**WellPlan**TMReport

04. КМГ-Бурение

Well Name: 243

Wellbore: 243

Design: План рев 02 от 07.10.20

Case: 215,9 мм

Date: October 5, 2023 at 11:52 PM

Created By:

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

# General Information

* 1. **General Case Information**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | 04. КМГ-Бурение | | |
| **Project** | Балгимбаев | **Site** | 243 ННС |
| **Well** | 243 | **Wellbore** | 243 |
| **Design** | План рев 02 от 07.10.20 | **Case** | 215,9 мм |
| **Hole MD** | 960.00 m | **Hole TVD** | 916.50 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**  **(°)** |
| 40 | 1 | 1210 | Yes | 18 | 24 |  |  |

* 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** | **300** | **300** | **300** | **226.7** | **222.73** |  | **0.25** | **40.36** |  |
| **Open Hole** | **960** | **660** |  | **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 | 762.516 | 762.52 | 114.3 | 97.18 | 9.144 | 0.433 | 142.88 | 63.5 | 33.86 | CS\_API 5D/7 | G | 2 |
| Heavy Weight | 130 | 892.52 | 127 | 76.2 | 9.3 | 1.219 | 165.1 | 76.2 | 73.13 | CS\_1340 MOD | 1340 MOD |  |
| Jar | 9.07 | 901.59 | 165 | 57 | 9.07 |  |  |  | 69.2 | SS\_15-15LC | 15-15LC MOD (1) |  |
| Heavy Weight | 37 | 938.59 | 127 | 76.2 | 9.144 | 1.219 | 165.1 | 76.2 | 73.13 | CS\_1340 MOD | 1340 MOD |  |
| MWD | 10.4 | 948.99 | 172 | 83 | 10.4 |  |  |  | 149.77 | SS\_15-15LC | 15-15LC MOD (1) |  |
| Stabilizer | 1.524 | 950.51 | 171.45 | 71.44 | 1.524 |  |  |  | 123.91 | CS\_API 5D/7 | 4145H MOD |  |
| Sub | 0.96 | 951.47 | 172 | 83 | 0.96 |  |  |  | 156.36 | SS\_15-15LC | 15-15LC MOD (1) |  |
| Mud Motor | 8.2 | 959.67 | 172 | 69.85 | 8.2 |  |  |  | 156.37 | CS\_API 5D/7 | 4145H MOD |  |
| Bit | 0.33 | 960 | 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 | 960 | 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 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 30.00 | 0.00 | 0.00 | 30.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 60.00 | 0.00 | 0.00 | 60.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 90.00 | 0.00 | 0.00 | 90.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 120.00 | 0.00 | 0.00 | 120.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 150.00 | 0.00 | 0.00 | 150.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 180.00 | 0.00 | 0.00 | 180.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 210.00 | 0.00 | 0.00 | 210.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 240.00 | 0.00 | 0.00 | 240.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 270.00 | 0.00 | 0.00 | 270.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 300.00 | 0.00 | 0.00 | 300.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 330.00 | 0.00 | 0.00 | 330.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 360.00 | 0.00 | 0.00 | 360.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 390.00 | 0.00 | 0.00 | 390.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 400.00 | 0.00 | 0.00 | 400.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 420.00 | 1.93 | 313.50 | 420.00 | 2.900 | 0.138 | 0.000 | 0.00 | 0.23 | -0.24 | 2.900 | 0.000 |
| 450.00 | 4.83 | 313.50 | 449.94 | 2.900 | 0.322 | 0.000 | -0.02 | 1.45 | -1.53 | 2.900 | 0.000 |
| 480.00 | 7.73 | 313.50 | 479.76 | 2.900 | 0.483 | 0.000 | -0.06 | 3.71 | -3.91 | 2.900 | 0.000 |
| 501.17 | 9.78 | 313.50 | 500.68 | 2.900 | 0.585 | 0.000 | -0.09 | 5.93 | -6.25 | 2.900 | 0.000 |
| 510.00 | 9.40 | 307.17 | 509.39 | 3.811 | 0.641 | 0.000 | -0.03 | 6.88 | -7.37 | -1.303 | -21.515 |
| 540.00 | 9.05 | 283.32 | 539.01 | 3.811 | 0.817 | 0.000 | 1.38 | 8.91 | -11.62 | -0.344 | -23.847 |
| 570.00 | 10.22 | 261.48 | 568.60 | 3.811 | 0.975 | 0.000 | 4.62 | 9.05 | -16.55 | 1.166 | -21.844 |
| 600.00 | 12.48 | 245.76 | 598.01 | 3.811 | 1.117 | 0.000 | 9.69 | 7.33 | -22.13 | 2.259 | -15.722 |
| 630.00 | 15.35 | 235.30 | 627.13 | 3.811 | 1.245 | 0.000 | 16.56 | 3.74 | -28.36 | 2.877 | -10.460 |
| 660.00 | 18.56 | 228.22 | 655.83 | 3.811 | 1.362 | 0.000 | 25.19 | -1.71 | -35.19 | 3.210 | -7.077 |
| 690.00 | 21.96 | 223.22 | 683.97 | 3.811 | 1.468 | 0.000 | 35.56 | -8.98 | -42.59 | 3.397 | -5.004 |
| 720.00 | 25.47 | 219.51 | 711.43 | 3.811 | 1.566 | 0.000 | 47.61 | -18.05 | -50.54 | 3.510 | -3.702 |
| 750.00 | 29.05 | 216.66 | 738.10 | 3.811 | 1.656 | 0.000 | 61.30 | -28.88 | -59.00 | 3.581 | -2.851 |
| 775.54 | 32.14 | 214.70 | 760.08 | 3.811 | 1.727 | 0.000 | 74.19 | -39.44 | -66.57 | 3.626 | -2.304 |
| 780.00 | 32.10 | 213.87 | 763.86 | 3.000 | 1.734 | 0.000 | 76.54 | -41.40 | -67.91 | -0.248 | -5.623 |
| 803.18 | 32.00 | 209.50 | 783.51 | 3.000 | 1.770 | 0.000 | 88.60 | -51.86 | -74.36 | -0.133 | -5.649 |
| 810.00 | 32.00 | 209.50 | 789.29 | 0.000 | 1.755 | 0.000 | 92.12 | -55.00 | -76.14 | 0.000 | 0.000 |
| 840.00 | 32.00 | 209.50 | 814.73 | 0.000 | 1.693 | 0.000 | 107.58 | -68.84 | -83.97 | 0.000 | 0.000 |
| 870.00 | 32.00 | 209.50 | 840.17 | 0.000 | 1.634 | 0.000 | 123.05 | -82.68 | -91.80 | 0.000 | 0.000 |
| 901.48 | 32.00 | 209.50 | 866.87 | 0.000 | 1.577 | 0.000 | 139.28 | -97.20 | -100.01 | 0.000 | 0.000 |
| 930.00 | 32.00 | 209.50 | 891.06 | 0.000 | 1.529 | 0.000 | 153.98 | -110.35 | -107.46 | 0.000 | 0.000 |
| 960.00 | 32.00 | 209.50 | 916.50 | 0.000 | 1.481 | 0.000 | 169.45 | -124.19 | -115.28 | 0.000 | 0.000 |

* 1. **Geothermal Gradient Data**

|  |  |  |  |
| --- | --- | --- | --- |
| **Ambient Temperature** | 27.000 °C | **Mudline Temperature** | °C |
| **Temperature @ Depth** | 40.000 °C @ 916.50 m | **Gradient** | 1.42 °C/100m |

# Schematics

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Well:** | 243 | **Wellbore:** | 243 | **Case:** | 215,9 мм | **String Name:** | секция 215,9мм |
|  |  |  |  |  |  |  |  |
| Schematic | | | | | | | |

# Torque & Drag Setup Data

* 1. **Settings**

|  |  |  |  |
| --- | --- | --- | --- |
| **Measured Depth of Bit** | 960.00 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** | 400.00 m | **End MD** | 960.00 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 | 7.00 | 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 |
| --- | --- |
| Casing | 0.25 |
| Open Hole | 0.30 |

* 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** | 64.07 tonne | using | 80.00% of yield |
| **Minimum Weight on Bit to Sinusoidal Buckle during a rotating on bottom operation** | 22.98 tonne | at | 390.34 m |
| **Minimum Weight on Bit to Helical Buckle during a rotating on bottom operation** | 23.32 tonne | at | 390.34 m |
| **Pick-Up Drag** | 6.03 tonne | | |
| **Slack-Off Drag** | 4.53 tonne | | |
| **Block Rating (Hoisting System)** | 100.00 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 | 44.27 | 0.30 | 779.26 | 180.74 | 960.00 | 0.00 |
| Подъём |  |  |  |  |  |  |  | 0.0000 | 0.0 | 0.0 | 54.83 | 0.41 | 835.64 | 124.36 | 960.00 | 0.00 |
| Бурение ротором |  |  |  |  |  |  |  | 7.0639 | 1.3 | 0.5 | 41.80 | 0.26 | 762.52 | 197.48 | 847.41 | 112.59 |
| Бурение ГЗД |  |  |  |  |  |  |  | 0.0000 | 0.0 | 0.0 | 40.15 | 0.24 | 762.52 | 197.48 | 862.87 | 97.13 |
| Вращение над забоем |  |  |  |  |  |  |  | 3.8944 | 0.6 | 0.6 | 48.80 | 0.35 | 811.74 | 148.26 | 960.00 | 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** | 250.0000 atm |
| Equipment Mode | NA | **Surface Pressure Loss** | 6.8046 atm |
| Equipment Type | NA |  |  |

* 1. **Pump Pressure Information**

|  |  |  |  |
| --- | --- | --- | --- |
| Maximum Surface Pressure | 250.0000 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 | 400.00 m | **End MD** | 960.00 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** | 129.7431 atm |
| **Bit Pressure Loss** | 9.8907 atm | **Percent Power at Bit** | 7.62 % |
| **Bit Hydraulic Power / Area (HSI)** | 0.7 hp/in² | **Bit Nozzle Velocity** | 38.66 m/s |
| **Bit Hydraulic Power** | 40.32 hp | **Bit Impact Force** | 143.12 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** |