**WellPlan**TMReport

04. КМГ-Бурение

Well Name: 146

Wellbore: 146

Design: Для МиГ S

Case: 215,9 мм

Date: October 6, 2023 at 12:12 AM

Created By:

|  |  |
| --- | --- |
|  |  |
|  |  |

# General Information

* 1. **General Case Information**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | 04. КМГ-Бурение | | |
| **Project** | Восточный Mакат | **Site** | 146 ННС S-образ. |
| **Well** | 146 | **Wellbore** | 146 |
| **Design** | Для МиГ S | **Case** | 215,9 мм |
| **Hole MD** | 1069.00 m | **Hole TVD** | 1062.00 m |
| **Air Gap** | 0.00 m | **Ground Elevation** | m |
| **Reference Point** | @ | **Well Type** | Platform |

* 1. **Active Fluid**

### **Fluid Data**

|  |  |  |  |
| --- | --- | --- | --- |
| **Fluid** | KC1 | **Type** | Mud |
| **Mud Base Type** | Water | **Base Fluid** | Water |
| **Rheology Model** | Bingham Plastic | **Foamed** | N |

### **Rheology Data**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Temperature  (°C) | Pressure  (atm) | Base Density  (kg/m³) | Ref Fluid Properties | PV (Mulnf)  (cp) | YP (Tau0)  (lbf/100ft²) | Fann Data | |
| **Speed**  **(rpm)** | **Dial**  **(°)** |
| 45 | 1 | 1250 | Yes | 22 | 23 |  |  |

* 1. **Hole Section**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Section**  **Type** | **Section Depth**  **(m)** | **Section Length**  **(m)** | **Shoe Depth**  **(m)** | **ID**  **(mm)** | **Drift**  **(mm)** | **Eff. Hole Diameter**  **(mm)** | **Coefficient**  **of**  **Friction** | **Linear Capacity**  **(L/m)** | **Volume**  **Excess**  **(%)** |
| **Casing** | **350** | **350** | **350** | **226.7** | **222.73** |  | **0.25** | **40.36** |  |
| **Open Hole** | **1069** | **719** |  | **215.9** | **220.45** | **215.9** | **0.3** | **36.61** | **0** |

* 1. **String Details**

| **Type** | **Length**  **(**m**)** | **Depth**  **(**m**)** | **Body** | | **Stabilizer / Tool Joint** | | | | **Weight** | **Material** | **Grade** | **Class** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **OD**  **(**mm**)** | **ID**  **(**mm**)** | **Avg Joint Length**  **(**m**)** | **Length**  **(**m**)** | **OD**  **(**mm**)** | **ID**  **(**mm**)** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Drill Pipe | 869.216 | 869.22 | 114.3 | 97.18 | 9.144 | 0.433 | 142.88 | 63.5 | 33.86 | CS\_API 5D/7 | G | 2 |
| Heavy Weight | 160 | 1029.22 | 127 | 76.2 | 9.144 | 1.219 | 165.1 | 76.2 | 73.13 | CS\_1340 MOD | 1340 MOD |  |
| Jar | 9.07 | 1038.29 | 165 | 57 | 9.07 |  |  |  | 69.2 | SS\_15-15LC | 15-15LC MOD (1) |  |
| Heavy Weight | 9.3 | 1047.59 | 127 | 76.2 | 9.144 | 1.219 | 165.1 | 76.2 | 73.13 | CS\_1340 MOD | 1340 MOD |  |
| MWD | 10.4 | 1057.99 | 172 | 83 | 10.4 |  |  |  | 149.77 | SS\_15-15LC | 15-15LC MOD (1) |  |
| Stabilizer | 1.524 | 1059.51 | 171.45 | 71.44 | 1.524 |  |  |  | 123.91 | CS\_API 5D/7 | 4145H MOD |  |
| Sub | 0.96 | 1060.47 | 172 | 83 | 0.96 |  |  |  | 156.36 | SS\_15-15LC | 15-15LC MOD (1) |  |
| Mud Motor | 8.2 | 1068.67 | 172 | 69.85 | 8.2 |  |  |  | 156.37 | CS\_API 5D/7 | 4145H MOD |  |
| Bit | 0.33 | 1069 | 215.9 |  | 0.33 |  |  |  | 50 |  |  |  |

### **Grade in Use**

| Grade | Minimum Yield Stress (psi) |
| --- | --- |
| 1340 MOD | 55,000 |
| 15-15LC MOD (1) | 110,000 |
| 4145H MOD | 110,000 |
| G | 105,000 |

### **String Nozzles**

| Component | MD  (m) | Port Open | Diverted Flow | Amount Diverted  (%) | Nozzle  (32nd") | TFA  (in²) |
| --- | --- | --- | --- | --- | --- | --- |
| Polycrystalline Diamond Bit | 1,069 | NA | NA | NA | 8.0X14.0 | 1.203 |

### **Mud Motors**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Component | Length (m) | Steering tool | | | Kick pad | | | Pressure loss @ Flow rate ( @ ) | Lobe config | Eccentricity () | Rotor mass () | Rev. per Volume () |
| **Bend angle (°)** | **Ref angle (°)** | **Offset (m)** | **Length (m)** | **OD (mm)** | **Offset (m)** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  | @  @  @  @ |  |  |  |  |

* 1. **Wellpath - Calculation Method: Minimum Curvature**

| MD  (m) | INC  (°) | AZ  (°) | TVD  (m) | DLS  (°/30m) | AbsTort  (°/30m) | RelTort  (°/30m) | VSect  (m) | NS  (m) | EW  (m) | Build  (°/30m) | Walk  (°/30m) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.00 | 3.00 | 1.82 | 0.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 30.00 | 3.00 | 1.82 | 29.96 | 0.000 | 0.000 | 0.000 | -1.56 | 1.57 | 0.00 | 0.000 | 0.000 |
| 60.00 | 3.00 | 1.82 | 59.92 | 0.000 | 0.000 | 0.000 | -3.12 | 3.14 | 0.00 | 0.000 | 0.000 |
| 90.00 | 3.00 | 1.82 | 89.88 | 0.000 | 0.000 | 0.000 | -4.68 | 4.71 | 0.00 | 0.000 | 0.000 |
| 120.00 | 3.00 | 1.82 | 119.84 | 0.000 | 0.000 | 0.000 | -6.24 | 6.28 | 0.00 | 0.000 | 0.000 |
| 150.00 | 3.00 | 1.82 | 149.79 | 0.000 | 0.000 | 0.000 | -7.80 | 7.85 | 0.00 | 0.000 | 0.000 |
| 180.00 | 3.00 | 1.82 | 179.75 | 0.000 | 0.000 | 0.000 | -9.35 | 9.42 | 0.00 | 0.000 | 0.000 |
| 210.00 | 3.00 | 1.82 | 209.71 | 0.000 | 0.000 | 0.000 | -10.91 | 10.99 | 0.00 | 0.000 | 0.000 |
| 240.00 | 3.00 | 1.82 | 239.67 | 0.000 | 0.000 | 0.000 | -12.47 | 12.56 | 0.00 | 0.000 | 0.000 |
| 270.00 | 3.00 | 1.82 | 269.63 | 0.000 | 0.000 | 0.000 | -14.03 | 14.13 | 0.00 | 0.000 | 0.000 |
| 300.00 | 3.00 | 1.82 | 299.59 | 0.000 | 0.000 | 0.000 | -15.59 | 15.70 | 0.00 | 0.000 | 0.000 |
| 330.00 | 3.00 | 1.82 | 329.55 | 0.000 | 0.000 | 0.000 | -17.15 | 17.27 | 0.00 | 0.000 | 0.000 |
| 360.00 | 3.00 | 1.82 | 359.51 | 0.000 | 0.000 | 0.000 | -18.71 | 18.84 | 0.00 | 0.000 | 0.000 |
| 390.00 | 3.00 | 1.82 | 389.47 | 0.000 | 0.000 | 0.000 | -20.27 | 20.41 | 0.00 | 0.000 | 0.000 |
| 420.00 | 3.00 | 1.82 | 419.42 | 0.000 | 0.000 | 0.000 | -21.83 | 21.98 | 0.00 | 0.000 | 0.000 |
| 450.00 | 3.00 | 1.82 | 449.38 | 0.000 | 0.000 | 0.000 | -23.39 | 23.55 | 0.00 | 0.000 | 0.000 |
| 480.00 | 3.00 | 1.82 | 479.34 | 0.000 | 0.000 | 0.000 | -24.94 | 25.12 | 0.00 | 0.000 | 0.000 |
| 500.00 | 3.00 | 1.82 | 499.31 | 0.000 | 0.000 | 0.000 | -25.98 | 26.17 | 0.00 | 0.000 | 0.000 |
| 510.00 | 1.74 | 4.10 | 509.31 | 3.800 | 0.075 | 0.000 | -26.39 | 26.58 | 0.01 | -3.790 | 6.851 |
| 540.00 | 2.08 | 174.17 | 539.30 | 3.800 | 0.281 | 0.000 | -26.30 | 26.50 | 0.10 | 0.341 | 170.070 |
| 570.00 | 5.87 | 177.10 | 569.22 | 3.800 | 0.467 | 0.000 | -24.22 | 24.43 | 0.30 | 3.796 | 2.927 |
| 600.00 | 9.67 | 177.73 | 598.94 | 3.800 | 0.633 | 0.000 | -20.17 | 20.38 | 0.60 | 3.799 | 0.631 |
| 630.00 | 13.47 | 178.01 | 628.33 | 3.800 | 0.784 | 0.000 | -14.16 | 14.38 | 1.01 | 3.800 | 0.277 |
| 660.00 | 17.27 | 178.16 | 657.25 | 3.800 | 0.921 | 0.000 | -6.22 | 6.44 | 1.53 | 3.800 | 0.157 |
| 690.00 | 21.07 | 178.27 | 685.58 | 3.800 | 1.046 | 0.000 | 3.62 | -3.39 | 2.15 | 3.800 | 0.102 |
| 720.93 | 24.99 | 178.34 | 714.04 | 3.800 | 1.165 | 0.000 | 15.70 | -15.46 | 2.89 | 3.800 | 0.071 |
| 750.00 | 24.99 | 177.97 | 740.39 | 0.163 | 1.126 | 0.000 | 27.96 | -27.72 | 3.67 | -0.001 | -0.386 |
| 780.00 | 24.99 | 177.58 | 767.58 | 0.163 | 1.089 | 0.000 | 40.62 | -40.36 | 4.57 | 0.000 | -0.386 |
| 795.75 | 24.99 | 177.38 | 781.86 | 0.163 | 1.070 | 0.000 | 47.27 | -47.00 | 5.07 | 0.001 | -0.386 |
| 810.00 | 23.39 | 177.23 | 794.85 | 3.363 | 1.111 | 0.000 | 53.10 | -52.82 | 5.53 | -3.360 | -0.316 |
| 840.00 | 20.03 | 176.84 | 822.72 | 3.363 | 1.191 | 0.000 | 64.19 | -63.87 | 6.45 | -3.360 | -0.389 |
| 870.00 | 16.68 | 176.30 | 851.19 | 3.363 | 1.266 | 0.000 | 73.63 | -73.28 | 7.31 | -3.358 | -0.539 |
| 900.00 | 13.32 | 175.50 | 880.16 | 3.363 | 1.336 | 0.000 | 81.39 | -81.00 | 8.11 | -3.356 | -0.801 |
| 930.00 | 9.97 | 174.17 | 909.54 | 3.363 | 1.401 | 0.000 | 87.45 | -87.01 | 8.83 | -3.352 | -1.328 |
| 960.00 | 6.63 | 171.52 | 939.22 | 3.363 | 1.463 | 0.000 | 91.77 | -91.29 | 9.49 | -3.342 | -2.652 |
| 990.00 | 3.33 | 163.59 | 969.11 | 3.363 | 1.520 | 0.000 | 94.35 | -93.82 | 10.07 | -3.299 | -7.931 |
| 993.04 | 3.00 | 161.82 | 972.15 | 3.363 | 1.526 | 0.000 | 94.52 | -93.98 | 10.13 | -3.222 | -17.445 |
| 1020.00 | 3.00 | 161.82 | 999.06 | 0.000 | 1.485 | 0.000 | 95.89 | -95.31 | 10.61 | 0.000 | 0.000 |
| 1050.00 | 3.00 | 161.82 | 1029.02 | 0.000 | 1.443 | 0.000 | 97.42 | -96.78 | 11.15 | 0.000 | 0.000 |
| 1080.00 | 3.00 | 161.82 | 1058.98 | 0.000 | 1.403 | 0.000 | 98.95 | -98.26 | 11.68 | 0.000 | 0.000 |
| 1083.02 | 3.00 | 161.82 | 1062.00 | 0.000 | 1.399 | 0.000 | 99.10 | -98.41 | 11.74 | 0.000 | 0.000 |

* 1. **Geothermal Gradient Data**

|  |  |  |  |
| --- | --- | --- | --- |
| **Ambient Temperature** | 27.000 °C | **Mudline Temperature** | °C |
| **Temperature @ Depth** | 45.000 °C @ 1062.00 m | **Gradient** | 1.69 °C/100m |

# Schematics

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Well:** | 146 | **Wellbore:** | 146 | **Case:** | 215,9 мм | **String Name:** | секция 215,9мм |
|  |  |  |  |  |  |  |  |
| Schematic | | | | | | | |

# Torque & Drag Setup Data

* 1. **Settings**

|  |  |  |  |
| --- | --- | --- | --- |
| **Measured Depth of Bit** | 1069.00 m | **Bending Stress Magnification** | Yes |
| **Block Weight** | 15.00 tonne | **Stiff String Analysis** | No |
| **Enable Sheave Friction Correction** | No | **Viscous Torque and Drag** | No |
| **Pump Rate** | 30.000 L/sec | **Contact Force Normalization Length** | 9.30 m |
| **Mechanical Efficiency (Single Sheave)** | 97.00 | **Lines Strung** | 12 |
|  |  | **Side Force** | 0.00 kgf |
| **Offset from Wellhead** | m | **Angle at Wellhead** | ° |
| **Buckling limit factor** | 1 |  |  |

* 1. **Run Parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Start MD** | 500.00 m | **End MD** | 1069.00 m |
| **Step Size** | 9.30 m |  |  |

* 1. **Normal Analysis Operational Parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| Drilling | WOB/Overpull  (tonne) | Torque at Bit  (kN-m) | Include Pump Rate |
| Rotating On Bottom | 8.00 | 4.1650 | NA |
| Slide Drilling | 5.00 | 0.0000 | NA |
| Backreaming | NA | NA | NA |
| Rotating Off Bottom |  |  | NA |
| Tripping | **Speed**  **(m/min)** | **RPM**  **(rpm)** | **Include Pump Rate** |
| Tripping In | 10.00 | 0 | NA |
| Tripping Out | 10.00 | 0 | NA |

* 1. **Friction Factors**

| Section Type | Coefficient of Friction |
| --- | --- |
| Open Hole | 0.30 |
| Casing | 0.25 |

* 1. **String Fill Up**

|  |  |  |  |
| --- | --- | --- | --- |
| **Use String Fill Up (Tripping In only)** | No | **Period** | m |

# Torque and Drag Results

* 1. **Mechanical Limitations**

|  |  |  |  |
| --- | --- | --- | --- |
| **Overpull Margin during a Tripping Out operation** | 54.96 tonne | using | 80.00% of yield |
| **Minimum Weight on Bit to Sinusoidal Buckle during a rotating on bottom operation** | 13.82 tonne | at | 1047.59 m |
| **Minimum Weight on Bit to Helical Buckle during a rotating on bottom operation** | 18.42 tonne | at | 1047.59 m |
| **Pick-Up Drag** | 5.84 tonne | | |
| **Slack-Off Drag** | 4.59 tonne | | |
| **Block Rating (Hoisting System)** | 200.00 tonne | | |
| **Torque Rating (Rotating Equipment)** | kN-m | | |

* 1. **Load Summary**

| Load Condition | Stress Failure | | | Buckling Limits | | | Torque Failure | Torque at the Rotary Table  (kN-m) | Total Windup with Bit Torque  (revs) | Total Windup without Bit Torque  (revs) | Measured Weight  (tonne) | Total Stretch  (m) | Axial Stress = 0 | | Neutral Point Distance from surface  (m) | Neutral Point Distance from Bit  (m) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fatigue | 90% Yield | 100% Yield | Sinusoidal | Helical | Lockup | Distance from Surface  (m) | Distance from Bit  (m) |
| Спуск |  |  |  |  |  |  |  | 0.0000 | 0.0 | 0.0 | 49.10 | 0.42 | 909.18 | 159.82 | 1069.00 | 0.00 |
| Подъём |  |  |  |  |  |  |  | 0.0000 | 0.0 | 0.0 | 59.53 | 0.54 | 927.83 | 141.17 | 1069.00 | 0.00 |
| Бурение ротором |  |  |  |  |  |  |  | 6.3784 | 1.3 | 0.4 | 45.69 | 0.35 | 869.22 | 199.78 | 959.13 | 109.87 |
| Бурение ГЗД |  |  |  |  |  |  |  | 0.0000 | 0.0 | 0.0 | 45.26 | 0.36 | 869.22 | 199.78 | 1006.94 | 62.06 |
| Вращение над забоем |  |  |  |  |  |  |  | 3.7484 | 0.6 | 0.6 | 53.69 | 0.47 | 919.54 | 149.46 | 1069.00 | 0.00 |

# Torque and Drag Plots

|  |
| --- |
|  |
| * 1. **Эффективное натяжение** |
| * 1. **Вес на крюке** |
| * 1. **Момент** |
| * 1. **Мин. вес на долоте** |

# Hydraulics Setup Data

* 1. **Calculation Engine**

|  |  |  |
| --- | --- | --- |
| Model Used | WellPlan |  |

* 1. **Cuttings Loading Calculation Option**

|  |  |  |  |
| --- | --- | --- | --- |
| Rate of Penetration | 18.00 m/hr | **Rotary Speed** | 40 rpm |
| Cuttings Diameter | 3.18 mm | **Cuttings Density** | 2.500 sg |
| Bed Porosity | 36.00 % | **MD Calculation Interval** | 30.48 m |

* 1. **Surface Equipment Information**

|  |  |  |  |
| --- | --- | --- | --- |
| Pressure Loss Calculation | Specify Pressure loss | **Maximum Working Pressure** | 200.0000 atm |
| Equipment Mode | NA | **Surface Pressure Loss** | 6.8046 atm |
| Equipment Type | NA |  |  |

* 1. **Pump Pressure Information**

|  |  |  |  |
| --- | --- | --- | --- |
| Maximum Surface Pressure | 200.0000 atm | **Pump Rate** | 30.000 L/sec |
| Maximum Pump Power | hp | **Maximum Allowable Pump Rate** | L/sec |
| Use Roughness | N |  |  |
| Pipe Roughness | NA | **Annulus Roughness** | NA |
| Booster Pump |  | **Injection Depth** |  |
| Injection Temperature |  | **Injection Rate** |  |
| Include Tool Joint Pressure Losses | N |  |  |
| Include Back Pressure |  | **Back Pressure** | 0.0000 atm |
| Sea Floor Returns | N | **Sea Water Density** | NA |

* 1. **Run Parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| Start MD | 500.00 m | **End MD** | 1069.00 m |
| Step Size | 9.30 m |  |  |

* 1. **Flow Rate (Q= 30.000 L/sec)**

### **Bit Parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Pump Rate** | 30.000 L/sec | **Stand Pipe Pressure** | 138.7624 atm |
| **Bit Pressure Loss** | 10.2177 atm | **Percent Power at Bit** | 7.36 % |
| **Bit Hydraulic Power / Area (HSI)** | 0.7 hp/in² | **Bit Nozzle Velocity** | 38.66 m/s |
| **Bit Hydraulic Power** | 41.65 hp | **Bit Impact Force** | 147.85 kgf |
| **Surface Equip. Pressure Loss** | 6.8046 atm | **Total Bit Flow Area** | 1.203 in² |

* 1. **Gel Strength**

|  |  |  |  |
| --- | --- | --- | --- |
| 0 Second | 5.000 lbf/100ft² | **10 Second** | 9.000 lbf/100ft² |
| 10 Minute | 18.000 lbf/100ft² | **30 Minute** | 25.000 lbf/100ft² |
| Maximum | lbf/100ft² |  | |

* 1. **Mud Temperature Information**

|  |  |  |  |
| --- | --- | --- | --- |
| Include Mud Temperature Effects | N | **Circulation Time** | NA |

# Hydraulics Plots

|  |
| --- |
|  |
| * 1. **Потери давления на долоте** |
| * 1. **Мин. расход по глубине** |
| * 1. **Высота шламовой подушки по глубине** |
| * 1. **Потери мощности компонента** |
| * 1. **Потери давления компонента** |