**Appendix 2**

**1- Labsara 1 drilling data sheet**

**1.1. Identification:**

Drilling Code: 2/615.

Location: Oujda Angad Province – rural commune of Labsara.

Coordinates: Longitude x = 790521 m; latitude y = 451832 m; altitude z = 700 m.

**1.2. Technical and lithological characteristics**

*1.2.1- Air reconnaissance drilling at 8 "1/2*

Depth 304 m.

Water coming - 243 m; Q = 1,5 L/s.

Air-lift tests: Piezometry; = 196,70 m; Dynamic level = 197,75 m; Q = 2,7 L/s.

Duration - 6 hours

Conductivity = 1310 µS / cm; T = 25.5 ° C.

*1.2.2. Lithological section*

|  |  |  |
| --- | --- | --- |
| **Topside** | **Underside** | **Nature** |
| 0 | 6 | Limestone |
| 6 | 111 | Marly limestone |
| 111 | 242 | Dolomitic limestone with marly joints |
| 242 | 290 | Dolomitic limestone |
| 290 | 298 | Marl |

**1.3. Bore characteristics**

|  |  |  |  |
| --- | --- | --- | --- |
| Diameter | From | To | Type |
| 17"1/2 | 0 | 248 | MFT AIR |
| 12"1/4 | 248 | 300 | MFT AIR |

**1.4. Equipment**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Tubing | Diameter | **From** | **To** | **Thickness (mm)** | **Type of fitting** | **Type of strainer** |
| full | 14" | 0 | 238 | 8.00 | Welding |  |
| Strainer | 14" | 238 | 244 | 8.00 | Welding | Coined ribs |
| full | 14" | 244 | 248 | 8.00 | Welding |  |
|  |  | 248 | 300 | Bare hole | | |

**1.5. Development**

|  |  |  |
| --- | --- | --- |
| **Nature** | **Type** | **Volume (L)** |
| Air-lift  + Pump | Poly-phosphates  HCL acid | 3  2 |

Air-lift: water tubes 4 "1/2 at 288 m - air tubes 1" 1/4 - dimension 282 m.

3/4 "piezometer tubes - 220 m.

Duration - 8 hours;

Piezometry = 196.65 m; Dynamic level = 196.75 m; Q = 3 L/s.

Development by SUBTECK 125 CV pump.

Pump setting elevation: 220 m.

*1.5.1. Step pumping test:*

Date: from 01/08/2019 to 15/08/2019.

Static level: 201.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Step | Flow rate (L/s) | Duration (h) | Dynamic level (m) |  |  |
| 1 | 15 | 2h | 204,11 |  |  |
| 2 | 18 | 2h | 204,83 |  |  |
| 3 | 21 | 2h | 205,4 |  |  |
| 4 | 24 | 2h | 207,53 |  |  |

*1.5.2. Long- term pumping test*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Descent*** | | | | | | | *ascent* | |
| Date | Duration  (h) | Pump setting elevation (m) | Flow rate (L/s) | Static level (m) | Dynamic level (m) | Drawdown (m) | Duration(h) | Residual drawdown (m) |
| 16/06/2019 | 72 | 215,00 | 22 | 201,00 | 207,00 | 6,00 | 2 |  |

**1.6. Operating conditions**

   Flow rate: 22 L/s.

   Dynamic level: 207 m.

  Pump setting elevation: 215 m.

**1.7. Quality data**

   Turbidity (NTU): 0,4.

   Conductivity (µS / cm): 1320.

   PH: 7,75.

**2. Labsara 2 drilling data sheet**

**2.1. Identification:**

Drilling Code: 6/615.

Location: Oujda Angad Province.

Coordinates: Longitude X : 791869 m Latitude Y : 453731 m Altitude Z : 667 m.

**2.2. Lithological section**

|  |  |  |
| --- | --- | --- |
| **Topside** | **Underside** | **Nature** |
| 0 | 7 | Limestone |
| 7 | 114 | Marly limestone |
| 114 | 247 | Dolomitic limestone with marly joints |
| 247 | 290 | Dolomitic limestone |
| 290 | 300 | Grey marl |

**2.3. Bore characteristics**

|  |  |  |  |
| --- | --- | --- | --- |
| Diameter | From | To | Type |
| 22" | 0 | 8 | Air Drilling |
| 17"1/2 | 8 | 250 | Air Drilling |
| 8"1/2 | 250 | 300 | Air Drilling |

* First water coming at 245 m; Q = 1.0 L/s.
* Second water coming at 250 m; Q = 2.5 L/s.
* Air lift development - duration 6 hours
* Flow rate = 2,5 L/s.
* Piezometry = 199.00 m.
* Drawdown: = 0,10 m.
* Conductivity: 1470 µs/cm; Temperature = 25°C.

**2.4. Equipment**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Tubing | Diameter | From | To | Thickness (mm) | Type of fitting | **Type of strainer** |
| Full | 18"5/8 | 0 | 8.00 | 8.00 | Welding |  |
| Full | 14" | 0 | 227.00 | 8.00 | Welding |  |
| Strainer | 14" | 227 | 245.00 | 8.00 | Welding | **Coined ribs 0.5 mm** |
| Full | 14" | 245 | 250.00 | 8.00 | Welding |  |
| Trou nu |  | 250.00 | 300.00 |  |  |  |

**2.5. Development**

|  |  |  |
| --- | --- | --- |
| **Nature** | **Type** | **Volume (L)** |
| 1 Air-lift  + Pump | HCL at 22°  Polyphosphate | 2.5  3 |

*2.5.1. Step pumping test:*

Date: from 01/08/2019 to 15/08/2019.

Static level: 187 m.

Pump setting elevation: 235 m.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Step | Flow rate (L/s) | |  | Duration (h) | | | Dynamic level (m) | |  |  |  |  |  |
| 1 | 8 | |  | 1h30 | | | 208,36 | |  |  |  |  |  |
| 2 | 9 | |  | 1h30 | | | 212,13 | |  |  |  |  |  |
| 3 | 10 | |  | 1h30 | | | 216,73 | |  |  |  |  |  |
| 4 | 11 | |  | 1h30 | | | 217,08 | |  |  |  |  |  |
|  |  |  | | |  |  | |  | |  |  |  |  |

*2.5.2. Long- term pumping test*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Descent*** | | | | | | | *ascent* | |
| Date | Duration  (h) | Pump setting elevation (m) | Flow rate (L/s) | Static level (m) | Dynamic level (m) | Drawdown (m) | Duration(h) | Residual drawdown (m) |
| 17/05/2019 | 72 | 235,00 | 9 | 187,00 | 222,65 | 35,65 | 2 |  |

**2.6. Operating conditions**

   Flow rate: 9 L/s.

   Dynamic level: 222,65 m.

  Pump setting elevation: 235 m.