R. Lagaaij

The Hague, 5th March, 1969

Mr. A. Jackson,
A/S Norske Shell,
Exploration and Production,
P.O. Box 59,
T a n a n g e r
Norway

Ref. telecon Jackson-Lagaaij of 3.3.69

Dear Alan,

On 3rd March you asked our opinion on the possible explanation for the curious repetition of the Paleocene-Maastrichtian beds in the 1/3-1 well, tectonics being, as you said, entirely out of the question.

From what I remember of Vlierboom's views, and after a check with Jan Stolk, I can safely state that the sledge-hammer argument of facies faunas will simply not do. Both palaeontology and palynology arrived at exactly the same conclusion, and in these marine sediments one could not possibly envisage the occurrence of "facies floras".

Why not lay the blame on gravity sliding of a huge extraneous block along a sliding plane located at 10,320' in your well? Notice that the lithologies of the Maastrichtian above (chalk) and below (limestone) this depth are markedly different, which would smoothly fit into this hypothesis.

As to the other points you mentioned: Jan Stolk is preparing his notes to accompany the distribution chart of 17/11/1, and as to the currently drilling 17/10/1: the deepest samples thusfar received (9110') are being analysed for a possible age indication, to which we hope to revert by telex.

In the meantime, all best wishes to you and your staff.

Sincerely yours,

Wbut

top of second occurrence of Paleocene J.

ADRES: CAREL VAN BYLANDTLAAN 30
TEL.: (070)

Shales

Shales in 17/11-1 caused trouble in the following ways:

1. Gumbo shales in the upper Tertiary and sloughing shales from the Lower Tertiary caused about 1 day loss during logging and caused the loss of some of the logs over the Upper Cretaceous / Tertiary boundary.

2. Soft shales of the Albian/Aptian interval caused delay during the well velocity shoot in an attempt to ream the hole, and prevented a survey being made below 5100'.

In 1/3-1 the Tertiary shales did not cause serious trouble, but were potentially dangerous at times, and required much time in conditioning the mud. The Tertiary shale repetition in the Upper Chalk caved badly during the slow drilling of the hard limestone, and lost circulation probably occured in them during higher mud weights used to combat the gas influx from lower in the hole.

References on Shales:

Drilling problem shales.1- classification simplifies mud selection
J. Kelly: O & G Jnl June 3 1968

2. A New look at troublesome shales.
J. Kelly: O&G Jnl june 10 1968

Seismic data indicate depth, magnitude of abnormal pressures.
E.B. Pennebaker. World Oil, June 1968

A/S NORSKE SHELL

SIDEWALL SAMPLE DESCRIPTION

FIELD : Wildcat WELL NO. 1 / 3 - 1 DEPTH OF HOLE: 16 000 ft DATE TAKEN 27 - 10 - 1968 PAGE NO. 1

DEPTH	RECOVERY m m	LITHOLOGY	SAMPLE FLUORESCENCE	COLOUR OF CUT	CUT FLUORESCENCE
15055		Marl, dk gnsh gy, fm, sl.slty, micropyritic, sbfissile	nil	nil	nil
15086		Arg. Lst. (lA) dk gnsh gy, mod hd, splintery,sbfissile, occ.micropyritic	nil	nil	nil
15091		Arg Lst gen. a/a	nil	nil	nil
15094		Arg Lst gen. a/a	nil	nil	nil
15195		Shale, gnsh blk, fm, sbfissile-fissile,mod-v calc. carb. specks,micropyritic	nil	nil	nil
15202		Shale gen. a/a	nil	nil	nil
15240		Shale, gnsh blk,fm-hd, sbfissile-fissile, micropyritic, non-vsl. calc.	nil	nil	nil
15254		Shale, gen. a/a but massive, sl. calc.	nil	nil	nil
15284		Shale, gnsh blk, fm-hd, sbfissile-fissile, sl.calc.	nil	nil	nil
15305		Shale, dk gnsh gy, fm, sbfissile, calc.	nil	nil	nil
15313		Shale, olv blk, hd, fissile, splintery, sl. calc-mod. calc.	nil	nil	nil
15324		Dolomitic Lst (lA) lt olv gy, hd, splintery, sl. argill.	nil	nil	nil
15348		Rocksalt, prob. ptly potash salt, clr, orange, brittle, crs crystall.			
		intergrown w/ Anhydrite, wht-colorless clear, crs crystall.	nil	nil	nil

A/S NORSKE SHELL

SIDEWALL SAMPLE DESCRIPTION

FIELD : WELL NO. 1/3-1 DEPTH OF HOLE: 10255 ft. DATE TAKEN 5th. August 1968 PAGE NO. 1

DEPTH	RECOVERY m m	LITHOLOGY	SAMPLE FLUORESCENCE	COLOUR OF CUT	CUT FLUORESCENCE
9839 ft.		Lst:arg,no visible por,med dk gy,microxln,compact Wackestone,slty to fn sdy,	Very faint yellow	None	Poor yellowish white.
		opaque (rnd)-ang,clr gy & wht grains,crumbly,mod hd,occ massive Py.			
9844 ft.		Lst: arg,no visible por,med dk gy,microxln,compact Wackestone,slty-fn sdy,	None	None	Slow,very faint gnsh yellow.
		ang,v lt gy-gy qtz grains,platey,hd,Py,occ microfossils,			
9849 ft.		Lst: v arg,no vis por,med dk gy-dk gy,microxln,compact Mudstone with fn clst	Very faint gnsh yellow.	None	Very faint gnsh yellow.
		particles,(slty),crumbly,firm,occ microPy,with thin bedded Clst: med dk gy,			
		platey,non swelling,v sl calc,firm,(Py),laminated.			
9858 ft.		Clst: med gy,crumbly,hygroturgid,firm,sl calc,sl slty.	None	None	None
9861 ft.		Clst: brnsh blk,waxy,conchoidal break,non swelling,firm,sl calc, micromica,	None	None	None
		occ bituminous inclusions,occ microfossils.			
10162 ft.		Clst: brnsh blk,laminated,non swelling,firm,sl calc,micromica,occ bit	None	None	None
		inclusions,abundant Py streaks & inclusions,v microPy,v occ green Glc.			
10173 ft.		Lst: chalk,no vis por,wht,microxln,chk Mudstone,crumbly-splintery,mod hd,	Pale yellow mineral flu.	None	None
		v occ microPy,abundant microfossils,			
10200 ft.		Lst: chalk,no vis por,wht,microxln,chk Mdst,crumbly-occ splintery,mod hd,occ	Pale yellow mineral flu.	None	None
		microPy,microfossils.			
10226 ft.		Lst: chalk,no vis por,wht,microxln,chk Mdst,crumbly-splintery,mod hd,occ	Pale yellow mineral flu.	None	None.
		microPy,microfossils(occ silicified).			

Micpl. + Wd (brn) - not older than L. Cret (Apt - Alb)

Shale - few ind. Apt - Alb.

lt brn Micro plancton - unconf. 14930:

n-butane,	-	0.75	3.6
iso pentane,	-	0.47	2.2
n-pentane,	-	0.36	1.7
hexanes,	-	0.48	2.3
heptanes plus,	-	0.63	3.0
varbon dioxide,	-	0.95	4.5
oxygen,	-	17.30	-
nitrogen,	-	73.42	56.1

the composition of the air free sample was calculated assuming the oxygen to originate from air and thus subtracting the associated amount of nitrogen.

would add that the composition of the calculated air-free sample should not be considered as an accurate representative composition because of the large multiplication factor resulting from subtraction of the theoretical amount of air in the original sample. it is, for instance, impossible to estimate if and to what extent oxygen might have been consumed by mud or metal at the degasser conditions. in that case the nitrogen content of the air-free sample

(contd)

zczc
rr ptth
ep/21/22
from bataafse int. petr. mij the hague 27/8/68 mar
to syell tananger epo
confidential
tx1680
well 1/3-1
your telex 336 (20/8).
the results of ksepl's analysis of gas sample, identification number nor/1/gas, taken from the degasser outlet on drilling through cretacious limestone in well 1/3-1 at a depth of 11165 ft, are as follows:

		sample as received	air free sample (calculated)
methane,	mol o/o	3.50	16.5
ethane,	-	0.83	3.9
propane,	-	0.89	4.2
iso butane,	-	0.42	2.0

(contd)

zczc
pp ptth
from bataafse intern petr mij the hague 24.9.68 jr
to shell tananger epo
urgent
confidential
tx0087
your 419 (18/9)
the results of the analysis of oznli rqqjc nor/2/gas

		sample as received	air free sample (calculated)
idxfd ttvku	mol o/o	10.54	57.7
ihnyc okuku	,,	1.96	10.7
aoerd ttvku	,,	1.31	7.2
pyjhw qdttv	,,	0.53	2.9
zyzjy xcoku	,,	0.69	3.8
pyery qyxco	,,	0.40	2.2
zytwf odttv	,,	0.25	1.4
cjuec onlku	,,	0.26	1.4

- continued page two -

cjsvd tzpjm pinlx	mol o/o	0.21	1.1
xzigy sgwpj kmzsx	,,	0.06	0.3
dhaby qkuku (+ mzbtz ykuku)	,,	17.53	-
bovdw kyqku	,,	64.44	11.3

the air-free composition was calculated by assuming the dhaby qkuku (+ mzbtz ykuku) to originate from air and thus subtracting the associated amount of bovdw kyqku.

+

nnnn

shelp sg

AIR GUN COMPUTATION SHEET

1/3-1 Well

E_{KB} = 84.5ft
V_w = 4850ft/s

KB = 84.5ft amsl
E_D = MSL

Gun Depth = 60ft
Gun Hydrophone Depth = 70ft

Records	d	Z	GD**	T*	T-GD	t_e	t_c	t_c	Va	ΔZ	Δt_c	V_i
	ft	ft	s	s	s	s	s	s	ft/s	ft	s	ft/s
1	2026	1941	.021 .021 .022			.014		.359?	5410	1332	.192	6940
2	3358	3273	.021 .020	.547 .548	.536 .538	.014	.550 .552	.551	5940	1658	.240	6910
3	5016	4931	.021 .021	.798 .798	.777 .777	.014	.791 .791	.791	6230	1202	.187	6430
4	6218	6133	.020 .020	.984 .984	.964 .964	.014	.978 .978	.978	6270	1314	.202	6500
5	7532	7447	.020 .021	1.186 1.186	1.166 1.165	.014	1.180 1.179	1.180	6310	920	.134	6870
6	8452	8367	.020 .020	1.320 1.320	1.300 1.300	.014	1.314 1.314	1.314	6370	1049	.143	7340
7	9501	9416	.020 .020	1.463 1.462	1.443 1.442	.014	1.457 1.456	1.457	6460	651	.078	8350
8	10152	10067	.019 .020	1.540 1.541	1.521 1.521	.014	1.535 1.535	1.535	6560	533	.052	10250
15	10685	10600	.021	1.594	1.573	.014	1.587	1.587	6680	315	.022	14320
14	11000	10915	.021 .021	1.616 1.615	1.595 1.594	.014	1.609 1.608	1.609	6780	1006	.058	17340

AIR GUN COMPUTATION SHEET

1/3-1 Well

E_{KB} = 84.5ft
V_W = 4850 ft/s

KB = 84.5ft amsl
E_D = MSL

Gun Depth = 60ft
Gun Hydrophone Depth = 70ft

Records	d	Z	GD**	T*	T-GD	t_e	t_c	t_c	v_a	Δ_Z	Δt_c	V_i
	ft	ft	s	s	s	s	s	s	ft/s	ft	s	ft/s
13	12006	11921	.021	1.674	1.653	.014	1.667	1.667	7150			
										994	.056	17750
12	13000	12915	.020	1.729	1.709		1.723					
			.020	1.728	1.708	.014	1.722	1.723	7500			
			.021	1.731	1.710		1.724					
										512	.034	15060
11	13512	13427	.021	1.764	1.743		1.757	1.757	7640			
			.021	1.763	1.742	.014	1.756					
10	14200	14115	.021	1.802	1.781	.014	1.795	1.795	7860	688	.038	18110
9	14626	14541	.022	1.832	1.810		1.824			426	.026	16380
			.021	1.828	1.807	.014	1.821					
			.022	1.829	1.807		1.821					
			.021	1.829	1.808		1.822	1.821	7990			
			.022	1.830	1.808		1.822					
			.020	1.824	1.804		1.818					

T* is the time measured from the techno time break to the first trough of the downhole signal

GD* is the time measured from the techno time break to the first trough on the gun hydrophone monitor

$$t_e = \frac{\text{Gun Hydrophone Depth}}{V_W}$$

Gun hydrophone trace obscured - T* estimated

The time for the top level is influenced by casing arrivals - the time shown was obtained from the stacked record.

A/S NORSKE SHELL

WEEKLY CORING REPORT No. 1

Core barrel 6 1/4 x 4

Shoe size 8 7/16 " x 4

Core diameter 4"

WELL 1 / 3 - 1 FROM 15 - 8 TO 16 - 8 1968

Feet cored	Feet Recovered	Depth Interval & Lithology	Dip	Smell	Core fluorescence	Tetra fluorescence	Chloroform	Remarks
67 ft	64 ft	11165-11169: Lst: wht-occ.vltgry,vhd,splintery,tight,icroxstln, massive,very fossiliferous(Radiolaria,Foraminifera, Spiculae)foss.filled w/silex,dissemin.fn pyrite xxstls,numer.fract.zones + stylolites,bit.stain (dead oil)on fracture planes,occ.on stylolites no visible poros,no flu,no cut.			nil	nil		
		11169-11170: Lst: gen.a/a but less fossil,abund.hairline fracs						
		11170-11172: Lst: gen a/a but sl.softer,sl chalky structure,no fossils noted. at 11170 slickenside plane stain.w/Sh,blvblk,fm-hd, fissile,sl.bitum.but no flu,no cut						
		at 11172 Lignite,blk,ptly silicif.soaked w/oil, giving yellowish-grn flu,but no cut.			fair	nil		
		11172-11181: Lst: gen.a/a abund.closed + opened fracs						
		11181-11188: Lst: gen.a/a abund.stylolites,few 1/4" layers Sh, olvblk-brnshblk,fm-hd,fissile,sl.bitum.very calc. prob.remains from diluted Lst.Shale layers bec. thiner & more scarce with depth.						
		11188-11229: Lst: gen.a/a getting more compact with depth,occ. concoidal rupture,some small spots showing yellow flu,prob.oil filled microfoss.trc.dead oil on frac. planes. at 11192 Sh: olvblk,fm-hd,fissile,sl.calc.dissem. pyritexxstls,micromica,layer 1/4" thick at 11198 Calcarenite?: ltolvgry,hd,very fossilif, (Lamellibr.Spiculae)milkywht compon.mostly rnd,ptly diluted,well cem.w/ crs xstln calcite,tan, 1/4"			faint	nil		
		Throughout entire core no poros.visible.No dip determinable						

DESCRIPTIONS BY .....

A/S NORSKE SHELL | WELL 1/3-1 | CORE Nº 1.

CORE DESCRIPTION

Cored from: 11,165'0" to: 11,232'0" Recovered 60' 10½" %
Core size 4"
Formation: U. Cret Chalk
Scale 1:50
Date: Described by: G. D. Franks
Sheet: 1

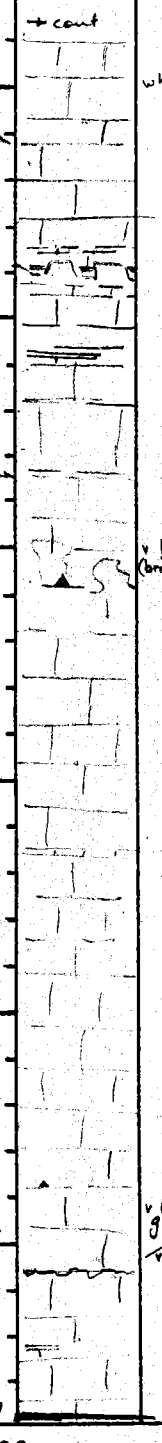
Depth and Shows	Litho Column	Colour	Composition	Cement and Poros	Sedimentary and Diagentic Structures	Interpretation and Petrophysical Data
11165			cpt-chk Lime Mdst	I(II)A	imbibes water	
			stylolitic bedding planes covered with black bituminous sh (mm - thick).		Stylolites	
					Near vertical hairline fractures	Total porosity 20-30% (estimate)
11170			whitish-grey (- slightly brownish)		Bedding dip 10° - 15°	
					Slight oil stain on fractures: weak fluorescence	
11175						
11180						
			Bit. sh partings (to 5 mm)		Prominent stylolites	
11185			Dip - Horiz to 12°			
					Tight hairline fractures 70° - 90° some at ± 50°	
11190		med gy	1 cm crystalline Lime Grainstone	IIIA	Pelecypod shells. Bit sh layer	
		v lt (orn)gy	cpt Lime Mdst	IA	occ small carb. specks	
11195						
		gy	5mm Lime Grnst	IIIA	fossil (crin?) frags in clear lime cmt	

Notes

A/S NORSKE SHELL | WELL 1/3-1 | CORE Nº 1

CORE DESCRIPTION

Cored from: 11165 to: 11232 Recovered 60' 10½" % Core size 4 "
Formation: U. Cret Chalk Scale 1:50
Date: Described by: G. Franks Sheet: 2

Depth and Shows	Litho Column	Colour	Composition	Cement and Poros	Sedimentary and Diagentic Structures	Interpretation and Petrophysical Data
11200		wh	cpt Lime Mdst	IA		
11205			thin layers Lime Grainst-Packstone colour banded - lt (brn) gy - v lt(brn) gy Bituminous shale layers		Large stylolites	
11210		v lt (brn)gy	Faint banding; occ grains white lime aphanatic Lime Mudstone	IA	Complex stylolites	
11215			thin layers Lime Grainstone	IA	Hairline fractures	
11220						
11225		v lt gy / v lt	cpt - aphanatic Lime Mudstone	IA	stylolites Hairline fractures (dip 75°-90°) Small chert nodules (5 mm), elongated	
11229			thin bituminous Shale layers			

Notes

Tananger, 23.8.68
Exploration Dept.

CORE DESCRIPTION

11165 - 11170 copt. aphanatic lime mudstone I A; white - v. lt (gy) brn, micr xln, ang Brk, hd, foss, (pyr).
Stylolitic bedding planes with mm bit shale layers.
Frac, jts, oil stain (weak flu) on frac.

11170-11189' 10" copt. (chalky) lime mudstone I/II A; no vis por. but imbibes water, white - v. lt (gy) brn, ang Brk, hd.
Stylolites with prominent (5 mm) bit shale partings 10° - 15° bedding dip. Tight hairline fracs. with 70° - 50° dip.

at 11189' 10" 1 cm lime grainstone III A, lt gy, m xln, hkl Brk, fossils (pelecyp). Bit. layer on lower side.

11189' 11" - 11202 copt. aphanatic lime mudstone I A, v. lt brn gy, ang - conch Brk, hd.
5 mm lime grainstone III A at 11197' 2"; fossil (crinoid?) frags clear lime cmt.

11202 - 11218 copt. aphanatic lime mudstone I A; ang - conch Brk, hd, with faint colour bedding and occ. thin (mm) beds lime packstone - wackestone, bioclostic, (microfossils), thin bit. shale layers and large stylolites. Near vertical hairline fracs with oil stain.

11218 - 11224 copt. chalky lime mudstone I/II A, no vis por, whi - v. lt gy hairline fracs and stylolites.

11224 - 11229 copt. aphanatic lime mudstone I A v. lt gy - v. lt (brn) gy.

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

CORE ANALYSIS RESULTS

pany Shell Norske A/S — Formation — File UKCA 132
1/3 - 1 — Core Type — Date Report 4th Sept. '68
— Drilling Fluid — Analysts R.F.B.
ty Norway — State — Elev. — Location

Lithological Abbreviations

SD SH LM — DOLOMITE-DOL, CHERT-CH, GYPSUM-GYP — ANHYDRITE-ANHY, CONGLOMERATE-CONG, FOSSILIFEROUS-FOSS — SANDY-SDY, SHALY-SHY, LIMY-LMY — FINE-FN, MEDIUM-MED, COARSE-CSE — CRYSTALLINE-XLN, GRAIN-GRN, GRANULAR-GRNL — BROWN-BRN, GRAY-GY, VUGGY-VGY — FRACTURED-FRAC, LAMINATION-LAM, STYLOLITIC-STY — SLIGHTLY-SL/, VERY-V/, WITH-W/

DEPTH FEET	PERMEABILITY MILLIDARCYS Ka	PERMEABILITY MILLIDARCYS Kl	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE OIL	RESIDUAL SATURATION PER CENT PORE TOTAL WATER	SAMPLE DESCRIPTION AND REMARKS	Perm Ka	Perm Kl
11165'0" - 11165'4"	.02	.01	4.8	0	85.4	Lm, white, chemical, hd, dense, argillaceous, anhy, salty; black stylolite partings, pin-point vugs, sl pyritic	.02	.01
65'4" - 65'9"	.04	.02	6.7	0	86.6	a.a.	.04	.02
69'10"- 70'4"	.04	.02	8.3	0	91.6	a.a.	.06	.03
70'4" - 70'9"	6.0	4.5	12.7	0	79.5	a.a.	.10	.06
74'5" - 74'10"	.12	.07	19.4	0	69.1	a.a.	.14	.08
74'10"- 75'3"	.22	.13	17.9	0	71.5	a.a.	.14	.08
80'5" - 80'11"	.12	.07	20.4	0	73.6	a.a.	.31	.19
80'11"- 81'4"	.10	.06	20.3	0	74.0	a.a.	.14	.08
86'0" - 86'9"	.06	.03	19.5	0	55.4	a.a.	.16	.11
89'11"- 90'5"	.08	.04	6.7	0	92.8	a.a.	.08	.04
90'5" - 90'10"	.12	.02	10.1	0	80.2	a.a.	.04	.02
95' - 95'10"	.10	.06	20.6	0	61.3	a.a.	.18	.13
95'10"- 96'3"	.12	.07	17.1	0	62.0	a.a.	.20	.14
11200'6" - 11201'0"	.04	.02	4.0	0	87.5	a.a.	.02	.01
01'0" - 04'6"	.06	.03	7.6	0	93.8	a.a.	.08	.04
06'7" - 07'2"	.04	.02	6.0	0	93.2	a.a.	.06	.03
07'2" - 07'8"	.06	.03	7.6	0	89.5	a.a.	.06	.03
15'1" - 15'7"	.14	.08	8.0	0	94.5	a.a.	.10	.06
15'7" - 16'1"	.10	.06	9.6	0	93.6	a.a.	.08	.04
19'10"- 20'5"	.16	.14	15.7	0	70.2	a.a.	.18	.13
20'5" - 21'0"	.12	.07	15.3	0	77.2	a.a.	.14	.08
24'10"- 25'4"	.04	.02	6.5	0	93.8	a.a.	.04	.02
11225'4" - 11225'10"	.08	.04	6.9	0	93.0	a.a.	.10	.06

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

CORE ANALYSIS RESULTS

Company Shell Norske A/S Formation File UKCA 132
Well 1/3 - 1 Core Type Date Report 4th Sept. '68
Field Drilling Fluid Analysts R.F.B.
County Norway State Elev. Location

Lithological Abbreviations

ND-SD, ALE-BH, E-LM — DOLOMITE-DOL, CHERT-CH, GYPSUM-GYP — ANHYDRITE-ANHY, CONGLOMERATE-CONG, FOSSILIFEROUS-FOSS — SANDY-SDY, SHALY-SHY, LIMY-LMY — FINE-FN, MEDIUM-MED, COARSE-CSE — CRYSTALLINE-XLN, GRAIN-GRN, GRANULAR-GRNL — BROWN-BRN, GRAY-GY, VUGGY-VGY — FRACTURED-FRAC, LAMINATION-LAM, STYLOLITIC-STY — SLIGHTLY-SL/, VERY-V/, WITH-W/

DEPTH FEET	PERMEABILITY MILLIDARCYS Ka	PERMEABILITY MILLIDARCYS Kl	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE OIL	RESIDUAL SATURATION PER CENT PORE TOTAL WATER	SAMPLE DESCRIPTION AND REMARKS	Perm Ka	Perm Kl
11165'0" - 11165'4"	.02	.01	4.8	0	85.4	Lm, white, chemical, hd, dense, argillaceous, anhy, salty; black stylolite partings, pin-point vugs, sl pyritic	.02	.01
65'4" - 65'9"	.04	.02	6.7	0	86.6	a.a.	.04	.02
69'10"- 70'4"	.04	.02	8.3	0	91.6	a.a.	.06	.03
70'4" - 70'9"	6.0	4.5	12.7	0	79.5	a.a.	.10	.06
74'5" - 74'10"	.12	.07	19.4	0	69.1	a.a.	.14	.08
74'10"- 75'3"	.22	.13	17.9	0	71.5	a.a.	.14	.08
80'5" - 80'11"	.12	.07	20.4	0	73.6	a.a.	.31	.19
80'11"- 81'4"	.10	.06	20.3	0	74.0	a.a.	.14	.08
86'0" - 86'9"	.06	.03	19.5	0	55.4	a.a.	.16	.11
89'11"- 90'5"	.08	.04	6.7	0	92.8	a.a.	.08	.04
90'5" - 90'10"	.12	.02	10.1	0	80.2	a.a.	.04	.02
[illegible]4" - 95'10"	.10	.06	20.6	0	61.3	a.a.	.18	.13
95'10"- 96'3"	.12	.07	17.1	0	62.0	a.a.	.20	.14
11200'6" - 11201'0"	.04	.02	4.0	0	87.5	a.a.	.02	.01
01'0" - 04'6"	.06	.03	7.6	0	93.8	a.a.	.08	.04
06'7" - 07'2"	.04	.02	6.0	0	93.2	a.a.	.06	.03
07'2" - 07'8"	.06	.03	7.6	0	89.5	a.a.	.06	.03
15'1" - 15'7"	.14	.08	8.0	0	94.5	a.a.	.10	.06
15'7" - 16'1"	.10	.06	9.6	0	93.6	a.a.	.08	.04
19'10"- 20'5"	.16	.14	15.7	0	70.2	a.a.	.18	.13
20'5" - 21'0"	.12	.07	15.3	0	77.2	a.a.	.14	.08
24'10"- 25'4"	.04	.02	6.5	0	93.8	a.a.	.04	.02
11225'4" - 11225'10"	.08	.04	6.9	0	93.0	a.a.	.10	.06

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

CORE ANALYSIS RESULTS

Company Shell Norske A/S Formation File UKCA 132
Well 1/3 - 1 Core Type Date Report 4th Sept. '68
Field Drilling Fluid Analysts R.F.B.
County Norway State Elev. Location

Lithological Abbreviations

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

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS Ka	PERMEABILITY MILLIDARCYS Kl	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE OIL	RESIDUAL SATURATION PER CENT PORE TOTAL WATER	SAMPLE DESCRIPTION AND REMARKS	Perm Ka	Perm Kl
1	11165'0" - 11165'4"	.02	.01	4.8	0	85.4	Lm, white, chemical, hd, dense, argillaceous, anhy, salty; black stylolite partings, pin-point vugs, sl pyritic	.02	.01
2	65'4" - 65'9"	.04	.02	6.7	0	86.6	a.a.	.04	.02
3	69'10"- 70'4"	.04	.02	8.3	0	91.6	a.a.	.06	.03
4	70'4" - 70'9"	6.0	4.5	12.7	0	79.5	a.a.	.10	.06
5	74'5" - 74'10"	.12	.07	19.4	0	69.1	a.a.	.14	.08
6	74'10"- 75'3"	.22	.13	17.9	0	71.5	a.a.	.14	.08
7	80'5" - 80'11"	.12	.07	20.4	0	73.6	a.a.	.31	.19
8	80'11"- 81'4"	.10	.06	20.3	0	74.0	a.a.	.14	.08
9	86'0" - 86'9"	.06	.03	19.5	0	55.4	a.a.	.16	.11
10	89'11"- 90'5"	.08	.04	6.7	0	92.8	a.a.	.08	.04
11	90'5" - 90'10"	.12	.02	10.1	0	80.2	a.a.	.04	.02
12	95'4" - 95'10"	.10	.06	20.6	0	61.3	a.a.	.18	.13
13	95'10"- 96'3"	.12	.07	17.1	0	62.0	a.a.	.20	.14
14	11200'6" - 11201'0"	.04	.02	4.0	0	87.5	a.a.	.02	.01
15	01'0" - 04'6"	.06	.03	7.6	0	93.8	a.a.	.08	.04
16	06'7" - 07'2"	.04	.02	6.0	0	93.2	a.a.	.06	.03
17	07'2" - 07'8"	.06	.03	7.6	0	89.5	a.a.	.06	.03
18	15'1" - 15'7"	.14	.08	8.0	0	94.5	a.a.	.10	.06
19	15'7" - 16'1"	.10	.06	9.6	0	93.6	a.a.	.08	.04
20	19'10"- 20'5"	.16	.14	15.7	0	70.2	a.a.	.18	.13
21	20'5" - 21'0"	.12	.07	15.3	0	77.2	a.a.	.14	.08
22	24'10"- 25'4"	.04	.02	6.5	0	93.8	a.a.	.04	.02
23	11225'4" - 11225'10"	.08	.04	6.9	0	93.0	a.a.	.10	.06

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

CORE ANALYSIS RESULTS

Company Shell Norske A/S Formation File UKCA 132
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Lithological Abbreviations

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

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS Ka	PERMEABILITY MILLIDARCYS Kl	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE OIL	RESIDUAL SATURATION PER CENT PORE TOTAL WATER	SAMPLE DESCRIPTION AND REMARKS	Perm Ka	Perm Kl
1	11165'0" - 11165'4"	.02	.01	4.8	0	85.4	Lm, white, chemical, hd, dense, argillaceous, anhy, salty; black stylolite partings, pin-point vugs, sl pyritic	.02	.01
2	65'4" - 65'9"	.04	.02	6.7	0	86.6	a.a.	.04	.02
3	69'10"- 70'4"	.04	.02	8.3	0	91.6	a.a.	.06	.03
4	70'4" - 70'9"	6.0	4.5	12.7	0	79.5	a.a.	.10	.06
5	74'5" - 74'10"	.12	.07	19.4	0	69.1	a.a.	.14	.08
6	74'10"- 75'3"	.22	.13	17.9	0	71.5	a.a.	.14	.08
7	80'5" - 80'11"	.12	.07	20.4	0	73.6	a.a.	.31	.19
8	80'11"- 81'4"	.10	.06	20.3	0	74.0	a.a.	.14	.08
9	86'0" - 86'9"	.06	.03	19.5	0	55.4	a.a.	.16	.11
10	89'11"- 90'5"	.08	.04	6.7	0	92.8	a.a.	.08	.04
11	90'5" - 90'10"	.12	.02	10.1	0	80.2	a.a.	.04	.02
12	95'4" - 95'10"	.10	.06	20.6	0	61.3	a.a.	.18	.13
13	95'10"- 96'3"	.12	.07	17.1	0	62.0	a.a.	.20	.14
14	11200'6" - 11201'0"	.04	.02	4.0	0	87.5	a.a.	.02	.01
15	01'0" - 04'6"	.06	.03	7.6	0	93.8	a.a.	.08	.04
16	06'7" - 07'2"	.04	.02	6.0	0	93.2	a.a.	.06	.03
17	07'2" - 07'8"	.06	.03	7.6	0	89.5	a.a.	.06	.03
18	15'1" - 15'7"	.14	.08	8.0	0	94.5	a.a.	.10	.06
19	15'7" - 16'1"	.10	.06	9.6	0	93.6	a.a.	.08	.04
20	19'10"- 20'5"	.16	.14	15.7	0	70.2	a.a.	.18	.13
21	20'5" - 21'0"	.12	.07	15.3	0	77.2	a.a.	.14	.08
22	24'10"- 25'4"	.04	.02	6.5	0	93.8	a.a.	.04	.02
23	11225'4" - 11225'10"	.08	.04	6.9	0	93.0	a.a.	.10	.06

10.13 ⊕
shelp sg
for j g mcgowan following are permeabilities measured on core received here two days ago your 1/3-1 well interval 11165'0'' through 11225'10''

	horizontal		vertical	
sample	air perm	liquid perm	air perm	liquid perm
1	0.02	0.01	0.02	0.01
2	0.04	0.02	0.04	0.02
3	0.04	0.02	0.06	0.03
4	6.0	4.5	0.10	0.06
5	0.12	0.07	0.14	0.08
6	0.22	0.13	0.14	0.08
7	0.12	0.07	0.31	0.19
8	0 10	0 06	0.14	0.08
9	0.06	0.03	0.16	0.11
10	0.08	0.04	0.08	0.04
11	0.12	0.07	0.04	0.02
12	0.10	0.06	0.18	0.13
13	0.12	0.07	0.20	0.14
14	0.04	0.02	0.01	0.01
15	0.06	0.03	0.08	0.04
16	0.04	0.02	0.06	0.03
17	0.06	0.03	0.06	0.03
18	0.14	0.08	0.10	0.06
19	0.10	0.06	0.08	0.04
20	0.16	0.11	0.18	0.13
21	0.12	0.07	0.14	0.08
22	0.04	0.02	0.04	0.02
23	..08	0.04	0.10	0.06

all permeabilities are given in millidarcies

we are now spotchecking porosities of above samples on helium porosimeter and will notify you if t re is any pronounced c ange from porosities originally reported to you
many thanks coreLab grissett

DATE: 23/8-68

		Action	Info.	Init.	Date
1	Ops.man.				
2	Expl.man.				
3	Petr.eng.				
4	Ops.eng.				
5	Drilling				
6	Mats.				
7	Adm.				
8	Geol.		✓		
9					
10					

FILE 1.017

+ ?.
ok tks

⊕
co lb ln 1
⊕
shelp sg

for john g mcgowan following is analysis done on 1/3-1 cores received tonight stop permeability samples are now drying and provisional perms could be given thursday but friday would be better to insure complete drying stop analysis follows stop first column depth (feet-inches) second column porosity last column water saturation as å space

11165	0 - 11165	4	4.8 85.4
65	4 - 65	9	6.7 86.6
69	10- 70	4	8.3 91.6
70	4 - 70	9	12.7 79.5
74	5 - 74	10	19.4 69.1
74	10- 75	3	.,955

for john g mcgowan following is analysis done on 1/3-1 cores received tonight stop permeability samples are now drying and provisional perms could be given thursday but friday would be better to insure complete drying stop analysis follows stop first column depth (feet-inches) second column porosity last column water saturation as å pore space

Depth		Porosity	Water Saturation
11165 0 -	11165 4	4.8	85.4
65 4 -	65 9	6.7	86.6
69 10-	70 4	8.3	91.6
70 4 -	70 9	12.7	79.5
74 5 -	74 10	19.4	69.1
74 10-	75 3	17.9	71.5
80 5 -	80 11	20.4	73.6
80 11-	81 4	20.3	74.0
86 0 -	86.9	19.5	55.4
89 11 -	90 5	6.7	92.8
90 5 -	90 10	10.1	80.2
95 4 -	95 10	20.6	61.3
95 10-	96 3	17.1	62.0
00 6 -	01 0	4.0	87.5
01 0 -	01 6	7.6	93.8
06 7 -	07 2	6.0	93.2
07 2 -	07 8	7.6	89.5
15 1 -	15 7	8.0	94.5
15 7 -	16 1	9.6	93.6
19 10-	20 5	15.7	70.2
20 5 -	21 0	15.3	77.2
24 10-	25 4	6.5	93.8
25 4 -	25 10	6.9	93.0

21-8-68

(11200)

1-017

oil saturations measured zero throughout stop good odors noted in zone 11170 4 through 11181 4 inclusive stop this same interval showed hairline fracturing with bright hydrocarbon fluorescence on fracture surfaces and occasional traces of hydrocarbon fluorescence in matrix but resultant oil saturation was too small to measure stop will telephone you friday morning to report horizontal and vertical perms unless you want provisional perms on thursday in which case please contact us stop sample remnants will be transmitted to rijswik per your instructions stop many thanks for this work
best regards corelab london

+ ?

interval instead of the 3 foot interval first used. the new calculation and plot will be forwarded to you soonest but we can see only marginal improvement. for our next cdm run we intend to use the old three arm dipmeter.

secundo

we concur that it would be useful for you to take up the matter directly with schlumberger and we should be glad to learn outcome of discussions in due course.

+

nnnn

10 +? 31005+ 110 303
12.52
bataafse haag
shelp sg
zczc
rr
ep/22/21/11
from shell tananger epo 28/8/68
to bipm the hague
tx-361
part coded

DATE: 28-8-68

		Action	Info.	Init.	ate
1	Ops.man.			L	
2	Expl.man.		✓		
3	Petr.eng.	✓		Jm	
4	Ops.eng.				
5	Drilling				
6	Mats.				
7	Adm.				
8					
9					
10					

FILE

dipmeter results well 1/3-1
- your 1817 -

results of cdm no. 1 have been discussed with schlumberger locally because of high scatter and improbably c v z n x dip values in formation believed from reliable seismic evidence to be flat to z i m y p e p b f o z l z f v j l g s j. this was our first run with schlumberger's four arm high resolution dipmeter and in our opinion the confusing array of readings is due to measurement of false dips caused by minor formation anomalies. the s m v c t r v i i p r c k i n y j c n l are in any case probably not suitable for good dipmeter results. because of the scatter schlumberger have recalculated the dipmeter results on a 9 foot correlation

cont'd

zczc
rr ptth
ep/22/21/11
from bataafse int petr mij the hague 27.8.68 rn
to norske shell tananger
tx1817
dipmeter results well 1/3-1.
we noticed that the dipmeter results from run 1 in above well, as presented by schlumberger, show an unbelievably high scatter.
we would like to contact schlumberger on this matter directly from this office.
please concur.
+

DATE: 28-8-68

		Action	Info.	Init.	Date
1	Ops.man.				
2	Expl.man.				
3	Petr.eng.	✓			
4	Ops.eng.				
5	Drilling				
6	Mats.				
7	Adm.				
8					
9					
10					

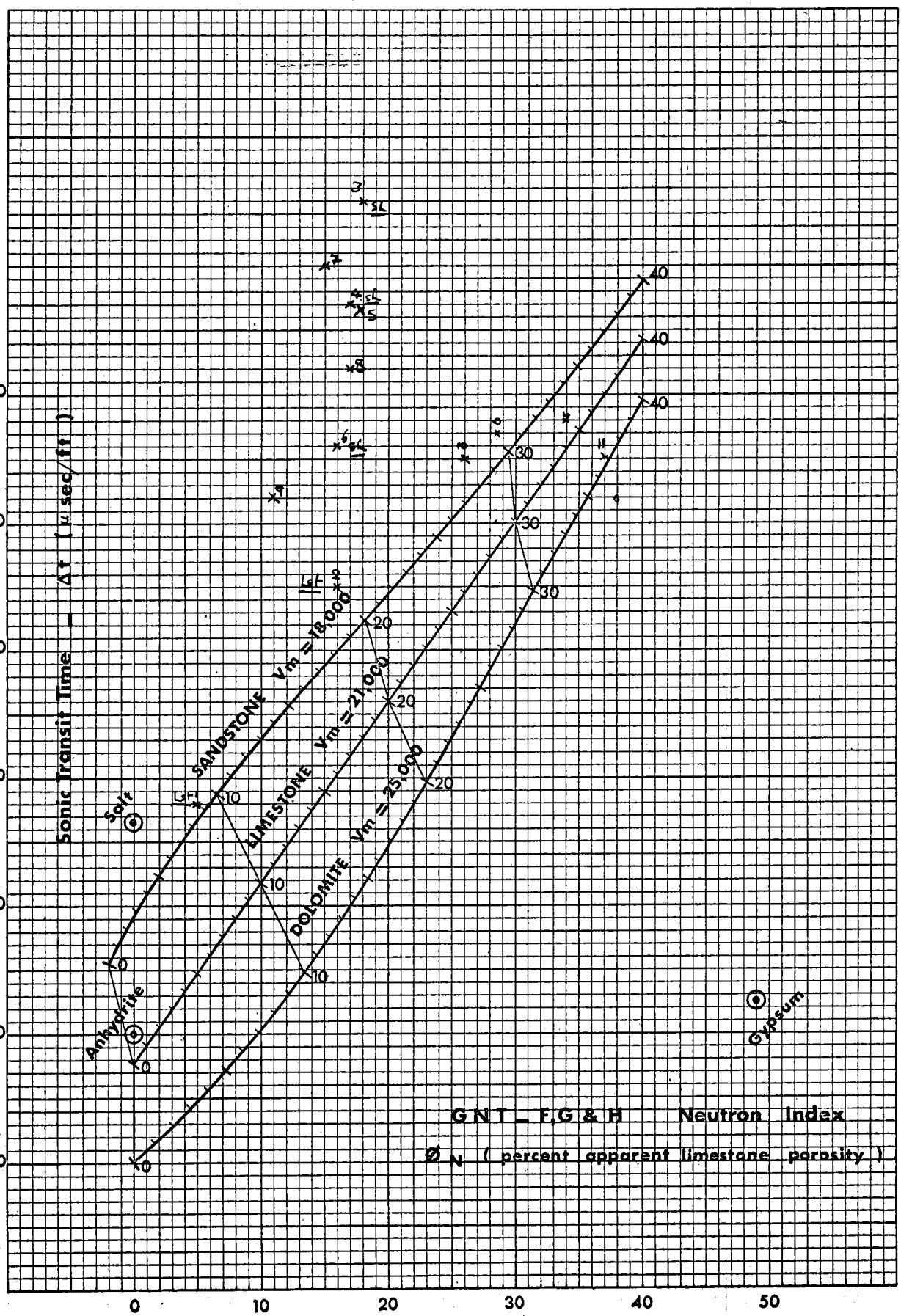
FILE

nnnn
shelb sg
1055 msn 28/8

9840 - 10000 1/3-1

CLEAN FORMATIONS

determination of lithology and porosity, GNT-F, G and H + Sonic

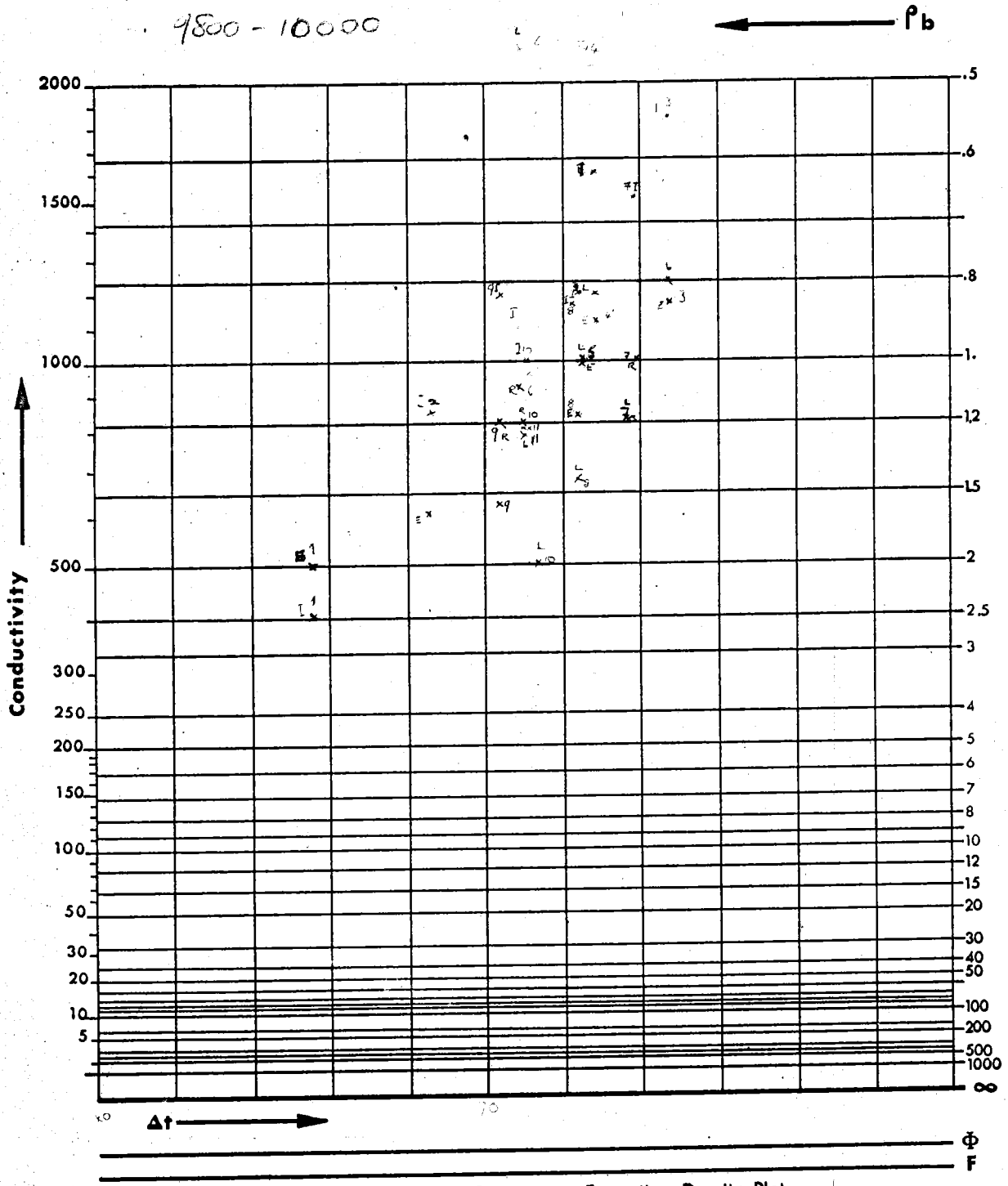


44

9840-50 arg fst with too low apparent porosity

sh variable sonic in same app. Φ range — but graph scale sensitivity exaggerated — compare Sonic Log

GRID FOR SONIC — RESISTIVITY OR FD — RESISTIVITY PLOTS

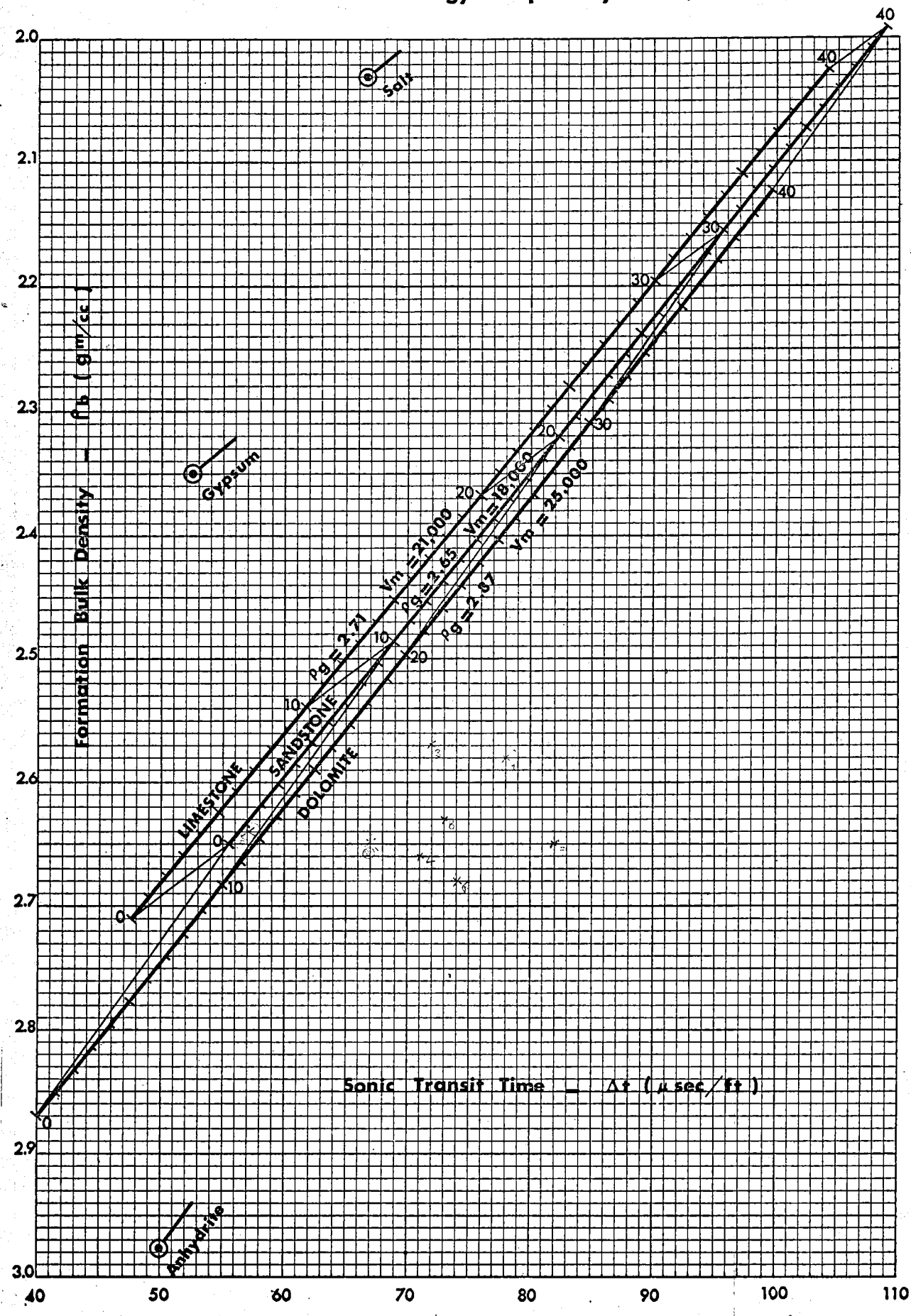


Grid for Resistivity vs Sonic or vs Formation Density Plot

$$F = \frac{.62}{\Phi^{2.15}}$$

Limestones !!
interval 14680 – 14880

CLEAN FORMATIONS
determination of lithology and porosity FDC + Sonic



43

Sonic log (velocity log)

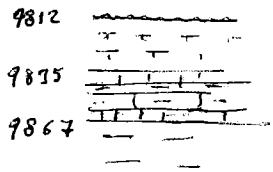
+/or Density log

i.e. depth of burial great? compressibility?

Notes on Logs 1/3-1

Lower Interval of Tertiary

Break at 9812



← FD increases
Sonic increases (Δt decreases)

Sands at 9970 poor spread 9918 - 10000 as thin beds 1 - 2' thick

Middle Section

"Tuff" layers

5086	Sonic 140	FD 2.37		no NL
8082	141	2.21		
7995	143	2.37		
5108	160	2.12		
5297	147	2.25		
5356	135	2.00		
5395	154	2.00		
5644	129	2.03		

Boundary at 5974 to less clayey, lower velocity, lower density fmtn. (v. low; avg 180 μsec/ft) v. low - 1.85 - 1.90 avg

Boundary at 6292 higher γ ray, higher (shale) velocity, somewhat higher density → 1.95 - 2.00

Chalk γ ray base 10158 ; interval just above has abc lst streaks

Marl interval 10190 - 10196

FD chalk at 10157

SP chalk at 10158

Just above Chlk	10151	γ, 35 API ;	Sonic 120	FD 2.8	24% App. porosity	
Marl In Chalk	10196	γ, 25 API ;	" 167	FD 1.84	29% App. por	v. soft cl. layer ⓜ
Chalk	10160	γ 12 API ;	" 70	FD 2.45	28%	