

# Nodal Analysis - Engineering Report

Generated: 2025-11-23 20:00:05

Query: Nodal Analysis

## I. Summary of Solution

### Nodal Analysis Summary

Density: 1000.0 kg/m3 | Viscosity: 0.061000000000000006 Pa.s | Roughness: 1e-05 m  
Reservoir pressure: 230.0 bar | Wellhead pressure: 10.0 bar | PI: 5.0 m3/hr/bar  
ESP depth: 500.0 m

Pump curve points: 5  
Trajectory segments: 3

Operating point: Q=289.72 m3/hr, BHP=172.16 bar, Head=315.4 m

## V. Supporting Sources

Source 1: pdfFiles/NLOG\_GS\_PUB\_EOWR ADK-GT-01 SODM v1.1.pdf | Page: 15

Early  
Valanginian to Barremian/ Early Aptian  
Thuringian  
Lower Permian (Saxonian)  
Late Westphalia  
"Diverse"  
"Diverse"  
Maassluis  
Oosterhout  
Oosterhout  
Breda  
Rupel  
Rupel  
Dongen  
Dongen  
Dongen  
Landen  
Ommelanden  
Ommelanden  
Texel  
Holland  
Holland  
Holla  
Vlieland  
Zechstein 1 (Werra)  
Slochteren  
Slochteren  
Ruurlu  
Rupel Clay  
Vessem  
Asse  
Brussels Sand

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 B.D.T  
 Landen Clay  
 Ple  
 Texel Marlstone  
 Upper Holland Marl  
 Upper Holland Marl  
 Middle Holland Claystone  
 Lowe  
 Vlieland Claystone  
 Z1 Anhydrite  
 Z1 Copp  
 18/11/2017  
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 20/11/2017  
 25/11/2017  
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 26/11/2017  
 27/11/2017  
 28/11/2017  
 05/12/2017  
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 16/12/2017  
 21/1  
 22/12/2017  
 22/12/2017  
 2  
 24" Roller Cone Bit VG-1/HC; S/N: 5251002  
 24" Roller Cone Bit VG-1/HC; S/N: 5251002  
 24" Roller Cone Bit VG-1/HC; S/N: 5251002  
 17.5" Roller Cone Bit S/N: 5233668; IADC 415  
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 17.5" Roller Cone Bit S/N: 5233668; IADC 415  
 17.5" Roller Cone Bit S/N: 5233668; IADC 415  
 12 1/4" PDC; Type: TD506FX/BHI; S/N: 7158723  
 12 1/4" PDC; Type: TD506FX/BHI; S/N: 7158723  
 12 1/4" PDC; Type: TD506FX/BHI; S/N: 7158723  
 12 1/4" PDC; Type: TD506FX/BHI; S/N: 7158723  
 12 1/4" PDC S/N: 7038898  
 8 1/2" PDC ; Type: TD 506X ; S/N: 7042273  
 # Incl at 121.68 m  
 1.99 °  
 AZ : 282.46 °  
 TOT DEV: 2.11 m  
 TVD : 121.66 m  
 # Incl at 158.88 m  
 1.52 °  
 AZ : 290.80 °  
 TOT DEV: 3.20 m  
 TVD : 158.84 m  
 # Incl at 196.46 m  
 0.99 °  
 AZ : 290.28 °  
 TOT DEV: 4.04 m  
 TVD : 196.41 m  
 # Incl at 233.84 m  
 0.83 °  
 AZ : 297.19 °  
 TOT DEV: 4.64 m  
 TVD : 233.78 m  
 # Incl at 271.78 m  
 0.56 °  
 AZ : 299.26 °

TOT DEV: 5.08 m  
 TVD : 271.72 m  
 # Incl at 308.47 m  
 0.96 °  
 AZ : 314.18 °  
 TOT DEV: 5.57 m  
 TVD : 308.41 m  
 # Incl at 345.62 m  
 1.42 °  
 AZ : 289.01 °  
 TOT DEV: 6.38 m  
 TVD : 345.55 m  
 # Incl at 382.83 m  
 2.11 °  
 AZ : 284.56 °  
 TOT DEV: 7.49 m  
 TVD : 382.74 m

Source 2: pdfFiles/NLOG\_GS\_PUB\_EOWR ADK-GT-01 SODM v1.1.pdf | Page: 15

Early  
 Valanginian to Barremian/ Early Aptian  
 Thuringian  
 Lower Permian (Saxonian)  
 Late Westphalia  
 "Diverse"  
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 Maassluis  
 Oosterhout  
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 Dongen  
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 Landen  
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 Holland  
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 Holla  
 Vlieland  
 Zechstein 1 (Werra)  
 Slochteren  
 Slochteren  
 Ruurlo  
 Rupel Clay  
 Vesseem  
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 Z1 Anhydrite  
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 18/11/2017  
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 22/12/2017  
 2  
 24" Roller Cone Bit VG-1/HC; S/N: 5251002  
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 24" Roller Cone Bit VG-1/HC; S/N: 5251002  
 17.5" Roller Cone Bit S/N: 5233668; IADC 415  
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 12 1/4" PDC; Type: TD506FX/BHI; S/N: 7158723  
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 12 1/4" PDC S/N: 7038898  
 8 1/2" PDC ; Type: TD 506X ; S/N: 7042273  
 # Incl at 121.68 m  
 1.99 °  
 AZ : 282.46 °  
 TOT DEV: 2.11 m  
 TVD : 121.66 m  
 # Incl at 158.88 m  
 1.52 °  
 AZ : 290.80 °  
 TOT DEV: 3.20 m  
 TVD : 158.84 m  
 # Incl at 196.46 m  
 0.99 °  
 AZ : 290.28 °  
 TOT DEV: 4.04 m  
 TVD : 196.41 m  
 # Incl at 233.84 m  
 0.83 °  
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 TOT DEV: 4.64 m  
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 AZ : 289.01 °  
 TOT DEV: 6.38 m  
 TVD : 345.55 m  
 # Incl at 382.83 m  
 2.11 °  
 AZ : 284.56 °  
 TOT DEV: 7.49 m

flow rate (< 2000  
l/min)  
Final Depth: 2358  
m (MD)  
Purebore 1.03  
kg/l  
Ca. 10 m<sup>3</sup>/h dynamic  
losses  
Ca. 8 m<sup>3</sup>/h dynamic  
losses  
Total losses (dynamic)  
between 225 m and 275  
m ca. 88 m<sup>3</sup>  
Purebore 1.04 kg/l  
Purebore 1.07 kg/l  
(incr.)  
0.9 % of glycol  
Losses (dynamic) in 24"  
section ca. 88 m<sup>3</sup>  
Static losses at 515 m  
0.3 m<sup>3</sup>/h.  
Purebore 1.14 kg/l  
Glycol: 3 %  
KCl: 110 kg/m<sup>3</sup>  
NaCl: 11 kg/m<sup>3</sup>  
Purebore 1.14 kg/l  
Glycol: 3 %  
KCl: 110 kg/m<sup>3</sup>  
NaCl: 11 kg/m<sup>3</sup>  
Purebore 1.16 kg/l  
Glycol 3.1%  
KCl: 108 kg/m<sup>3</sup>  
NaCl: 27.5 kg/m<sup>3</sup>  
Purebore 1.18 kg/l  
(incr.)  
Glycol 3.0%  
KCl: 110 kg/m<sup>3</sup>  
NaCl: 33 kg/m<sup>3</sup>  
Purebore 1.18 kg/l  
Glycol 3 %  
KCl: 109 kg/m<sup>3</sup>  
NaCl: 34 kg/m<sup>3</sup>  
No losses in 17  
1/2" section  
Purebore 1.23 kg/l  
Glycol 3 %  
KCl: 97 kg/m<sup>3</sup>  
NaCl: 47 kg/m<sup>3</sup>  
Purebore 1.24 kg/l  
Glycol 4 %  
KCl:120 kg/m<sup>3</sup>  
NaCl: 52 kg/m<sup>3</sup>  
Purebore 1.25 kg/l  
Glycol 4 %  
KCl:121 kg/m<sup>3</sup>  
NaCl: 64 kg/m<sup>3</sup>  
Purebore 1.25 kg/l  
Glycol 4 %  
KCl:114 kg/m<sup>3</sup>  
NaCl: 75 kg/m<sup>3</sup>  
Purebore 1.30 kg/l  
Glycol 4 %  
KCl:114 kg/m<sup>3</sup>  
NaCl: 103 kg/m<sup>3</sup>

Purebore 1.35 kg/l  
 Glycol 4 %  
 KCl: 116 kg/m<sup>3</sup>  
 NaCl: 168 kg/m<sup>3</sup>  
 Drill In Fluid : 1.08 kg/l  
 Drill In Fluid : 1.08 kg/l  
 Bit #1, Run # 1  
 24" Roller Cone VG-  
 1/HC; IADC 115  
 S/N: 52511001  
 1x20+3x22, TFA =  
 1.4205 in<sup>2</sup>  
 Gauge In  
 Flow in = 1470 l/min  
 SPP = 13 bar  
 Flow in = 1590 l/min  
 SPP = 23 bar  
 Flow in = 1550 l/min  
 SPP = 24.4 bar  
 Flow in = 1630 l/min  
 SPP = 35 bar  
 Flow in = 1900 l/min  
 SPP = 53 bar  
 Bit #2, Run # 1  
 17.5" Roller Cone; IADC  
 415  
 S/N: 5233668  
 3x20+1x22, TFA =  
 1.2916 in<sup>2</sup>  
 Flow in = 3000 l/min  
 SPP = 105 bar  
 Flow in = 3000 l/min  
 SPP = 115 bar  
 Flow in = 3030 l/min  
 SPP = 128 bar  
 Flow in = 3499 l/min  
 SPP= 140 bar  
 Flow in = 3460 l/min  
 SPP= 185 bar  
 Flow in = 3480 l/min  
 SPP= 191 bar  
 Flow in = 3500 l/min  
 SPP= 203 bar  
 Flow in = 3500 l/min  
 SPP= 222 bar  
 Flow in = 3548 l/min  
 SPP= 244 bar  
 Flow in = 3500 l/min  
 SPP= 261 bar  
 Flow in = 3500 l/min  
 SPP= 262 bar  
 Flow in = 3548 l/min  
 SPP= 273 bar  
 Flow in = 3450 l/min  
 SPP= 291 bar  
 Flow in = 3240 l/min  
 SPP= 301 bar  
 Bit #5, Run # 1  
 12.25" PDC  
 S/N: 7038898  
 6x18, TFA = 1.4916 in<sup>2</sup>

Source 4: pdfFiles/NLOG\_GS\_PUB\_EOWR ADK-GT-01 SODM v1.1.pdf | Page: 15

flow rate (< 2000  
 l/min)  
 Final Depth: 2358  
 m (MD)

Purebore 1.03  
 kg/l  
 Ca. 10 m<sup>3</sup>/h dynamic  
 losses  
 Ca. 8 m<sup>3</sup>/h dynamic  
 losses  
 Total losses (dynamic)  
 between 225 m and 275  
 m ca. 88 m<sup>3</sup>  
 Purebore 1.04 kg/l  
 Purebore 1.07 kg/l  
 (incr.)  
 0.9 % of glycol  
 Losses (dynamic) in 24"  
 section ca. 88 m<sup>3</sup>  
 Static losses at 515 m  
 0.3 m<sup>3</sup>/h.  
 Purebore 1.14 kg/l  
 Glycol: 3 %  
 KCl: 110 kg/m<sup>3</sup>  
 NaCl: 11 kg/m<sup>3</sup>  
 Purebore 1.14 kg/l  
 Glycol: 3 %  
 KCl: 110 kg/m<sup>3</sup>  
 NaCl: 11 kg/m<sup>3</sup>  
 Purebore 1.16 kg/l  
 Glycol 3.1%  
 KCl: 108 kg/m<sup>3</sup>  
 NaCl: 27.5 kg/m<sup>3</sup>  
 Purebore 1.18 kg/l  
 (incr.)  
 Glycol 3.0%  
 KCl: 110 kg/m<sup>3</sup>  
 NaCl: 33 kg/m<sup>3</sup>  
 Purebore 1.18 kg/l  
 Glycol 3 %  
 KCl: 109 kg/m<sup>3</sup>  
 NaCl: 34 kg/m<sup>3</sup>  
 No losses in 17  
 1/2" section  
 Purebore 1.23 kg/l  
 Glycol 3 %  
 KCl: 97 kg/m<sup>3</sup>  
 NaCl: 47 kg/m<sup>3</sup>  
 Purebore 1.24 kg/l  
 Glycol 4 %  
 KCl:120 kg/m<sup>3</sup>  
 NaCl: 52 kg/m<sup>3</sup>  
 Purebore 1.25 kg/l  
 Glycol 4 %  
 KCl:121 kg/m<sup>3</sup>  
 NaCl: 64 kg/m<sup>3</sup>  
 Purebore 1.25 kg/l  
 Glycol 4 %  
 KCl:114 kg/m<sup>3</sup>  
 NaCl: 75 kg/m<sup>3</sup>  
 Purebore 1.30 kg/l  
 Glycol 4 %  
 KCl:114 kg/m<sup>3</sup>  
 NaCl: 103 kg/m<sup>3</sup>  
 Purebore 1.35 kg/l  
 Glycol 4 %  
 KCl:116 kg/m<sup>3</sup>  
 NaCl: 168 kg/m<sup>3</sup>  
 Drill In Fluid : 1.08 kg/l  
 Drill In Fluid : 1.08 kg/l  
 Bit #1, Run # 1  
 24" Roller Cone VG-

1/HC; IADC 115  
 S/N: 52511001  
 1x20+3x22, TFA =  
 1.4205 in<sup>2</sup>  
 Gauge In  
 Flow in = 1470 l/min  
 SPP = 13 bar  
 Flow in = 1590 l/min  
 SPP = 23 bar  
 Flow in = 1550 l/min  
 SPP = 24.4 bar  
 Flow in = 1630 l/min  
 SPP = 35 bar  
 Flow in = 1900 l/min  
 SPP = 53 bar  
 Bit #2, Run # 1  
 17.5" Roller Cone; IADC  
 415  
 S/N: 5233668  
 3x20+1x22, TFA =  
 1.2916 in<sup>2</sup>  
 Flow in = 3000 l/min  
 SPP = 105 bar  
 Flow in = 3000 l/min  
 SPP = 115 bar  
 Flow in = 3030 l/min  
 SPP = 128 bar  
 Flow in = 3499 l/min  
 SPP= 140 bar  
 Flow in = 3460 l/min  
 SPP= 185 bar  
 Flow in = 3480 l/min  
 SPP= 191 bar  
 Flow in = 3500 l/min  
 SPP= 203 bar  
 Flow in = 3500 l/min  
 SPP= 222 bar  
 Flow in = 3548 l/min  
 SPP= 244 bar  
 Flow in = 3500 l/min  
 SPP= 261 bar  
 Flow in = 3500 l/min  
 SPP= 262 bar  
 Flow in = 3548 l/min  
 SPP= 273 bar  
 Flow in = 3450 l/min  
 SPP= 291 bar  
 Flow in = 3240 l/min  
 SPP= 301 bar  
 Bit #5, Run # 1  
 12.25" PDC  
 S/N: 7038898  
 6x18, TFA = 1.4916 in<sup>2</sup>

Source 5: pdfFiles/NLOG\_GS\_PUB\_EOWR ADK-GT-01 SODM v1.1.pdf | Page: 15

Flow in = 3500 l/min  
 SPP= 262 bar  
 Flow in = 3548 l/min  
 SPP= 273 bar  
 Flow in = 3450 l/min  
 SPP= 291 bar  
 Flow in = 3240 l/min  
 SPP= 301 bar  
 Bit #5, Run # 1  
 12.25" PDC  
 S/N: 7038898  
 6x18, TFA = 1.4916 in<sup>2</sup>

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Source 6: pdfFiles/NLOG\_GS\_PUB\_EOWR ADK-GT-01 SODM v1.1.pdf | Page: 15

Flow in = 3500 l/min  
SPP= 262 bar  
Flow in = 3548 l/min  
SPP= 273 bar  
Flow in = 3450 l/min  
SPP= 291 bar  
Flow in = 3240 l/min  
SPP= 301 bar  
Bit #5, Run # 1  
12.25" PDC  
S/N: 7038898  
6x18, TFA = 1.4916 in<sup>2</sup>  
Flow in = 3430 l/min  
SPP= 300 bar  
Bit # 6, Run # 1  
8.5 " PDC  
S/N: 7042273  
6x14, TFA = 0.902 in<sup>2</sup>  
Flow in = 2446 L/min  
SPP= 142 bar  
Flow in=2527 l/min  
SPP=152 bar

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