**WellPlan**TMReport

04. КМГ-Бурение

Well Name: Н1-ЮЗК

Wellbore: Н1-ЮЗК

Design: План №1 от 06.08.20

Case: 2159

Date: October 5, 2023 at 8:11 PM

Created By:

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

# General Information

* 1. **General Case Information**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | 04. КМГ-Бурение | | |
| **Project** | Ю.З. Камышитовый | **Site** | Н-1 с альтитудой |
| **Well** | Н1-ЮЗК | **Wellbore** | Н1-ЮЗК |
| **Design** | План №1 от 06.08.20 | **Case** | 2159 |
| **Hole MD** | 298.00 m | **Hole TVD** | 217.47 m |
| **Air Gap** | 0.00 m | **Ground Elevation** | -22.00 m |
| **Reference Point** | WELL (copy) @ -22m | **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**  **(°)** |
| 21 | 1 | 1120 | Yes | 16 | 22 |  |  |

* 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** | **15** | **15** | **15** | **224.41** | **222.25** | **295.3** | **0.25** | **39.55** |  |
| **Open Hole** | **298** | **283** |  | **215.9** | **222.25** | **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 | 249.58 | 249.58 | 101.6 | 82.3 | 9.144 | 0.433 | 127.4 | 61.91 | 26.12 | CS\_API 5D/7 | G | 2 |
| Heavy Weight | 27 | 276.58 | 127 | 76.2 | 9.144 | 1.219 | 165.1 | 76.2 | 73.13 | CS\_1340 MOD | 1340 MOD |  |
| MWD | 10.4 | 286.98 | 172 | 83 | 10.4 |  |  |  | 149.77 | SS\_15-15LC | 15-15LC MOD (1) |  |
| Sub | 0.91 | 287.89 | 170.69 | 60.96 | 0.91 |  |  |  | 156.36 | SS\_15-15LC | 15-15LC MOD (1) |  |
| Mud Motor | 9.71 | 297.6 | 171.45 | 76.2 | 9.71 |  |  |  | 103.53 | CS\_API 5D/7 | 4145H MOD |  |
| Bit | 0.4 | 298 | 215.9 |  | 0.4 |  |  |  | 100 |  |  |  |

### **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 | 298 | NA | NA | NA | 1.0X15.0 | 0.995 |
| Polycrystalline Diamond Bit | 298 | NA | NA | NA | 2.0X12.0 | 0.995 |
| Polycrystalline Diamond Bit | 298 | NA | NA | NA | 4.0X14.0 | 0.995 |

### **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** | 30.00 m |
| **Interpolation Interval** | 9.14 m |

|  |  |
| --- | --- |
| Measured Depth Top  (m) | Magnitude  (°) |
| 0.00 | 0.50 |
| 35.00 | 1.50 |

* 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 | 0.15 | 0.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 20.00 | 0.00 | 0.15 | 20.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 30.00 | 0.00 | 0.15 | 30.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 35.00 | 0.00 | 0.15 | 35.00 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 |
| 45.00 | 2.93 | 232.85 | 45.00 | 8.800 | 1.956 | 0.000 | 0.25 | -0.16 | -0.20 | 8.800 | 0.000 |
| 60.00 | 7.33 | 232.85 | 59.93 | 8.800 | 3.667 | 0.000 | 1.59 | -0.97 | -1.27 | 8.800 | 0.000 |
| 75.00 | 11.73 | 232.85 | 74.72 | 8.800 | 4.693 | 0.000 | 4.05 | -2.47 | -3.25 | 8.800 | 0.000 |
| 90.00 | 16.13 | 232.85 | 89.28 | 8.800 | 5.378 | 0.000 | 7.64 | -4.66 | -6.12 | 8.800 | 0.000 |
| 105.00 | 20.53 | 232.85 | 103.51 | 8.800 | 5.867 | 0.000 | 12.32 | -7.52 | -9.87 | 8.800 | 0.000 |
| 120.00 | 24.93 | 232.85 | 117.34 | 8.800 | 6.233 | 0.000 | 18.08 | -11.03 | -14.48 | 8.800 | 0.000 |
| 135.00 | 29.33 | 232.85 | 130.69 | 8.800 | 6.519 | 0.000 | 24.87 | -15.18 | -19.92 | 8.800 | 0.000 |
| 150.00 | 33.73 | 232.85 | 143.47 | 8.800 | 6.747 | 0.000 | 32.65 | -19.93 | -26.16 | 8.800 | 0.000 |
| 165.00 | 38.13 | 232.85 | 155.61 | 8.800 | 6.933 | 0.000 | 41.39 | -25.26 | -33.16 | 8.800 | 0.000 |
| 180.00 | 42.53 | 232.85 | 167.04 | 8.800 | 7.089 | 0.000 | 51.03 | -31.14 | -40.88 | 8.800 | 0.000 |
| 195.50 | 47.08 | 232.85 | 178.04 | 8.800 | 7.225 | 0.000 | 61.87 | -37.76 | -49.57 | 8.800 | 0.000 |
| 200.00 | 48.84 | 232.85 | 181.05 | 11.715 | 7.326 | 0.000 | 65.19 | -39.79 | -52.23 | 11.715 | 0.000 |
| 210.00 | 52.74 | 232.85 | 187.37 | 11.715 | 7.535 | 0.000 | 72.88 | -44.48 | -58.39 | 11.715 | 0.000 |
| 220.00 | 56.65 | 232.85 | 193.15 | 11.715 | 7.725 | 0.000 | 80.99 | -49.43 | -64.88 | 11.715 | 0.000 |
| 230.00 | 60.55 | 232.85 | 198.36 | 11.715 | 7.898 | 0.000 | 89.46 | -54.60 | -71.67 | 11.715 | 0.000 |
| 240.00 | 64.46 | 232.85 | 202.98 | 11.715 | 8.057 | 0.000 | 98.27 | -59.97 | -78.72 | 11.715 | 0.000 |
| 250.00 | 68.36 | 232.85 | 206.98 | 11.715 | 8.203 | 0.000 | 107.36 | -65.52 | -86.01 | 11.715 | 0.000 |
| 260.00 | 72.27 | 232.85 | 210.34 | 11.715 | 8.339 | 0.000 | 116.71 | -71.23 | -93.50 | 11.715 | 0.000 |
| 270.00 | 76.17 | 232.85 | 213.06 | 11.715 | 8.464 | 0.000 | 126.26 | -77.06 | -101.15 | 11.715 | 0.000 |
| 280.00 | 80.08 | 232.85 | 215.12 | 11.715 | 8.580 | 0.000 | 135.98 | -82.99 | -108.94 | 11.715 | 0.000 |
| 290.00 | 83.98 | 232.85 | 216.51 | 11.715 | 8.688 | 0.000 | 145.81 | -88.99 | -116.81 | 11.715 | 0.000 |
| 300.00 | 87.89 | 232.85 | 217.22 | 11.715 | 8.789 | 0.000 | 155.71 | -95.03 | -124.75 | 11.715 | 0.000 |
| 305.41 | 90.00 | 232.85 | 217.32 | 11.715 | 8.841 | 0.000 | 161.08 | -98.31 | -129.05 | 11.715 | 0.000 |
| 330.00 | 90.00 | 230.39 | 217.32 | 3.000 | 8.405 | 0.000 | 185.56 | -113.63 | -148.28 | 0.000 | -3.000 |
| 360.00 | 90.00 | 227.39 | 217.32 | 3.000 | 7.955 | 0.000 | 215.51 | -133.41 | -170.83 | 0.000 | -3.000 |
| 390.00 | 90.00 | 224.39 | 217.32 | 3.000 | 7.574 | 0.000 | 245.51 | -154.34 | -192.32 | 0.000 | -3.000 |
| 420.00 | 90.00 | 221.39 | 217.32 | 3.000 | 7.247 | 0.000 | 275.46 | -176.37 | -212.67 | 0.000 | -3.000 |
| 432.41 | 90.00 | 220.15 | 217.32 | 3.000 | 7.125 | 0.000 | 287.82 | -185.79 | -220.75 | 0.000 | -3.000 |
| 450.00 | 90.00 | 220.15 | 217.32 | 0.000 | 6.847 | 0.000 | 305.32 | -199.27 | -232.06 | 0.000 | 0.000 |
| 480.00 | 90.00 | 220.15 | 217.32 | 0.000 | 6.419 | 0.000 | 335.16 | -222.25 | -251.34 | 0.000 | 0.000 |
| 510.00 | 90.00 | 220.15 | 217.32 | 0.000 | 6.041 | 0.000 | 365.00 | -245.23 | -270.63 | 0.000 | 0.000 |
| 540.00 | 90.00 | 220.15 | 217.32 | 0.000 | 5.706 | 0.000 | 394.84 | -268.21 | -289.91 | 0.000 | 0.000 |
| 570.00 | 90.00 | 220.15 | 217.32 | 0.000 | 5.405 | 0.000 | 424.68 | -291.19 | -309.20 | 0.000 | 0.000 |
| 600.00 | 90.00 | 220.15 | 217.32 | 0.000 | 5.135 | 0.000 | 454.53 | -314.17 | -328.48 | 0.000 | 0.000 |
| 630.00 | 90.00 | 220.15 | 217.32 | 0.000 | 4.890 | 0.000 | 484.37 | -337.15 | -347.76 | 0.000 | 0.000 |

* 1. **Geothermal Gradient Data**

|  |  |  |  |
| --- | --- | --- | --- |
| **Ambient Temperature** | 26.000 °C | **Mudline Temperature** | °C |
| **Temperature @ Depth** | 21.000 °C @ 217.47 m | **Gradient** | -2.30 °C/100m |

# Schematics

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Well:** | Н1-ЮЗК | **Wellbore:** | Н1-ЮЗК | **Case:** | 2159 | **String Name:** | 215,9 мм |
|  |  |  |  |  |  |  |  |
| Schematic | | | | | | | |

# Torque & Drag Setup Data

* 1. **Settings**

|  |  |  |  |
| --- | --- | --- | --- |
| **Measured Depth of Bit** | 298.00 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** | 20.000 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** | 30.00 m | **End MD** | 298.00 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 | 3.00 | 4.1670 | NA |
| Slide Drilling | 2.00 | 0.0000 | NA |
| Backreaming | 4.00 | 0.0000 | 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** | 62.80 tonne | using | 80.00% of yield |
| **Minimum Weight on Bit to Sinusoidal Buckle during a rotating on bottom operation** | 5.55 tonne | at | 8.91 m |
| **Minimum Weight on Bit to Helical Buckle during a rotating on bottom operation** | 5.67 tonne | at | 8.91 m |
| **Pick-Up Drag** | 1.82 tonne | | |
| **Slack-Off Drag** | 1.96 tonne | | |
| **Block Rating (Hoisting System)** | 225.00 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 | 20.51 | 0.09 | 148.40 | 149.60 | 298.00 | 0.00 |
| Подъём |  |  |  |  |  |  |  | 0.0000 | 0.0 | 0.0 | 24.28 | 0.10 | 249.58 | 48.42 | 298.00 | 0.00 |
| Бурение ротором |  |  |  |  |  |  |  | 6.0162 | 0.5 | 0.1 | 19.47 | 0.09 | 95.47 | 202.53 | 110.82 | 187.18 |
| Бурение ГЗД |  |  |  |  |  |  |  | 0.0000 | 0.0 | 0.0 | 17.64 | 0.08 | 24.52 | 273.48 | 28.21 | 269.79 |
| Обратная проработка |  |  |  |  |  |  |  | 1.5929 | 0.1 | 0.1 | 26.47 | 0.12 | 277.39 | 20.61 | 298.00 | 0.00 |
| Вращение над забоем |  |  |  |  |  |  |  | 1.3526 | 0.1 | 0.1 | 22.47 | 0.10 | 249.58 | 48.42 | 298.00 | 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 | 10.00 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** | 270.0000 atm |
| Equipment Mode | NA | **Surface Pressure Loss** | 6.8046 atm |
| Equipment Type | NA |  |  |

* 1. **Pump Pressure Information**

|  |  |  |  |
| --- | --- | --- | --- |
| Maximum Surface Pressure | 350.0000 atm | **Pump Rate** | 20.000 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 | 30.00 m | **End MD** | 298.00 m |
| Step Size | 9.30 m |  |  |

* 1. **Flow Rate (Q= 20.000 L/sec)**

### **Bit Parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Pump Rate** | 20.000 L/sec | **Stand Pipe Pressure** | 59.3056 atm |
| **Bit Pressure Loss** | 5.9469 atm | **Percent Power at Bit** | 10.03 % |
| **Bit Hydraulic Power / Area (HSI)** | 0.3 hp/in² | **Bit Nozzle Velocity** | 31.16 m/s |
| **Bit Hydraulic Power** | 16.16 hp | **Bit Impact Force** | 71.18 kgf |
| **Surface Equip. Pressure Loss** | 6.8046 atm | **Total Bit Flow Area** | 0.995 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** |