

# ESTIMATED PORE PRESSURE & FRACTURE GRADIENT WELL 1/9-3

Denne rapport  
tilhører

OSTAGE

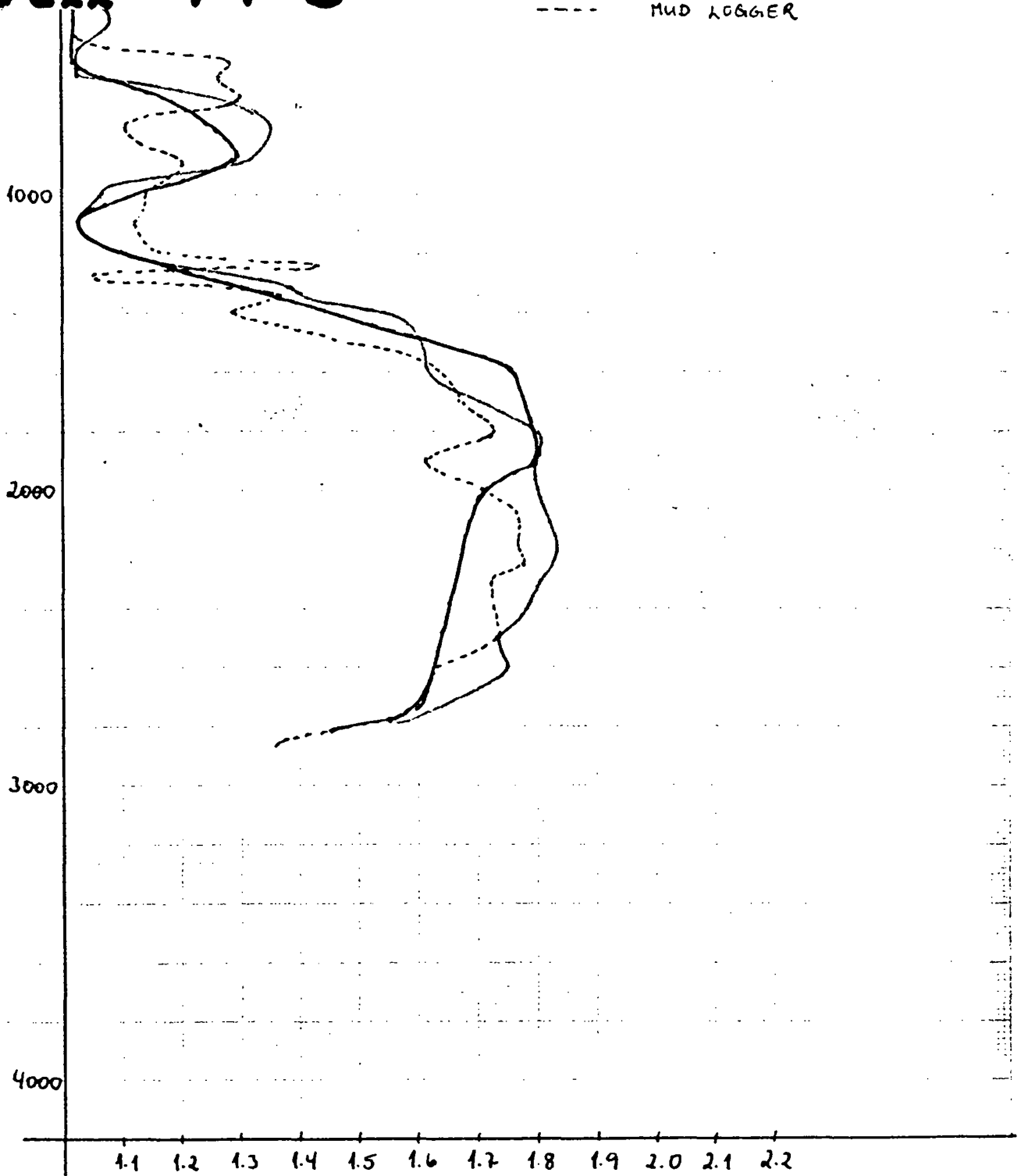
TEKNOLOGISENTER  
20090040015

KODE Well 1/9-3 nr 21

Returneres etter bruk

—  
—  
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MUD LOGGER



Pressure gradient (g/cc)

PORE PRESSURE GRADIENTS

WELL 1/9-3

Depth (RKB)  
(m) 0



- CALL. PORE PRESSURE GRAD.
- PRED. PORE PRESSURE GRAD.
- - - MUD LOGGER

1000

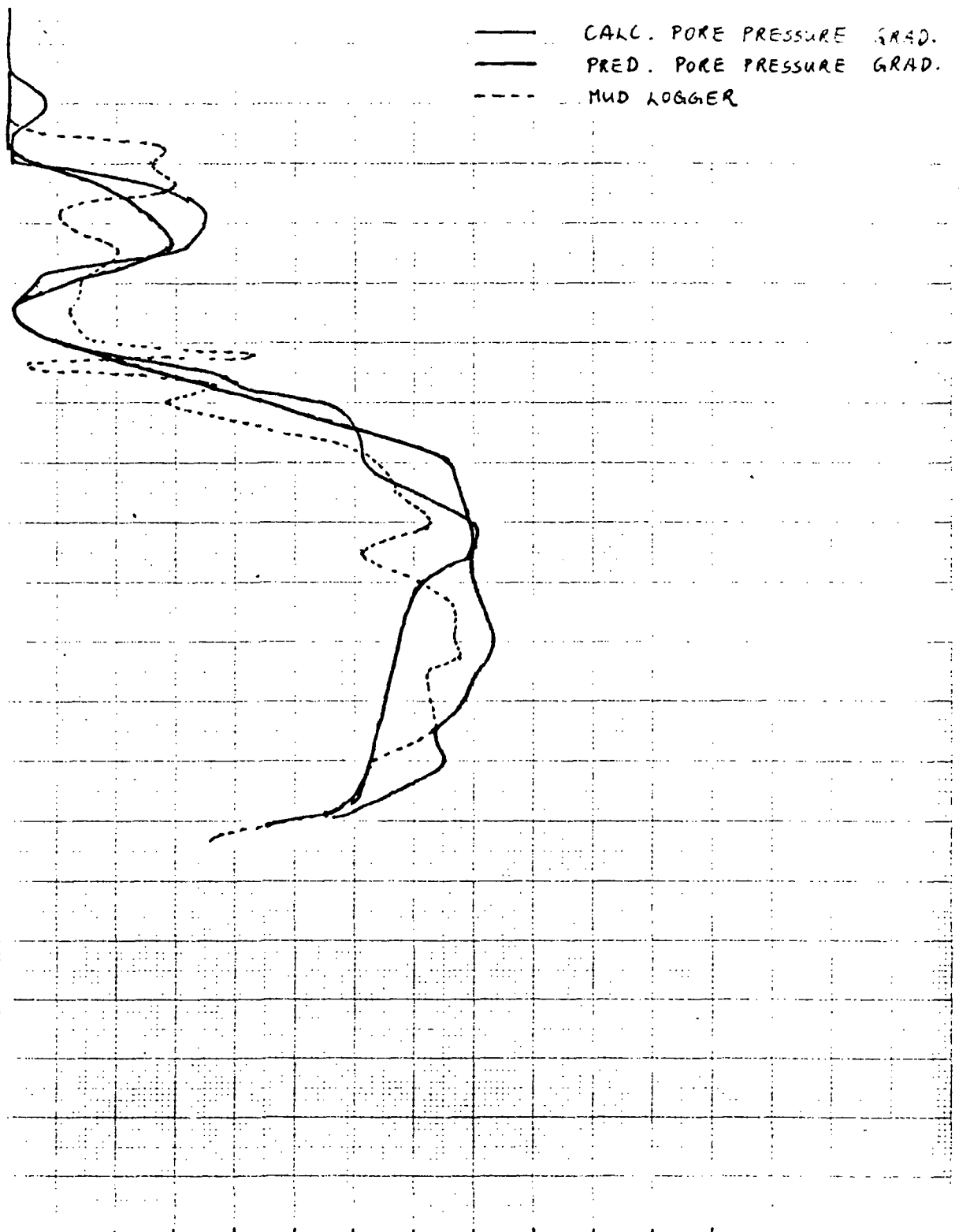
2000

3000

4000

1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2

Pressure gradient (g/cc)



ESTIMATED PORE PRESSURE & FRACTURE GRADIENT

Well 1/a-3

Depth (RKB)  
(m)



36" CSG  
(170. m)

20" CSG  
(434. m)

16" CSG  
(1345 m)

13 3/8" CSG  
(2770 m)

1000

2000

3000

4000

- Pore pressure
- Mud weight
- - - Frac. grad. (Eaton..)
- Frac. grad. (Andersen..)
- Leak off test

(No leak off) .16

● L.O.: 1.98 g/cc .14

1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2

Pressure gradient (g/cc)

Depth (ft) ↓

Well 119-3  
STATION

→  $\Delta t_{sl}$  (hr/ft)

500

1000

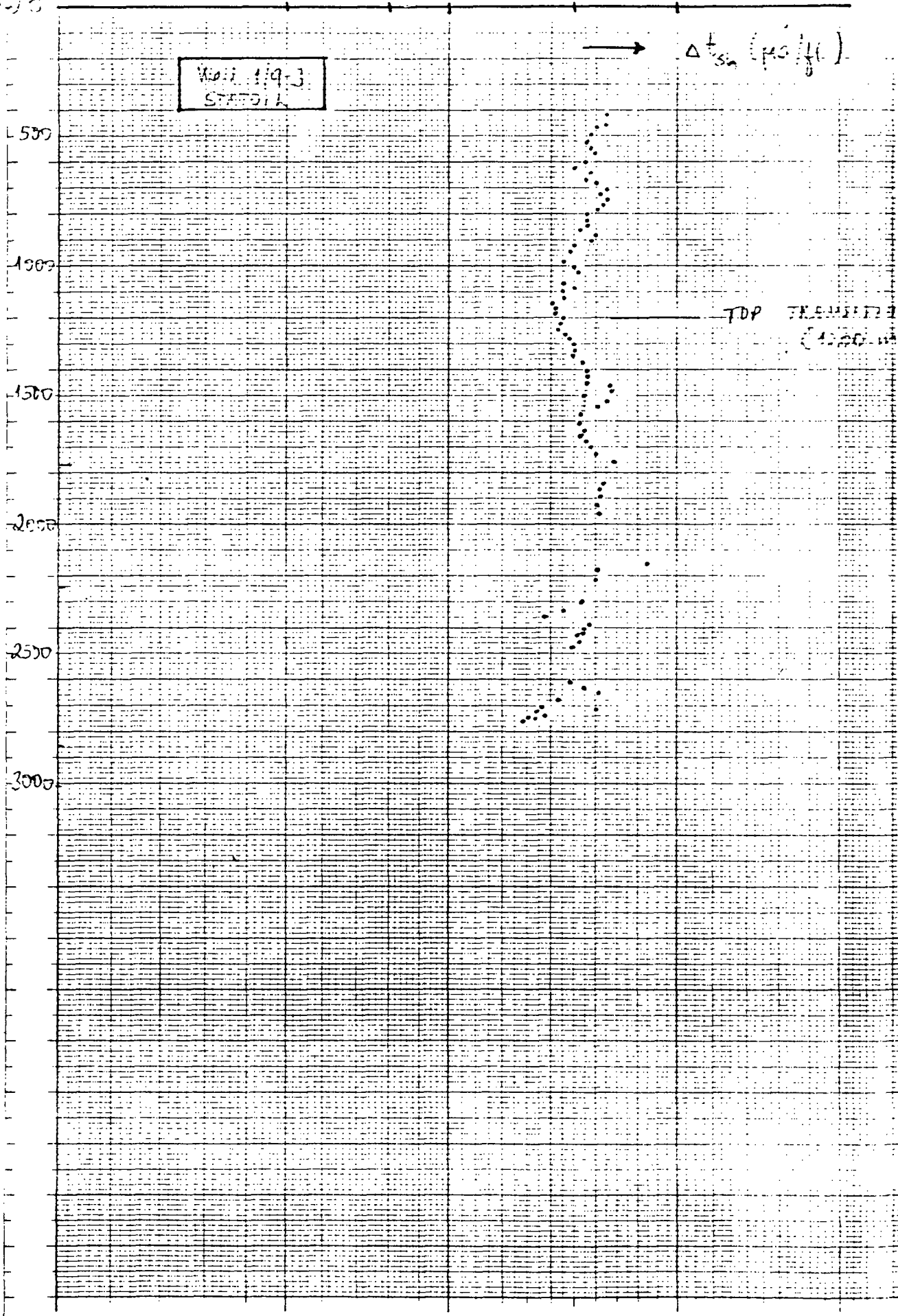
1500

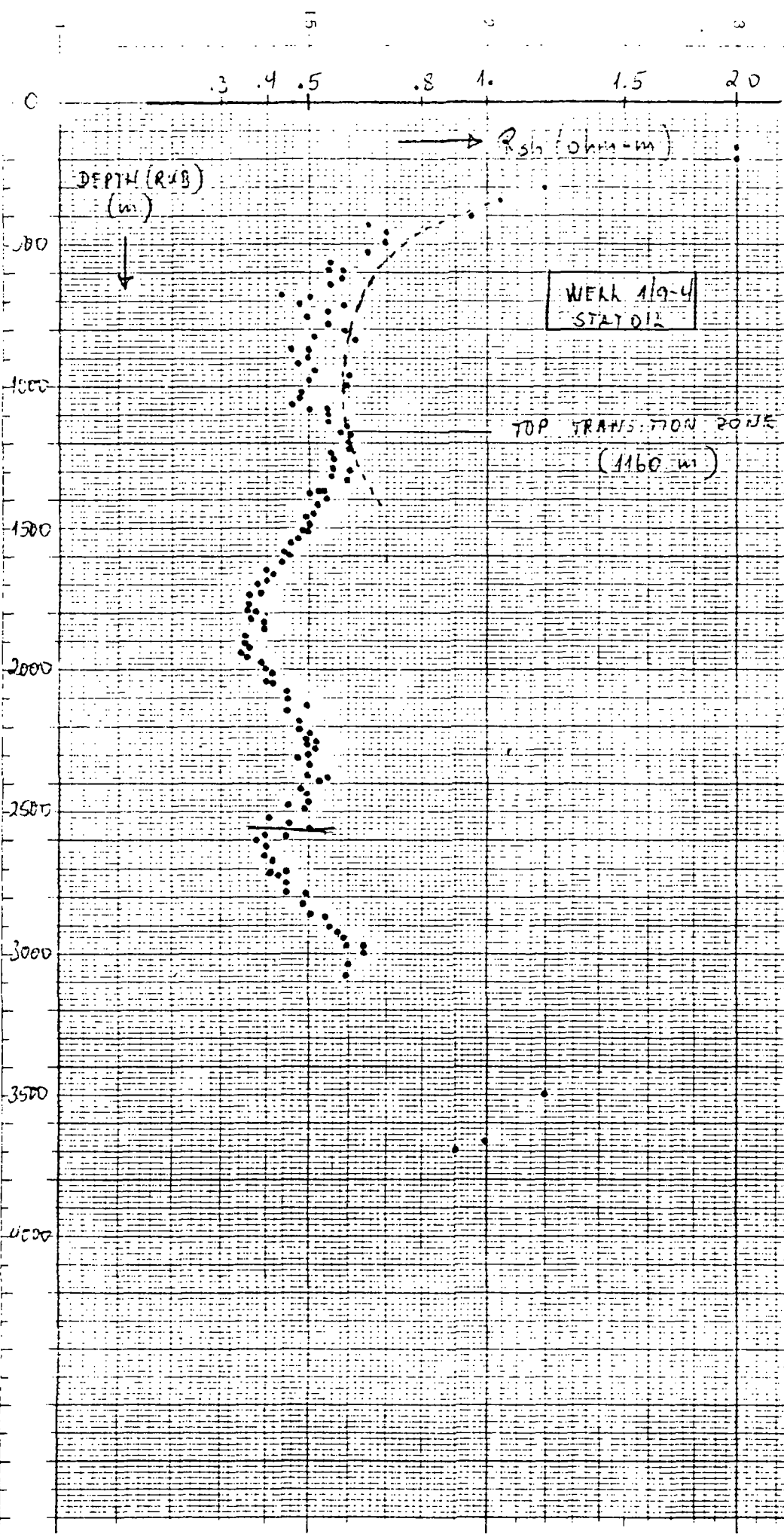
2000

2500

3000

TDP TRAPPOINT  
(1000 ft)

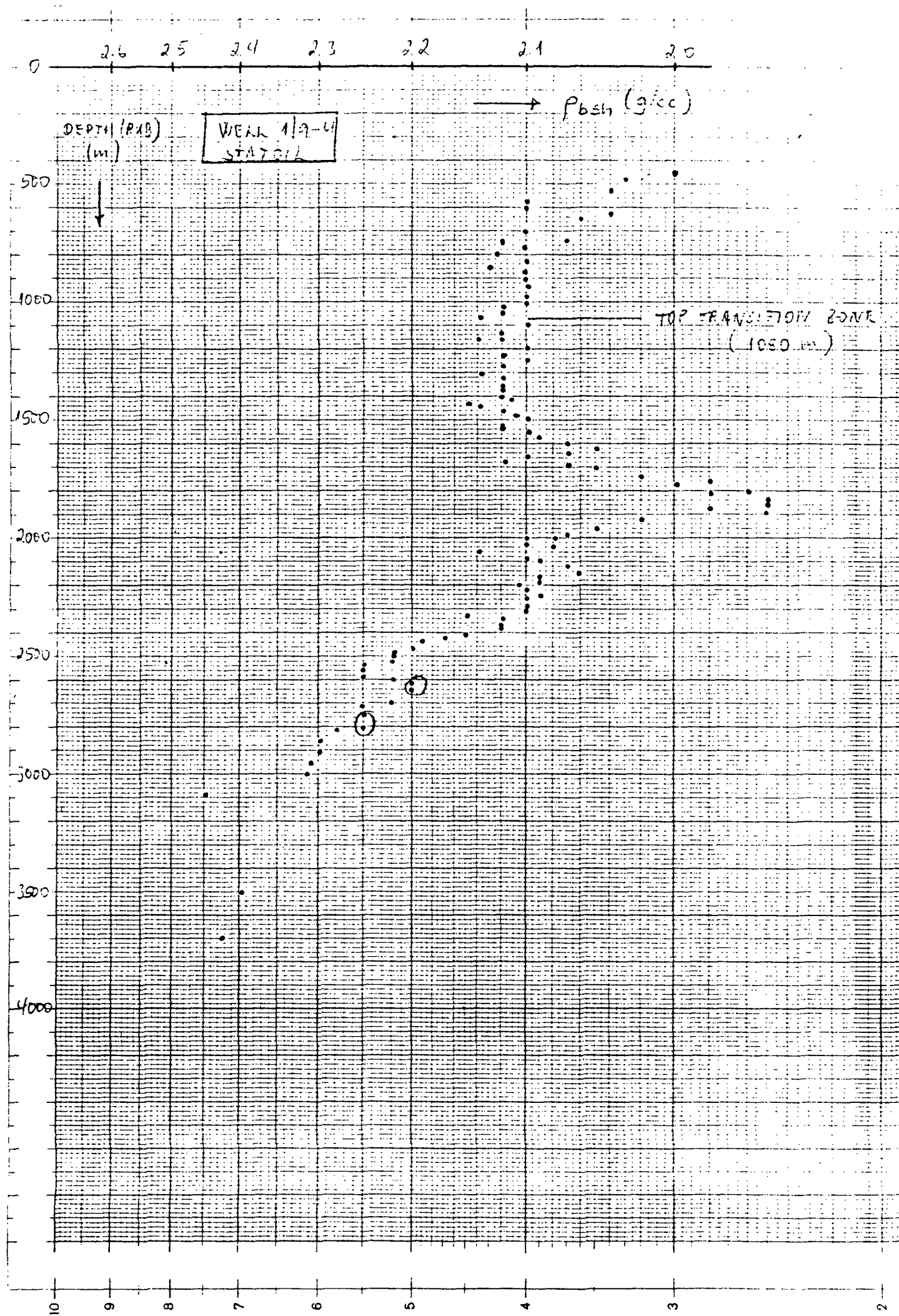




Eine Achse logar geteilt, von 1 bis 10, Einheit 250 mm, die andere von 1 bis 10, Einheit 100 mm

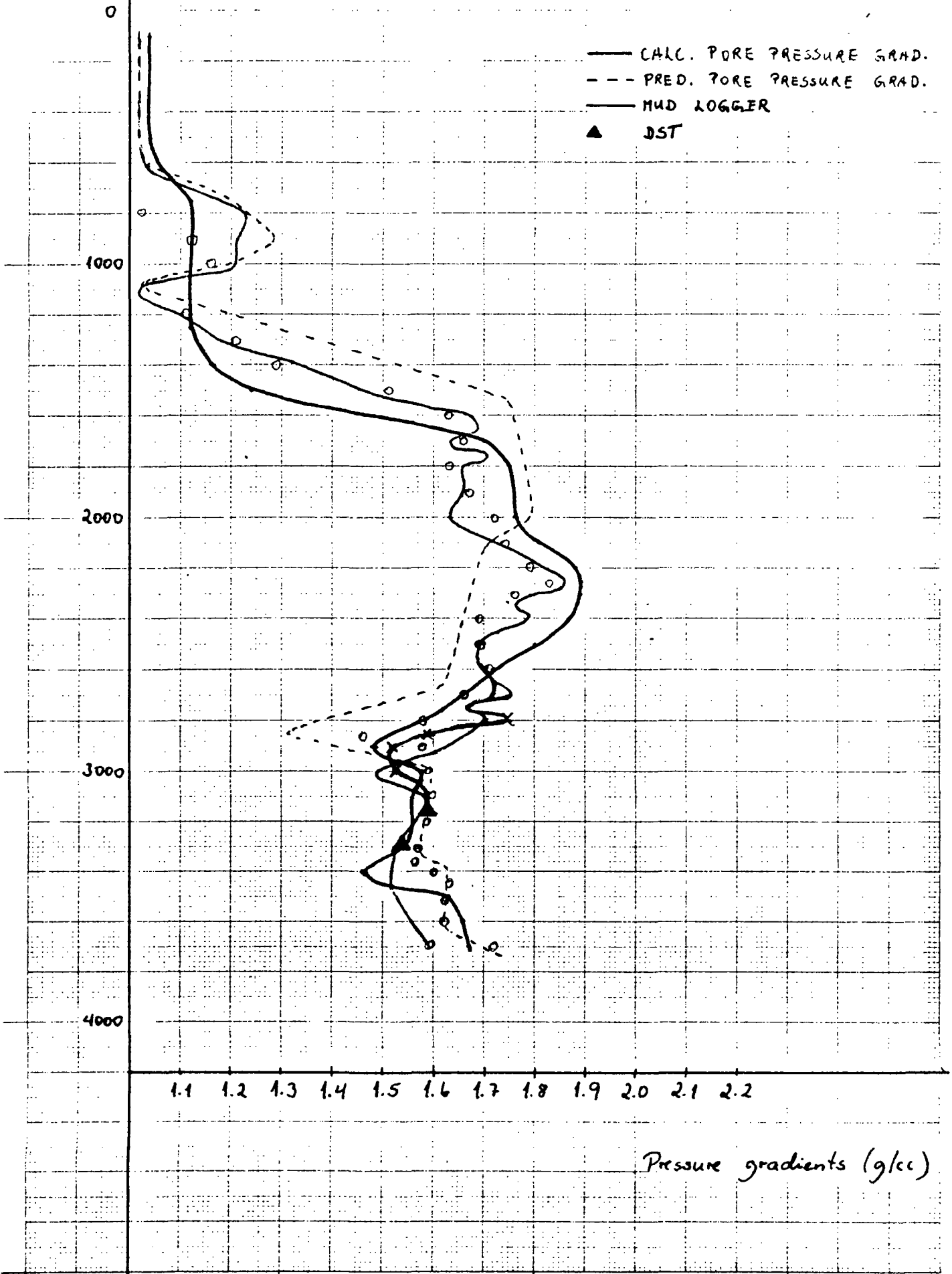
Bestell-Nr. 667 060, Nr. 367

SCHILLER & SCHULL GMBH, 3352 EINBECK



PORE PRESSURE GRADIENTS

WELL 1/9-4

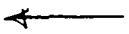


Pressure gradients (g/cc)

TOTAL GAS (Exploration Logging)

Well 1/9-3  
STAD 1/2

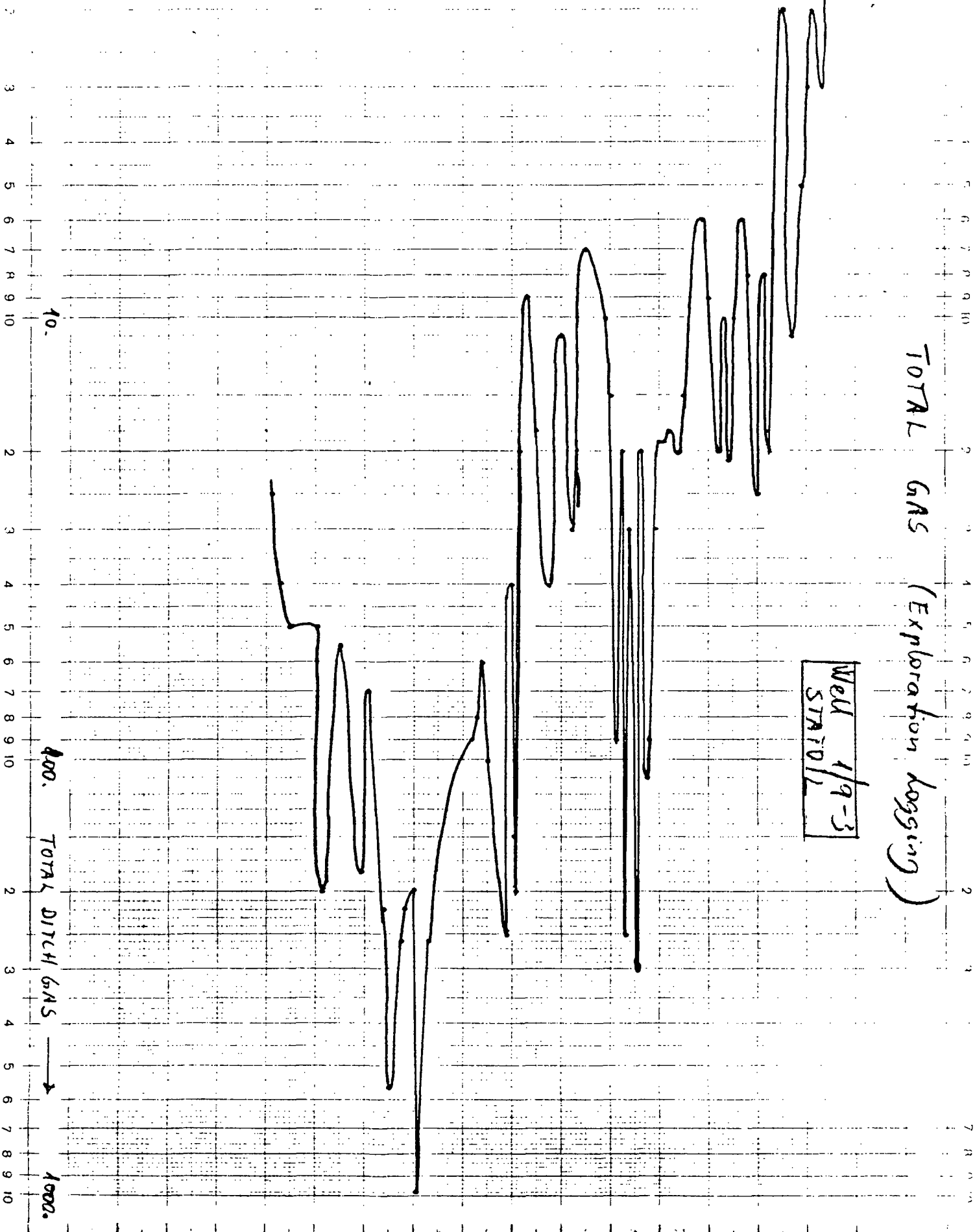
Depth (ft.)



1000

0

1.



100.

TOTAL DITCH GAS

1000.

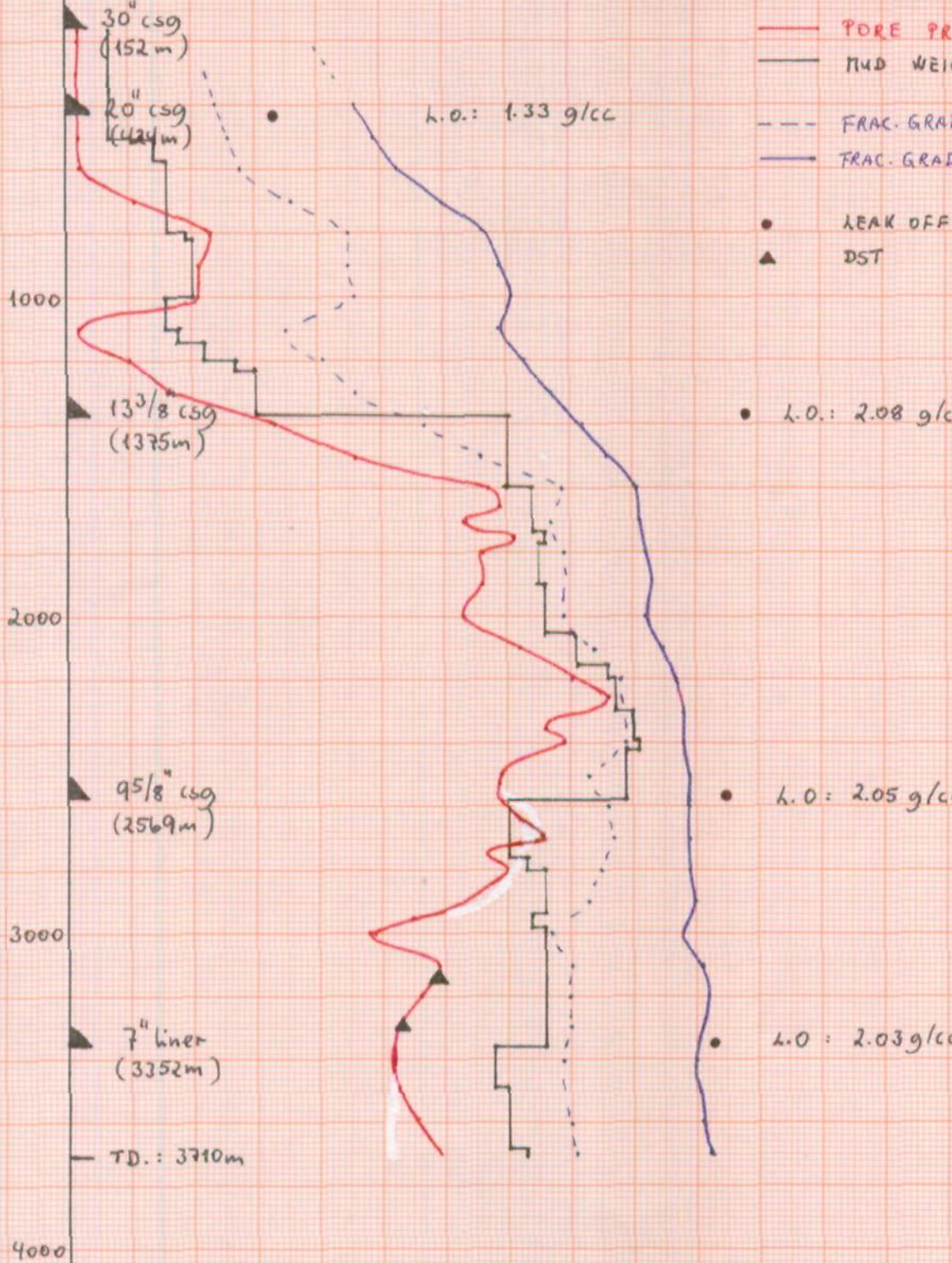
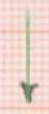
Vertical text on the left margin: 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. Fine... log... well... ops... tube... m d... from...



# ESTIMATED PORE PRESSURE & FRACTURE GRADIENT

WELL 1/9-4

Depth (RKB)  
(m)



- PORE PRESSURE
- MUD WEIGHT
- - - FRAC. GRAD. (EATON...)
- FRAC. GRAD. (ANDERSEN...)
- LEAK OFF TEST
- ▲ DST

1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2

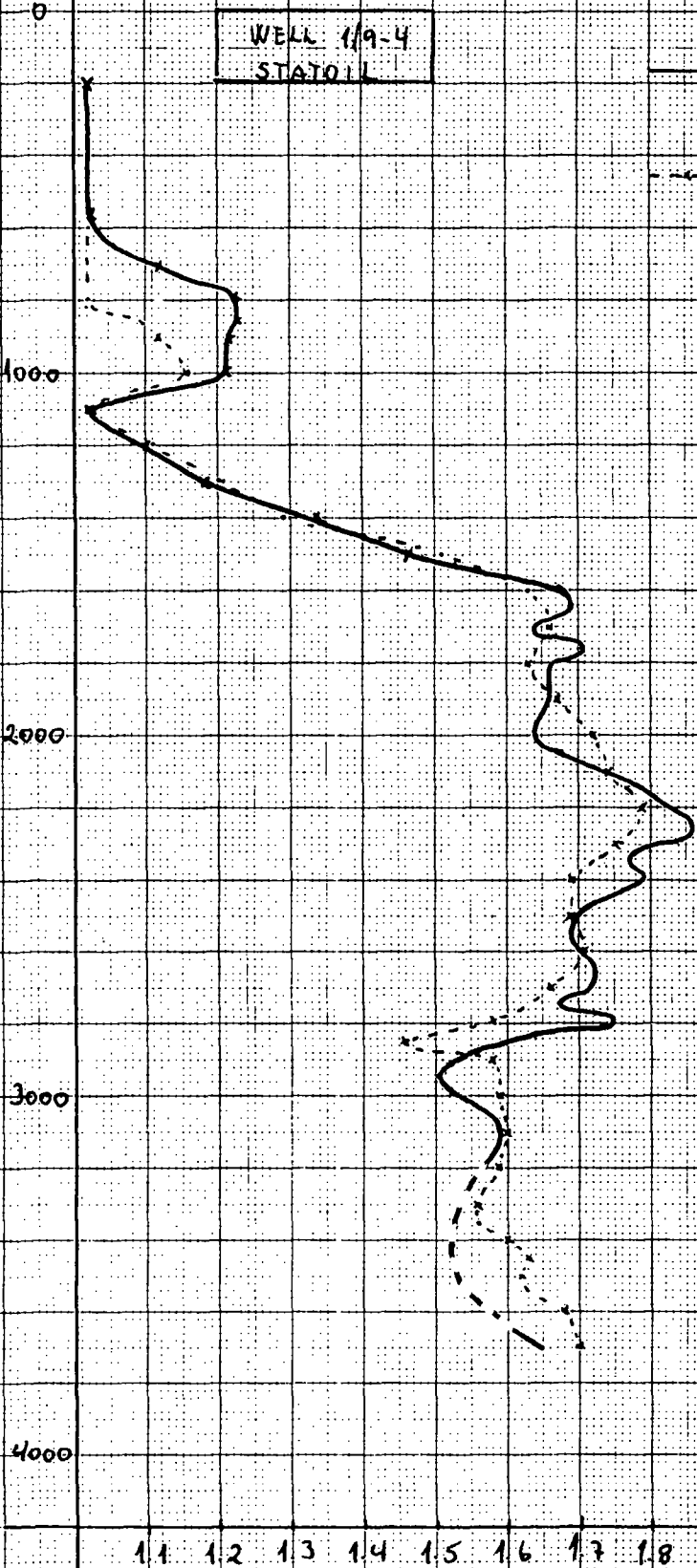
Pressure gradient (g/cc)

ESTIMATED PORE PRESSURE GRADIENTS

WELL 119-4  
STATOIL

— PORE PRESSURE GRAD.  
FROM SONIC LOG

- - - PORE PRESSURE GRAD  
FROM  $D_c$  - EXP

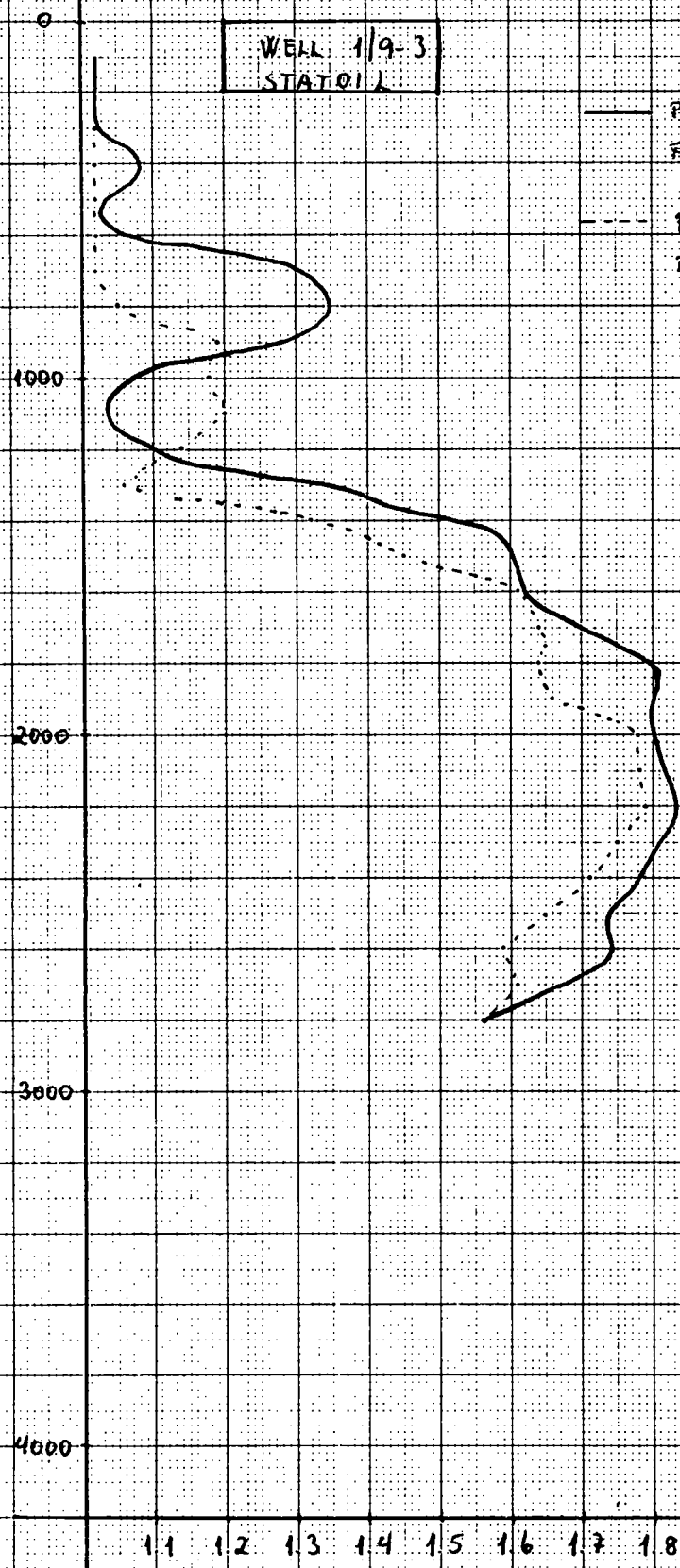


Pressure gradient (g/cc)

ESTIMATED PORE PRESSURE GRADIENTS

WELL 1/9-3  
STATOIL

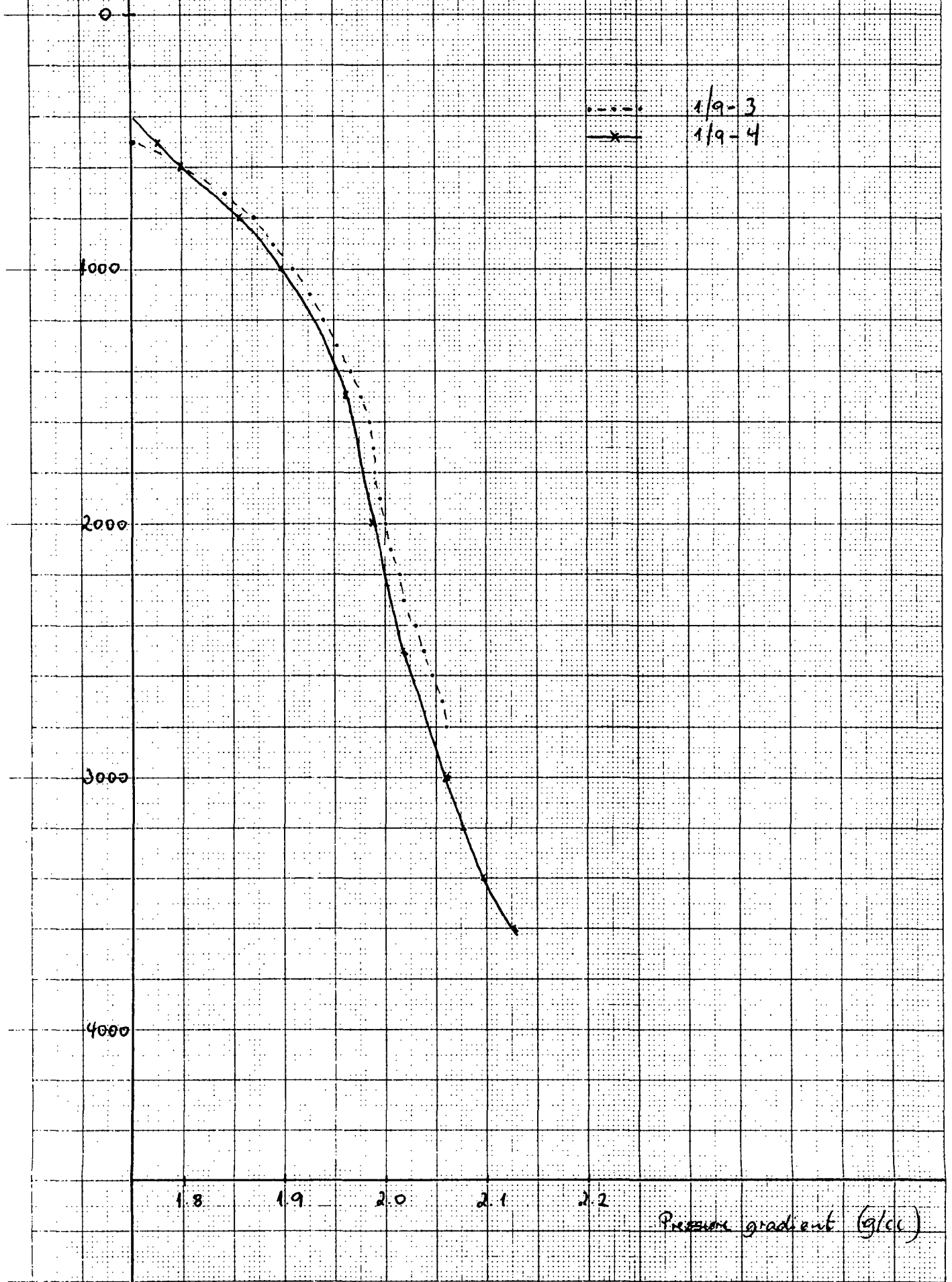
— PORE PRESSURE GRAD.  
FROM SONIC LOG  
- - - PORE PRESSURE GRAD.  
FROM  $D_c$  - EXP.



Pressure gradients (g/cc)

Overburden gradient, Well 1/9-3, 1/9-4

Integrated FDC logs



..... 1/9-3  
—x— 1/9-4

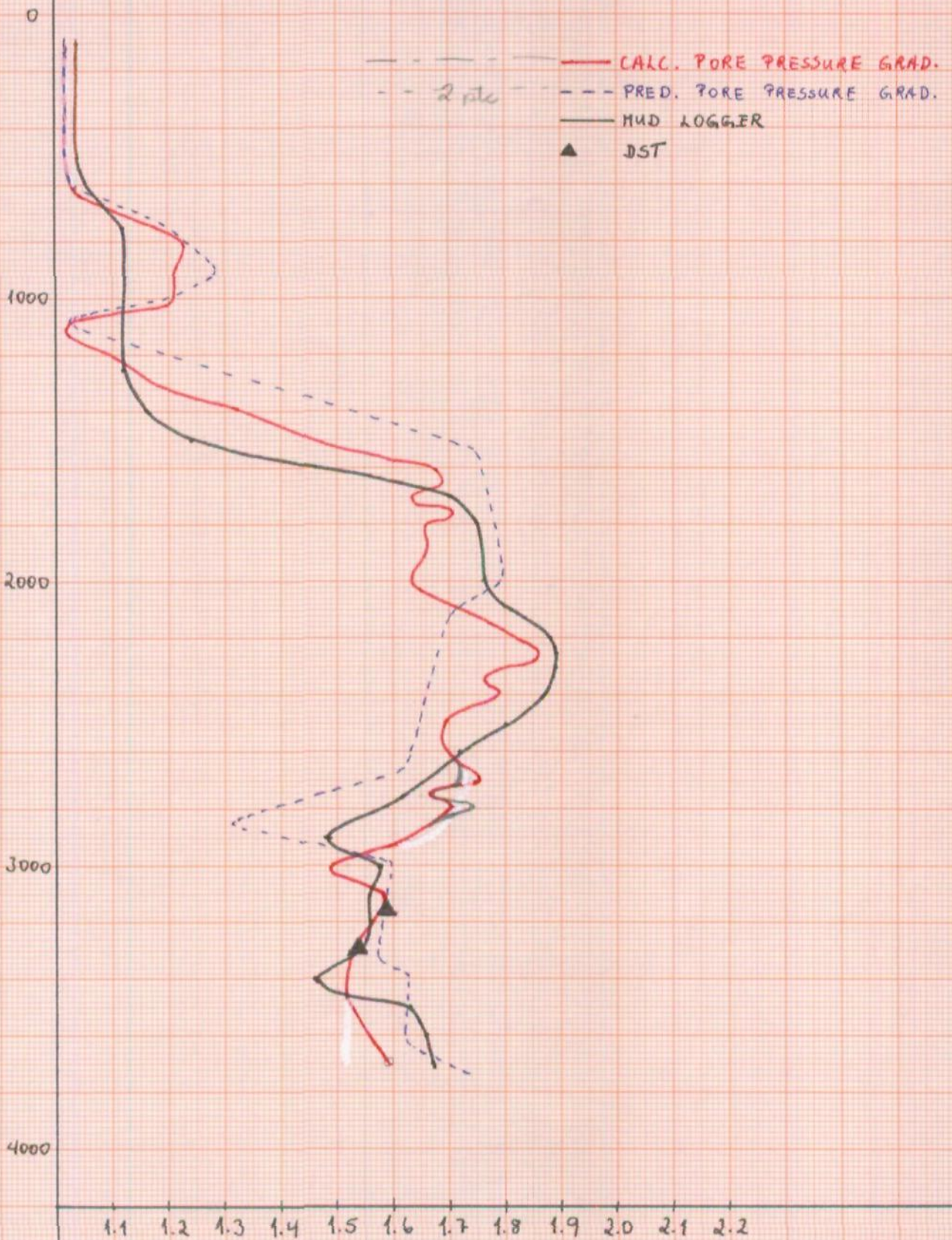
0  
1000  
2000  
3000  
4000

1.8 1.9 2.0 2.1 2.2

Pressure gradient (g/cc)

# PORE PRESSURE GRADIENTS

WELL 1/9-4



Pressure gradients (g/cc)

Shale Density

1/9-4  
STATOIL

0  
500  
1000  
1500  
2000  
2500  
3000  
3500  
4000

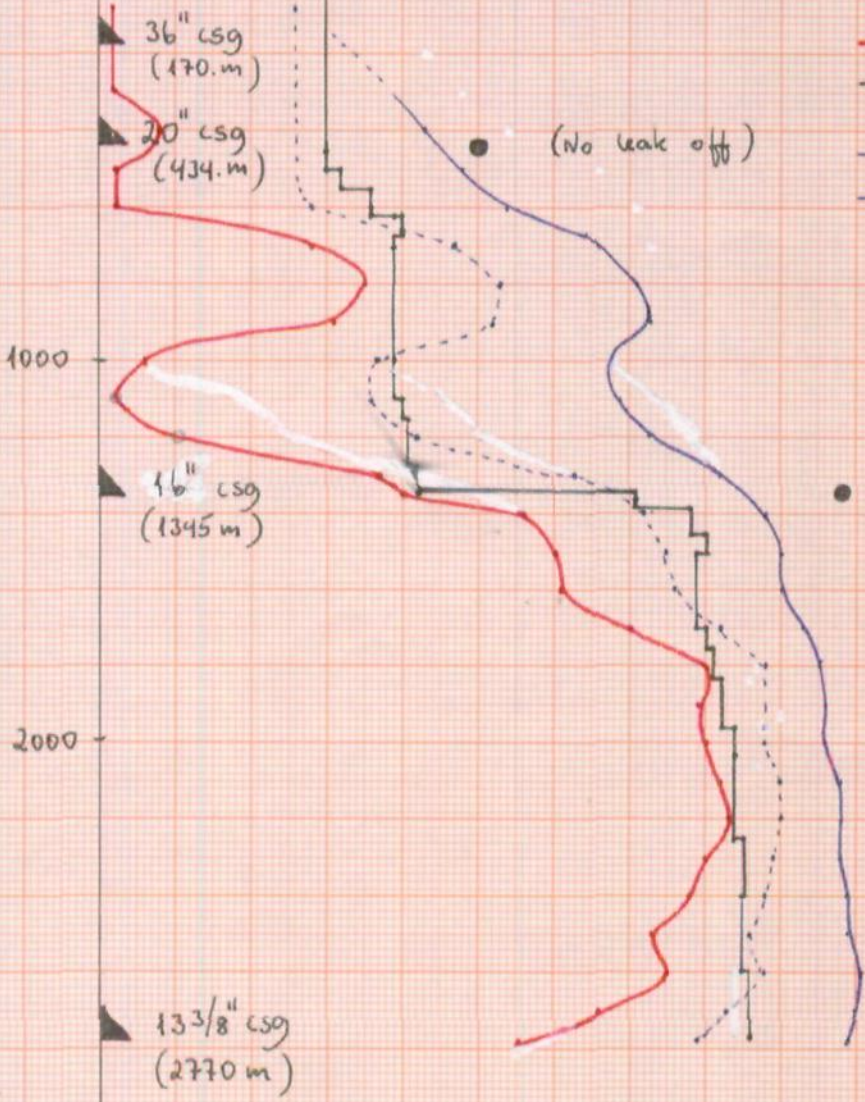
1.8 1.9 2. 2.1 2.2 2.3 2.4 2.5 2.6

(g/cc)

ESTIMATED PORE PRESSURE & FRACTURE GRADIENT

Well 1/9-3

Depth (RKB)  
(m)



- Pore pressure
- Mud weight
- - - Frac. grad. (Eaton..)
- Frac. grad. (Andersen..)
- Leak off test

1000

2000

3000

4000

1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2

Pressure gradient (g/cc)

PORE PRESSURE GRADIENTS

WELL 1/9-3

Depth (RKB)  
(m)



1000

2000

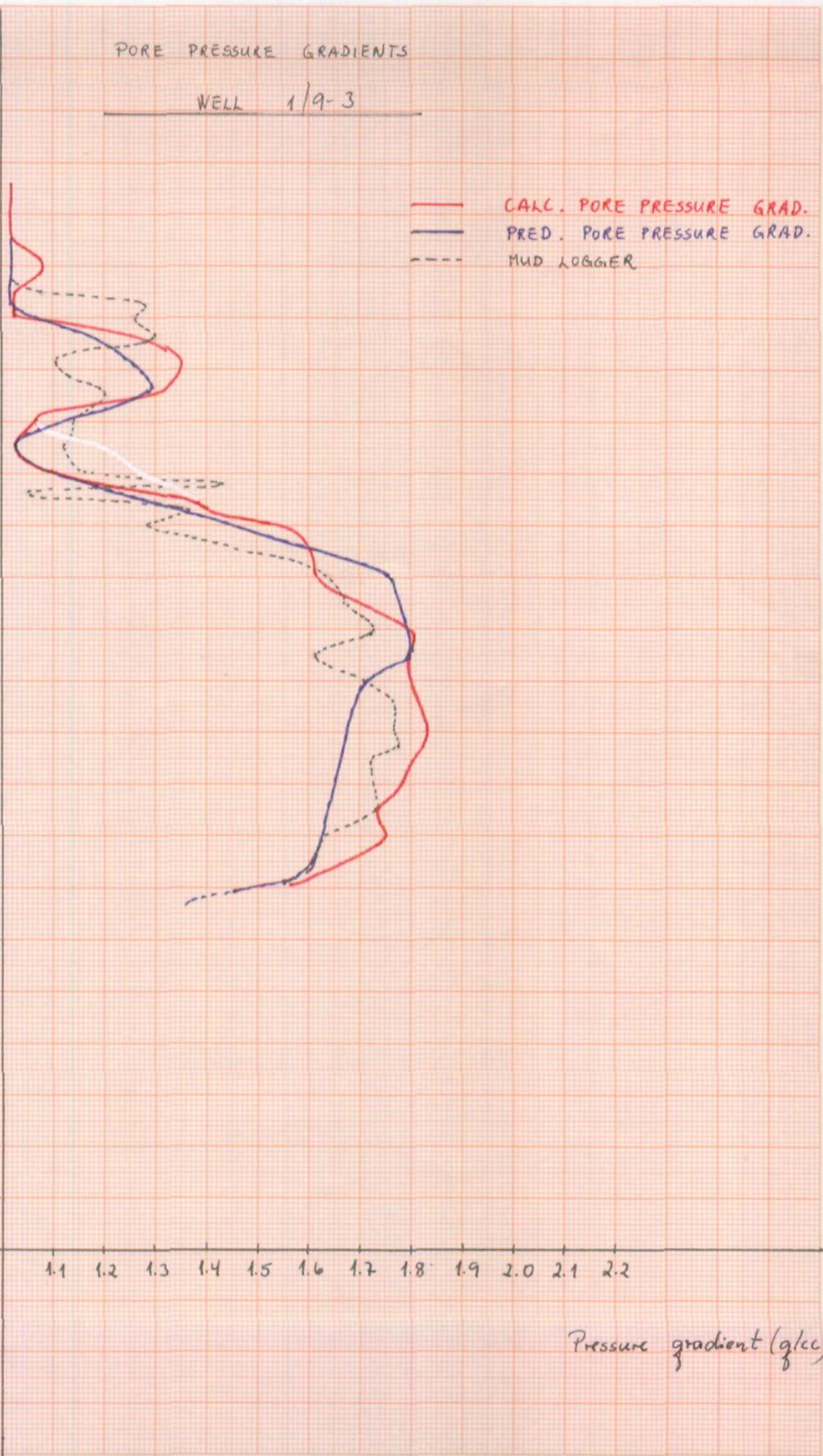
3000

4000

- CALC. PORE PRESSURE GRAD.
- PRED. PORE PRESSURE GRAD.
- - - MUD LOGGER

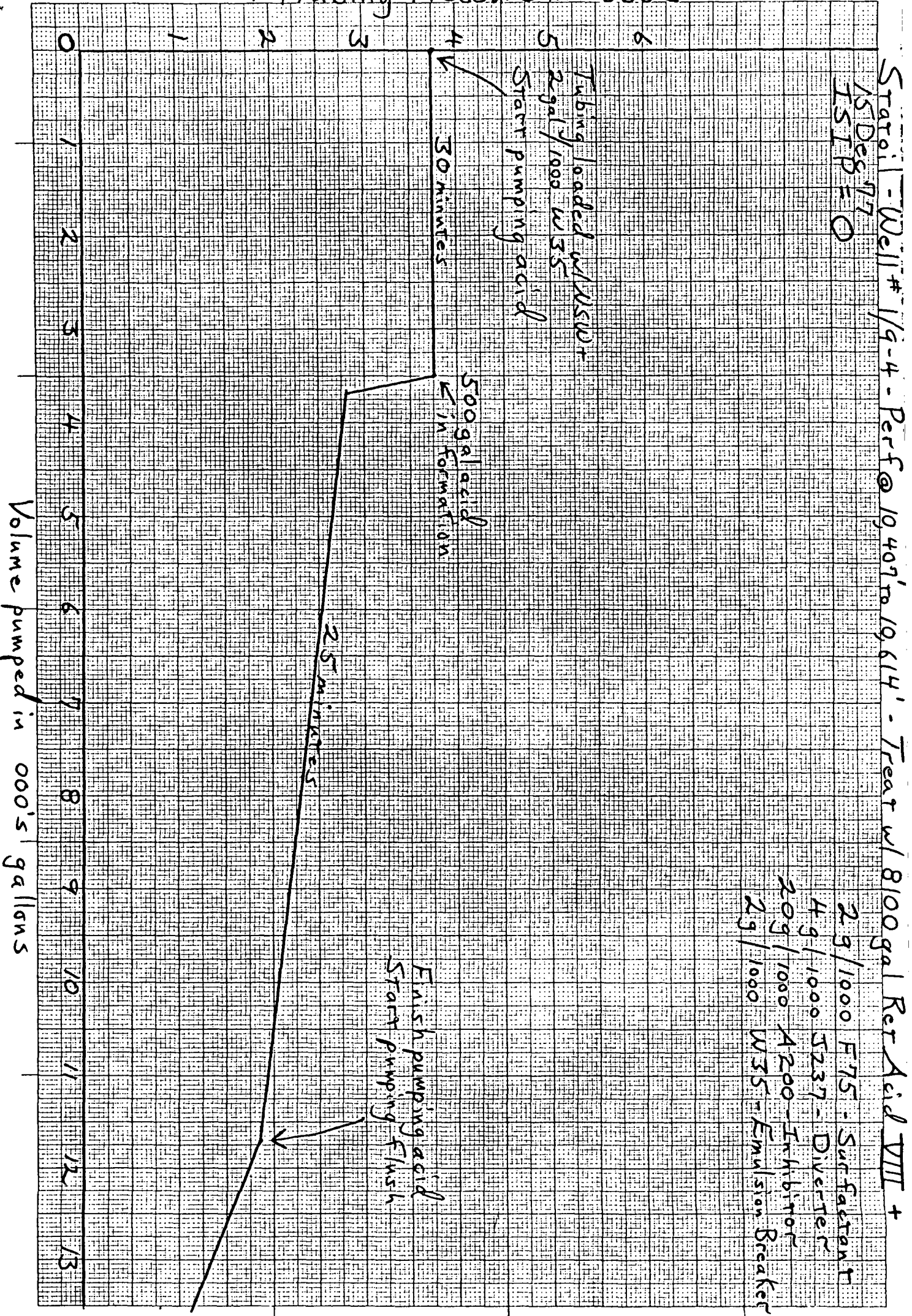
1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2

Pressure gradient (g/cc)





ST 02-P5. 11.16.00 1/4-4 Tubing Pressure in 000's PSI



Stator - Well # 1/4-4 - Perf @ 10,409 to 10,614' - Treat w/ 8100 gal Ref Acid VIII +

ASD Des 77  
ISIP = 0

- 2 g / 1000 F75 - Surfactant
- 4 g / 1000 S237 - Diverter
- 20 g / 1000 A200 - Inhibitor
- 2 g / 1000 W35 - Emulsion Breaker

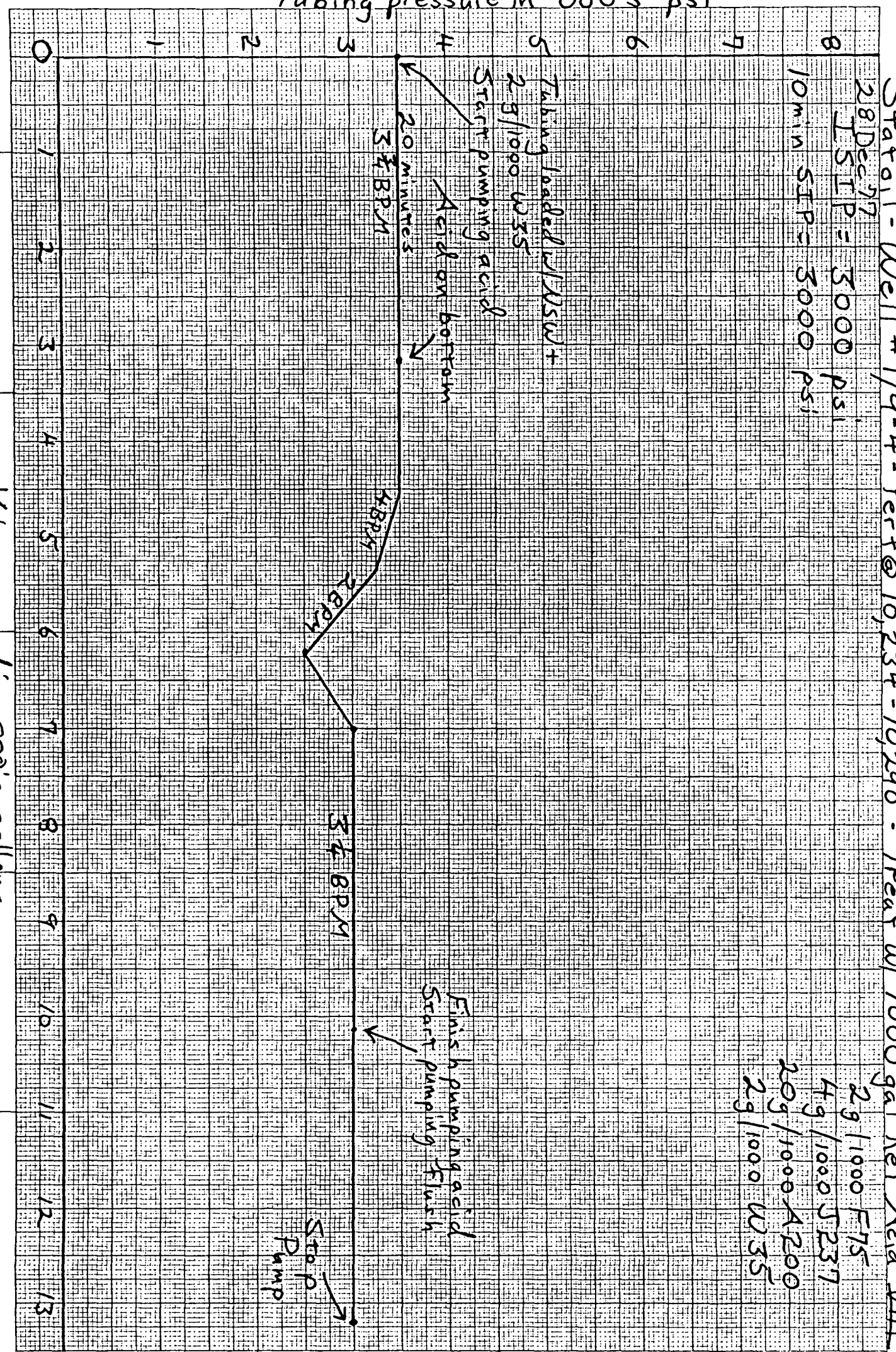
Volume pumped in 000's gallons

# Tubing Pressure in 000's PSI

0	1	2	3	4	5	6	7	8	9	10	11	12	13
Station = Well # 119-4-Perf @ 10,417 to 10,489' - Treat w/ 8000 gal Ret Acid VIII + 24 Dec 77 JSIP = 4000 PSI 3 min SIP = 4000 PSI 2g/1000 F75 - Surfactant 4g/1000 J237 - Diverter 20g/1000 AP20 - Inhibitor 2g/1000 W35 - Emulsion Breaker													
Injection treating pressures were 4200 PSI @ 2 BPM throughout the treatment.													

Volume pumped in 000's gallons

Tubing pressure in 000's psi



Station - Well # 19-4-Perf @ 10,234'-10,290'. Treat w/ 7000 gal Ket Acid 411 +

28 Dec 77  
 ISTEP = 3000 psi  
 10 min SIP = 3000 psi

2g / 1000 F75  
 4g / 1000 J237  
 20g / 1000 A200  
 2g / 1000 W35

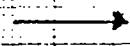
Tubing loaded w/ WSW +  
 2g / 1000 W35  
 Start pumping acid

Acid on bottom

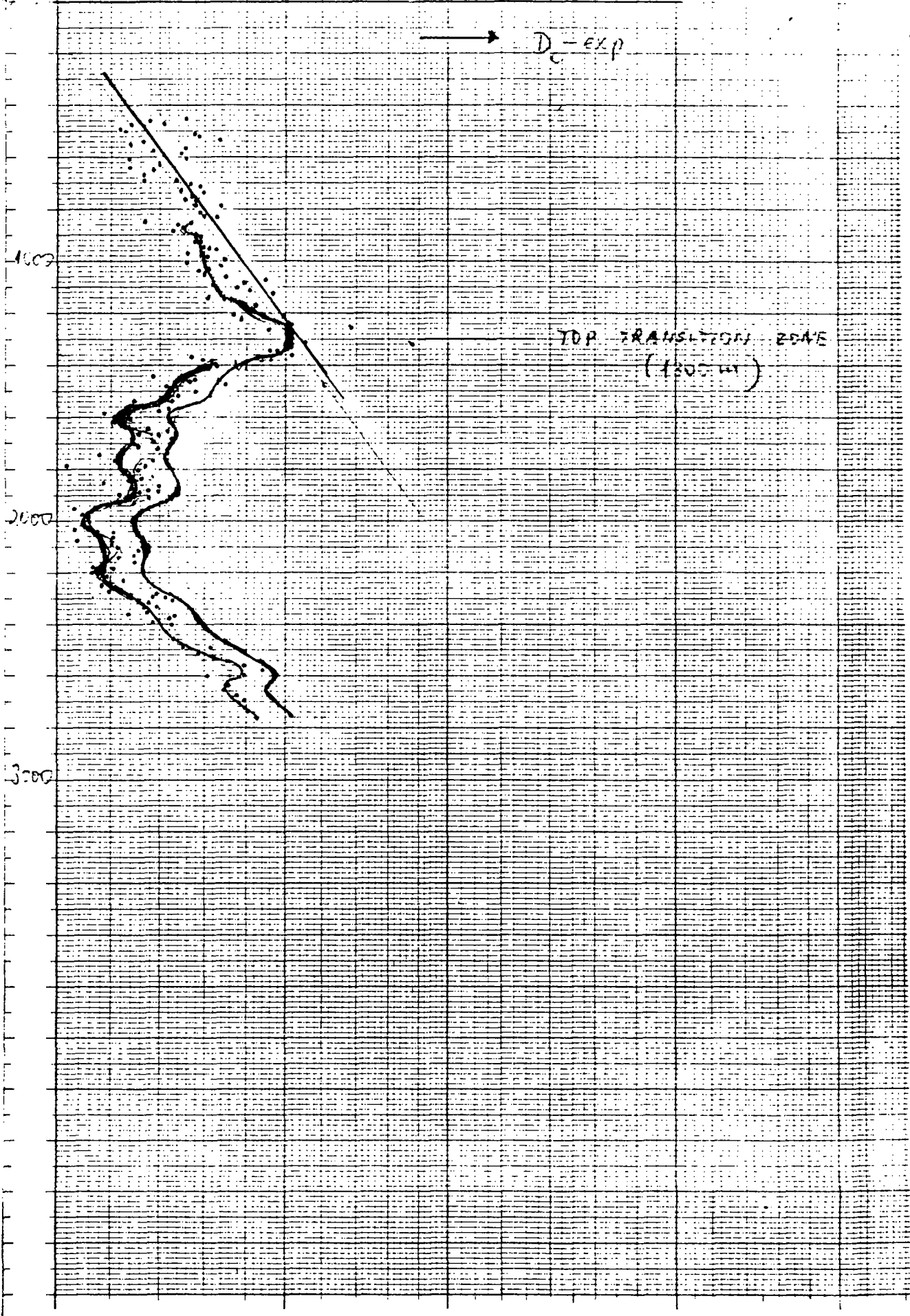
Finish pumping acid  
 Start pumping flush

Volume pumped in 000's gallons

$D_c$  - exp



$D_c$  - exp



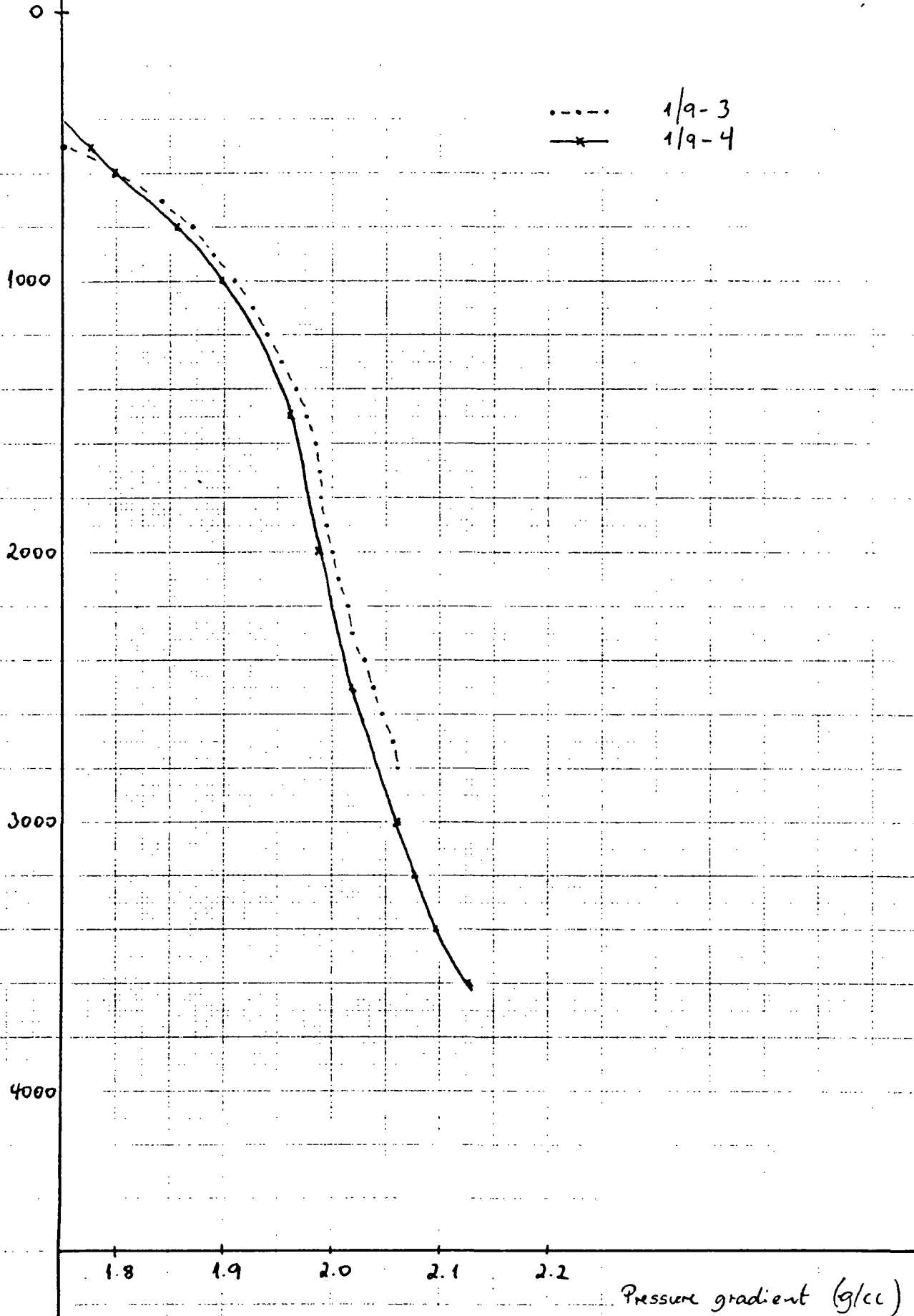
1000

2000

3000

TOP TRANSITION ZONE  
(1200 m)

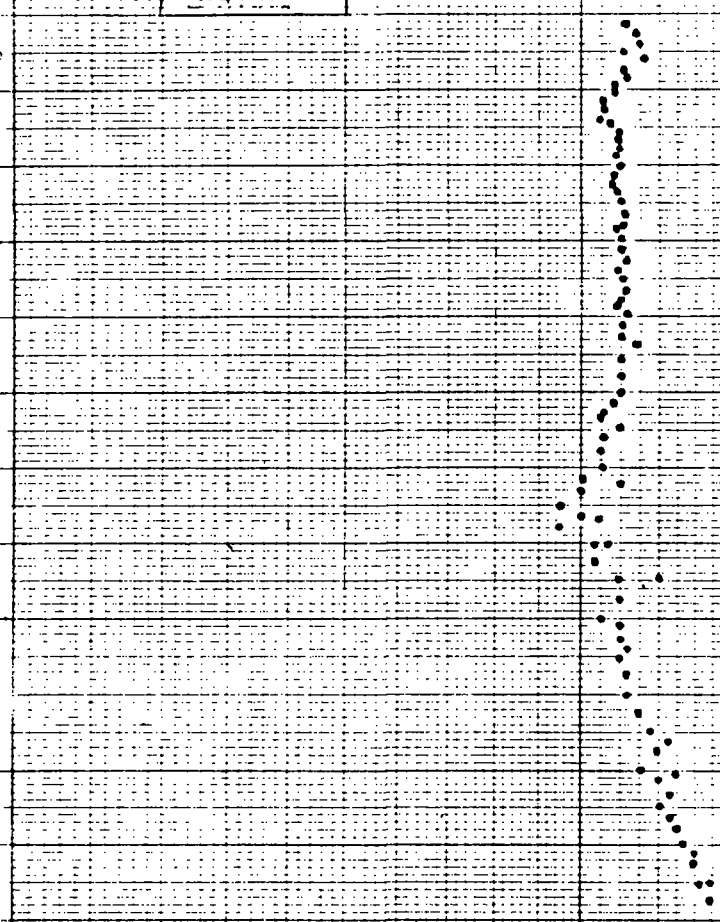
Overburden gradient, Well 1/9-3, 1/9-4  
Integrated FDC-logs





Well 112-3  
29 1953

$\rho_{\text{gas}}(\text{g/cc})$



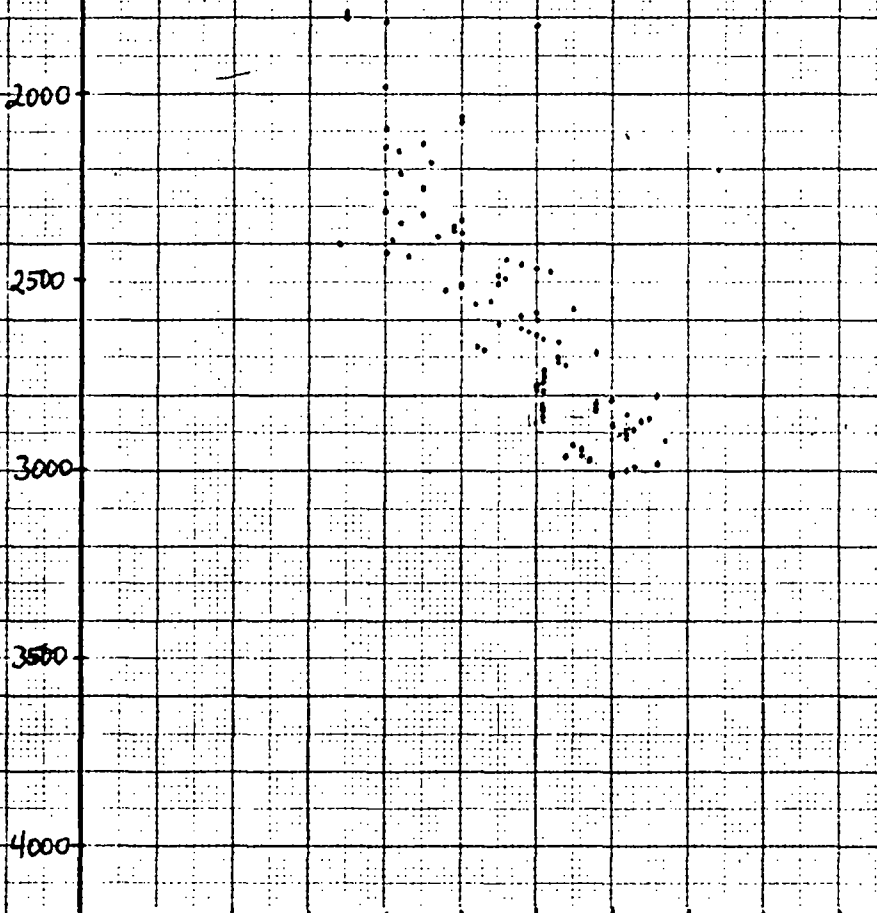
Shale Density

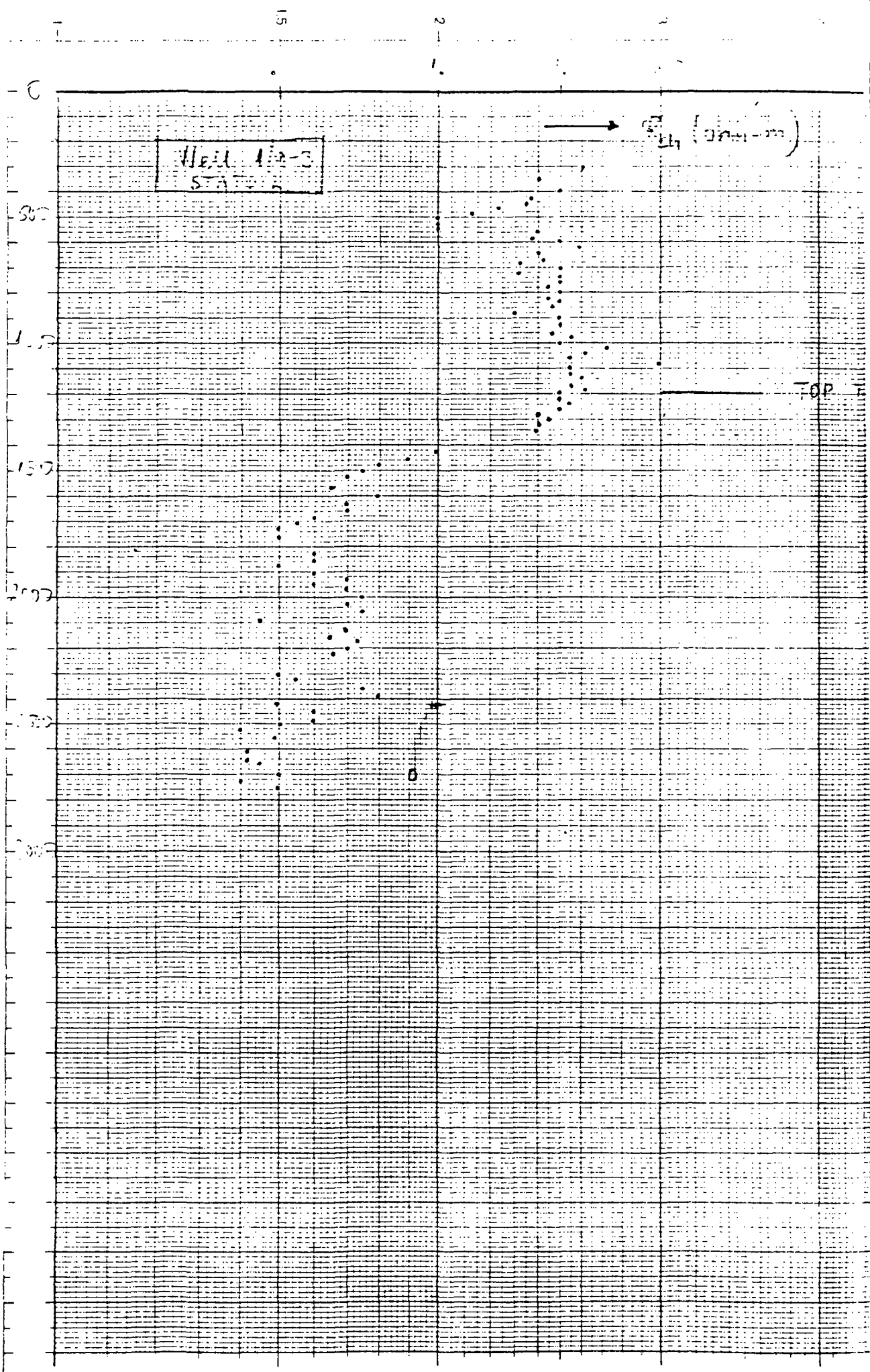
1/9-4  
STATOIL

0  
500  
1000  
1500  
2000  
2500  
3000  
3500  
4000

1.8 1.9 2. 2.1 2.2 2.3 2.4 2.5 2.6

(g/cc)





HEIL 1-2-3  
STATION 1

→ (100-250)

300

250

200

150

100

50

0

TOP

15

2

C