88.00	4383.50	5915.60	1.8884	22.8
		52.00	3287.40	4818.50	2.6000	22.8			89.00	4384.30	5936.40	1.8784	22.8
		53.00	3298.80	4851.90	2.4717	22.8			90.00	4408.30	5958.40	1.8887	22.8
		54.00	3336.70	4887.80	2.4444	22.8			91.00	4431.80	5983.90	1.8671	22.8
		55.00	3388.30	4921.40	2.4182	22.8			92.00	4468.10	6008.20	1.8478	22.8
		56.00	3395.80	4948.00	2.3929	22.8			93.00	4476.90	6029.00	1.8387	22.8
		57.00	3439.90	4992.00	2.3684	22.8			94.00	4498.90	6051.00	1.8298	22.8
		58.00	3456.10	5008.20	2.3448	22.8			95.00	4524.40	6076.50	1.8211	22.8
		59.00	3475.70	5027.80	2.3220	22.8			96.00	4551.00	6103.10	1.8125	22.8
		60.00	3494.30	5048.40	2.3000	22.8			97.00	4578.40	6128.50	1.8041	22.8
		61.00	3518.20	5068.30	2.2787	22.8			98.00	4598.40	6150.50	1.7969	22.8
		62.00	3537.10	5089.20	2.2581	22.8			99.00	4625.10	6177.20	1.7879	22.8
		63.00	3541.20	5193.30	2.2381	22.8	G	End of 2nd Shutin	100.00	4650.50	6202.80	1.7800	22.8
		64.00	3672.50	5224.90	2.2188	22.8	Q	Final Hydrostatic	0.00	0.00	8755.90		22.8
		65.00	3691.00	5243.10	2.2000	22.8							
		66.00	3707.20	5258.30	2.1818	22.8							
		67.00	3754.70	5308.80	2.1642	22.9							
		68.00	3775.50	5327.80	2.1471	22.9							
		69.00	3784.00	5348.10	2.1304	22.9							
		70.00	3886.90	5419.00	2.1143	22.8							
		71.00	3894.70	5446.80	2.0986	22.8							
		72.00	3923.70	5475.80	2.0833	22.9							
		73.00	3943.30	5495.40	2.0685	22.8							
		74.00	3969.50	5511.80	2.0541	22.8							
		75.00	4004.70	5558.80	2.0400	22.8							
		76.00	4053.30	5606.40	2.0263	22.8							
		77.00	4082.20	5634.30	2.0130	22.8							
		78.00	4113.50	5665.80	2.0000	22.8							
		79.00	4145.80	5698.00	1.9873	22.8							
		80.00	4174.80	5728.90	1.9750	22.8							
		81.00	4201.40	5753.50	1.9630	22.8							
		82.00	4232.70	5784.80	1.9512	22.8							
		83.00	4261.80	5813.70	1.9398	22.8							
		84.00	4280.10	5832.20	1.9286	22.8							
		85.00	4298.70	5850.80	1.9176	22.8							
		86.00	4323.00	5875.10	1.9070	22.8							

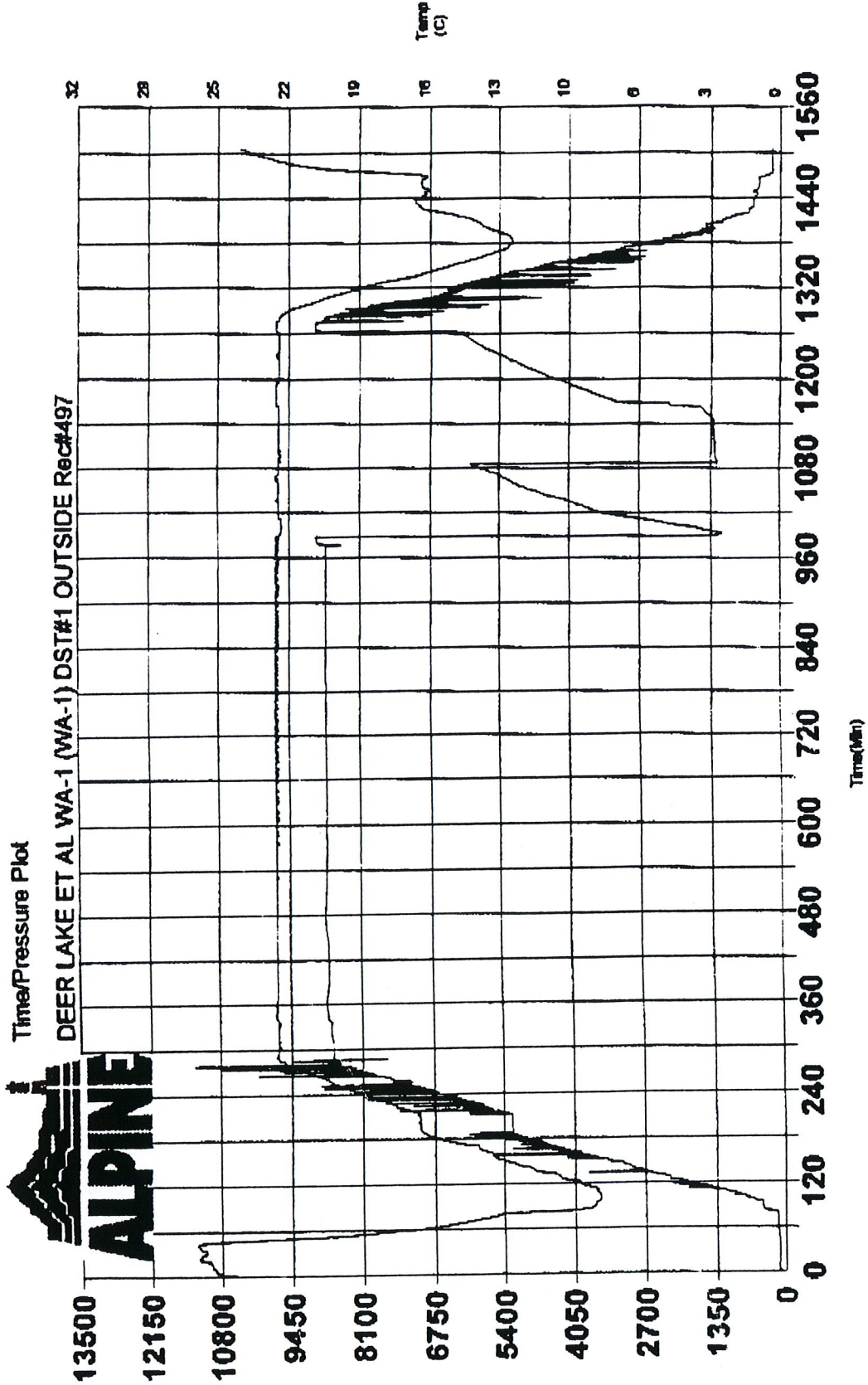








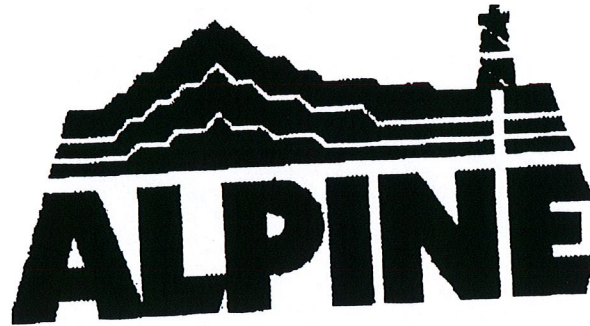




A Initial Hydrostatic - 8023
B Start of 1st Flow - 1142
C End of 1st Flow - 1142
D End of 1st Shutoff - 5080
E Start of 2nd Flow - 1212

F End of 2nd Flow - 1552
G End of 2nd Shutoff - 6203
Q Final Hydrostatic - 8756

DEER LAKE ET AL WA-1



Drill Stem Test Report

Prepared for: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

Well Name: DEER LAKE ET AL WA-1
Location: WA-1

Test Date: 08/08/2000

Job Ticket #: D2-09853 DST#: 3

WA-1

DST #3



Drill Stem Testing Report

Company: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

Contact: STAN PODULSKY

Job Ticket #: D2-09853

DST#: 3

Test Date: 08/08/2000 1740hrs

Well Name: DEER LAKE ET AL WA-1

Location: WA-1

General Information:

Test Type: CONV. BOTTOM HOLE
Interval: 665.00m - 872.00m
Formation: NORTH BROOK
KB Elevation: 92.50m
Ground Elevation: 90.00m
Total Depth: 872.00m
Test Mode: Fluid

Tester: C. PETERSON
Truck No.: 0Y0
Contractor: LOGAN DRILLING
Rig No.: 50 LI
Hole Diameter: 98mm
Hole Condition: GOOD
Bottom Hole Temperature: 22.80 C

Electronic Recorder Information:

OUTSIDE
Recorder #: 497

FLUID
Recorder #: 490

Range: 70000 kPag
Depth: 870.69 m

Range: 35000 kPag
Depth: 659.63 m

Flag Points:

A Initial Hydrostatic
E Start of 2nd Flow
F End of 2nd Flow
G End of 2nd Shutin
Q Final Hydrostatic

Time:	Pressure:
0.00	8826.7
0.00	8820.4
48.00	9064.9
128.00	9301.2
0.00	8838.3

Test Run Information:

Start Time: 1740hrs
Reached Test Depth: 2030hrs
Pull Out Time: 1242hrs
Tool Out Of Hole: 830hrs

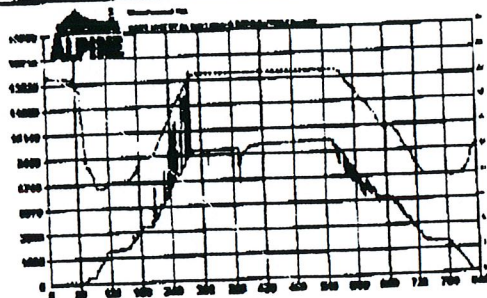
Weight set on Packers: 2.00daN
Weight to free Packers: 10.00daN
Initial String Weight: 9.00daN
Unseated String Weight: 9.00daN

Tool Chased Dist: 0.00m	Water Loss: 20.00cm ³
Mud Type: POLYMER	Mud Drop: NO
Mud Weight: 1140.00kg/m ³	VIS: 35.00S/L
Amount of fill: 0.00m	Filter Cake: 1.00mm
Amt of cushion: 0.00	Pump Time: 25min
Type of cushion:	Reversed Out: NO

General Remarks:

PREFLOW: No preflow, due to losing packer seat upon opening tool.

FINAL FLOW: Very weak air blow decreasing to dead in 10 minutes. Remaining dead throughout remainder of flow.



Recovery Description:

Total fluid recovery was 60 meters drilling fluid with some hydrocarbon flecking.

No gas to surface.

Gas Bomb: 0 Sampler: 0
Fluid Sample: 7 Sent to: CORE LAB



Drill Stem Testing - Tool Diagram / Description

Company: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

Job Ticket #: D2-00053
Test Date: 08/08/2000 1740hrs

DST#: 3

Well Name: DEER LAKE ET AL WA-1

Location: WA-1

Contact: STAN PODULSKY

Conventional Bottomhole

Drill Collar Stands: 0
Drill Collar Singles: 0
Drill Pipe Stands: 74
Drill Pipe Singles: 0
Heavy Wt. Pipe Stands: 0
Heavy Wt. Pipe Singles: 0
Total Drill Collars/Pipe and Tools: 671.80m
Total Drill Pipe Above K.B.: 6.80m
Total Depth: 872m

6.91m

Tool / Drill Stem Information:

Tool Weight: 1.00 daN
Drill Collar Inside Diameter: 0.00 mm
Drill Collar Total Length: 0.00 m
Drill Pipe Inside Diameter: 78.00 mm
Drill Pipe Total Length: 664.89 m
Heavy Weight Pipe Diameter: 0.00 mm
Heavy Weight Pipe Length: 0.00 m
Bottom Choke Diameter: 9.52 mm
Number of Packers: 2 Dia.: 82.55 mm

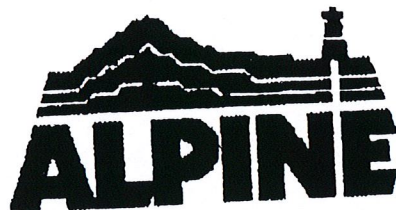
Depth:
666.00m

Tool Remarks:

205.9m

Total Depth: 872.00m

Item	Length
XO	0.16
REC 4490	1.39
SHUT IN TOOL	1.34
REC 4441	1.39
PACKER	1.27
PACKER UP	0.82
PACKER DOWN	0.56
PERF	3.00
REC 4498	1.39
XO	0.16
D.C.	201.0
XO/REC 4497	0.16
BULLNOSE	0.20



Drill Stem Testing - Time / Pressure Listing

Company: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

Job Ticket #: D2-09853

DST#: 3

Test Date: 08/08/2000 1740hrs

Well Name: DEER LAKE ET AL WA-1

Location: WA-1

Contact: STAN PODULSKY

Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abscissa (T+dt)/dt	Temp. (°C)	Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abscissa (T+dt)/dt	Temp. (°C)
									36.00	2383.20	9003.60		22.8
A	Initial Hydrostatic	0.00	0.00	8826.70		22.8			37.00	2390.10	9010.50		22.8
E	Start of 2nd Flow	0.00	0.00	8820.40		22.8			38.00	2396.20	9016.60		22.8
		1.00	1214.20	7834.60		22.8			39.00	2407.50	9027.90		22.8
		2.00	1370.40	7990.60		22.8			40.00	2412.10	9032.50		22.7
		3.00	1489.60	8110.00		22.7			41.00	2414.40	9034.80		22.8
		4.00	1582.70	8213.10		22.8			42.00	2417.90	9038.30		22.8
		5.00	1679.50	8299.60		22.8			43.00	2424.80	9045.20		22.8
		6.00	1765.90	8376.30		22.8			44.00	2428.50	9049.90		22.8
		7.00	1824.10	8444.50		22.8			45.00	2435.30	9055.70		22.8
		8.00	1882.00	8502.40		22.7			46.00	2437.60	9058.00		22.8
		9.00	1832.90	8553.30		22.8			47.00	2441.00	9061.40		22.8
		10.00	1979.20	8599.80		22.8			48.00	2444.50	9064.90		22.8
		11.00	2018.60	8638.00		22.8	F	End of 2nd Flow	1.00	7.00	9071.90	49.0000	22.8
		12.00	2052.20	8672.60		22.8			2.00	8.10	9073.00	25.0000	22.8
		13.00	2086.90	8707.30		22.8			3.00	15.10	9080.00	17.0000	22.8
		14.00	2118.10	8738.50		22.8			4.00	16.70	9083.60	13.0000	22.8
		15.00	2143.80	8764.00		22.8			5.00	19.90	9084.80	10.6000	22.8
		16.00	2165.60	8786.00		22.8			6.00	19.90	9084.80	9.0000	22.8
		17.00	2189.90	8810.30		22.8			7.00	19.90	9084.80	7.8571	22.8
		18.00	2209.60	8830.00		22.8			8.00	17.40	9082.30	7.0000	22.8
		19.00	2226.10	8848.50		22.8			9.00	17.40	9082.30	6.3333	22.8
		20.00	2242.00	8862.40		22.8			10.00	18.70	9084.60	5.8000	22.8
		21.00	2252.40	8872.80		22.8			11.00	27.80	9092.70	5.3636	22.8
		22.00	2266.30	8886.70		22.8			12.00	26.60	9091.50	5.0000	22.8
		23.00	2276.70	8897.10		22.8			13.00	34.70	9099.60	4.6923	22.8
		24.00	2286.30	8906.70		22.8			14.00	39.40	9104.30	4.4286	22.8
		25.00	2297.50	8917.90		22.8			15.00	41.70	9108.60	4.2000	22.8
		26.00	2307.60	8928.30		22.8			16.00	39.40	9104.30	4.0000	22.8
		27.00	2316.00	8936.40		22.8			17.00	40.50	9105.40	3.8235	22.8
		28.00	2326.60	8948.20		22.8			18.00	41.70	9108.60	3.6857	22.8
		29.00	2339.20	8959.60		22.8			19.00	44.00	9108.90	3.5263	22.8
		30.00	2348.10	8968.60		22.8			20.00	46.30	9111.20	3.4000	22.8
		31.00	2353.10	8973.50		22.8			21.00	48.60	9113.50	3.2857	22.8
		32.00	2360.00	8980.40		22.8			22.00	54.40	9119.30	3.1818	22.8
		33.00	2368.10	8988.50		22.8			23.00	54.40	9119.30	3.0670	22.8
		34.00	2376.20	8996.60		22.8			24.00	56.70	9121.60	3.0000	22.8
		35.00	2383.20	9003.60		22.8							



Drill Stem Testing - Time / Pressure Listing

Company: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

Job Ticket #: D2-09853 DST#: 3
Test Date: 08/08/2000 1740hrs

Well Name: DEER LAKE ET AL WA-1
Location: WA-1

Contact: STAN PODULSKY

Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abcissa (T+dt)/dt	Temp. (°C)	Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abcissa (T+dt)/dt	Temp. (°C)
		25.00	60.20	9125.10	2.9200	22.8			62.00	113.40	9178.30	1.7742	22.8
		26.00	63.70	9128.80	2.8462	22.8			63.00	119.20	9184.10	1.7619	22.8
		27.00	67.40	9132.30	2.7778	22.8			64.00	122.70	9187.60	1.7500	22.8
		28.00	67.40	9132.30	2.7143	22.8			65.00	126.20	9191.10	1.7385	22.8
		29.00	68.50	9133.40	2.6552	22.8			66.00	131.00	9195.90	1.7273	22.8
		30.00	68.20	9131.10	2.6000	22.8			67.00	131.00	9195.90	1.7164	22.8
		31.00	68.20	9131.10	2.5484	22.8			68.00	132.20	9197.10	1.7059	22.8
		32.00	67.40	9132.30	2.5000	22.8			69.00	133.10	9198.00	1.6957	22.8
		33.00	70.80	9135.50	2.4545	22.8			70.00	134.30	9199.20	1.6857	22.8
		34.00	71.80	9136.70	2.4118	22.8			71.00	135.40	9200.30	1.6761	22.8
		35.00	76.40	9141.30	2.3714	22.8			72.00	140.10	9205.00	1.6667	22.8
		36.00	76.70	9143.80	2.3333	22.8			73.00	138.90	9203.80	1.6575	22.8
		37.00	83.40	9148.30	2.2973	22.8			74.00	142.60	9207.90	1.6486	22.8
		38.00	85.80	9151.70	2.2632	22.8			75.00	143.70	9208.60	1.6400	22.8
		39.00	84.70	9149.80	2.2308	22.8			76.00	143.70	9208.60	1.6316	22.8
		40.00	84.70	9149.80	2.2000	22.8			77.00	147.20	9212.10	1.6234	22.8
		41.00	85.90	9150.80	2.1707	22.8			78.00	148.40	9213.30	1.6154	22.8
		42.00	88.00	9152.90	2.1429	22.8			79.00	148.40	9213.30	1.6076	22.8
		43.00	89.10	9154.00	2.1163	22.8			80.00	148.30	9214.20	1.6000	22.8
		44.00	92.80	9157.60	2.0909	22.8			81.00	151.80	9216.60	1.5928	22.8
		45.00	90.30	9155.20	2.0667	22.8			82.00	152.80	9217.70	1.5854	22.8
		46.00	85.70	9150.60	2.0435	22.8			83.00	155.10	9220.00	1.5783	22.8
		47.00	83.40	9148.30	2.0213	22.8			84.00	158.60	9223.50	1.5714	22.8
		48.00	84.50	9149.40	2.0000	22.8			85.00	158.30	9221.20	1.5647	22.8
		49.00	88.80	9151.70	1.9798	22.8			86.00	148.20	9213.10	1.5581	22.8
		50.00	88.00	9152.90	1.9600	22.8			87.00	145.90	9210.80	1.5517	22.8
		51.00	90.30	9155.20	1.9412	22.8			88.00	147.00	9211.90	1.5485	22.8
		52.00	95.10	9161.00	1.9231	22.8			89.00	152.80	9217.70	1.5393	22.8
		53.00	97.20	9162.10	1.9067	22.8			90.00	155.10	9220.00	1.5333	22.8
		54.00	98.80	9164.70	1.8889	22.8			91.00	154.00	9218.90	1.5275	22.8
		55.00	100.90	9165.80	1.8727	22.8			92.00	158.60	9223.50	1.5217	22.8
		56.00	100.90	9165.80	1.8571	22.8			93.00	157.40	9222.30	1.5161	22.8
		57.00	104.20	9169.10	1.8421	22.8			94.00	162.10	9227.00	1.5106	22.8
		58.00	106.50	9171.40	1.8276	22.8			95.00	166.70	9231.60	1.5053	22.8
		59.00	110.00	9174.90	1.8136	22.8			96.00	167.80	9232.70	1.5000	22.8
		60.00	111.10	9176.00	1.8000	22.8			97.00	175.90	9240.80	1.4948	22.8
		61.00	115.80	9180.70	1.7869	22.8			98.00	177.10	9242.00	1.4898	22.8



Drill Stem Testing - Time / Pressure Listing

Company: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

Job Ticket #: D2-08653

DST#: 3

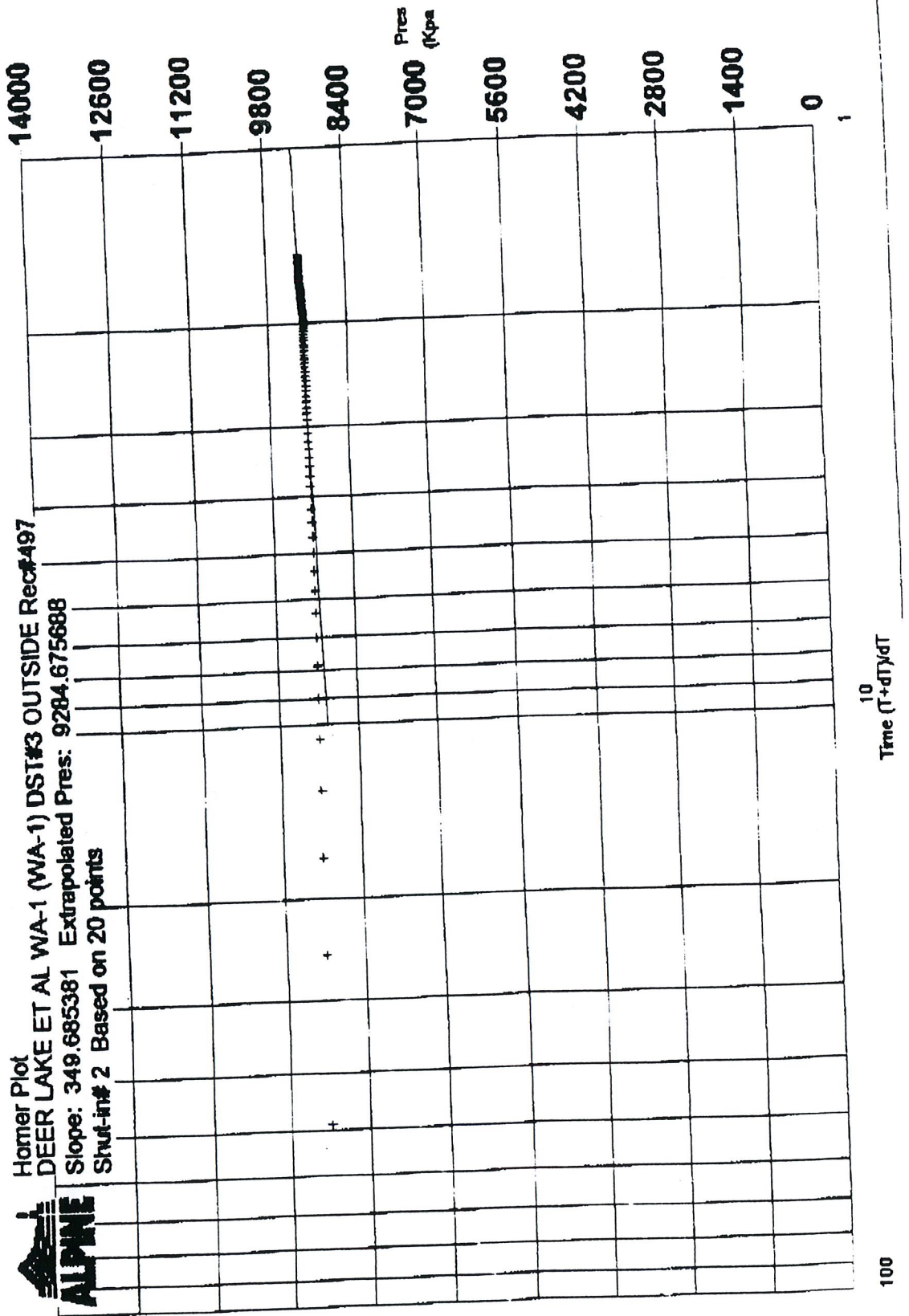
Test Date: 08/08/2000 1740hrs

Well Name: DEER LAKE ET AL WA-1

Location: WA-1

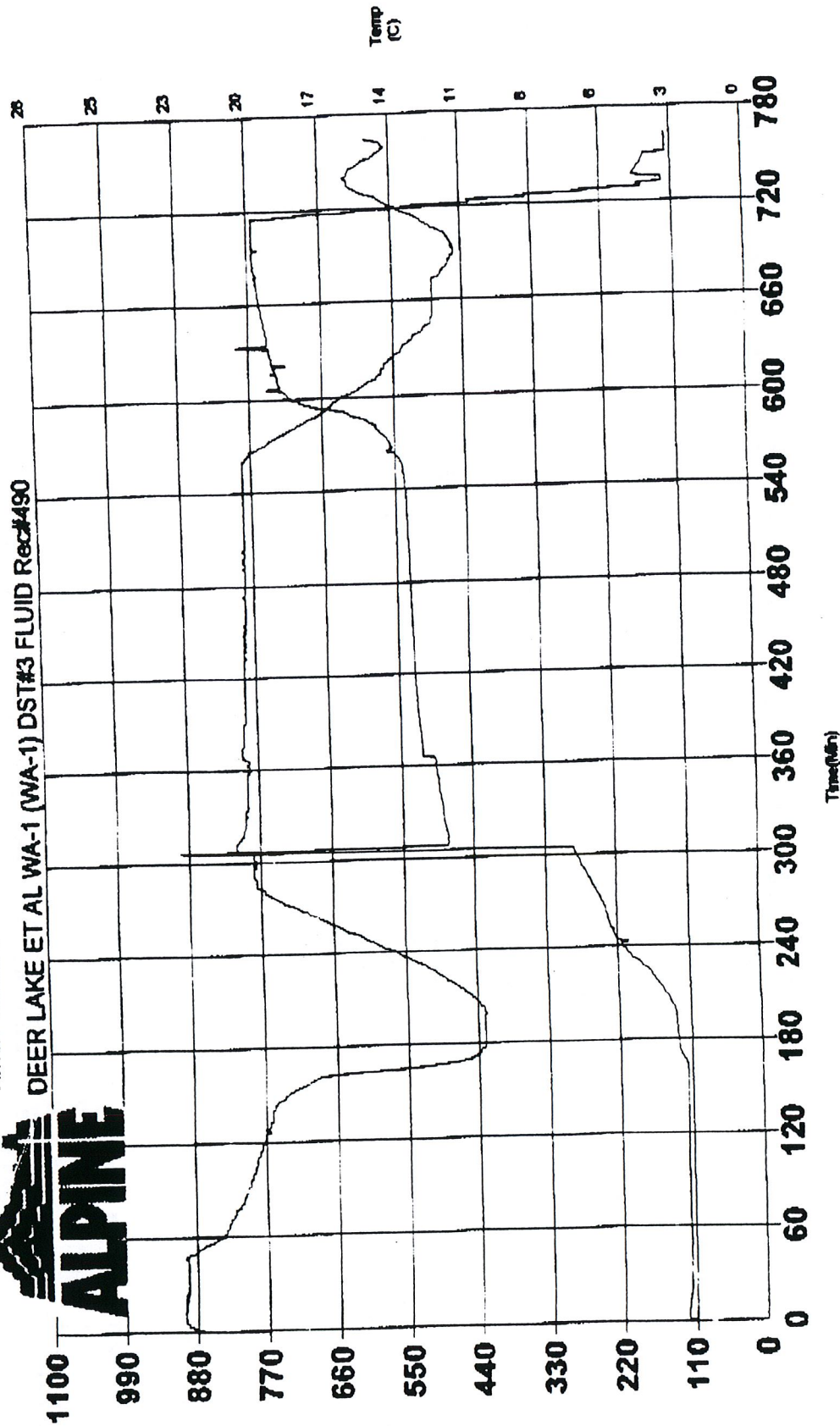
Contact: STAN PODULSKY

Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abcissas (Feet)/ft	Temp. (°C)
		99.00	179.40	9244.30	1.4848	22.8
		100.00	182.90	9247.80	1.4800	22.8
		101.00	181.70	9246.80	1.4752	22.8
		102.00	185.20	9250.10	1.4705	22.8
		103.00	188.70	9253.60	1.4660	22.8
		104.00	192.20	9257.10	1.4615	22.8
		105.00	193.30	9258.20	1.4571	22.8
		106.00	197.90	9262.80	1.4528	22.8
		107.00	201.40	9266.30	1.4485	22.8
		108.00	202.60	9267.50	1.4444	22.8
		109.00	204.90	9269.80	1.4404	22.8
		110.00	207.20	9272.10	1.4364	22.8
		111.00	207.20	9272.10	1.4324	22.8
		112.00	210.70	9275.60	1.4288	22.8
		113.00	214.10	9279.00	1.4248	22.8
		114.00	211.80	9276.70	1.4211	22.8
		115.00	215.50	9280.40	1.4174	22.8
		116.00	215.50	9280.40	1.4138	22.8
		117.00	215.50	9280.40	1.4103	22.8
		118.00	216.60	9281.50	1.4066	22.8
		119.00	217.60	9282.50	1.4034	22.8
		120.00	218.80	9283.70	1.4000	22.8
		121.00	221.10	9288.00	1.3957	22.8
		122.00	224.60	9299.50	1.3934	22.8
		123.00	224.60	9299.50	1.3902	22.8
		124.00	229.20	9294.10	1.3871	22.8
		125.00	230.30	9295.20	1.3840	22.8
		126.00	235.20	9300.10	1.3810	22.8
		127.00	235.20	9300.10	1.3760	22.8
G	End of 2nd Shutin	128.00	236.30	9301.20	1.3750	22.8
Q	Final Hydrostatic	0.00	0.00	8838.30		22.8

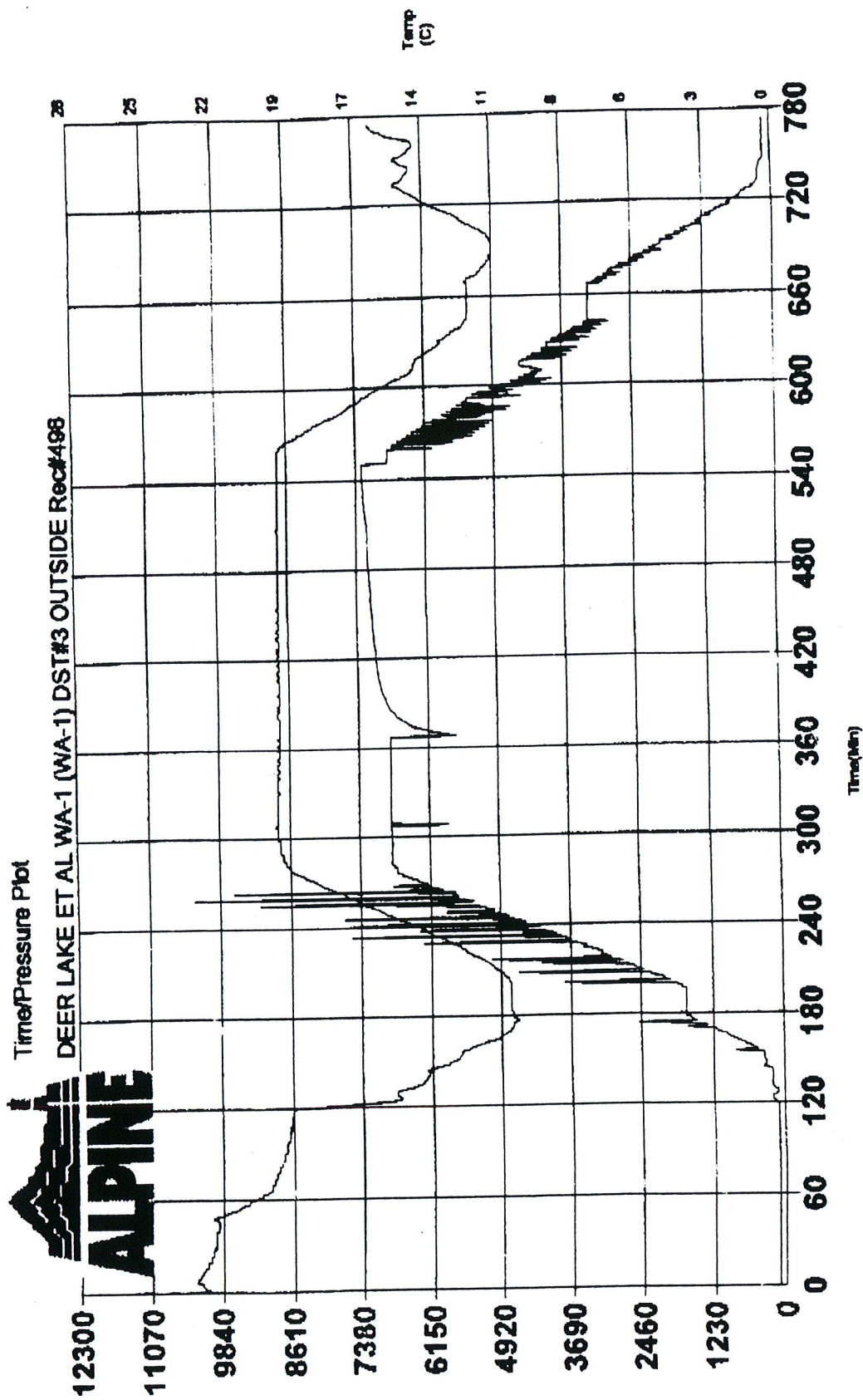


Time/Pressure Plot

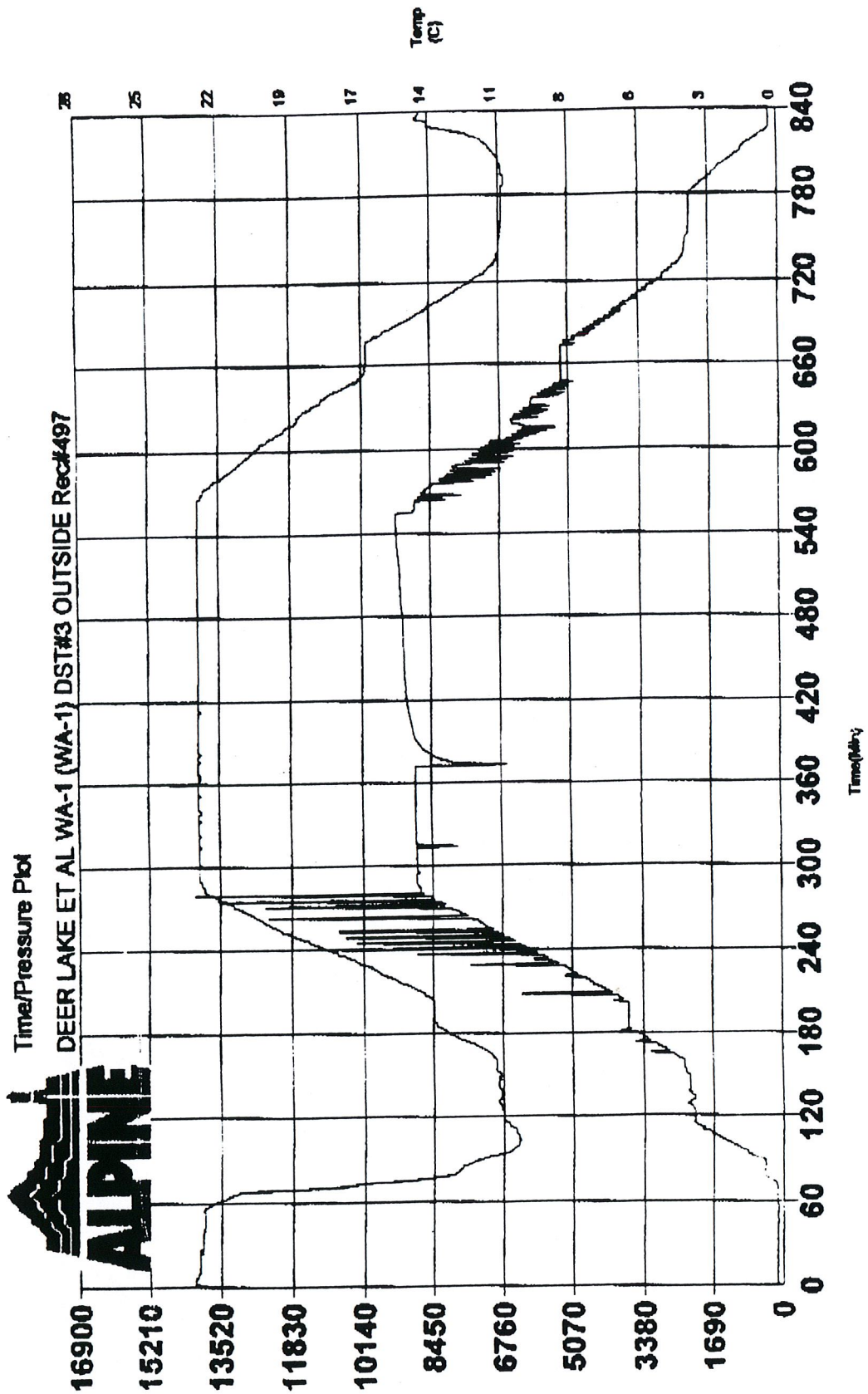
DEER LAKE ET AL WA-1 (WA-1) DST#3 FLUID Rec#490



A Initial Hydrostatic - 261
E Start of 2nd Flow - 490
F End of 2nd Flow - 524
G End of 2nd Shutin - 532
Q Final Hydrostatic - 532



A Initial Hydraulic - 6736
 E Start of 2nd Flow - 5666
 F End of 2nd Flow - 7042
 G End of 2nd Shutin - 7271
 Q Final Hydraulic - 6815



A Initial Hydrostatic - 8627
E Start of 2nd Flow - 8620
F End of 2nd Flow - 8066
G End of 2nd Strain - 9301
Q Final Hydrostatic - 8838

DEER LAKE ET AL WA-1



Drill Stem Test Report

Prepared for: DEER LAKE OIL & GAS
C/O 225 Scarboro Ave. S.W.
CALGARY, AB

Well Name: DEER LAKE ET AL WA-1
Location: WA-1

Test Date: 12/01/2000

Job Ticket #: D2-08937 DST#: 4

WA-1

DST #4

**Drill Stem Testing - Gas Recovery Measurements**

Company: DEER LAKE OIL & GAS
C/O 225 Seabrook Ave. S.W.
CALGARY, AB

Job Ticket #: D2-00837
Test Date: 12/01/2000 300hrs

DST#: 4

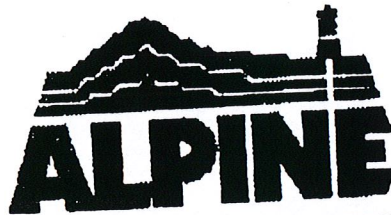
Well Name: DEER LAKE ET AL WA-1

Location: WA-1

Contact: STAN PODULSKY

Gas Measurements for Flow # 2 *BJ2*
Gas Recovery Measured With: Critical Flow

Time (min.)	Orifice (mm)	Pressure (kPa)	Rate (m ³ /d)
20	12.70	60	2935.00
25	12.70	40	2335.00
30	6.35	65	823.00
35	6.35	80	922.00
40	6.35	100	1061.00
45	6.35	115	1158.00
50	6.35	120	1188.00
55	6.35	120	1188.00
60	6.35	110	1128.00
65	6.35	105	1054.00
70	6.35	100	1061.00
75	6.35	90	995.00
80	6.35	80	922.00



Drill Stem Testing - Time / Pressure Listing

Company: DEER LAKE OIL & GAS
C/O 225 Bearbore Ave. S.W.
CALGARY, AB

Job Ticket #: D2-00987
Test Date: 12/01/2000 300hrs

DST#: 4

Well Name: DEER LAKE ET AL WA-1

Location: WA-1

Context: STAN PODULSKY

Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Absolent (T+d)/d	Temp. (°C)	Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Absolent (T+d)/d	Temp. (°C)
		68.00	9478.80	12180.30	1.1061	35.1			103.00	10132.40	12835.80	1.0880	34.7
		67.00	9801.60	12205.10	1.1048	35.1			104.00	10145.70	12849.20	1.0873	34.7
		66.00	9525.90	12229.40	1.1028	35.1	D	End of 1st Section	105.00	10157.80	12861.30	1.0867	34.7
		69.00	9549.70	12253.20	1.1014	35.1	E	Start of 2nd Flow	0.00	0.00	3104.50		33.8
		70.00	9873.40	12278.90	1.1000	35.1			1.00	-107.00	2997.80		33.9
		71.00	9898.00	12299.80	1.0989	35.1			2.00	-214.70	2889.80		33.9
		72.00	9818.70	12323.30	1.0972	35.0			3.00	-289.10	2835.40		34.0
		73.00	9841.70	12346.30	1.0958	35.0			4.00	-280.80	2823.80		34.0
		74.00	9883.70	12367.20	1.0948	35.0			5.00	-315.80	2788.80		34.0
		75.00	9885.10	12388.60	1.0933	35.0			6.00	-388.80	2737.60		34.0
		76.00	9704.70	12408.30	1.0921	35.0			7.00	-423.00	2681.80		34.1
		77.00	9728.20	12428.70	1.0908	35.0			8.00	-458.30	2648.20		34.1
		78.00	9745.80	12448.30	1.0897	35.0			9.00	-475.80	2628.90		34.1
		79.00	9783.20	12468.70	1.0886	35.0			10.00	-478.70	2624.80		34.1
		80.00	9783.40	12488.80	1.0878	35.0			11.00	-488.80	2617.80		34.1
		81.00	9800.80	12504.30	1.0864	35.0			12.00	-498.20	2608.50		34.2
		82.00	9819.30	12522.80	1.0854	35.0			13.00	-502.80	2601.70		34.1
		83.00	9836.70	12540.20	1.0843	34.9			14.00	-495.80	2608.80		34.1
		84.00	9854.00	12567.50	1.0833	35.0			15.00	-489.80	2604.80		34.2
		85.00	9871.40	12574.80	1.0824	35.0			16.00	-487.60	2608.80		34.1
		86.00	9887.80	12591.10	1.0814	35.0			17.00	-487.50	2607.00		34.2
		87.00	9903.80	12607.30	1.0805	34.9			18.00	-512.70	2591.80		34.2
		88.00	9919.40	12622.80	1.0795	34.9			19.00	-524.80	2578.70		34.1
		89.00	9935.10	12638.80	1.0787	34.9			20.00	-513.80	2590.70		34.2
		90.00	9950.70	12654.20	1.0778	34.9			21.00	-510.80	2593.80		34.1
		91.00	9965.70	12669.20	1.0769	34.9			22.00	-507.80	2597.00		34.1
		92.00	9981.30	12684.80	1.0761	34.9			23.00	-475.10	2628.40		34.1
		93.00	9996.40	12699.80	1.0753	34.9			24.00	-421.80	2682.70		34.1
		94.00	10011.40	12714.80	1.0745	34.7			25.00	-395.80	2708.70		34.1
		95.00	10025.90	12729.40	1.0737	34.7			26.00	-383.40	2741.10		34.2
		96.00	10038.80	12742.10	1.0728	34.9			27.00	-343.70	2780.80		34.1
		97.00	10052.80	12756.00	1.0722	34.7			28.00	-314.80	2789.70		34.1
		98.00	10067.80	12771.10	1.0714	34.7			29.00	-288.60	2805.80		34.1
		99.00	10081.80	12785.00	1.0707	34.7			30.00	-288.70	2815.80		34.1
		100.00	10094.20	12797.70	1.0700	34.7			31.00	-280.80	2823.80		34.1
		101.00	10108.80	12810.40	1.0693	34.7			32.00	-288.70	2837.80		34.2
		102.00	10120.20	12823.70	1.0686	34.7			33.00	-255.20	2849.30		34.1



Drill Stem Testing - Time / Pressure Listing

Company: DEER LAKE OIL & GAS
C/O 225 Searborn Ave. S.W.
CALGARY, AB

Job Ticket #: D2-08837
Test Date: 12/01/2000 300hrs

DST#: 4

Well Name: DEER LAKE ET AL WA-1

Location: WA-1

Contact: STAN PODULSKY

Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abscissa (T+d)/kt	Temp. (°C)	Chart Label	Comments	Time (Min.)	Delta P (KPag)	Pressure (KPag)	Abscissa (T+d)/kt	Temp. (°C)
		34.00	-282.30	2882.20		34.1			71.00	-57.80	3048.70		34.1
		35.00	-243.80	2880.80		34.1			72.00	-51.80	3063.00		34.1
		36.00	-237.20	2887.90		34.1			73.00	-41.10	3083.40		34.1
		37.00	-226.70	2878.80		34.1			74.00	-33.80	3071.00		34.1
		38.00	-217.80	2886.80		34.1			75.00	-30.80	3073.90		34.1
		39.00	-208.30	2888.20		34.1			76.00	-23.10	3081.40		34.1
		40.00	-208.60	2887.80		34.1			77.00	-11.60	3082.80		34.1
		41.00	-187.30	2887.20		34.1			78.00	-4.00	3100.80		34.1
		42.00	-188.20	2818.30		34.1			79.00	2.90	3108.80		34.1
		43.00	-181.10	2823.40		34.1			80.00	8.10	3112.80		34.1
		44.00	-178.80	2828.80		34.1	F	End of 2nd Flow	81.00	8.10	3112.80		34.1
		45.00	-188.40	2838.10		34.1			1.00	341.40	3484.00	88.0000	34.1
		46.00	-184.80	2838.80		34.1			2.00	782.80	3885.50	45.0000	34.1
		47.00	-183.20	2841.30		34.1			3.00	1115.10	4227.70	30.3333	34.2
		48.00	-148.80	2854.80		34.1			4.00	1380.80	4603.10	23.0000	34.3
		49.00	-145.80	2888.70		34.1			5.00	1823.20	4736.80	18.8000	34.3
		50.00	-142.30	2882.20		34.1			6.00	1838.40	4851.00	15.8887	34.4
		51.00	-140.00	2884.50		34.1			7.00	2026.30	5137.80	13.6714	34.4
		52.00	-141.20	2883.30		34.1			8.00	2188.40	5311.00	12.0000	34.5
		53.00	-135.40	2888.10		34.1			9.00	2382.10	5474.70	10.7778	34.5
		54.00	-130.80	2873.70		34.1			10.00	2616.80	5828.20	9.8000	34.6
		55.00	-125.50	2878.00		34.1			11.00	2863.20	6785.80	9.0000	34.6
		56.00	-118.20	2886.30		34.1			12.00	2786.10	6887.70	8.3333	34.8
		57.00	-113.40	2881.10		34.1			13.00	2805.80	6018.10	7.7882	34.8
		58.00	-108.20	2886.30		34.1			14.00	3022.40	8135.00	7.2857	34.7
		59.00	-104.70	2889.80		34.1			15.00	3137.50	8230.10	6.8887	34.7
		60.00	-101.20	3003.30		34.1			16.00	3241.70	8354.30	6.5000	34.7
		61.00	-88.80	3005.00		34.1			17.00	3344.70	8487.30	6.1786	34.7
		62.00	-84.30	3010.20		34.1			18.00	3450.80	8863.20	5.8889	34.8
		63.00	-84.80	3019.70		34.1			19.00	3854.20	8888.80	5.6316	34.8
		64.00	-84.80	3019.70		34.1			20.00	3883.10	8786.70	5.4000	34.9
		65.00	-84.20	3020.30		34.1			21.00	3744.00	8850.60	5.1806	34.9
		66.00	-78.10	3028.40		34.1			22.00	3834.80	8847.40	5.0000	35.0
		67.00	-72.30	3032.20		34.1			23.00	3918.70	7031.30	4.8281	35.0
		68.00	-70.00	3034.50		34.1			24.00	3888.30	7108.90	4.6887	35.0
		69.00	-65.40	3038.10		34.1			25.00	4075.00	7187.60	4.5200	35.0
		70.00	-59.80	3044.80		34.1			26.00	4151.80	7284.80	4.3848	35.0



Drill Stem Testing - Time / Pressure Listing

Company: DEER LAKE OIL & GAS
C/O 225 Searborn Ave. S.W.
CALGARY, AB

Job Ticket #: D2-08837

DST#: 4

Test Date: 12/01/2000 300hrs

Well Name: DEER LAKE ET AL WA-1

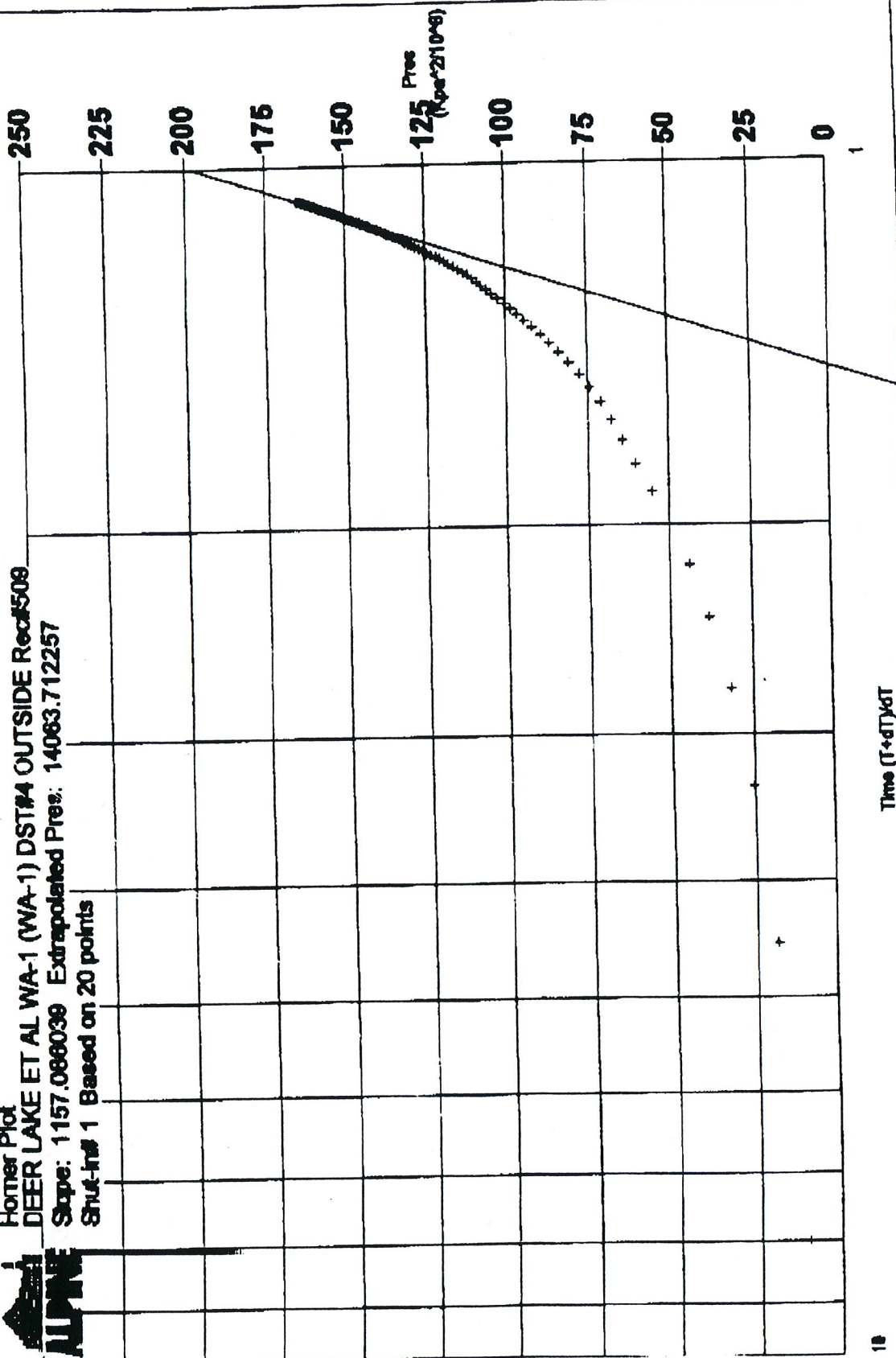
Location: WA-1

Contact: STAN PODULSKY

Chart Label	Comments	Time (Min.)	Data P (KPa)	Pressure (KPa)	Absolutes (T+dPa)	Temp. (°C)
		175.00	8272.80	11386.20	1.8029	34.5
		176.00	8283.00	11396.80	1.8000	34.5
		177.00	8282.80	11405.40	1.4972	34.5
		178.00	8303.20	11416.80	1.4944	34.5
		179.00	8313.10	11426.70	1.4916	34.5
		180.00	8321.80	11434.40	1.4888	34.5
		181.00	8332.20	11444.80	1.4862	34.5
		182.00	8342.80	11455.20	1.4835	34.5
		183.00	8351.80	11464.50	1.4808	34.5
		184.00	8361.70	11474.80	1.4783	34.5
		185.00	8370.80	11483.80	1.4757	34.5
		186.00	8380.80	11493.40	1.4731	34.5
		187.00	8380.00	11502.80	1.4706	34.5
		188.00	8388.70	11511.30	1.4681	34.5
Q	End of 2nd Strain	188.00	8408.00	11520.80	1.4656	34.5
Q	Final Hydrostatic	0.00	0.00	14881.80		33.9

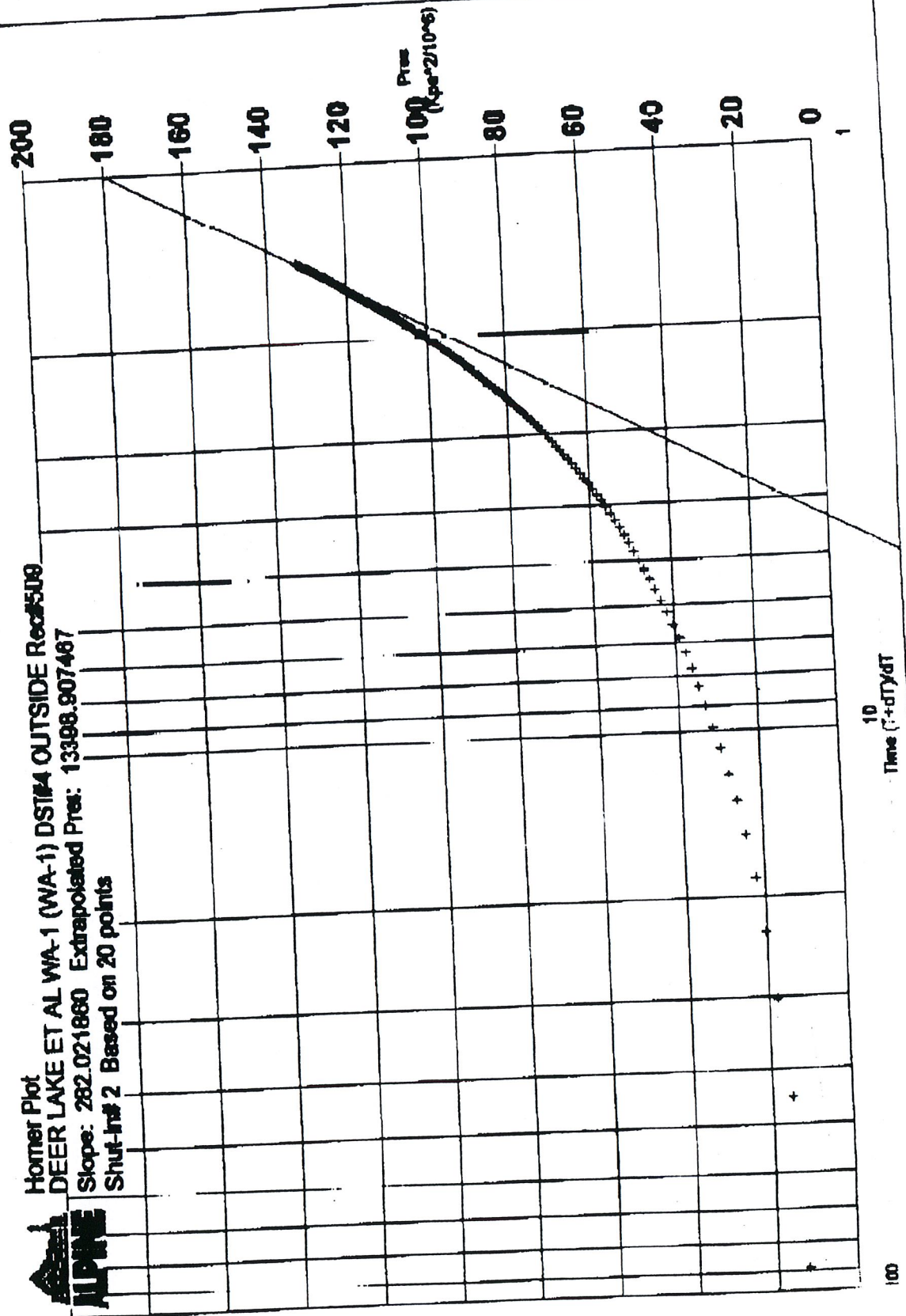
Homer Plot
DEER LAKE ET AL WA-1 (WA-1) DST#4 OUTSIDE Rec#508
Slope: 1157.086039 Extrapolated Pres: 14063.712257
Shut-in# 1 Based on 20 points

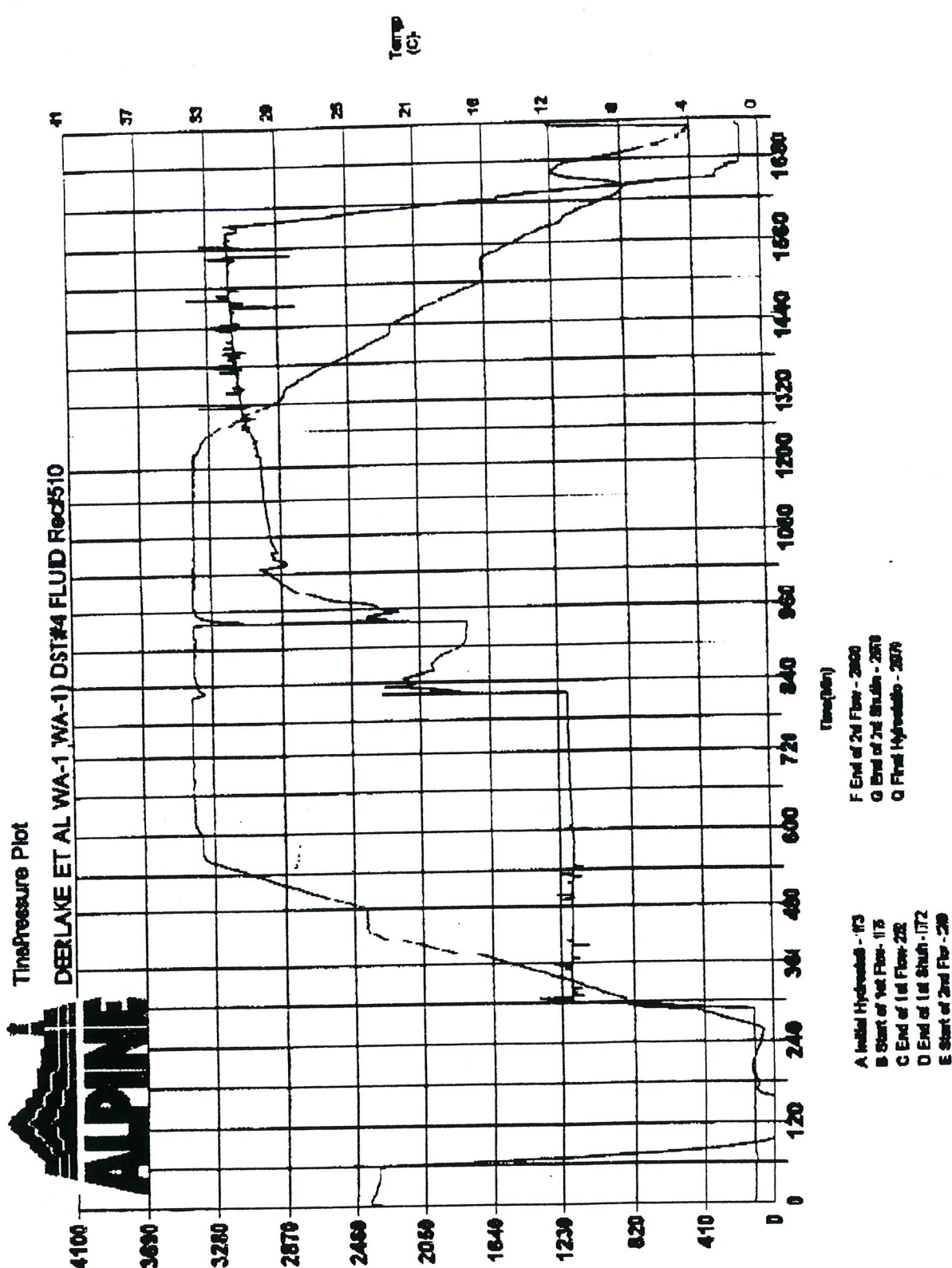
ALPINE





Horner Plot
DEER LAKE ET AL WA-1 (WA-1) DST#4 OUTSIDE RECD508
Slope: 282.021860 Extrapolated Pres: 13398.907467
Shut-In# 2 Based on 20 points



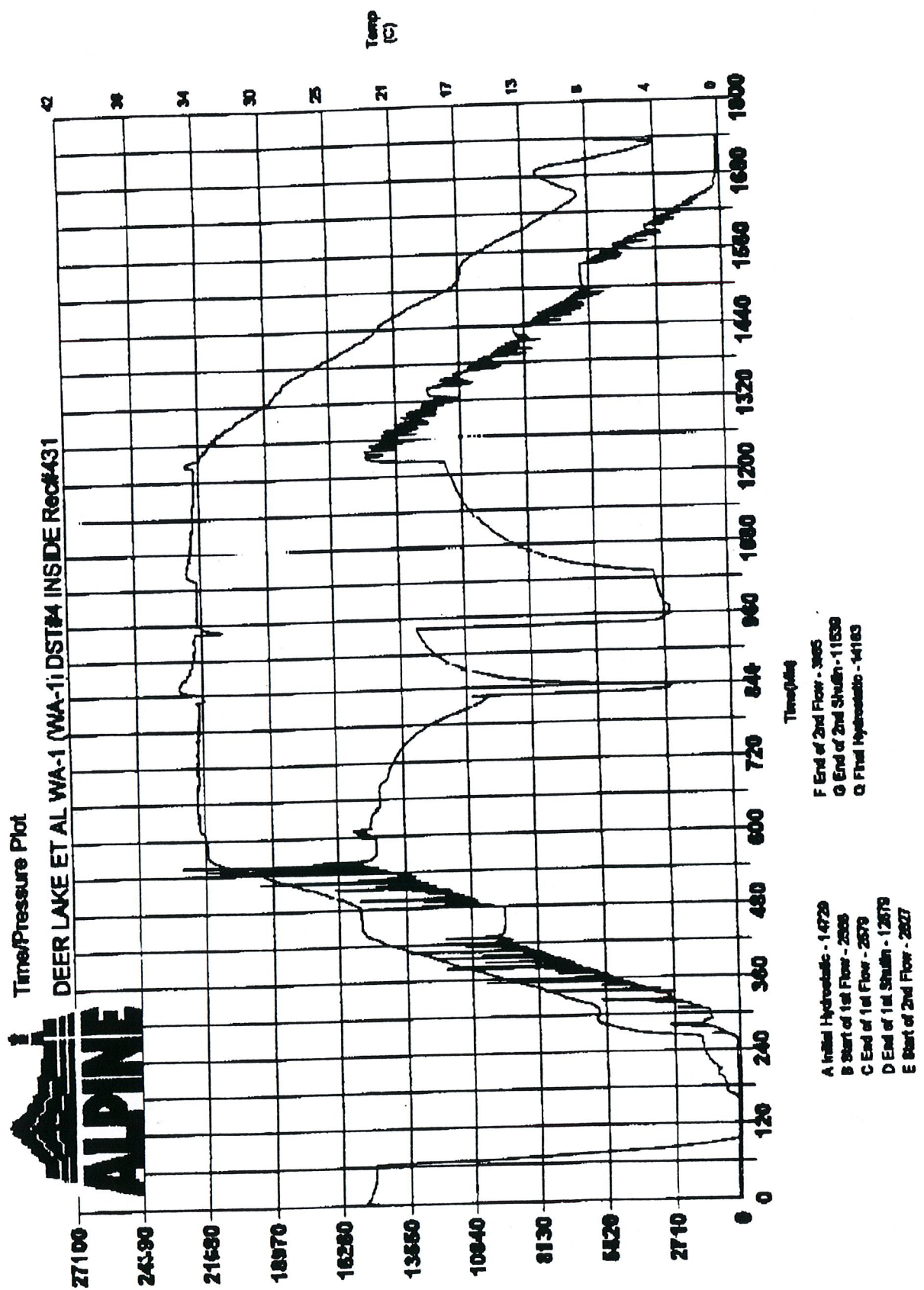


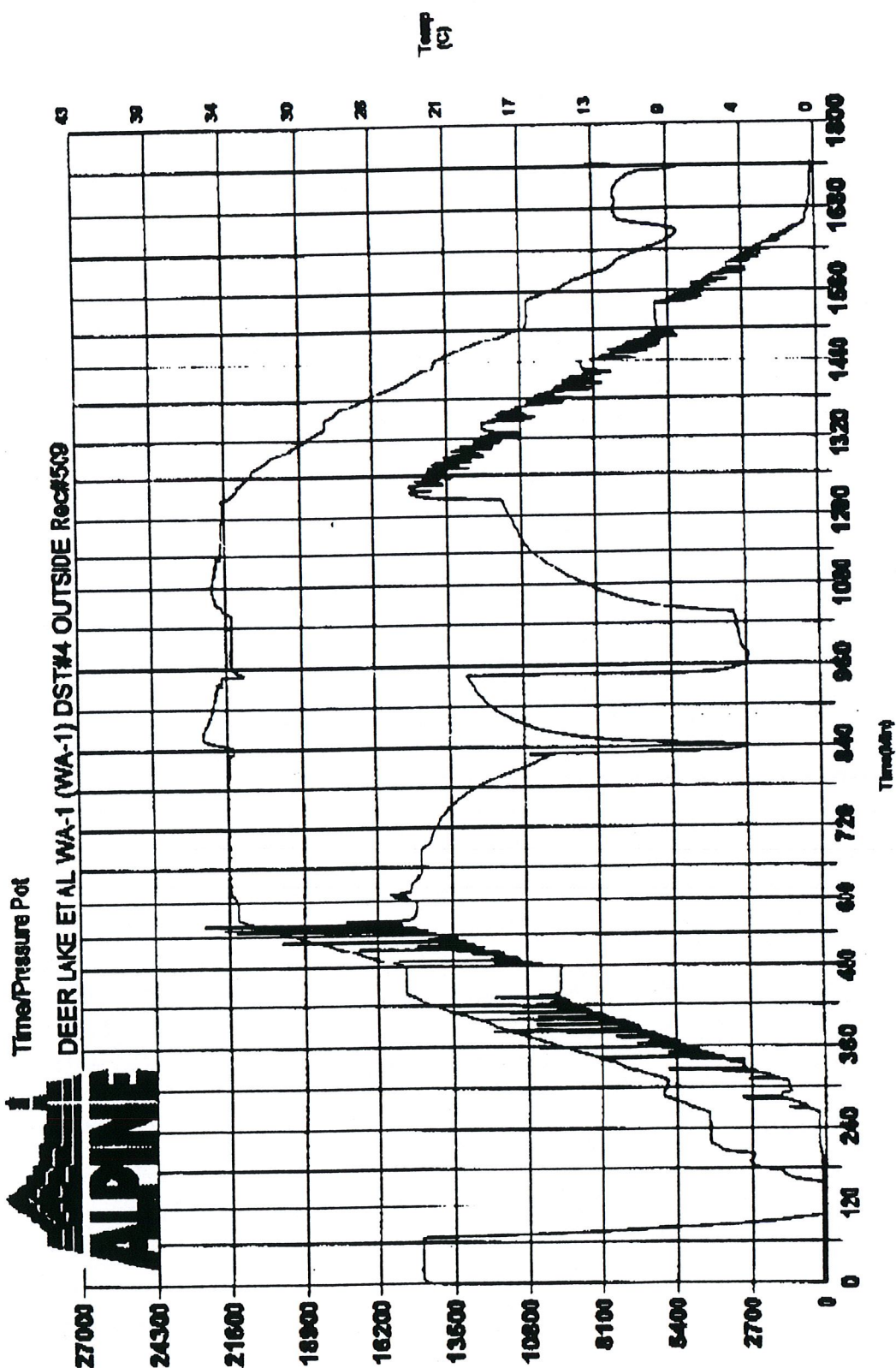
Phone: 709-579-5050 Fax: 709-579-5096

P. O. Box 5580, St. John's
Newfoundland A1C 5W4

Windland Petroleum Inc.







F End of 2nd Flow - 3113
 G End of 2nd Shutin - 11521
 Q Final Hydrostatic - 14882

A Initial Hydrostatic - 14859
 B Start of 1st Flow - 3140
 C End of 1st Flow - 2704
 D End of 1st Shutin - 12881
 E Start of 2nd Flow - 3106

Numerical Value of Constants
in Order of Appearance
($c_1, c_2, c_3 \dots$)

CUSTOMARY

SI

EQUATION

$\frac{\partial^2 p}{\partial r^2} + \frac{1}{r} \frac{\partial p}{\partial r} = \frac{\phi \mu c}{c_1 k} \frac{\partial p}{\partial t}$	0.00264	3.557×10^{-6}
$\Delta p_s = c_1 \frac{q B \mu}{k h} \left(\frac{k}{k_s} - 1 \right) \ln \left(\frac{r_s}{r_w} \right)$	141.2	1.866×10^3
$p_i - p_{wf} = c_1 \frac{q B \mu}{k h} \left \ln \left(\frac{c_2 \phi \mu c_t r_w^2}{k t} \right) - 2s \right $	70.6 1,688	9.33×10^2 1.253×10^5
$\bar{p} - p_{wf} = c_1 \frac{q B \mu}{k h} \left \ln \left(\frac{r_e}{r_w} \right) - \frac{3}{4} + s \right $	141.2	1.866×10^3
$p_i - p_{wf} = c_1 \frac{q B \mu}{k h} \left \frac{c_2 k t}{\phi \mu c_t r_e^2} + \ln \left(\frac{r_e}{r_w} \right) - \frac{3}{4} + s \right $	141.2 0.000527	1.886×10^3 7.1×10^{-6}
$J = \frac{q}{\bar{p} - p_{wf}} = \frac{k_j h}{c_1 B \mu \left \ln \left(\frac{r_e}{r_w} \right) - \frac{3}{4} + s \right }$	141.2	1.866×10^3
$\bar{p} - p_{wf} = c_1 \frac{q B \mu}{k h} \left \frac{1}{2} \ln \left(\frac{10.06 A}{C_A r_w^2} \right) - \frac{3}{4} + s \right $	141.2	1.866×10^3
$p_D = \frac{c_1 k h (p_i - p_w)}{q_i B \mu}$	0.00708	5.356×10^{-4}
$r_i = \left(\frac{k t}{c_1 \phi \mu c_t} \right)^{1/2}$	948	7.036×10^4
$t_p = c_1 N_p / q_{last}$	24	24



SERVIPETROL LTD.
International Petroleum Consultants



Numerical Value of Constants
in Order of Appearance
($c_1, c_2, c_3 \dots$)

CUSTOMARY

SI

EQUATION

$$s' = s + Dq_g - 1.151 \left| \frac{(p_{1hr} - p_{wf})}{m} - \log \left(\frac{k}{\phi \mu_i c_{ti} r_w^2} \right) + c_1 \right|$$

3.23 2.10

$$\lambda_t = \frac{k_o}{\mu_o} + \frac{k_w}{\mu_w} + \frac{k_g}{\mu_g}$$

- -

$$k_o = c_1 \frac{q_o B_o \mu_o}{mh}$$

162.6 2.149x10³

$$k_g = c_1 \frac{(q_g - \frac{q_o R_s}{c_2}) B_g \mu_g}{mh}$$

162.2 2.149
1,000 1.000

$$k_w = c_1 \frac{q_w B_w \mu_w}{mh}$$

162.6 2.149x10³

$$s = 1.151 \left| \frac{p_{1hr} - p_{wf}}{m} - \log \left(\frac{\lambda_t}{\phi c_t r_w^2} \right) + c_1 \right|$$

3.23 5.10

$$t_D = \frac{c_1 k t}{\phi \mu_i c_{gi} r_w^2}$$

0.000264 3.557x10⁻³

$$\psi_D = \frac{khT_{sc} [\psi(p_i) - \psi(p_{wf})]}{c_1 p_{sc} q_g T}$$

50,300 3.733



SERVIPETROL LTD.
International Petroleum Consultants



Numerical Value of Constants
in Order of Appearance
(C₁, C₂, C₃...)

CUSTOMARY SI

EQUATION

$$p_D = \frac{kh (p_i - p_{wf})}{c_1 q_g \mu_i B_{gi}}$$

141.2

1.866

$$\psi(p_{wf}) - \psi(\bar{p}) - c_1 \frac{p_{sc}}{T_{sc}} \frac{q_g T}{kh} \left| 1.151 \log \left(c_2 \phi \mu_{\bar{p}} \frac{c_{tp} r_w^2}{kt} \right) \right.$$

50,300

3.733

$$-(s + D |q_g|) \left| \right.$$

1,688

125.3

$$p_{wf}^2 - \bar{p}^2 + c_1 q_g \mu_{\bar{p}} z_{\bar{p}g} \frac{T}{kh} \left| \log \left(\frac{c_2 \phi \mu_{\bar{p}} c_{tp}}{kt_p} \right) - \frac{s + D [q_g]}{1.151} \right|$$

1,637

1.508

1,688

11.638

$$\bar{p}^2 - p_{wf}^2 = a q_g + b q_g^2$$

-

-

$$a = c_1 \frac{\mu_{\bar{p}} z_{\bar{p}g} T}{kh^2} \left| \ln \left(\frac{r_e}{r_w} \right) - 0.75 + s \right|$$

1,422

1.309

$$b = c_1 \frac{\mu_{\bar{p}} z_{\bar{p}g} T}{kh} D$$

1,422

1.309



SERVIPETROL LTD.
International Petroleum Consultants



Numerical Value of Constants
in Order of Appearance
(C₁, C₂, C₃...)

<u>EQUATION</u>	<u>CUSTOMARY</u>	<u>SI</u>
$q_g = C (\bar{p}^2 - p_{wf}^2)^n$	-	-
$\bar{p}^2 - p_{wf}^2 = a_t q_g + b q_g^2$	-	-
$a_t = c_1 \frac{\mu_{\bar{p}} z_{\bar{p}g} T}{kh} \left \frac{1}{2} \ln \left(\frac{kt}{c_2 \phi \mu_{\bar{p}} c_{cp} r_w^2} \right) + s \right $	1,422 1,688	1.309 125.3
$c_t = S_o c_o + S_w c_w + S_g c_g + c_f$	-	-
$\omega = S_f / (S_f + S_m)$	-	-
$\lambda = \alpha \frac{k_m}{k_2} r_w^2$	-	-

For equations used in the evaluation of horizontal wells please refer to the paper "Transient Pressure Analysis of Horizontal Wells in Anisotropic Naturally Fractured Reservoirs," by Roberto Aguilera and Michael C. Ng, SPE Formation Evaluation (March 1991) 95-100.



SERVIPETROL LTD.
International Petroleum Consultants



NOMENCLATURE

- $a = 1,422 \frac{\mu_p \bar{z}_{pg} T}{kh} \left[\ln \left(\frac{r_e}{r_w} \right) - 0.75 + s \right]$
 A = drainage area of well, sq ft (m^2)
 A_f = fracture area, sq ft (m^2)
 A_R = reservoir area, acres (m^2)
 A_{wb} = wellbore area, sq ft (m^2)
- $b = 1,422 \frac{\mu_p \bar{z}_{pg} TD}{kh}$
 b' = intercept of $(p_i - p_{wf})/q_n$ plot, psi/STB-D ($kPa/m^3/d$)
 B = formation volume factor, res vol/surface vol
 B_g = gas formation volume factor, RB/Mscf
 B_{gi} = gas formation volume factor evaluated at p_i , RB/Mscf (m^3/m^3)
 B_o = oil formation volume factor, RB/STB (m^3/m^3)
 B_w = water formation volume factor, RB/STB (m^3/m^3)
 c = compressibility, psi^{-1} (kPa^{-1})
 c_f = formation compressibility, psi^{-1} (kPa^{-1}). It also refers to fracture compressibility in the case of naturally fractured reservoirs.
 c_g = gas compressibility, psi^{-1} (kPa^{-1})
 c_{gi} = gas compressibility, evaluated at original reservoir pressure, psi^{-1} (kPa^{-1})
 c_{gw} = compressibility of gas in wellbore, psi^{-1} (kPa^{-1})
 c_o = oil compressibility, psi^{-1} , (kPa^{-1})



C_{pr} = pseudoreduced compressibility

C_t = $S_o c_o + S_w c_w + S_g c_g + c_f$ = total compressibility, psi^{-1} (kPa^{-1})

C_{ti} = total compressibility evaluated at p_i , psi^{-1} (kPa^{-1})

C_{tp} = total compressibility evaluated at \bar{p} , psi^{-1} (kPa^{-1})

C_w = water compressibility, psi^{-1} (kPa^{-1})

C_{wb} = compressibility of liquid in wellbore, psi^{-1} (kPa^{-1})

C_{wp} = compressibility of pure (gas-free) water, psi^{-1} (kPa^{-1})

C = performance coefficient in gas-well deliverability equation

C_A = shape constant or factor

C_s = wellbore storage constant, bbl/psi (m^3/kPa)

C_{SD}, C_D = $0.894 C_s / \phi c_t \text{ hr}_w^2$ = dimensionless wellbore storage constant

D = non-Darcy flow constant, D/Mscf (d/m^3)

E = flow efficiency, dimensionless

$Ei(-x)$ = $-\int_x^\infty (e^{-u/u}) du$
= the exponential integral

F' = $\Delta t_p / \Delta t_c$ = ratio of pulse length to cycle length

g = acceleration of gravity, ft/sec^2 (m/s^2)

g_c = gravitational units conversion factor, 32.17
($\text{lbm/ft} / (\text{lbf-s}^2)$), dimensionless

h = net formation thickness, ft (m)

h_{\max} = maximum distance between natural fractures, ft (m)

h_{\min} = minimum distance between natural fractures, ft (m)

H_x = reservoir width, ft (m)

H_y = reservoir length, ft (m)



H_s = standoff height, ft (m)
 J = productivity index, STB/D-psi ($m^3/d.kPa$)
 J_{actual} = actual or observed well productivity index, STB/D-psi ($m^3/d.kPa$)
 J_{ideal} = productivity index with permeability unaltered to sandface, STB/D-psi ($m^3/d.kPa$)
 J_g = gas-well productivity index, Mcf/D-psi ($m^3/d.kPa$)
 J_1 = Bessel function
 k = reservoir rock permeability, md
 k_f = formation permeability (McKinley method), md
 k_g = permeability to gas, md
 k_H = horizontal permeability
 k_J = reservoir rock permeability (based on PI test), md
 k_o = permeability to oil, md
 k_s = permeability of altered zone (skin effect), md
 k_x, k_y = horizontal permeabilities of anisotropic systems, md
 k_v, k_z = vertical permeability, md
 k_w = permeability to water, md
 k_{wb} = near-well effective permeability (McKinley method), md
 k_2 = fracture permeability, md
 L = distance from well to no-flow boundary, ft (m), also
 L = length of horizontal well, ft (m)
 L_e = effective length of horizontal well, ft (m)
 L_f = length of one wing of vertical fracture, ft (m)
 m = $162.6 B\mu/kh$ = absolute value of slope of middle time line, psi/cycle (kPa.cycle)



- m' = $162.6 B\mu/kh$ = slope of drawdown curve with $(p_i - p_{wf})/q$ as abscissa, psi/STB/D-cycle (kPa/m³/d.cycle)
- m'' = slope of p_{ws}^2 or p_{wf}^2 plot for gas well, psia²/cycle (kPa.cycle)
- m_L = slope of linear flow graph, psi/hr^{1/2} (kPa.h^{1/2})
- m_{max} = maximum slope on buildup curve of fractured well, psi/cycle (kPa.cycle)
- m_{true} = true slope on buildup curve uninfluenced by fracture, psi/cycle (kPa.cycle)
- M = molecular weight of gas
- n = inverse slope of empirical gas-well deliverability curve
- p = pressure, psi (kPa)
- \bar{p} = volumetric average or static drainage-area pressure, psi (kPa)
- p^* = MTR pressure trend extrapolated to infinite shut-in time, psi (kPa)
- p_b = bubble point pressure, psi (kPa)
- p_D = $0.00708 kh(p_i - p)/qB\mu$ = dimensionless pressure as defined for constant-rate problems
- p_{DMBH} = $2.303(p^* - p)/m$, dimensionless
- p_i = original reservoir pressure, psi (kPa)
- p_{MT} = pressure on extrapolated MTR, psi (kPa)
- p_o = arbitrary reference pressure, psia (kPa)
- p_{pc} = pseudocritical pressure, psia (kPa)
- p_{pr} = pseudoreduced pressure
- p_r = pressure at radius r , psi (kPa)



- p_{sc} = standard-condition pressure, psia (kPa) (frequently, 14.7 psia)
- p_{wf} = flowing BHP, psi (kPa)
- p_{ws} = shut-in BHP, psi (kPa)
- $p_{1\text{ hr}}$ = pressure at 1-hour shut-in (or flow) time on middle-time line (or its extrapolation), psi (kPa)
- q = flow rate, STB/D (m^3/d)
- q_D = dimensionless instantaneous flow rate at constant BHP
- q_g = gas flow rate, Mscf/D (m^3/d)
- q_{gt} = total gas flow rate from oil well, Mscf/D (m^3/d)
- q_o = oil flow rate, STB/D (m^3/d)
- q_w = water flow rate, STB/D (m^3/d)
- Q_p = cumulative production at constant BHP, STB (m^3/d)
- Q_{pD} =
$$\frac{BQ_p}{1.119\phi c_t h r_w^2 (p_i - p_{wf})}$$
- = dimensionless cumulative production
- R = universal gas constant
- R_s = dissolved GOR, scf gas/STB oil (m^3/m^3)
- R_{sw} = dissolved gas/water ratio, scf gas/STB water (m^3/m^3)
- R_{swp} = solubility of gas in pure (gas-free) water, scf gas/STB water (m^3/m^3)
- r = distance from center of wellbore, ft (m)
- r_{dt} = transient drainage radius, ft (m)
- r'_d = radius of drainage, ft (m)
- r_e = external drainage radius, ft (m)
- r_{eD} = r_e/r_w
- r_i = radius of investigation, ft (m)



r_s = radius of altered zone (skin effect), ft (m)
 r_w = wellbore radius, ft (m)
 r_{wa} = effective wellbore radius, ft (m)
 s = skin factor, dimensionless
 s' = $s + Dq_g$ = apparent skin factor from gas-well buildup test, dimensionless
 s^* = $\log(k/\phi\mu c_t r_w^2) - 3.23 + 0.869s$
 \bar{s} = $\log\left(\frac{k}{\phi\mu c_t r_w^2}\right) - 3.23 + 0.869s$
 S_f = fracture storage, ft/psi (m/kPa)
 S_g = gas saturation, fraction of pore volume
 S_m = matrix storage, ft/psi (m/kPa)
 S_o = oil saturation, fraction of pore volume
 S_w = water saturation, fraction of pore volume
 t = elapsed time, hours
 t_D = $0.000264 kt/\phi\mu c_t r_w^2$
 = dimensionless time
 t_{DA} = $0.00264 kt/\phi\mu c_t A$
 = dimensionless time based on drainage area, A
 t_{DLf} = $0.000264 kt/\phi\mu c_t L_f^2$
 = dimensionless time based on fracture half-length
 t_{end} = end of MTR in drawdown test, hours
 t_{ll} = time at which late-time region begins, hours
 = lag time in pulse test, hours
 t_p = cumulative production/most recent production rate
 = pseudoproducing time, hours
 t_{pss} = time required to achieve pseudosteady state, hours



t_s = time for well to stabilize, hours
 t_{wbs} = wellbore storage duration, hours
 T = reservoir temperature, °R (°K), also
 T = transmissibility, md-ft/cp (md-m/cp)
 T_{pc} = pseudocritical temperature, °R (°K)
 T_{pr} = pseudoreduced temperature
 T_{sc} = standard condition temperature, °R (°K) usually (520°R)
 u = flow rate per unit area (volumetric velocity), RB/D-sq ft
 $(m^3/d.m^2)$
 V_p = reservoir pore volume, cu ft (m^3)
 V_R = reservoir volume, bbl (m^3)
 V_w = wellbore volume, bbl (m^3)
 x = distance coordinate used in linear flow analysis, ft (m)
 Y_1 = Bessel function
 z = gas-law deviation factor, dimensionless
 z_i = gas-law deviation factor evaluated at pressure p_i ,
dimensionless
 z_{pg} = gas-law deviation factor evaluated at \bar{p} , dimensionless
 α_n = roots of equation $J_1(\alpha_n)Y_1(\alpha_n r_{eD}) - J_1(\alpha_n)Y_1(\alpha_n r_{eD}) = 0$
 γ_g = gas gravity (air = 1.0)
 γ_o = oil gravity (water = 1.0)
 ΔN_p = oil production during a time interval, STB (m^3)
 Δp^* = $p^* - p_w$, psi (kPa)
 $(\Delta p)_d$ = pressure change at departure (McKinley method), psi (kPa)
 $(\Delta p)_s$ = $141.2 qB\mu(s)/kh = 0.869 ms$ = additional pressure drop
across altered zone, psi (kPa)



- Δp_{ws}^* = $p_{ws} - p_{MT}$ = difference between pressure on buildup curve and extrapolated MTR, psi (kPa)
- Δt = time elapsed since shut-in, hours
- $\Delta t'$ = time elapsed since rate change in two-rate flow test, hours
- Δt_c = cycle length (flow plus shut-in) in pulse test, hours
- Δt_d = time at departure (McKinley method), hours
- Δt_{end} = time MTR ends, hours
- Δt_p = pulse-period length, hours
- Δt_x = time at which middle-and late-time straight lines intersect, hours
- n = $0.000264 k/\phi\mu c$ = hydraulic diffusivity, sq ft/hr (m^2/h)
- ω = naturally fractured reservoirs storativity ratio (Warren and Root)
- τ = approximate beginning of homogeneous behavior in naturally fractured reservoirs, hours
- λ = naturally fractured reservoirs interflow parameter (Warren and Root)
- λ_t = $(k_o/\mu_o + k_g/\mu_g + k_w/\mu_w)$
- μ = viscosity, cp (Pa.s)
- μ_g = gas viscosity, cp (Pa.s)
- μ_i = gas viscosity evaluated at p_i , cp (Pa.s)
- μ_o = oil viscosity, cp (Pa.s)
- $\mu_{\bar{p}}$ = gas viscosity evaluated at \bar{p} , cp (Pa.s)
- μ_w = water viscosity, cp (Pa.s)
- ρ = density of liquid in wellbore, lbm/cu ft (kg/m^3)
- ϕ = porosity of reservoir rock, dimensionless



ϕ_2 = fracture porosity, dimensionless

$\psi(p) = 2 \int_{p_o}^p \frac{p}{\mu z} dp$
= gas pseudopressure, psia²/cp (kPa²/Pa.s)



SERVIPETROL LTD.
International Petroleum Consultants

