

PTP-RESN-057-96

October 16th, 1997

RECEIVED

PETRO-TECH
PERUANA S.A.

1997 OCT 20 AM 8:36

TO: Rigoberto Francia

FROM: Alberto Agurto

SUBJECT: Pressure Build Up Test
Well LO16-8

Please find attached the results obtained from Build Up test run in the above mentioned well in order to determine the present formation pressure and define if its production level can be improved by stimulation or not.

The main results are as follows:

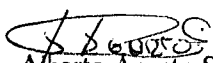
Date	: October 9-13th, 1997.
Perforated interval	: 8082' - 7910'.
Formation	: Lower Basal Salina.
Middle point depth	: 8000' MD 7293' VD.
Shut in time	: 90 hrs.
Pressure at MPP	: 413 psi. (last reading).
Extrap. Pressure P*	: 490 psi.
Well head pressure	: 340 psi.
Fluid level	: 7942' MD 7230' VD.
Formation gradient	: 0.070 psi/ft.
Flowing BHP at MPP	: 210 psi.
Permeability	: 8.13 md.
Skin factor	: +3.66 psi.

This well is located in the LO16 Lower Bs. Salina Gas Injection Project, on April 1993 it was completed using TCP technique and it reached an initial production of 1589 BOPD flowing, currently it produces 29 BOPD * 1 BWPD * 3632 GOR and cumulative oil production of 254 MBO.

The recorded pressure is stabilized and could be considered representative of the average reservoir pressure. The present formation gradient at middle point is lower than the recorded previously on November 1994 (0.080 psi/ft) but it compares favorably with the recorded in well LO16-7 on April 1997 (0.073 psi/ft) located in the same reservoir, therefore there is not a clear effect in the pressure due to gas injection yet.

The interpretation using the Double porosity reservoir model was most adequate, the reservoir characteristics from Straight Line evaluation are similar to those obtained using the Matching method, the analysis shows that the fissures response near the wellbore is masked by wellbore storage and damage.

Therefore, having into account the above conditions, it is recommend to perform a stimulation job for improving the present production of the well. It has been estimated that net increase in production, if the skin is totally removed, will be 30 BOPD.


Alberto Agurto S.
Reservoir Engineer

c.c.: J. Mego.
Well File.

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Evaluation of the well LO16-8

Data :	P*	=	490 psi
	P _{wf}	=	210 psi
	Q	=	31 BPD
	s	=	+ 3.66
	Kh	=	244 md-ft
	Bo	=	1.216
	u	=	0.950

Net increase in production if the skin is totally removed.

1. E _{F1}	=	7 / (7+3.66)	= 65.7%
2. J _{ACT}	=	31 / 490-210	= 0.111
3. ΔPs	=	141.2 Bo u Q s / Kh	= 76 psi
4. P _w	=	210 - 76	= 134 psi
5. Q _{ACT}	=	J _{ACT} (490 - 134)	= 40 BPD
6. Q	=	(P*-P _w)Kh/141.2 Bo u * 7	= 76 BPD
7. For E _{F2}	=	100% and J = 0.213	

Net increase 76 - 40 = 36 BDP.

A.Agurto



**Main Results****LO16-8**

Company PETROTECH
Field Lobitos
Well LO16-8
Test BU
Date Oct-97
Gauge
Depth

Formation interval Lw.Bs.Salina
Perforated interval
Tsi: 90 hrs. Np: 254MBO
Tp: 1636 days.

TEST TYPE Standard**FLUID TYPE** Oil

Porosity Phi (%) 12.5
Well Radius rw 0.354 ft
Pay Zone h 30 ft

Volume Factor B 1.2
Total Compr. ct 2.56E-5 psi-1
Viscosity 0.95 cp

Flow Period # 2
Rate 0 STB/day
Rate Change 31 STB/day
P at dt=0 209.86 psia
Pi 489.495 psia

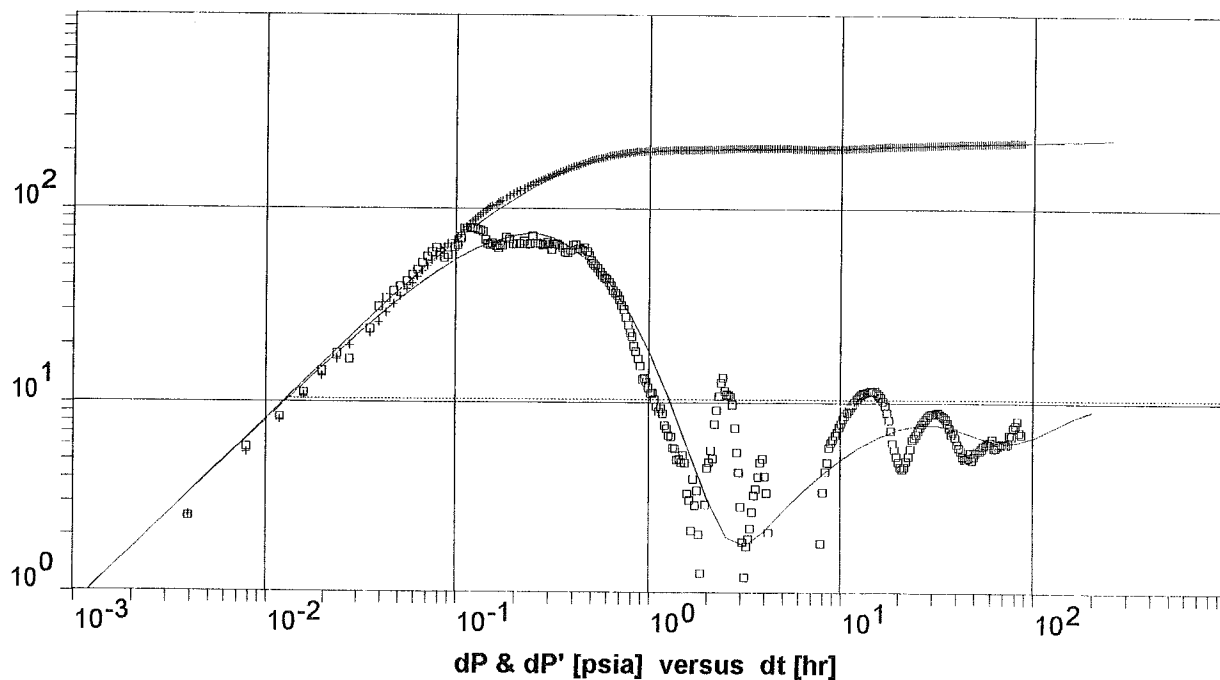
Time Match 39.2 (hr)-1
Pressure Match 0.0489 (psia)-1

RESERVOIR 2 Phi PSS
BOUNDARY Infinite
WELL Storage & Skin
Storage C 0.00193 STB/psi
Ci/Cf 0.972586
Alpha 498000
Skin factor 3.66

kh 244 md.ft
k 8.13 md
Mobility k/mu 8.56
Omega 0.0112
Lambda 1.13E-5

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	Log-Log		LO16-8
	Company	PETROTECH	Test BU
	Field	Lobitos	Date Oct-97
	Well	LO16-8	Gauge



Flow Period # 2
 Rate 0 STB/day
 Rate Change 31 STB/day
 P at dt=0 209.86 psia
 Smoothing 0.1
 Pi 489.495 psia

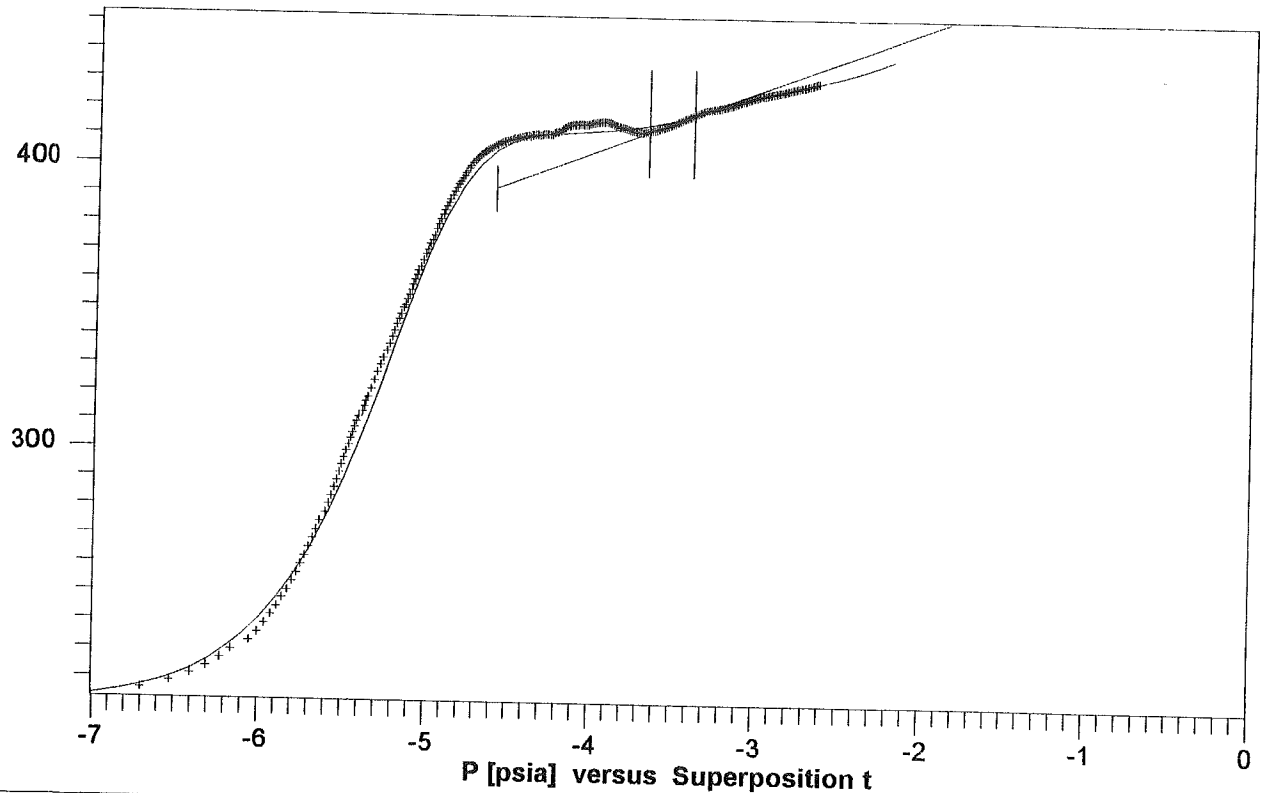
 Time Match 39.2 (hr)-1
 Pressure Match 0.0489 (psia)-1

RESERVOIR 2 Phi PSS
 BOUNDARY Infinite
 WELL Storage & Skin
 Storage C 0.00193 STB/psi
 Ci/Cf 0.972586
 Alpha 498000
 Skin factor 3.66

kh 244 md.ft
 k 8.13 md
 Mobility k/mu 8.56
 Investig. R 446 ft
 Omega 0.0112
 Lambda 1.13E-5

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	Semi-Log		LO16-8
	Company	PETROTECH	Test BU
	Field	Lobitos	Date Oct-97
	Well	LO16-8	Gauge



Flow Period # 2
Rate 0 STB/day
Rate Change 31 STB/day
P at dt=0 209.86 psia
Pi 489.495 psia

STRAIGHT LINE

From 8.44 hr
To 15.8 hr
Slope 21.9 psia
Intercept 492.276 psia
value at dt=1hr 391.748 psia

-> p* 492.276 psia
-> PMatch 0.0526 (psia)⁻¹
-> k.h 263 md.ft
-> k 8.75 md
-> Skin 4.81

Time Match 39.2 (hr)⁻¹
Pressure Match 0.0489 (psia)⁻¹

RESERVOIR 2 Phi PSS
BOUNDARY Infinite
WELL Storage & Skin
Storage C 0.00193 STB/psi
Ci/Cf 0.972586
Alpha 498000
Skin factor 3.66

kh 244 md.ft
k 8.13 md
Mobility k/mu 8.56
Omega 0.0112
Lambda 1.13E-5

COPESERPET S.A.

Compañía Peruana de Servicios Petroleros

96 hr. Pressure Build-up

Well LO16 - 8 Lobitos Offshore

October, 9th - 13th 1997

PETRO - TECH PERUANA S.A.
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CPSP 142-97

Talara, October the 17th, 1997.

ENG° JOHN MEYERS
Production Engineering Manager
PETRO-TECH PERUANA S.A.

Dear Sr.

Attached you will find the report of the 96 hr. PRESSURE BUILD UP test carried out in the well LO16 - 8 (Basal Salina sand) Lobitos Offshore.

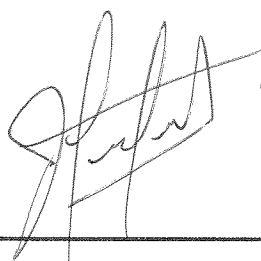
The porpouse of this test is to know reservoir extrapolated pressure, permeability and skin.

Data used in this report was obtained using your Memory Gauge model EMS-725F - 15 with range of 5000 psi and 250 °F s/n 87013, wich is aviable for you to have a good service.

If you have any question please contact us.

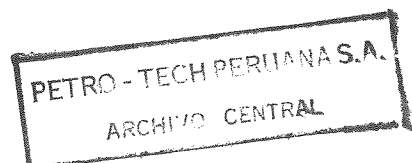
Thanks for your kind attention,

Yours sincerely,



José Manuel Castro Solórzano
COPESERPET S.A.

W.C.
Eng° Alberto Agurto.
Eng° Ricardo Corman.
Well File.



COPESERPET S.A.

TEST: 96 HR. PRESSURE BUILD-UP
WELL LO16-8

FIELD: LOBITOS OFFSHORE
SAND: BASAL SALINA (8082' - 7910')

DAILY REPORT

OCTOBER, 9th 1997

INITIAL CONDITIONS

Current Installation: Tubing 2 7/8"
Well Status: Producing with continuous G/L.
Cycle: 76x4:30
BOP installed: yes
Cumulative Prod. = 251178 STB.
Rate = 31 STB/day (August 1997).
10:30 Fish standing valve at 7887' with difficulty.
11:20 RIH dead weight down to 8100'.
12:00 Well producing cycle is set to 20x5:00
12:06 Activate Memory gauge s/n 87013.
12:15 Activate Amerada gauge x 2025 psi with 120hr. clock.
12:43 RIH gauges to 8050'.
12:53 Gauges at 8050'.

Record 3 injection cycles:

Cycle	P(sys)	P(sep)	WHP
12:55 I	890-850	30	N.R.
13:20 II	860-890	35	75
13:45 III	850-890	35	75
13:55	Close G/L.		
14:00	Discharge well tubing and annulus.		
14:30	Shut-in well.		
	WHP=40 psi.		
	P(annul)=10 psi.		
15:15	WHP=200 psi.		

OCTOBER, 10th 1997

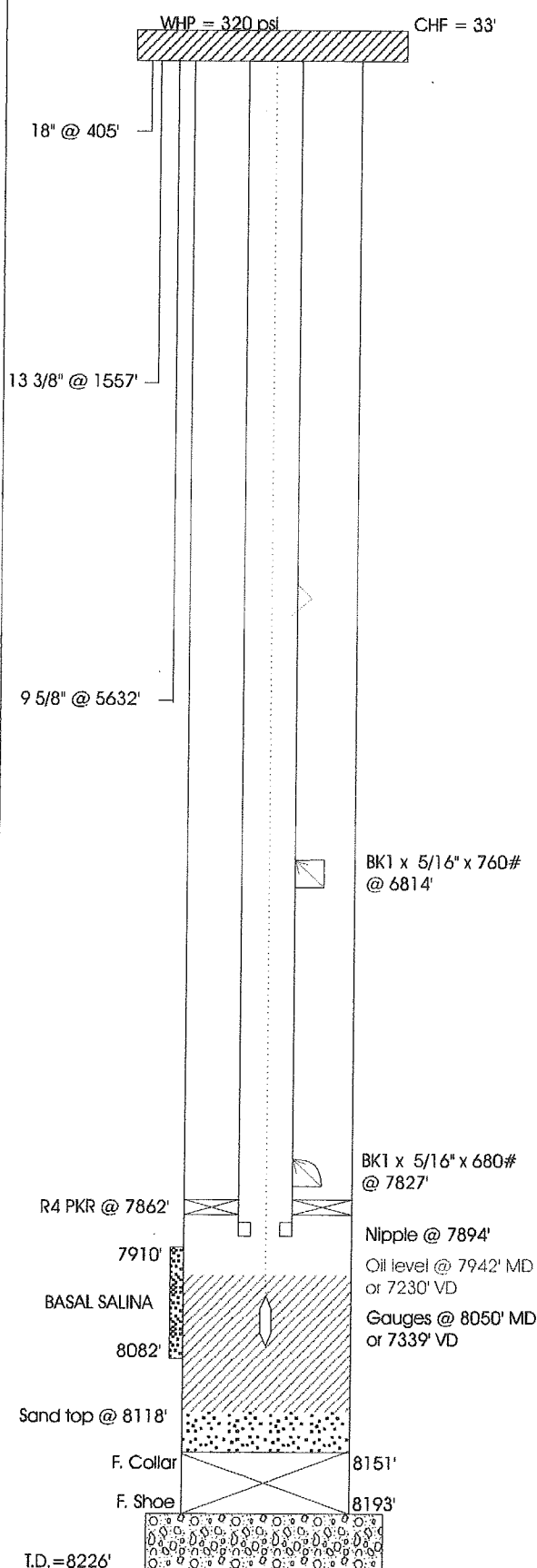
8:00	WHP=340 psi.	P(annul)=320 psi.
12:00	WHP=340 psi.	P(annul)=320 psi.
18:00	WHP=340 psi.	P(annul)=320 psi.

OCTOBER, 11th 1997

8:00	WHP=340 psi.	P(annul)=303 psi.
12:00	WHP=340 psi.	P(annul)=303 psi.
18:00	WHP=340 psi.	P(annul)=303 psi.

OCTOBER, 13th 1997

8:15	WHP=340 psi.				
8:47	POOH gauges with stations as follows:				
	8050'	7800'	7200'	6000'	3000'
	8000'	7600'	7000'	5000'	2000'
	7900'	7400'	6500'	4000'	0'
9:47	Gauges at surface.				
10:00	Deactivate memory gauge.				
10:20	RIH impression block. Seating Nipple at 7887'.				
11:45	Install standing valve.				
	Leave the well with the Petrotech's responsible.				



Field Operator: Adán Quiroga

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Summary of Results

Date of Test	October, 9th - 13th 1997	
Formations	Basal Salina (8082' - 7910')	
Depth of Gauges	8050	ft. MD
	7339	ft. VD
Well Head Pressure	340	psi
Annulus Pressure	303	psi
Bottom Hole Static Pressure	429.94	psia
Bottom Hole Static Temperature	126.10	°F
Static Gradient at Depth of Gauges	0.0586	psi/ft
Static Gradient at MPP	0.0571	psi/ft
Oil level	7942	ft. MD
	7230	ft. VD
Water level	-	ft. MD
	-	ft. VD
Oiltramp	Crude oil	

Build-up Data & Results

Oil viscosity	1.1	cp
Total compressibility	25E-6	psi-1
Porosity	0.09	
Pay zone	150	ft
Square wellbore radius	0.0529	in2
Oil FVF	1.2	bbl/STB
Oil Production rate	31	STB/day
Cummulative production	251178	STB
Model used	Homogeneous with Wellbore Storage & Skin	
Permeability	3.37	md
Skin	14.89	
Cs	0.00233	STB/psi
p*	465	psia

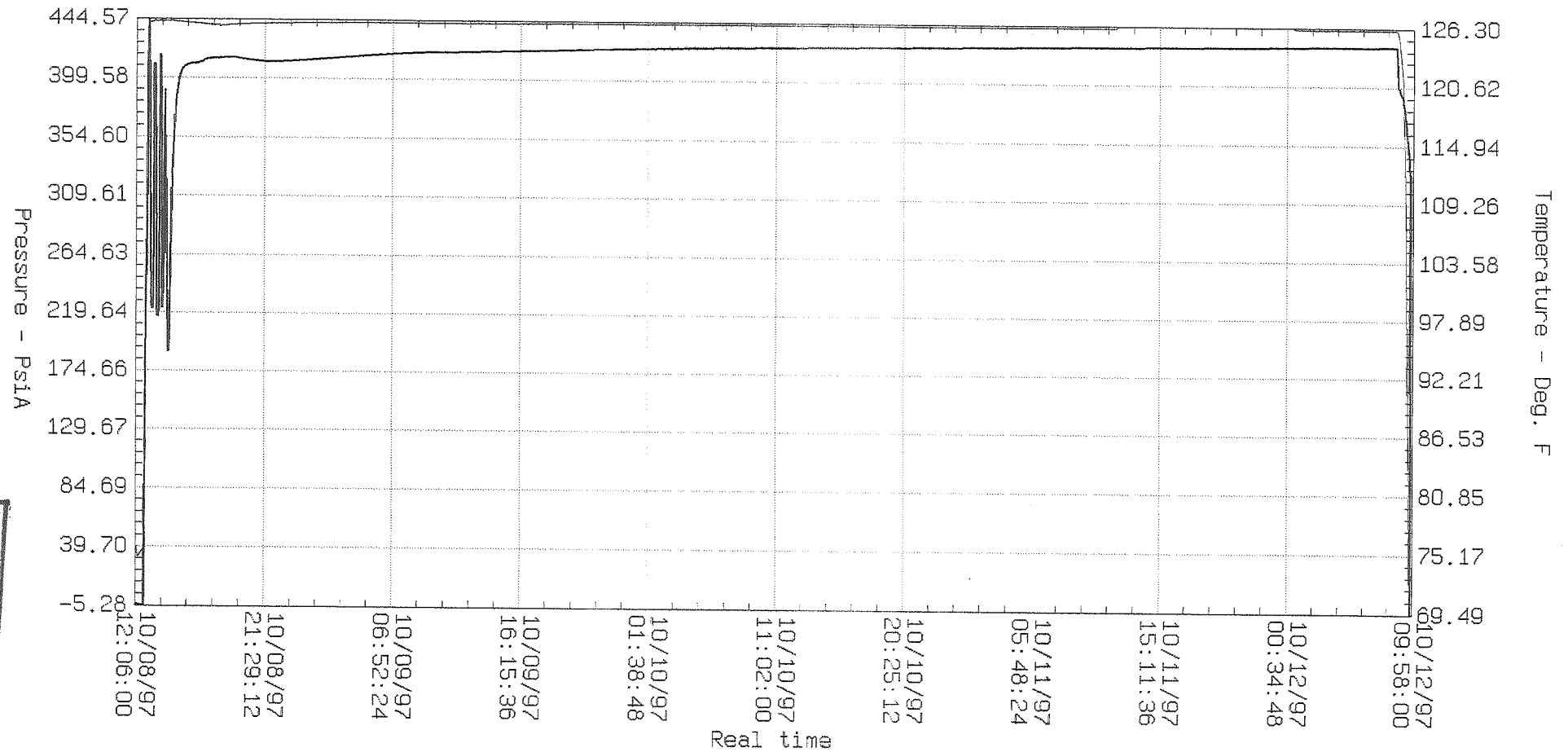
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LOGGED PRESSURE / TEMPERATURE DATA

File name: BL0168

Company : COPESERPET S.A.
 Client : PETRO-TECH PERUANA S.A.
 Gauge number : 87013
 Well name : L016-8
 Well number : L016-8
 Test number : BL0168
 Field name : LOBITOS OFFSHORE

Test operator: JOSE M. CASTRO
 Comments :



Starting date: 10/08/97
 time: 12:06:00

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Three injection cycles & 96 hr. Pressure Build-up

Date	Time	Elapsed Time (hr)	Pressure (psia)	Temperature (F)
First Injection starts				
10/08/97	12:56:15	0.0000	311.31	125.44
10/08/97	12:58:30	0.0375	396.00	125.84
10/08/97	13:00:45	0.0750	444.57	125.94
10/08/97	13:03:00	0.1125	417.69	125.97
10/08/97	13:05:15	0.1500	380.51	125.97
10/08/97	13:07:30	0.1875	323.58	125.97
10/08/97	13:09:45	0.2250	257.12	125.96
10/08/97	13:12:00	0.2625	232.79	125.96
10/08/97	13:14:15	0.3000	224.50	125.97
10/08/97	13:16:30	0.3375	222.32	125.99
10/08/97	13:18:45	0.3750	223.18	126.03
10/08/97	13:21:00	0.4125	230.67	126.04
Second Injection starts				
10/08/97	13:23:15	0.4500	348.22	126.08
10/08/97	13:25:30	0.4875	409.00	126.10
10/08/97	13:27:45	0.5250	399.19	126.10
10/08/97	13:30:00	0.5625	372.72	126.10
10/08/97	13:32:15	0.6000	323.67	126.08
10/08/97	13:34:30	0.6375	255.14	126.04
10/08/97	13:36:45	0.6750	226.14	126.03
10/08/97	13:39:00	0.7125	217.49	126.04
10/08/97	13:41:15	0.7500	216.24	126.04
10/08/97	13:43:30	0.7875	218.36	126.06
Third Injection starts				
10/08/97	13:45:45	0.8250	225.40	126.08
10/08/97	13:48:00	0.8625	340.14	126.10
10/08/97	13:50:15	0.9000	412.97	126.13
10/08/97	13:52:30	0.9375	405.62	126.13
10/08/97	13:54:45	0.9750	377.00	126.13
10/08/97	13:57:00	1.0125	333.83	126.10
10/08/97	13:59:15	1.0500	266.64	126.08
10/08/97	14:01:30	1.0875	227.98	126.04
10/08/97	14:03:45	1.1250	254.52	126.06
10/08/97	14:06:00	1.1625	307.79	126.10
10/08/97	14:08:00	1.1958	345.81	126.11
10/08/97	14:10:00	1.2292	376.28	126.11
10/08/97	14:12:00	1.2625	348.31	126.11
10/08/97	14:14:00	1.2958	269.82	126.08
10/08/97	14:16:00	1.3292	291.92	126.08
10/08/97	14:18:00	1.3625	312.78	126.08
10/08/97	14:20:00	1.3958	255.91	126.10
10/08/97	14:22:00	1.4292	226.55	126.08
10/08/97	14:24:00	1.4625	208.66	126.08
10/08/97	14:26:00	1.4958	190.37	126.10
10/08/97	14:28:00	1.5292	189.38	126.10
10/08/97	14:29:45	1.5583	194.32	126.10
10/08/97	14:30:00	1.5625	195.44	126.10
Shut in well after discharging Tubing and annulus. Build-up starts				

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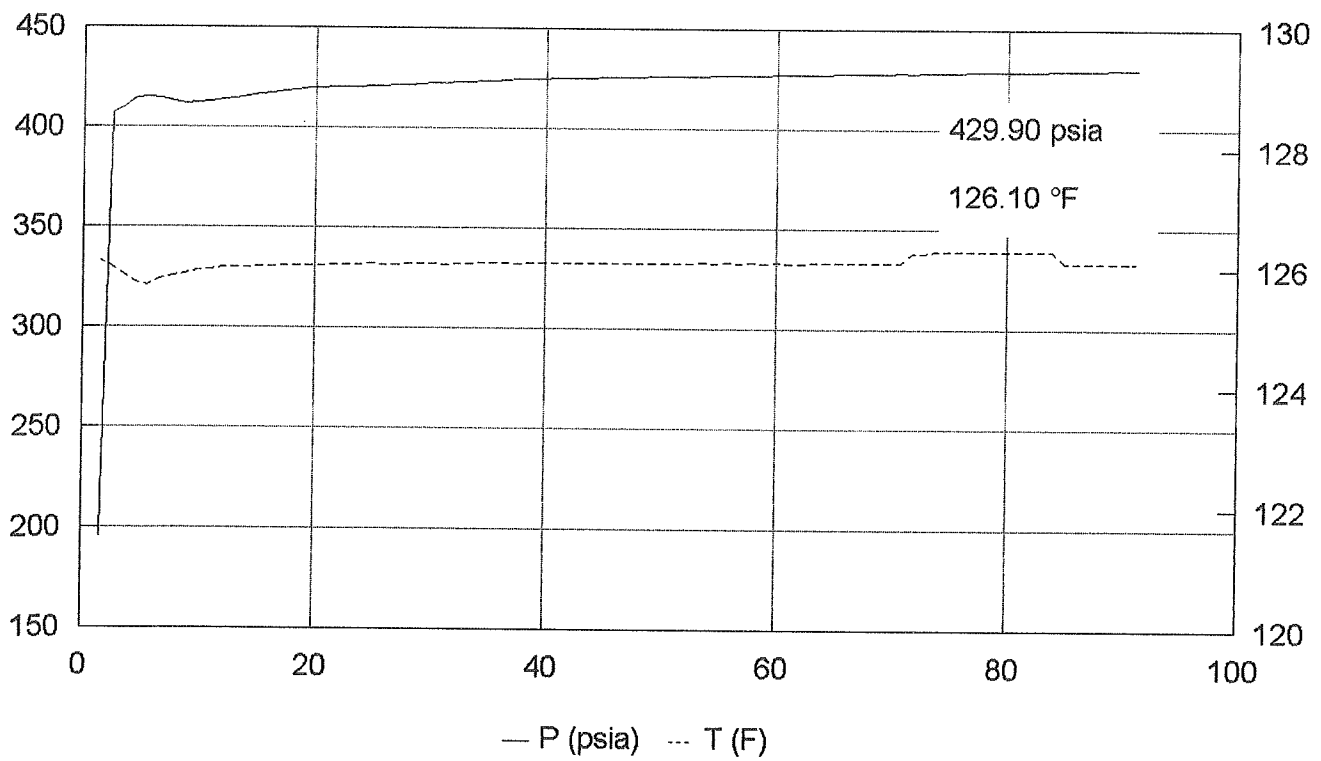
10/08/97	15:30:00	2.5625	406.81	125.99
10/08/97	16:30:30	3.5708	410.33	125.87
10/08/97	17:31:30	4.5875	414.36	125.75
10/08/97	18:34:00	5.6292	415.20	125.70
10/08/97	19:38:00	6.6958	414.64	125.80
10/08/97	20:42:00	7.7625	413.02	125.85
10/08/97	21:46:00	8.8292	412.03	125.89
10/08/97	22:50:00	9.8958	412.35	125.94
10/08/97	23:54:00	10.9625	413.04	125.96
10/09/97	00:58:00	12.0292	413.87	125.99
10/09/97	02:02:00	13.0958	414.75	125.99
10/09/97	03:06:00	14.1625	415.65	125.99
10/09/97	04:10:00	15.2292	416.57	126.01
10/09/97	05:14:00	16.2958	417.44	126.01
10/09/97	06:18:00	17.3625	418.24	126.03
10/09/97	07:22:00	18.4292	418.97	126.03
10/09/97	08:26:00	19.4958	419.55	126.03
10/09/97	09:30:00	20.5625	419.96	126.03
10/09/97	10:34:00	21.6292	420.16	126.04
10/09/97	11:38:00	22.6958	420.26	126.04
10/09/97	12:42:00	23.7625	420.54	126.04
10/09/97	13:46:00	24.8292	420.81	126.06
10/09/97	14:50:00	25.8958	421.08	126.04
10/09/97	15:54:00	26.9625	421.38	126.04
10/09/97	16:58:00	28.0292	421.69	126.06
10/09/97	18:02:00	29.0958	421.99	126.06
10/09/97	19:06:00	30.1625	422.31	126.06
10/09/97	20:10:00	31.2292	422.63	126.04
10/09/97	21:14:00	32.2958	422.95	126.06
10/09/97	22:18:00	33.3625	423.26	126.06
10/09/97	23:22:00	34.4292	423.57	126.08
10/10/97	00:26:00	35.4958	423.83	126.08
10/10/97	01:30:00	36.5625	424.09	126.08
10/10/97	02:34:00	37.6292	424.33	126.06
10/10/97	03:38:00	38.6958	424.55	126.08
10/10/97	04:42:00	39.7625	424.79	126.08
10/10/97	05:46:00	40.8292	424.98	126.08
10/10/97	06:50:00	41.8958	425.13	126.08
10/10/97	07:54:00	42.9625	425.26	126.08
10/10/97	08:58:00	44.0292	425.32	126.08
10/10/97	10:02:00	45.0958	425.55	126.08
10/10/97	11:06:00	46.1625	425.65	126.08
10/10/97	12:10:00	47.2292	425.74	126.08
10/10/97	13:14:00	48.2958	425.86	126.08
10/10/97	14:18:00	49.3625	425.97	126.08
10/10/97	15:22:00	50.4292	426.08	126.08
10/10/97	16:26:00	51.4958	426.18	126.08
10/10/97	17:30:00	52.5625	426.30	126.08
10/10/97	18:34:00	53.6292	426.42	126.10
10/10/97	19:38:00	54.6958	426.52	126.08
10/10/97	20:42:00	55.7625	426.63	126.10
10/10/97	21:46:00	56.8292	426.74	126.08
10/10/97	22:50:00	57.8958	426.87	126.10

126.10
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126.10

10/10/97	23:54:00	58.9625	426.98	126.08
10/11/97	00:58:00	60.0292	427.09	126.10
10/11/97	02:02:00	61.0958	427.17	126.08
10/11/97	03:06:00	62.1625	427.29	126.08
10/11/97	04:10:00	63.2292	427.41	126.10
10/11/97	05:14:00	64.2958	427.53	126.10
10/11/97	06:18:00	65.3625	427.64	126.10
10/11/97	07:22:00	66.4292	427.73	126.10
10/11/97	08:26:00	67.4958	427.84	126.10
10/11/97	09:30:00	68.5625	427.94	126.10
10/11/97	10:34:00	69.6292	428.06	126.10
10/11/97	11:38:00	70.6958	428.17	126.10
10/11/97	12:39:45	71.7250	428.11	126.27
10/11/97	13:40:45	72.7417	428.20	126.27
10/11/97	14:41:45	73.7583	428.31	126.29
10/11/97	15:42:45	74.7750	428.41	126.29
10/11/97	16:43:45	75.7917	428.50	126.29
10/11/97	17:44:45	76.8083	428.58	126.29
10/11/97	18:45:45	77.8250	428.67	126.29
10/11/97	19:46:45	78.8417	428.76	126.29
10/11/97	20:47:45	79.8583	428.84	126.29
10/11/97	21:48:45	80.8750	428.92	126.29
10/11/97	22:49:45	81.8917	429.01	126.29
10/11/97	23:50:45	82.9083	429.09	126.29
10/12/97	00:51:45	83.9250	429.18	126.29
10/12/97	01:56:00	84.9958	429.43	126.11
10/12/97	03:00:00	86.0625	429.50	126.10
10/12/97	04:04:00	87.1292	429.59	126.11
10/12/97	05:08:00	88.1958	429.66	126.10
10/12/97	06:12:00	89.2625	429.74	126.10
10/12/97	07:16:00	90.3292	429.83	126.10
10/12/97	07:48:00	90.8625	429.88	126.11
10/12/97	08:20:00	91.3958	429.90	126.10
Build-up ends				

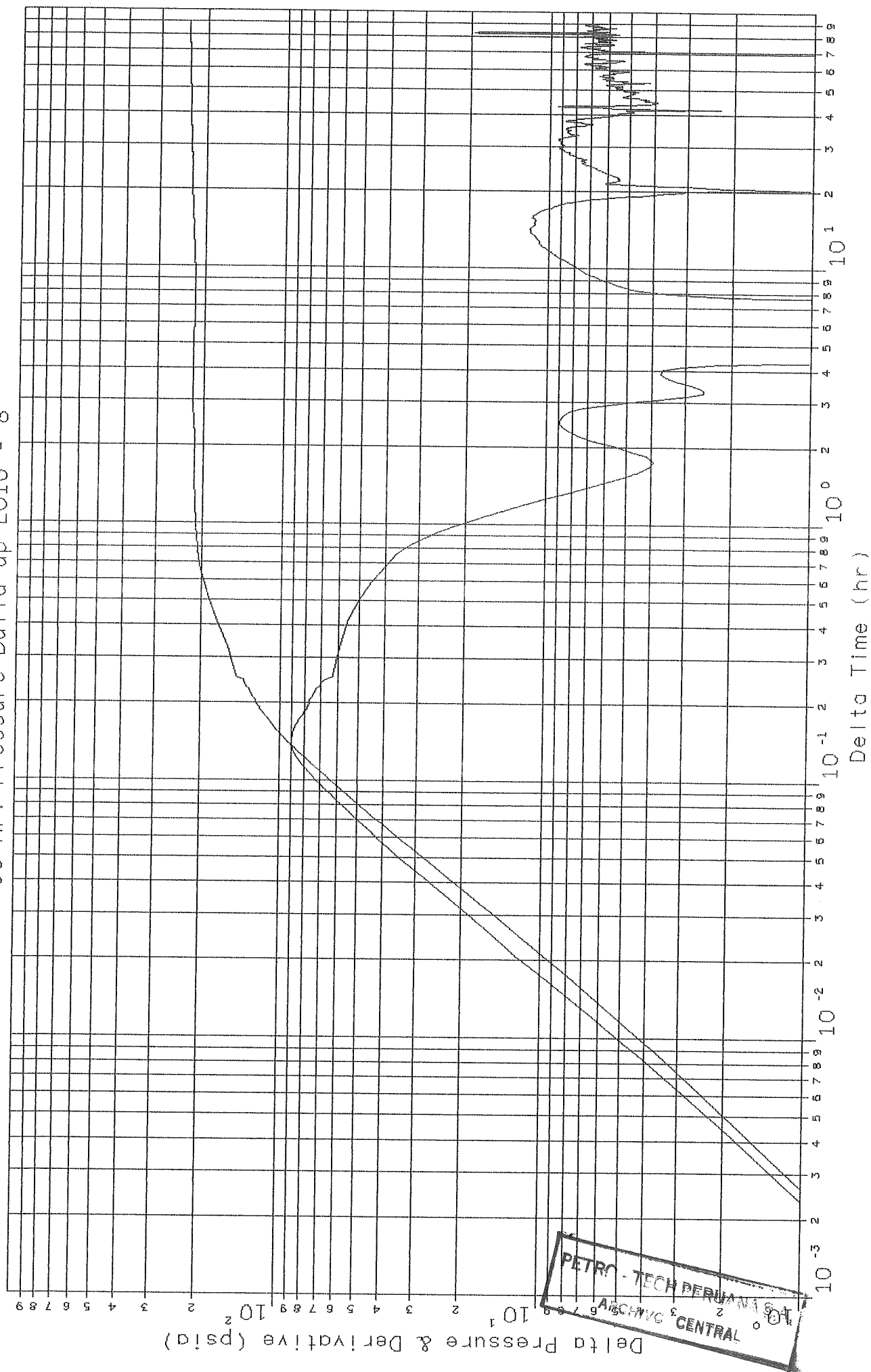
PETRO-TECH PERU S.A.
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96 hr. Pressure Build-up



PETRO-TECHNICAL S.A.
ANEXO CENTRAL

96 Hr. Pressure Build-up L016 - 8



PETRO-TECH PERMANENT
ARCHIVE CENTRAL

Fluid Level at Static Condition

Measured depth (ft)	Vertical depth (ft)	Pressure (psia)	Gradient (psi/ft)
0	0.00	333.54	-
2000	1920.16	350.23	0.0087
3000	2845.40	358.09	0.0085
4000	3771.21	366.49	0.0091
5000	4668.42	374.88	0.0094
6000	5522.25	382.94	0.0094
6500	5952.99	386.93	0.0093
7000	6394.99	391.15	0.0095
7200	6572.14	392.83	0.0095
7400	6750.51	394.40	0.0088
7600	6930.17	396.30	0.0106
7800	7111.43	398.05	0.0097
7900	7202.35	399.01	0.0106
8000	7293.34	417.10	0.1988
8050	7338.84	429.94	0.2822

Levels

	Measured (ft)	Vertical (ft)
Wet Gas Level=	-	-
Oil Level =	7942	7230
Water Level =	-	-

	Measured (ft)	Vertical (ft)
MPP =	7996	7289.70

$$\text{Pressure (MPP)} = 417.10 - (7293.34 - 7289.70) \times 0.2822$$

$$\text{Pressure (MPP)} = 416.07 \quad \text{psia}$$

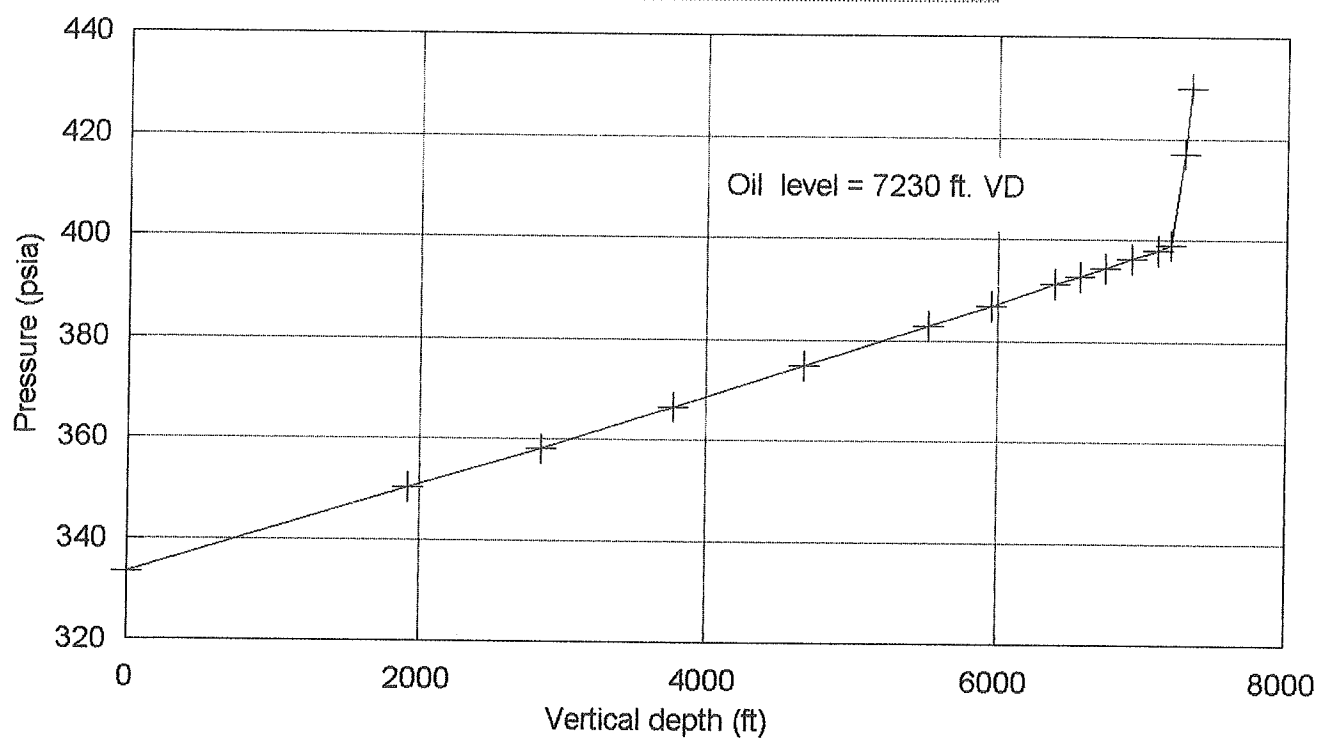
Gradients

Gradient (MPP) =	0.0571	psi/ft
Gradient (Gauge) =	0.0586	psi/ft

Gas Gradient =	0.0091	psi/ft
Wet Gas Gradient=	-	psi/ft
Oil Gradient =	0.2822	psi/ft
Water Gradient =	-	psi/ft

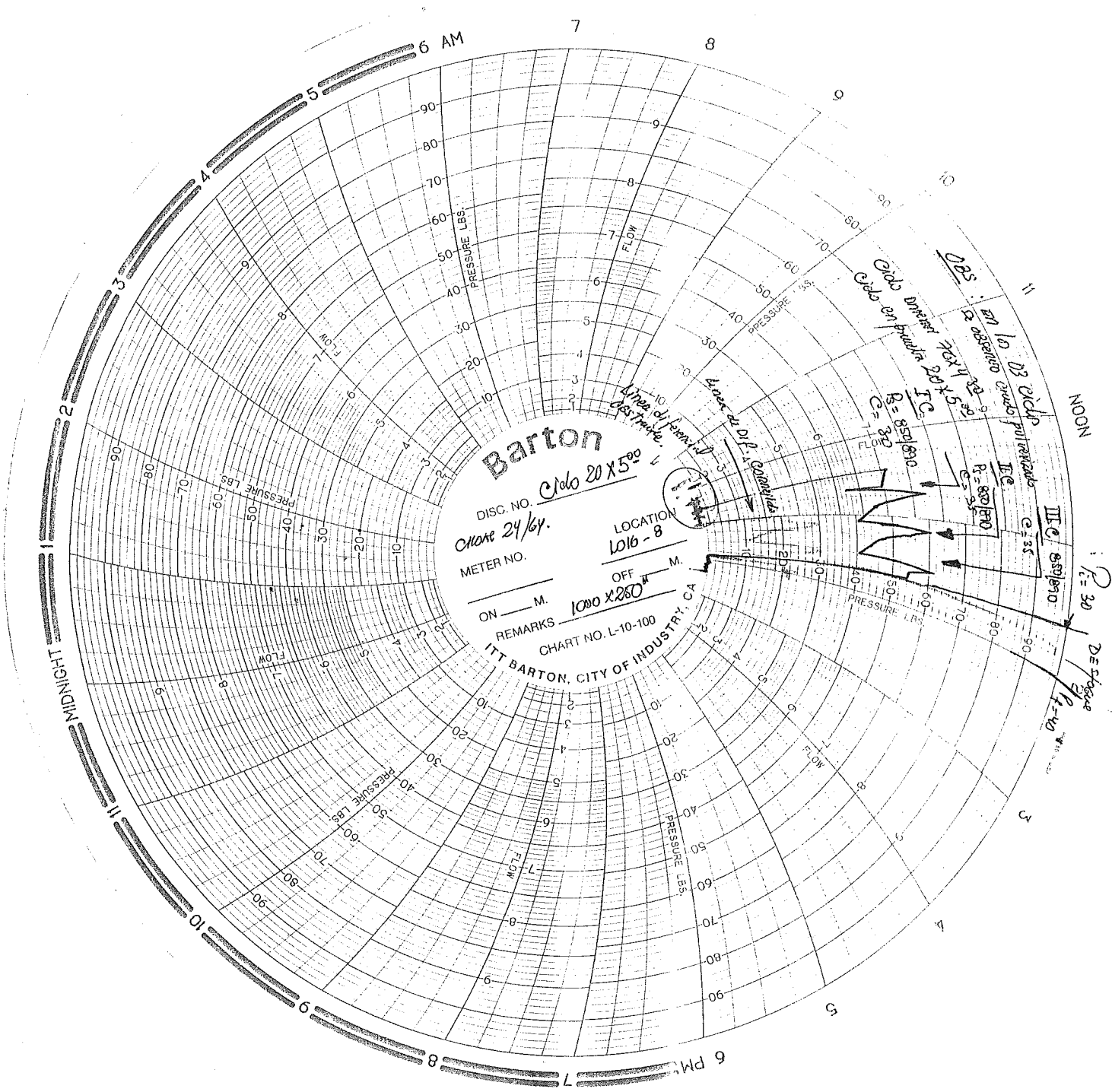
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Fluid Level at Static Condition

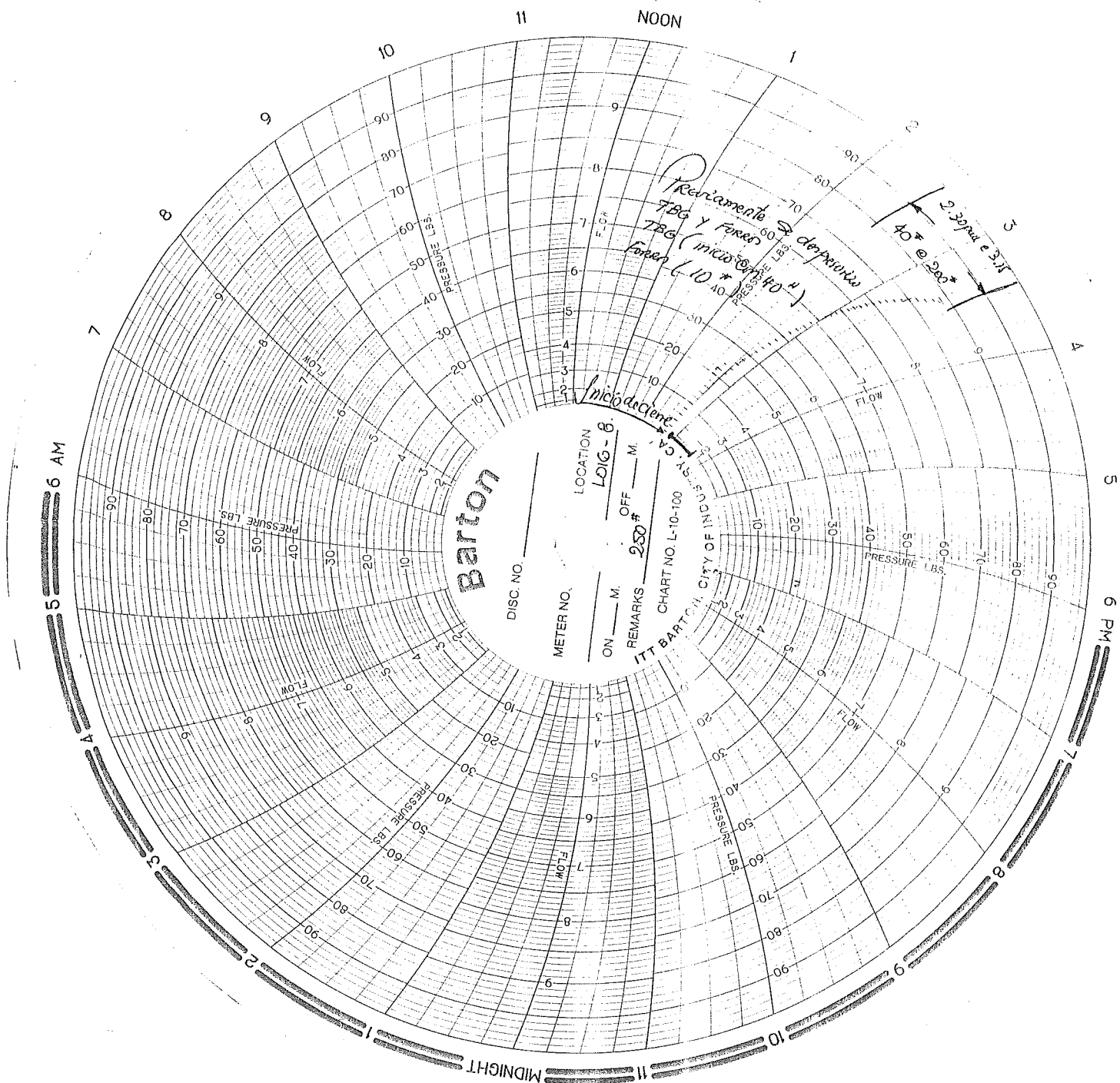


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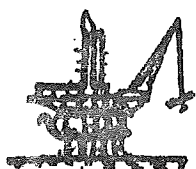
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