

CONOCO NORWAY INC.  
NORWEGIAN GULF OIL PRODUCTION COMPANY  
K/S A/S PELICAN ET COMPANY.

FINAL REPORT - NORWEGIAN NORTH SEA WELL 7/9-1.

LIST OF CONTENTS

Location Plat 1:100,000.

<u>A) GEOLOGICAL REPORT</u>		<u>PAGE</u>
I	Summary	1
II	Well Data	2
III	Formation Tops	3
IV	Hydrocarbon Indications.	4
V	Schlumberger log evaluation.	5
 <u>B) ENGINEERING REPORT</u>		
 <u>C) ENCLOSURES</u>		
I	Composite Well log (with BHC Sonic Gamma Ray log)	
II	Wellsite Lithologic log.	
III	Exploration Logging Co. Mud log.	
IV	Schlumberger logs.	
V	Micropalaeontology Report.	
VI	Core Analysis Report.	

GEOLOGICAL LIBRARY

CONOCO NORWAY INC.  
NORWEGIAN GULF OIL PRODUCTION CO.  
K/S A/S PELICAN ET CO.

WELL LOCATION PLAT.

Well : CONOCO / GULF / PELICAN - 7 / 9 - 1

Country :- Norway

Location :- Lat : 57° 20' 37.1" N.

Long : 02° 51' 21.4" E.

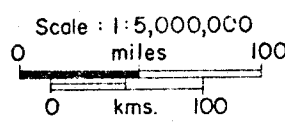
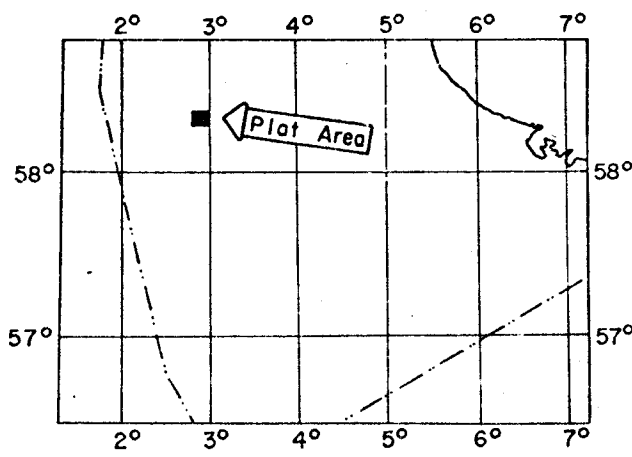
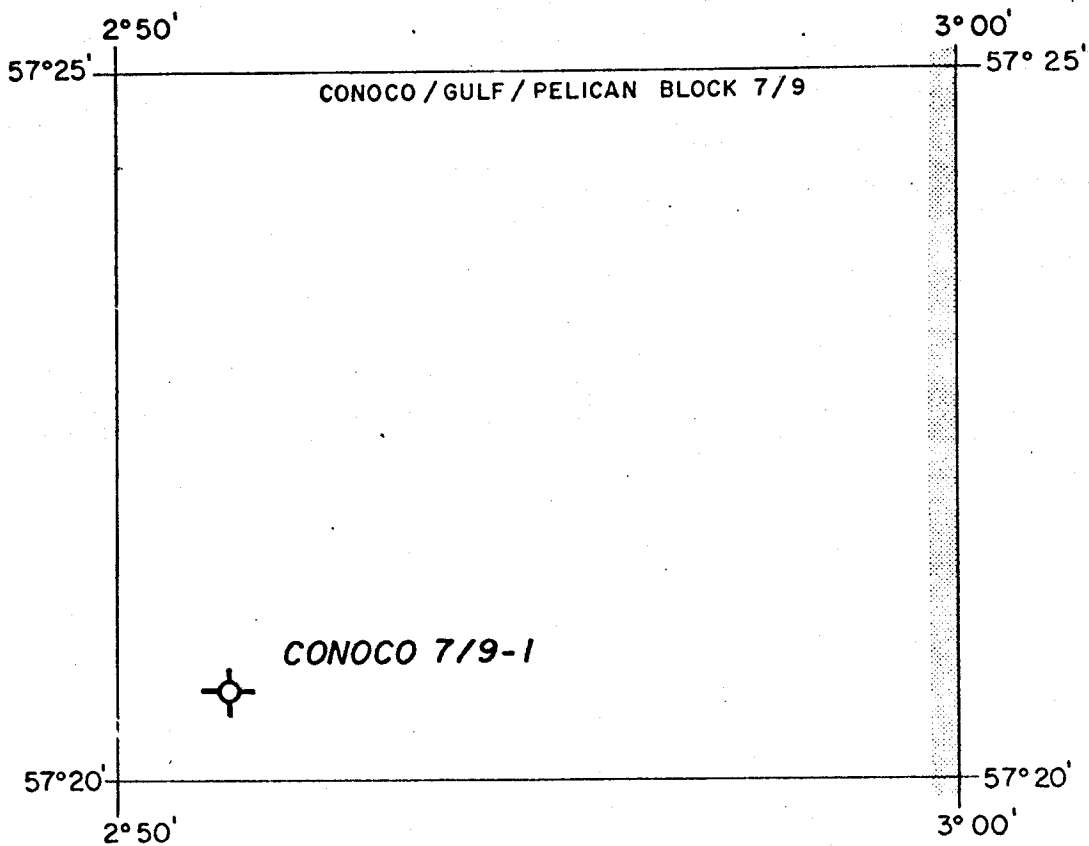
Area :- North Sea

K.B. elev. :- 101 ft.

Water depth :- 229 ft.

T.D. :- 9617' (Schl.) 9614' (Driller)

Scale 1:100,000



I SUMMARY

Conoco/Pelican/Gulf 7/9-1 was an exploration well drilled in the Norwegian sector of the North Sea under a farmin agreement with Gulf, Conoco acting as the operator.

The objective of the well was to test for hydrocarbons in Tertiary, Cretaceous Jurassic and Triassic reservoirs over a Zechstein salt well which showed 1300 feet of vertical closure over an area of about 25 square miles at the base Tertiary level.

The Tertiary Palaeocene Sands were not developed over the structure. All the other objectives, the Tertiary Danian calcarenites, upper Cretaceous Maestrichtian chalk and the Middle Jurassic to Triassic sandstones were water bearing. The well was plugged and abandoned as a dry hole at a total depth of 9614 feet in Zechstein salt.

## II WELL DATA

1).	<u>Cores.</u>	<u>Interval</u>	<u>Recovery</u>	<u>Lithology</u>
	Core No.1	7249-7273	7249-7264.5	Limestone + Shale
	Core No.2	7403-7416	7403-7413	Limestone

N.B. On the composite log the position of the cores has been adjusted by  $5\frac{1}{2}$  ft downward to fit the Schlumberger Sonic Gamma Ray log.

Detailed description at foot of the composite log.

### 2). Sidewall Cores.

A total of 90 sidewall cores were shot with recoveries from 74 shots.

Detailed descriptions at the foot of the composite log.

### 3). Electric logs.

Schlumberger logs were run before setting  $9\frac{5}{8}$ " casing and at T.P.. A logging run prior to setting  $12\frac{3}{4}$ " casing failed due to poor hole conditions.

Details on composite log heading.

III FORMATION TOPS

	<u>BRT(ft)</u>	<u>Subsea(ft)</u>	<u>Thickness(ft)</u>
<u>Quaternary</u>			
Pleistocene-Recent	330	-229	850
<u>Tertiary</u>			
Pliocene (with L. Pleistocene)	1180	-1079	1020
Pliocene	2200	-2099	780
Upper Miocene - (with? L. Pliocene)	2980	-2879	650
Lower/Middle Miocene	3630	-3529	840
Oligocene (? Upper)	4470	-4369	1520
Middle Oligocene	5990	-5889	300
Lower Oligocene or Upper - Eocene	6290	-6189	260
Lower Eocene	6550	-6449	249
Upper to Middle Palaeocene	6799	-6698	444
<u>Cretaceous</u>			
Danian	7243	-7142	30
Maestrichtian	7273	-7172	207
Maestrichtian-Campanian	7480	-7379	180
Campanian-Senonian	7660	-7559	138
Albian-Aptian	7798	-7697	42
Barremian	7840	-7739	205
<u>Jurassic</u>			
Furbeckian-Kimmeridgian	8045	-7944	233
Lias (Lower)	8278	-8177	255
<u>Triassic</u>			
Rhaetian?	8533	-8432	24
Undifferentiated	8557	-8456	671
<u>Permian</u>			
Zechstein	9228	-9127	389+
Total Depth	9617 (Schl)	-9516.	

2486  
254

#### IV HYDROCARBON INDICATIONS.

Continuous recording of the gas content of the mud was carried out using a hot wire detector for total gas and a chromatograph for recording the individual hydrocarbons. No problems of gas detection were encountered even though the diesel oil content of the mud was maintained between 4% and 7%.

During the drilling of the Tertiary section to a depth of 5500 feet shale gas from the sometimes richly organic shales maintained a high background between 0.5% and 1% methane in the mud with maximum values of 2.5% recorded between 1650 feet and 1950 feet. Below 5500 feet background readings were generally below 0.1% methane to the base of the Tertiary shale section.

The upper Jurassic shales between <sup>2453.6m</sup>8050 feet and <sup>2484.1m</sup>8150 feet also gave indications up to 0.1% methane.

Apart from the shale gas recorded no shows were encountered in any of the porous sections.

## V SCHLUMBERGER LOG EVALUATION

The following Schlumberger logs were run beneath the 9 $\frac{5}{8}$ " casing: -

	Logged Interval (KB depths)
Induction - Electric log	7037' -9563'
Microlaterolog (with caliper)	7034' -9608'
BHC Sonic/Gamma	7038' -9605'
Formation Density/Gamma	7037' -9614'
High Resolution Dipmeter (4-arm)	7038' -9616'

### Remarks.

Because of the thick mud cake build-up over the porous zones of interest, the microlaterolog is unsuitable for quantitative use. Therefore water saturations cannot be determined from the  $\frac{R_{xo}}{R_t}$  Vs  $\frac{R_{mf}}{R_w}$  crossplot.

However, an inspection of the Induction Electric log proves that no hydrocarbons are present. Over all porous zones in the Lower Tertiary Upper Cretaceous carbonates, Jurassic sandstones, and Triassic sandstones, the deep reading RIND curve always reads less than the shallower reading 16" short normal curve. This is to be expected as the salinity of the mud filtrate is 51,000 ppm NaCl compared with formation water Salinities greater than 125,000 ppm NaCl.

The SP curve appears to function normally until 8900' KB. However, below this depth, it loses its character because of the increase in mud salinity.

Determination of Rw

1. Lower Tertiary - Upper Cretaceous carbonates

Depth (ft) KB	pb gm/cc	C millimeters/m
7245	2.44	1100
7262	2.42	1250
7280	2.35	1900
7297	2.19	3950
7305	2.27	2950
7316	2.22	3300
7324	2.20	3950
7337	2.32	2400

At point A Ro = 0.6 pb = 2.38

$$\phi = 19.5\% \text{ from Schlumberger chart Por - 5 } F = \frac{1}{\phi}^2 = 27$$

$$Rw = \frac{Ro}{F} = \frac{0.6}{27} = 0.022 \text{ at } 196^\circ \text{ F}$$

giving a salinity of 145,000 ppm NaCl  
(Schlumberger chart Gen-9)

2. Jurassic Sandstones

Depth (ft) KB	pb gm/cc	C millimeters/m
8166	2.32	2000
8170	2.31	2150
8179	2.37	1050
8216	2.28	3000
8222	2.27	3450
8248	2.36	1750
8254	2.40	1150
8260	2.33	2100

N.B. Slight depth adjustments have been made on some conductivity readings to give the best correlation with the FD - log. Values for zones rather than specific depths have been read in order to compensate for the 'shoulder effect' in the IES log.

From the RIND Vs pb crossplot

At point A Ro = 0.50 pb = 2.34  $\phi \approx 19\%$

$$\text{from Schlumberger chart Por - 1 } F = \frac{0.62}{\phi 2.15} = 22$$

$$Rw = \frac{Ro}{F} = \frac{0.50}{22} = 0.023 \text{ at } 213^\circ \text{ F}$$



Using Schlumberger chart Gen - 9 this gives a salinity of 125,000 ppm NaCl

Values of  $R_w$  and consequently salinity for the Jurassic sandstones may not be as accurate as desired, because the sandstones are interbedded with shales (except for the relatively clean interval 8208' - 8230' KB). Conductivity readings for sandstone intervals less than 5 ft thick may not be accurate due to the poor focusing power of the IES tool.

### 3. Triassic - Bunter Sandstones

Depth (ft) KB	pb gm/cc	C millimeters/m
8644	2.35	1800
8665	2.27	4100
8669	2.39	2000
8675	2.28	3500
8687	2.31	2500
8693	2.32	3200
8713	2.30	2300
8731	2.37	1600
8743	2.31	1850
8766	2.32	2100
8793	2.34	1900
8813	2.37	1500
8840	2.38	1700
8883	2.36	1450
8895	2.43	1100

From the RIND Vs pb crossplot.

At point A  $R_o = 0.40$   $pb = 2.35$   $\phi = 18\%$   $F = 25$

$$\therefore R_w = \frac{R_o}{F} = \frac{0.40}{25} = 0.016$$

$\therefore R_w = 0.016$  at  $222^\circ F$  giving a salinity of 190,000 ppm NaCl

CONCLUSIONS

1) The  $R_w$  and salinity values for the three potential reservoir horizons were calculated from RIND Vs pb crossplots, and were found to be :-

Formation	$R_w$ (oLm-Meters)	Salinity ppm NaCl	Formation Temperature °F
Lower Tertiary - Upper Cretaceous carbonates	0.022	145,000	196
Jurassic sandstones	0.023	125,000	213
Triassic sandstones	0.016	190,000	222

2) All three reservoir horizons are water bearing.

3) Approximate porosity values are as follows (no allowance has been made for shale content, although all values are taken from relatively clean zones) :-

Formation	Footage between 15% & 18% $\phi$	Footage > 18% $\phi$
Jurassic sandstones	10 ft	21 ft
Triassic sandstones	49 ft	40 ft

Although the Lower Tertiary - Upper Cretaceous carbonates contain relatively porous sections, it is doubtful if any are permeable.

General

Conoco-Pelican-Gulf well 7/9-1 was drilled in the Norwegian North Sea in April and May 1971. The well was spudded on 22nd April and required 33 days to complete. T.D. was 9614'. The Zapata jackup, "Maersk Explorer", was used on this well. Water depth was 224' and conventional surface control equipment was used. In general the operations were trouble-free and the well was plugged and permanently abandoned as a dry hole.

Bits

Seventeen bits were used as follows:

No.	Size	Footage	Hours	Ft./Hrs.
1	26"	1172	36	32.6
1	17-1/2"	2029	35	58.2
4	12-1/4"	3527	75 1/2	46.8
10	8-1/2"	2235	102	21.9
1	8-7/16"	284	34 1/2	8.25
1	8-15/32" core head	37	6 1/2	5.7

All bits were jet type except the 26", and all except the 26" and 17 1/2" were sealed bearing. In the upper part of the hole some of the bits were pulled prematurely. A copy of the bit record is attached.

Coring

Two cores were attempted using a Christensen conventional core barrel and a Christensen C-22 core head.

The first core, 7249 - 7273, recovered 15 1/2 feet. The core barrel had jammed. Formation was a chalky limestone of Danian age. The second core, 7403 - 7416, recovered 10 feet. The barrel had jammed again. Formation was a chalky limestone of Maestrichtian age. The cores were cut using 10 - 12,000 lbs weight and 130 - 160 R.P.M. Pump pressure was 1400 - 1500 and circulation rate 260 G.P.M.

Casing and Cementing.

30" conductor pipe was driven to refusal at 355' RKB - 25' penetration using a D-44 Hammer. By using a high viscosity gel mud and careful drilling, circulation was maintained and the hole was drilled to the 20" casing point, 1502'.

The 20" 8 round casing stuck; after running 20 joints, at 793'. The pipe was cemented with 800 sacks class B + 12% gel cement, tailed in with 300 sacks neat class B. Cement was returned to the surface.

**GEOLOGICAL LIBRARY**

Cont...2..

The 13-3/8" casing was run at 3511' after a 17 1/2" hole had been drilled to 3531'. 92 joints of K-55 buttress were used. The pipe was cemented with 1800 sacks of class B + 12% gel followed by 300 sacks class B neat. A Cameron mud line hanger run at 341', was backed off to wash the cement out of the annulus. Considerable difficulty was experienced in the attempt to reconnect this riser, finally requiring the removal of the lower threads on the pin end of the hanger.

172 joints 47 lbs 9-5/8" N-80 buttress casing, a total of 7034', was run and landed in the mud line hanger at 341'. The pipe was cemented with 1700 sacks class B + 4% gel tailed in with 800 sacks neat class B, retarded.

Some cement returns were observed. The annulus was washed out and the mud line hanger reconnected and tested without incident.

#### Mud

Total mud cost on this well was approximately \$ 70,000. The well was spudded using a high viscosity gel-seawater mud. After drilling out of the 20" casing, which stuck at 793', the mud was converted to a ligno sulfonate-seawater. The 700' of 26" rathole left below the 20" casing gave considerable trouble by acting as a build up area for large balls of gumbo which collected there as 17 1/2" hole was being made. Annular velocity in this part of the hole, even with a circulation rate of 900 G.P.M. was probably less than 30 f.p.m. An attempt to run electric logs at the 13-3/8" casing point failed because of the fill at 1450'.

Drilling detergent was used to reduce torque and drag and was successful in the upper part of the hole. Toward T.D. an increase in mud weight to 14.0 ppb was necessary to further reduce excessive torque.

Mud supplier was Magcobar. A copy of the mud summary is attached.

#### Comments

The total rig days charged to the well include 5 days waiting on weather at the end of the operation.

A deviation problem arose in the 8 1/2" hole, starting around 7400' where the angle was 4 1/2°. It increased steadily and at 8933' the last survey point was 5 1/2°. Light bit weight, high rotary speeds, and a bottom hole assembly usually successful in dropping angle had no effect.

P.O. Box 130  
4056 Tananger, Norway.

3rd May 1971.

SUMMARY OF DRILLING OPERATIONS

CONOCO-PELICAN-GULF 7/9/1

1530 Hours April 20th - 0800 Hours May 3rd, 1971  
Reports as of 0800 am for day reported covering previous 24 hours.

APRIL 21, 1971

16½ Hrs. - Under tow and positioning rig.

APRIL 22, 1971

11 Hrs. - Rigging up.  
10 Hrs. - Run and drive 30'' - 1'' wall conductor to 355'  
RKB, 25' penetration, conductor refused.  
3 Hrs. - Rigging up to drill.

Water depth 224'. RKB to Mud Line 330'.  
RKB to mean low wave 106. Air Gap 55'  
Leg penetration 17'

Final DECCA Coordinates:

57° 20' 37.116'' N  
02° 51' 21.426'' E

APRIL 23, 1971

T.D. 735' Progress 735' D.S.S. 1

8½ Hrs. - Rigging up to drill out, pick up E.H.A.  
5½ Hrs. - Drilling to 433'  
½ Hrs. - TOTCO 427' - 1'  
2 Hrs. - Trip for drill collars  
7½ Hrs. - Drilling

APRIL 24, 1971

T.D. 1495' Progress 760' D.S.S. 2

22 Hrs. - Drilling  
2 Hrs. - Clean out flow line.

APRIL 25, 1971

T.D. 1502' Progress 7' D.S.S. 3

1 Hr. - Drill to 1502'  
½ Hr. - TOTCO 1502' - ½'  
17½ Hrs. - Condition Hole, two trips.  
5 Hrs. - Running 20'' casing.

Summary of Drilling Operations cont...

APRIL 26, 1971

T.D. 1502' Progress 0' D.S.S. 4

- 7½ Hrs. - Ran 20 Joints 94 Pound 8 rd 20'' casing. Casing stuck at 793'.
- 2 Hrs. - Cemented with 800 sacks 12% gel and 300 sacks class B cement. Cement returns to surface.
- 14½ Hrs. - W.O.C. Nippling up 20'' Hydril washed out 30'' - 20'' Annulus to 340' with 2 - 1'' lines.

APRIL 27, 1971

T.D. 2335' Progress 833' D.S.S. 5

- 9 Hrs. - Nipple up, test 20'' casing and 20'' Hydril to 500 p.s.i. ok.
- 3½ Hrs. - Go in hole, drill cement 764' - 793', clean 26'' hole to 1502'.
- 9½ Hrs. - Drilling with Bit No 2.
- 2 Hrs. - Clean out flow line.

APRIL 28, 1971

T.D. 3020' Progress 685' D.S.S. 6

- 1½ Hrs. - Drill to 2489'
- ½ Hr. - TOTCO 2489' - 1°.
- 3 Hrs. - Short trip to clean hole.
- 9 Hrs. - Drilling to 3020'.
- 10 Hrs. - Short trip and clean flow line.

APRIL 29, 1971

T.D. 3531' Progress 511' D.S.S. 7

- 15 Hrs. - Drill to 3531'
- 4½ Hrs. - Circulate short trip, some drag.
- 1 Hr. - Circulate, condition hole.
- ½ Hr. - TOTCO 3531' - 1°.
- 3 Hrs. - Measure out of hole, no correction.

APRIL 30, 1971

T.D. 3531' Progress 0' D.S.S. 8

- 1 Hr. - Attempt to log, stopped 1471'.
- 6 Hrs. - Trip to condition hole, bridge at 1471'.
- 1 Hr. - Attempt to log, stopped 1471'.
- 8 Hrs. - Trip to condition hole, increase mud weight to 12.0 pound/gal. Bridges at 1471' and 2900'.
- 8 Hrs. - Running 13-3/8'' casing.

Summary of Drilling Operations cont...

14

MAY 1, 1971

T.D. 3531' Progress 0 D.S.S. 9

- 7 Hrs. - Finish running 13-3/8" casing. Ran 92 joints 13-3/8" K-55 casing set at 3511', float collar at 3436, mud line hanger at 341'. Cemented with 1800 sacks class B with 12% gel and 300 sacks class "B" neat. Cement returns to surface. Bumped plug with 1500 p.s.i. float held. Job complete 13.45 pm 30 April 1971.
- 17 Hrs. - W.O.C. released 13-3/8" riser. Washed cement out of 20' - 13-3/8" annulus. Could not reconnect riser. Pulled and layed down riser. Removed 20' hydril. Reran riser with centralizer. Could not connect.

MAY 2, 1971

T.D. 3531' Progress 0 D.S.S. 10

- 10 Hrs. - Pulled riser, dressed threads on running tool. Ran and welded riser, screwed in 3 turns, would not hold pressure.
- 10 Hrs. - Pulled riser. Modified running tool by removing lower threads with grinder. Replaced O-ring and packing. Reran riser, connected, tested with 1000 p.s.i. o.k. Apparently third thread in hanger was damaged when riser was first removed.
- 4 Hrs. - Cut off casing. Nippling up.

MAY 3, 1971

T.D. 3730' Progress 199' D.S.S. 11

- 1/2 Hr. - Pack K-bushing. Test bushing and casing 1500 p.s.i. o.k.
- 5 1/2 Hrs. - Nipple up B.O.P.
- 3 Hrs. - Test B.O.P., choke and kill lines to 5000 p.s.i. 2500 p.s.i. on hydril o.k.
- 4 1/2 Hrs. - Pick up bottom hole assembly. Go in hole.
- 4 1/2 Hrs. - Drill Plug and float collar at 3431', shoe at 3511'.
- 6 Hrs. - Drilling.

18th May 1971

SUMMARY OF DRILLING OPERATIONSCONOCO-PELICAN-GULF 7/9-1

0800 Hours May 4th - 0800 Hours May 18th 1971

Reports as of 0800 am for day reported covering previous 24 hours.

MAY 4, 1971

T.D. 5128'      Progress 1398'      D.S.S. 12

11 Hrs. - Drilling  
 1 Hr. - Short trip - 40,000 overpull first 5 stands  
 1/2 Hr. - Drilling  
 1/2 Hr. - Circulate  
 11 Hrs. - Drilling

MAY 5, 1971

T.D. 5880'      Progress 752'      D.S.S. 13

1 Hr. - Finish short trip  
 2-1/2 Hrs. - Drilling to 6244'  
 2 Hrs. - Circulate and totco  
 5-1/2 Hrs. - Trip for bit no. 4  
 13 Hrs. - Drilling

MAY 6, 1971

T.D. 6369'      Progress 489'      D.S.S. 14

8 Hrs. - Drilling to 6118'  
 1/2 Hr. - Circulate and survey  
 7 Hrs. - Trip for bit no. 5. Pick up 3 additional DC  
 and rearranged stabilizers. Ran in hole. No  
 drag and no fill  
 8-1/2 Hrs. - Drilling 12-1/4 hole.

MAY 7, 1971

T.D. 7058'      Progress 689'      D.S.S. 15

8 Hrs. - Drilling to 6713'  
 9 Hrs. - Circulate, totco and trip for bit no. 6,  
 no drag, no fill.  
 7 Hrs. - Drilling to 7058'

Cont.....2....



Summary of Drilling Operations cont....

16

MAY 8, 1971

T.D. 7058'      Progress 0      D.S.S. 16

1-1/2 Hrs. - Condition hole, short trip, 15' fill  
 1-1/2 Hrs. - Condition hole  
 3-1/2 Hrs. - Pull out to log  
 10 Hrs. - Ran Schlumberger gamma-ray sonic and IES logs.  
           Schlumberger T.D. 7061'  
 7 Hrs. - Lay down 9-1/2 and 7-3/4 drill collars. Run  
           in hole  
 1/2 Hr. - Condition hole.

3

MAY 9, 1971

T.D. 7058'      Progress 0      D.S.S. 17

1/2 Hr. - Condition hole  
 2-1/2 Hrs. - Pull out of hole  
 2-1/2 Hrs. - Set Cameron mud line hanger  
 11 Hrs. - Ran 172 joints 9-5/8" - 47 lbs buttress  
           casing set at 7034' landed in sub sea hanger  
           at 345' RKB.  
 4 Hrs. - Circulated casing and cemented with 1700  
           sacks 4% Gel and 800 sacks neat class "B"  
           retarded cement. Approximately 75 sacks return  
           to surface.  
 1-1/2 Hrs. - Removed riser, washed out cement, reconnected  
           tested to 1500 psi. ok.  
 2 Hrs. - Rig down Halliburton - Nipple up while W.O.C.

MAY 10, 1971

T.D. 7090'      Progress 32'      D.S.S. 18

10-1/2 Hrs. - Nipple up  
 2-1/2 Hrs. - Test BOP, choke and kill lines to 5000 psi.,  
           Hydril and casing to 2500 psi. ok.  
 1-1/2 Hrs. - Pick up BHA  
 4-1/2 Hrs. - Go in hole, install casing protectors on  
           every joint.  
 3 Hrs. - Drill plug and float collar at 6941'  
 1-1/2 Hrs. - Drill cement to 7020', tested casing to 2500  
           psi. ok, drill shoe at 7033'.  
 1/2 Hrs. - Drilling

MAY 11, 1971

T.D. 7273'      Progress 183'      D.S.S. 19

6 Hrs. - Drilling 7090' to 7249'  
 1 Hr. - Circulate for sample  
 11 Hrs. - Trip out, pick up core barrel, go in hole,  
           circulate, drop bell.  
 4 Hrs. - Cutting core no. 1 - 7249 - 7273, 24 feet,  
           barrel apparently jammed  
 2 Hrs. - Pulling out of hole

MAY 12, 1971

T.D. 7415'                  Progress 142'                  D.S.S. 20

- 1-1/2 Hr. - Pull out with core no. 1
- 1-1/2 Hr. - Recover core no 1 - 7249 - 7273', cut 24 feet, rec. 15-1/2 feet.
- 3 Hrs. - Go in hole with bit no. 8
- 3 Hrs. - Drilling
- 5 Hrs. - Condition mud, short trip into casing increase mud weight to 14.0 lb/gal. 2
- 1-1/2 Hr. - Drilling to 7403'
- 1 Hr. - Circulate, Totco
- 5-1/2 Hr. - Trip for Core No. 2
- 1/2 Hr. - Circulate, drop ball.
- 1-1/2 Hr. - Cutting Core No. 2 - 7403 - 7415'

MAY 13, 1971

T.D. 7650'                  Progress 235'                  D.S.S. 21

- 1 Hr. - Cutting core No. 2 to 7416'. Barrrel jammed.
- 2-1/2 Hrs. - Pull out of hole
- 2 Hrs. - Lay down core No. 2 7403 - 7416' - Recovered 10 feet
- 1/2 Hr. - Slip and cut drilling line
- 3 Hrs. - Go in hole.
- 1/2 Hr. - Wash and neam 25' to bottom
- 14-1/2 Hrs. - Drilling to 7650'.

MAY 14, 1971

T.D. 7891'                  Progress 241'                  D.S.S. 22

- 4 Hrs. - Trip for bit No. 10
- 15-1/2 Hrs. - Drilling to 7891'
- 4-1/2 Hrs. - Totco and trip for bit No. 11

MAY 18, 1971

T.D. 9281'                  Progress 1390'                  D.S.S. 26

- 2 Hrs. - Go in hole TP.U 9 DC
- 10-1/2 Hrs. - Drilling
- 1 Hr. - Circulate C
- 3-1/2 Hrs. - Drilling
- 1/2 Hrs. - Survey
- 2-1/2 Hrs. - Pull out of hole
- 3 Hrs. - Go in hole
- 1 Hr. - Drilling
- 8 Hrs. - Drilling
- 1 Hr. - Circulate sample
- 3-1/2 Hrs. - Drilling
- 3 Hrs. - Pull out of hole
- 2-1/2 Hrs. - Go in hole
- 1 Hr. - Drilling
- 1 Hr. - Circulate samples
- 4 Hrs. - Drilling

Cont....4.

Summary of Drilling Operations cont....

MAY 18, 1971 cont..

6	Hrs. - Drilling
1/2	Hr. - Survey
6	Hrs. - Trip
3-1/2	Hrs. - Drilling
1	Hr. - Circulate
7	Hrs. - Drilling
2	Hrs. - Drilling
6	Hrs. - Trip for bit
6-1/2	Hrs. - Drilling
7-1/2	Hrs. - Trip for bit, BHA, cut drill line
2	Hrs. - Drilling

CONOCO NORWAY INC.

P.O. Box 130  
4056 Tanager  
Norway

19

26th May 1971

SUMMARY OF DRILLING OPERATIONS

CONOCO-PELICAN-GULF

0800 Hours May 19th - 0800 Hours May 26th 1971  
Reports as of 0800 am for day reported covering previous 24 hours.

MAY 19, 1971

T.D. 9487'      Progress 206'      D.S.S. 27  
24      Hrs. - Drilling

MAY 20, 1971

T.D. 9614'      Progress 127'      D.S.S. 28  
4      Hrs. - Drilling  
1-1/2 Hrs. - Short trip  
4-1/2 Hrs. - Drilling  
5      Hrs. - Trip for bit  
3      Hrs. - Drilling  
1      Hr. - Circulate  
1/2 Hr. - Drilling  
1      Hrs. - Circulate  
3-1/2 Hrs. - Pull out of Hole to log

MAY 21, 1971

T.D. 9614'      Progress 0      D.S.S. 29  
24      Hrs. - Rig up and run IBS, PDC, SSL, MLL, Sonic - GR, HRD, Now shooting SWC

MAY 22, 1971

T.D. 9614'      Progress 0      D.S.S. 30  
9      Hrs. - Sidewall coring. Recovered 74 of 90 shots.  
3-1/2 Hrs. - Lay down drill collars  
3      Hrs. - Go in hole, spot plug No. 1 7140' - 7300' with 75 sacks class E cement  
3      Hrs. - W.O.C. - Check top cement 7140'  
5-1/2 Hrs. - Set retainer in 9-5/8" casing at 6900'. Broke down formation below retainer at 1000 p.s.i., mud weight 14.0 lb/per gal. Squenced 150 sacks class "E" below retainer, spotted 50 sacks on top retainer.

Cont.....2....

Summary of Drilling Operations cont...

MAY 23, 1971

	T.D. 9614'	Progress 0	D.S.S. 31
1	Hr.	- Tested retainer, would not hold pressure	
4	Hrs.	- Full out of hole. Removed damaged cementing tool. Go in hole. Spotted 200 sacks cement on top of retainer. Tested 1500 p.s.i. ok.	
11	Hrs.	- Laying down drill pipe, nipple down BOP	
3	Hrs.	- Spot 50 sacks class B at 468', washed out at 350'	
5	Hrs.	- Could not remove 9-5/8" riser. Made two cuts. at 348 and 345'. Could not pull.	

6

MAY 24, 1971

	T.D. 9614'	Progress 0	D.S.S. 32
19	Hrs.	- Jarred 9-5/8" and 13-3/8" risers loose, layed down. Cut 20" at 339'. Layed down. Cut 30" at 335'.	
5	Hrs.	- Waiting on weather to pull 30" riser	

6

MAY 25, 1971

	T.D. P & A		D.S.S. 33
13	Hrs.	- Waiting on weather	
5	Hrs.	- Pull and lay down 30" conductor	
6	Hrs.	- Preparing to move	

4

MAY 26, 1971

			D.S.S. 34
24 hrs	Hrs.	- Waiting on weather	

4

MAY 27, 1971

			D.S.S. 35
24	Hrs.	- Waiting on weather	

4

MAY 28, 1971

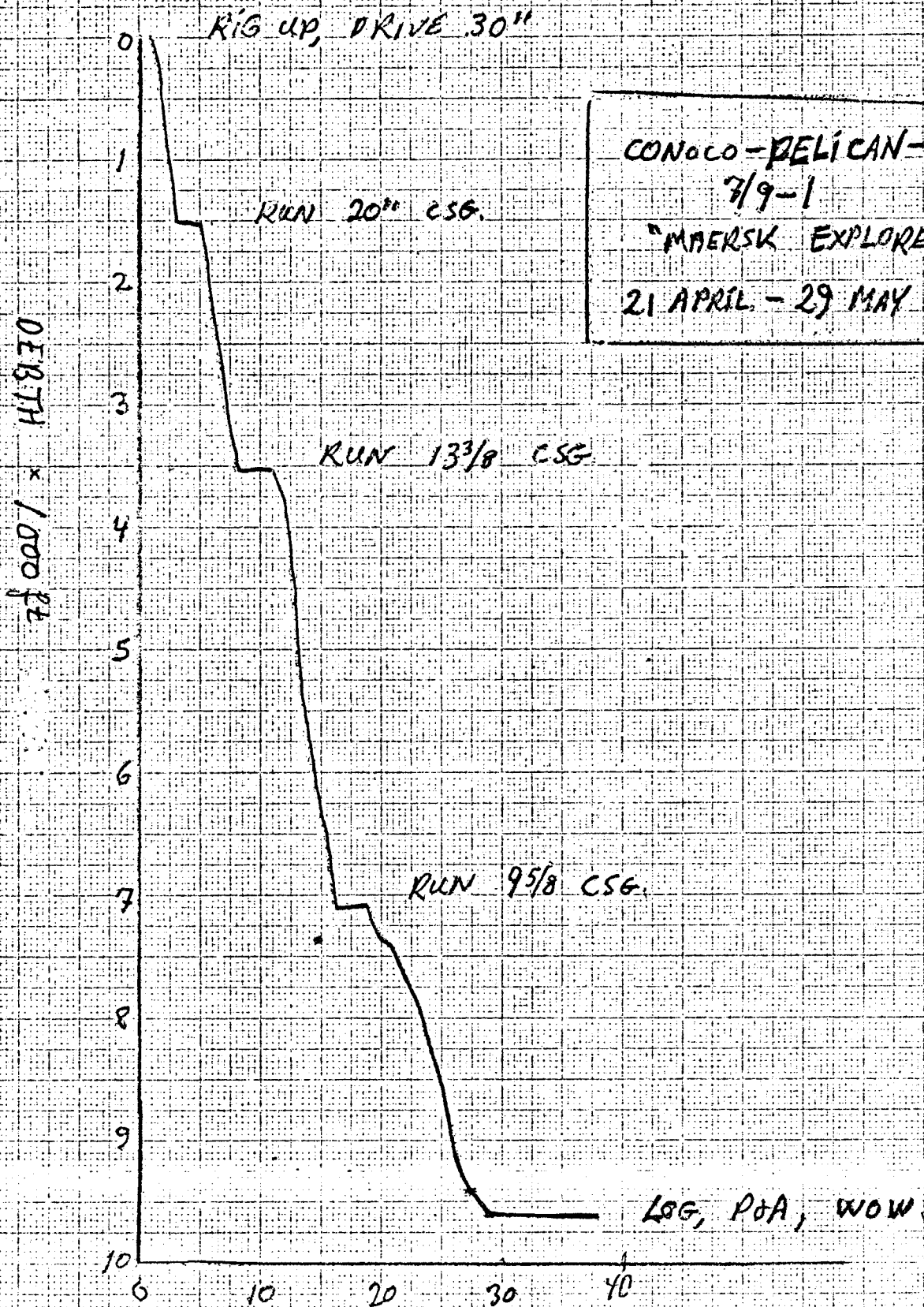
			D.S.S. 36
24	Hrs.	- Waiting on weather	

4

MAY 29, 1971

	T.D. P and A		D.S.S. 37
24	Hrs.	- Waiting on weather	
2	Hrs.	- Jacking down - Hooking up tugs - Under tow for 8/12-1 1000 hours May 29 1971. Final report for rig and well. Plugged and abandoned.	

4



CONOCO-DELICAN-GULF  
7/9-1  
"MAERSK EXPLORER"  
21 APRIL - 29 MAY 1971

## CONOCO NORWAY INC.

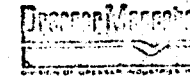
## CONOCO-PELICAN-GULF 7/9-1

Drilling Time Analysis

	<u>Hours</u>	<u>Days</u>	<u>o/o</u>
MOVING	18-1/2	0.8	2.1
RIG UP - DOWN	17	0.7	1.8
CONDUCTOR	10	0.4	1.0
DRILLING	301	12.5	32.2
TRIPS - DRILLING	106	4.4	11.3
REAM	1/2	-	-
CORING	30	1.2	3.1
CASING AND CEMENT	47	2.0	5.2
W.O.C. - NIPPLE UP	101	4.2	10.9
CONDITION HOLE	65	2.7	7.0
TOTCO	4	0.2	0.5
CIRC. SAMPLES	5	0.2	0.5
LOGGING	52	2.2	5.7
P. AND A.	59-1/2	2.5	6.4
WOW TO MOVE	114	4.8	12.3
	<u>930-1/2</u>	<u>38.8</u>	<u>100.0</u>





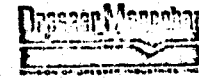
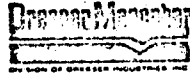


# WELL DATA SHEET

MAG-545-A

OPERATOR <b>OCILCO-PERLINAN-GULF</b>	SURVEY SEC. <b>T P</b>	CASING SIZE	DEPTH	DRLG. DAYS	BIT SIZE
WELL <b>7/9-1</b>	FIELD	SURFACE			
CONTRACTOR <b>TAAPATA</b>	COUNTY	INTERMEDIATE			
ENGINEER	STATE	COUNTRY	PRODUCTION		

DATE	DEPTH	WT.	VISCOSITY		CORR. 115°F		GELS		pH	FLUID LOSS		CL <input checked="" type="checkbox"/> CACL <input type="checkbox"/> NACL <input type="checkbox"/> 1000'S	ALKALINITY			CA ppm	Mg ppm	RETORT			ACTIVITY		RATIO		# Sbl CEC			
			SEC.	CPS.	PV	YP	0	10		100 PSI API	500 PSI 300 °F HT-HP		PF	PM	MF			% OIL	% SOL	% WATER	As	Am	OIL	H2O				
1/7/71		8.9	42						11.0																			
2/1	7.5	9.1	51						10.0																			
3/1	11.5	8.3	43						9.5																			
4/1	15.5	8.4	45						10.0																			
5/1	11																											
6/1	20.5	7.8	45		14	5	12		11.0	10.0		10.5	1.0				200			5	14	80						
7/1	25.5	10.7	50		15	5	10		11.5	11.0		15	2.5				200			5	14	82						
8/1	30.5	12.0	50		17	5	12		11.0	8.2		12.5	1.0	2.0			200			5	15	80						
9/1	35.5	13.0	50		17	5	13		11.5	8.2		12.5	1.0	2.0			200			5	15	80						
10/1	40.5	11.9	51		17	5	13		11.5	8.2		12.5	1.0	2.0			200			6	12	82						
11/1	45.5	12.5	53		18	6	10		11.5	6.4		12.5	2.0	3.0			200			6	12	82						
12/1	50.5	12.8	57		17	5	10		11.5	6.0		11	1.7	4.0			200			6	11	75						
13/1	55.5	12.7	53		17	5	9		11.5	5.3		14	1.5	3.5			200			6	12	78						
14/1	60.5	13.0	53		21	5	6		11.0	6.2		10	2.0	3			200			5	13	72						
15/1	65.5	13.2	49		20	5	6		11.5	6.0		14	1.3	2.0			200			5	14	71						
16/1	70.5	13.2	57		24	12	4		11.5	6.1		14	1.7	3.5			200			5	14	73						
17/1	75.5	13.1	53		20	10	2		11.5	6.0		14	1.5	2.5			200			5	13	72						
18/1	80.5	13.1	57		22	12	4		11.5	6.1		14	1.2	2.0			200			5	13	72						
19/1	85.5	13.5	53		21	10	6		11.3	6.0		14	2.0	2.0			200			6	14	70						
20/1	90.5	14.0	55		22	11	6		11.5	6.2		13	0.8	3.0			200			6	15	69						
21/1	95.5	14.0	50		17	7	2		11.5	7.0		13	1.2	5.5			200			6.5	15	70.5						
22/1	100.5	14.0	42		11	8	2		11.5	7.0		13	1.3	5.5			200			6.5	15	70.5						
23/1	105.5	14.0	45		10	5	2		11.5	6.0		14	1.0	3.0			200			7.0	14	67						
24/1	110.5	14.0	47		10	11	2		11.5	6.1		14	1.0	2.5			200			7.0	14	67						
25/1	115.5	14.0	47		15	11	6		11.5	6.0		15	1.4	2.5			200			7.0	14	67						
26/1	120.5	14.0	46		15	11	2		11.5	6.0		15	1.0	2.0			200			7.0	14	67						
27/1	125.5	14.0	47		15	11	2		11.5	6.0		15	1.0	2.0			200			7.0	14	67						



# WELL DATA SHEET

MAG-545-A

OPERATOR <i>CONOCO-Phillips-Gulf</i>	SURVEY SEC. T R	CASING SIZE	DEPTH	DRLG. DAYS	BIT SIZE
WELL <i>7/7-1</i>	FIELD	SURFACE			
CONTRACTOR	COUNTY	INTERMEDIATE			
ENGINEER	STATE	COUNTRY	PRODUCTION		

DATE	DEPTH	WT.	VISCOSITY		CORR. 115°F		GELS		pH		FLUID LOSS		CL <input type="checkbox"/>		ALKALINITY			RETORT			ACTIVITY		RATIO		# Bbl
			SEC.	CPS.	PV	YP	0	10	BECK STRIP <input type="checkbox"/>	100 PSI API	500 PSI 300 °F HT-HP	CACL <input type="checkbox"/>	NACL <input type="checkbox"/>	PF	PM	MF	CA ppm	Mg ppm	% OIL	% SOL	% WATER	A <sub>s</sub>	A <sub>m</sub>	OIL	
<i>12/1</i>	<i>142</i>	<i>14.1</i>	<i>4.1</i>		<i>21.4</i>	<i>2.12</i>	<i>11.0</i>	<i>7</i>			<i>15</i>	<i>0.8</i>	<i>2</i>		<i>600</i>		<i>6</i>	<i>29</i>	<i>6.5</i>						
<i>30</i>	<i>144</i>	<i>14.0</i>	<i>3.3</i>		<i>14.13</i>	<i>4.08</i>	<i>11.0</i>	<i>10</i>			<i>31</i>	<i>0.6</i>	<i>2</i>		<i>500</i>		<i>6</i>	<i>29</i>	<i>6.5</i>						
<i>31</i>	<i>1</i>	<i>14.0</i>	<i>3.3</i>				<i>11.0</i>	<i>9</i>			<i>31</i>				<i>140</i>										

DATE SPUD: \_\_\_\_\_ DATE T.D.: \_\_\_\_\_ B.H.T. \_\_\_\_\_ COMPLETION FLUID TYPE: \_\_\_\_\_ COST: \_\_\_\_\_  
 PACKER MUD TYPE: \_\_\_\_\_ COST: \_\_\_\_\_



## CORE ANALYSIS RESULTS

Company CONOCO Formation \_\_\_\_\_ File UKCA 398  
 Well 7/9-1 Core Type \_\_\_\_\_ Date Report 3.6.71  
 Field \_\_\_\_\_ Drilling Fluid \_\_\_\_\_ Analysts R.F.B.  
 County NORTH SEA State DANISH Elev. \_\_\_\_\_ Location \_\_\_\_\_

**NORWAY. Lithological Abbreviations**

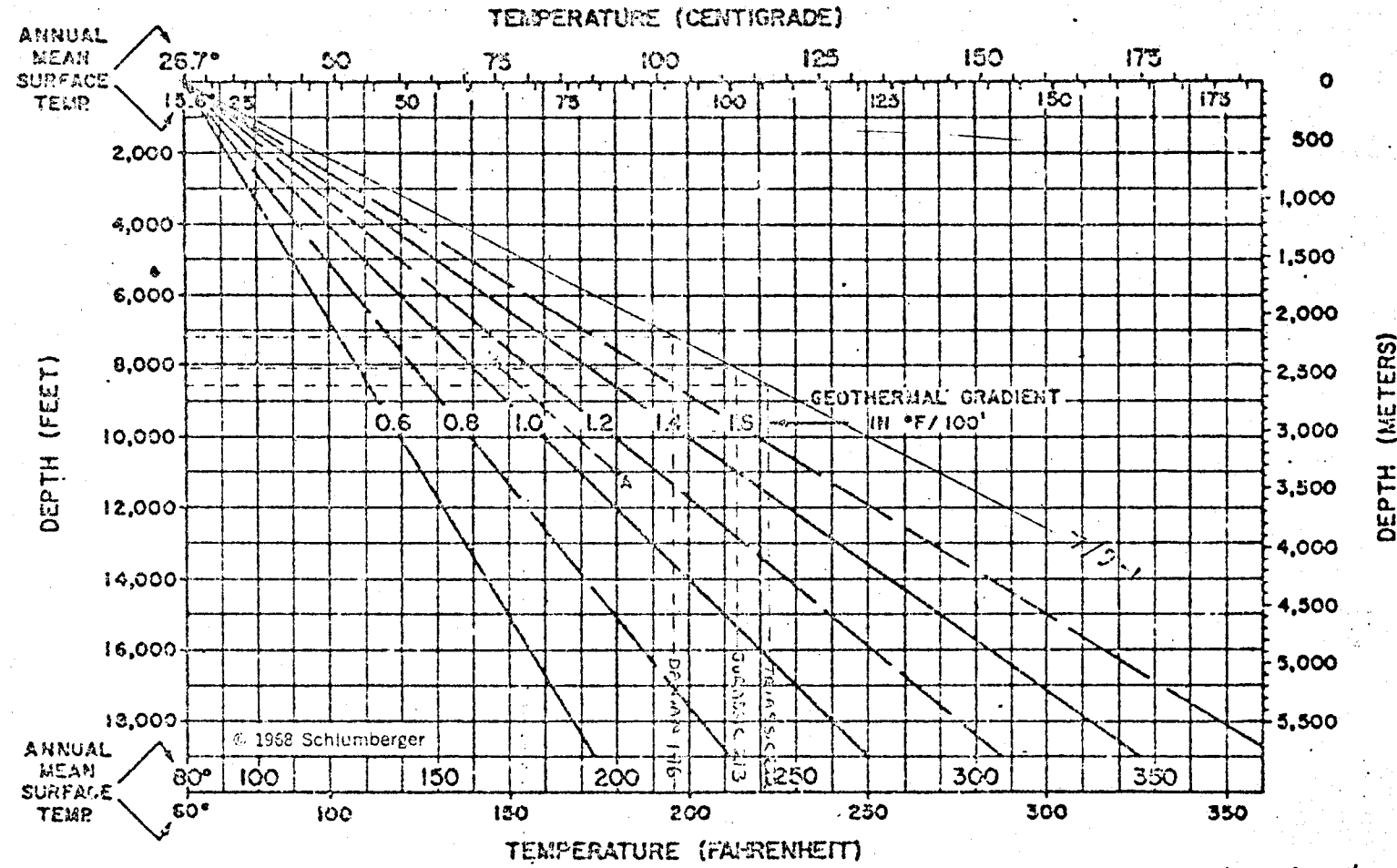
SAND - SD	DOLOMITE - DOL	ANHYDRITE - ANHY	SANDY - SDY	FINE - FN	CRYSTALLINE - XLN	BROWN - BRN	FRACTURED - FRAC	SLIGHTLY - SL/
SHALE - SH	CHERT - CH	CONGLOMERATE - CONG	SHALY - SHY	MEDIUM - MED	CLAY - CLN	GRAY - GR	LAMINATION - LAM	VERY - V/
LIME - LM	GYPSUM - GYP	FOSSILIFEROUS - FOSS	LIMY - LMY	COARSE - CSR	GRANULAR - GRNL	VUGGY - VGY	STYLOLITIC - STY	WITH - W/

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCY		POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE		SAMPLE DESCRIPTION AND REMARKS
		PERMEABILITY	PERMEABILITY		OIL	TOTAL WATER	
		Ka	Kl				
1	7250	0.27	0.17	18.9			1st, gy, xline, marly app.
2	53	0.27	0.17	17.4			AA
3	56	0.19	0.12	18.7			AA, v lt pk.
4	59	0.14	0.08	15.0			AA, wh
5	62	0.25	0.16	19.3			AA
6	7403.5	0.19	0.12	16.0			AA
7	7406.5	0.23	0.14	16.9			AA

These analyses, opinions or interpretations are based on observations and materials supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories, Inc. (all errors and omissions excepted); but Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warranty or representation, as to the productivity, proper operations or profitability of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

# ESTIMATION OF FORMATION TEMPERATURE

(Linear Gradient Assumed)



Conoco/Pelican/Gulf 7/9-1

EXAMPLE: BHT is 200°F at 11,000' (Point A).  
 Temperature at 8,000' is 167°F (Point B).

BHT = 242°F at 9,500' after 17 hrs circulating time.

Temperature Gradient Conversions: 1°F/100 ft = 1.824°C/100 m  
 1°C/100 m = 0.5486°F/100 ft

Average formation temps are :-  
 Danian carbonate = 196°F  
 Jurassic sandstones = 213°F  
 Triassic sandstones = 222°F

LOWER TERTIARY - UPPER CRETACEOUS CARBONATES

7/9-1

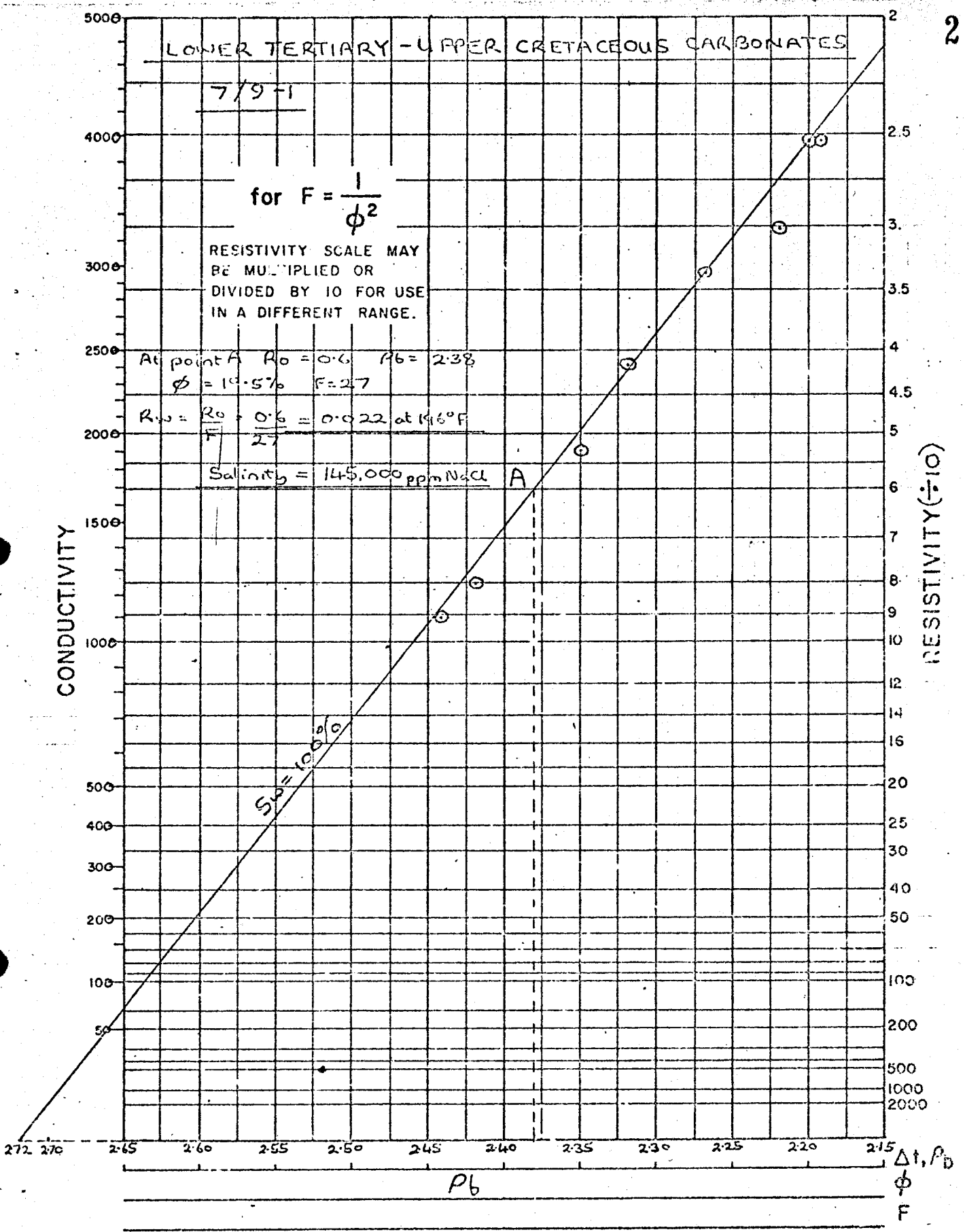
for  $F = \frac{1}{\phi^2}$

RESISTIVITY SCALE MAY BE MULTIPLIED OR DIVIDED BY 10 FOR USE IN A DIFFERENT RANGE.

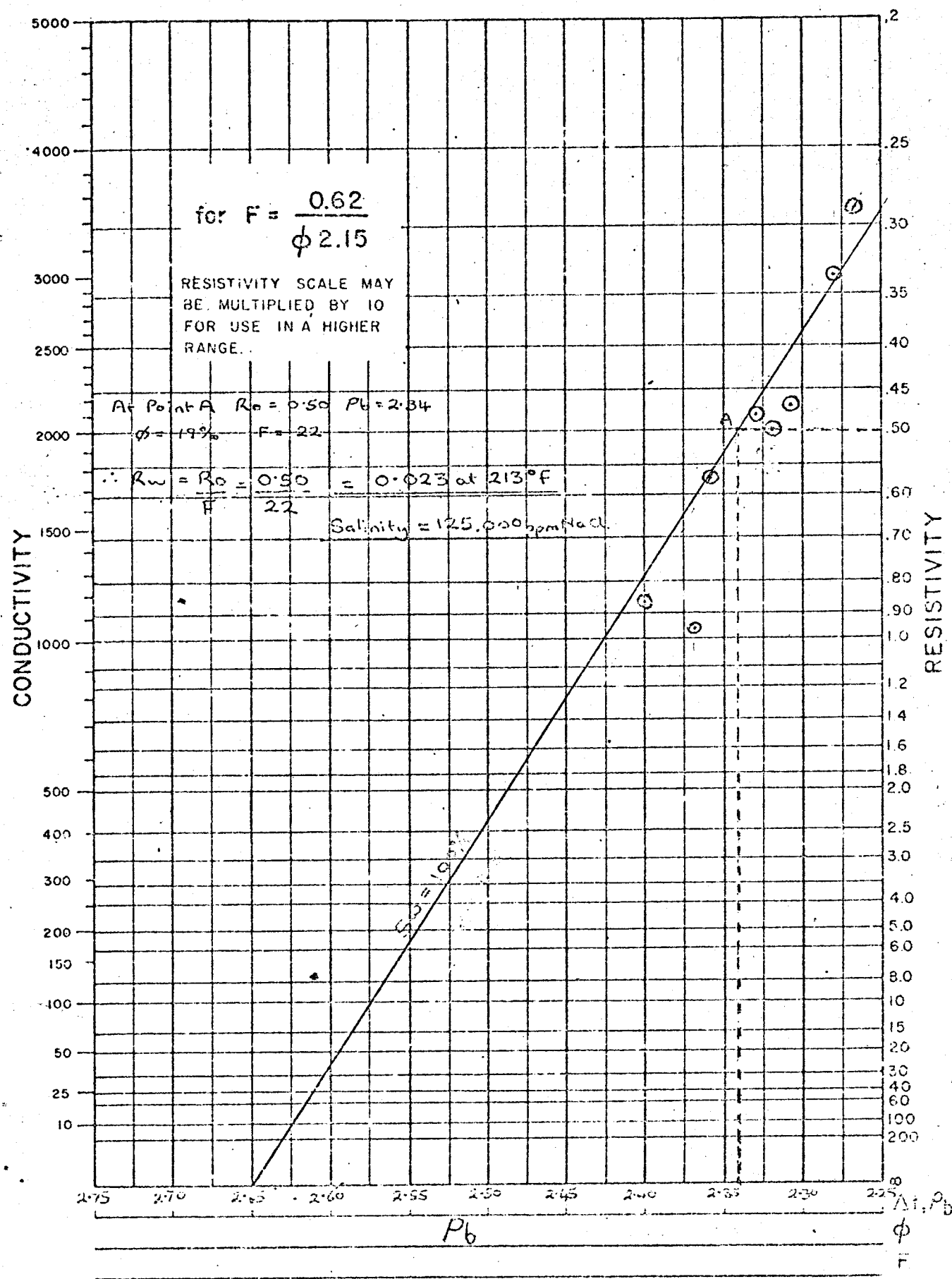
At point A  $R_0 = 0.6$   $R_b = 2.38$   
 $\phi = 10.5\%$   $F = 2.7$

$R_w = \frac{R_0}{F} = \frac{0.6}{2.7} = 0.222$  at  $146^\circ F$

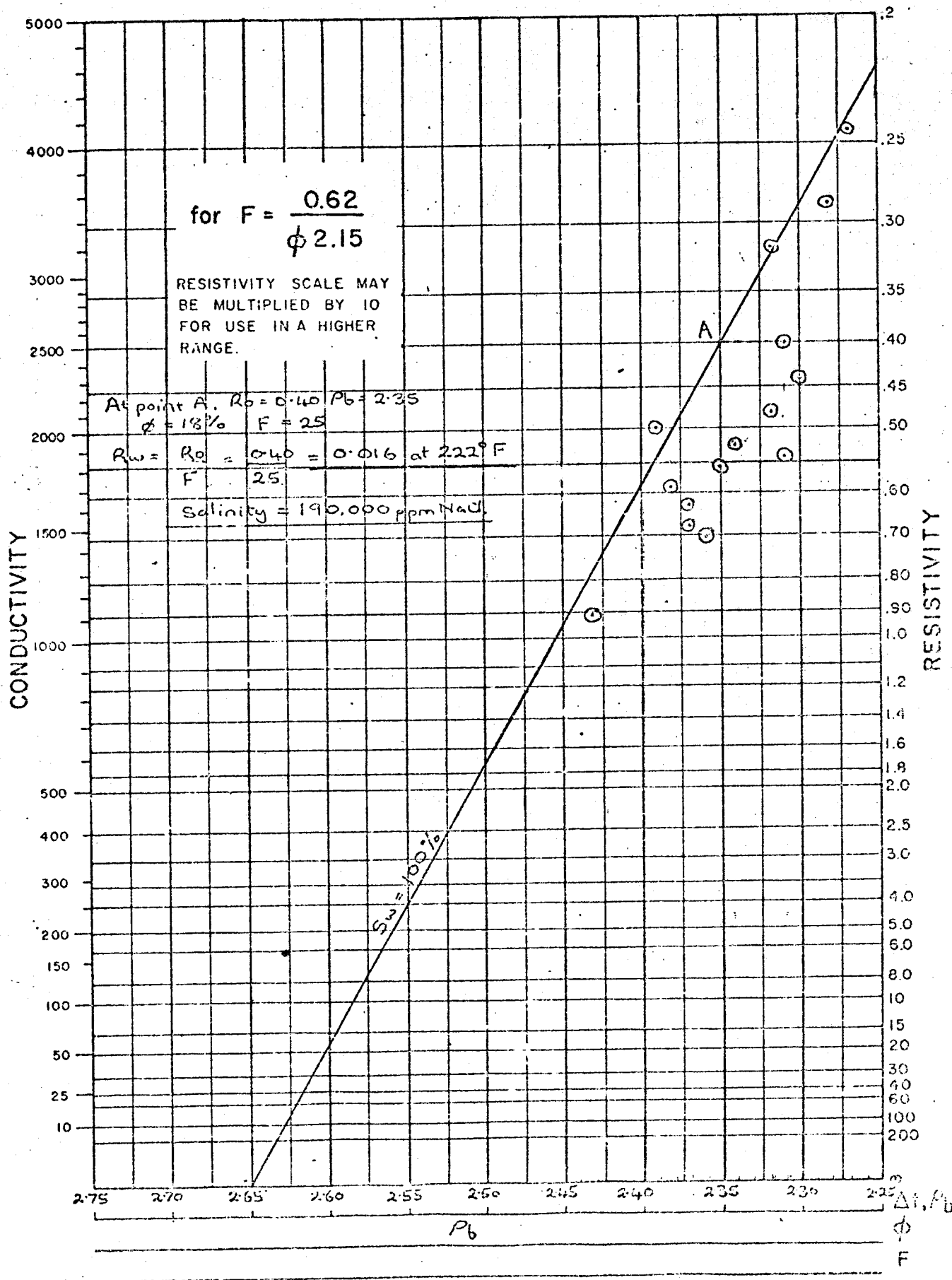
Salinity = 145,000 ppm NaCl



RESISTIVITY VS POROSITY



RESISTIVITY VS POROSITY





To: J. C. Patterson.

Date: 29th July 1971.

Subject: 7/9-1 Geophysical Post Mortem

1) Accuracy of Geophysical Tops

a) Top Paleocene

<u>Prognosed</u>	<u>Actual</u>	<u>Error</u>	<u>Allowable error</u>
6870	6698	+ 172	+ 200

Comment

The error of just under 200' on this pick may be due to slight discrepancies in our velocity control, which at the time of prognosis was based on only three wells. It is however just on the quoted error.

b) Top Danian Chalk

<u>Prognosed</u>	<u>Actual</u>	<u>Error</u>	<u>Allowable error</u>
7230	7192	+ 88	+ 200

Comment

This event was picked correctly, but we probably have minor imperfection in the velocity function.

c) Top Lower Cretaceous

<u>Prognosed</u>	<u>Actual</u>	<u>Error</u>	<u>Allowable error</u>
8150	7697	+ 453	+ 500

Comment

This event was probably picked a leg too deep on the seismic section. The base chalk is a difficult event to pick in the Western part of the Norwegian North Sea, and this could have caused a slight miscorrelation. Also our velocity is probably in error, our well control indicates that the chalk velocity is varying from 12,000 to 15,000 ft/sec over short distances.

d) Event picked as Top Jurassic

<u>Prognosed</u>	<u>Actual</u>	<u>Error</u>	<u>Allowable error</u>
9663	7944	+1719	+ 500

Comment

Below the base chalk only one strong reflection in the lower Mesozoic is apparent. We have a seismic line which passes through the GULF 7/12-1 well and our 7/9-1. In the GULF well there was at least 1000ft of Lower Cretaceous and probably 1500ft. This thickness caused us to pick the strong event just below TD of the well as being Top Jurassic. The inter-donal correlation of this event is very poor, a basically seismic character correlation was performed between this, Top Jurassic in 7/12-1 and the event on 7/9-1.

Contd/..

This correlation gave us about 1500 ft of Lower Cretaceous section in 7/9-1. Infact we had 247' of Lower Cretaceous, this drastic thinning is not pickable on the seis.

e) Top Salt

<u>Prognosed</u>	<u>Actual</u>	<u>Error</u>	<u>Allowable error</u>
10,930	9127	1,8043	+ 500

The seismic pick of the Top Zechstein Salt is not really valid, as was stated at the time, it was based on assuming our Top Jurassic was correct which accounts for the error. This pick was made to a) alert drilling department to the fact that we knew the structure was a salt feature but could not find it accurately and b) to inform the Norwegian Government as why we did not intend to drill to the required TD of 12,000'.

J.R. Sherwood.

JR/SHERWOOD/mn