**WellPlan**TMReport

04. КМГ-Бурение

Well Name: 2758

Wellbore: 2758

Design: Copy Of Design #2 РК от 25.08.23 (1)

Case: Copy Of 152,4мм новый (1)

Date: October 5, 2023 at 11:16 AM

Created By:

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

# General Information

* 1. **General Case Information**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | 04. КМГ-Бурение | | |
| **Project** | Молдабек | **Site** | 2758\_Акт выноса |
| **Well** | 2758 | **Wellbore** | 2758 |
| **Design** | Copy Of Design #2 РК от 25.08.23 (1) | **Case** | Copy Of 152,4мм новый (1) |
| **Hole MD** | 828.42 m | **Hole TVD** | 263.59 m |
| **Air Gap** | 5.20 m | **Ground Elevation** | 84.32 m |
| **Reference Point** | WELL (copy) (copy) @ 89.52m | **Well Type** | Platform |

* 1. **Active Fluid**

### **Fluid Data**

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

### **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**  **(°)** |
| 30 | 1 | 1130 | Yes | 12 | 20 |  |  |

* 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** | **433** | **433** | **433** | **161.7** | **158.75** |  | **0.25** | **20.54** |  |
| **Open Hole** | **828.42** | **395.42** |  |  |  | **152.4** | **0.3** | **18.24** | **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 | 9.225 | 9.23 | 101.6 | 82.3 | 9.144 | 0.433 | 137.32 | 76.2 | 26.41 | CS\_API 5D/7 | G | 2 |
| Drill Collar | 160 | 169.23 | 120.65 | 50.8 | 9.144 |  |  |  | 73.83 | CS\_API 5D/7 | 4145H MOD |  |
| Heavy Weight | 160 | 329.23 | 88.9 | 57.15 | 9.144 | 1.219 | 120.65 | 58.75 | 34.53 | CS\_1340 MOD | 1340 MOD |  |
| Drill Pipe | 470 | 799.23 | 88.9 | 66.09 | 9.144 | 0.469 | 117.48 | 53.98 | 25.12 | CS\_API 5D/7 | G | 2 |
| Sub | 0.91 | 800.14 | 120.65 | 28 | 0.91 |  |  |  | 64.63 | CS\_API 5D/7 | 4145H MOD |  |
| MWD | 10.44 | 810.58 | 120.65 | 40.64 | 10.44 |  |  |  | 85.87 | SAE 4145 | SAE 4145 |  |
| MWD | 9.1 | 819.68 | 120.65 | 40.64 | 9.1 |  |  |  | 85.87 | SAE 4145 | SAE 4145 |  |
| Stabilizer | 1.524 | 821.2 | 104 | 31.75 | 1.524 |  |  |  | 43.75 | CS\_API 5D/7 | 4145H MOD |  |
| Mud Motor | 7 | 828.2 | 120.65 | 63.5 | 7 |  |  |  | 57.37 | CS\_API 5D/7 | 4145H MOD |  |
| Bit | 0.221 | 828.42 | 152.4 |  | 0.221 |  |  |  | 126.49 |  |  |  |

### **Grade in Use**

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

### **String Nozzles**

| Component | MD  (m) | Port Open | Diverted Flow | Amount Diverted  (%) | Nozzle  (32nd") | TFA  (in²) |
| --- | --- | --- | --- | --- | --- | --- |
| Polycrystalline Diamond Bit | 828 | NA | NA | NA | 5.0X16.0 | 0.982 |

### **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. **Tortuosity (Random Inc and Az)**

|  |  |
| --- | --- |
| **Tortuosity Period** | 100.00 m |
| **Interpolation Interval** | 9.14 m |

|  |  |
| --- | --- |
| Measured Depth Top  (m) | Magnitude  (°) |
| 0.00 | 0.50 |
| 100.00 | 1.50 |
| 200.00 | 1.50 |
| 300.00 | 1.50 |
| 400.00 | 1.50 |
| 500.00 | 1.00 |
| 600.00 | 1.00 |
| 700.00 | 1.00 |
| 828.42 | 1.00 |

* 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 | 0.00 | 357.89 | 0.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 30.00 | 0.00 | 357.89 | 30.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 52.00 | 0.00 | 357.89 | 52.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 60.00 | 2.39 | 346.87 | 60.00 | 8.966 | 1.195 | 0.000 | 0.17 | 0.16 | -0.03 | 8.966 | 0.000 |
| 75.00 | 6.87 | 346.87 | 74.94 | 8.966 | 2.750 | 0.000 | 1.37 | 1.35 | -0.26 | 8.966 | 0.000 |
| 90.00 | 11.36 | 346.87 | 89.75 | 8.966 | 3.786 | 0.000 | 3.73 | 3.68 | -0.72 | 8.966 | 0.000 |
| 105.00 | 15.84 | 346.87 | 104.33 | 8.966 | 4.526 | 0.000 | 7.22 | 7.15 | -1.39 | 8.966 | 0.000 |
| 120.00 | 20.32 | 346.87 | 118.58 | 8.966 | 5.081 | 0.000 | 11.84 | 11.71 | -2.28 | 8.966 | 0.000 |
| 135.00 | 24.81 | 346.87 | 132.43 | 8.966 | 5.512 | 0.000 | 17.56 | 17.36 | -3.38 | 8.966 | 0.000 |
| 150.00 | 29.29 | 346.87 | 145.79 | 8.966 | 5.858 | 0.000 | 24.32 | 24.06 | -4.69 | 8.966 | 0.000 |
| 165.00 | 33.77 | 346.87 | 158.57 | 8.966 | 6.140 | 0.000 | 32.11 | 31.75 | -6.18 | 8.966 | 0.000 |
| 180.00 | 38.25 | 346.87 | 170.70 | 8.966 | 6.376 | 0.000 | 40.86 | 40.41 | -7.87 | 8.966 | 0.000 |
| 195.00 | 42.74 | 346.87 | 182.10 | 8.966 | 6.575 | 0.000 | 50.52 | 49.97 | -9.73 | 8.966 | 0.000 |
| 210.00 | 47.22 | 346.87 | 192.71 | 8.966 | 6.746 | 0.000 | 61.04 | 60.37 | -11.76 | 8.966 | 0.000 |
| 225.00 | 51.70 | 346.87 | 202.46 | 8.966 | 6.894 | 0.000 | 72.36 | 71.56 | -13.94 | 8.966 | 0.000 |
| 240.00 | 56.19 | 346.87 | 211.28 | 8.966 | 7.023 | 0.000 | 84.39 | 83.46 | -16.26 | 8.966 | 0.000 |
| 255.00 | 60.67 | 346.87 | 219.14 | 8.966 | 7.138 | 0.000 | 97.07 | 96.00 | -18.70 | 8.966 | 0.000 |
| 270.00 | 65.15 | 346.87 | 225.96 | 8.966 | 7.239 | 0.000 | 110.32 | 109.10 | -21.25 | 8.966 | 0.000 |
| 285.00 | 69.64 | 346.87 | 231.73 | 8.966 | 7.330 | 0.000 | 124.06 | 122.69 | -23.90 | 8.966 | 0.000 |
| 300.00 | 74.12 | 346.87 | 236.39 | 8.966 | 7.412 | 0.000 | 138.21 | 136.68 | -26.62 | 8.966 | 0.000 |
| 311.68 | 77.61 | 346.87 | 239.25 | 8.966 | 7.470 | 0.000 | 149.45 | 147.80 | -28.79 | 8.966 | 0.000 |
| 328.69 | 77.61 | 346.87 | 242.90 | 0.000 | 7.084 | 0.000 | 165.94 | 164.11 | -31.97 | 0.000 | 0.000 |
| 330.00 | 77.98 | 346.87 | 243.17 | 8.436 | 7.089 | 0.000 | 167.20 | 165.36 | -32.21 | 8.436 | 0.069 |
| 345.00 | 82.20 | 346.90 | 245.75 | 8.436 | 7.147 | 0.000 | 181.87 | 179.86 | -35.03 | 8.436 | 0.067 |
| 360.00 | 86.41 | 346.94 | 247.24 | 8.436 | 7.201 | 0.000 | 196.68 | 194.51 | -37.87 | 8.436 | 0.066 |
| 365.70 | 88.02 | 346.95 | 247.52 | 8.436 | 7.220 | 0.000 | 202.33 | 200.10 | -38.95 | 8.435 | 0.066 |
| 390.00 | 88.01 | 349.38 | 248.36 | 3.000 | 6.957 | 0.000 | 226.49 | 224.04 | -43.05 | -0.007 | 3.002 |
| 420.00 | 88.01 | 352.38 | 249.40 | 3.000 | 6.675 | 0.000 | 256.43 | 253.79 | -46.71 | -0.002 | 3.002 |
| 450.00 | 88.01 | 355.38 | 250.45 | 3.000 | 6.430 | 0.000 | 286.41 | 283.70 | -48.80 | 0.003 | 3.002 |
| 480.04 | 88.02 | 358.39 | 251.49 | 3.000 | 6.215 | 0.000 | 316.38 | 313.70 | -49.33 | 0.009 | 3.002 |
| 510.00 | 88.02 | 358.39 | 252.52 | 0.000 | 5.850 | 0.000 | 346.24 | 343.65 | -49.07 | 0.000 | 0.000 |
| 540.00 | 88.02 | 358.39 | 253.56 | 0.000 | 5.525 | 0.000 | 376.13 | 373.63 | -48.81 | 0.000 | 0.000 |
| 570.00 | 88.02 | 358.39 | 254.59 | 0.000 | 5.234 | 0.000 | 406.02 | 403.61 | -48.54 | 0.000 | 0.000 |
| 600.00 | 88.02 | 358.39 | 255.63 | 0.000 | 4.973 | 0.000 | 435.91 | 433.59 | -48.28 | 0.000 | 0.000 |
| 630.00 | 88.02 | 358.39 | 256.67 | 0.000 | 4.736 | 0.000 | 465.79 | 463.57 | -48.02 | 0.000 | 0.000 |
| 660.00 | 88.02 | 358.39 | 257.70 | 0.000 | 4.520 | 0.000 | 495.68 | 493.56 | -47.76 | 0.000 | 0.000 |
| 690.00 | 88.02 | 358.39 | 258.74 | 0.000 | 4.324 | 0.000 | 525.57 | 523.54 | -47.50 | 0.000 | 0.000 |
| 720.00 | 88.02 | 358.39 | 259.78 | 0.000 | 4.144 | 0.000 | 555.46 | 553.52 | -47.24 | 0.000 | 0.000 |
| 750.00 | 88.02 | 358.39 | 260.81 | 0.000 | 3.978 | 0.000 | 585.35 | 583.50 | -46.97 | 0.000 | 0.000 |
| 780.00 | 88.02 | 358.39 | 261.85 | 0.000 | 3.825 | 0.000 | 615.24 | 613.48 | -46.71 | 0.000 | 0.000 |
| 810.00 | 88.02 | 358.39 | 262.89 | 0.000 | 3.683 | 0.000 | 645.13 | 643.46 | -46.45 | 0.000 | 0.000 |
| 828.32 | 88.02 | 358.39 | 263.52 | 0.000 | 3.602 | 0.000 | 663.38 | 661.77 | -46.29 | 0.000 | 0.000 |
| 828.42 | 88.02 | 358.39 | 263.52 | 0.000 | 3.601 | 0.000 | 663.48 | 661.87 | -46.29 | 0.000 | 0.000 |

* 1. **Pore Pressure**

| True Vertical Depth (TVD)  (m) | Pore Pressure  (atm) | Equivalent Mud Weight (EMW)  (kg/m³) |
| --- | --- | --- |
| 5.20 | 0.5024 | 998 |

* 1. **Fracture Gradient**

| True Vertical Depth (TVD)  (m) | Fracture Pressure  (atm) | Equivalent Mud Weight (EMW)  (kg/m³) |
| --- | --- | --- |
| 5.20 | 0.0000 | 0 |

* 1. **Geothermal Gradient Data**

|  |  |  |  |
| --- | --- | --- | --- |
| **Ambient Temperature** | 25.000 °C | **Mudline Temperature** | °C |
| **Temperature @ Depth** | 20.000 °C @ 263.59 m | **Gradient** | -1.94 °C/100m |

# Schematics

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Well:** | 2758 | **Wellbore:** | 2758 | **Case:** | Copy Of 152,4мм новый (1) | **String Name:** | 152,4 |
|  |  |  |  |  |  |  |  |
| Schematic | | | | | | | |

# Torque & Drag Setup Data

* 1. **Settings**

|  |  |  |  |
| --- | --- | --- | --- |
| **Measured Depth of Bit** | 828.42 m | **Bending Stress Magnification** | Yes |
| **Block Weight** | 17.00 tonne | **Stiff String Analysis** | No |
| **Enable Sheave Friction Correction** | No | **Viscous Torque and Drag** | No |
| **Pump Rate** | 15.000 L/sec | **Contact Force Normalization Length** | 9.45 m |
| **Mechanical Efficiency (Single Sheave)** | 97.00 | **Lines Strung** | 12 |
|  |  | **Side Force** | kgf |
| **Offset from Wellhead** | m | **Angle at Wellhead** | ° |
| **Buckling limit factor** | 1 |  |  |

* 1. **Run Parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Start MD** | 0.00 m | **End MD** | 828.56 m |
| **Step Size** | 10.00 m |  |  |

* 1. **Normal Analysis Operational Parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| Drilling | WOB/Overpull  (tonne) | Torque at Bit  (kN-m) | Include Pump Rate |
| Rotating On Bottom | 5.00 | 1.3730 | NA |
| Slide Drilling | 2.00 | 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 |
| --- | --- |
| Casing | 0.25 |
| Open Hole | 0.30 |

* 1. **String Fill Up**

|  |  |  |  |
| --- | --- | --- | --- |
| **Use String Fill Up (Tripping In only)** | No | **Period** | 0.00 m |

# Torque and Drag Results

* 1. **Mechanical Limitations**

|  |  |  |  |
| --- | --- | --- | --- |
| **Overpull Margin during a Tripping Out operation** | 65.31 tonne | using | 80.00% of yield |
| **Minimum Weight on Bit to Sinusoidal Buckle during a rotating on bottom operation** | 12.90 tonne | at | 18.11 m |
| **Minimum Weight on Bit to Helical Buckle during a rotating on bottom operation** | 13.28 tonne | at | 18.11 m |
| **Pick-Up Drag** | 4.75 tonne | | |
| **Slack-Off Drag** | 5.83 tonne | | |
| **Block Rating (Hoisting System)** | 250.00 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 | 23.94 | -0.15 | 100.94 | 727.48 | 828.42 | 0.00 |
| Подъём |  |  |  |  |  |  |  | 0.0000 | 0.0 | 0.0 | 34.52 | -0.10 | 763.07 | 65.35 | 828.42 | 0.00 |
| Бурение ротором |  |  |  |  |  |  |  | 4.8720 | 0.9 | 0.5 | 24.77 | -0.18 | 111.27 | 717.15 | 130.78 | 697.64 |
| Бурение ГЗД |  |  |  |  |  |  |  | 0.0000 | 0.0 | 0.0 | 21.12 | -0.18 | 60.85 | 767.57 | 71.04 | 757.38 |
| Вращение над забоем |  |  |  |  |  |  |  | 2.7985 | 0.5 | 0.5 | 29.77 | -0.12 | 262.90 | 565.52 | 828.42 | 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 | 10.00 m/hr | **Rotary Speed** | 25 rpm |
| Cuttings Diameter | 3.18 mm | **Cuttings Density** | 2.145 sg |
| Bed Porosity | 36.00 % | **MD Calculation Interval** | 10.00 m |

* 1. **Surface Equipment Information**

|  |  |  |  |
| --- | --- | --- | --- |
| Pressure Loss Calculation | Specify Pressure loss | **Maximum Working Pressure** | atm |
| Equipment Mode | NA | **Surface Pressure Loss** | 0.0000 atm |
| Equipment Type | NA |  |  |

* 1. **Pump Pressure Information**

|  |  |  |  |
| --- | --- | --- | --- |
| Maximum Surface Pressure | 350.0000 atm | **Pump Rate** | 15.000 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 |  |  |  |
| Include Back Pressure |  | **Back Pressure** | atm |
| Sea Floor Returns | N | **Sea Water Density** | NA |

* 1. **Run Parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| Start MD | 0.00 m | **End MD** | 828.56 m |
| Step Size | 10.00 m |  |  |

* 1. **Flow Rate (Q= 15.000 L/sec)**

### **Bit Parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Pump Rate** | 15.000 L/sec | **Stand Pipe Pressure** | 117.0027 atm |
| **Bit Pressure Loss** | 3.4653 atm | **Percent Power at Bit** | 2.96 % |
| **Bit Hydraulic Power / Area (HSI)** | 0.2 hp/in² | **Bit Nozzle Velocity** | 23.68 m/s |
| **Bit Hydraulic Power** | 7.06 hp | **Bit Impact Force** | 40.93 kgf |
| **Surface Equip. Pressure Loss** | 0.0000 atm | **Total Bit Flow Area** | 0.982 in² |

* 1. **Gel Strength**

|  |  |  |  |
| --- | --- | --- | --- |
| 0 Second | lbf/100ft² | **10 Second** | lbf/100ft² |
| 10 Minute | lbf/100ft² | **30 Minute** | 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** |