

# FLOPET

Denne rapport  
tilhører



LTEK DOK.SENTER

L.NR. 12483010015

KODE Well 1/9-6 nr 11

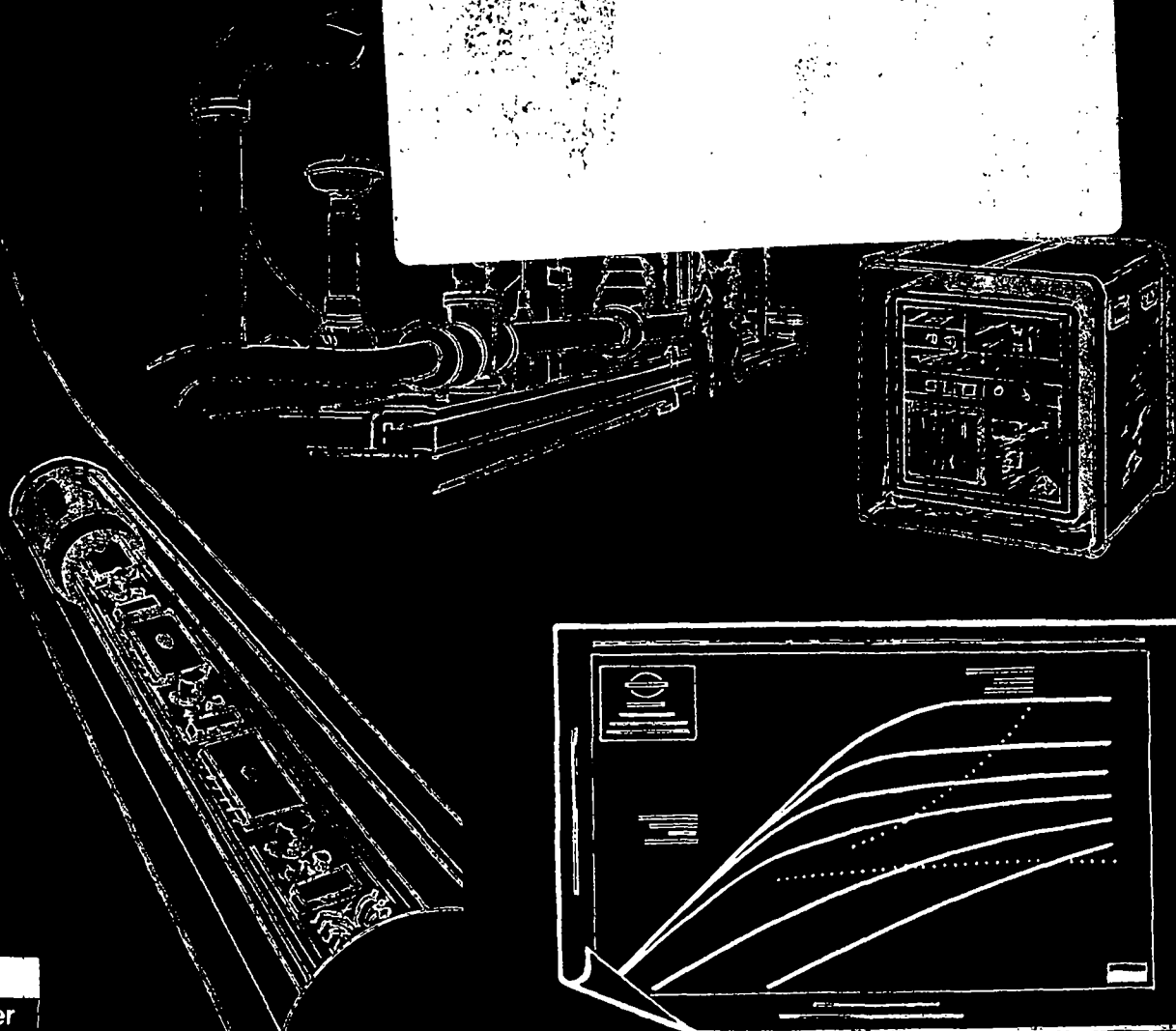
Returneres etter bruk

## Well Testing Report

PPCO Norway

Tommeliten Well: 1/9-6

Cretaceous Date: 12.09.82-19.09.82



# FLOPETROL

DIVISION : NSD  
BASE : NOB  
REPORT N° : 82/2301/ 32

## Well Testing Report

Client : PPCO Norway

Field : Tommeliten

Well : 1/9-6

Zone : Cretacious

Date : 12.09.82-19.09.82

DST no. 2

DST no. 2A

# FLOPETROL

Client : PPCO NorwaySection : INDEXBase : NOBField : TommelitenPage : 2Well : 1/9-6Report N°: 82/2301/32

## INDEX

- 1 \_ TEST PROCEDURE \_
- 2 \_ MAIN RESULTS \_
- 3 \_ OPERATING AND MEASURING CONDITIONS \_
- 4 \_ SURFACE EQUIPMENT DATA \_
- 5 \_ WELL COMPLETION DATA \_
- 6 \_ SEQUENCE OF EVENTS \_
- 7 \_ WELL TESTING DATA \_

N° DOP 101

Flopetrol chief operator

Name : B. Nilssen

Client representative

Name : J. Hamilton, S. Jones,  
E. Hodcroft

# FLOPETROL

Client : PPCO Norway

Section :

**1**

Field : Tommeliten

Page : 3

Base : NOB

Well : 1/9-6

Report N°82/2301/32

## - TEST PROCEDURE -

### DST # 2

The test string was run with Halliburton down hole tools and Flopetrol EZ-tree and lubricator valve with the water cushion to surface. Since unable to proceed with the originally planned stimulation programme due to weather, the well was opened to the gauge tank on a 2" adjustable choke for 17 minutes initial flow period, and shut in at surface for 746 minutes for initial shut in period, before proceeding with stimulation programme. During this programme the tubing appearantly plugged and the well was opened for 40 minutes in an attempt to free the pluggage. 5 minutes after shut-in the pressure increased rapidly from 3 to 4250 psi and the stimulation programme was commenced after 33 minutes. A communication between the tubing and annulus was observed and the tubing contents were reverse circulated overboard.

### DST # 2A

After running in DST # 2A the stimulation programme was carried out as per programme and the well opened to the flare for clean up through the adjustable choke. First 11 min. on 12/64", then 5 min. on 16/64", then 9 min. on 20/64", then 3 min. on 32/64" and finally 158 min. on 48/64" adjustable choke. Gas reached surface after 7 min on 48/64" choke. Due to a burst Weco seal, the well was shut in for 73 minutes before reopening on a 32/64" adjustable choke for 5 minutes when it was shut in again due to an arriving helicopter. After 9 min. shut in, the well was opened on a 32/64" adjustable hoke for 289 minutes during which the flow was diverted through the test separator and accurate oil, gas and water rates were measured. The well was then shut in for 812 min. during which one TPT and one SDR were run in the hole and hung off on wireline. The well was then opened on 16/64" adjustable choke which was changed to a 16/64" fixed choke after 18 min. and the flow was diverted through the test separator after 80 min. flow. A sudden pressure increase occured after 330 min. followed by a rapid decrease in pressure. The separator was bypassed and the well shut in after 367 min. flow. No pressure build up was observed and the string was believed plugged. The test was finally abandoned and the string contents reverse circulated overboard.

# FLOPETROL

Client : PPCO Norway

Section :

**2**

Base : NOB

Field : Tommeliten

Page : 4

Well : 1/9-6

Report N°: 82/2301/32

**— MAIN RESULTS —** DST No. 2

Tested interval : Cretaceous Perforations : 11.930'-11.990'

Operation	Duration	Bottom hole pressure	Well head pressure	Oil prod. rate	Gas prod. rate	G.O.R.
Units	mins		psig			
Initial Flow Period on 2" Adj. choke	17	--	< 50	---	---	---
Initial shut in period	746	--	2350	---	---	---

Depth of bottom hole measurements : N/A Reference : --

Temperature : -- at : -- depth

Separator gas gravity (air : 1) at choke size : N/A

STO gravity at choke size : N/A

BSW : N/A Water cut : N/A

**REMARKS AND OTHER OPERATIONS**

Only cushion water produced

- OPERATING AND MEASURING CONDITIONS -A - TYPE OF GAUGE -BOTTOM HOLE :

Pressure : TPT/SSDR 10.000 PSIA  
 Temperature : TPT/SSDR 300°F

WELL HEAD :

Pressure : DWT/Foxboro recorder 0-5000 psig  
 Temperature : Foxboro recorder 0-200°F

SEPARATOR :

Pressure : Barton 0-1500 psig  
 Temperature : Barton 0-180°F

B - PRODUCTION RATE CONDITIONS AND SOURCES -OIL PRODUCTION RATE

- Tank  
 Meter  
 Dump

- Floco  
 Rotron

## Reference conditions.

- Separator  
 Atmospheric pressure 60 F

## Shrinkage measurement.

- With tank  
 With shrinkage tester

GAS PRODUCTION RATE

- Orifice meter

## Standard conditions.

14.73 PSIA and 60°F

WATER PRODUCTION RATE

- Tank  
 Meter

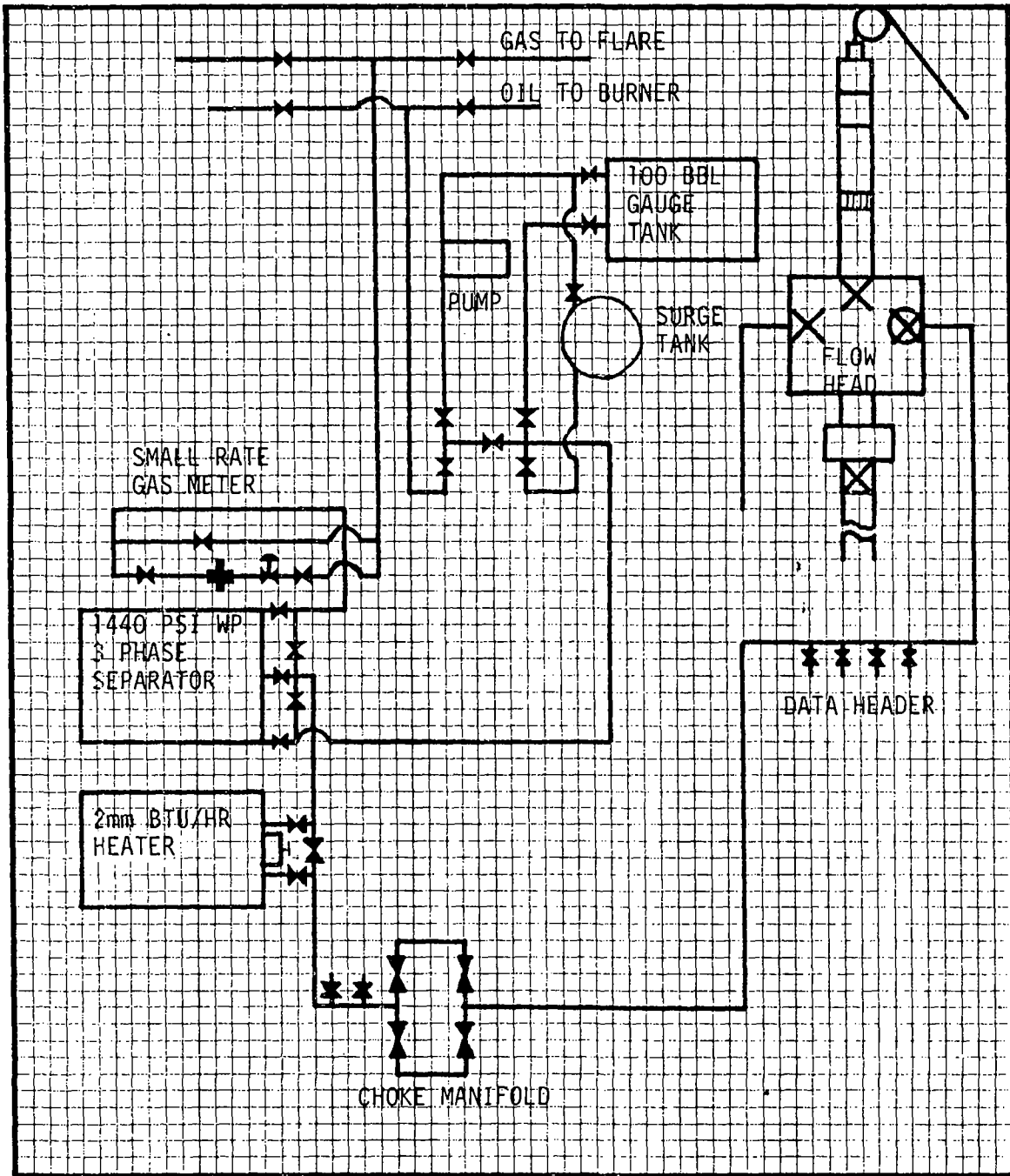
C - WELL DATA -WELL STATE DURING SURVEY :

Well producing through : tubing/drift pipe/casing  
 Main casing size 7" set at 12.700' Total well depth \_\_\_\_\_  
 Tubing size 5" and 3½" VAM set at \_\_\_\_\_ Packer RTTS set at 11.853'  
 Perforations :  
 - Zone Cretaceous From 11.930' to 11.990' From \_\_\_\_\_ to \_\_\_\_\_  
 - Zone \_\_\_\_\_ From \_\_\_\_\_ to \_\_\_\_\_ From \_\_\_\_\_ to \_\_\_\_\_  
 -

WELL STATE BEFORE TEST :

- Well closed since DST no. 1  
 Well flowing since \_\_\_\_\_ Producing zone Cretaceous  
 Choke size \_\_\_\_\_

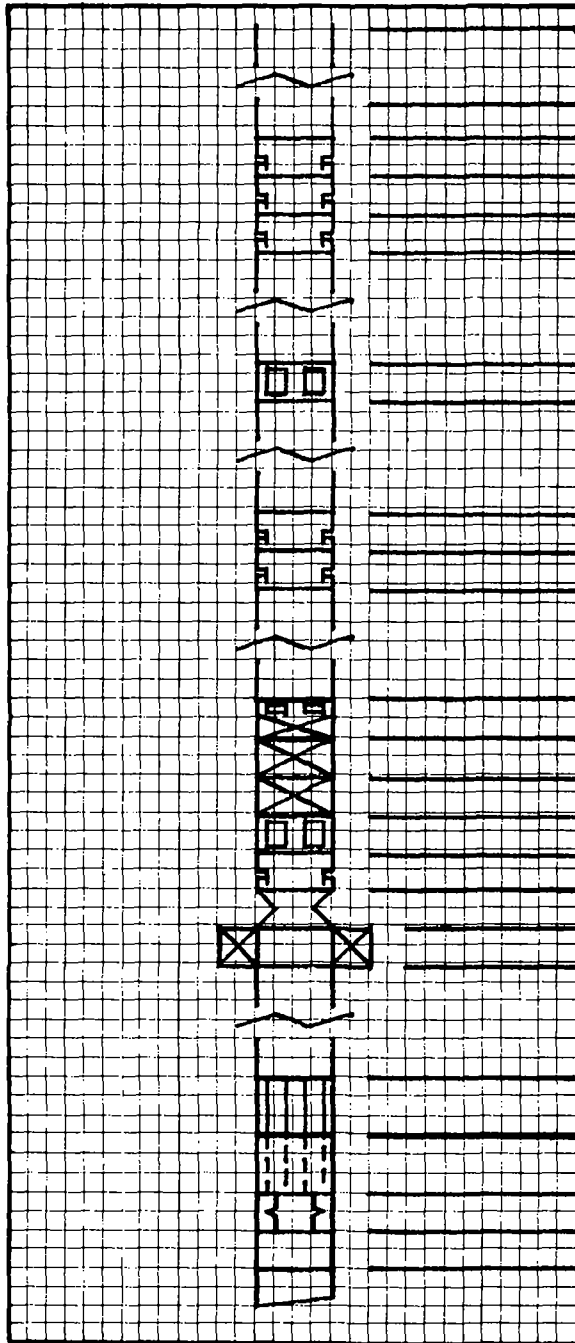
## - SURFACE EQUIPMENT LAYOUT -



### REMARKS :

Drawing schematic only  
Not to scale

## -WELL COMPLETION DATA-



5" Tubing

3½" Tubing

Slip joint open

Slip joint closed

Slip joint closed

4 3/4" Drill Collars

RTTS Circulating valve 11.602'

4 3/4" Drill Collars

Slip joint closed

Slip joint closed

4 3/4" Drill Collars

APR "M" 11.820'

Drill pipe tester valve 11.825'

APR "N" 11.838'

Hydraulic bypass valve 11.844'

Big John Jars 11.850'

Safety Joint 11.853'

RTTS Packer 11.858'

3½" Drill Pipe

Bundle carrier 11.929'

Perforated joint 11.939'

"F" nipple 11.942'

2 3/8" Tubing

"Mule shoe" 12.003'

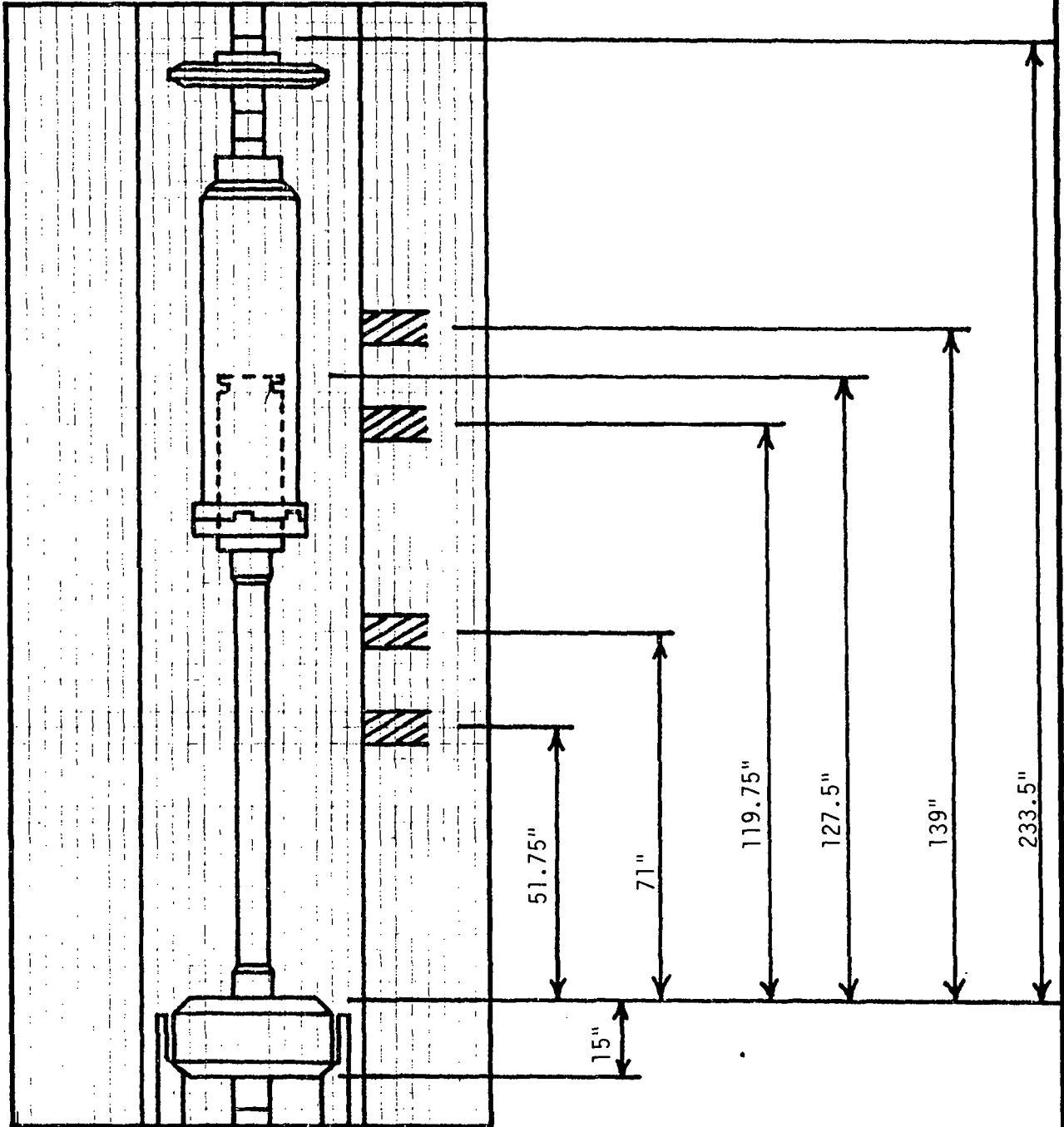
### REMARKS

Drawing schematic only.  
Not to scale.



- WELL COMPLETION DATA -

EZ-TREE

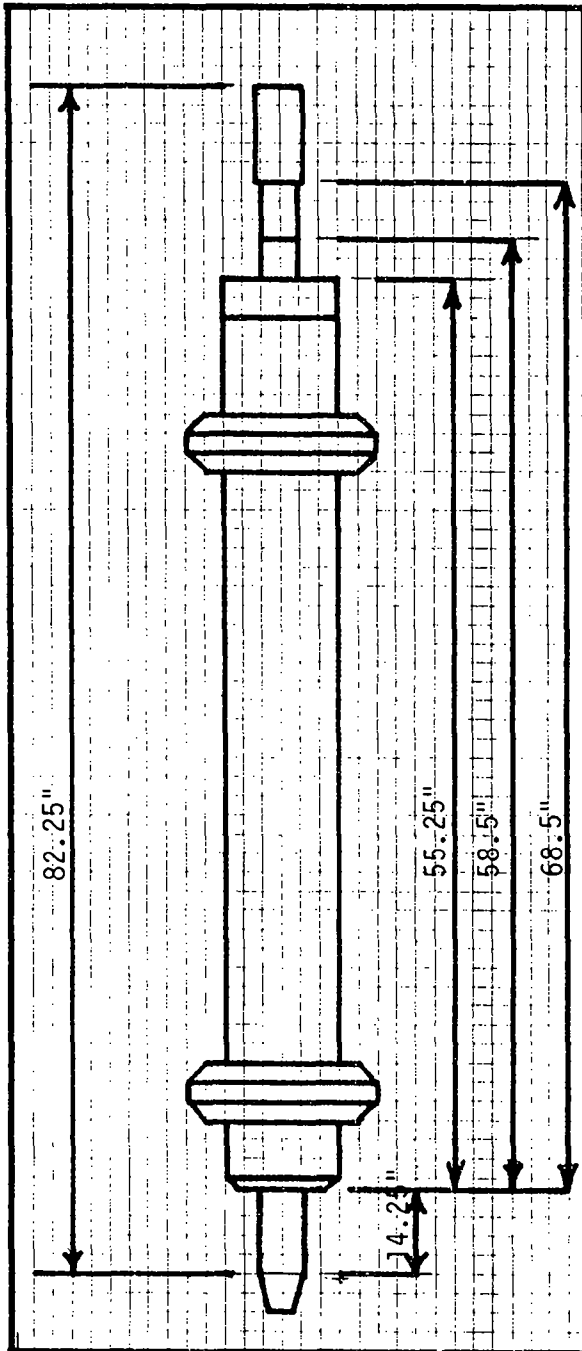


REMARKS :

Drawing schematic only  
Not to scale.

- WELL COMPLETION DATA -

## LUBRICATOR VALVE



REMARKS :

Drawing schematic only.  
Not to scale.

# FLOPETROL

Client : PPCO Norway

Section : 6

Base : NOB

Field : Tommeliten

Page : 11

Well : 1/9-6

Report N°:82/2301/32

## - SEQUENCE OF EVENTS -

DATE	TIME	OPERATION
		DST # 2 and 2 A
		Perforations: 11,930' - 11,990'
		Packer: RTTS 11,853'
		Cushion: Sea water to surface
12/9-82	11:35	EZ-tree on string.
	11:55	Through Rotary table.
	12:35	Lubricator valve on string
	12:45	Lubricator valve through Rotary table.
	14:15	Flowhead on string.
	14:30	Fluted hanger in wear bushing.
	14:45	Ready to pressure test, failsafe valve closed, flowline not connected. Master valve closed, kill valve open.
	14:50	Pressure test master, failsafe and swab valves 7000 psi, ok.
	15:15	End of pressure test, opened master valve, pressure test to D.P. tester valve 7000 psi, ok.
	15:17	Closed EZ-tree valves and bled off pressure above to 500 psi.
	16:00	Repressurized and opened EZ-tree valves, closed lubricator valve. Bled off pressure above to 500 psi.
	16:13	Repressurized and opened lubricator valve. Closed master valve.
	16:27	Repressurized and opened master valve.
	16:27	Bled off pressure.
	16:40	Closed mastervalue.
	16:47	Pick up string.
	16:49	Rotate to set packer
	16:53	String landed.

N° DOP 107

# FLOPETROL

Section : **6**

## \_ SEQUENCE OF EVENTS \_(Continuation)

Page : 12  
Report N°: 82/2301/32

DATE	TIME	OPERATION
12.09.82	16:55	Pick up string again.
	16:57	Set down and lift string again.
	16:59	Turn to set packer.
	17:01	String landed.
	17:03	Pick up.
	17:04	Set down.
	17:05	Pick up
	17:10	Turning
	17:12	Set down
	17:16	Pick up
	17:18	Turning, packer set
	17:22	Set down
	18:00	Opened failsafe to flush lines. To flare.
	18:08	Start to pressure test upstream of choke manifold 7000 psi.
	18:13	Bled off to repair leaking Weco union.
	18:20	Repressurized to 7000 psi.
	18:30	Pressure test ok.
	19:25	Closed kill and swab valves. Opened master and failsafe choke manifold closed.
	19:30	Opened APR-N
	19:37	Opened well to gauge tank on 2" adjustable choke.
	19:54	Shut in well for initial shut in period.
13.09.82	08:20	Close failsafe valve
	09:00	Start pressure test line from boat to kill valve on flow- head.
	09:27	Pressure test finish, ok.
	09:30	Open kill valve.
	09:33	Start stimulation program.
	10:57	Stop stimulation program.
	11:19	Open fail safe valve.

N° DOP 108

# FLOPETROL

Section : **6**Page : 13  
Report N: 82/2301/32

## SEQUENCE OF EVENTS (Continuation)

DATE	TIME	OPERATION
13.09.82	11:22	Open choke on 64/64" adj. to burner slowly bean up to 128/64" adj.
	11:26	Choke on 128/64" adj.
	11:31	Close low-torque valve, kill line.
	11:50	Choke down to 4/64" adj.
	11:52	Choke on 4/64" adj.
	12:00	Close choke manifold.
	12:33	Close failsafe and proceed stimulation program.
		Communication observed between annulus and TBG.
	13:27	Open failsafe and start reverse circulating (through Flopetrol choke to burner).
	14:25	Stop reversing
	14:30	Close failsafe
	15:35	Rigg up kill line to mud pits
	14:43	Start reversing (via kill line)
	17:30	Finish reversing, start rig down.
	17:38	Start picking up to unset packer.
	17:54	Packer unset (4th attempt).
	18:25	Flowhead off string.
	19:38	Lubricator valve off string.
	20:15	EZ-tree off string. Continue pull out rest of test string.
		END DST # 2.
		<u>DST # 2A</u>
16.09.82	06:55	EZ-tree on string
	07:13	EZ-tree through table
	07:34	Lub. valve on string
	07:50	Lub. valve through table
	08:55	Flowhead on string

# FLOPETROL

Section : **6**Page : 14  
Report N°: 82/2301/32

## SEQUENCE OF EVENTS (Continuation)

DATE	TIME	OPERATION
16.09.82	09:10	String landed in BOP
	09:30	Closed failsafe and swab valve, open kill valve and master valve.
	09:45	Pressure test the string to 7000 psi.
	10:19	Closed EZ-tree, bleed down to 500 psi.
	10:35	Pressure up to 7000 psi. open EZ-tree.
	10:36	Closed lub valve, bleed down to 500 psi.
	10:51	Pressure up to 5000 psi, open lub valve.
	10:54	Closed master valve, bleed down to 500 psi.
	11:13	Pressure up to 7000 psi, open master valve. Pressure test ok.
	11:14	Bleed off pressure to zero.
	11:20	Closed master valve.
	11:23	Pick up string to set the packer.
	11:29	Packer set.
	11:52	Fail safe open line up for stimulation and pressure test to 7000 psi against choke manifold.
	14:00	Test ok. Close failsafe and open master.
	14:04	APR-N opened, start stimulation progr.
	15:35	Stimulation programme finished. Opened failsafe valve.
		Start rigging down Dowell lines.
	16:06	Opened well through adjustable choke. Increasing gradually to 12/64". Returns water.
	16:17	Increased adjustable choke to 16/64".
	16:22	Increased adjustable choke to 20/64".
	16:31	Increased adjustable choke to 32/64".
	16:34	Increased adjustable choke to 48/64".
	16:41	Gas to surface.
	19:12	Shut in failsafe and APR-N; leaking chucksan of rig floor.
	19:17	Close master valve.

# FLOPETROL

Section : **6**

## SEQUENCE OF EVENTS (Continuation)

Page : 15  
Report N: 82/2301/32

DATE	TIME	OPERATION
16.09.82	19:18	Open kill line and failsafe to flush lines. Change out leaking chocks.
	19:30	Close choke manifold and pressure test to 7000 psi.
	20:18	Pressure up to 3500 above master and open to choke.
	20:22	Open APR-N.
	20:25	Open slowly towards 32/64" adj. choke
	20:30	Shut in at choke (Due to helicopter)
	20:39	Open well slowly on adj. choke towards 32/64".
	21:00	Switch flow through separator.
17.09.82	01:28	Closed in well at fail safe valve and start to rig up wireline.
	01:30	Start burn off tank contents.
	01:35	Closed choke manifold.
	01:42	Open failsafe valve.
	02:46	SSDR on.
	02:55	Test on TPT ok.
	03:15	Close lubricator valve.
	03:20	Bleed off to burner.
	04:00	Gauges in lubricator, start pressure test to 7000 psi.
	04:45	Test ok, open lubricator valve.
	04:47	Start to run in.
	10:00	Gauges at depth of 11,949' CCL, TPT, at 11,981.73'.
	15:00	Opened well on adjustable choke increasing gradually to 16/64".
	15:18	Changed to 16/64" fixed choke.
	16:05	Diverted flow through heater.
	16:20	Diverted flow through separator.
	16:30	Start readings.
	20:31	Lost signal from TPT.
	21:06	Bypassed separator.

# FLOPETROL

Section : **6**

## \_ SEQUENCE OF EVENTS \_ (Continuation)

Page : 16  
Report N: 82/2301/32

DATE	TIME	OPERATION
17.09.82	21:07	Shut in well at choke manifold.
	21:10	Pick up on wireline to regain tension. Tools seem lost.
		Start to pull out of the hole with wireline.
18.09.82	00:09	Close APR-N
	00:10	"Birds nest" on wireline, unable to go through flowtubes.
	00:20	Start bleeding off tubing pressure.
	00:32	Pressure on 1500 psi.
	00:35	Try to work out the wire.
	00:45	Start bleeding off tubing pressure.
	01:05	Pressure on 0
	07:49	Disconnect the stuffing box and pull out the wire (667 fot)
	08:07	Closed master valve.
	09:35	Rig up slick line BOP.
	10:50	Lubricator on.
	11:00	Pressure test from master valve and up to 5500 psi.
	11:16	Test ok.
	11:18	Open master valve, pump in water to pressure up the whole string to 5500 psi.
	12:01	Pressure up to 5500
	12:45	Open APR-N
	13:00	RIH with wire line 17/8" OD.
	15:01	Closed lubricator valve.
	15:05	Bled off tubing pressure to flare. Retrived W.L. and rigged up with 2" OD impression block.
	16:30	Opened lubricator valve after pressure testing and RIH with W.L.
	17:47	Wireline OOH, close lubricator valve and bleed off tubing pressure.
	20:00	Pressure test to 5500 psi.
	20:30	Open lubricator valve and RIH.



# FLOPETROL

Section : **6**

## \_ SEQUENCE OF EVENTS -(Continuation)

Page : 17  
Report N°: 82/2301/ 32

DATE	TIME	OPERATION
18.09.82	22:00	Wireline on surface, close lubricator valve and bled tubing pressure to flare.
	23:00	Start to rig down wireline lubricator, BOP's etc.
	23:36	Pressurize tubing to 4100 psi and open lubricator valve.
		Start pressurizing annulus to shear APR-M circulating valve.
19.09.82		(Not sure if APR-M is open)
	00:05	Bleed down press to 1000 psi.
	00:31	Closed lubricator valve, bleed off pressure.
	00:37	Open lubricator valve.
	00:41	Closed lubricator valve.
	00:50	Press up against lub. valve to 2500.
	00:52	Open lub. valve.
	01:22	Closed master valve open choke flush lines.
	01:31	Closed fail safe.
	01:32	Open master, pump up string to 200 psi with water.
	01:36	Closed master, rig down lines.
	01:50	Unseat packer, set back in bushing to observe well.
	02:32	Closed choke manifold.
	02:37	Open failsafe valve open choke manifold for bleed down pressure in string.
	02:53	Pressure bleed of, closed choke manifold.
	02:55	Closed fail safe valve.
	02:58	Pressure up the string to 200 psi with mud.
	03:24	Open failsafe.
	03:26	Open choke manifold, and bleed down to 0.
	03:35	Close choke manifold and fail safe valve, try to pressure up the string.
	03:47	Open failsafe valve and choke manifold.
	04:01	Close choke manifold and failsafe valve, try pressure up again.



# FLOPETROL

Client: PPCo Norway  
 Field: Tommeliten  
 Well: 1/9-6

## - WELL TESTING DATA SHEET -

Section : 7

Page : 19  
 Report N°: 82/23017 32

Base : NOB

DATE - TIME	PRESSURE AND TEMPERATURE MEASUREMENTS			SEPARATOR			PROD. RATES AND FLUID PROPERTIES			GOR		Water Production	
	BOTTOM HOLE	WELL HEAD	PSIG	Temp.	Cg. press.	Temp.	Press.	OIL OR CONDENSATE	GAS	GOR	GOR	Rate	Cumulative
Time HRS	Pressure	Tg. temp of	PSIG	Temp.	Cg. press.	Temp.	Press.	Rate	Rate	Rate	Rate	Rate	Units
								Gravity	Gravity	Air = 1	Air = 1	Rate	BBSLS
12.09.82													
19:30	Opened	APR-N											
19:30			DST # 2										
19:31			70										
19:32			193										
19:32			645										
19:33			900										
19:34			1080										
19:35			1195										
19:36			1330										
19:37			1430										
19:37	Opened	well on 2" adjustable	choke for initial flow period.										
19:37			1430										
19:38			50										
19:42			50										2.6

TESTED INTERVAL : 11.930' - 11.990'  
 DEPTH REFERENCE : RKB  
 DEPTH OF B.H. MEASUREMENTS : 11.981.73' RKB

LIQUID FLOW RATE MEASURING CONDITIONS :  
 14.73 PSIA and 60°F

# FLOPETROL

## \_WELL TESTING DATA SHEET\_(Continuation)

Page Report N°: 20 / 82/2301/32

Section : **7**

DATE - TIME	PRESSURE AND TEMPERATURE MEASUREMENTS			PROD. RATES AND FLUID PROPERTIES				GOR		Water Production	
	BOTTOM HOLE	WELL HEAD	SEPARATOR	OIL OR CONDENSATE	GAS		GOR	GOR	Cumulative	Units	
Temp.	Tg. press.	Temp.	Rate	Gravity	Rate	Gravity					
Cumul	Pressure	of	psig	Rate	BSW	Air=1			BBLs		
HRS	MIN										
12:09:82											
19:42											
19:47	10		50						3.4		
19:52	15		50						4.5		
19:54	17		50						5.3		
19:54	0		Shut in well at choke for initial shut in period								
19:56	2		50								
19:57	3		205								
19:58	4		400								
19:59	5		592	48							
20:00	6		780	47							
20:01	7		930	47							
20:02	8		1070	47							
20:03	9		1195	47							
20:04	10		1330	47							
20:05	11		1447	47							
20:06	12		1545	47							
20:07	13		1645	47							
20:08	14		1725	47							



**FLOPETROL** - WELL TESTING DATA SHEET\_(Continuation) Page Report N°: 82/2301/32 Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS			PROD. RATES AND FLUID PROPERTIES				GOR		
Time	Cumul	BOTTOM HOLE	WELL HEAD		SEPARATOR		OIL OR CONDENSATE		GAS		Units
HRS	MIN	Temp.	Pressure	Tg. temp.	Temp.	Press.	Rate	Gravity	Rate	Gravity	BRLS
				OF	PSIG					Air=1	
23:00											
23:30	216			48	2339						
24:00	246			48	2337						
13.09.82											
00:30	276			48	2335						
01:00	306			48	2335						
01:30	336			47	2335						
02:00	366			47	2336						
02:30	396			46	2339						
03:00	426			45	2340						
03:30	456			44	2342						
04:00	486			44	2342						
04:30	516			44	2342						
05:00	546			44	2342						
05:30	576			44	2345						
06:00	606			44	2352						
06:30	636			43	2353						
07:00	666			43	2352						



# FLOPETROL

## \_WELL TESTING DATA SHEET\_(Continuation)

Page Report N: 82/2301/32

: 24

Section : **7**

DATE - TIME	PRESSURE AND TEMPERATURE MEASUREMENTS			SEPARATOR				PROD. RATES AND FLUID PROPERTIES				GOR
	BOTTOM HOLE	WELL HEAD	Temp. of	Tg. temp.	Cg. press.	Temp.	Press.	OIL OR CONDENSATE	GAS		Units	
Time HRS	Temp. Pressure	PSIG	of	PSIG				Rate	Gravity	Rate	Gravity	BBS
13:09.82												
12:08												
12:09				4270								
12:10				4285								
12:11				4280								
12:12				4310								
12:13				4310								
12:14				4320								
12:15				4340								
12:20				4390								
12:25				4440								
12:33												
13:27												
14:25												
14:30												
14:35												
14:43												
17:30												

stimulation program.  
annulus observed  
(through Flopetrol choke to burrel)

Close failsafe valve and proceed  
Communication between tubing and  
Open failsafe, start reverse out  
Stop reversing.  
Close failsafe  
Rig up kill line to mud pits.  
Start reversing (via kill line)  
Finished reversing - end DST # 2



# FLOPETROL

## \_WELL TESTING DATA SHEET\_(Continuation)

Page : 25  
Report N°: 82/2301/32

Section : 7

DATE - TIME	PRESSURE AND TEMPERATURE MEASUREMENTS		PROD. RATES AND FLUID PROPERTIES				GOR	Water Production	
	BOTTOM HOLE Pressure	WELL HEAD Tg. temp. of PSIG	SEPARATOR Temp. Press.	OIL OR CONDENSATE Rate Gravity	GAS Rate Gravity	Ph		BBLs	Units
16.09.82									
Time Cumul HRS	MIN								
16th September 1982		DST # 2A.							
11:29			Set packer and start pressure test surface lines.						
14:00			Test ok. Close failsafe and open master valve.						
14:04			Open APR-N and start stimulation program.						
15:35			End of stimulation program. Opened failsafe valve.						
16:06			2760						
16:06	-		Opened well through adjustable choke increasing gradually to 12/64". Returns water.						
16:06	0		2760						
16:07	1		2785						
16:08	2		2820						
16:09	3		2850						
16:10	4		2867						
16:11	5		2895						
16:12	6		2922						
16:13	7		2950						
16:14	8		2974						
16:15	9		3005						5.0





**FLOPETROL** - WELL TESTING DATA SHEET\_(Continuation)

DATE - TIME	PRESSURE AND TEMPERATURE MEASUREMENTS			SEPARATOR				PROD. RATES AND FLUID PROPERTIES				GOR								
	BOTTOM HOLE	WELL HEAD	SEPARATOR	OIL OR CONDENSATE	GAS		Water	GAS		Mercaptan										
Time	Temp	Pressure	Tg. temp	Ig. press.	Cg. press.	Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity	Rate	Ph/Cl	Co2	H2S	Units			
HRS	MIN		OF	PSIG				%				Air=1			%	PPM	Units			
16:45																				
16:46	12		77	3410																
16:47	13			3410																
16:48	14			3420																
16:49	15			3425																
16:50	16		80	3427																
16:55	21		86	3430																
17:00	26		90	3425				27						6.5/ 60.000						
17:05	31		103	3440																
17:10	36		110	3445																
17:15	41		115	3450																
17:20	46		120	3455																
17:25	51		123	3450																
17:30	56		127	3500				20						6.5/ 59.000	6	0	0			
17:45	71		133	3510																
18:00	86		138	3497				18						5.5/ 53.000						
18:15	101		141	3517																
18:30	116		145	3507				7										1	0	0













# FLOPETROL

## \_WELL TESTING DATA SHEET\_(Continuation)

Page Report N°: 34  
82/2301/32

Section : **7**

DATE - TIME	PRESSURE AND TEMPERATURE MEASUREMENTS		SEPARATOR				PROD. RATES AND FLUID PROPERTIES				GOR	
	BOTTOM HOLE	WELL HEAD	Temp.	Ig.press.	Cg.press.	Temp.	Press.	OIL OR CONDENSATE	GAS			
Time	Pressure	Ig.press.	PSIC	OF	PSIC	Temp.	Press.	Rate	Gravity	Rate	Gravity	Units
HRS	MIN										Air=1	
17:09:02												
02:15												
02:20												
02:25												
02:30												
02:35												
02:40												
02:45												
02:50												
02:55												
03:00												
03:05												
03:10												
03:15												
03:18												
04:00												
04:45												
04:46												
04:47												

Closed lub. valve, bleed of pressure  
Gauges in lubricator, start pressure test to 7000 psi.  
Test ok, open lub. valve





**FLOPETROL** WELL TESTING DATA SHEET\_(Continuation) Page Report N°: 82/2301/32 Section : **7**

DATE - TIME	PRESSURE AND TEMPERATURE MEASUREMENTS			SEPARATOR				PROD. RATES AND FLUID PROPERTIES			
	BOTTOM HOLE	WELL HEAD		Temp.	Press.	Rate	Gravity	Rate	Gravity	GAS	
Time	Temp of PSIA	Iq. temp of PSIG	Cg. press.	Temp.	Press.	Rate	Gravity	Rate	Gravity	Units	
18.09.82											
15:00											
15:01	251.2	6983.3	-								
15:02	251.2	6982.5	4855								
15:03	251.2	6982.0	4881								
15:04	251.2	6981.8	4885								
15:05	251.2	6982.0	4854								
15:06	251.2	6981.3	54	4885							
15:07	251.2	6981.1	54	4885							
15:08	251.2	6980.9	54	4885							
15:09	251.2	6981.1	54	4884							
15:10	251.2	6981.3	54	4883							
15:11	251.2	6981.3	54	4883							
15:12	251.2	6980.9	54	4882							
15:13	251.2	6980.9	54	4882							
15:14	251.2	6980.9	54	4882							
15:15	251.2	6980.8	54	4880							
15:18	18	Changed to 16/64" fixed choke.									
15:20	20	251.5	6973.9	4837							

**FLOPETROL** - WELL TESTING DATA SHEET\_(Continuation) Page Report N°: 82/2301/32 Section : 7

DATE - TIME	PRESSURE AND TEMPERATURE MEASUREMENTS			SEPARATOR			PROD. RATES AND FLUID PROPERTIES			GOR			
	BOTTOM HOLE		WELL HEAD		Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity	Water	Co <sub>2</sub> /5/H <sub>2</sub> S
Time	Temp. of PSIA	Pressure	Tg. temp. of PSIG	Ig. press. of PSIG	°F	PSIG	BBLs/D	60/60 %	MMSCF/D	Air = 1	PH/c.l-	PPM	Units
17:09:32													
15:20													
15:25	25	251.2	6969.1	55	4842								
15:30	30	251.2	6964.1		4820								
15:35	35	251.2	6960.0	58	4805								
15:40	40	251.2	6956.3	59	4785								
15:45	45	251.2	6954.2	60	4770								
16:00	60	251.2	6936.6	66	4690								
16:15	75	251.3	6926.2	70	4714								
16:20	80	251.3	6923.6	Diverted flow through separator.									
16:30	90	251.4	6917.7	73	4745								
16:45	105	251.4	6909.1	74	4750								
17:00	120	251.5	6901.8	75	4750	68	195	.804	0	4.682	.710	4762	N/A
17:30	150	251.6	6889.6	77	4740	72	195			4.636		4809	N/A
18:00	180	251.8	6879.8	78	4735	72	195		0	4.636		4932	N/A
18:30	210	251.9	6871.4	79	4730	72	195			4.585		4828	N/A
19:00	240	252	6863.9	80	4725	71	195	.803	0	4.627	.706	4800	N/A
19:30	270	252.1	6857.3	80	4720	72	195			4.597		4890	N/A
20:00	300	252.2	6851.4	81	4715	74	195			4.587		4905	N/A



# FLOPETROL

## \_WELL TESTING DATA SHEET\_(Continuation)

Page : 40  
Report N: 82/2301/32

Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS			SEPARATOR			PROD. RATES AND FLUID PROPERTIES			GOR	
Time HRS	Cumul MIN	BOTTOM HOLE		WELL HEAD		SEPARATOR		OIL OR CONDENSATE		GAS		Units
		Temp.	Pressure	Iq. temp of	Iq. press. PSIG	Cg. press.	Temp.	Press.	Rate	Gravity	Rate	
17:09.82												
21:22												
21:25	18			62	2827							
21:30	23			60	2827							
21:35	28				2825							
21:40	33				2825							
21:45	38				2819							
21:50	43				2817							
21:55	48				2812							
22:00	53				2810							
22:15	68				2802							
22:30	83				2799							
22:45	98				2789							
23:00	113				2779							
23:15	128				2767							
23:30	143				2755							
24:00	173				2730							
18.09.82												
00:09	182											

Closed APR-N, start bleeding off tubing pressure to flare.







# FLOPETROL

DIVISION : NSD

BASE : NOB

REPORT N°: 82/2301/ 32

## Well Testing Report Annexes —

Client : PPCO Norway

Field : Tommeliten

Well : 1/9-6

Zone : Cretaceous

Date : 12.09.82 - 19.09.82

DST No. 2

DST No. 2A

## INDEX of ANNEXES

- 1** - BOTTOM HOLE PRESSURE AND TEMPERATURE MEASUREMENT -
  - 1.1 - B. H. guge calibration -
  - 1.2 - B. H. pressure calculation -
  - 1.3 - B. H. temperature calculation -
  
- 2** - LIQUID PRODUCTION RATE MEASUREMENT -
  - 2.1 - Measurements with tank -
  - 2.2 - Measurements with meter -
  
- 3** - GAS PRODUCTION RATE MEASUREMENT -
  
- 4** - SAMPLING SHEETS -
  - 4.1 - Bottom hole sampling -
  - 4.2 - Surface sampling -
  
- 5** - CHARTS AND MISCELLANEOUS -

- LIQUID PRODUCTION RATE MEASUREMENT -2.1 - MEASUREMENT WITH TANK -

$$V_o = V \times K \times (1 - BSW)$$

$V_o$  : Net oil volume at 60°F and atmospheric pressure.

$V$  : Gross oil volume measured by tank gauging.

$K$  : Volume correction factor to be applied between the tank temperature during gauging and 60°F.

BSW : Basic sediments and water.

2.2 - MEASUREMENT WITH METER -

a) Shrinkage factor is measured by shrinkage tester.

$$V_o = V_S \times f \times (1 - Shr) \times K \times (1 - BSW)$$

$V_o$  : Net oil volume at 60°F and atmospheric pressure.

$V_S$  : Gross oil volume measured by meter under separator conditions.

$f$  : Meter correction factor =  $\frac{\text{Volume measured in tank}}{\text{Volume measured by meter}}$

$Shr$  : Percentage of oil volume reduction between separator and tank conditions, reported to oil volume at separator conditions.

$K$  : Volume correction factor to be applied between the final temperature during shrinkage measurement and 60°F.

BSW : Basic sediments and water.

b) Shrinkage factor is measured with tank.

$$V_o = V_S \times (1 - Shr') \times K \times (1 - BSW)$$

$V_o, V_S, K$  and BSW : Same meaning as in a).

$(1 - Shr')$  : Shrinkage factor including meter correction factor.

# FLOPETROL

Client: PPCo Norway

Field: Tommeliten

Well: 1/9-6

Section : Annex

**2.1**

Page : 45

Report N° : 82/2301/32

**- OIL PRODUCTION RATE -  
- MEASUREMENT WITH TANK -**

Base : NOB

Date - Time	Gauge Graduation	Tank volume		STO Gravity		K	BSW %	Net volume of STO %	Net STO product. rate	Cumulative production							
		Volume V	Temp.	Gravity	Temp.						Grav. 60°F	S.G.	BBSLS	°F	S.G.	BBSLS	/day
12.09.82																	
19:30	Open APR-N																
19:37	Open well to tank on 2" Adj. choke																
19:37	37																
19:42	47	2.64						2.6	760.3	2.6							
19:47	50	.79						0.8	228.1	0.8							
19:52	54	1.06						1.1	304.1	1.1							
19:54	57	0.79						.8	570.2	.8							
19:54	Shut in well at choke manifold.																
23:05	Diverted flow to the tank																
23:05	37.0																
23:10	113.0	20.06	76	.807	.810	.9921	3	19.30	2779.2	19.30							
23:10	Diverted flow back to burner, meterreading in same																

1 cm = 0.264 BBSLS in tank.

Tested interval : Cretaceous  
Perforations : 11.930' - 11.990'

time = 27.3 BBSLS



# FLOPETROL

Client: PPCo Norway  
 Field: Tommeliten  
 Well: 179-6

WATER - PRODUCTION RATE -  
 - MEASUREMENT WITH METER -

Section: **ANNEX 2.2**  
 Page: 47  
 Report N°: 82/23017 32

Base: NOB Meter reading: 59.48 Units: BBLs

DATE - TIME	Interval	MIN	Meter reading BBLs	Vs BBLs	BSW %	V <sub>o</sub> *	1 - Shr		OIL GRAVITY		K	Net volume of STO. V <sub>o</sub> BBLs	Net STO product rate BBL/day	Cumulative production BBLs
							Factor	Temp	Gravity	Temp				
16.09.82				DST # 2A										
22:55	-			Dumped water from separator.										
23:00	-		62,98	3.50	-	-	-	-	-	-	-	3.70	-	
23:30	30		64.90	1.92	-	-	-	-	-	-	-	2.03	97.3	5.73
24:00	30		66.50	1.60	-	-	-	-	-	-	-	1.69	81.1	7.42
17th September 1982														
00:30	30		68.53	2.03	-	-	-	-	-	-	-	2.14	102.9	9.56
01:00	30		69.76	1.23	-	-	-	-	-	-	-	1.30	62.3	10.86
01:28	28		71.18	1.42	-	-	-	-	-	-	-	1.50	63.8	12.36
01:28	28		Closed in well at failsafe valve.											

Shrinkage factor measured by Shrinkage tester  Tank   
 \*V<sub>o</sub> = V<sub>s</sub> x f (1 - BSW) = Net oil volume at separator conditions. f = 1.056  
 TESTED INTERVAL: Cretaceous  
 PERFORATIONS: 11.930' - 11.990'



# FLOPETROL

Client: PPCo Norway

Field: Tommeliten

Well: 1/9-6

Base: NOB

## - OIL PRODUCTION RATE - - MEASUREMENT WITH METER -

Section: ANNEX 2.2

Page: 48

Report N: 82/2301/32

DATE - TIME	Interval HRS	Meter reading BBSL	VS BBSL	BSW %	V <sub>o</sub> ' BBSL	1 - Shr		OIL GRAVITY		K	Net volume of STO. V <sub>o</sub> BBSL	Net STO product rate BBSL/day	Cumulative production BBSL	Units
						Factor I-%	Temp. of F	Gravity S.G.	Temp. of F					
16.09.82			DST # 2A											
21:00	-	Diverted flow through separator												
21:30	-	Start readings.	Estimated cumulative production										450	
21:30	-	79.9												
22:00	30	168.0	88.1	0	82.20	.900	56	.807	.810	1.0020	74.1	3557.9	524.1	
22:30	30	247.9	79.9	0	74.55	.900	56	.807	.810	1.0020	67.2	3226.8	591.3	
23:00	30	326.1/21.8	78.2	0	72.96	.900	56	.807	.810	1.0020	65.8	3158.1	657.1	
23:30	30	101.2	79.4	0	74.08	.900	56	.807	.810	1.0020	66.8	3206.6	723.9	
24:00	30	181.1	79.9	0	74.55	.900	56	.807	.810	1.0020	67.2	3226.8	791.2	
17th September 1982														
00:30	30	262.6	81.5	0	76.04	.900	56	.795	.800	1.0020	68.6	3291.5	859.7	
01:00	30	336.6	74.00	0	69.04	.900	56	.807	.800	1.0020	62.3	2988.6	922.0	
01:28	28	405.9	69.30	0	64.66	.900	56	.807	.800	1.0020	58.3	2998.7	980.3	
01:28	-	Shut in well at failsafe valve.												
16:20	-	Diverted flow through separator												

Shrinkage factor measured by Shrinkage tester  Tank   
 \*V<sub>o</sub>' = V<sub>S</sub> x f x (1 - BSW) = Net oil volume at separator conditions. f = 1.017  
 FLOCO: 1.017 TESTED INTERVAL: Cretaceous  
 ROTRON: 0.933 PERFORATIONS: 11.930' - 11.990'



### - GAS PRODUCTION RATE MEASUREMENT by orifice meter -

Reference is made to the rules and coefficients given in AGA gas measurement Comitee Report No. 3 for orifice metering.

#### a) Equations -

$$Q = C \sqrt{hw \times Pf}$$

- Q : Production rate at reference conditions.
- C : Orifice flow coefficient.
- hw : Differential pressure in inches of water.
- Pf : Flowing pressure in psia

$$C = Fu \times Fb \times Fg \times Y \times Fff \times Fpv$$

- Fu : Unit conversion factor in desired reference conditions.
- Fb : Basic orifice factor (Q in Cu. ft/hour).
- Fg : Specific gravity factor.
- Y : Expansion factor.
- Fff : Flowing temperature factor.
- Fpv : Supercompressibility factor (estimated).

#### Remarks

- Fm : Manometer factor is equal one since only bellows type meters are used.
- Fr : Reynolds factor is considered to be one.

TABLE OF Fu FACTOR				
UNITS	REFERENCE CONDITIONS			
	60° F 14.73 psia	0° C 760 mm Hg *	15° C 760 mm Hg*	15° C 760 mm Hg*
Cu. ft/hour	1	0.9483	1.0004	1.0137
Cu. ft/day	24	22.760	24.009	24.329
m3/hour	0.02832	0.02685	0.02833	0.02870
m3/day	0.6796	0.6445	0.6799	0.6889

\* Mercury at 32 F

#### b) Meter data -

Meter type : Daniel Flange taps - Pf taken down ~~the~~ stream  
 Flow recorder type : Barton ID of meter tube : 5.761"

#### c) Specific gravity source -

Sampling point : Top of Separator gas outlet  
 Gravimeter type : KIMRAY

#### d) Supercompressibility factor Fpv -

All coefficients are from AGA NX 19 manual for natural gas free of air, CO<sup>2</sup> and H<sub>2</sub>S. More accurate values could only be determined by laboratory measurement.

Section : ANNEX 3  
 Page Report N : 51 / 82/2301/32

- GAS PRODUCT. RATE MEASUREMENT -

Client : PPCo Norway  
 Field : Tommeliten  
 Well : 1/9-6

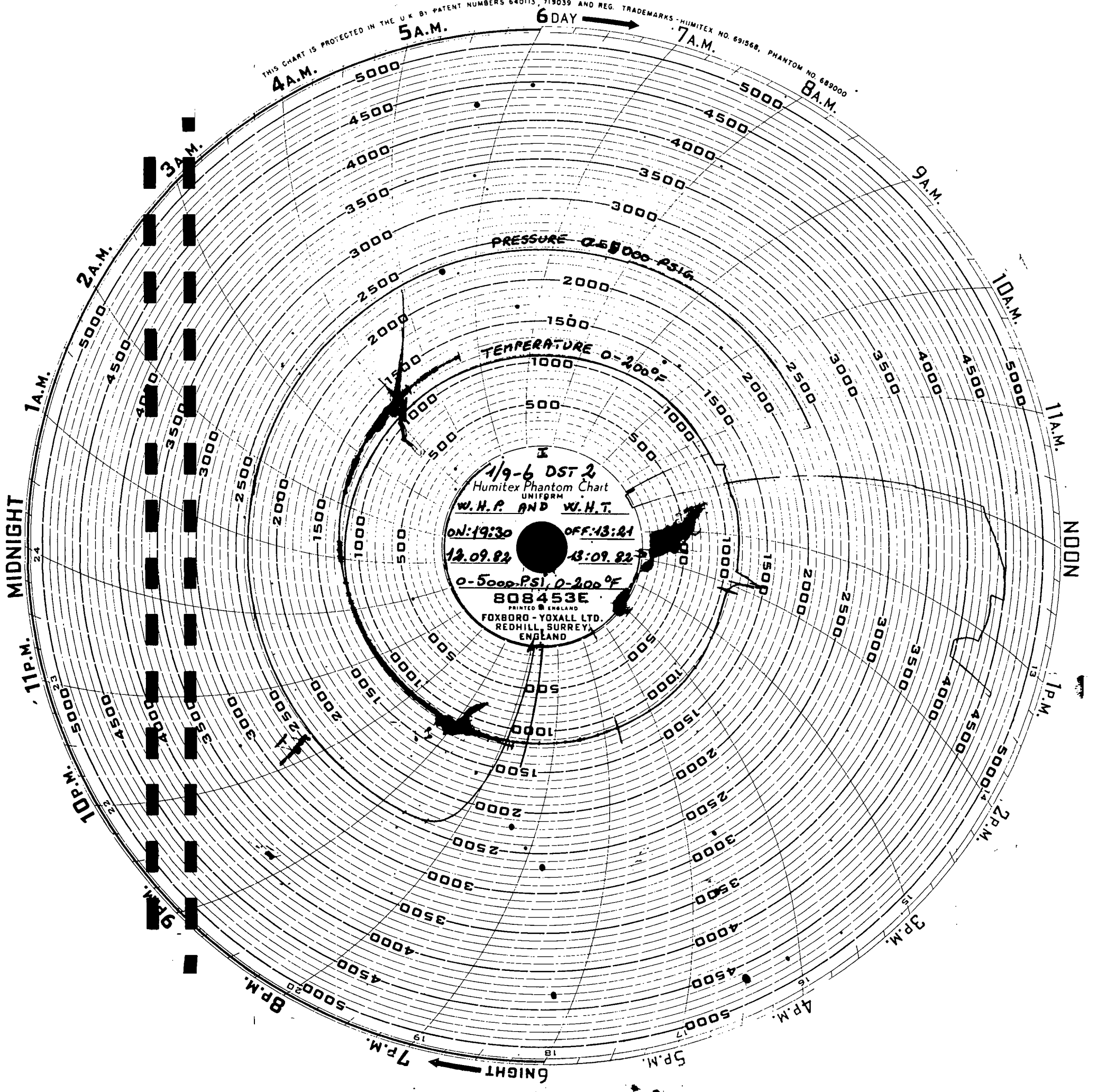
Base : NOB

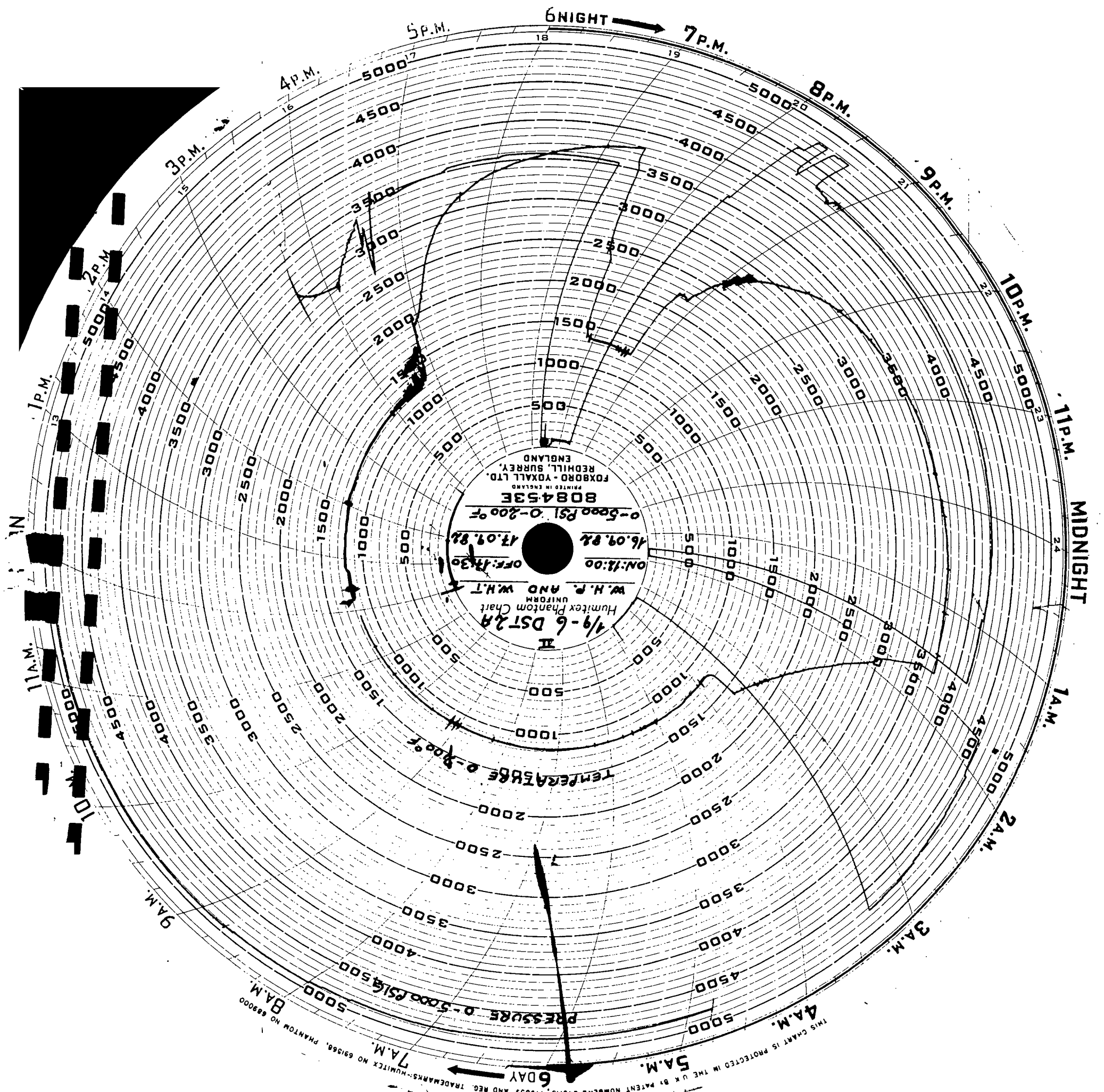
DATE - TIME Interval HRS	Flowing Temp OF	Pf absolute psia	h w of wat	$\sqrt{h_w \times P_f}$	Orifice diameter Inches	Gas gravity (air=1)	F <sub>b</sub>	F <sub>g</sub>	Y	F <sub>tf</sub>	F <sub>pv</sub>	C	Gas production	
													rate MMSCFD	Q Cumulative Production MMSCF
16.09.82				DST # 2A										
21:00				Diverted flow through separator										
21:30				Estimated cumulative production until 21:30 Hrs.									2.6	
22:00	75	825	80	256.905	3.250	.683	2276.5	1.2100	1.0006	.9859	1.0841	70702	18.16	2.978
22:30	79	825	81	258.505	3.250	.683	2276.5	1.2100	1.0006	.9822	1.0815	70267	18.16	3.357
23:00	80	825	88	269.444	3.250	.682	2276.5	1.2109	1.0006	.9813	1.0806	70197	18.91	3.751
23:30	84	825	91	273.998	3.250	.682	2276.5	1.2109	1.0006	.9777	1.0781	69777	19.12	4.149
24:00	84	825	93	276.993	3.250	.689	2276.5	1.2047	1.0006	.9777	1.0800	69542	19.26	4.550
17th September 1982														
00:30	84	825	93	276.993	3.250	.689	2276.5	1.2047	1.0006	.9777	1.080	69542	19.26	4.951
01:00	84	825	90	272.489	3.250	.689	2276.5	1.2047	1.0006	.9777	1.080	69542	18.95	5.346
01:28	84	825	90	272.489	3.250	.689	2276.5	1.2047	1.0006	.9777	1.080	69542	18.95	5.715
01:28				Shut in well at failsafe valve										
16:20				Diverted flow through separator										
16:30				Start measurements. Estimated cum. till 16.30										6.008

F<sub>u</sub> = 24  
 Recorder ranges P<sub>f</sub> = 0-1500 PSIG  
 h<sub>w</sub> = 0-400" H<sub>2</sub>O Temp = 0-180°F  
 TESTED INTERVAL : Cretaceous PERFORATIONS : 11.930' - 11.900'



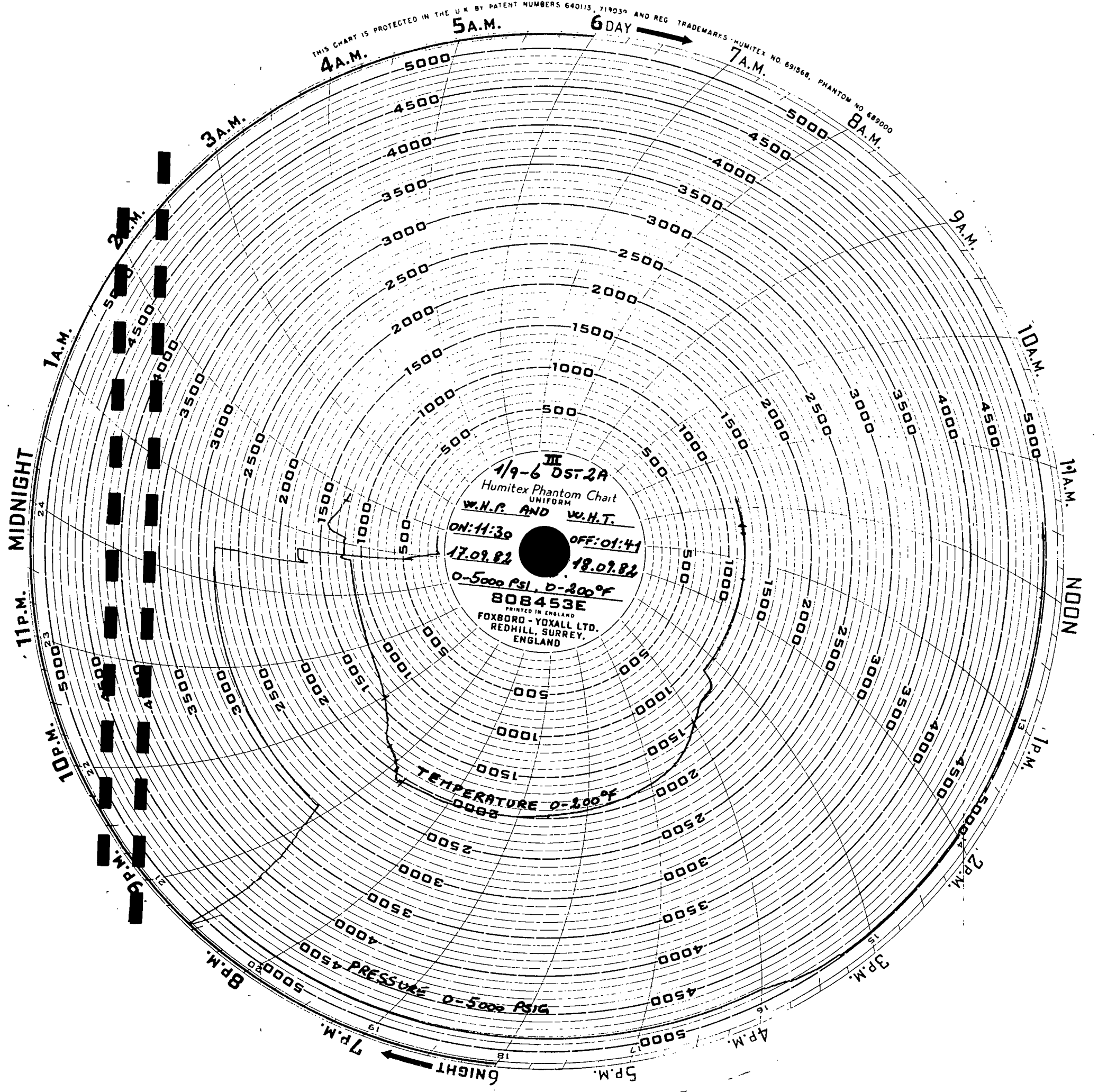
THIS CHART IS PROTECTED IN THE U.K. BY PATENT NUMBERS 640113, 719039 AND REG. TRADEMARKS - HUMITEX NO. 691568, PHANTOM NO. 689000





THIS CHART IS PROTECTED IN THE U.K. BY PATENT NUMBERS 640113, 719029 AND REG. TRADEMARKS--HUMITEX NO 691566, PHANTOM NO 689000  
 7 A.M.

THIS CHART IS PROTECTED IN THE U.K. BY PATENT NUMBERS 640113, 719039 AND REG. TRADEMARKS HUMITEX NO. 691568, PHANTOM NO. 69000



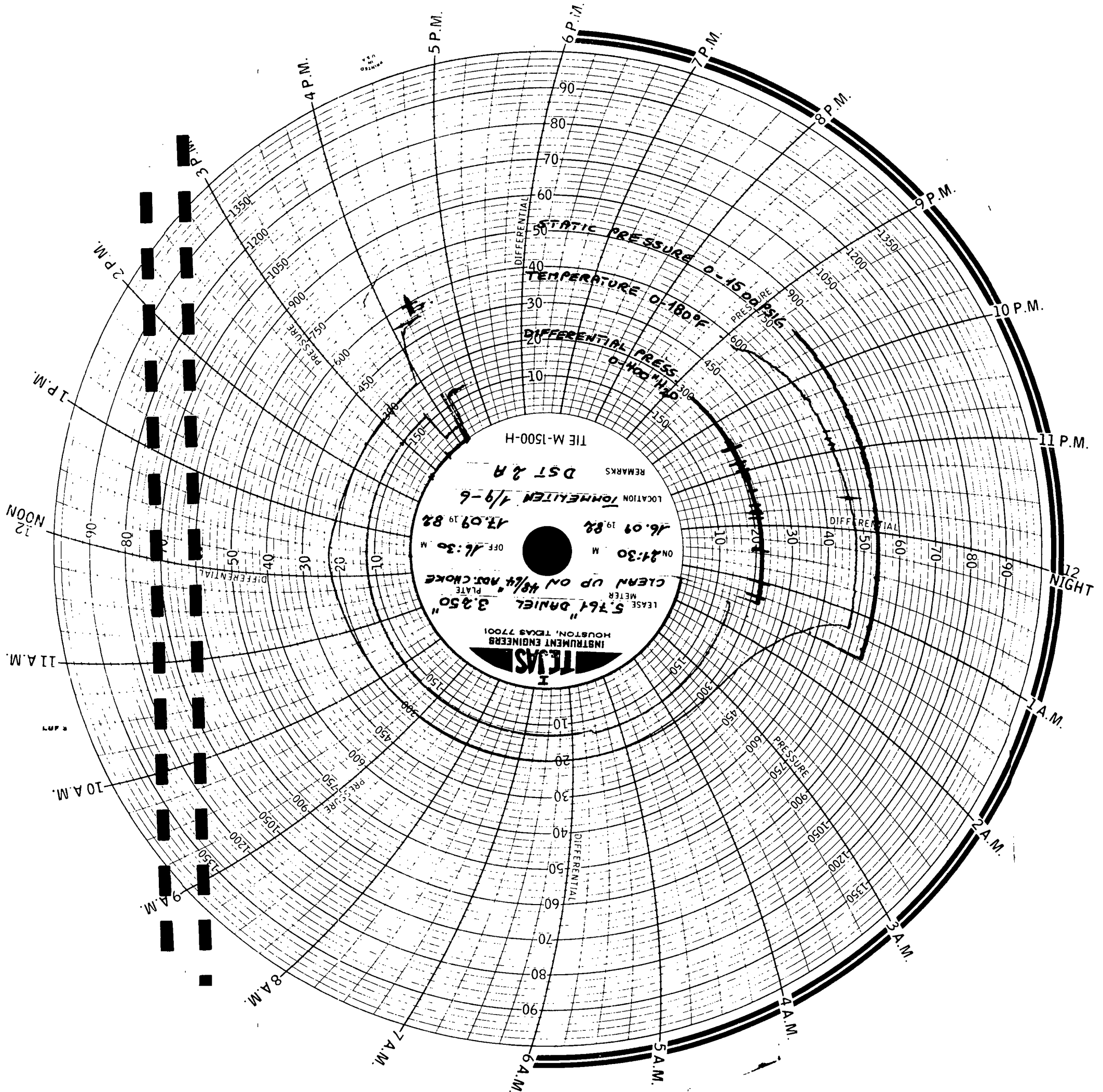
1/9-6 DST-2A  
Humitex Phantom Chart  
UNIFORM  
W.H.P. AND W.H.T.  
ON: 11:30 OFF: 01:41  
17.09.82 18.09.82  
0-5000 PSI, 0-200°F  
808453E  
PRINTED IN ENGLAND  
FOXBORO - YOXALL LTD.  
REDHILL, SURREY,  
ENGLAND

TEMPERATURE 0-200°F

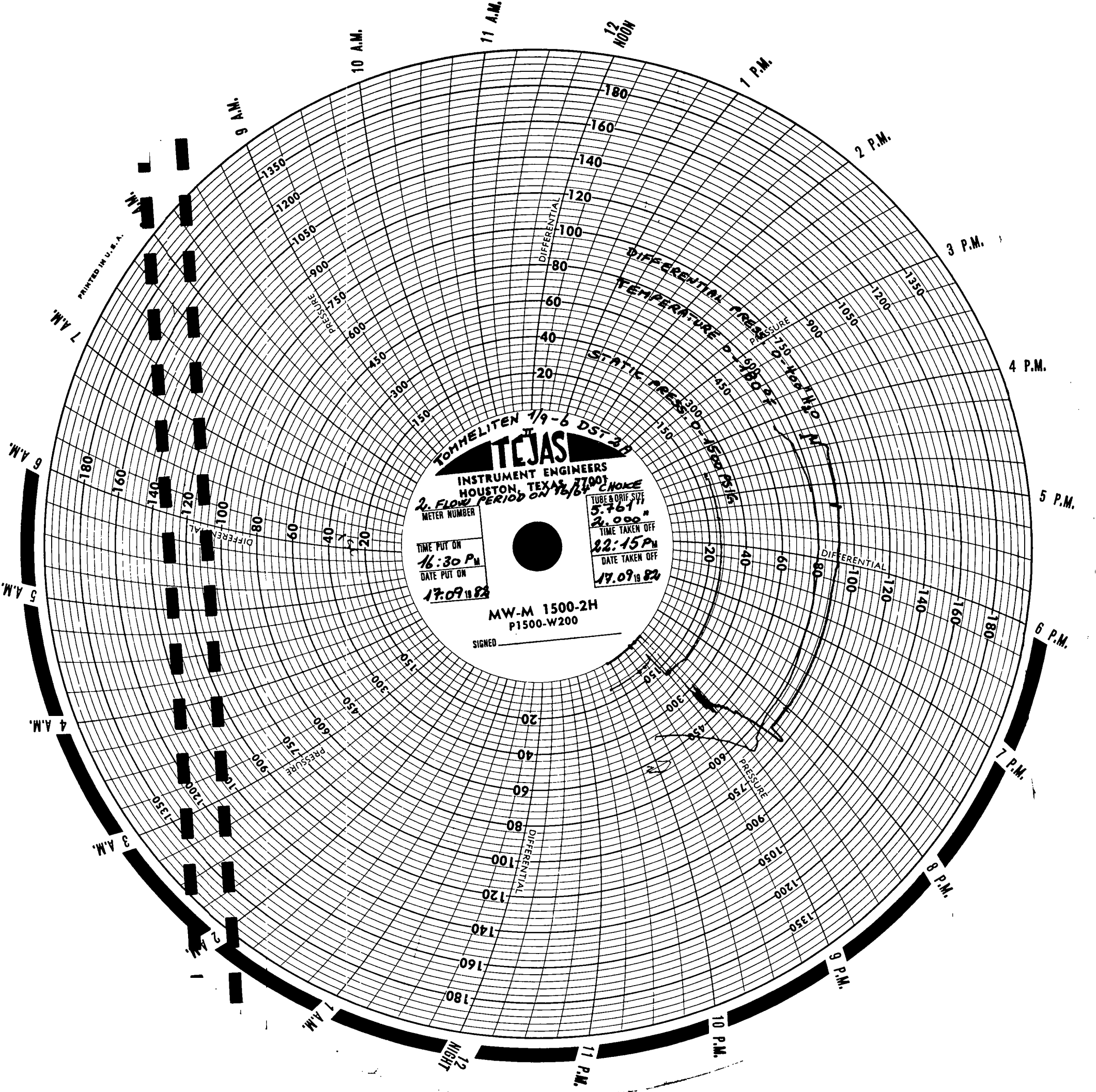
PRESSURE 0-5000 PSIG

6 NIGHT





PRINTED IN U.S.A.



10 A.M.

11 A.M.

12 NOON

1 P.M.

2 P.M.

3 P.M.

4 P.M.

5 P.M.

6 P.M.

7 P.M.

8 P.M.

9 P.M.

10 P.M.

11 P.M.

12 NIGHT

1 A.M.

2 A.M.

3 A.M.

4 A.M.

5 A.M.

6 A.M.

7 A.M.

8 A.M.

9 A.M.